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APPRAISAL OF

KIKINDA IRON FOUNDRY EXPANSION PROJECT

YUGOSLAVIA

November 5, 1973

Industrial Projects Department

Public Disclosure Authorized

CURRENCY EQUIVALENTS

Except where otherwise indicated, all figures are quoted in Yugoslav Dinars (Din).

US$ 1	=	Din 15.5
Din 1	=	US$0.0645
Din 1,000	=	US$64.516

WEIGHTS AND MEASURES

All units are metric, except pipe diameters which are in inches.

1 metric ton	=	1,000 kilograms (kg)
1 metric ton	=	2,204.6 pounds
1 kilometer (km)	=	0.62 miles
1 cubic meter (m^3)	=	35.32 cubic feet (cu ft)

ABBREVIATIONS AND ACRONYMS

FOB	-	Fabrika Odlivaka Beograd
KIKINDA, the Company	-	Livnica Zeljeza i Tempera
SAS	-	Social Accounting Service
TPY	-	(metric) Tons Per Year
UMI	-	Udruzena Metalska Industrija
YIB	-	Yugoslav Investment Bank
ZASTAVA	-	Zavodi Crvena Zastava

KIKINDA FISCAL YEAR

January 1 - December 31

Industrial Projects Department
October 1973

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This report was prepared by Messrs. S.P. Nayar, I. Glenday and Y.T. Shetty of the Industrial Projects Department.

YUGOSLAVIA

KIKINDA IRON FOUNDRY EXPANSION PROJECT

SUMMARY AND CONCLUSIONS

i. This report appraises the expansion of Livnica Zeljeza i Tempera (Kikinda), one of the largest producers of iron castings and the only producer of grinders--a machine tool--in Yugoslavia. The project is located in the town of Kikinda, Vojvodina Province, about 130 km north of Belgrade near the border of both Hungary and Romania. The project would increase the annual production capacity of Kikinda from 19,900 tons of castings to 39,000 tons; from 4,000 tons of pipe fittings to 6,400 tons; and from 350 units of machine tools to 460 units. The estimated financing required for the project, including interest during construction and incremental working capital, is Din 591 million (US$38.1 million equivalent), of which the foreign exchange component would be equivalent to Din 290 million (US$18.7 million)--about half of total total financing required. Implementation of the project is about to begin and is expected to be completed by early 1977.

ii. Since 1967, the Bank has made three loans to industry in Yugoslavia amounting to US$45 million equivalent, using the Yugoslav Investment Bank as a channel, for the modernization and expansion of 19 industrial projects which were individually appraised by the Bank. However, in order to maximize the impact of Bank lending to industry in that country, the Bank has modified its lending strategy to include direct industrial loans to large projects of key economic importance if long-term finance on reasonable terms cannot be obtained from other sources. It is also envisaged that at some later date indirect lending for small and medium size industrial projects would be provided through a line of credit.

iii. It is in this context that the Federal Government has asked the Bank to help finance this high priority project which would thus become the first recipient of a direct Bank loan to industry in Yugoslavia. The loan, in the amount of US$14.5 million equivalent, would finance the foreign exchange cost of competitively - bid equipment and spares, and would be for 14 years, including 4 years of grace, with an effective interest rate of 9% per annum, including guarantee fees to the Autonomous Province of Vojvodina where the plant is located. The loan would help meet approximately 41% of the cost of the project; the remaining 59% would be financed entirely from internal cash generation, including US$1.2 million in foreign exchange. In addition US$3 million required for interest payment during construction will be met from internal cash generation.

iv. The Bank loan would finance the c.i.f. foreign exchange cost of equipment and spares. Since all equipment that could be procured locally has been allocated to local currency expenditures, Yugoslav manufacturers are not expected to bid directly for Bank-financed equipment. For the purpose of bid comparisons, preference would be given to local components

of foreign bids to the extent of 15% of the price of such components or actual customs duty on similar imported components, whichever is less.

v. The project is linked to the anticipated expansion of industries in Yugoslavia such as agricultural machinery, electrical equipment, building construction, commercial vehicles and automobiles, machine tools, consumer durables, rail wagons and shipbuilding. These industries are targetted to expand at over 8.5% per year on average during the current Five-Year Social Plan (1971-75). Their rapid growth would not be possible without the availability of castings and machine tools, which would have to be imported (under tight world supply conditions as far as castings are concerned) if domestic output were not expanded.

vi. Kikinda's project is export-oriented as well. In 1972, nearly 35% of the Company's sales revenue of Din 296 million (US$19.1 million) came from exports. By 1977, when the project is expected to be fully operational, exports would account for more than half of total revenue estimated at Din 713 million (US$46 million). Furthermore, average net foreign exchange earnings and savings to the economy resulting from the project are expected to be US$17 million per year, offsetting in just over one year after project completion the entire foreign exchange cost of the project. Faced with mounting debt repayment obligations on short and medium-term suppliers' credits, and an increasing gap in the balance of trade, Yugoslavia has a critical need to raise its foreign exchange earnings from exports through the expansion of competitive industries and to save foreign exchange by import substitution.

vii. Markets for Kikinda's products appear well assured and the Company has established a good name for high quality, both at home and abroad. In general, the existing shortage of castings in the world is expected to continue because, in developed countries, it is becoming more difficult to attract labor to work in foundries and wages in the relatively labor-intensive production of castings and machine tools have increased costs there substantially. Kikinda's prices are generally lower than those for comparable products in Western Europe. Even if international prices were to fall by 10% from the levels assumed in the financial projections, most of the Company's products would still be competitive.

viii. Kikinda has a young, dynamic and efficient management team and is headed by a capable General Manager, who was elected in 1971 for a four-year term by the Central Workers' Council, the supreme management body of the enterprise. The General Manager is supported by an Executive Board consisting of eight members from the Council. In practice, the management makes all major decisions and has the full cooperation of the Council.

ix. The Company has a sound financial position which provides a good base for expansion. Since a major portion of the project cost is expected to be financed from the Company's internal cash generation, debt as a percentage of equity plus debt is expected to remain consistently below 40% even during the construction period. Long-term debt service coverage would

be above 2.5 times during project implementation and reach the high level of 3.9 in 1978, the first year of repayment of the Bank loan. Furthermore, it is estimated that the project has high financial and economic rates of return of 19% and 18% respectively and, even under foreseeable adverse conditions, the probability is low that they would drop below 15%.

x. Based on agreements reached during negotiations on necessary commitments as summarized at the end of the report, the project is suitable for a Bank loan of US$14.5 million equivalent. A guarantee fee of 1-3/4% per annum is to be paid to the Autonomous Province of Vojvodina by the Company in addition to the Bank's normal lending rate.

I. INTRODUCTION

A. General

1.01 This report appraises the proposed expansion project of Livnica Zeljeza i Tempera (Kikinda) 1/, one of the major castings producers and the only producer of grinding machines in Yugoslavia. The plant is situated at Kikinda, a town about 130 km north of Belgrade and about 5 km south of the Romanian border, in the Autonomous Province of Vojvodina. The project would increase Kikinda's capacity for castings from 19,900 to 39,000 metric tons per year (TPY); pipe fittings from 4,000 to 6,400 TPY; and machine tools from 350 to 460 units, including broadening of the product range. The project is expected to be completed by early 1977. The total financing required, including interest during construction and an increase in working capital, is Din 591 million equivalent (US$38.1 million), of which about Din 224.8 million (US$14.5 million) will be for imported equipment.and spares. The proposed Bank loan of US$14.5 million would cover the entire foreign exchange cost of equipment and spares.

1.02 This loan would be the first direct Bank loan to industry in Yugoslavia, all Bank loans in this field since 1967 having been channeled through the Yugoslav Investment Bank (YIB). The Borrower, therefore, would be Kikinda. Following an industrial identification mission in 1971, eight industrial projects were submitted to the Bank for financing, of which the expansion of Kikinda was one of the projects selected. Another selected foundry expansion project - that of Fabrika Odlivaka Beograd (FOB) - has also been appraised and will be presented shortly to the Executive Directors for consideration.

1.03 The expansion programs of the Kikinda and FOB foundries are on the Government's priority list for industrial development. They are considered vital for the further growth of the country's engineering industries, in particular those producing machine tools, agricultural machinery, motor vehicles, ships, electrical as well as non-electrical equipment, and consumer durables. Some of the enterprises in these sub-sectors have already started their expansions in anticipation of the additional castings from the two projects; the foundry projects should, therefore, be executed without delay.

1.04 The Kikinda project was appraised by a mission which visited Yugoslavia in April/May 1973 and which consisted of Messrs. Nayar (Chief), Glenday and Shetty of the Industrial Projects Department and Mr. Paschke (Consultant). Foundry terms and production processes are briefly described in Annex 1-1.

B. The Role of the Bank

1.05 In its bid for accelerated economic development, Yugoslavia has been relying heavily on short and medium-term suppliers' credits. The

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1/ This Company is commonly referred to as the Kikinda Iron Foundry.

rapidly growing debt service payments over the last 5 years have been a serious problem. To reduce its dependence on suppliers' credit, Yugoslavia is exploring the possibility of long-term finance on reasonable terms from foreign sources, including the Bank.

1.06 In view of past experience with three indirect Bank loans totalling US$45 million for the modernization of 19 industrial enterprises, spreading the impact of Bank lending thinly, the Bank has decided to undertake direct lending to a few selected projects of national importance in Yugoslavia, in those cases where the projects are not suited for IFC participation and/or cannot obtain long-term financing on reasonable terms, while continuing indirect lending for small and medium size industrial projects through a line of credit. As Kikinda does not require foreign joint venture participation, nor does it wish such participation - at least not at this time - to provide technology, market strategy or market outlets, Bank participation appears appropriate. Furthermore, the Company tried unsuccessfully to obtain adequate external financing on reasonable terms from other foreign sources before approaching the Bank. While Kikinda was able to obtain commercial - type financing from Barclays Bank (para. 2.02), this was not anywhere near the amount of foreign exchange credit that it is now seeking.

II. THE COMPANY

A. Background

2.01 Plant operations of what is now Kikinda started in 1908 with a brick factory; production of malleable and gray iron castings was added in 1934, machine tools in 1951, and malleable pipe fittings in 1954. Since then the enterprise has undertaken a series of expansion programs, raising its annual production capacity to the following current levels: malleable castings, 11,500 tons; nodular castings, 4,500 tons; gray castings, 900 tons; finished pipe fittings, 4,000 tons; and machine tools, 350 units. Expansion of nodular castings' capacity from 4,500 to 7,500 TPY is underway (para. 2.02).

2.02 Kikinda is one of seven enterprises which benefited from a 1967 Bank loan (504-YU) channeled through YIB. Under this loan, the Company received the equivalent at the time of US$1.1 million (Din 13.8 million) to meet foreign exchange costs for expanding the malleable foundry and for replacing an old gray iron foundry with a new facility for both gray and nodular castings. There was a delay of one year in project completion and a cost overrun of about Din 7 million (from Din 37 million to 44 million), mainly because procurement was slower than anticipated, partly due to the enterprise's lack of experience in international competitive bidding procedures and acceleration of inflation in Yugoslavia and abroad. The project was completed in 1971 and following it, the Company borrowed US$348,000 equivalent from Barclays Bank of London to increase further its capacity of nodular castings from 4,500 to 7,500 tons annually by the end of 1973. This expansion program is nearing completion as scheduled.

B. Organization and Management

2.03 Kikinda - as is usual in Yugoslavia - is managed by its workers. It has no subsidiaries. The self-management system is explained in Annex 2-1, which also contains an organization chart of the enterprise. The supreme managing body of the Company is the Central Workers' Council, consisting of 28 members elected by the workers for a period of two years. This body formulates the policy of the enterprise and approves major investment plans, annual budgets, and disposition of income. It also elects the top management of the Company. Kikinda's key executive is its General Manager, Mr. Pajic, who was elected by the Workers' Council in 1971 for a four-year term. He is eligible for a second term.

2.04 Mr. Pajic has had 12 years of experience with the Company in various managerial and technical positions, and was Deputy General Manager before election to his present position. The General Manager is assisted by an Executive Board, a body drawn from the Workers' Council, and responsible for day-to-day operations of the enterprise. The Board consists of 9 members - 8 from the Workers' Council and the General Manager. The General Manager is independent of the Board in his functions and is responsible only to the Workers' Council. In practice, the management takes all major decisions and has the full cooperation of the Workers' Council.

2.05 The General Manager has delegated most of the day-to-day operational responsibilities to his Deputy General Manager, Mr. Ruzin (who was also elected in 1971), while he concentrates on the development aspects of the Company. The members of Kikinda's management are well trained and experienced. They constitute a young, dynamic group, whose average age is about 40 years. Key officials are supported by sufficient qualified persons and the present arrangement is considered effective. According to Yugoslav law, no company can merge or consolidate without protecting the rights of third parties concerned. During negotiations, it was agreed that the Company will not sell, lease, transfer or assign its rights or assets without the prior consent of the Bank.

C. Plant Facilities

2.06 The existing facilities include a malleable iron foundry; a gray and nodular iron foundry, a fitting finishing plant, a machine tool plant, a quality control laboratory, and supporting ancillary facilities. They are described in detail in Annex 2-2. The plants are well operated and maintained. However, several factors pose constraints on production. They include: imbalances between melting, molding, and heat-treatment facilities in the foundries; partly outdated machinery, which makes it difficult to achieve the close tolerance required for machine tool production; and antiquated facilities for power supply and heating. The proposed expansion project is intended to overcome these shortcomings.

2.07 The enterprise has a unit responsible for safety aspects and accident prevention, but measures taken so far are less than satisfactory. As greater emphasis is needed in this area, the Bank has been assured by the Company during negotiations that it will improve and maintain an appropriate safety program.

D. Past Growth and Financial Results

2.08 As a result of previous expansions (as shown in the following table), the Company increased its net sales from Din 115.8 million in 1968 to Din 296.0 million in 1972, an increase of 156% over a period of four years, and net profits jumped from Din 8.3 million to 27 million during the same period (Annex 2-3). It should be noted that during 1968-71, the Company did considerably better in terms of sales and cash generation than forecasts contained in the previous appraisal (Report No. LA-2a, dated June 29, 1967).

Sales and Earnings, 1968-1972

	1968	1969	1970	1971	1972
Sales Volume (tons)					
Castings (incl. pipe fittings)	6,620	8,096	7,954	10,760	13,258
Machine Tools	616	884	870	868	854
Sales & Earnings (Din million)					
Net Sales /1	115.8	173.3	359.0	234.2	296.0
of which: Machine Tools	26.6	38.0	36.6	57.4	75.1
Net Income	8.3	6.9	4.7	13.7	27.0
Net Income as % of Net Sales	7.2	4.0	3.0	5.9	9.1

/1 Including revenue from machine tool servicing not shown in product breakdown.

2.09 Kikinda has been expanding its production and sales by concentrating on higher quality products, starting new product lines and closing unprofitable ones (e.g. stoves and lathes). The Company has established a name both at home and abroad for its products, especially foundry products which, in 1972, accounted for nearly 60% of net sales and which have a low rejection rate of 2% or less. Furthermore, the Company's exports have been growing at an average annual rate of 55% during the last four years; they represented 35.0% of net sales in 1972. 1/ Capacity production has consistently been very high. As a matter of fact, in 1972 the Company operated above its rated capacity in all departments except the nodular foundry. In the case of nodular castings, a newly-introduced product line, full capacity utilization is anticipated by the end of 1973.

1/ Kikinda's export performance is described in greater detail in paras. 3.13 and 3.14.

2.10 Net income in the above table is understated because of high depreciation charges and the practice of charging to operations certain costs associated with expansion investments. Net income as a percentage of net sales increased from 7.2% in 1968 to 9.1% in 1972, with an intermittent dip in 1969 and 1970 mainly due to the charging of interest during construction and start-up expenses to operations in accordance with Yugoslav law. Kikinda's record of production, sales, and earnings thus indicates that it is a growing and profitable firm.

E. Recent Financial Position

2.11 Balance sheets for the past five years (1968-1972) are given in Annex 2-4, and the balance sheet as of December 31, 1972 is summarized below:

Kikinda's Balance Sheet, as of December 31, 1972
(in Din million)

Assets		Liabilities	
Cash and Bank	16.1	Accounts Payable	53.6
Receivables	56.0	Current Portion of Long-Term Debt	7.7
Inventories	71.2		
Total Current Assets	143.3	Total Current Liabilities	61.3
Net Fixed Assets	51.6	Long-Term Debt	51.5
Others	37.5	Equity /1	119.6
	232.4		232.4

/1 "Equity" includes the Business Fund, Collective Consumption Fund, Reserve Fund and Mutual Reserve Fund; they are explained in Annex 7-3, pages 4 to 6.

2.12 It can be seen that the Company's financial structure is sound, with a current ratio of about 2.3:1 and a debt/equity ratio of 30/70. This reflects the fact that the Company has been able to finance its past expansions primarily by internal cash generation, and thus provides a good financial base for the expansion project. Furthermore, net fixed assets are likely to be understated because of the accelerated depreciation and other write-offs mentioned above.

III. THE MARKET

A. Supply and Demand

3.01 A detailed analysis of the market for foundry products (castings) and machine tools is provided in Annexes 3-1 and 3-2.

1. Castings

3.02 There are some 250 foundries in Yugoslavia, of which about 50 account for 90% of total output. In 1972, total production of castings, including steel and non-ferrous castings which make up some 18% of the total, was about 453,300 tons; total iron castings output - i.e. Kikinda's line of production - was about 373,000 tons, of which 92% was gray castings, 5% malleable castings (including pipe fittings) and 3% nodular castings. Taking into account the present expansion plans of various Yugoslav foundries, including those of Kikinda and FOB, it is likely that the output of iron castings in the country will increase to 575,000 tons in 1977, or by an average annual rate of 9%.

3.03 The following table summarizes past and projected demand and supply of iron castings in Yugoslavia through 1977:

Yugoslavia-Demand/Supply Comparisons for Iron Castings
(000 tons)

	1968	1972	1973	1977	Average Annual Growth Rate (%)	
	---actual---		--forecast--		1968-72	1972-77
Production	260.0	373.0	418.0	575.0	9.5	9
Imports	4.0	14.0	15.0	25.0	37	12
Total Supply	264.0	387.0	433.0	600.0	10	9
Domestic Consumption	212.7	321.0	375.0	609.0	11	13.5
Exports	51.3	66.0	72.5	100.0	6.5	8.5
Surplus (deficit)	0.0	0.0	(14.5)	(109.0)		

3.04 Domestic consumption of iron castings increased at an annual rate of 11% during 1968-1972, reaching 321,000 tons in 1972. Considering the plans for accelerated industrial development in Yugoslavia and based on an industry by industry assessment of their needs for castings, consumption in the future is likely to grow at 13.5% per year, reaching 609,000 tons in 1977. The main consumers of castings are producers of agricultural machinery, motor vehicles, machine tools, electrical and non-electrical equipment, consumer durables, and rail wagons, as well as the construction and shipbuilding industries.

3.05 Yugoslavia is a net exporter of iron castings. Important export markets for it have been the Federal Republic of Germany, France, Italy, Bulgaria, Poland, Romania and the U.S.S.R. In 1972, exports reached 66,000 tons (about 18% of production) of which about 65% and 35% respectively went to convertible and clearing area countries. Imports, on the other hand, amounted to only 14,000 tons and consisted mainly of items which are not produced in Yugoslavia. In the future, exports to convertible as well as clearing area countries are expected to grow at an annual rate of 8.5%, while imports are projected to increase by 12% a year from the present low base.

3.06 Based on the above projections, and as shown in the above table, Yugoslavia is expected to have a shortage of some 9,000 tons of iron castings in 1977 to meet internal demand alone, or a gap of about 109,000 tons

when the export demand is taken into account. Some further expansion of capacity beyond that already contemplated would, therefore, appear necessary to meet the anticipated domestic and export demand. Furthermore, the export potential might well be greater than assumed here. There is a shortage of castings in the world that is expected to continue at least in the foreseeable future, primarily because, in developed countries, which are responsible for about 90% of castings' output, it is becoming more difficult to get labor to work in foundries despite high wages, and stringent pollution controls there have increased capital as well as production costs.

2. Machine Tools

3.07 Production of machine tools in Yugoslavia did not start until after World War II, when a limited range was manufactured in small quantities. Since then production has been growing fast and the range of machine tools produced has been expanded. However, as shown in Annex 3-2, over the past five years (1968-1972) consumption of machine tools has been increasing even faster than production and dependence on imports has continued to increase. It is expected that in the near future Yugoslavia will have to continue importing a major share of its requirements of machine tools, as additions to local production capacity are not expected to keep pace with growing demand. It should be noted that the anticipated 1972-77 average annual growth rate in machine tool consumption of 8.5% as compared to the 16% during the 1968-72 period does not reflect a softening of demand but merely an adjustment of the distortion in the former growth rate that was due to the extraordinarily high increase in Yugoslavia's machine tool consumption in 1972. The average growth rate between 1968 and 1977 would be about 12% per year, slightly higher than it had been during 1968-71 (11%).

3.08 However, the overall market development for all machine tools is not very relevant for Kikinda's market prospects in this area (other than setting the general framework) since its production is directed to only a rather specialized market segment - that of grinding machines of which, as was mentioned previously, the Company is the sole producer in the country. In Yugoslavia, as in most other industrializing and developed countries, demand for grinders has been increasing more rapidly than for most other types of machine tools. The important domestic users of grinders are the motor vehicle, tractor, ball bearing and machine tool industries. The following table summarizes the past and projected demand and supply for grinders in Yugoslavia through 1977:

Yugoslavia: Demand/Supply Comparisons for Grinding Machines

	1968	1972	1977	Average Annual Growth Rate (%) 1968-1972	1972-1977
	-------units-------				
Production	124	271	380	21	7
Imports /1	90	90	330	0	29
Total Supply	214	361	710		
Domestic Consumption /1	207	340	570	13	11
Exports	7	21	140	25	46

/1 Includes certain types of grinders not produced in Yugoslavia.

3.10 Domestic consumption of grinders is projected to increase by 12.5% annually up to 1975, reaching about 485 grinders in that year and thereafter at about 8.5% reaching some 570 grinders in 1977. Domestic production of grinders is expected to increase from 271 units in 1972 to 380 units in 1977, equivalent to a growth rate of 7% per year, of which, however, only 240 units are destined for domestic consumption since 140 units (37%) are intended to be exported. The supply gap of 330 units in 1977 including certain types of grinders (centerless and special purpose grinders) not produced in Yugoslavia, will have to be met from imports. However, Kikinda, being the only producer in the country, has plans for further future expansions of its grinder production capacity to narrow this gap, closely watching changes in technology and consumer preference.

3.11 Exports of grinders increased from 7 machines in 1968 to 78 machines in 1971; but dropped sharply to 21 machines in 1972, partly due to the expiration of the licensing arrangement of Kikinda with Fortuna, a German manufacturer of grinders, and the consequent stoppage of sales through Fortuna; and partly due to the pressing needs in the domestic market. The exports of grinders are expected to increase from the present low base to about 140 units by 1977 on the basis of contracts already concluded by Kikinda and others now being negotiated.

B. Kikinda's Market Position and Sales Forecasts

1. Castings

3.12 Kikinda has become one of Yugoslavia's largest producers of malleable and nodular iron castings, but has only a negligible position in the country's production of gray castings, which the Company makes only to meet its own requirements in the manufacture of machine tools. As the result of the project, the Company will further increase its market position in malleable and nodular castings but stay with its present share in gray castings as shown in the following table:

Production, Demand and Kikinda's Share by Type of Castings
(in tons)

	Country's Production			Domestic Demand	Deficit	Kikinda's Production		
	1967	1972	1977	1977	1977	1967	1972	1977
Malleable and Pipe Fittings	10.5	20.3	28.8	30.5	(1.7)	5.8	9.2	19.5
Gray	242.0	341.6	522.2	548.0	(25.8)	- /1	0.7	1.5
Nodular	1.0	11.0	24.0	30.5	(6.5)	- /2	3.3	16.0
Total Castings	253.5	372.9	575.0	609.0	(34.0)	5.8	13.2	37.0

/1 The Company had virtually no production of gray castings in 1967.
/2 Production started only in 1971 with the Bank's past loan.

3.13 The table indicates that for each of the different types of castings (as was the case for all castings combined, para. 3.06), domestic production is not expected to fill domestic demand in 1977, so that imports of castings will have to continue, even if there were no exports of castings from Yugoslavia. Nevertheless, Kikinda intends to export about 75% of its incremental output, with total exports expected to increase from 7,290 tons (55% of total sales) in 1972 to 24,700 tons (nearly 67% of total sales) in 1977.

3.14 Also while the Company's production in 1977 of malleable castings (including pipe fittings) and nodular castings is anticipated to rise to about two-thirds each of the country's total output of these items (against 45% and 30% respectively in 1972), due to its substantial exports, Kikinda's share in the domestic market for these products is to increase only from about 17% in 1972 to 18% in 1977. As will be described further below, the Company has already started to negotiate medium and long-term sales contracts, as is usual in this type of industry, for a major portion of its additional production.

2. Machine Tools

3.15 As was mentioned previously, Kikinda, apart from grinding machines, also produces radial drills and in 1972 entered into a 5-year contract with Romania to supply hydraulic parts to a company there producing "Fortuna" machines under a German license. However, radial drills and hydraulic parts made up only a small portion of the Company's sales in 1972 (21% of the value of machine tools and 5.5% of total Company sales) and are primarily used to fill capacity of the machine tool plant efficiently. This will also be their prime purpose in the foreseeable future.

3.16 Since Kikinda is the only producer of grinding machines in Yugoslavia, the Company's market prospects are identical with those of the country, which were discussed in paras. 3.07-3.11. It should be remembered that domestic demand is expected to be substantially in excess of Kikinda's production capabilities, so that even if exports were to fall short of expectations, the Company should still find a ready market at home.

3.17 So far the Company has been producing only universal and surface grinders but not special purpose, centerless and internal grinders. Kikinda has recently entered into an agreement with the Bryant Corporation, a subsidiary of the Ex-Cell-O Corporation of the U.S. for the production of internal grinders starting from 1974. The production of these grinders is expected to increase from 10 units in 1974 to 20 units in 1977, exclusively for sale in the domestic market. The import demand for such machines has averaged about 25 annually during 1968-72.

3. Sales Build-Up and Destination of Sales

3.18 Kikinda is heavily export oriented (para 6.02). A year by year sales breakdown is provided in Annexes 3-3 and 6-1, by product, volume and value through 1983. The volume forecasts together with destination of sales by currency area are summarized below for 1972 (actual) and for 1977, the first full year of operations upon completion of the project:

Sales Build-Up by Product and Area of Destination

	Total Distribution by Area /1							
	1972				1977			
	D	CO	CL	T	D	CO	CL	T
Castings (tons)								
Malleable (incl. pipe fittings)	4,217	4,552	429	9,198	6,800	11,500	1,200	19,500
Gray	750	-	-	750	1,500	-	-	1,500
Nodular	1,000	500	1,810	3,310	4,000	10,500	1,500	16,000
				13,258				37,000
Machine Tools (units)								
Grinders	250	11	10	271	240	70	70	380
Radial Drills	60	-	-	60	60	10	10	80
Others /2	-	-	195	195	-	-	-	-

/1 D = Domestic; CO = Convertible currency countries; CL = Clearing currency countries; and T = Total.
/2 Hydraulic parts to Romania.

3.19 Kikinda sells most of its malleable castings through long-term contracts (5 to 10 years) with Zavodi Crvena Zastava (Zastava), the only local car manufacturer and a beneficiary under Bank Loan 654-YU, and the German automaker, Opel. These two customers alone will account for about 60% of Kikinda's malleable castings sales in 1977. The Company is negotiating with local car assemblers and foreign firms for additional supply contracts and, on the basis of preliminary inquiries, indications are that demand for Kikinda's malleable castings will be in excess of what it could supply in 1977.

3.20 Kikinda and the other major foundry in Yugoslavia, FOB, signed an agreement in 1971 in which they reached a basic understanding on the demarcation of production. While Kikinda makes gray castings only for its own

machine tool production, FOB produces a wide range of gray castings primarily for the engine-driven vehicle sector. Kikinda, in turn, concentrates on the production of malleable and nodular castings. Priority in supply is given to customers in convertible currency countries (predominantly Germany) and the remainder is to be supplied to Zastava as well as TAM (a beneficiary under Bank Loan 504-YU) and FAP-FAMOS, two commercial vehicle manufacturers. Based on present contracts and inquiries, the Company expects to sell close to 70% of its 1977 output abroad.

3.21 In the case of pipe fittings, Kikinda has already contracted for 6,100 tons in 1977, out of the 9,200 tons it intends to sell in that year. Here also, some 65% of production is expected to be exported to customers abroad, prominent among which are Locatelli (Italy) and Induco Handel (Germany).

3.22 As for machine tool exports, the Company already has orders on hand for the supply of 82 machines by 1977 to the following countries: the U.S.S.R., 50; the U.S., 12; and Italy and Germany, together 20. Kikinda is currently negotiating orders for another 38 machines to the U.S. and 20 to other countries.

4. Marketing Organization

3.23 The Company has an efficient marketing organization with representatives in Germany, Italy, the U.S.S.R. and some other countries. In the past, Kikinda relied largely on Invest-Import and Dinava in Belgrade, Masino-Implex of Zagreb, and other agents for export sales. However, it is now placing more emphasis on direct sales to foreign customers under long-term contracts.

3.24 In the domestic market, castings are sold directly to customers under long-term contracts except for pipe fittings which are distributed through local wholesalers. For local sales of machine tools, Kikinda has field representatives in various republics. The Company plans to increase the number of sales engineers in domestic representative offices. Furthermore, it works closely with Masino-Union, Belgrade, in studying long-term machine tool requirements and product development needs.

C. Prices and Competitive Position

3.25 An international comparison of prices of castings is difficult because of variations of castings in size, quality and intricacy. However, there is no doubt that Kikinda's prices of castings are on the whole very competitive internationally. Kikinda's competitive prices coupled with their high quality have resulted in substantial demand by foreign customers for these products and have placed the Company in a very favorable position. Approximate average 1972 domestic, ex-plant, price indices for selected items of Kikinda are compared with those of German and Italian producers, also ex-plant, in the following table (details are given in Annex 3-1 and 3-2):

Average 1972 Domestic Price Indices (Ex-Plant)
(Kikinda Price = 100)

Selected Products	Kikinda	Italian	German
Malleable Casting (Wheel Hub)	100	110	130
Nodular Casting (Wheel Hub)	100	106	124
Flat Grinders (URB-550) /1	100	163	132

/1 Compared with Blohm's Simplex-5 of Germany and Alpa's RT-450 of Italy.

3.26 Kikinda's sales prices vary among domestic, clearing and convertible area markets (Annex 6-1). Prices for the clearing area countries are fixed according to agreements; they bear little relation to market conditions in those countries. However, in the past, export prices to the clearing area countries have been higher than domestic prices generally and are expected to remain so in the future. In the case of pipe fittings 1/, nodular castings and grinding machines, the Company's export prices for the convertible area are on average about 15% lower than its domestic prices. This is partly because of keen competition with foreign suppliers in establishing new markets. However, in the case of malleable castings, a major product line of the Company, its domestic prices are lower than export prices although this may in part be due to some differences in quality requirements between the products exported and those sold at home. At present, domestic prices of pipe fittings and machine tools are controlled, whereas malleable, gray and nodular castings are free from such controls, except general temporary controls for reasons of containing inflation.

1. Export Incentives

3.27 The Federal Government provides export incentives, the most important of which is the retention quota under which the exporting company is allowed to retain 20% of its foreign exchange earnings for use without any restriction.

2. Protection

3.28 As already noted, Kikinda's products are internationally competitive. However, nominal protection through customs duties and taxes exists to the extent of 25% for iron castings and about 30% for grinders. This duty shelter is of interest to Kikinda only to the extent that it helps prevent the sale of foreign products in Yugoslavia at marginal cost.

IV. THE PROJECT

A. Objectives and Scope

4.01 The proposed project is designed both to increase the capacity of different plants and to modernize and replace obsolete equipment. It would increase the capacity of malleable iron castings from 11,500 to 21,000

1/ In the case of pipe fittings. export prices are substantially lower than domestic prices largely because of keen competition from Far Eastern countries.

TPY; nodular iron castings from 7,500 to 16,500 TPY; gray iron castings from 900 to 1,500 TPY; pipe fittings from 4,000 to 6,400 TPY; and machine tools from 350 to 460 units annually, including the introduction of new lines of precision and internal grinding machines. The project plans, detailed engineering and cost estimates were orginally prepared by the Company in early 1972, and were subsequently revised in the first quarter of 1973 after consultation with different equipment suppliers.

4.02 To achieve the above objectives the following major additions and alternations are to be made: (i) expansion and modernization of the malleable foundry, which would include two 6-7 tons/hr hot blast cupolas, four 10-ton/hr electric induction furnaces, two flaskless molding lines, one automatic molding line, two annealing furnaces and supporting facilities; (ii) expansion of the gray and nodular foundry, with four 12-ton/hr electric furnaces and core-making facilities, and one heat-treatment plant with supporting facilities; (iii) expansion of the fitting finishing plant with more specialized machines for finishing and galvanizing, and packing facilities; (iv) expansion and modernization programs of the machine tool plant which will include relocation of existing machines, replacement of old machines and addition of more sophisticated facilities including numerically - controlled machines and a climatized mounting room; (v) revamping of the existing utility installations; (vi) installation of modern pollution control equipment; and (vii) a new centralized storage and materials handling system, including a railroad connection to the plant, to streamline materials flow and reduce handling costs. A detailed description of the project is given in Annex 4-1 and the plant layout is shown in Annex 4-2.

B. Observations

4.03 The proposed facilities and plant designs are based upon careful identification of the bottlenecks in the present plants and were chosen with the objective of further improving product quality and increasing productivity. The project can be implemented without significantly interfering with the production of the existing facilities, although in the case of the malleable iron foundry, this will require that the expansion be carried out in two phases. This foundry is designed in such a way that it could be changed over to a nodular iron foundry, if required in the future by shifting market demand, with only slight modifications and minor additions. In the gray and nodular iron foundry, new production facilities will be added without any major alterations to the existing facilities. Further expansion of this foundry beyond that contemplated by the project is not possible due to lack of space.

4.04 Most of the existing facilities in the pipe fitting finishing plant will continue to be utilized after the expansion. With the addition of specialized production machines to this plant, Kikinda will be able to produce pipe fittings of a larger range than hitherto possible (3/8" to 4" in diameter). In the case of the machine tool plant, the addition of numerically - controlled equipment is essential for starting the production of more specialized precision grinders. Kikinda has no prior experience

in operating these numerically - controlled machines, which require highly skilled operators and programers; however, training facilities are available in Yugoslavia for such machines and, moreover, the Company plans to train operators abroad with the help of its licensor, the Bryant Corporation of the U.S., and equipment suppliers. In order to be competitive the Company has to mechanize some of its operations. However, the Company plans do not include the installation of sophisticated equipment to save labor.

4.05 Projected plans for infrastructure - power, gas, road and railroad connection - development are satisfactory. During negotiations, the Company has provided evidence that it has obtained commitments from the authorities concerned for the timely development of these infrastructure facilities. Further, the Company has received a formal expression of intent from Electrovojvodina that the latter will install at its own cost a new 35/10 KV transformer station near the plant site.

C. Ecology

4.06 A new Federal law for environmental and pollution control, passed recently, stipulates that all enterprises have to conform to certain general pollution standards by the end of 1973 and must meet more stringent standards by 1977. In a foundry, the major pollutants are dust and fumes, and to improve the present situation at the plant and to satisfy the regulations, Kikinda plans to install devices for dust and fume extraction in both foundries at a cost of about Din 10 million, representing some 10% of the cost of the foundry equipment of the project. Although water pollution is not a major problem in a foundry, Kikinda, as a precaution, neutralizes water before discharging it. Details of pollution control are given in Annex 4-3. The measures proposed by the Company are judged to provide adequate pollution control. The necessary equipment will be supplied locally and, therefore, will not be eligible for Bank financing. During negotiations, the Company has agreed that the planned environmental protection measures will be implemented and maintained.

D. Labor Force

4.07 At the end of 1972, there were 2,084 employees in Kikinda, including 415 persons in the machine tool plant. Details are given in Annex 4-4. Foundry labor productivity is currently low, as reflected by the requirement of between 90 and 100 manhours per ton of castings. The Bank has projected the labor productivity in Kikinda to improve to 50 manhours per ton of castings upon completion of the project which is reasonable considering that comparable foundries in Western Europe require 35-50 manhours per ton. To achieve this goal, Kikinda would need at least 30% more employees compared to the present level and this has been assumed in the financial projections. However, the Company is rather optimistic regarding additional employment and believes that a 20% increase in manpower would be adequate, partly because, under the self-management system, workers are basically reluctant to hire more labor than absolutely necessary since that reduces the surplus that is available for distribution to them. Therefore, during negotiations

assurances were received from the Company that it will maintain an adequate labor force to meet fully the needs of the project.

E. Project Execution

4.08 Kikinda will have primary responsibility for project execution. With several expansions to its credit, the Company management is basically well experienced to carry out the project. The main burden of project execution will rest with Kikinda's expansion department, which is headed by a committee consisting of directorsof operating departments. Although their caliber is high, this arrangement is not considered satisfactory for the large-scale expansion envisaged because of an apparent lack of coordination among them even at the present early stage of project implementation, and the question whether they could devote adequate time to the project in view of their other operational responsibilities. An expansion section completely separate from the operating departments with well-defined responsibilities and authority is essential for proper project execution. During negotiations, the Bank obtained assurances from the Company that it will form such a functional section with Mr. Lepedat, a well-experienced foundry expert, as the chief and assign adequate full-time staff as required for the implementation of the project.

4.09 Also, the Company requires assistance in the preparation of specifications for international competitive bidding and evaluation of tenders. For this purpose, therefore, the Company, hired in September, 1973, Hayek Engineering A.G., as experienced Swiss consulting firm.

4.10 Civil construction and erection of equipment will be carried out by Yugoslav contractors, while Kikinda's own construction department will be responsible for additions to and alterations of the existing facilities. Equipment suppliers will provide assistance in erection and start-up, and provide performance guarantees. These are satisfactory arrangements.

F. Project Timing

4.11 The project implementation schedule is shown in Annex 4-5. Engineering and design of the project are well advanced; preparation of procurement documents as well as civil construction of certain facilities have begun. Orders for foreign equipment to be financed by the Bank are expected to be placed during the first quarter of 1974. Phase I of the malleable foundry will become operational in the third quarter of 1974. Most other facilities scheduled for completion in 1975 will become fully operational in 1976. The delivery and construction schedules based on information provided by potential equipment suppliers are considered realistic.

V. CAPITAL COST AND FINANCING PLAN

A. Project Cost

5.01 Capital costs of the project are detailed in Annex 5-1 and summarized below:

Summary of Capital Cost

	---(Din Million)----			------(US$ Million)--			
	Local	Foreign	Total	Local	Foreign	Total	%
Equipment and Spares /1	48.1	173.4	221.5	3.1	11.2	14.3	37.5
Duty and Taxes	46.0	-	46.0	3.0	-	3.0	7.8
Erection	21.6	-	21.6	1.4	-	1.4	3.6
Civil Construction	36.4	-	36.4	2.3	-	2.3	6.2
	152.1	173.4	325.5	9.8	11.2	21.0	55.1
Contingencies: Physical	14.5	21.1	35.6	1.0	1.3	2.3	6.0
Price	29.6	30.3	59.9	1.9	2.0	3.9	10.1
Total Fixed Assets	196.2	224.8	421.0	12.7	14.5	27.2	71.2
Pre-operating & Start-up	12.0	4.0	16.0	0.8	0.2	1.0	2.7
Engineering	-	5.0	5.0	-	0.3	0.3	0.9
Incremental Working Capital	92.5	10.3	102.8	5.9	0.7	6.6	17.4
Total Project Cost	300.7	244.1	544.8	19.4	15.7	35.1	92.2
Interest During Construction	0.6	45.8	46.4	/2	3.0	3.0	7.8
Total Financing Required	301.3	289.9	591.2	19.4	18.7	38.1	100.0

/1 c. i. f. cost at plant.

/2 Negligible.

5.02 Equipment cost estimates are derived from quotations received in the first quarter of 1973 from suppliers in six different countries. The prevailing import duties and taxes of about 27% on the c.i.f. value of foreign equipment at the Yugoslav border have been added. Pre-operating and start-up expenses are based on Kikinda's previous experience. Civil engineering and construction costs are based on quotations received by the Company in early 1973. Physical contingencies equivalent to slightly more than 10% of equipment and civil works cost estimates are included; they are considered adequate in view of the advanced stage of project preparation.

5.03 Furthermore, price contingencies of 6% per annum have been applied to the cost of foreign equipment including import duties and taxes. As for local equipment, construction and erection costs, the following rates have been applied to cover anticipated inflation in Yugoslavia: 1973 = 10%; 1974 = 8%; and 1975 and 1976 = 6% a year. The declining rates are based on the assumption that the measures being taken to curb inflation will succeed. Total assumed contingencies, therefore, amount to 22.7% of total fixed project cost.

The project cost estimates, including the physical and price contingencies, are considered adequate.

5.04 Of the Din 591 million financing needed for the project, about Din 290 million, or about 49%, are estimated to be required in foreign exchange. All equipment expected to be procured domestically has been allocated to local currency expenditure and will be bid for only within Yugoslavia. Yugoslav manufacturers are not expected to bid directly on the other (imported) equipment, since it is not presently manufactured in Yugoslavia, but they are expected to contribute local components estimated to average about 15% of the value of foreign equipment.

B. Working Capital

5.05 Kikinda's present working capital level is satisfactory. Incremental working capital requirements due to the project are estimated at Din 102.8 million, of which about Din 10.3 million would be needed in foreign exchange; these take into account recent Yugoslav regulations, which require the Company to reduce its collection as well as payment periods and the Bank has accepted the Company's target as desirable and obtainable. Details are given in Annex 5-2. Working capital is to be financed from internal cash generation and should actual requirements be somewhat higher than anticipated, Kikinda is expected either to use some of its own cash generation (para. 5.07) or to finance them with short-term credits.

C. Financing Plan

5.06 The financing plan to cover the project's cost (para. 5.01) of Din 591 million (US$38.1 million) includes Din 366 million (US$23.6 million) from internal cash generation and the remaining Din 225 million (US$14.5 million) from the proposed Bank loan.

5.07 All foreign exchange costs of machinery and equipment will be financed by the Bank loan and the remaining costs will be met from internal cash generation. A summary of the sources and application of funds (Annex 7-2) during the implementation of the project follows:

Summarized Sources and Application of Funds
during 1973-1977
(Din Million)

Sources		Applications	
Cash from operations	620.8 /1	Project	421.0 /2
IBRD Loan	224.8	Other Investments	25.3
		Debt Repayment	38.3
		Appropriations	60.2
		Net increase in working capital including surplus cash	300.8 /3
	845.6		845.6

/1 Net of pre-operating and start-up expenses, engineering expenses, and interest during construction of together Din 67.4 million, which are charged to operations, in accordance with Yugoslav law or Company practice.
/2 Fixed asset costs.
/3 Does not provide for distribution of income to workers.

5.08 The Bank loan would be for 14 years, including a grace period of 4 years, at an interest rate of 7-1/4% per annum plus a guarantee fee of 1-3/4% accruing to the Autonomous Province of Vojvodina 1/, thus raising the total effective cost of the Bank loan to 9%. The Bank loan will be guaranteed by both the Federal Government and Jugobanka of Novi Sad. Strictly on project grounds an 11-year loan, including 4 years of grace, would be adequate. However, the 14-year loan term is recommended instead to help relieve the country's medium-term foreign exchange loan repayment obligations.

5.09 During the construction period (1973-1977), Kikinda's cumulative cash generation is expected to be adequate to meet the project needs. However, due to a heavy concentration of expenditures on the project in 1974 and 1975, Kikinda may require short-term credits in 1975. Whatever additional resources - foreign as well as local - might be needed to complete the project and bring it into operations, including maintenance of an adequate working capital level equivalent to a current ratio of at least 2:1, and independently of whether the need for such additional funds is caused by a cost overrun or a shortfall of cash generation, they are to be provided by the Jugobanka, on terms satisfactory to the Bank. Assurances to this effect have been received during negotiations.

1/ The Federal Government is the guarantor of the Bank loan. It, in turn, is required by Yugoslav law to obtain a guarantee from the Republic or Autonomous Province where the project is located; in this case Autonomous Province of Vojvodina. Since Yugoslav law prevents the Federal Government from accepting the guarantee fee, it has requested the Autonomous Province of Vojvodina to receive this fee.

D. Procurement and Disbursement

5.10 The Bank loan would finance the c.i.f. foreign exchange cost (Yugoslav border or port of entry) of equipment and spares. The Bank-financed items - foreign equipment and spares - will be divided into 21 packages (8 packages for foundries and the fitting finishing shop and 13 packages for the machines tool plant), and will be procured following Bank guidelines. All the 15 equipment packages costing over US$100,000 equivalent each will be procured by international competitive bidding. The remaining 6 packages costing less than US$100,000 each (representing less than 6% of total foreign equipment cost) would be obtained through a procedure under which contracts may be awarded by the Company after having obtained four comparable bids from qualified suppliers in at least three countries outside of Yugoslavia. A detailed list of equipment to be procured under the Bank loan is contained in Annex 5-3. It is recommended that for purposes of bid comparisons, preference be given to local components of foreign bids to the extent of 15% of the price of such components or the actual customs duty on similar imported components, whichever is less.

5.11 For most of the domestic equipment (to be financed by the Company), quotations have already been received from various suppliers. However, Kikinda will place orders for most of the equipment only in the fourth quarter of 1973 after the procurement consultant (para. 4.08) will have reviewed the specifications. Civil construction work, for which competitive bidding within Yugoslavia is required by law, will be carried out by Yugoslav contractors under the direction of Kikinda. The Company has already awarded civil construction contracts to two of the four Yugoslav contractors who had submitted their bids.

5.12 The estimated disbursement schedule for the Bank loan is shown in Annex 5-4. It is based on detailed estimates of order placements, payment schedules, and expected delivery times for equipment in line with the construction schedule (para. 4.11).

VI. REVENUES, RAW MATERIALS, AND PRODUCTION COSTS

A. Sales Revenues

6.01 Detailed assumptions on selling prices for each of the Company's product lines and on aggregate sales build-up through 1983 are contained in Annex 6-1 and Annex 3-3 respectively. As a result of the expansion project, sales revenue from foundry products are expected to increase by about 170% from Din 185 million in 1973 to Din 497 million in 1977, when the project would be fully operational. During the same period, sales proceeds from machine tools would double from Din 81 million to Din 163 million, and revenue from various services would rise from Din 32 million to Din 53 million. Total sales would reach the level of Din 713 million in 1977 compared with Din 298 million in the current year. These projections assume that the foundries and the machine

current year. These projections assume that the foundries and the machine tool department would operate at 80% and 75% of their respective rated capacities, based on two-shift operations. These assumptions are realistic compared with Kikinda's past performance and the experience of comparable plants in other countries.

6.02 Presently, exports, both to the convertible and clearing areas, account for about 42% of total sales. The share of exports is expected to rise to 52% in 1977, when total sales would be nearly 2-1/2 times the 1973 level. Of the projected export earnings of Din 367 million in 1977, about Din 288 million (78%) would be from the convertible area and Din 79 million (22%) from the clearing area. Foundry products would account for nearly 85% of total exports and machine tools for the balance of 15%.

6.03 Sales revenue has been calculated in current value terms and on domestic sales exclude charges for freight and handling, which in Yugoslavia are usually borne by customers. Selling prices (ex-factory) would continue to vary for domestic sales, and for exports to clearing and convertible areas. For financial projections, prices in current Dinars are assumed to rise by 4-6% a year for all products except part of the pipe fittings to be sold locally.

B. Raw Materials

6.04 The Company appears to be well assured of the supply of its main raw materials, including pig iron, steel scrap, ferroalloys, coke, anthracite, bentonite, quartz sand, resins and limestone (Annex 6-2). Import requirements for all the above items are expected to be low except for ferroalloys and resins a major portion of which need to be procured from abroad. But for these two materials (ferroalloys and resins) also, no problems are foreseen in meeting Kikinda's needs, especially because the foreign exchange and trade regime gives priority to import of raw materials required for export production. Moreover, Kikinda would have an adequate amount of foreign exchange from retention quota 1/ to meet any shortfalls in domestic raw materials supply through imports.

C. Production Costs

6.05 Production cost estimates (Annex 6-3), like those of sales (para. 6.01), are based on 80% and 75% capacity utilizations of the foundries and machine tool plant respectively. Present (1973) and projected (1977) production costs on a per unit basis are given below separately for the different product groups:

1/ Under the Yugoslav foreign exchange and trade system exporters are entitled to a retention quota in foreign exchange equivalent to 20% of their export revenue from convertible currency countries. This foreign exchange can be used freely by the companies concerned.

Direct Production Costs (in Dinars) /1

Year	Malleable Castings	Pipe Fittings	Gray and Nodular Castings	Typical Machine Tools (Universal Grinder) /2 (Per unit)
	(Per ton)			
1973	6,241	11,207	6,980	111,800
1977	6,182	12,484	7,341	131,000

/1 Including costs of raw materials, supplies, utilities and labor, but excluding general overhead expenses, depreciation, insurance and other operating expenses.

/2 Universal grinders represent about half of Kikinda machine tool sales in units.

6.06 It has been assumed that during the whole forecast period (1973-1983) wage rates at Kikinda would increase by about 5% a year and raw materials costs by 4-5%. During the period 1973 - 1977, to which the above table relates, production cost per ton of malleable castings (at current prices) is expected to decrease, in spite of inflation, by about 1% because of economies of scale, rationalization, and the impact of new technology. Since the gray and nodular foundry expansion is only in addition to the existing plant which is of rather recent origin, the impact of new technology will not offset completely the inflationary cost increases. As a result, per ton costs of gray and nodular castings are expected to go up by 5%. In the case of pipe fittings, where the expansion is a relatively modest one (from 4,000 to 6,400 tons per year), costs per ton are expected to increase by about 11%, partly because of rapidly rising zinc prices. For a typical machine tool, the production cost per unit would increase over the four-year period by 17%, partly because the Company is embarking on the production of more sophisticated machine tools, which would, of course, also demand higher prices.

VII. FUTURE PROFITABILITY AND FINANCIAL POSITION

A. Profitability

7.01 Detailed income and cash flow forecasts through 1983 are shown in Annexes 7-1 and 7-2 respectively, and selected items are summarized below:

Selected Income Statement Items
(Din million)

	1972 (actual)	1973	1974	1975	1976	1977	1983
Net Sales	296	298	373	459	631	713	850
Operating income	38	67	90	112	154	159	120
Net Income after Taxes	27	62	80	92	132	137	110
% of Net Sales	9	21	21	20	21	19	13
% of Avg. Equity	26	41	36	30	31	25	8
Cash Generation	57	66	86	113	172	184	155

7.02 Compared with Din 27 million in 1972, Kikinda is expected to show a net income of Din 62 million in 1973, primarily due to lower depreciation rates intended to be used by the Company from that year (1973) onward in line with rates in Western foundries. As a result of the project, net sales are expected to increase by Din 415 million, or by about 139% between 1973 and 1977, while net income after taxes go up by Din 75 million, or by about 120%. The fact that net income increases less rapidly than sales during the construction period and even declines thereafter in absolute amounts is due to the higher inflation rates assumed for production cost inputs as compared to selling prices. Net sales during project implementation are not expected to drop because, as mentioned earlier (para. 4.03), the project will be implemented without disturbing existing production facilities. Since a major portion of net income after taxes will be needed to help finance the project, agreement has been reached during negotiations that the Company will - until the project is completed - distribute income to its workers only to the extent that the annual depreciation plus the allocation to the Business Fund during that period would still be sufficient for timely execution of the project.

B. Financial Position

7.03 Balance sheet projections for 1973 through 1983 contained in Annex 7-3 are summarized below:

Selected Balance Sheet Items
(Din million)

	1972 (Actual)	1973	1974	1975	1976	1977	1983
Net Working Capital	85.4	78	99	126	173	181	219
Equity	120	181	262	354	486	623	1401
Long-Term Debt	52	42	136	214	235	218	75
Current Ratio /1	2.3	2.3	2.7	2.6	2.6	2.6	2.6
Long-Term Debt/Equity Ratio /2	30:70	19:81	34:66	38:62	33:67	26:74	5:95

/1 Excluding surplus cash, which would be earmarked for further expansion.
/2 Assuming no income distribution to workers. All surplus cash allocated to equity.

7.04 The long-term debt/equity ratio was satisfactory in 1972 and is expected to remain strong during project implementation with a maximum debt position of 38% being reached in 1975. Thereafter, the debt/equity ratio declines and by 1983 Kikinda would have only 5% in debt, reflecting good profitability of the expanded plant; this is based on the assumption that generally there will be no income distribution to the workers in excess of 5% annual increase in earnings per employee. For comparison purposes, Kikinda's income statements and balance sheet projections, without the proposed expansion, are given in Annexes 7-4 and 7-5 respectively.

7.05 The Company's liquidity position is satisfactory and is expected to improve even during project implementation. The current ratio would have been higher than shown above (and the equity build-up correspondingly slower) if surplus funds generated had been included in current assets. A portion of net income, except for the funds required for the project, could be distributed to the workers, which is normal practice in Yugoslavia, and would then not remain as surplus cash for allocation to equity. In order to keep the Company in a sound financial position, agreements have been reached during negotiations that Kikinda will not in the course of project implementation, without the prior consent of the Bank: (a) undertake additional capital investments or incur new debts in excess of Din 20 million equivalent in any one year other than for the project; or (b) distribute income and/or make other cash outlays other than for normal operations if the current ratio were to fall below 2:1 after such income distribution and/or cash outlay. After project completion, for any new investment or borrowing in excess of Din 20 million the Company will consult the Bank.

C. Financial Rate of Return

7.06 The project provides a financial rate of return of 23.5% at current value terms. 1/ Detailed assumptions are contained in Annex 7-6. Kikinda's overall operations, which would have a rate of return of 8.4% without the expansion project, are expected to yield 16.4% with the project.

7.07 Sensitivity tests have been conducted to determine the effects of various events on the financial rate of return; they are shown in Annex 7-6 and are summarized below:

Sensitivity Tests on Financial Rate of Return

Case	Description	Rate of Return (%)
1	Base Case	23.5
2	Sales revenue decrease 10%	14.8
3	Operating cost increase 20%	11.6
4	One year project delay plus 15% cost overrun	9.2
5	Sales revenue decrease 10% and operating cost increase 5%	12.2
6	Project cost increase 10% and operating cost increase 10%	15.5

1/ In real terms, the financial rate of return would be 19.3%.

7.08 The project has a low financial risk since the rate of return remains above 9% even with such combinations of adverse conditions as assumed in the above table. If revenues drop by 10% - which is equivalent to about a 90% drop in the assumed exports to the clearing area or a 25% decline in exports to the convertible area without any change in domestic sales and without a corresponding reduction in operating costs - the return would decrease to 14.8%. The return tends to be more sensitive to changes in operating costs than capital costs (Annex 7-6). If production costs were to increase by 5%, which would be equivalent to about a 10% increase in the cost of raw materials, the return would drop to 21%. Since the probability of having a serious delay in project completion and major cost overrun (the two factors with the most adverse effect on the return) is rather low in view of the advanced preparation of the project and its impending implementation, the likelihood of the return falling below 15% is remote.

D. Debt Service Coverage

7.09 Based on the projections and proposed financing plan, Kikinda's long-term debt service coverage forecasts indicate the following:

	Long-Term Debt Service Coverage Forecasts				
	1973	1974	1975	1976	1978 /1
Times Covered	2.5	3.7	4.2	3.3	3.9

/1 The year in which repayment of the Bank loan will begin.

7.10 Debt service coverage is satisfactory even during the implementation of the project. However, according to Yugoslav law, the Company will also have to generate sufficient foreign exchange to service its foreign commitments including debt service. Funds available to the Company in foreign exchange and its foreign currency requirements have, therefore, been analysed in Annex 7-7. The analysis indicates that there would be enough foreign funds available to meet projected needs, but that the position will be tight during construction, primarily because interest on the Bank loan during that period will be paid out of current operations and not be capitalized. During negotiations, assurances were therefore, received from the Jugobanka that it will make foreign exchange funds available to the Company, to the extent that the foreign exchange generated by Kikinda (through retention and depreciation quotas) is not adequate to meet its repayment obligations in foreign exchange to the Bank.

E. Break-Even Points

7.11 The profit break-even point in 1978, after completion of the project, would be at about 57% of effective capacity of the plant. Due to the assumed increases in production costs, the profit break-even would rise to 64% in 1983. The cash break-even point in 1978 would be at about 61% of capacity. Further details on break-even are given in Annex 7-8 .

F. Major Risks

7.12 As regards the market, the sale of castings to the clearing area is, to some extent, beyond the control of the Company. 1/ However, the Company presently has long-term contracts - about 50% of total projected clearing area sales-to supply castings to certain customers in the clearing area. It is unlikely that revenues from exports to the clearing area would drop by 50% without at least some offsetting sales to convertible currency countries or at home. But, as explained in para. 7.08, even if such a drastic decline should occur, the project would still provide an adequate return. Another risk in the project pertains to the technological changes occurring in Western Europe and elsewhere with respect to the type of castings used in automotive production. Malleable castings are slowly being replaced by nodular castings. However, the Company is guarding against this risk (para. 4.03) by producing malleable casting with sufficient flexibility in the design of the malleable iron foundry to change over to a nodular foundry with only minor additions and alterations.

G. Accounting and Audit Requirements

7.13 The Company's present accounting system follows the Yugoslav system in which it is difficult and time consuming to transform financial statements into a format which would make them a more meaningful management tool. From its previous association with the Bank (para. 2.02), the Company has gained adequate experience to improve its internal accounting and is taking measures to improve the accounting system further. Furthermore, agreement has been reached during negotiations on the establishment by the end of 1973 of separate accounts for the Bank project in a form satisfactory to the Bank.

7.14 Kikinda's accounts would be audited by the Social Accounting Service (SAS), which is an autonomous government agency responsible for financial inspection of Yugoslav enterprises. SAS annually conducts a limited review of the statutory financial statements, primarily to ensure that enterprises' financial transactions comply with Yugoslav law; it does not perform an audit nor provide a report on the accounts. SAS is currently planning a training program under which its staff will be trained by an international accounting firm in auditing methods consistent with Bank requirements. 2/ During negotiations, agreements were reached that the Company

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1/ Because agreements on exports are reached at the government-government level in the clearing area countries.

2/ The training program would be carried out by accounting consultants acceptable to the Bank and employed on terms and conditions satisfactory to the Bank. A few international accounting firms have submitted proposals for the training program scheduled to start in January 1974.

would invite SAS to undertake annual audits of Kikinda's 1974 and 1975 accounts as a part of the SAS's on-the-job training program of its staff in collaboration with the international firm of accountants. In the event that SAS is not thereafter able to achieve a consistent and satisfactory standard of auditing, Kikinda will retain, at the request of the Bank, an experienced independent auditing firm.

VIII. ECONOMIC JUSTIFICATION

A. Economic Rate of Return

8.01 The incremental economic rate of return for the project is about 18% in real terms. 1/ Prices used for this calculation are shown in Annex 7-6 and the economic sensitivity analysis is given in Annex 8-1. Export prices (c.i.f. border) of Kikinda to the convertible currency area have been used as the accounting prices to calculate sales revenues. All material inputs, most of which are of domestic origin, have been valued at international prices (c.i.f., Yugoslav border). Labor costs have been based on market wage rates. The economic rate of return is generally sensitive to changes in costs and benefits to the same extent as the financial return. A decrease of 10% in revenue lowers the economic rate to 11%. A combination of 10% higher capital costs and 10% higher operating costs would reduce the return to 12%. Thus the project has a good return under foreseeable circumstances.

B. Competitiveness

8.02 Kikinda is predominantly export oriented. It is highly significant that about 67% of its incremental revenue would be from exports. As discussed in Chapter III and Annexes 3-1 and 3-2, ex-factory selling prices of Kikinda's products are generally lower than prices for comparable products in Western Europe. Even if international prices were to fall by 10%, most of Kikinda's products would still be competitive. Yugoslavia has a nominal protection of between 25 and 30% (customs duties and other related taxes) on industrial products including castings and machine tools. Kikinda does not require this duty shelter other than to be protected against products that might be sold below marginal cost in Yugoslavia.

C. Linkages and Employment

8.03 The project is crucial for the projected expansion of a variety of essential industries (para. 3.04) which are targetted to expand on average at over 8.5% per year in the foreseeable future. Their rapid growth would not be possible without the availability of adequate castings and machine tools. While these could, of course, be imported, Kikinda is able to help fill this gap competitively together with very substantial savings in foreign exchange.

1/ At current prices, the economic rate of return is 21.5%.

8.04 The enterprise is located in the predominantly agricultural region of Vojvodina, whose industrial potential is yet to be fully exploited. The project would help to expand the industrial base of the region, thus keep additional industrial capacity away from existing industrial concentration centers and help absorb trained personnel who presently migrate abroad. While the direct employment benefits from this project are small since only some 630 persons are expected to be added to Kikinda's labor force, the indirect employment creation is higher at an estimated level of approximately 950 (Annex 8-3).

D. Comparative Advantage

8.05 Kikinda as well as other foundries in Yugoslavia have substantial advantage especially in labor costs compared with Western European foundries. For example, at present, the average wage per manhour in Kikinda is hardly US$0.8 as against US$3.5 in the Federal Republic of Germany.

E. Estimated Foreign Exchange Effects

8.06 One of the most important benefits from the project is the increase in the annual net foreign exchange earnings. The incremental net foreign exchange earnings from the Kikinda expansion would be about US$10 million a year (Annex 8-2) and would more than offset in two years after project completion the total foreign exchange cost of the project estimated at about US$19 million. The total net foreign exchange earnings of the Company after all foreign operating costs and debt service payments are calculated to range from US$20 million in 1977 to US$23 million in 1983 which is more than the total foreign exchange cost of the project. Furthermore, the total net foreign exchange impact of the project can be considered as the total value of incremental production less its production cost at international prices, because if Kikinda does not expand, its incremental domestic sales will have to be met from imports. Foreign exchange earnings and foreign exchange savings combined then would amount to about Din 264 million (US$17 million) in 1977, the Company's first full year of operations upon completion of the project.

8.07 Faced with mounting debt repayment obligations on short and medium-term suppliers' credit, and an increasing gap in the balance of trade, Yugoslavia has a critical need to raise its foreign exchange earnings from exports.

IX. RECOMMENDATIONS

9.01 During negotiations, the following principal agreements were reached with the Jugobanka and the Company:

A. Agreements that the Jugobanka will:

(a) provide project completion and cost-overrun guarantees (para. 5.09); and

(b) make foreign exchange funds available to the Company, if the latter's foreign exchange funds are not sufficient to cover its obligations (para. 7.10).

B. Agreements that the Company will:

(a) not sell, lease, transfer or assign its rights or assets (para. 2.05);

(b) introduce and maintain adequate safety measures (para. 2.07);

(c) implement and maintain strict environmental protection measures (para. 4.06);

(d) maintain an adequate labor force (para. 4.07);

(e) form a well-staffed expansion section (para. 4.08);

(f) pay 1-3/4% guarantee fees to the Autonomous Province of Vojvodina (para 5.08);

(g) allocate adequate internally generated funds for the project (para. 7.02);

(h) observe certain financial covenants to maintain a sound financial position (para. 7.05); and

(i) make adequate provision for proper external auditing (para. 7.13).

9.02 Based on foregoing agreements, the project provides a sound basis for a loan to Kikinda equivalent to US$14.5 million for 14 years, including a 4-year grace period.

Industrial Projects Department
October 19, 1973

YUGOSLAVIA - KIKINDA IRON FOUNDRY PROJECT
DESCRIPTION OF TERMS AND PRODUCTION PROCESSES

1. In a broad sense, the art of founding may be described as making a cavity in the sand and filling it with fluid metal. In the cold state, the metal retains the shape and contour of the cavity and becames a metal casting.

2. The term "iron castings" covers a wide range of iron - carbon - silicon alloys containing from 2% to 4% carbon and 0.25% or more of silicon in combination with varying percentages of manganese, sulphur and phosphorous, and sometimes one or more of special alloying elements, such as nickel, chromium, molybdenum and vanadium.

3. There are various kinds of iron castings; they are roughly grouped as chilled-iron castings, gray-iron castings, alloyed-iron castings, malleable castings and nodular-iron castings. In general, castings are made by mixing and melting together different grades of pig iron, foundry scrap, steel scrap and ferro-alloys or other metals depending on the type of casting. Further details may be found in "Cast Metals Handbook" published periodically by the American Foundryman's Association.

A. Types of Castings

Gray Iron Castings

4. Gray iron castings are made of pig iron, of mixtures of pig iron and steel, or of mixtures of pig iron, steel and other metals in smaller amounts. They are frequently sold under trade names, such as Mechanite, Gunite, Ermalite, Ferrosteel, Gun-iron, etc. Chemically, gray iron castings include a large number of metals covering a wide range in composition, with carbon varying from 2 to 4 percent, and silicon from 0.5 to 3 percent with small amounts of other metal according to the type of product produced.

Nodular Iron Castings

5. Nodular iron, also called ductile iron and sheroid graphite iron, is a relatively new grade introduced around 1948 and is gaining in popularity over malleable castings due to better economy in production. It has been used for castings having section from 1/8 inch up to 40 inches thick. It is produced by treating molten iron that normally would produce gray castings with magnesium alloys. The addition of these alloys results in castings which have the carbon present in spheroid form. Castings so made have relatively high strength and better ductility than ordinary gray iron. Several types of nodular castings with varying structures can be developed by alloying or heat treating.

Malleable Castings

6. They are of two kinds, known as white heart, or European; and black heart, or American; these terms indicate differences in the process and the products and countries of origin. Malleable castings are comparatively soft and can be bent without breaking. Malleable castings contain 2.25 to 3.0 percent carbon, 0.3 to 0.5 percent manganese, 0.6 to 1.15 percent silicon and small amounts of sulphur and phosphorous; the exact composition, particularly with respect to silicon, being varied according to the type of castings. In the "green" state, these castings are relatively brittle and possess poor mechanical properties; therefore, annealing of these castings is essential. After annealing a metal similar to soft steel but of much coarser grain and less ductile is obtained.

Alloyed Castings

7. These are used most exclusively for applications where resistance to wear, to heat (including elongation), and to corrosion; high strength of castings, rigidity, damping of vibrations and amenability to heat treatment are of prime importance. The alloying elements - silicon, nickel, chromium, molybdenum, copper and titanium - are used in varying quantities depending on the type of use. Many of these irons are patented compositions and are sold under various trade names such as Ni-resist, Causal metal, Silal, Ni-Crosilal. etc.

Chilled-Iron Castings

8. These castings are extremely hard on the surface. Cast iron with some sections is purposely cooled so fast by chills that the carbon is retained in combined form, while other sections are allowed to cool gradually, so that the carbon is retained in the form found in gray iron. Such castings are used for rolls and various other articles which require a hard, wear-resisting surface.

B. Processes of Production

9. The products of a foundry vary in size, complexity, the metal used, the type of castings, the number of castings produced, the techniques of production employed, the precision of the castings and the extent to which they are finished; these differences are most often inter related.

There are several important and quite unrelated stages in the production of iron castings

- Design and pattern making
- Preparation of Sand
- Core-Making

- Mold-Making
- Melting
- Pouring
- Cleaning, finishing and inspecting.

Design and Pattern Making

10. Design and construction of the pattern is perhaps the most important single factor in the production of castings. Not only the patterns must be dimensionally accurate, but full consideration must be given to making them meet the requirements of the foundry equipment and technique. To make the sand mold, it is first necessary to make a pattern of the part to be cast, which will leave its imprints in the sand. There are several types of patterns, each fulfilling a specific need. Patterns may be made of wood or metal, as required, and used in conjunction with hand-molding or machine molding methods, depending upon the number of castings to be made and the degree of precision required. When a large number of castings have to be produced, a metal pattern is made in the pattern room by skilled patternmakers.

Preparation of Sand

11. The quality and composition of the molding sand is very important. It must contain clay as well as silica and be sufficiently loose to allow gases to escape during casting. The particle size of the sand is also important as it has a bearing on the surface quality of the castings. Clay content in the sand should be about 18-20% to achieve the necessary cohesion of the mixture in the mold.

Core-Making

12. A core is nothing more than a solid shape made of sand. Sand is rammed either by hand or machine or blown into a core box. When the core box is filled with sand and the excess sand is removed with a straight edge, it is turned over and the box lifted from the core thus formed. The ramming operation sometimes includes placement of reinforcing rods, or wires, for strengthening purposes. The cores thus prepared are baked to make them hard, strong and smooth. There are various processes to make cores. The interior surfaces of castings are generally formed by cores, which are inserted in the mold after the pattern has been withdrawn. In some molding operations, cores are used to form exterior surface of castings.

Mold-Making

13. For making molds, the molder places a pattern on a flat plate and then puts a molding box, or "flask", on this plate and fills it with prepared sand. The sand is compacted by ramming and is finished by hand with special

tools. Next, this pattern (first part) is removed, the molder having made half a mold. Then he makes the second half the same way and, after removing this pattern (second part), the two flasks are carefully put together to form the complete mold. A channel, or "runner", is cut in the sand through which the molten metal is poured and also other channels known as "risers" to allow excess metal to escape. Sometimes, depending upon the type and shape of castings, cores are placed upon the type provided for the purpose in the main mold, before the two flakes are put together to form the complete mold. Fundamentally, the machine-molding method differs little from the process previously described for the manual or floor-molding operations, the main difference being that the ramming and the removal of the patterns from the sand are performed by machine. Also construction of gates and risers will be performed by the machine. However, the placement of cores, patching and finishing of the mold still remain as the chief function of the molder. There are various methods of making molds. A relatively new molding method known as "Disamatic molding process" - flaskless molding - lends itself to the production of molds by machine methods without using flask.

Melting

14. Generally, three types of furnaces are or have been employed by foundries for melting iron. These are: (1) the cupola furnace; (2) the pneumatic furnace; and (3) the electric furnace.

15. The cheapest and the oldest type, and the most extensively used is the cupola, which is, essentially, a vertical steel cylinder lined with refractory materials. Within the cupola are placed alternate layers of coke and iron; air is forced through them and the iron is melted by contact with hot gases. The molten metal drips down through the incandescent fuel to the bottom of the furnace and, when the plug is removed, the iron runs into ladles ready for pouring operations.

16. The pneumatic furnace is used to produce certain high-grade cast irons, because tests can be made during the melting process and because the metal is more easy to control in it than in the cupola. The entire charge is placed in the furnace at one time, melted down in one mass on hearth, and tapped when the proper temperature and composition are reached.

17. Because quality can be quite accurately controlled and higher temperatures secured, the electric furnace is sometimes used in melting cast iron. The entire charge is placed in the furnace at one time. Since the cost is ordinarily greater than in the cupola, the electric furnace is generally used only when special quality control is required.

Pouring

18. The molten metal withdrawn from the furnace is transferred to the refractory ladle which is carried to the pouring bay where the metal is poured into the molds. The casting temperature and the pouring time must be carefully

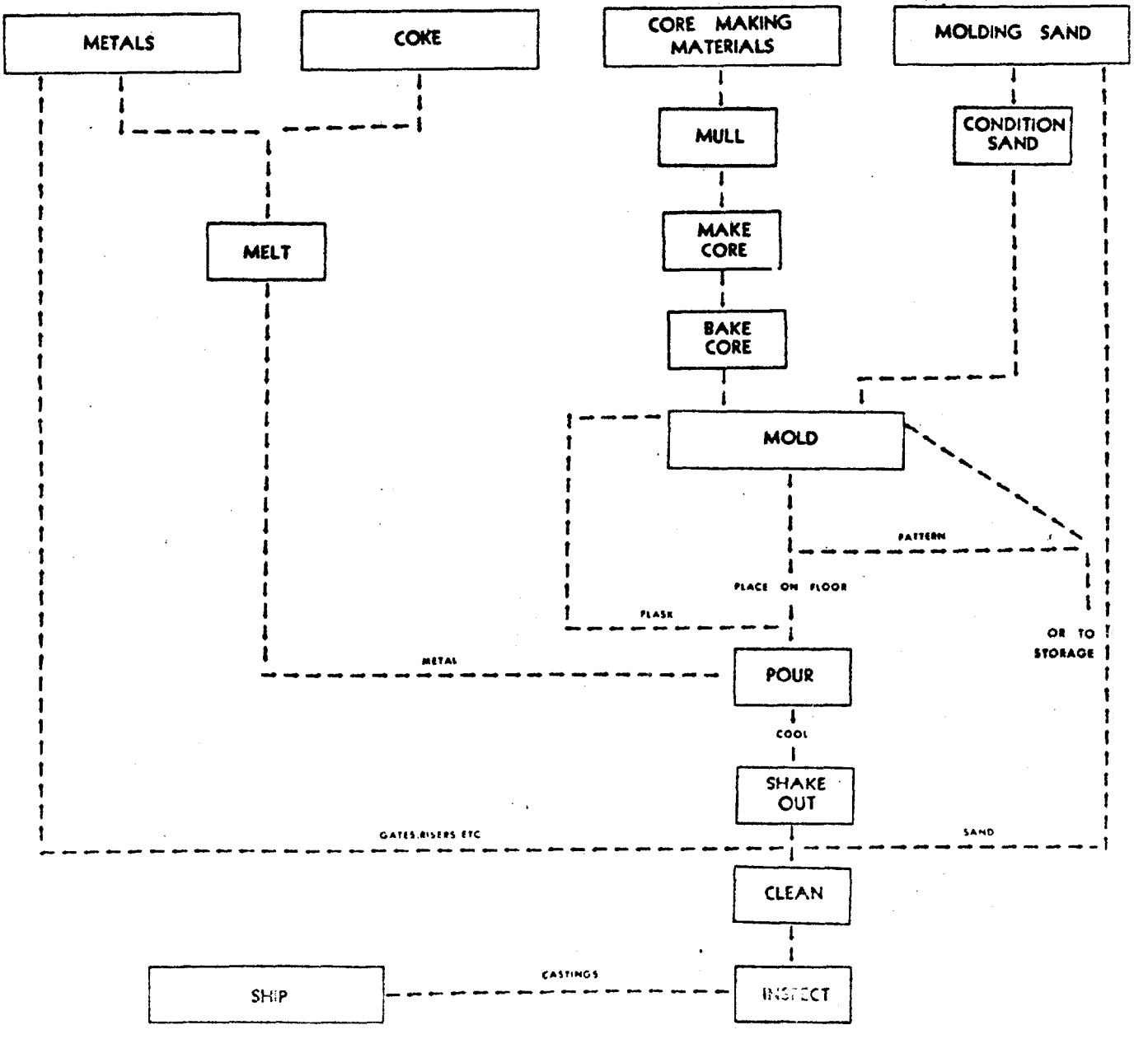
controlled to avoid casting defects. Once the castings have been cooled, they are shaken out. The gates and risers are broken off and returned to the furnace for remelting, while the sand is screened and either thrown away or sent back for re-use.

Cleaning, Finishing and Inspecting

19. Adhering sand is removed by brushing or tumbling in a revolving barrel, or by the abrasive action of sand blasting. Rough places and fins in castings are smoothed and settled by grinding and chipping. A quick inspection is generally made when castings are delivered to the cleaning room so that no further time may be wasted on defective work. After the cleaning, a thorough inspection is made and satisfactory castings are selected for shipment.

20. Certain types of castings - nodular iron and malleable castings, - are heat treated to make castings stronger and more resistant to shock and fatigue. The finished castings are placed in the annealing furnace, heated in the furnace to the desired temperature and cooled gradually to the room temperature. The temperature at which the castings are heated and the cooling rate depend on the type of castings.

FLOW CHART
GRAY IRON FOUNDRY



Industrial Projects Department
June 1973

YUGOSLAVIA - KIKINDA IRON FOUNDRY PROJECT

WORKERS' SELF-MANAGEMENT

1. Workers' self-management is a common feature of Yugoslav enterprises. In Kikinda, as in other "work organizations" in the social sector, this system operates through direct as well as indirect participation of employees in making decisions. The organizational framework of self-management mainly consists of Work Units, Work Units Council, the Workers' Assembly, the Workers' Council, the Managing Board, and the General Manager.

A. Direct Participation

Work Units and Work Units Council

2. Economic units are departmental and functional units within the enterprise. Chief of every Economic Unit is a member of the Work Units Council which pays particular attention to work incentives, better utilization of human and capital resources and improved productivity. The council has a president and a vice-president elected by its members. In case of dispute among the Work units, an arbitration commission is appointed whose decision is final.

Workers Assembly

3. The Work Units Council is responsible in its work to the Workers' Assembly in which all the employees participate directly in making decisions on key issues. The assembly could be convened any time under the following circumstances: (a) the initiative of the General Manager or on its own initiative; (b) when one-tenth of the workers demand it; and (c) on demand by any socio-political organization. The Assembly is presided over by the President of the Work Units' Council.

B. Indirect Participation

4. Since it is not possible for workers to make all decisions by themselves, some of their rights and management functions are delegated to management bodies elected by them, i.e. Workers' Council, Board of Management, etc.

Central Workers' Council

5. The Central Workers' Council is the most important management body. It consists of 28 members elected for two years by the employees of Kikinda. Nobody can be elected for two consecutive terms. Every year, half the members of the Council are replaced by newly-elected members.

6. The council sets forth the policy of the enterprise. Its approval is necessary on major investments, annual investment plans, and appropriation of company profits. To facilitate its operation, the council has different committees for: investment, internal control, technical improvement, standard of living, personnel, discipline, work standards, waste disposal, accident prevention and health protection, distribution of personal income, awards of medals, petitions and complaints, and job competition and reappointments. In addition to these standard committees, some others can be appointed to deal with specific problems as the need arises.

Executive Board

7. The Executive Board, a body of the Workers' Council, consists of 9 members, including the General Manager. The members are elected by the Central Workers' Council for two years. No member can be elected for more than one term in a row. Half the members (excluding the General Manager) are replaced every year. The members elect among themselves the president and his deputy. However, the General Manager cannot be elected the president of the Executive Board.

8. The Board has certain independence in the exercise of its functions as laid down by by-laws or other enactments of the enterprise. It drafts working and development plans and programs, and submits them to the Workers' Council for approval. In general, the Board is responsible for the proper functioning of the enterprise. It consists of mostly skilled workers and office employees with higher education.

General Manager

9. The General Manager is elected by the Workers' Council but he must have the following qualifications and experience: (a) university-level specialist's training and 6 years of experience in management positions; or (b) high school education combined with 12 years of experience in management positions.

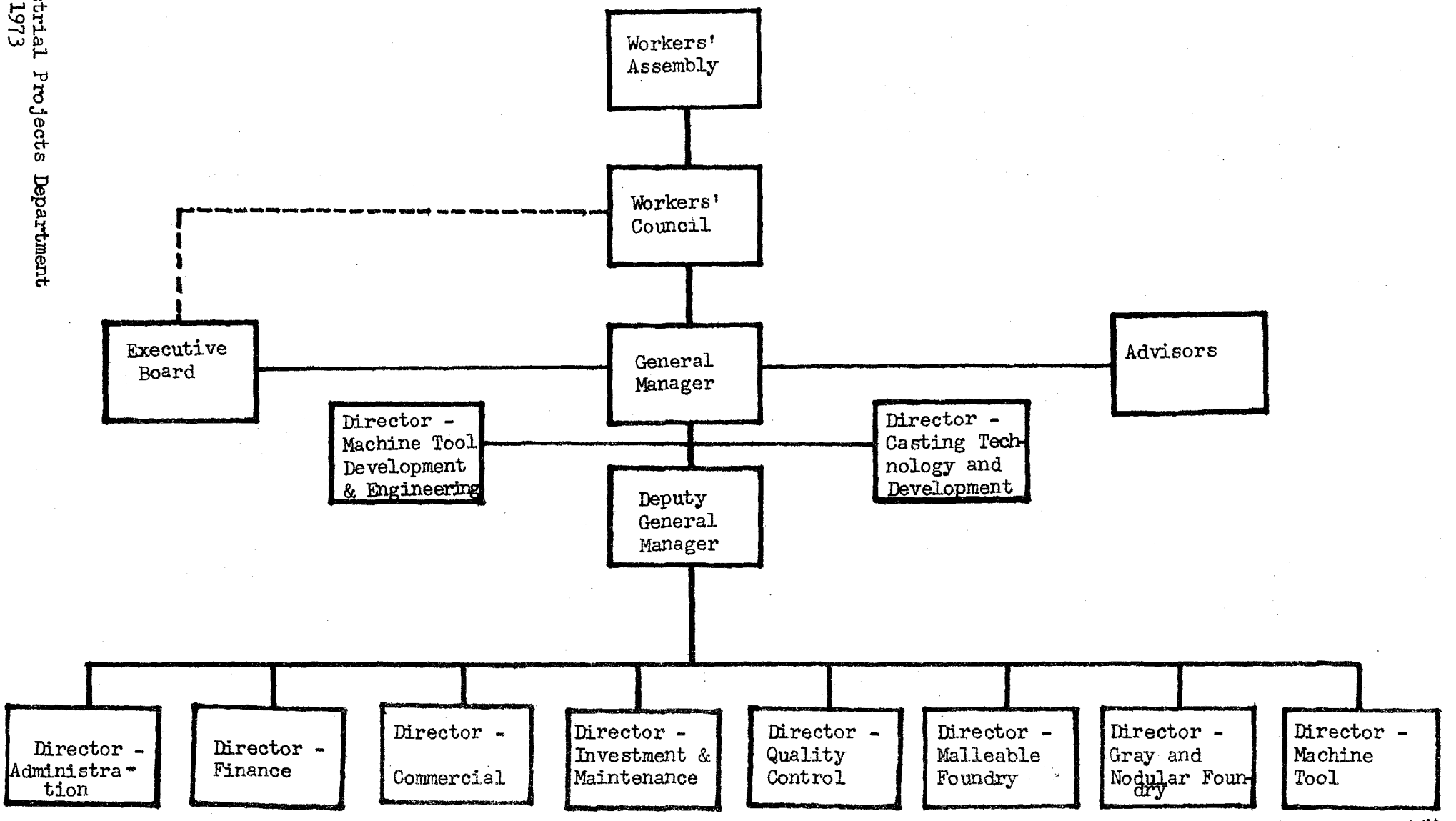
10. The Workers' Council sets up a committee to consider all applications for the position of General Manager, and proposes the election of the candidate who best meets the prescribed conditions. The term of the General Manager is for four years, but he is eligible to compete for a second term. According to the Company Statute, 4 months before the expiry of the General Manager's first term, an open competition for reappointment should be announced. In case the General Manager does not enjoy the confidence of the Workers' Council and the Executive Board, he could be relieved of his duty even before the expiration of his term.

11. The General Manager is independent in his functions and is only responsible to the Central Workers' Council. He carries out the decisions of managing

bodies, represents the company outside, concludes contracts on behalf of the firm, and looks after the application of legal measures. He formulates the business policy of the enterprise and is responsible for the attainment of good business results through increased production, economy and profitability.

12. The present General Manager of the Kikinda Foundry is Pajic Rade Miroslav, 39. A graduate of the School of Chemical Engineering, Belgrade, Pajic has had more than 12 years of experience in various management positions in Kikinda. He worked as Chief of Laboratory, Main Metallurgist of the Malleable and Nodular Castings Plants, Chief of the Production Development Department, Director of the Malleable Castings Department, Director of the Nodular Castings Department and Deputy General Manager before becoming General Manager in March 1971. He is an active member of many professional associations as well as socio-political organizations. He is President of the Executive Council of the Federal Machine Tool Producers Association (Masino-Union), Belgrade, and also of the Credit Committee of Jugobanka, Novi Sad.

YUGOSLAVIA - KIKINDA IRON FOUNDRY PROJECT
ORGANIZATION CHART



Industrial Projects Department
July 1973

YUGOSLAVIA - KIKINDA IRON FOUNDRY PROJECT

DESCRIPTION OF EXISTING FACILITIES

1. The plant is located in the town of Kikinda (population: 40,000), about 130 km north of Belgrade near the Romanian border, and is about 76 meters above sea level. The plant consists of four main production facilities - malleable foundry, gray and nodular foundry, fitting finishing plant and machine tool plant - which are located in separate buildings as shown in the plant layout (Annex 4-2).

2. The malleable foundry produces exclusively black hearth malleable iron castings for the automotive industry and pipe fittings and has a capacity of 11,500 TPY. The gray and nodular iron foundry produces gray iron castings (mainly hand-molded) for Kikinda's own machine tool production and nodular iron castings (mainly machine-molded) for automotive and miscellaneous other industries. The gray and nodular foundry has a capacity of 900 TPY of gray iron and 4,500 TPY of nodular iron castings; the nodular iron capacity is expected to rise to 7,500 TPY in 1974, after the completion of the existing project. The present pipe fitting finishing plant has a capacity to handle 3,800 to 4,000 TPY of fittings of 3/8" to 2" in size. The machine tool plant presently produces about 350 units, equivalent to about 900 TPY, of grinders, radial drills, and hydraulic parts.

3. The existing principal facilities of the Kikinda plant are as follows:

A. Malleable Iron Foundry

Melting Plant

4. Facilities for the production of liquid iron consist of two batteries of cupola furnaces with furnace charging systems and liquid iron receivers. The melting plant which delivers liquid iron to the fitting-molding line, has a cold blast cupola with 2 furnaces of 4-ton/hour capacity each. These furnaces work alternatively to meet the liquid iron needs. There is an electirc induction receiver (600 KVA) with a 4-ton/hr. capacity. The liquid iron is transferred to the pouring lines through hand-pushed ladles on a monorail system. This melting plant will be dismantled to make room for the new electric furnaces before the second phase of the project implementation. This plant was completed in 1961 and some repairs were made in 1970.

5. The melting plant which provides liquid iron to the molding lines for making automotive and other castings, consists of one battery of two hot blast cupola furnaces of 4-ton/hr. capacity - each working alternatively, one electric induction receiver (600 KVA) of 4-ton/hr. capacity and two 50-cycle induction furnaces each with a 4-ton holding capacity. These furnaces are primarily used for superheating and correcting of liquid iron. Hand-pushed ladles mounted on a monorail system are being used for transferring liquid iron to the pouring line. This melting plant was constructed in 1965 and was overhauled in 1970; it will be used even after the implementation of the proposed project.

Molding Lines

6. There are two molding lines for fittings production and one molding line for automotive castings.

7. Molding Line No. 1: The capacity of this line is about 4,610 TPY. There are seven pairs of cope and drag molding machines for fittings and each pair has a capacity of 100 molds per hour. This molding line includes a 6-meter/minute transfer car conveyor line with core setting, pouring and cooling areas. This line is provided with an automatic weighing system. Prepared sand is transported to the mold-making machines through rubber conveyors. There are overhead sand bins for temporary storage of prepared sand. The flask size used in this line is 400 x 330 x (100 x 2) mm. A shakeout with a capacity of 0.5 tons to separate castings from sand is located adjacent to this line. Used sand is transported out of this area through rubber conveyors. This molding line will be dismantled after the completion of Phase I of the proposed project.

8. Molding Line No. 2: This line has a capacity of 850 TPY, but is operated only part-time owing to its worn out condition. This line comprises a roller conveyor line for mold assembly, pouring and cooling, four pairs of cope and drag molding machines with a total capacity of 140 molds per hour and a 0.5 ton shake-out grate. The conveyor system for the transportation of prepared sand for molding line No. 1 is also used for the molding line No. 2. There are separate overhead bins for prepared sand. This molding line will also be discontinued after the completion of Phase I of the project.

9. Molding Line No. 3: This line is primarily for automotive castings and has a capacity of 6,000 TPY. This molding line includes eight pairs of cope and drag molding machines with a total capacity of 280 molds/hour, roller conveyor lines for core-setting, mold-assembly, pouring, cooling and flask transfer to the molding mechines. This molding line receives prepared sand from a different source than No. 1 & 2 molding lines and the other serves molding line No. 3. The capacity of both the sand preparation plants is 40 m^3/hr. each.

10. The sand preparation plant which provides the fitting-molding lines with uniform sand, includes a sand-loading device (5-ton/hr), a rotary dryer for new silica sand (5-ton/hr), a sand-preparation process line (40 m^3/hr) and a rubber belt conveyor system (40 m^3/hr) for transferring the prepared sand. The capacity of this plant will be increased during Phase II of the project.

11. The sand preparation plant, which serves the automotive castings molding line, includes a sand-loading device (5-ton/hr), a rotary dryer (5-ton/hr), a sand-preparation process line (40 m^3/hr), and a rubber belt conveyor system (40 m^3/hr) for transporting prepared sand to molding machines. During Phase I of the project, this plant will be rearranged.

Core-making

12. Facilities for the making of cores consist of two core rooms located adjacent to respective molding lines. The core room near molding lines Nos. 1 & 2 comprises a core sand conveyor system (3-ton/hr), sand-preparation equipment (3-ton/hr), necessary core-making equipment for oil sand, hot box and shell cores, sand distribution systems, conveyor for core handling, and chamber drying ovens for cores. Cores are supplied to the fitting-molding line through a monorail system; a second monorail is available for the transportation of cores within the core room. During Phase II of the project, some minor alterations and modifications would be made in this core room.

13. The core-making facilities adjacent to the existing molding line No. 3 comprise one 2-ton/hr sand preparation equipment, core-making machines and a rotary dryer (5-ton/hr). These facilities will be rearranged during the implementation of Phase I of the project.

Casting Finishing

14. To insure adequate cooling of castings, they are stored temporarily near the shake-out grate. From this area, castings are transported to the cleaning room by fork lifts.

Cleaning Room

15. In this section, de-finning, finishing, cleaning and initial inspection of castings are done. This section is equipped with 16 double-end grinders, 3 large blasting machines, 4 small blasting machines, a number of benches for manual chipping and grinding operations, 2 straightening presses and an electro-magnetic testing apparatus. Some of the cleaning room equipment was purchased in 1968/69. During the implementation of Phase I of the project, this section will be relocated.

Heat Treatment Facilities

16. There are two elevator annealing furnaces for tempering and stress-relieving. One has a capacity of 8-ton/charge and the other 10-ton/charge. Apart from this, there is one low temperature continuous furnace (0.7-ton/hr), one high temperature continuous furnace (0.7-ton/hr) and four chamber furnaces. At the end of the continuous furnaces, oil bath and water bath facilities are available. The continuous furnaces were installed in 1969. No changes in this section are envisaged.

Observation

17. The present facilities in the malleable iron foundry are well kept and well maintained even though some of the equipment is very old and needs replacement. The entire foundry is operated on two shifts per day (5 days per week plus one Saturday per month) with the exception of some parts of the cleaning room with a capacity for only one shift working per day which

is sufficient for present production level, and of the heat treatment facilities which are working 3 shifts per day owing to capacity constraints. The bottlenecks which prevent higher production in the malleable plant are the limited heat treatment and molding capacities.

B. Gray and Nodular Iron Foundry

Melting Plant

18. The gray and nodular iron foundry has only melting plant which consists of one battery of two hot blast cupola furnaces of 4-5 tons/hr capacity. These furnaces operate alternately to meet the liquid iron demand for gray and nodular iron casitngs. In the first two shifts, liquid iron for nodular castings is produced and, in the third shift, liquid iron for gray castings is produced. The melting plant includes sufficient charging carts and devices. A vibrating desulfuring unit (2 tons) is mounted next to the cupola furnaces. Molten iron is charged into this unit where calcium carbide is used to lessen the sulfur content and to improve the ductility of castings. Slag is removed and base iron is added to the 4-ton coreless induction holding furnace (500 KVA) for superheating and corrections. Molten metal is poured from this furnace into a delivery ladle; ferromagnesium is added, under control, to the ladle if the metal is meant for nodular castings. Bridge cranes, with a capacity of 15 tons, in the main bay, are used for the liquid iron transfer.

Molding Lines

19. There are three molding lines - two machine-molding lines for nodular castings and one hand-molding line for gray castings - which are presently operating; and one more machine-molding line is currently being installed.

20. (a) Molding Line No. 1: This line is a hand-molding line capable of producing castings up to 900 TPY and has a slinger station for the gray iron castings, for the machine tools. Total area covered by this line is about 460 m^2. A sand conveying and ramming device of 10 m^3/hr of sand capacity is also available. Since gray iron is produced only in the third shift, this line is operated only in the third shift. The molten metal is transported to this line by overhead bridge crane (5.5 tons).

21. (b) Molding Line No. 2: This is a cope and drag type molding line with two pairs of molding machines (70 molds/hr) and has a capacity of 1,700 TPY. This line consists of two roller-conveyor lines for core-setting, mold-assembly, pouring, cooling and flask transfer to the molding machines. Various sizes of flasks are used in this line. The sand for making molds is transported to this line by overhead rubber conveyor belts and is stored temporarily in overhead sand bins. Two shakeout grates (0.5 ton) are located at the end of each roller path conveyor. Castings are separated from the sand at these shakeout grates and are stored temporarily at this area for cooling. The used sand is transported out of this area through conveyor belts. This line will be dismantled during project implementation.

22. (c) Molding Line No. 3: This line has a capacity of 2,800 TPY of castings and is equipped with 2 pairs of molding machines (25 and 30 molds/hr). This line comprises four roller-conveyor lines for core-setting, mold-assembly, pourings, cooling and flask transfer to the molding machines. Prepared sand is brought to the molding machines through overhead conveyor belts (30 m^3/hr) and is temporarily stored in overhead sand bins, from which the molding machines are fed. The molten iron is poured into the molds by using an overhead hand-pushed monorail system. Two shakeout grates (0.3 ton and 0.5 ton) are used to separate castings from the molds and the used sand is transported out of this area through conveyor belts. Even after the completion of the project, this line will be used without any major alterations.

23. (d) Molding Line No. 4: This line under construction is expected to be completed by the end of 1973. This is a Shell molding line and is different from the other lines in the sense that it uses dry pre-coated sand while the others use wet sand. Therefore, the sand preparation unit is also a part of this line. This line also has its own cleaning room facilities. The capacity of this line is 3,000 TPY; however, it can be increased up to 4,000 TPY depending upon the type of castings produced. In this plant, sand from a 2-ton/hr. sand preparation process facility is transported to two shell molding machines (30 cycles/hr) by a 2-ton/hr. sand handling elevator. There are four Shell core-making machines (40 cycles/hr.) capable of producing up to 390,000 cores per year. Sand for core making is stored in four sand bunkers each with 0.7 m^3 capacity. The molding line is equipped with a cooling tunnel which has a 10,000 N m^3/hr gas suction device. The molds are brought to the molding line through an overhead monorail system. Molten iron is transported to the molding line from the holding furnace by monorial. Metal pouring and initial cooling is done in the molding line and the castings are separated from the mold at a 0.5 ton shakeout grate. With the use of a 0.2 ton console crane, castings are transferred from the molding line to a cooling conveyor line which takes the castings to a cooling tunnel. Total cooling time is about 2.5 hours. After cooling, the castings are removed from the conveyor for cleaning. The cleaning section of this plant has work benches for cutting of castings, special grinding machines for cutting and grinding, double end grinding machines, belt conveyors and electromagnetic separators. Finished products are then sent to the storage area.

Sand Preparation Plant

24. The sand preparation plant for the three molding lines (Nos. 1, 2 & 3) has a capacity of 40 m^3/hr of sand. This plant consists of a sand loading device (5 m^3/hr.), a rotary dryer (5 m^3hr.), two sand mixers (15 m^3/hr. each) and conveyor belt systems for transporting prepared sand. This plant was installed in 1969 and will continue to operate, with slight modifications, even after the proposed expansion.

Core-making

25. The core-making plant serves molding lines Nos. 1, 2 & 3 and is equipped with core sand preparation devices (2-ton/hr), a 15-liter core-making machine (50 cycles/hr.), a 7.5-liter core-making machine (60 cycles/hr.), a roller path for cores handling, chamber dryers for cores and sufficient core storage shelves.

Casting Finishing

26. The facilities for finishing is primarily used for castings from the molding lines Nos. 1, 2 and 3. Cleaning facilities include a chamber blasting machine (2 x 6 m), a continuous blasting machine for nodular castings, console-type grinding machines, cut-off grinding machines, necessary work benches and floor cleaning area.

27. For the heat treatment of castings, there is an elevator annealing furnace (12-ton/charge). The castings are charged into this furnace with the use of a charging cart and are moved to this area by an overhead bridge crane (2.5 ton). No changes in this section are envisaged in the project.

Observations

28. This plant is fairly new (installed in 1969) and is well operated and maintained. With the addition of the new molding line - no. 4-Shell molding line - the present production constraint regarding molding capacity will be eliminated. However, the melting shop capacity will be a bottleneck for increasing production beyond 7,500 TPY of nodular iron castings in two shifts.

C. Fitting Finishing Shop

29. The fitting finishing shop is located in a separate building adjacent to the machine tool plant (see Annex 4-2). The total capacity of this plant is about 3,800 to 4,000 TPY of pipe fittings ranging in size from 3/8" to 2". Fitting castings from the malleable iron foundry are weighed at the fitting finishing plant before any finishing operation is done.

Initial Finishing

30. In this section, most of the initial cleaning and finishing work is done prior to final machine work. This section is equipped with nine double-head grinding machines with supporting roller paths for initial grinding work, 19 tumbling drums for surface cleaning, and one pressure testing equipment.

Final Machining

31. After the initial cleaning and finishing, the fittings (elbows, T-pieces, couplings, etc.) are transported by a monorail system to the respective machining areas. Machines for final machining comprise 20 lathes for final machining, 18 internal thread-cutting machines, 2 grinding machines, 10 outer thread-cutting machines, 1 elbow thread-cutting machine, 1 T-piece thread-cutting machine, 10 column-type drilling machines, 1 tool-sharpening machine, and auxiliary equipment. Most of this equipment will be relocated during the implementation of the project. After the final machining operations, most of the fittings are transported to the cleaning section for preparation for galvanizing and the remaining are moved to the continuous conservation line for black fittings. All inplant transportation is by monorail systems. There are adequate facilities within the plant for semi-finished and finished product storage.

Cleaning Room

32. Prior to galvanizing the fittings, they are thoroughly cleaned and dried. Equipment and other facilities included in this section are 2 caustic soda vats, 4 water vats, one acid vat and lye vat. After proper cleaning, the fittings are transported to the galvanizing section by a monorail. During the project implementation, very minor alterations to this section are envisaged.

Galvanizing Section

33. The cleaned fittings are received at the continuous dryer (0.5 ton/hr.) which controls the capacity of this section. This unit also includes one 40-ton zinc melting furnace, one 10-ton zinc melting furnace, zinc baths, heated tables, console crane (0.2 ton) for loading and unloading, water vats and a centrifuge. Present capacity of this unit is about 1,260 TPY. After galvanizing, products are transported to the final finishing and packing section.

Final Finishing and Packing

34. This section includes two continuous varnish coating machines, conveyor belts for transporting the final product to the packing section, a few roller conveyors for packing, control tables, packing tables and sufficient space for cardboard box and finished product storage. From here, cartons containing the finished fittings are shipped out.

Observations

35. Present production of fittings is limited to 4,000 TPY due to the capacity limitations of this plant. The layout of the machine tools in this plant will have to be slightly altered to bring about an increase in production. Even though some of the equipment and machines in this shop are fairly old (installed in 1957) and need replacement, these facilities are maintained properly and operated efficiently. Due to the capacity restrictions in the galvanizing section, the produciton of galvanized fittings, which have a good demand, is limited.

D. Machine Tool Plant

36. The machine tool factory is also located in a separate building with all essential staff departments except the quality control department. It has its own plant management, which is responsible to the Managing Director.

37. The layout of the machine tool factory, originally made for the production of lathes, drills and surface grinders, was done on a functional basis - all milling operations in one section, turning operations in another, etc. Now that the plant has discontinued making lathes and has undertaken the production of various types of grinders, the old layout is not suitable for optimal material flow for the present production.

38. The following sections are in the plant: steel storehouse, steel cutting section, machine preparation and store for small parts, store for large parts, tool room, casting store, sections for grinding, milling, drilling, and turning operations, cleaning of castings, locksmithing and welding, marking of casings for machining, electric fittings, hardening, painting, sub-assembling and assembling, assembling and testing of hydraulic parts, assembling of electric control devices, final assembly of the machines, final painting, final adjusting and delivery. The equipment in the plant consists of: 28 Universal lathes (installed in 1957-62; 10 of them would be put out of use); 3 Revolver lathes (recently installed); 20 Milling machines (installed in 1957-62; 7 of them would be put out of use); 5 Gear Tooth Milling Cutters (installed in 1962); 14 Drilling Machines (installed in 1957-62; 3 of them would be put out of use); 26 Grinding Machines (installed in 1958-62; 5 of the would be taken out of service); 7 Boring and Milling Machines (installed in 1957-62; 2 of them would be put out of use); 6 Planning Machines (installed in 1960; 1 of them would be taken out of service); 1 Grinder for Guide Rods installed in 1960; it would be put out of use); and 4 Cutting Machines (installed in 1957-60; 1 of them would be taken out of service). The machine tool plant also includes sufficient auxiliary equipment to support the present level of production.

Observation

39. At present, in the machine tool plant there are certain problems primarily due to the use of old machine tools which are no longer sufficiently accurate and are not geared for mass production. Furhermore, the internal transport of assembly parts, semi-finished products and finished products is also a problem since the present layout of the plant was made when the company was producing different types of products. Therefore, to improve the efficiency of the plant even for the present production, new machines as well as relocation of equipment are necessary. Relocation of machine tools is envisaged in the project.

E. Quality Control Department

40. The quality control department, a self-contained department directly under the General Manager, observes strict control of all phases of production (melting, core-making, molding, final control of products in the cleaning shop, and material control of raw materials and supplies). The quality control laboratory is very well equipped. It consists of a spectograph for 12 elements, a wet-chemical laboratory, a physical laboratory, and necessary supporting units. No additions and alterations in this laboratory are planned under the project.

F. Utilities

Electric Power and Distribution

41. All power for Kikinda is purchased from "Elektrovojvodina' of Novi Sad. The plant is supplied with power from a main 35/10 KV transformer substation. Because of the subsequent additions of new facilities in different

phases plus the depreciated condition of the transformer, the distribution system as it now exists is hampered by overload at the transformer station. Although the company has taken measures to rectify this situation, power is distributed (through closed loop system) to different plants by underground cables (10 KV) and is stepped down from 10 KV to 0.4 KV before feeding electric motors and furnaces. Sub-stations with 10/0.4 KV transformers are located near each plant. The total installed electric power at Kikinda is 12 MVA and the annual electric power consumption is about 20 million kwh. Considerable changes, additions and alterations to the power distribution system are proposed in the project.

Gas

42. Natural gas for the plant operation is purchased from NAFTAGAS, which has its central distribution station close to the plant. From the Gage Control station (25 atmospheric pressure) which is adjacent to the plant, gas is brought to the distribution station through a 3-1/2" pipeline after reducing the pressure to 4.5 atmospheric unit. From this station, the gas is supplied to various production plants, where the pressure is further reduced to 1 atmospheric unit prior to distribution within the plants. Gas is being used in the malleable iron foundry (for the heat treatment plant and core making shop, nodular and grey foundry), for cupola air heater and core-making shop, and fitting finishing shop (for galvanizing lines). Moreover, gas is used for cooking and heating boilers. The consumption of gas is about 1,250 NW^3/h. The present gas pipe system does not adequately satisfy the requirements; this problem is to be rectified under the project.

Compressed Air

43. The present compressor station is about 12 years old and has 5 piston compressors each with a capacity of 20 m^3/hr. Apart from the expansion of castings plants which operate exclusively with compressed air, the machine tool plant expansion would also increase the need for compressed air. The compressed air requirement has increased more than three times in the last 10 years. The present consumption rate is about 96 NM^3/hr (at 7 times the atmospheric pressure). The existing capacity and the distribution system - mostly worn out due to age - is very tight for the present production. In the project, major changes are planned for the compressor station.

Water

44. The present water distribution system was built during the last 10 years to meet the needs of different phases of plant expansion. With the 4 existing wells, which have a capacity of 920 lit/min., most of the present water requirements are met. By adopting recirculation systems, the water shortage is minimized. Further, an overhead water tank (50 m^3) is also available as reserve and can provide water at required pressure. The plant is also connected to the city water system, which supplies water exclusively to annealing furnaces and induction furnaces. Additional water distribution systems are envisaged in the project.

Heating

45. All plants are centrally heated by steam. The steam boiler room has two boilers with a capacity of 13 tons of steam per hour. The present steam pipeline system needs replacement since its capacity is not adequate to supply sufficient steam to different plants. This problem is aggravated by the need for greater quantities of steam to compensate for the heated air going out of the plant due to air cleaning ventilation. The present system of heating will be replaced by hot water heating systems under the project.

Industrial Projects Department
June 1973

YUGOSLAVIA - KIKINDA IRON FOUNDRY PROJECT

HISTORICAL INCOME STATEMENTS (1968-1972)
(Din million)

Years Ended December 31,	1968	1969	1970	1971	1972
Net Sales 1/	115.8 a/	173.3 a/	159.0	234.2	296.0
Cost of Goods Sold					
Materials, Supplies and Utilities 2/	59.9	98.7	83.5	116.7	144.4
Labor	21.9	32.7	33.3	42.0	53.2
Gross Profit	34.0	41.9	42.2	75.5	98.4
Operating Expenses					
Selling and Administration 3/	5.4	7.3	7.6	8.4	13.3
Maintenance and Repair 4/	1.5	1.9	2.2	4.2	4.4
Depreciation	5.4	8.9	11.5	21.1	30.2
Other 5/	3.2	5.2	6.2	11.1	12.2
Operating Profit	18.5	18.6	14.7	30.7	38.3
Other Income 6/	0.7	1.1	1.3	2.9	5.9
Other Expenses					
Interest	6.7	7.3	7.2	10.2	9.3
Sundry 7/	2.0	2.9	1.9	9.0	7.4
Income Before Taxes and Contributions	10.5	9.5	6.9	14.4	27.5
Taxes and Contributions 8/	2.2	2.6	2.2	0.7	0.5
Net Income ("Dobit")	8.3	6.9	4.7	13.7	27.0
Distribution of Net Income					
- Appropriation to Reserve Fund	0.9	1.0	0.6	0.8	2.1
- Appropriation to Business Fund	7.0	5.5	3.6	9.9	21.3
- Appropriation to Collective Consumption Fund 9/	0.4	0.4	0.5	2.8	3.0
- Appropriation to Mutual Reserve Fund	-	-	-	0.2	0.6

1/ Including revenue from services (machine tool servicing, etc.) and internal company sales.
2/ Includes part of the costs of "maintenance and repair" and "selling and administration".
3/ Excluding office supplies, etc. which are included under "material costs".
4/ Excluding material costs of medium-scale repair and maintenance costs.
5/ Includes land and water tax, water contribution, insurance, contributions to associations and chambers of commerce.
6/ Interest on receivables, interest from obligatory loan contributions, etc.
7/ Extraordinary expenses including start-up expenses of the previous project and the preoperating expense for the project.
8/ Interest on Business Fund (abolished in 1971), contribution for the development of areas hit by natural disasters. etc.

9/ Since 1971, it is treated as a loan to Federal Government. Previously, it was treated as a tax
a/ Includes sales invoiced in previous years, but not yet paid.

Industrial Projects Department
May, 1973.

YUGOSLAVIA - KIKINDA IRON FOUNDRY PROJECT
HISTORICAL BALANCE SHEETS (1968-1972)
(Din Million)

Dec. 31,	1968	1969	1970	1971	1972
ASSETS					
Current Assets					
Cash and Bank	10.5	8.9	1.6	8.1	16.1
Receivables	28.3	39.6	46.8	43.6	56.0
Inventory	38.3	45.0	59.2	60.0	71.2
Sub-total	77.1	93.5	107.6	111.7	143.3
Gross Fixed Assets	73.2	104.4	112.6	168.2	176.2
Less: Accumulated Depreciation	29.3	38.2	48.7	97.9	124.6
Net Fixed Assets	43.9	66.2	63.9	70.3	51.6
Financial Assets	3.0	6.0	10.3	12.2	19.5
Other Assets	7.3	6.3	12.9	13.5	18.0
TOTAL ASSETS	131.3	172.0	194.7	207.7	232.4
LIABILITIES					
Current Liabilities					
Accounts Payables*	44.2	59.1	72.8	59.2	53.6
Current Portion of Long-Term Debt	**	**	**	4.7	7.7
Sub-total	44.2	59.1	72.8	63.9	61.3
Long-Term Debt	33.1	50.7	54.2	51.4	51.5
Equity					
Business Funds	45.9	52.0	55.7	79.1	100.8
Reserve Funds	3.4	4.3	4.9	5.5	7.6
Collective Consumption Funds	4.7	5.9	7.1	7.6	10.4
Mutual Reserve Fund	-	-	-	0.2	0.8
Sub-total	54.0	62.2	64.7	92.4	119.6
TOTAL LIABILITIES	131.3	172.0	194.7	207.7	232.4
Current Ratio	1.7	1.6	1.5	1.7	2.3
Long-Term Debt/Equity Ratio	38:62	45:55	46:54	36:64	30:70

* Including short-term borrowing from other enterprises.
** Current portion of long-term debt is included in long-term debt.
Note: For explanation of terms used, refer to Annex 7-3, page 2 .

Industrial Projects Department
May 1973

YUGOSLAVIA: KIKINDA IRON FOUNDRY PROJECT

MARKET FOR IRON CASTINGS

A. Industrial Setting

1. Yugoslavia has a dynamic industry sector which in 1971 contributed to over 30% of the Gross National Product estimated at approximately US$15 billion. Industrial production has been expanding at a real annual rate of about 10.5% during 1952-1971, and nearly one-fourth of total labor force estimated at 8.3 million (1971) is engaged in the industrial sector.

2. Unlike the case in many developing countries, industrial development in Yugoslavia has been outward-oriented and, on the whole, competitive. Industrial exports have grown at an average annual rate of 14% during the decade 1961-1971, faster than the rate of growth in industrial production. Industry, along with mining, accounts for over 85% of the total exports of US$2,810 million (1971).

3. Since widespread reforms of 1965, there has been a general reduction in quantitative restrictions and import duties and a better alignment of domestic prices with world prices. By the end of 1971, only 20% equipment imports, 25% of raw material and semi-finished goods and 37% of consumer goods imports fell under the restrictive commodity quota and direct licensing schemes. Between 1965 and 1971, the average duty on all imports was lowered from about 14% to about 12% and on equipment imports from 24% to 18%, with further reductions in 1972 and 1973. Compared to most developing countries, these rates are quite moderate. They are increased, however, by customs and border taxes (together 3-4%) and, since 1971, by a special surtax of 6%. The highest average duty protection applies to metal products (25%) and electrical equipment (22%), two of the fast-growing subsectors.

4. The current Five-Year Plan (1971-75) target for the growth of industry (including mining and quarrying) is 8% a year. Crude steel production is expected to grow at an annual rate of 14%, reaching about 5 million tons in 1975. Equipment and durable consumer goods industry, which currently accounts for about 26% of the total industrial output, is expected to grow at the rate of 8.5% a year.

Main Users of Castings

5. The main users of castings are motor vehicles, agricultural machinery, electrical and non-electrical machinery, machine tools, construction industry, rail wagons, shipbuilding, and consumer durables. Past trends and future projections of production in some of these industries are shown below:

	Units	1967	1970	1975 1/	1980 1/
Motor Cars	Nos.	47,888	110,709	210,000	250,000
Trucks	Nos.	9,654	12,901	25,200	32,050
Buses	Nos.	2,421	3,856	5,750	5,000
Tractors	Nos.	8,793	12,047	27,000	40,000
Machine Tools	Tons	9,841	12,180	16,100	20,000

1/ UMI estimates based on the Social Plan

B. Structure of Foundry Industry

6. There are about 250 foundries in Yugoslavia of which approximately 50 accounted for nearly 90% of the production of castings in 1972 totalling about 453,300 tons. The following table shows the structure of the foundry industry:

Structure of Foundry Industry (1972)

	Production (in tons)	% of Total Production
I. Iron Castings		
Malleable	12,927	2.8
Pipe Fittings	7,408	1.6
Gray	341,571	75.4
Nodular	11,000	2.4
Sub-total	372,906	82.2
II. Steel Castings	51,959	11.5
III. Total Ferrous Castings (I + II)	424,865	93.7
IV. Non-Ferrous Castings	28,422	6.3
V. Total Castings (III + IV)	453,287	100.0

7. Only 12 foundries have an annual capacity of over 10,000 tons each (see Tables 1 and 3). Majority of the foundries (162) produce less than 500 tons a year. An international comparison (Table 4) shows that Yugoslav production of castings is low. For example, in 1971 the production of Yugoslavia was only 9% of the castings output of the Federal Republic of Germany.

C. Production of Castings

8. In 1960, the total production of castings was nearly 231,670 tons. During 1960-1972, it increased at an annual rate of 5.8%. The following table shows the growth of production during this period and the projection for 1977 (see also Table 2):

Production of Castings (Tons)

	1960	1972	1977	Average Annual Growth (%)	
	---Actual----		Proj.	1960-1972	1972-1977
Iron Castings					
a. Malleable Iron Castings and Pipe Fittings	4,400	20,335	28,750 1/	13.6	7.0
b. Gray and Nodular Castings	188,031	352,571	546,250 2/	5.4	9.5
c. Total Iron Castings	192,431	372,906	575,000	5.6	9.0
d. Steel Castings	23,320	51,959	83,000	7.0	10.0
e. Total Ferrous Castings (c + d)	215,751	424,865	658,000	6.0	9.0
f. Non-Ferrous Castings	15,915	28,422	48,500	5.0	11.0
TOTAL	231,666	453,287	706,500	5.8	9.0

1/ Including about 10,000 tons of pipe fittings.
2/ Including about 24,000 tons of nodular castings.

Source: Foundry Association of Yugoslavia and Bank.

9. Considering the expansion programs of various foundries, it appears that during 1972-1977, total production of castings would grow at an average annual rate of about 9%, reaching 706,500 tons in 1977.

Iron Castings

10. The production of iron castings accounted for 82% of the total castings output in 1972. The percentage is expected to decline slightly to 81% by 1977 because of the faster rate of expansion of steel and non-ferrous foundries. Among iron castings, gray and nodular castings are the most important followed by malleable castings and pipe fittings.

11. Gray and Nodular Castings: There are 100 and odd gray and nodular iron foundries in Yugoslavia of which less than half accounted for nearly 90% of the total production estimated at 352,600 tons in 1972. Production in the next five years is expected to increase by about 55% mainly because of the expansion of the following five foundries: FOB, Kikinda, Zrenjanin, Ilias and Store.

During 1972-78, FOB, a leading producer of gray castings, plans to increase its production of gray and nodular castings from 34,000 tons to 90,000 tons; Kikinda's output of different products is expected to jump from 13,260 tons to 37,000 tons; and the Zrenjanin foundry which produces mostly radiators for heating buildings, plans to expand its production from 15,000 tons to 30,000 tons. FOB and Kikinda are bound by a technical and production demarcation agreement signed in 1971. According to this agreement, FOB would concentrate on the production of gray castings for the motor vehicle and tractor industries, while Kikinda would confine its gray castings production to meet its internal requirements to produce machine tools. In the case of nodular castings, Kikinda would expand its production on a large scale (from 3,310 tons to 16,000 tons) during 1972-1977 while FOB would undertake only minor expansion from 4,150 tons to 9,250 tons. Further, FOB would not produce malleable and pipe fittings, while Kikinda would expand its production of such castings.

12. Currently, the production of nodular castings is low at 11,000 tons with Kikinda accounting for 30% of the total production. Kikinda's production of these castings is expected to increase to 16,000 tons in 1977 when the Company would account for about 67% of the total of nodular output. Apart from Kikinda and FOB, there are three nodular casting producers: Store Steel Plant in Slovania; Torpedo at Rijeka in Croatia; and Dalit at Daruvar, also in Croatia. These three plants, which also produce gray castings, had the following production capacity in 1972:

	(in tons)	
	Nodular	Gray
Store	2,500	12,500
Torpedo	500	3,500
Dalit	400	3,100

Of the above three foundries, only Torpedo has plans to expand and double its production of both gray and nodular castings.

13. Malleable Castings: There is a trend towards the use of nodular castings in the place of malleable iron castings in the main automobile producing countries. As a result, nodular iron castings are likely to gain importance in the future. However, it is very unlikely that the complete substitution of malleable castings by nodular castings would take place within the next decade. Currently, there is a shortage of malleable castings in Western Europe where the production of such castings has decreased steeply. In this context, Kikinda, the major producer of malleable castings, feels that the prospect for malleable castings are good at least for one decade. Under a carefully planned expansion program, Kikinda is expanding its malleable castings production from 9,198 tons to 19,500 tons during 1972-1977. While doing this, sufficient flexibility would be built into the expanded facilities to switch over from malleable to nodular and gray castings production completely if future market conditions necessitate such a measure.

14. Kikinda currently accounts for about 40% of the total malleable castings production in the country. Other important producers of malleable castings are: MINEL at Topola in Serbia; Novi Zivot at Zenica in Bosnia -- Hercegovina; and Titan at Kamnik in Slovenia. These three foundries have the following expansion programs:

Malleable Castings Capacity
(In tons)

	1972	1977
MINEL	1,500	2,000
Novi Zivot	4,000	5,200
Titan	4,000	5,200
Total	9,500	12,400

15. Malleable Pipe Fittings: In 1972, Kikinda accounted for 56% of the total malleable pipe fittings produced in Yugoslavia. Apart from this Company, which plans to expand its production from 4,113 tons to 6,400 tons during 1972-77, there is only one other foundry (Titan) which has major expansion plans to double its capacity to 4,000 TPY.

D. Growth of Castings Consumption

16. The main consumers of iron castings (excluding pipe fittings) are industries producing agricultural machinery, motor vehicles, machine tools, ships, rail wagons, household appliances, etc. The construction industry is the main consumer for pipe fittings. Currently, as a result of the construction boom in Yugoslavia, there is a shortage of pipe fittings and their prices are controlled.

17. The apparent consumption of all iron castings increased at an average rate of 11% during the last four years, reaching 321,000 tons in 1972 as shown in the following table:

Past Trend of Apparent Consumption of Iron Castings
(In '000 tons)

	1968	1969	1970	1971	1972
1. Domestic Iron Casting Production	260.0	306.5	340.0	360.0	373.0
of which:					
a. Gray and Nodular	248.0	293.0	324.0	343.0	352.6
b. Malleable (including Pipe Fittings)	12.0	13.5	16.0	17.0	20.4
2. Exports	51.3	50.4	57.0	61.4	66.0
3. (1) - (2)	208.7	256.1	283.0	298.6	307.0
4. Imports	4.0	6.8	9.7	11.0	14.0
5. Apparent Consumption (3) + (4)	212.7	262.9	292.7	309.6	321.0

E. Demand Forecast for Iron Castings by Subsectors

18. According to past experience in Yugoslavia, the average requirements of castings to manufacture one unit of the following products are: 1 car, 110 kgs; 1 truck, 890 kgs; 1 bus, 720 kgs; 1 wheeled tractor, 885 kgs; 1 crawler tractor, 1,470 kgs; one ton of machine tools, 830 kgs; one ton of electrical equipment, 100 kgs; one ton of non-electrical equipment, 280 kgs; one ton of agricultural machinery (excluding tractors), 100 kgs; one ton of construction machinery, 370 kgs. These normative requirements are used to forecast the need for castings in the various subsectors.

Motor Vehicles

19. Car Production: Zavodi Crvena Zastava (ZCZ) located at Kragujevac, near Belgrade, is the only car producer in Yugoslavia. It produces five basic models under a license from FIAT of Italy. It has an annual capacity to produce 110,000 cars. In 1972, Zastava produced 90,000 cars, with the capacity utilization being 82%. The production of the company is expected to increase to 225,000 in 1977. Based on the normative of about 110 kgs of castings per car, the total requirements of Zastava would be about 24,800 tons in 1977. The company relies mainly on the FOB (at Belgrade), Kikinda (130 km from Belgrade) and MINEL (at Topola) foundries for the supply of castings.

20. Car Assembling: There are three enterprises which assemble cars. They include: Industrija Motornih Vozil (IMV), at Novo Mesto, operating in collaboration with Renault of France; Tovarna Motornih Vozil (TOMOS) at Koper which collaborates with Citroen of France; and Udruzena Metalna Industrija (UNIS) at Sarajevo which has collaboration agreement with Volkswagen of Germany. Their total assembly production was about 20,000 in 1972. It is expected to remain constant at this level up to 1977. Therefore, the demand for castings by car assemblers would continue to be at the 1972 level of 2,200 tons.

21. Truck and Bus Producers/Assemblers: The main truck and bus producers/assemblers are FAP-FAMOS (Priboj and Sarajevo), Ikarus (Zemun), TAM (Maribor), Torpedo (Rijeka), and Zastava. Their total production is expected to increase as follows:

(Nos.)

	1972 (Actual)	1977
Trucks and Vans	15,000	27,000
Buses	4,000	6,000

22. Assuming an average of 890 kgs of casting per truck and 720 kgs per bus, the total castings requirements for their production/assembly would increase from 13,770 tons in 1972 to 28,130 tons in 1977.

Tractors

23. Wheeled Tractors: The production of wheeled tractors is projected to increase from 17,850 in 1972 to 38,850 in 1977. Assuming about 885 kgs of castings per tractor, the total requirement of castings for the production of wheeled tractors would be 33,500 tons in 1977 compared to 15,800 tons in 1972.

24. Caterpillar Tractors: The output of caterpillar tractors is projected to increase from 545 in 1972 to 1,150 in 1977. Assuming 1,470 kgs of castings per unit, the total requirement of castings for the production of caterpillar tractors would be 1,700 tons in 1977.

Agricultural Machinery (excluding tractors)

25. These machinery including harvesters, combines, etc. consumed a total of about 5,500 tons of castings in 1972. Their production is projected to increase to 72,000 tons in 1977. Assuming an average of 100 kgs of castings per ton of machinery of this type, the total requirement of castings by this subsector would be about 7,200 tons in 1977.

Machine Tools

26. Machine tool production in 1972 was 13,125 tons when 10,160 tons of castings were required. The production is expected to reach 17,990 tons in 1977, when the total castings requirements, at the rate of 830 kgs per ton of machine tools, would be about 14,900 tons.

Electrical Machinery

27. The production of electrical machinery in 1972 was about 24,500 tons when the total castings used in their manufacture was nearly 2,450 tons. This subsector is growing at the rate of about 9% a year and its production is expected to reach 37,700 tons in 1977. Assuming 100 kgs of castings per ton of electrical machinery, the total requirement of castings by the electrical machinery subsector would be 3,770 tons in 1977.

Non-Electrical Machinery

28. In 1972, about 24,000 tons of castings were used to produce about 85,700 tons of non-electrical machinery. The production of non-electrical machinery, presently growing at the fast rate of about 10.5% a year, is expected to reach about 141,200 tons in 1977. Assuming 280 kgs per ton of non-electrical machinery, the total requirement of castings by this subsector would be about 39,500 in 1977.

Construction Machinery

29. The manufacture of construction machinery required over 16,100 tons of castings in 1972. Assuming 370 kgs of castings per ton of construction machinery, the total requirement of castings by this subsector would be about 29,700 in 1977 when the total production of construction machinery is projected at 80,300 tons.

Consumer Durables

30. The production of consumer durables required about 33,500 tons of castings in 1972. This subsector is growing at the rate of 8.5%. Assuming the same growth rate for the castings requirements of this subsector, the total requirement of castings would reach about 50,400 in 1977.

Other Users

31. Other users of castings include ship building, railway rolling stock, housing, etc. as well as the replacement market for various motor vehicles and machinery. These users required about 185,200 tons of castings in 1972. Looking at the projections for the growth of these subsectors, it seems realistic to assume that their castings requirements would increase by at least 15% a year. Based on this assumption, their casting needs would be about 372,300 tons in 1977.

F. Total Demand and Supply Comparison

32. From the above estimates, it appears that the total demand for castings in Yugoslavia would increase between 1972 and 1977 as follows:

Total Demand for Castings by Subsectors
(in '000 tons)

	1972	1977
Car Production	11.8	26.8
Truck Production	13.8	24.1
Bus Production	2.7	4.0
Tractor Production	16.6	36.0
Agricultural Machinery (excluding tractors)	5.5	7.2
Machine Tools	10.2	14.9
Electrical Equipment	2.5	3.8
Non-Electrical Equipment	24.0	39.5
Construction Machinery	16.1	29.7
Consumer Durables	33.5	50.4
Other Users	185.2	372.3
Total	320.9	608.7

The above table shows that the total demand for iron castings would grow from about 321,000 tons in 1972 to 609,000 tons in 1977, reflecting an average annual growth rate of around 13.5%.

33. Currently, the shares of gray, nodular and malleable castings (including pipe fittings) in total demand are around 91%, 3% and 6% respectively. This is borne out by the experience in other countries as well, with minor variations. However, by 1977, the share of malleable castings is likely to go down to 5% and the share of nodular castings would go up to 5%, with the share of gray castings declining slightly to 90%. This change in the proportional

shares of the three types of castings would result mainly because nodular castings are gradually replacing malleable castings. Assuming these shares, the total demand in 1977 by type of castings would be as follows:

Total Domestic Demand in 1977 by Type of Castings
(in '000 tons)

Gray	548.0
Nodular	30.5
Malleable (including pipe fittings)	30.5
Total	609.0

G. Domestic Production and Demand Comparison for 1977

34. As noted earlier, the total production of iron castings would be 575,000 tons in 1977. However, the domestic demand would be higher than the production by 34,000 tons as shown below:

Domestic Production and Demand for Iron Castings in 1977
(in '000 tons)

	Production	Domestic Demand	Surplus (deficit)
Gray	522.2	548.0	- 25.8
Nodular	24.0	30.5	- 6.5
Malleable (including pipe fittings)	28.8	30.5	- 1.7
Total	575.0	609.0	- 34.0

The above table shows that the domestic production of all types of iron castings would fall short of domestic demand.

Imports

35. Yugoslavia imports certain types of iron castings (i.e. valve bodies, large pipe fittings etc.) which are either in short supply or not made in the country. Imports were at the low level of 4,000 tons in 1968 but they rose sharply by 37% a year, reaching 14,000 tons in 1972. In the future, they are projected to rise at an annual rate of about 12%, reaching 25,000 tons in 1977.

Exports and Total Domestic Supply

36. Yugoslavia is a significant exporter of iron castings. In 1972, its exports reached 66,000 tons, 5 times the imports. The main export markets are Germany, Italy, France, Hungary, Romania, Bulgaria, and the U.S.S.R. Exports grew at the rate of 6.5% a year during 1968-72. During the next 5 years (1972-77), they are projected to grow at an annual rate of 8.5%, reaching 100,000 tons in 1977. It is most likely that this export level

would be reached. In that case, castings available for internal consumption would be 475,000 tons. To this, if the projected imports of 25,000 tons are added, the total domestic supply would be 500,000 tons compared to the internal demand for about 609,000 tons. This reflects that by 1977, the actual deficit between total demand and supply would reach 109,000 tons. Therefore, foundries in Yugoslavia will have to expand at a faster rate to bridge the widening gap between supply and demand.

H. Market for Kikinda Castings

37. Kikinda is the largest producer of malleable and nodular castings for cars and commercial vehicles, and pipe fittings for the construction industry. It also produces gray castings in a small quantity for its own machine tool production.

38. During 1972-77, Kikinda's production of malleable castings would increase from 5,085 tons to 13,100 tons. During the same period, the production of nodular castings would rise from 3,310 tons to 16,000 tons; pipe fittings, from 4,113 tons to 6,400 tons; and gray castings from 750 tons to 1,500 tons. The following table compares the share of Kikinda in the production of various castings in Yugoslavia between 1972 and 1977:

Share of Kikinda in Yugoslav Production of Castings by Types

Type of Castings	Kikinda Production (tons)		Country's Production (tons)		% Share of Kikinda	
	1972	1977 (proj.)	1972	1977 (proj.)	1972	1977 (proj.)
Malleable	5,085	13,100	12,927	18,750	39.3	70.0
Nodular	3,310	16,000	11,000	24,000	30.1	67.0
Pipe Fittings	4,113	6,400	7,408	10,000	55.6	64.0
Gray	750	1,500	341,571	522,250	0.2	0.3

The above table shows that during 1972 and 1977, the share of Kikinda in the country's production would increase greatly from the already high level in the case of malleable and nodular castings as well as pipe fittings. But, in the case of gray castings, Kikinda's share would continue to be insignificant. For Kikinda's malleable castings, the main customers are the Yugoslav car manufacturer, Zastava, as well as car assemblers; Opel AG of the German Federal Republic; and car manufacturers in the German Democratic Republic. Inquiries for supply of malleable castings have been received from Volkswagen and Ford of Germany, Alfa Romeo of Italy, and also from some U.S. car producers. For Kikinda's nodular iron castings used mainly for trucks and buses, the main customers are the two Yugoslav truck manufacturers, TAM (a joint venture with Klockner Hambolt Deutz, Germany), and FAP-FAMOS (a joint venture with DMB, Germany); and the truck manufacturers Raba and Cepel in Hungary and MAN of Germany. Further, inquiries have been received from Volkswagen (Germany) and some U.S. producers.

1. Malleable Iron Castings

39. As already noted, Kikinda sells most of its castings by entering into long-term supply agreements with major automotive manufacturers. The Company has agreed to deliver 2,000 tons of malleable iron castings to Zastava in 1973 and, with the projected more than doubling of car production by 1977,

its castings requirement from Kikinda is likely to increase by at least 30% by 1977. As for exports, the Company has a long-term contract with Opel AG (Germany) to supply about 5,000 tons in 1977. These two customers alone would account for nearly 58% of Kikinda's market for malleable iron castings in 1977. The existing contracts with several other customers in Yugoslavia would result in the sale of an additional 2,700 tons per year. The following table shows the agreed deliveries to and projected requirements of Kikinda's main customers:

	Agreed Deliveries		Agreed Deliveries Plus Inquiries
	1973	1977	1977
		(in tons)	
Domestic Market			
Zastava	2,000	-	2,600
FAP-FAMOS	-	-	600
Cimos	100	-	1,700
Others	100	-	400
Sub-Total	2,200		5,300
Convertible Market			
Opel AG (Germany)	3,800	5,000	5,000
Alfa Romeo (Italy)	150	-	1,000
VW (Germany)	-	-	1,000
Ford (Germany)	-	-	2,000
U.S. (inquiry)	-	-	2,000
Sub-Total	2,950		11,000
Clearing Market	-	-	-
Grand Total	5,150	5,000	16,300

40. According to these projections, the expected total demand of 16,300 tons will exceed Kikinda's projected available capacity of 13,100 tons by 3,200 tons in 1977.

2. Nodular Iron Castings

41. Kikinda has already contracted for 5,000 tons which it will not be able to meet fully with its current 4,500-ton capacity. The following table shows the agreed deliveries for 1973 and the expected demand in 1977:

	Agreed Deliveries	Inquiries Received
	1973	1977
	(in tons)	
Domestic Market		
	-	3,600
FAP-FAMOS	500	1,000
TAM and others	500	500
Sub-Total	1,000	5,100
Convertible Market		
DMB (Germany)	400	400
KHD (")	-	2,000
VW (")	-	200
MAN (")	100	2,000
U.S.	1,400	6,800
Djer (Hungary)	1,000	-
Cepel (Hungary)	500	2,000
Sub-Total	3,400	13,400
Clearing Market	100	1,000
Grand Total	4,500	19,400

42. According to the above table, the expected total demand of 19,400 tons will exceed the projected available capacity of 16,000 tons of Kikinda by 3,400 tons in 1977.

3. Kikinda Pipe Fittings

Domestic Market

43. Table 7 shows domestic sales of fittings according to republics. Sales of fittings in 1972 reached 1,882 tons. The current commitment to domestic wholesalers for 1973 is 2,000 tons of finished fittings. With the expectation of increased available capacity, sales of 3,300 tons are projected for 1977. This represents a 12.5% annual average growth of domestic sales which appears realistic as sales have grown in the past at an annual average rate of about 15%. This appears to be a reasonable assumption, given the housing shortage in Yugoslavia and the present construction boom especially in the private and social sector apartment projects.

Export Markets

44. Convertible currency areas: The main export markets for Kikinda fittings are Italy and the German Federal Republic. In May 1969 Kikinda signed a 10-year supply contract with Locatelli, Italy, for minimum deliveries of castings of 1,800 tons annually. By 1977 an additional 3,100 tons are expected to be sold to foreign customers.

45. Clearing Currency Areas: Kikinda entered into an agreement to supply, together with the only other Yugoslav producer (Titan) up to 1,300 tons annually to the German Democratic Republic. Agreed quantities for 1973 by Kikinda to the clearing area were limited to 200 tons; it is expected to increase to 1,000 tons in 1977.

Sales Projection

46. Kikinda projects the following sales of pipe fittings:

	Agreed or Expected Deliveries (tons)		Demand (tons) Inquiries Plus Contracts
	1973	1977	1977
Domestic			
- wholesalers	2,000	3,000	3,300
Export - Convertible areas	1,800	1,800	4,900
of which:			
- Locatelli (Italy)	1,700	1,800	3,000
- Induco Handel (Germany)	100	-	1,000
- Others	-	-	900
Export - Clearing Area	200	600	1,000
Total Export	2,000	2,500	5,900
Total Sales: Domestic and Export	4,000	5,500	9,200

47. As against an anticipated demand for 9,200 tons of Kikinda pipe fittings, the Company's production would be only 6,400 tons, thus indicating a gap of 2,800 tons in 1977.

I. Price Tariffs and Competitive Position in Export Markets

1. Castings Prices

48. For castings (except pipe fittings), Yugoslav foundries are free to set domestic prices taking into account the prevailing market conditions, the international price level, the national development policy, and the stage of development of the enterprises. The Federal Council for Prices has the power to review the prices set by the enterprises. Export prices can also be freely set, although in several cases, foundries enter into long-term supply contracts with automotive manufacturers which specify the quantities required and the minimum prices that can be expected. Table 5 shows for 1973 comparative ex-factory prices for some typical automotive castings. Direct price comparisons are difficult as the casting piece weight, size and intricacy influence the price structure of individual castings. The prices per ton of castings, therefore, give only a very limited basis for comparison as the product mix of one enterprise differs from another, and the price per ton reflects such differences. This is particularly true of the Yugoslav foundries where relatively simple castings have been chosen for price comparison with those of export markets. However, the overall average price for the German malleable and nodular castings pertains to more intricate castings.

49. Kikinda has a good rating with its major export customer, Opel AG; the rejection rate is hardly 2%. As a result of uniformly good quality, Kikinda exports command good prices. Its prices are on the whole internationally competitive.

Imports and Import Tariffs

50. The official customs duty of 15% on the import of unfinished iron castings plus 10% in import taxes give an overall protection of 25%. Imports of unfinished ferrous castings are not controlled; however, the total imports to Yugoslavia of unfinished gray and malleable iron castings are low. Imports of finished automotive castings by automotive assemblers are also not directly controlled, but are allowed only on the basis of the foreign exchange retention quota earned by enterprises.

Exports and Export Incentives

51. Exports of castings are encouraged by the Government especially to convertible currency markets. The enterprise receives a direct incentive to export through the foreign exchange retention quota system whereby 20% of the foreign exchange earnings is available to the enterprise for free use.

52. Cooperation agreements between foreign car manufacturers and Yugoslav assemblers require that the Yugoslav assemblers export a certain amount of automotive components before receiving an import permit for CKD car parts.

Castings are one of the important products available for such exports and this is one of the reasons for the German, Italian and French car manufacturers' interest in importing castings from Yugoslavia.

Quality and Delivery Performance

53. To ensure continuity and quality of supply, automotive manufacturers set strict standards. The major Western automotive manufacturers give their supplying foundries quality ratings based on their adherence to metallurgical quality specifications and delivery schedules. On this basis, order sizes and prices are set. For instance, for foreign suppliers German car manufacturers allocate a maximum per foundry of between 20% to 30% of their total requirements of specific types of castings. Prices are set on the basis of competitive bids, and the quality rating of a foundry determines the price offered by the customer. Low-rated foundries are unlikely to receive long-term orders; hence the need for a foundry to establish good rating with customers.

Domestic Prices

54. Kikinda's average domestic price per ton for malleable iron castings compared to those of its major export markets is about 30% lower than the domestic prices of Germany and over 10% lower than Italian prices. (Table 5). While, for reasons discussed in Para. 48, these prices are not strictly comparable, they do indicate a sufficient price advantage for Kikinda to expand exports for malleable iron castings.

55. Kikinda's average domestic price for nodular iron castings does not have any price advantage when compared to the average price for a sample of castings from Italy, but it is over 10% lower than the average domestic price in the German Federal Republic. Anticipated supply shortages in Italy due to the expansion projects of Alfa Romeo are expected to increase the domestic prices of castings and improve the export prospects of Kikinda to that country.

Export Prices

56. Table 6 shows that Kikinda's export prices per ton of both malleable and nodular castings are typically lower for sales to convertible markets than for domestic sales. This is due in part to the need to compete with other foreign suppliers.

2. Pipe Fittings Prices

57. Domestic prices for pipe fittings are controlled by the Federal Government. The last increase in pipe fitting prices was 18% in 1971. As for imports, the present customs rate of 12% plus 10% import taxes gives an overall protection of 22%. Pipe fittings of very small diameter which are not produced in Yugoslavia are imported. Currently, as Yugoslavia is experiencing a shortage of fittings, Kikinda expects that the Government will reduce the import duty. Kikinda, therefore, projects a drop in average price per ton of fittings from 25,000 Dinars in 1972 to 23,500 Dinars in 1977.

58. Export prices for the clearing area are expected to rise at a higher rate than for the convertible area due to continuing shortage conditions in the former. Convertible market prices for Kikinda are determined largely by its sales agent, Locatelli, Italy. The 10-year supply contract with the firm specifies minimum annual delivery quantities, but the price is to be determined according to market conditions. While Kikinda could possibly realize higher prices by independent sales, the sale of fittings is largely controlled by groups of suppliers, and entry to this market is difficult. Pricing is based on quantity discounts from certain recognized catalogues.

J. Kikinda's Marketing Organization for Castings

For Automotive Castings

59. For the domestic market, sales are made directly to customers. Supply agreements are entered into with the automotive manufacturers, Zastava, TAM and FAP-FAMOS.

60. Export sales are now increasingly made directly to customers by the sales staff of Kikinda instead of depending entirely on export-import firms as in the past. However, such firms are encouraged to bring in new orders and inquiries. Those firms include: Invest-Import in Belgrade for German Federal Republic customers; Masino-Impeksin Zagreb, and Dinara in Belgrade for Hungary; FAP-FAMOS in Belgrade for Mercedes Benz, Germany; UNIS-TAS in Sarajevo for Volkswagen, Germany; and Kosmos in Ljubljana for MAN, Germany, and Alfa Romeo, Italy.

61. To insure closest cooperation with export customers especially on technical and quality matters, Kikinda maintains direct contacts with the customers concerned. For example, Kikinda's resident representative (sales engineer) in Frankfurt, Germany, maintains close contact with their main purchasing agent, Reinhalt Huppert, for supply to the German automotive manufacturers.

For Pipe Fittings

62. On the domestic market, 90% of Kikinda's fittings are sold through wholesalers, and the remainder directly to customers. The wholesale outlets are located in Novi Sad, Belgrade, Skopje, Maribor and Split.

63. Export sales are made through fittings dealers such as Locatelli (Italy) and Induco Handel (German Federal Republic) and by trade agreements to clearing markets. Export invoicing is handled by Invest-Import in Belgrade for the German Federal Republic, and by Metalka in Ljubljana for the German Democratic Republic. Sales to the Lebanon are handled by Zeljpohon in Zagreb, and to Bulgaria by Unis Komerc in Sarajevo.

Industrial Projects Department
July 1973

Table 1

YUGOSLAVIA - STRUCTURE OF FERROUS AND NON-FERROUS FOUNDRIES[1/] (1972)
(By Capacity Groups in Tons Per Annum and by Republics)
(1972)

Republic	tons				
	Up to 500	500-2,000	2-5,000	5-10,000	Over 10,000
Slovenia	19	10	3	3	3
Croatia	59	10	11	1	3
Serbia & Vojovodina	66	12	10	8	5
Bosnia - Herzegovina	10	3	4	1	1
Macedonia	5	-	2	-	-
Montenegro	3	-	-	1	-
Total Number[2/]	162	35	30	14	12

Annual Production Capacity*
(1972): 458,400 tons total, ferrous and non-ferrous
of which: 354,200 tons gray iron
22,700 tons malleable iron
11,500 tons nodular iron
40,000 tons steel castings
30, 000 tons non-ferrous castings

* Approximate, varying according to product mix; based on two-shift operation.

1/ Approximate capacity data derived from statistics provided by the enterprises FOB and Kikinda, and the Yugoslav Foundry Association.

2/ The total number of operating foundries is approximate.

Industrial Projects Department
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Table 2

YUGOSLAVIA - IRON CASTINGS PRODUCTION - HISTORY AND FORECAST[1/]
('000 Tons)

	1967	1968	1969	1970	1971	1972	1973	1974	1975	1978
Gray	242.0	246.8	290.8	321.3	337.3	341.6	371.5	403.5	437.0	566.5
Malleable (including pipe fittings)	10.5	12.0	13.5	16.0	17.0	20.3	22.0	23.5	25.0	30.5
Nodular	1.0	1.2	2.2	2.7	5.7	11.0	13.0	16.0	21.0	30.0
TOTAL	253.5	260.0	306.5	324.0	360.0	372.9	406.5	443.0	483.0	627.0

1/ Based on production data and forecasts supplied by the Yugoslav Foundry Association.

Industrial Projects Department
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TABLE 3

YUGOSLAVIA - MAIN FOUNDRY CAPACITIES - 1973 1/

Republic	Location	Producer	Foundry Type	Typical or Main Product	Approximate Current Capacity (Tons)
FERROUS:					
Slovenia	Crnomelj	Belt	gray	auto castings	7,000
	Jesenice	Zelezarna	gray and steel	ingot molds	3,500
	Kamnik	Titan	malleable and gray	appliances and fittings	7,500
	Ljubljana	Litostroj	gray and steel	marine engines, machine tools	7,000
	Maribor	TAM	gray	air cooled engines	2,000
	Muta ob Dravi	Muta	gray	flywheels	13,000
	Nova Gorica	Gostol	gray	stove plates	3,000
	Ravne na Koroskem	Zelezarna	gray and steel	alloys	12,000
	Store	Zelezarna	steel and nodular	ingot molds, auto castings	27,000
Croatia	Bjelovar	Tomo Vinkovic	gray	implements	2,000
	Daruvar	Dalit	gray and nodular	construction equipment	4,000
	Osijek	Olt	gray and malleable	motors, implements, baths	15,000
	Pula	Uljanik	gray	marine engines	3,000
	Rijeka	Torpedo	gray and nodular	engines & crankshafts	4,000
	Rijeka	3 May	gray	marine engines	3,000
	Rijeka	Vulkan	steel	valves	4,000
	Sisak	Zeljezara	steel and gray	industrial equipment	8,000
	Slavonski Brod	Dakovic	gray	machine tools & construction equipment	3,000
	Slavonska Pozega	Lievaonica	gray	radiators & sanitation castings	20,000
	Split	Brodogradiliste	gray	marine engines	3,000
	Varazdin	MIV	gray	pipes and fittings	10,000
	Virovitca	Rapid	malleable	automotive castings	1,000
	Zagreb	J. Credelj	gray	brake shoes (railways)	2,000
	"	Prvomajska	gray	machine tools	4,500
	"	Tekstil stroj	gray	textile machines	2,000
	"	Vulkan	steel	marine parts	4,000
Serbia & Vojvodina	Ada	GE-GE	gray	machine tools	1,000
	Belgrade	ILR	gray and steel	railway castings	5,000
	"	FOB and IMR	gray and nodular	automotive castings	34,000
	"	"Beograd"	gray	sewerage pipes & fittings	20,000
	Dekovica	Dekovica	gray	sewerage pipes	1.000
	Guca	Industrijki Kombinat	gray	pipes and fittings	10,000
	Kikinda	LZT	gray. malleable and nodular	auto castings, machine tools. fittings	16,500
	Knjasevac	FML	gray	tractor parts	1,000
	Kraljevo	Fabrika Vagona	gray	stove plates	4,000
	Krusevac	14 October	steel	caterpillar tractor castings	1,000
	Leskovac	Rode Metslac	gray	textile machinery	5,000
	Mladenovac	Petar Drapsin	malleable & gray	piston rings	2,000
	Nis	S. Paunovic MIN	gray	railway castings	5,000
	Novi Sad	27 March	gray	piston sets, auto castings	6,000
	Novi Sad	MAG-Podeda	gray & malleable	machine tools, implements, fittings	2,000
	Prijepolje	FAP-F AMOS	gray	truck brake drums	4,000
	Smederevo	Fagram	gray	machine tools & compressors	3,000
	Smederevo	Zeljezara	steel	steel castings	5,000
	Surdulica	Mackatica	steel	steel castings (manganese)	2,000
	Svetozarevo	M Mijal Kovic	gray	(gray and nonferrous)	2,000
	Topola	MINEL	malleable	auto castings	1,500
	Valjevo	Krusik	gray	precision castings	1,000
	Vrsac	"Beograd"	gray	spun pipes	5,000
	Zrenjanin	Frab. Katl i rad.	gray	radiators	18,000
Bosnia - Herzegovina	Banjaluka	Jelsingrad	gray & steel	machine tools	4,000
	Ilijas	Zenica	gray & steel	pipes, fittings, ingot molds	60,000
	Sarajevo	Energoinvest	gray & steel	valves & fittings	2,000
	Vares	Zenica	gray	pipes & fittings	5,000
	Zenica	Novi Zivat	malleable	auto castings	4,000
	Zenica	Zeljezara	steel	steel castings	4,000
Macedonia	Bitola	L. Bitola	gray	appliances	3,000
	Skopje	Zavodi Tito	gray	machine tools	3,000
Montenegro	Niksic	Boris Kidric	steel & gray	construction	3,000
NON-FERROUS					
Slovenia	Skofja Loka	LTH	aluminum	auto components	n.a.
Croatia	Makarska	Energoinvest	aluminum	n.a.	n.a.
	Rijeka	A. Mamic	bronze	marine parts & fittings	n.a.
	Rijeka	Bencic	bronze	n.a.	n.a
	Zagreb	Sila			
Serbia & Vojvodina	Belgrade	IPM	zinc	statues	n.a
	Kula	Istra	(non-ferrous)	n.a.	n.a.
	Kula	Vulkan	(non-ferrous)	n.a	n.a.
	Mladerovac	Peter Drapsin	aluminum & bronze	piston sets	5,000
	Nis	MIN	bronze	n.a.	n.a.
	Nis	Novkabel	(non-ferrous)	cables	n.a.
	Novi Sad	27 March	aluminum	piston sets	n.a.
	Sevojno	Sevojno	copper	cables	n.a
	Sombor	Bare Sekulia	(non-ferrous)	n.a.	n.a
	Zvecan	Trepca	lead	n.a.	n a.
Bosnia - Hergegovina	Zenica	Novi Zivot	(non-ferrous)	n a.	n.a.
Macedonia	Skopje	Alumina	aluminum	n.a	n.a.
Montenegro	Titograd	R Daki	(non-ferrous)	n.a.	n.a.

1/ Partial listing only, based on information supplied by Yugoslav Foundry Association and enterprises FOB-Belgrade and LZT-Kikinda.

Industrial Projects Department
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Table 4

INTERNATIONAL COMPARISON OF FOUNDRY PRODUCTION
('000 Tons)

	1967	1968	1969	1970	1971	Per Capita Production (1971) (In Kgs)
Gray Iron Castings						
Germany	2,898	3,259	3,602	3,763	3,277	55.6
U.K.	3,278	3,248	3,408	3,395	2,921	52.0
France	1,829	1,824	2,015	2,045	1,926	37.4
Italy	1,193	1,265	1,244	1,421	1,198	22.1
Yugoslavia	242	247	291	321	337	16.2
Nodular Iron Castings						
Germany	204	326	398	428	421	7.2
U.K.	129	173	198	231	232	4.1
France	232	274	310	400	400	7.8
Italy	35	40	75	70	68	1.3
Yugoslavia	1	1.2	2.2	2.7	5.7	0.3
Malleable Iron Castings						
Germany	205	247	281	295	272	4.6
U.K.	196	201	210	206	192	3.4
France	74	80	93	98	93	1.8
Italy	72	85	87	94	73	1.3
Yugoslavia 1/	10.5	12.0	13.5	16.0	17.0	0.8

1/ Including pipe fittings.

Source: Geisserei Verlag 1972 and Yugoslav Foundry Association.

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Table 5

YUGOSLAVIA - KIKINDA IRON FOUNDRY PROJECT

COMPARISON OF AUTOMOTIVE CASTINGS PRICES 1/ (EX-FACTORY)
(Din /Kg)

	Kikinda	Germany	Italy	U.S.	Hungary
Malleable Castings					
Differential Casing	9.70	11.00	9.79	9.66	-
Axle Casing	10.85	11.25	10.19	11.05	-
Wheel Hub	8.20	10.67	9.01	9.01	-
Average Price for Malleable Castings	9.00 2/	14.4 2/	9.66 3/	9.97 3/	-
Nodular Castings					
Transmission Case	9.52	10.67	9.35	-	11.05
Axle Casing	8.56	10.15	8.84	-	10.20
Wheel Hub	8.00	9.92	8.50	-	10.03
Average Price for Nodular Castings	10.00 2/	11.4 2/	8.89 3/	-	-

1/ Conversions to Dinars made at the following rates prevailing up to June 12, 1973:
1 US$ = 17 Din.
1 DM = 6.03 Din.

2/ Average price for all such products sold by the enterprise.

3/ Average price of selected items.

Industrial Projects Department
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TABLE 6

YUGOSLAVIA - KIKINDA IRON FOUNDRY PROJECT

AVERAGE UNIT SALES PRICES - ACTUAL AND FORECAST

(Dinars Per Ton)

	Actual					Projected				
	1968	1969	1970	1971	1972	1973.	1974	1975	1976	1977
Domestic[1]										
Nodular Iron Castings[2]	-	-	-	8900	10000	10800	11000	12500	13200	13200
Malleable Iron Castings	5800	6000	6740	7500	9000	9800	10400	10700	11000	11660
Fittings	15630	15360	18460	22670	25000	25000	25000	24000	23500	23500
Convertible areas										
Nodular Iron Castings	-	-	-	-	9900	9620	10200	10800	10800	11000
Malleable Iron Castings	-	-	7500	8200	10300	11200	11200	11800	12270	12270
Fittings	7500	8200	8700	9800	12600	13[illegible]00	14000	14600	15300	15912
Clearing Areas										
Nodular Iron Castings	-	-	-	9800	10250	11500	12000	12500	13000	13000
Malleable Iron Castings	7400	-	9500	9800	-	-	-	-	-	12880
Fittings	8300	9100	9500	11000	15600	16600	17600	18700	19800	20790

1/ Gray castings produced for internal use only.
2/ Nodular iron castings first produced in 1971.

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Table 7

YUGOSLAVIA: KIKINDA IRON FOUNDRY PROJECT
DOMESTIC SALES OF PIPE FITTINGS BY REPUBLIC
(Tons)

Republic	1968	1969	1970	1971	1972
Serbia	450	470	500	540	550
Croatia	330	352	358	376	382
Slovenia	270	300	308	330	330
Bosnia - Herzegovina	200	210	210	280	260
Macedonia	180	190	190	240	260
Montenegro	81	80	82	100	100
Total	1,511	1,602	1,648	1,866	1,882

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YUGOSLAVIA - KIKINDA IRON FOUNDRY PROJECT

MARKET FOR MACHINE TOOLS

A. Demand and Supply

Introduction

1. Yugoslavia started producing machine tools after World War II. Since then, it has emerged as an important producer of a wide range of machine tools such as drilling machines, milling machines, lathes, semi-automatic and automatic machines, planing/shaping machines, gear-cutting machines, grinding machines, etc.

Machine Stock

2. At the end of 1970, Yugoslavia had a machine tool stock of 125,000 units of which lathes accounted for the largest share of 39% of the total. The following table shows the structure of machine stock in the country:

Structure of Machine Stock (1970)

Type of Machines	Nos.	Percentage Share (%)
Lathes	48,750	39.0
Semi-Automatic and Automatic Machines	3,750	3.0
Milling Machines	17,500	14.0
Gear Cutting Machines	625	0.5
Drilling Machines	26,250	21.0
Planing/Shaping Machines	1,250	1.0
Grinding Machines (Including Sharpening Machines)	10,000	8.0
Other Machines	16,875	13.5
	125,000	100.0

3. For the existing stock of machine tools in 1970, the replacement demand is estimated at about 8350 units, assuming an average life of 15 years per machine tool.

4. Of the total machine tool stock, grinding machines (including sharpening machines) accounted for 8% of the total in 1970. The structure of grinder machine stock is shown separately below:

Structure of Grinding Machine Stock (1970)

Type of Machine	Nos.	% Share in Total
Round External Grinders	1,500	15.0
Flat/Surface Grinders	600	6.0
Internal Grinders	100	1.0
Sharpening Machines & Others	7,800	78.0
	10,000	100.0

5. Based on the same assumptions made earlier (i.e. an average 15-year life per machine tool), the replacement market for grinders alone would be for about 670 units.

Per Capita Consumption

6. The machine stock in Yugoslavia is fairly high but compared to advanced countries, its annual per capita consumption of machine tools is low as shown in the following table:

	Per Capita Consumption of Machine Tools (in US$)1/
Switzerland	15.5
U. S.	12.0
Federal Republic of Germany	9.5
U. K.	7.5
France	7.0
Belgium	5.0
Yugoslavia	2.0

1/ 1968 figures.

Source: Masino-Union, Yugoslavia

The above table shows that the per capita consumption of machine tools in Yugoslavia is approximately 1/8 of that in Switzerland and 1/6 of that of the U.S.

Structure of Demand

7. In the field of machine tools, there is a growing trend in demand toward more sophisticated machines, including automated machines, from simple machines. The changing demand with respect to different machines during 1962-71 is shown below:

Structure of Demand for Machine Tools
Percentage of Total Demand

	1962	1971
Lathes	45.0	31.0
Drilling Machines	4.0	5.5
Planing/Shaping Machines	8.7	0.7
Milling Machines	20.5	21.8
Grinding Machines (Including Sharpening Machines)	0.9	9.4
Special Purpose Machines	*	9.2
Metal-Pressing Machines	9.3	10.4
Others	11.6	12.0
	100.0	100.0

* Negligible

The above table shows that the share of lathes in total consumption has declined sharply from 45% to 31% while the share of grinding machines has jumped from 0.9% to 9.4% during 1962-1971. This has come about mainly because of the need for increasing accuracy and higher tolerance demanded of machine tools has established a trend away from turning operations to grinding operations.

8. According to the Masino-Union, the share of lathes and grinding machines in total demand would change in the future as follows:

	Lathes	Grinding Machines
1971 (actual)	31.0	9.4
1977	25.0	14.0

9. In advanced countries, the percentage share of grinders in total demand has already reached 25% compared to 19% for lathes. In view of the experience in developed countries, it is realistic to expect that the percentage share of grinders in total machine tool demand would rise to 14% in 1977 as forecast by the Masino-Union.

Trend of Consumption

10. Machine tool consumption has increased at an average annual rate of 16% during 1968-1972, reaching 25,952 tons in 1972 as shown below:

Growth of Consumption of Machine Tools
(1968-1972)

	In Tons
1968	14,298
1969	15,309
1970	15,158
1971	19,786
1972	25,952
1977 (Projection)	39,200

11. Starting from a low base, the machine tool consumption has been growing fast in the past. However, in the future, the consumption would grow at a slower pace, increasing in step with the growth of the metal-transforming and equipment industries. On this basis, Masino-Union has forecast that the demand for machine tools would increase at the rate of about 8.5% a year, reaching 39,200 tons in 1977.

12. As already noted earlier, the share of lathes and grinders would be 25% and 14% respectively of the total demand for machine tools. On the above assumptions the demand for lathes and grinders in 1977 would be as follows: lathes, 9,800 tons; and grinders, 5,500 tons. Assuming that on an average, one grinder weighs 2.5 tons, the total number of grinders, including sharpening machines, required in 1977 would be 2200 units. Out of these, universal,

surface and internal grinders would account for about 570, i.e. about 25% of the total demand for total grinders. This is consistent with the Masino-Union forecast that the total demand would reach 485 units in 1975 and beyond that it would increase at the rate of 8.5% a year. No attempt has been made to forecast the demand for other machine tools as they are not of much relevance for assessing the project under appraisal, the Kikinda Foundry, which wants to specialize in the manufacture of grinders while giving up gradually the production of drilling machines. However, in the immediate future, Kikinda would increase its drilling machine production from 60 units to 80 units to help alleviate the shortage of such machines in Yugoslavia. The existing shortage is obvious from the fact that the net imports of drilling machines reached 817 in 1972 compared to 263 units in 1968.

Production and Trade

13. The production of machine tools is expected to increase from the level of 13,125 tons in 1972 to 17,990 tons in 1977, representing an annual growth rate of 6.5%. The following table shows the development of the machine tool industry in the past (see also Table 1) and projections for the future:

Trend of Machine Tool Production and Trade
(1968-1977)
(in tons)

	1968	1969	1970	1971	1972	1977	Average Annual Growth Rate (%) (1968-72)	(1972-77)
Production (tons)	9,167	9,871	12,180	12,381	13,125	17,990	9.3	6.5
Export (tons)	2,219	2,622	3,587	4,055	3,648	6,700	13.0	13.0
Imports (tons)	7,350	8,060	6,565	11,460	16,475	27,910	22.0	11.0
Consumption (tons)	14,298	15,309	15,158	19,786	25,952	39,200	16.0	8.5
Exports as % of Production	24.2	26.6	29.5	32.8	27.8	37.2	-	-
Imports as % of Consumption	51.4	52.7	43.3	57.9	63.5	71.2	-	-

During 1968-1971, exports increased rapidly, reaching the peak of 4,055 tons in 1971 before declining slightly in 1972 because of sharp increase in domestic demand which also resulted in steep rise in imports. The share of imports in consumption has risen from about 51% in 1968 to 64% in 1972, and is expected to increase to 71% in 1977, thus indicating the widening gap between supply and demand.

B. Kikinda Machines

Production Development

14. The Kikinda Iron Foundry is the only producer of grinders in Yugoslavia. It started production of grinders under a license from the "Fortuna"Company of the German Federal Republic, and later added grinders of its own design. Kikinda's production program for machine tools included lathes, radial drills and universal external grinding machines. However, partly because of changes in machine tool technology and partly because of strong competition, the enterprise decided to

discontinue its production of lathes in 1969 and to widen instead its production program of grinders. Under a well thought out product development program, it decided that the next logical step would be to produce special external grinders and then to start producing internal grinders.

15. Though Kikinda has acquired sufficient experience in the production of external grinders, it has no experiences in the production of internal grinders. After careful consideration of its product development strategy, Kikinda entered into a 10-year license agreement with the Bryant Grinder Corporation of Springfield, Vermont (the U.S.) in February 1973. The contract provides for know-how and technical training required for the manufacture, sale and service of the licensed product against an initial cash payment plus a royalty per machine sold. Sales and services by Kikinda are licensed for most East European and Middle East countries and all Western European countries. However, the production is expected to be initially for the domestic market only.

Past Performance

16. The important domestic user of grinders are the automotive, tractor, ball bearing and machine tool industries. Table 3 shows the sales trend of grinders by republics in Yugoslavia. The following table shows the growth of production of and trade in grinders:

Yugoslavia: Production, Export and Import of Grinders 1/
(Units)

	1968	1969	1970	1971	1972
Production (Kikinda):					
- External grinding machines 2/	87	150	155	164	210
- Surface grinding machines	37	30	30	48	61
Total	124	180	185	212	271
Exports (Kikinda)					
- External grinding machines	5	31	77	78	21
- Surface grinding machines	2	9	1	-	-
Total	7	40	78	78	21
Import					
- External grinding machines	53	45	25	68	40
- Surface grinding machines	17	50	30	50	30
- Internal grinding machines	20	10	60	17	20
Total	90	105	115	135	90
Total addition to grinding machine stock	207	245	222	269	340

1/ Excludes hand- and bench-grinders
2/ Includes universal and special models

The above table shows that during 1968-72 Kikinda production of grinders more than doubled. As a result, imports of grinders have come down sharply in 1972 from the peak level of the previous year.

Demand for Grinders

17. The replacement demand alone would be for about 190 grinders a year. In addition, an additional 380 grinders would be required, thus raising the total demand to 570 grinders annually by 1977. According to Kikinda, the share of various grinders in total demand in 1977 would be as follows: Universal grinders, 50%; surface grinders, 25%; special grinders, 20%;and internal grinders, nearly 5%. Based on these assumptions, which seem reasonable, the demand for various types of grinders would be: Universal Grinders, 285; surface grinders, 145; special grinders, 115 (including centerless grinders); and internal grinders, 25.

Planned Expansion

18. After completion of the expansion project in 1977, Kikinda will have a capacity for about 460 machine tools a year. Of these, about 20% will be radial drills,[1] leaving a capacity for 380 grinders a year. (Table 2 shows details of the projected trend of sales of Kikinda in the future.)

19. The following table compares the demand for grinders with the estimated production of Kikinda:

Demand and Production of Grinders (1977)
(in units)

Type of Grinders	Demand	Kikinda Production	Deficit
Universal	285	190	-95
Surface	145	100	-45
Special	115	70	-45
Internal	25	20	-5
Total	570	380	-190

The deficit would be higher at 330 if projected exports of Kikinda are taken into account. In order to meet its foreign exchange and contractual obligations, the Company plans to export the following number of grinders:

Type of Grinders	Convertible Area	Clearing Area	Total
Universal	40	25	65
Surface	20	20	40
Special	10	25	35
Internal	-	-	-

1/ The Company is increasing its production of radial drills from 60 units to only 80 units, for which there is adequate demand. Ultimately, Kikinda wants to give up the production of radial drills while concentrating on grinder production.

20. Kikinda exports a number of grinders to the clearing area, mainly Poland and the U.S.S.R. (Table 4). Twelve special grinding machines would be sold to U.S.S.R. during 1973. A trade agreement with the U.S.S.R., concluded in September 1972, provides for the supply of 50 grinders a year by Kikinda starting in 1975. Therefore, it appears realistic to assume that grinder sales to the clearing area countries will be on average about 15% of total grinder production. In addition, Kikinda exports hydraulic systems for grinders to Rumania under a 5-year contract valid until 1976. (Table 2)

21. Exports of grinders to convertible currency countries were directed in the past to mainly the German Federal Republic (Table 4), under a contract with Kikinda's licensor, Fortuna, which had exclusive distribution rights in that market. However, this contract expired at the end of 1971 and since then Kikinda has been trying to promote exports on its own. It has signed a sales contract with a trading company in Frankfurt in order to gain new customers and replacement orders. Kikinda expects to sign a similar sales agency agreement with a trading firm in Milan, Italy. Through participation in trade fairs, contacts with importers, and a sales agreement with a machine tool sales and service agency in New Jersey, the U.S., Kikinda hopes to increase sales to the North American market. An order from the U.S. for 12 grinders was received in November 1972.

22. On the basis of contracts already signed or under discussion the Company plans to sell about 20 machines annually to Germany and Italy, and 50 machines a year to the U.S.

Prices, Tariffs and Competitive Position

23. Domestic prices (Table 5) of Kikinda's machine tools are controlled by the Government. The last price increase granted in December 1972, amounted to 15%. Table 6 compares the prices of various Kikinda grinders with those of two more important foreign competitors. It reveals that the Kikinda prices are considerably lower. While prices for the planned production of internal grinders have not yet been set, it is expected that they would be about 30% below the prices for comparable machines in Western Europe. Therefore, price is unlikely to impede Kikinda's export sales effort.

24. Nominal tariff protection (customs duties and taxes) amount to about 30%. Further, import permits by the Government and permission by Kikinda are required for their imports.

25. Product quality has been an important Kikinda objective, and the production of well-known licensed machine tools has helped establish this image. The production of internal grinders under license is consistent with this strategy. Delivery time is agreed with the customer at the placement of the purchase order. Universal grinding machines are typically available in 6 months, while special grinding machines require a longer period for additional attachments and settings.

26. Kikinda sales service in Yugoslavia and Western Europe includes a guarantee covering parts and necessary repairs during the first year; and repairs on a service charge are undertaken for up to 10 years after the sale.

Customers usually send machine operators to the Kikinda plant to get operating instructions prior to delivery. Kikinda engineers pay regular visits to customers to give assistance and get customers' views on the products purchased. These services are also extended to customers in the U.S. and the U.S.S.R. through local sales agencies appointed in those countries.

Marketing Organization for Machine Tools

27. Kikinda's sales director is based at the plant in Kikinda. Reporting to him are the deputy director for sales also based in Kikinda, and the sales director for machine tools based in Belgrade where the main sales office is located. Field representatives in the various Republics of Yugoslavia report to the Kikinda office on a regular basis. Export inquiries are handled mainly through the Belgrade office, while technical questions are handled at the plant. It is planned to strengthen the number of sales engineers working in the domestic representative offices. The enterprise works closely with the Masino-Union, Belgrade, in preparing long-term studies on the machine tool requirement and product development needs of the Yugoslav market.

28. In order to secure export sales and to develop new customer contacts Kikinda has its own sales engineers in Germany (Frankfurt) and in the U.S.S.R. (Moscow) and agency representatives in Italy (Milan), and the U.S. (New York). Kikinda has a fairly sophisticated sales organization and is aware of the importance of continuous marketing efforts in developing customer relationship. Domestic import-export firms used by Kikinda for casting sales provide additional contacts. Regular attendance and exhibits at trade fairs such as those held in Milan, Chicago and Zagreb help develop and maintain customer contact and keep in touch with product technology developments and price trends.

Industrial Projects Department
July 1973

Table 1

YUGOSLAVIA - KIKINDA IRON FOUNDRY PROJECT

TREND OF SUPPLY AND DEMAND FOR MACHINE TOOLS IN YUGOSLAVIA (1968-1972)

(Tons and units)1/

	1968		1969		1970		1971		1972	
	Units	Tons	Units	Tons	Units	Tons	Units	Tons	Units	Tons
Machine Tools 2/										
Domestic production	4607	9167	6630	9871	6705	12180	6812	12381	7221	13125
Less: Exports	990	2219	1681	2622	1009	3584	1311	4055	1519	3648
Domestic Sales	3617	6948	4949	7249	5696	8596	5501	8326	5702	9477
+ Imports	1398	7350	1058	8060	1673	6565	2302	11460	2638	16475
Total addition to machine tool stock	5015	14298	6007	15309	7369	15161	7803	19786	8340	25952
Of Which:										
Grinding Machines										
Domestic production	124	434	180	630	185	648	212	700	271	949
Less: Exports	7	24	41	140	78	273	78	237	21	74
Domestic sales	117	410	140	490	107	375	134	463	250	875
+ Imports	90	297	105	347	115	380	135	446	90	330
Total addition to grinding machine stock	207	707	245	837	222	755	269	909	340	1205

1/ Based on data from Kikinda and Masino-Union, Belgrade.
2/ Machine Tools include the following type categories: planing and milling machines, lathes, drilling machines, thread milling and gear-tooth cutting machines, and all types of grinding machines.

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TABLE 2

YUGOSLAVIA - KIKINDA IRON FOUNDRY PROJECT

SALES OF MACHINE TOOLS - ACTUAL AND FORECAST
(Units)

	Actual					Projected				
	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
Domestic										
Radial drills	52	51	62	43	60	50	50	50	50	60
Universal grinding machines	82	119	72	86	189	122	120	120	120	125
Surface grinding machines	35	21	29	48	61	40	40	40	50	60
Special grinding machines	-	-	6	-	-	10	15	25	35	35
Internal grinding machines 1/	-	-	-	-	-	-	10	10	20	20
Total	169	191	169	177	310	222	235	245	275	300
Exports										
Convertible Areas										
Radial drills	-	-	-	-	-	-	-	10	10	10
Universal grinding machines	-	27	73	78	11	32	40	40	40	40
Surface grinding machines	1	9	1	-	-	-	-	10	10	20
Special grinding machines	-	-	-	-	-	-	3	5	10	10
Internal grinding machines 1/	-	-	-	-	-	-	-	-	-	-
Total	1	36	74	78	11	32	43	65	70	80
Clearing Areas										
Radial drills	-	-	-	-	-	-	10	10	10	10
Universal grinding machines	5	5	4	-	10	-	20	20	20	25
Surface grinding machines	1	-	-	-	-	-	10	10	20	20
Special grinding machines	-	-	-	-	-	10	12	20	25	25
Internal grinding machines 1/	-	-	-	-	-	-	-	-	-	-
Hydraulic Parts	-	-	-	92	-	252	350	400	400	-
Total 2/	6	5	4	-	10	12	52	60	75	80
Total Machine Tool Sales 2/	176	232	247	255	331	264	330	370	420	460

1/ Internal grinder production under Bryant license expected to begin in late 1973.
2/ Excluding hydraulic parts, special contract with Rumania.

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TABLE 3

YUGOSLAVIA - KIKINDA IRON FOUNDRY PROJECT

DOMESTIC SALES OF GRINDING MACHINES BY REPUBLIC
(Units sold on cash and credit basis 1/)

	1968		1969		1970		1971		1972	
	Total Sales	Credit Sales	Total Sales	Credit Sales	Total Sales	Credit Sales	Total Sales	Credit Sales	Total Sales	Credit Sales
Serbia	44	12	46	16	39	9	62	4	112	7
Slovenia	33	8	36	10	27	7	21	3	60	9
Croatia	23	10	30	24	24	3	29	2	39	4
Bosnia - Herzegovina	12	3	18	6	13	3	18	2	27	5
Macedonia	5	1	7	2	3	1	4	-	9	1
Montenegro	-	-	3	-	1	-	-	-	3	-
Total Sales	117	34	140	58	107	23	134	11	250	26

1/ Typical 1973 credits are for a maximum of 10 years at 12% interest with 20% down payment for new investment projects, and a 50% downpayment for current purchases. Prior to December 1972, credit was available with no down payment.

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Table 4

YUGOSLAVIA: KIKINDA IRON FOUNDRY

Export of Grinders (units)

	1968	1969	1970	1971	1972
Clearing Currency Areas					
Poland	2	3	2	-	-
USSR	2	-	-	-	9
German Democratic Republic	1	1	-	-	-
Egypt	1	-	-	-	-
Czechoslovakia	-	-	2	-	1
Hungary	-	-	-	-	-
Romania	-	1	-	-	-
Sub-total	6	5	4	-	10
Convertible Currency Area					
U.S.A.	1	9	2	2	2
Italy	-	1	-	-	1
Federal Republic of Germany	-	26	70	75	8
Mexico	-	-	2	-	-
China (Mainland)	-	-	-	1	-
Pakistan	-	-	-	-	-
Canada	-	-	-	-	-
Sub-total	1	36	74	78	11
Total	7	41	78	78	21

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TABLE 5

YUGOSLAVIA - KIKINDA IRON FOUNDRY PROJECT

Kikinda Machine Tool Prices[1/] - Actual and Forecast (Dinars per unit)

Machine Type	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977
	Actual					Forecast				
Domestic										
Radial Drills	48,500	48,500	61,300	64,100	70,500	79,000	83,700	88,800	94,100	99,700
Universal Grinders	158,000	185,650	234,000	244,000	244,000	256,800	272,200	288,500	305,900	324,200
Surface Grinders	108,000	108,000	113,260	129,400	139,300	156,600	166,000	176,000	186,500	197,700
Special Grinders	-	-	410,000	-	-	800,000	848,000	899,000	953,000	1,010,000
Internal Grinders[2/]	-	-	-	-	-	-	504,000	534,200	566,300	600,000
Convertible Areas										
Radial Drills	-	-	-	-	-	72,000	76,300	79,400	82,500	85,900
Universal Grinders	-	117,490	139,724	184,260	206,250	231,000	244,900	255,700	264,800	275,400
Surface Grinders	75,000	81,028	84,414	-	-	135,000	143,100	148,800	154,800	161,000
Special Grinders	-	-	-	-	-	620,000	657,200	683,500	710,800	739,300
Clearing Areas										
Radial Drills	-	-	-	-	-	79,000	83,700	79,400	82,500	85,900
Universal Grinders	166,387	169,860	168,553	-	217,400	250,000	265,000	278,300	292,200	306,800
Surface Grinders	81,500	-	-	-	-	156,000	165,400	173,600	182,300	191,400
Special Grinders	-	-	-	-	-	720,000	763,200	801,400	841,400	883,500

1/ Average prices of all basic machine models.
2/ Production of internal grinders under Bryant license expected to begin in late 1973.

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TABLE 6

YUGOSLAVIA: KIKINDA IRON FOUNDRY PROJECT

PRICE COMPARISON BETWEEN KIKINDA GRINDERS AND COMPARABLE GRINDERS OF MAJOR FOREIGN COMPETITORS, DECEMBER 1972

(Dinars per unit)

Major Foreign Competitors					Kikinda Grinders		Price Comparison	
Brand and Designation of Grinder	Country	Price Free Border	Customs and Taxes (30%)	Selling Price(Din)	Designation of Kikinda Grinder	Selling Price(Din)	Kikinda Grinder Versus Foreign Competitor at Free Border Price	Kikinda Grinder Versus Foreign Competitor at Selling Price
Round Grinders								
1. Fortuna AFB-500	Germany	252,000	75,600	327,600	AFB-500 1/	164,850	65%	50%
2. Fortuna AFC-1000	Germany	387,000	116,100	503,100	AFC-1000 1/	235,260	66%	47%
3. Fortuna AFD-1000	Germany	472,500	141,750	614,250	AFD-1000 1/	316,137	69%	51%
4. Zocca RU-2000	Italy	344,720	103,415	448,135	UFC-2000	294,532	93%	65%
5. Siamp RL-2000	Italy	395,940	118,780	514,720	UFC-2000	294,532	81%	57%
6. Siamp RL-510	Italy	273,030	81,910	354,940	UFB-500	180,700	66%	51%
7. Studer RHU-500	Switzerland	270,000	81,000	351,000	UFB-500	180,700	66%	51%
Surface Grinders								
1. Blohm Simplex 5	Germany	150,600	45,180	195,780	URB-550	114,000	76%	58%
2. Alpa RT-450	Italy	186,020	55,800	241,820	URB-550	114,000	61%	47%
3. 3B 722	USSR	161,700	48,510	210,210	URB-1000	151,200	93%	72%
4. ABA FF	Germany	150,000	45,000	195,000	URB-550	114,000	76%	58%
5. Blohm Simplex 7	Germany	170,370	51,110	221,480	URB-750	129,600	76%	59%

1/ License from "Fortuna".

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ANNEX 3-2
Table 6

YUGOSLAVIA - KIKINDA IRON FOUNDRY PROJECT
SALES HISTORY AND FORECAST

	Legend	Actual 1968	1969	1970	1971	1972	Forecast 1973	1974	1975	1976	1977 onwards
1. Malleable Castings (tons)	T	3329	4186	4249	4748	5085	5150	5200	5200	7840	13100
	CO	-	240	1620	1950	2560	2950	3000	3200	5340	9000
	CL	50	-	350	250	190	-	-	-	-	600
	D	3279	3946	2279	2548	2335	2200	2200	2000	2500	3500
2. Finished Pipe Fittings (tons)	T	3291	3910	3705	4113	4113	4000	4000	4640	6160	6400
	CO	1063	1725	1773	1957	1992	1700	1700	1800	2560	2500
	CL	717	583	284	290	239	300	300	340	600	600
	D	1511	1602	1648	1866	1882	2000	2000	2500	3000	3300
3. Gray Castings (tons)	I	-	-	-	700	750	900	950	1000	1200	1500
4. Nodular Castings (tons)	T	-	-	-	1200	3310	4500	7500	9900	15000	16000
	CO	-	-	-	-	500	3400	5500	7100	9500	10500
	CL	-	-	-	1060	1810	100	500	800	1500	1500
	D	-	-	-	140	1000	1000	1500	2000	4000	4000
5. Total Castings	T	6620	8096	7954	10761	13258	14550	17650	20740	30200	37000
	CO	1063	1965	3393	3907	5052	8050	10200	12100	17400	22000
	CL	767	583	634	1600	2239	400	800	1140	2100	2700
	D	4790	5548	3927	4554	5217	5200	5700	6500	9500	10800
	I	-	-	-	700	750	900	950	1000	1200	1500
6. Machine Tools (nos.)	T	176	232	247	255	331	264	330	370	420	460
	CO	1	36	74	78	11	32	43	65	70	80
	CL	6	5	4	-	10	10	52	60	75	80
	D	169	191	169	177	310	222	235	245	275	300
(a) Drilling Machines (nos.)	T	52	51	62	43	60	50	60	70	70	80
	CO	-	-	-	-	-	-	-	10	10	10
	CL	-	-	-	-	-	-	10	10	10	10
	D	52	51	62	43	60	50	50	50	50	60
(b) Universal Grinders (nos.)	T	87	151	149	164	210	154	180	180	180	190
	CO	-	27	73	78	11	32	40	40	40	40
	CL	5	5	4	-	10	-	20	20	20	25
	D	82	119	72	86	189	122	120	120	120	125
(c) Surface (flat) Grinders (nos.)	T	37	30	30	48	61	40	50	60	80	100
	CO	1	9	1	-	-	-	-	10	10	20
	CL	1	-	-	-	-	-	10	10	20	20
	D	35	21	29	48	61	40	40	40	50	60
(d) Special Grinders (nos.)	T	-	-	6	-	-	20	30	50	70	70
	CO	-	-	-	-	-	-	3	5	10	10
	CL	-	-	-	-	-	10	12	20	25	25
	D	-	-	6	-	-	10	15	25	35	35
(e) Bryant Grinders (nos.)	T	-	-	-	-	-	-	10	10	20	20
	CO	-	-	-	-	-	-	-	-	-	-
	CL	-	-	--	-	-	-	-	-	-	-
	D	-	-	-	-	-	-	10	10	20	20
7. Hydraulic Parts (nos.)	T	-	-	-	-	195	252	350	400	400	-
	CO	-	-	-	-	-	-	-	-	-	-
	CL	-	-	-	-	195	252	350	400	400	-
	D	-	-	-	-	-	-	-	-	-	-

Legend D - Domestic Sales
CO - Convertible Area Sales
CL - Clearing Area Sales
I - Internal Sales
T - Total

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YUGOSLAVIA - KIKINDA IRON FOUNDRY PROJECT

PROPOSED FACILITIES

1. The existing facilities of the Kikinda Plant, described in Annex 2-2, include the facilities under construction which are expected to go on stream by the end of 1973. The project which is described in this section is to increase the capacity of malleable iron castings to 21,000 TPY, malleable fittings to 6,400 TPY, nodular iron castings to 16,500 TPY, gray iron castings to 1,500 TPY and machine tool production to 460 units (equivalent to 1,500 TPY).

A. Overall Concept

2. The main factors that characterise the expansion program of Kikinda are the following:

(a) Increased production of fittings and automotive and other castings in the malleable iron foundry by replacing some of the old equipment, by using electric induction furnaces, the most modern automatic molding lines (Disamatic), and continuous processing in heat treatment, and by increasing the capacity of the existing sand preparation, core-making, and cleaning facilities. The present plant building will be expanded to accommodate some of the new facilities to be installed under the program;

(b) Increased production in the gray and nodular iron foundry by replacing one molding line; and by installing electric induction furnaces, a mechanized new molding line and supporting sand preparation, core-making and cleaning facilities. In order to install these new facilities the present building will be expanded;

(c) Expansion of the production capacity of the machine tool plant by changing the present plant layout and material flow; by replacing old and obsolete machines; and by installing more accurate and sophisticated machines, including numerically-controlled machines. After the expansion, Kikinda plans to produce more specialized external grinders as well as internal grinders. The present machine tool building will be expanded to have a new plant layout and a climatized assembly room for high-precision assembly and testing;

(d) With the installation of more specialized machines and some changes in the layout of the existing plant, the capacity of the fitting finishing shop will be increased to 6,400 TPY. The project also envisages new machines to produce an assortment of fittings from 2-4 inches in size which are not produced

at present. Galvanized fittings production will be increased by adding new galvanizing facilities; and

(e) General revamping and remodelling of the existing auxilliary facilities and material handling facilities will eliminate some of the present production bottlenecks and also help improve general working conditions in the plants.

3. Since the expansion of all the existing plants is envisaged, the details of the proposed facilities contained in the expansion program are dealt with on a plant by plant basis. Details of the expansion program of the malleable iron foundry, gray and nodular iron foundry, fitting finishing plant, machine tool plant, raw material handling facilities and utilities, are given below.

B. Malleable Iron Foundry

3. In order to avoid production drops during the implementation of the project, this foundry will be expanded in two phases. In Phase I, two Disamatic molding machines, a melting plant, and sand preparation and core-making facilities will be installed between the existing heat treatment plant and the No. 3 molding line. A new continuous annealing furnace will also be installed near the old annealing furnaces and some additions will be made to the cleaning room facilities. A major portion of the building extension work will be carried out during Phase I. After completion of this phase, the molding lines, Nos. 1 and 2, and the supporting cold blast cupola furnaces and changing systems will be dismantled for Phase II of the project. The capacity of this foundry after the completion of Phase I would be 12,500 TPY. Under Phase II, a new molding line in the place of the old No. 1 and 2 molding lines as well as four electric induction furnaces in the place of cupola furnaces will be installed. Remodelling of the existing sand preparation and core-making facilities for molding line Nos. 1 and 2 and addition of a new malleabilizing furnace are also planned in Phase II of the project. After the completion of Phase II, total capacity of the malleable foundry would be 21,000 TPY.

Phase I

The following equipment will be installed during Phase I:

4. Melting Plant: A new battery of two hot blast cupola furnaces, each with 6-7 tons/hr. capacity, will be installed to work alternately. This melting plant will have its own raw material storage facilities: six pig iron and steel scrap bunkers (200 m^3), one coke storage bin (30 m^3), one limestone storage bin (20 m^3), and one charging car to transport raw materials. Charging of the furnace is completely mechanized. The capacity of the melting shop is calculated on the basis of the average weight of cast per mold (15.6 kg/mold), number of molds per hour (400 molds per hour) and 90% efficiency in cupola furnaces.

5. The molten iron is discharged into a holding furnace for temperature correction. There will be two electric induction heated channel furnaces - one to serve as a standby while the other works - and each has a 6 ton (500 KVA) holding capacity. Electric power consumption for 100°C temperature correction would be about 50 KW. The molten iron from the holding furnace will be transported to the automatic pouring devices - two of them, one at each of two Disamatic molding machines - by 1-ton ladles connected to monorail systems (one for each molding machine). The automatic pouring devices on the machine have 1.3 ton capacity each.

6. Molding Lines: There will be two similar Disamatic molding lines for the production of fittings. The capacity of both molding lines would be 7,900 TPY on a 2-shift operation. Disamatic molding facilities, developed by a firm in Copenhagen, Denmark, is unique in this field since it is a continuous row of vertical molding system without mold boxes. It is well suited for mass production lines because of its high molding capacity, mold rigidity, and easy core placement and fully automatic working. The Disamatic molding machine proposed in the project will have a steel band length for 88 mold parts for 600 x 400 x 3/300 size molds and the cooling time at 200 molds/hour will be about 22 minutes. Capacity utilization of this line is assumed to be 80% based on the average weight of casting per mold of 5.58 kg and 28.8 pieces of castings per mold. Assuming 8% scrap and 2% oxydation and other liquid iron losses, the total yield would be about 40%. There would be two shakeout grates (0.5 ton) and the castings would be transported by a monorail system to the shot blasting machines through a long cooling tunnel. In order to facilitate the erection of the new Disamatic molding lines, some minor modifications will be made to the existing molding line No. 3, thereby reducing its annual production capacity to 4,700 TPY.

7. Sand Preparation Plant: Based on the molding capacity of 240 molds per hour and the mold size of 600 x 480 x 300 (0.085 m^3), molding sand requirement would be about 40 m^3/hr. A safety margin of about 20% is incorporated in this calculation since the assumed production of mold is only 200 mold per hour. There will be two 20 m^3 sand mixing and preparation units, 5 m^3/hr. rotary sand dryer, four sand bunkers (300 m^3), one 2-ton crane for loading sand into bunkers, one sand loading device for sand mixers, and three used sand bins (180 m^3). Prepared sand is transported to the new Disamatic molding lines by sand conveyors and used sand is moved out of the molding facilities by rubber belt conveyors.

8. Some alterations and remodelling of the existing sand preparation plant for the present molding line No. 3 is also planned. Sand storage facilities - four bunkers with 300 m^3 capacity - will be installed. A 2 ton crane will be installed to load the bunkers with sand and a new charging device is also planned for the sand mixers. There will be two new (20 m^3 each) sand mixers and a new 5 m^3/hr. rotary dryer. By relocating the present conveyor system, prepared sand will be transported to the existing molding line No. 3.

9. Core-making: Hot box process will be used for making cores for the new Disamatic molding lines. Core-making will be semi-automatic and automatic and the cores will be transported to the molding machines by conveyors and will be placed in the molds by automatic machines. Core-making machines' capacity calculations are based on 19.5 cores per mold for 7,900 TPY production of castings, 80% machine capacity utilization and 5% breakage of cores. There will be four 2.5 liter core shooters for fittings under 1" in size and two automatic core shooters for special fittings. Two 2-ton/hr core sand preparation facilities will also be installed. The core-making shop will also have sufficient core storage facilities.

10. Casting Finishing: The castings from the vibrating shakeouts of the Disamatic molding lines will be transported to the cleaning room by a cooling conveyor which will pass through a cooling tunnel. Time required for cooling of castings is about 3 hours and the speed of this conveyor would be 0.5 meters/minute (length of conveyor cooling system will be 90 meters).

11. Cleaning Room: the casting and initial cleaning of castings will be accomplished by two continuous shot blasting machines. Degating, knock-out and inspection of castings will be done on two roller conveyor type work tables (19 meters in length). For final cleaning, three automatic grinders and two conventional double-wheel grinders will be added to the existing facilities. The present cleaning room layout will be modified to suit the increased production and material flow.

12. Heat Treatment: Based on 7,900 TPY of fitting productions, 100% capacity utilization and three-shift operation, the capacity of the new continuous annealing furnace is calculated to be 1.4 tons/hr. Heating of this furnace will be by natural gas and final temperature control will be by electric power. Since annealing is accomplished at a temperature of over 860°C, the whole process will be carried out in a protective atmosphere against nitrogen. A protective gas generator will be installed to supply sufficient nitrogen.

Phase II

13. After the completion and successful operation of items installed under Phase I, the existing molding lines, No. 1 & 2, and the melting plant supplying to these molding lines will be dismantled. Under Phase II of the project, the production capacity of automotive casting will be increased to 13,100 TPY for which the following equipment will be installed.

14. Melting Plant: The existing two cold blast cupolas will be replaced by four electric induction furnaces with 10-ton (2.1 MW) capacity each, of which one furnace without electrical connection will serve as a reserve. This melting plant will be equipped with storage facilities (12 bunkers with 15 m^3 capacity) for raw material, 5-ton loading crane for loading the storage bunkers, scrap preheating furnace (300°C) to reduce melting time and three sets of electrical equipment for the induction furnaces. The melting time required for each furnace

is about 40 minutes since 60% of the charge will be preheated prior to charging. The molten iron from the furnace is discharged into 3-ton pouring ladles which are connected to a monorail system for transporting molten metal from the melting plant to the molding line. The capacity of the melting plant is based on the production of 8,430 TPY of good castings assuming 10% scrap and 2% oxydation and other liquid iron losses in the induction furnaces.

15. Molding Line: The new automatic molding line with a capacity of 8,430 TPY will replace the existing molding lines, No. 1 & 2, and will be designed to produce automotive and other similar castings. The molding line will be capable of handling 250 molds per hours with an average weight castings per mold of 17.8 kg and will have 140 molds on the 100 meter long (speed 4 meter/min.) horizontal type conveyor. The flask size in this molding line would be 630 x 500 x 2/300 and one mold will contain on an average about 6.75 pieces with an average weight of 1.61 kg/pieces, and the cooling time at 250 mold/hr would be about 17 minutes. Capacity utilization of this molding line is assumed to be about 80% and total yield about 42% (mold yield 47%). This molding line will also have two high-pressure presses (one for the lower half and the other for the upper half), flask transport conveyor system, two sand storage (3 m^3) and fitting equipment, and one 1-ton shakeout grate. The castings from the shakeout is transported to the cleaning area by the cooling conveyor through a cooling tunnel.

16. Sand Preparation Plant: The existing sand preparation plant will be reconstructed and extended to provide sufficient sand for the new automotive casting molding line. Based on 250 molds/hr with mold size of 630 x 500 x 2/300, the capacity of the sand mixers is estimated at 60 m^3/hr; 2 new 30 m^3/hr sand mixers will be installed, with 20% safety margin. There will be 4 molding sand storage bins (300 m^3/hr) equipped with a 3-ton crane for loading sand, a new sand dryer with a capacity of 10 m^3/hr will be installed to dry the sand prior to charging into the mixers. Prepared sand will be transported to the molding lines by belt conveyors and the used sand will be transported from the molding area to three 50 m^3 used sand bin by a separate belt conveyor system.

17. Core Making: The core-making plant will serve the existing molding line No. 3 as well as the new automatic modling line. Semi-automatic shell process will be used to make cores. New equipment to be installed in the core-making shop are two sand mixing machines (3-ton/hr) for core sand, one 5 m^3 sand storage bin, core sand transportation carts, three 5-liter capacity core shooters for small cores, two 7.5 liter core shooters for medium-size cores, two 1.5 liter core shooters for large cores and core transport conveyors for transporting cores to the molding lines. The capacity utilization of the core-making plant would be 80% and core breakage is assumed to be about 5%.

18. Casting Finishing: Casting from the shakeout would be carried by a cooling conveyor through a 90-meter long cooling tunnel at a speed of 0.5 m/min. to the cleaning section. The time required for cooling is about three hours.

19. Cleaning Room: Two continuous blasting machines will be used for initial cleaning and two roller-conveyor-type work bench will be used for degating, knock out and inspection. For panel cleaning, the following new equipment will be added to the existing facilities: 20 grinding machines, 7 cleaning benches and 6 straightening presses.

20. Heat Treatment Plant: One two-channel continuous annealing furnace (1-ton/hr) with high and low temperature sections, will be installed in the new part of the foundry. This furnace will be heated by natural gas, and electric power will be used for final controls. The furnace operates (at 860°C) with a protective nitrogen atmosphere and the required nitrogen will be supplied by the protective gas generator. The capacity of this furnace, based on 3-shift operation and 100% efficency, would be 5,600 PTY. This plant will also have facilities for an oil bath, one water bath, and necessary storage for semi-finished and finished products.

21. Observations: The extension of the malleable foundry can be implemented without disturbing the present operations. The equipment for the processing of fittings can be erected on an area which is not used at present. With proper operation of facilities under Phase I, the plant will have sufficient capacity to meet its commitments to customers even when the existing cold blast cupola and molding line No. 1 & 2 are dismantled.

22. The proposed plant layout is favorable with regard to utilizing the existing facilities as well as for the future material flow. Internal transport of materials and castings is expected to be mechanized to the extent necessary to improve productivity. The planned equipment and technology are up-to-date and well suited for the manufacture of the intended products.

23. Melting Department: The cupola furnaces for fittings have a capacity of 6-7 tons/hr, which is about 21% above the average required amount of liquid iron for the Disamatic molding line. Further, there is a possibility for storing 12 tons of liquid iron in the two induction holding furnaces for peak requirements. Therefore, the melting capacity of the cupola is sufficient.

24. The melting capacity of electric induction furnaces for automotive castings is 6 tons/hr, whereas the average liquid iron requirement is about 5.4 tons/hr, i.e., there is only 11% reserve in the melting shop. Further, in order to avoid waiting time for liquid iron when castings which are above average in weight are produced, proper production control is essential.

25. Molding Plants:

(a) Fittings production line calculations are realistic. Although the assumed efficiency of 80% is achievable, 75% efficiency assumption would have been more realistic.

(b) Automotive casting molding line: The required number of molds and the mold capacity have been calculated correctly. However,

the efficiency of 80% for this molding line is rather optimistic. Doubling the present flask size to 1,00 x 630 x 2/300 would provide more flexibility and improved efficiency.

26. The capacities of sand preparation plants, core-making facilities, and cleaning room facilities are adequate for the proposed expansion.

27. A slight modification to the present layout of the heat treatment section is presently being considered, to make it more suitable for further plant expansion.

C. Gray and Nodular Foundry

28. The expansion project is an extension of the existing facilities with minor modifications to the present facilities. Since expansion will not affect the production of the existing plant, it will be carried out in one phase.

29. Melting Plant: No changes or modifications to the existing melting plant are envisaged in the project. A new melting plant consisting of four electric induction furnaces, with a capacity of 12 tons per furnace, 2 melting circuits (2.6 MW) and two holding circuits will be installed in the extended part of the building. This plant will be equipped with 8 raw material storage bunkers (150 m^3), 8 steel scrap storage bins (300 m^3), one 5-ton overhead crane for loading new materials, one charging device including a 5-ton crane and sufficient electrical equipment for the electric furnaces. A scrap preheating (200-300°C) furnace to reduce the melting time by 10 minutes will be installed. The furnace melting capacity would be 5.1 tons per cycle and the capacity of the melting shop would be 10 tons/hr. The molten iron from the electric furnace would be discharged to a 3-ton pouring ladle for transport to the molding line by a monorail system.

30. Molding Line: The existing molding line No. 2 (see Annex 2-1) which has a capacity of 1,700 TPY will be dismantled and the existing building will be extended to install a new automatic molding line with a capacity of 10,700 TPY. This molding line will be capable of producing 250 molds/hr. and the flask size will be 860 x 730 x 2/350. At the rate of 250 molds/hr, the cooling time would be 16 minutes. The design of this molding line includes two high pressure presses - one for the lower part of the line and the other for the upper part of the line, three transverse chassis moving devices and a continuous molding conveyor for molding, pouring and initial cooling. The capacity utilization of this machine is assumed to be 80%. Total yield, assuming 10% scrap and 2% oxydation and other furnace losses, would be about 54% (mold yield 61%). The castings will be dumped into a 1-ton shakeout grate where the castings would be separated from the sand. With the use of a 0.2-ton jig crane, castings will be loaded to a monorail cooling conveyor system which transports the castings to the cleaning room through a cooling tunnel.

31. Sand Preparation Plant: A new sand preparation plant will be installed for the new molding line. Based on 250 molds/hr, flask size of 860 x 730 x 2/350 and 20% safety factor, the sand preparation capacity required would be about 95 m^3/hr. There will be two sand mixers with a capacity of 50 m^3/hr each. This plant will also have the following machines: a sand loading device, an elevator (10 m^3/hr) for loading sand into a conveyor (10 m^3/hr) which will feed the sandmixers and dryer, a 10 m^3/hr sand dryer, a prepared sand conveyor line (100 m^3/hr), one storage bin (10 m^3) at each of the molding presses, a "used sand" conveyor system and four 90 m^3 "used sand" storage bins.

32. Core-Making: The core-making shop is intended to serve only the new molding line. The hot-box process will be used for the core-making. A number of core-making machines and their capacities are designed on the basis of 80% capacity utilization of the facilities plus 5% core breakage. The plant will have the following facilities: two 10 m^3 core sand storage, two 2.5-tons/hr core sand mixing units, a core sand transportation cart, 7 hot box shooters (two 5-liter, 80-cycles/hr shooters, three 7.5-liter, 60-cycle/hr shooters and two 15 liter, 50 cycle/hr shooters), sufficient storage space for finished cores and a conveyor system to transport to the molding line.

33. Casting finishing: As mentioned earlier, castings from the shakeout will be brought to the cleaning area through the cooling tunnel by a monorail conveyor system. This section of the foundry will be on two different floors. Most of the initial cleaning will be done on the lower floor and the final cleaning, inspection and heat treatment on the upper floor.

34. Cleaning Room: This section will have a continuous cleaning machine for initial cleaning, one 1.6 in diameter table blasting machine, work places for degating, hoppers for scrap metal, 8 special grinders, 6 simple grinding machines, 12 work places for final cleaning, inspection and control, and a few conveyor systems for material handling.

35. Heating Treatment: The heat treatment plant capacity is based on a 3-shift operation with 100% efficiency. An annealing furnace (14 tons/charge) with charging device will be installed. A protective gas generator (40 m^3/hr) for the supply of nitrogen to the furnace will be installed. The heat treatment time in this furnace would be between 16-24 hours and the capacity of this furnace, based on a 3-shift operation, would be about 4,600 TPY.

36. Observations: The expansion of this foundry can be carried out without disturbing the production of the existing facilities. All the existing equipment with the exception of the molding line No. 2 and some old machines in the core shop and cleaning shop will be used even after expansion.

37. The layout of the foundry with regard to the existing and future facilities and flow of material is favorable. Further expansion of this foundry will not be possible due to lack of adequate space and heat treatment facilities. However, the production could be increased by about 10% with minor alterations and additions to the facilities. The intended facilities and technology are suitable for the production of nodular iron

casting, with the exception of cooling line which is too short in length for adequate cooling; a longer cooling line would be more appropriate. The capacity calculations of all the facilities are reasonable and the planned number of machines and capacities are adequate for the proposed production increase. The internal transport will be mechanized as far as possible to increase productivity.

D. Fitting Finishing Plant

38. The existing fitting finishing plant will be expanded to accommodate additional equipment to increase the production capacity to 6,400 TPY of which about 4,300 PTY would be for galvanized fittings. Near this plant, sufficient storage space for raw fittings will be provided by installing 300 containers (1 x 0.8 x 0.6 m) for fitting castings, 40 containers (1 x 0.8 x 0.6 m) with fish mouth lids.

39. Initial Cleaning: No major changes are envisaged for this section excepting the installation of a new drum for greasing. The existing 19 tumbling drums are adequate for the increased production level.

40. Final Machining: The present layout of this section will be altered to suit the proposed production level. Moreover, the following new machines will be added to the existing facilities: six special automatic machines for elbows and "T" pieces, four automatic machines for couplings up to 1", three automatic machines for couplings pairs 1" to 2", 6 lathes for automotive casting, 7 work tables for joints, 7 fitting testing equipment, and sufficient inplant storage area for work-in-process. New monorail systems will be installed to improve the internal material transport.

41. Cleaning Room: Additional equipment to be installed in the existing cleaning room are: 13 preheating chambers, one caustic soda vat, water vat, one lye vat and the extension of the existing monorail system.

42. Galvanizing Section: A new galvanizing section (1.7-ton/hr) will be added to this plant. Machined fittings will be transported to this new section by a monorail system. A 1.2-ton/hr continuous dryer for drying the fittings will be installed. This section will also include 4 sets of zinc smelting furnaces (15 tons of melted zinc), 0.2-ton dipping crane, 1.5 x 2 m heated table, 1.5 m^3 water vat and 0.2-ton centrifuge. The capacity of this galvanizing section would be about 3,100 TPY.

43. Final Finishing and Packing: Four new surface finishing lines and one additional packaging facility will be installed, and the existing surface finishing and packaging lines will be relocated. For the final finishing lines, four 1-ton loading equipment, 4 surface finishing lines (varnish coating machines), 2 new belt conveyors and 2 new tunnel type dryers are planned. The new packaging line which will be very similar to the existing line, will have a roller type conveyor system, control tables for counting and final checking,

packaging tables, labelling equipment and sufficient storage area for cardboard boxes and finished products.

44. Observations: The layout of this plant is satisfactory for the material flow and the utilization of the existing as well as proposed facilities. The calculation of machine and plant capacities are based on the experience of Kikinda with its present facilities and are considered realistic. Most of the existing facilities will be utilized even after expansion. With the installation of fully automatic machines and mechanized internal transport systems, the productivity of this plant is expected to increase.

E. Machine Tool Plant

45. In the expansion program of this plant, major emphasis is given to the production of grinding machines (universal, flat, special and internal grinders) with better precision and automation and also to better quality and productivity, increased production capacity and better material flow. In order to achieve this, the machine tool plant will be extended and modernized with more sophisticated facilities; some of the existing machines which are inaccurate, old and unproductive will be replaced with new machines, and the present layout will be altered by relocating some of the machine tools for better material flow.

46. The production capacity of this plant will be increased to 460 machines which would include more specialized and automatic grinding machines. The selection as well as the number and capacity of machine tools are based on careful calculations of required machining time, accuracy and capacity utilization of machines. The layout of the plant, which would basically be on a functional basis, will have some flexibility for adding new products to the proposed product mix. The general plant layout, main sections and machine groups are shown at the end of this Annex. This plant is expected to work 2 shifts per day and its approximate overall capacity utilization would be about 75%, which is considered satisfactory for the type of work Kikinda is planning.

47. The following unproductive and inaccurate existing machines will be replaced with new machines: 10 universal lathes, 7 milling machines, 3 drilling machines, 1 planing machine, 1 special grinding machine, 2 boring machines, 1 grinding machine and 1 cutting machine. These machines will either be used in the maintenance shop or sold depending on the condition of the machines and the maintenance shop requirements.

48. Kikinda plans to add numerically-controlled boring and grinding machines to its production line to increase the productivity in mass production of assembly parts. It will also have a new temperature and humidity-controlled insulated area for the mounting of fine and precision grinders. The following new machines and equipment will be added: 4 boring and drilling machines (of which 2 boring machines will be numerically controlled), 13 milling machines, 11 grinding machines (of which one will be numerically

controlled), 1 planing machine, 1 horning machine, 1 lapping machine, 11 lathes, 2 sharpening machines, 1 cutting machine, 1 annealing furnace, 3 special furnaces, 1 washing device, 1 shot blast cleaner, various tools and devices for production and control, and necessary spare parts.

49. Observations: The basic calculations with regard to the plant capacity, number of machines and required area are satisfactory. The selection of machine types and facilities as well as the plant layout for the proposed production were done carefully. The only exception might possibly be the numerically-controlled machines; Kikinda has no prior experience in operating such machines which require high-skilled operators and programmers. However, facilities are available in Yugoslavia to train people to operate such machines. In the case of the plant layout, sufficient flexibility is incorporated to alter the product mix if needed and to add new product lines similar to what Kikinda plans to produce. There is ample space available for further expansion.

F. Utilities

50. Electric Power and Distribution: After the completion of the project, the installed electric power would increase threefold from 12 MW to 36.2 MW, while the power consumption would increase from 19.5 million kwh in 1972 to 60 million kwh in 1977. In order to meet the additional power requirement, the present distribution system will have to be modified. According to an agreement reached between Kikinda and the electric distribution company, Elektrovojvodina, the latter will install a new 35/10 KV main transformer, which would replace the existing main transformer station which is expected to be installed by Elektrovojvodina, will be completed by early 1975. Within the plant site, the present distribution system will be reconstructed and additional distribution lines and transformers will be installed by the Company. In the malleable iron foundry, the three existing transformer sub-stations will be expanded and a new one will be added. In the grey and nodular iron foundry, in addition to the existing sub-station, three new transformer sub-stations will be installed. One sub-station will be erected for the new compressed air station. Further, the machine tool factory will have a new sub-station in addition to the existing one. Expansion of the existing sub-station in the fitting finishing plant is also envisaged in the project. For lighting the plant site, the existing sub-station will be enlarged and modifications will be made to the closed circuit line by installing a 10,000 volt line. Most of the 10 KV distribution lines from the main transformer station to the sub-stations will be replaced by new cables. The power distribution lines inside the plants would be underground. The cost of the electric distribution system and installation within the plant site is included in the project.

51. Gas: The heat treatment facilities in both the foundries use gas. With the installation of additional heat treatment furnaces, the gas consumption would increase. Moreover, the expansion of the existing buildings would

also increase the gas consumption, since the boiler at the heating plant operates with gas. The total gas consumption would increase from the present rate of about 3.9 million Nm^3 to 7.1 million Nm^3 after the completion of the project. According to an agreement reached between Kikinda and Nafthagas, the latter will provide sufficient gas to meet the former's needs.

52. An additional 3-12/" pipeline will be provided to transport gas from the gage control station to the distribution station within the plant site. Additional distribution lines will be provided to supply gas to the malleable iron foundry and the gray and nodular iron foundry. By extending the existing line to the fitting finishing shop, the new galvanizing plant will be supplied with adequate gas. The existing distribution stations will be reconstructed to handle the increased gas needs and some of the old distribution pipelines will be replaced by new ones.

53. Compressed Air: Most of the facilities in the existing compressed air station were built in the early 1960's. The compressed air requirement would double upon completion of the project. After exploring the possibility of expanding the existing system with two more small compressor unit (20 m^3/min), Kikinda has decided to install a new compressed air station adjacent to the fitting finishing shop, with four 40 Nm^3/hr compressors (including one as a standby), and there is provision for installing one more, if needed. This would give Kikinda more flexibility and an assured supply of compressed air for the proposed production. The new compressors will work in conjunction with the existing ones to meet the plant requirements. The compressed air is mainly used in the pneumatically-operated molding machines (which are run exclusively by it), pneumatic hand core machines, pneumatic lifting devices and blasting and cleaning machines. The compressed air requirement would increase from the present rate of 95.5 Nm^3/hr to 183.8 Nm^3/hr (at 7 times the atmospheric pressure) after completion of the project. The total installed capacity of compressed air would be about 260 Nm^3/hr. Some of the existing distribution lines will be modified and additional lines will be installed to meet the expected increase in demand.

54. Water: Water consumption is expected to triple from 78 m^3/hr at present to 205 m^3/hr after the project completion. This would require complete reconstruction of the existing water distribution systems. A new 12" well will be drilled to obtain water from 200 meters below the ground level and the water (1,400 liters/min.) will be pumped into the water tower. The new well plus the existing four wells would be adequate for supplying necessary water for plant operations. The main water distribution will be by underground concrete pipes and the network distribution will be by ferrous pipes with corrosion protective coating. There will be automatic Ph meters, a water neutralization unit and a unit for separation of solid particles for purifying the water before circulation. A recirculation system will also be installed to minimize the water intake. Before the used water is discharged to the Kikinda town sewage system, it is neutralized to avoid corrosion of the sewage pipes. As for drinking water, it is received from the Kikinda town water supply system.

55. Heating: The present system of water heating for steam will be replaced by a new water heating system. Since most of the existing plants

will be expanded, the heating requirement would increase from the present rate of 7.9 k cal/hr to 13.1 cal/hr on completion of the project. In order to meet this increased demand, a new 8-ton/hr gas-heated steam boiler capable of supplying 5.6 k cal/hr, will be installed. The present steam heating distribution system will be modified and replaced because most of the existing lines are small to carry warm water for the proposed heating system.

56. Central Storage and Material Handling Facilities: A large control storage for all major raw materials required for the foundries will be built in an area south of the malleable iron foundry. A number of existing buildings will have to be demolished for the construction of this facility. The storage bins made of concrete will be 200 meters long and 35 meters wide. This bay will be served by three overhead gantry cranes, which will feed the melting shop bins with raw materials as well as unload raw materials into central storage bins. One central sand drying plant and pneumatic delivery system to serve both the foundries will also be installed.

57. Transportation: The present Belgrade - Kikinda road is being reconstructed and the road near Kikinda plant is planned to be re-routed by the Province of Vojvodina and the work is expected to be completed by 1974. Once the road is re-routed, Kikinda will construct a railroad track connecting the existing railroad track and the plant site. The cost of these installations is included in the project.

58. Under the urban development plan of Kikinda town, a new river port, about 1.2 km from the factory, on the branch of the Dunav-Tisa Canal network is being constructed and it is expected to be completed by the end of 1973. In case of emergency, Kikinda plans to use this facility for transporting raw materials and finished goods.

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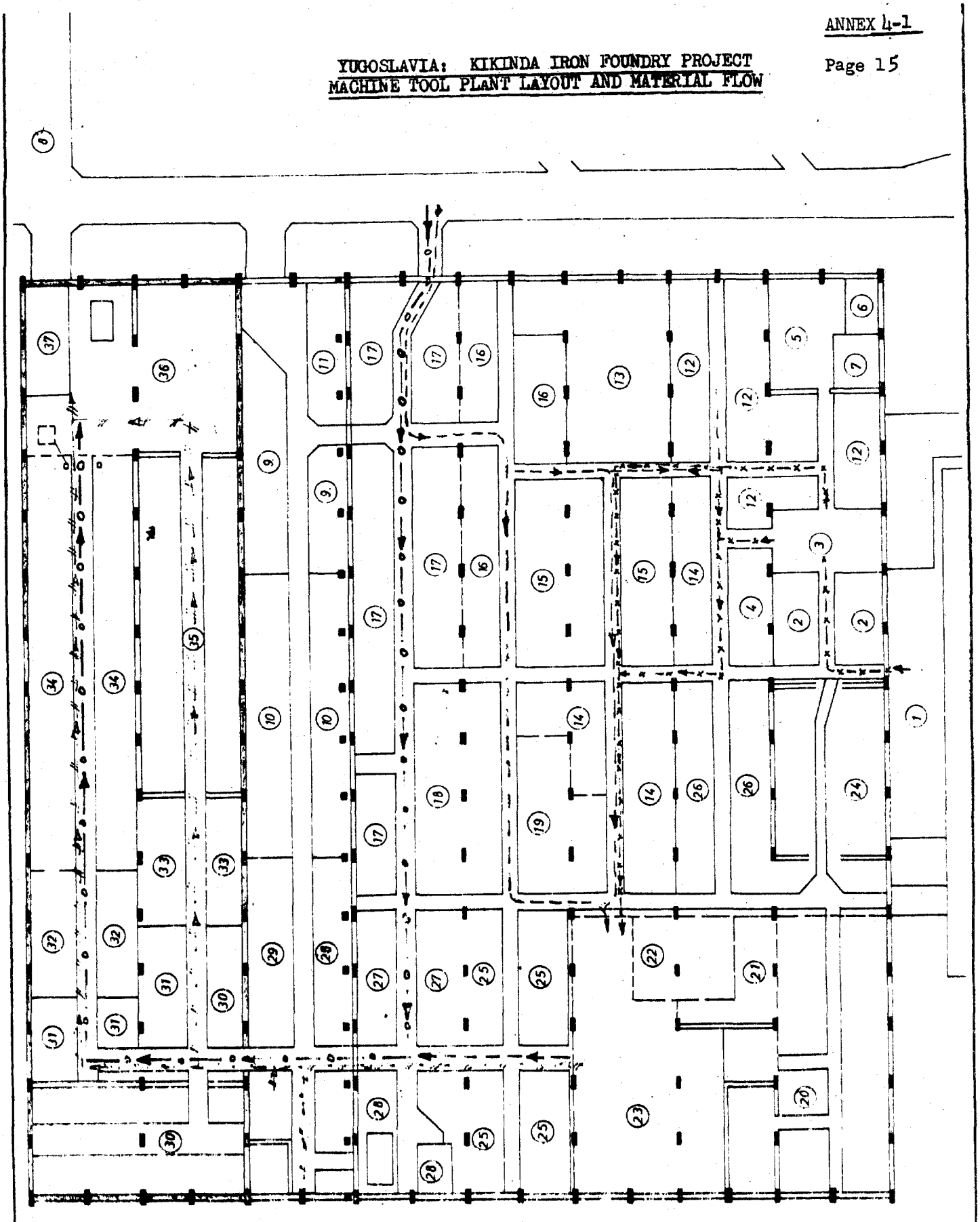
YUGOSLAVIA: KIKINDA IRON FOUNDRY PROJECT

LAYOUT OF MACHINE TOOL PLANT

1. Steel Storehouse
2. Cutting
3. Storage Area
4. Small Part Machining
5. Storehouse for Big Parts
6. Unpacking
7. Plant Maintenance
8. Storehouse for Casting
9. Treatment of Heavy Castings
10. Cleaning - Annealing - Sand Blasting of Castings
11. Marking Machines
12. Lathes
13. Tools Storing and Preparation for Treatment
14. Grinding Machines
15. Milling Machines
16. Boring Machines and Large Size Lathes
17. Final Heavy Machining
18. Drilling Machines
19. Locksmith's Shop and Storage Area
20. Tool Shop
21. Electrical Power Maintenance and Large Capacity Transformers
22. Electrical Control and Distribution Cubical Mounting
23. Storehouse
24. Hardening Department - Heat Treatment
25. Sub-assembling and Mounting Department
26. Heavy parts Assembly
27. Painting
28. Tinsmith's and Welder's
29. Hydraulic Systems Erection and Testing
30. Radial Drilling Machines Final Assembly
31. Flat Surface Grinding Machines Final Assembly
32. Turning Grindling Machines Final Assembly
33. Special Grinding Machines Assembly
34. Universal Grinding Machines Assembly
35. Precision Mounting and Testing Department with Constant Temperature Control
36. Final Painting, Adjusting and Packing of Machines
37. Delivery Area

YUGOSLAVIA: KIKINDA IRON FOUNDRY PROJECT
MACHINE TOOL PLANT LAYOUT AND MATERIAL FLOW



- o - Heavy Castings
----- Medium and Light Castings
-x-x- Steel Shapes
#- Components

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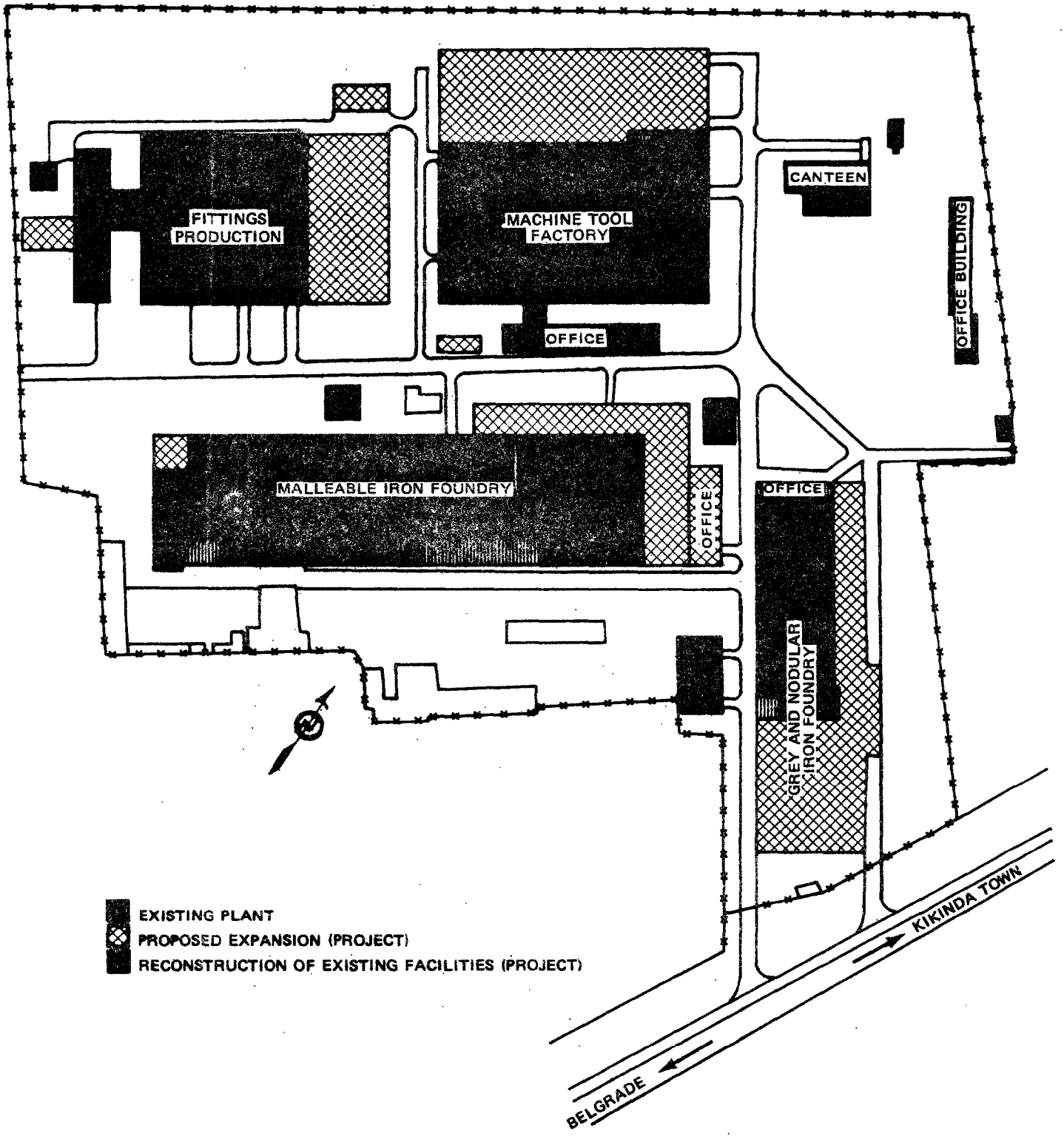
ANNEX 4-2

YUGOSLAVIA - KIKINDA IRON FOUNDRY

PLANT LAYOUT



World Bank—7725

YUGOSLAVIA - KIKINDA IRON FOUNDRY PROJECT

ECOLOGY

A. General Standards and Conditions in Yugoslavia

1. According to the Yugoslav law on protection against air pollution, it is obligatory for all manufacturing enterprises to obtain certification of the provincial administrative body responsible for pollution control as to whether the required conditions for protection against air pollution have been met. According to the Company management, the Kikinda town authorities are in full agreement with the current plant location and proposed facilities for the expansion program.

2. A new environment control law has recently been passed. This law stipulates that all new projects as well as existing plants should conform to certain minimum pollution standards by the end of 1973 and all set standards by 1977. A summary of the main conditions and standards, which are still rather general as set by the law is given below.

(a) Temperature:

Work Room	14°C (min.)
Offices	20°C

(b) Permissible concentration of harmful matters:

Mineral dust with over 50% free SiO_2	-- 175 particles/cm^3
Dust over 70% free SiO_2	-- 1 mg/m^3
Dust 10 - 70% free SiO_2	-- 2 mg/m^3
CO	-- 50 cm^3/m^3 ppm
CO_2	-- 5000 cm^3/m^3 ppm
SO_2	-- 4 mg/m^3
Fe_2O_3	-- Max 15 mg/m^3

(c) Lighting:

For simple work	50 - 100 Lux
For moderate work	100 - 600 Lux
Precision work	500 - 1000 Lux

There are no clear classifications of the nature of the work.

(d) Noise:

Permissible noice in production area	50 - 80 db
Permissible noise in office	40 - 50 db

(e) Air Pollution:

Plants are not permitted to release air containing harmful matter into the atmosphere above the following concentrations:

	Average daily Concentration mg/m^3	Individual Concentration mg/m^3
Sulphur dioxide	0.5	0.15
Soot	0.5	0.15
Carbon monoxide	1.0	3.0
Arsenic	0.003	-
Ash and inert dust	300 mg/m^3	-

The provincial administrative body in charge of health determines the maximum permissible concentration depending on the type of industry, location and climatic conditions.

B. Pollution Control Devices in Kikinda

3. Certain facilities in the Kikinda plant, as they exist now, may not satisfy the present legal requirements. However, with the facilities proposed under the project it is judged that Kikinda will be in a position to satisfy the conditions set by the new environmental law. The Company plans to have the most up-to-date facilities for pollution control at a total cost of about Din 10 million accounting for about 5% of the total project cost. The major facilities would include:

Dust and Fume Extraction

4. Effluent gases from all (existing and new) cupola furnaces in the malleable as well as the gray and nodular foundries will pass through "ELEX-Scheible" filters; these will be procured locally from a Yugoslav firm which is manufacturing this equipment under a license from ELEX of Switzerland. The gas is then purified by extraction units before being discharged into the atmosphere.

5. The sand preparation plants will use wet dust separators; the air extracted from these plants will be released through filters, which separate the sand fines, into the atmosphere. All major pollution sources - such as mold pouring, cooling tunnel and shake-out - will have local extraction units. Core-making shops, cleaning rooms, painting and varnishing and heat treatment sections will also have localized extraction and filtering systems for purification of the air.

Water Purification

6. Water pollution is not a major problem in a foundry because the discharged water does not contain any harmful materials. Nevertheless, the water is neutralized before discharge into the Kikinda town sanitary sewer.

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YUGOSLAVIA - KIKINDA IRON FOUNDRY PROJECT

LABOR FORCE PROJECTIONS
(Nos.)

	1972 (Actual)	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
I. Foundries												
Highly skilled	87	90	110	149	210	246	246	246	246	246	246	246
Skilled	202	212	222	270	324	384	384	384	384	384	384	384
Semi-skilled and Unskilled	838	839	870	851	789	706	706	706	706	706	706	706
Sub-Total	1127	1141	1202	1270	1323	1346	1346	1346	1346	1346	1346	1346
II. Machine Tools												
Highly skilled	179	235	235	253	276	301	301	301	301	301	301	301
Skilled	208	235	235	250	271	294	294	294	294	294	294	294
Semi-skilled & Unskilled	28	34	34	34	34	34	34	34	34	34	34	34
Sub-Total	415	504	504	537	581	629	629	629	629	629	629	629
III. Administration and sales												
Highly skilled	108	108	110	119	121	115	115	115	115	115	115	115
Skilled	166	166	184	194	204	300	300	300	300	300	300	300
Semi-skilled and Unskilled	60	60	40	21	16	26	26	26	26	26	26	26
Sub-Total	334	334	334	334	341	441	441	441	441	441	441	441
IV. Maintenance												
Highly skilled	74	85	109	127	138	138	138	138	138	138	138	138
Skilled	130	125	141	157	162	162	162	162	162	162	162	162
Semi-skilled and Unskilled	4	4	4	4	4	4	4	4	4	4	4	4
Sub-Total	208	214	254	288	304	304	304	304	304	304	304	304
GRAND TOTAL	2084	2193	2294	2429	2549	2710	2710	2710	2710	2710	2710	2710

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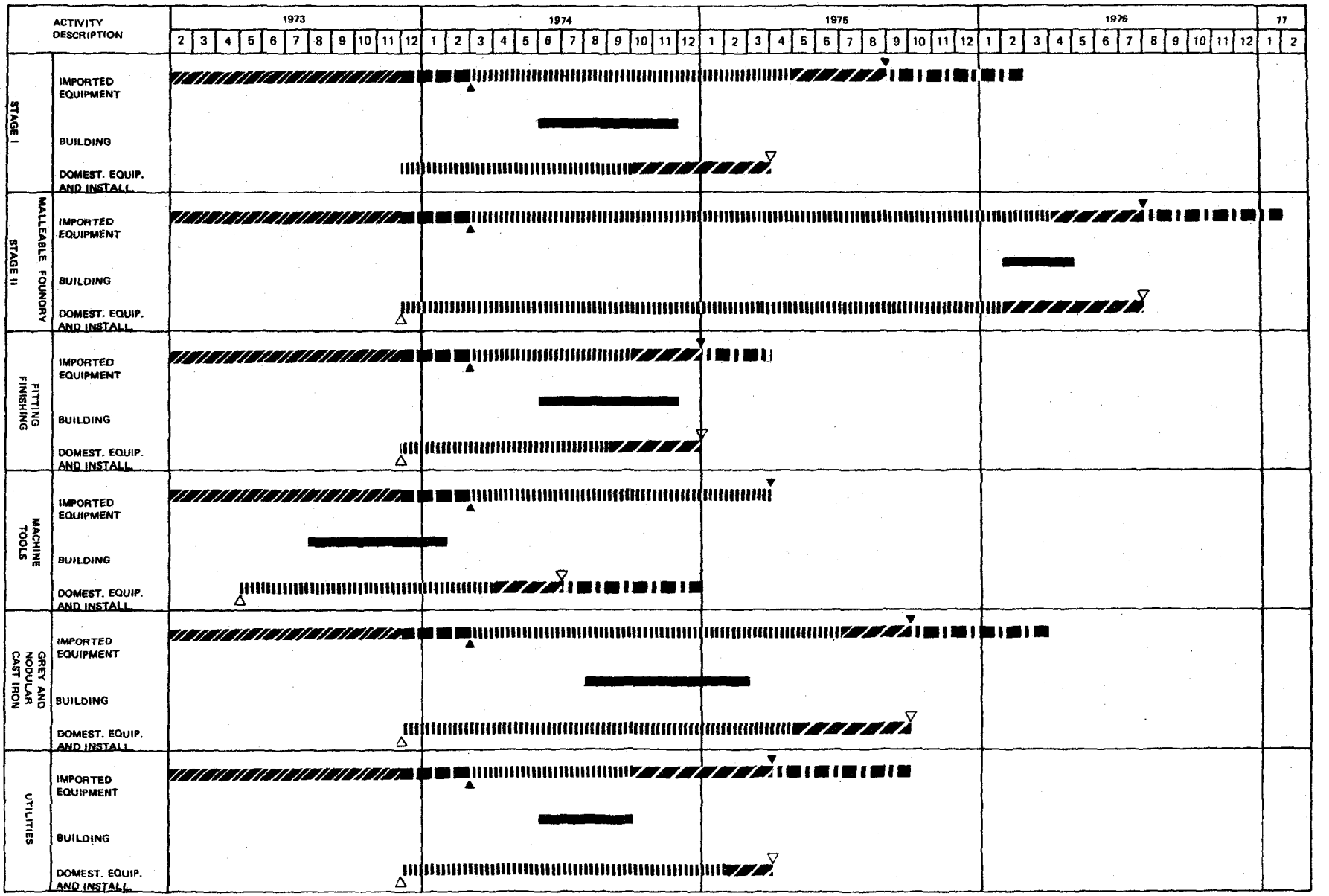
YUGOSLAVIA - KIKINDA IRON FOUNDRY

PROJECT IMPLEMENTATION SCHEDULE



TENTATIVE PROJECT PREPARATION

INTERNATIONAL TENDERING AND CONTRACTING IMPORTED EQUIPMENT

EQUIPMENT DELIVERY

EQUIPMENT ERECTION

TRIAL OPERATION

CIVIL ENGINEERING WORKS

▽ △ DINAR CURRENCY FUNDS

▼ ▲ FOREIGN CURRENCY FUNDS

ANNEX 4-5

YUGOSLAVIA - KIKINDA IRON FOUNDRY PROJECT
CAPITAL COST ESTIMATES

A. Summary

1. The capital cost estimates based on the technical studies undertaken by the company given on page 8 of this annex are summarized below:

Items	Din. Million Local	Foreign	Total	%
1. Buildings and Civil Construction	36.4	-	36.4	6.2
2. Equipment	44.5	173.4	217.9	36.9
3. Duty and Taxes	46.0	-	46.0	7.8
4. Transportation Cost	3.6	-	3.6	0.6
5. Erection and Installation	21.6	-	21.6	3.6
Sub-total	152.1	173.4	325.5	55.1
6. Contingency	14.5	21.1	35.6	6.0
7. Price Escalation	29.6	30.3	59.9	10.1
Project Cost	196.2	224.8	421.0	71.2
8. Pre-operating and Start-up 1/	12.0	4.0	16.0	2.7
9. Engineering 1/	-	5.0	5.0	0.9
10. Incremental Working Capital	92.5	10.3	102.8	17.4
11. Interest During Construction 1/	0.6	45.8	46.4	7.8
Total Financing Required	301.3	289.9	591.2	100.0
%	51	49	100	

1/ These items are charged to income statement since, according to Yugoslav law, interest during construction and start-up expenses cannot be capitalized; and the Company also charges preoperating and engineering expenses to the income statement.

2. The cost estimates prepared by the Company are based on the latest information available to it as well as its past experience. These estimates were reviewed by the Bank and are considered realistic. Details of calculations of each cost item are given below:

B. Building and Civil Construction (item 1)

3. The building construction cost estimates are based on total new area to be constructed and remodeled as well as the cost per unit area. The following are the areas to be added, reconstructed, and dismantled during project implementation:

	Area in m^2 Existing	New	To Be Reconstructed	To Be Dismantled	Total
1. Malleable Iron Foundry	14,851	3,289	1,080	1,311	16,799
2. Gray and Nodular Iron Foundry	5,455	5,333	354	531	10,257
3. Fitting Finishing Plant	4,044	336	-	-	4,380
4. Machine Tool Plant	10,620	5,040	-	170	15,490
5. Central Storage and Other Facilities	8,532	2,870	112	1,652	9,750
Total	43,502	16,868	1,546	3,694	56,676

4. The cost per unit area (m^2) varies from plant to plant and it ranges from about 1,600 Din/m^2 in the fittings department to about 2,400 Din/m^2 in the central storage department. The differences between various facilities are due to the amount and complexity of concrete work required in each plant. For example, concrete bins will be needed in the central storage area whereas the fitting finishing plant will require only a minor amount of concrete and building works. Another reason for cost differences is the differing needs for in-plant installations and foundation work. Taking these differences into account, it has been calculated that the average cost per m^2 would be about 2,000 Din/m^2, compared with the prevailing rate of about 1,500 Din/m^2 in Yugoslavia. Based on the above, the total cost of building and civil construction is estimated at Din 36.4 million and its breakdown is as follows:

	Total Building & Civil Construction Cost (000 Din)
Malleable Iron Foundry:	
Phase I	6,343
Phase II	2,718
Gray and Nodular Iron Foundry:	10,751
Fitting Finishing Plant	542
Machine Tool Shop	8,880
Central Storage and Other Facilities	7,137
Total	36,371

5. The Company has already received quotations from four Yugoslav construction firms. These quotations based on fixed-price contracts indicate that the total cost could be lower. But in Yugoslavia fixed-price contracts are not strictly followed because the contractor could increase his price if the Government allows higher construction costs. This being the case, the cost estimates given in the table are considered realistic.

C. Equipment Cost (item 2)

6. For most of the equipment and machinery, Kikinda has received written tenders from 3-6 suppliers from different countries. Most of the quotations are from suppliers in Germany, Italy, the U.K., Sweden, Denmark, and the U.S. The Company has also received quotations from at least three local suppliers for domestic equipment. The quoted prices from different suppliers vary on the average by about 25%. For foreign equipment, in most cases, price quotations were received between January and March 1973. These prices have been used for cost estimates; however, the Company feels that, under international competitive bidding, the actual delivery prices would be about 15% lower than those quoted. However, it should be noted that foreign equipment prices, in dollar terms, have increased by about 20% in the last two years. The following are the cost estimates for foreign (CIF Yugoslav border) as well as local equipment, including spare parts:

	Din Million		
Malleable Foundry	Local	Foreign	Total
Phase I:			
Melting Plant	-	8,093	8,093
Molding Line	390	3,861	4,251
Sand Preparation	650	3,776	4,426
Core Room	1,560	1,130	2,690
Cleaning Room	4,649	-	4,649
Heat Treatment Shop	-	13,326	13,326
Sub-total Phase I	7,249	30,186	37,435

	Din Million		
	Local	Foreign	Total
Phase II:			
Melting Plant	-	12,866	12,866
Molding Line	-	13,126	13,126
Sand Preparation	520	2,533	3,053
Core Room	780	1,533	2,313
Cleaning Room	1,685	-	1,685
Heat Treatment Shop	-	13,326	13,326
License fee for Convertor	-	200	200
Sub-total Phase II	2,985	41,342	44,327
Sub-total Phase I & II	10,234	71,528	81,762
Gray and Nodular Foundry			
Melting Plant	-	13,984	13,984
Molding Line	-	14,274	14,274
Sand Preparation	520	4,482	5,002
Core Room	780	1,757	2,537
Cleaning Room	2,941	-	2,941
Heat Treatment	-	3,519	3,519
License fee for Convertor	-	200	200
Sub-total	4,241	38,216	42,457
Fitting Finishing Plant			
Machines for Fittings	-	4,915	4,915
Machines for Couplings	-	10,385	10,385
Galvanizing & Transport Equipment	507	-	507
Sub-total	507	15,300	15,807
Machine Tool Plant			
Major Machining	3,741	29,546	33,287
Light Machining	6,640	11,186	17,826
Special Tools and Other Equipment	673	2,856	3,529
Control Equipment	-	663	663
	11,054	44,251	55,305
Auxiliary and Transport Equipment			
Transformer Stations	6,990	-	6,990
Boiler Plant and Heating	2,990	-	2,990
Air Compressor Station	-	2,420	2,420
Transport Equipment	8,528	-	8,528
Sub-total	18,508	2,420	20,928
Erection Cost Included in Foreign Equipment Cost 1/	-	1,717	1,717
TOTAL EQUIPMENT COST	44,544	173,432	217,969

1/ The cost of foreign specialists for the erection and supervision (1% of foreign equipment value) is added to each equipment package.

7. Of the total equipment cost of Din 218 million, about 45% will be for the malleable iron foundry and the fitting finishing plant, about 20% will be for the gray and nodular iron foundry and about 25% for the machine tool plant. About 20% of total equipment in value would be procured locally.

D. Duty and Taxes (item 3)

8. Duty and taxes are calculated based on the prevailing tariff rates (which came into effect on February 26, 1973) for machines and equipment. The present customs duty for foundry equipment varies from 15% to 19% of the CIF value (Yugoslav border) and for machine tools from 19-21%. For the projections, 17% duty for foundry equipment and 20% duty for machine tools have been assumed. In addition to the customs duty, there are other taxes to be paid for imported equipment. In addition to the customs duty, a total tax of 9% on the CIF value (Yugoslav border) - 3% import tax and 6% special tax - have to be paid for all imported items. Customs duty and other tax calculations are summarized below:

Items	Value of Imported Equipment CIF Yugoslav Border (000 Din)	Duty Rate % on CIF Value Yugoslav Border	Duty (000 Din)	Taxes 9% on CIF Value Yugoslav Border	Total (000 Din)
Malleable Foundry					
Phase I	30,186	17%	5,132	2,717	7,849
Phase II	41,342	17%	7,028	3,721	10,749
Gray & Nodular Foundry	38,216	17%	6,491	3,439	9,930
Fitting Finishing Plant	15,300	17%	2,598	1,377	3,975
Machine Tool Plant	44,251	20%	8,850	3,983	12,833
Others	2,420	17%	420	217	637
Total	171,715		30,519	15,454	45,973

E. Transport Cost (item 4)

9. Transport cost estimates including insurance and handling are based on the tonnage quoted by various suppliers and the prevailing transportation cost per ton of machinery; they were calculated separately for foreign and local equipment. The transportation cost for foreign equipment is from the Yugoslav border to the plant; this cost, including insurance per ton of equipment, is assumed to be 4.0 Din/km. An average distance of 700 km from the Yugoslav border to the plant for foreign equipment and an average distance of 600 km for domestic equipment are assumed. Based on these assumptions, total cost of transportation, including insurance and handling, is estimated at Din 3,568,000 broken down as follows:

Items	Transport and Related Cost (000 Din)
Malleable Foundry	
Phase I	1,434
Phase II	614
Gray and Nodular Foundry	960
Fitting Finishing Plant	150
Machine Tool Plant	352
Others	58
Total	3,568

F. Erection and Installation Costs (item 5)

10. Costs pertaining to these two items were separately estimated; the installation cost estimates are based on the bill of materials plus related assembly costs and the erection cost (including only final mounting and assembly costs) estimates are calculated as follows: (1) For the two foundries, 4% of total equipment value for major equipment and 1% of value for small pieces of equipment; and (2) for the machine tool plant, the fitting finishing plant and the auxiliary equipment, 2% of value for major equipment and 1% for minor equipment.

11. The installation and erection cost estimates on a plant by plant basis are as follows:

	Installation Cost (in '000 Din)					
	Electric Installation	Heating and Ventilation	Compressed Air	Gas Installation	Water Installation	Total
Malleable Foundry	2,173	1,300	250	300	250	4,273
Gray and Nodular Foundry	1,186	750	120	80	150	2,286
Fitting Finishing Plant	67	400	70	100	80	717
Machine Tool Plant	1,370	1,254	150	100	100	2,974
Others	2,433	1,350	-	200	420	4,403
Total	7,229	5,054	590	780	1,000	14,653

	Erection Costs (000 Din)
Malleable Foundry	3,682
Gray and Nodular Foundry	1,659
Fitting Finishing Plant	314
Machine Tool Plant	1,086
Other	202
	6,943

The total installation and erection costs add up to Din 21.6 million.

G. Contingency (item 6)

12. To the total cost estimates based on a detailed breakdown into facilities and equipment, a 10% contingency (for foreign as well as local costs) has been added to account for minor scope changes and omissions of equipment and civil works. Considering the advanced stage of preparation of the project, this contingency provision is considered more than adequate. This item also includes Din 3.8 million in foreign exchange, resulting from rounding of the Bank loan.

H. Price Escalation (item 7)

13. During the past two years, equipment (local as well as foreign) and civil construction costs have been increasing at an annual rate of about 10%. In order to account for future price and construction cost increases, price escalations have been added to the project cost. In view of the steps being taken by the Federal Government of Yugoslavia, the domestic inflation rate

is expected to drop in the future. Assuming that the measures taken to control inflation will succeed, the following domestic inflation rates have been assumed: 1973, 10%; 1974, 8%; and 6% per year afterwards. With regard to foreign equipment, a 6% inflation rate per year has been assumed. Based on these assumptions, total price escalation is estimated at 59,886,000 Dinars (29,561,000 Dinars on domestic cost and 30,325,000 Dinars on foreign exchange costs) about 14% of total project cost.

I. Pre-operating and Start-Up Expenses (item 8)

14. According to Yugoslav law and the Company practice, these expenses are not capitalized; they are charged to the income statement as they are incurred. Due to the peculiarity of the accounting system, a clear picture of these costs has not been obtained. Of the estimated total expenses of Din 16.0 million pre-operating costs would be about Din 12.0 million, including approximately Din. 5.0 million for training of personnel. Of the total expenses about Din 4.0 million is expected to be in foreign exchange primarily for travel and training abroad. Start-up expenses, estimated at Din 4.0 million, pertain only to the initial start-up of the facilities.

J. Engineering (item 9)

15. Since the Company lacks experience in preparing tender specifications and evaluating international bids, it plans to appoint a technical consultant for this purpose. The cost for this service is estimated to be about 5.0 million Dinars in foreign exchange. This expense will also be charged to income statement.

K. Incremental Working Capital (item 10)

16. Details of calculations and underlying assumptions are given in Annex 5-2.

L. Interest During Construction (item 11)

17. Interest during construction is calculated on the basis of the expected disbursement. All foreign interest charges relate to the Bank loan and the small amount of local interest is due to the need for the Company to borrow short-term funds in 1975. All interest is charged to the income statement as required by law.

M. General Comments

18. The cost estimates on the whole have been well prepared on a plant-by-plant basis and are considered realistic. However, the investment cost per ton of malleable castings (US$1041/ton)[1] appears high compared to international cost standards which range from US$750-850/ton. Major reasons for the difference are the needs for: (i) replacement of some existing facilities; (ii) revamping of certain facilities; (iii) heavy investment in heat treatment equipment; and (iv) additional material handling and pollution control facilities for the existing plant.

19. Investment costs per ton in the gray and nodular foundry and in the fitting finishing plant, estimated at US$626/ton and US$740/ton respectively,

1/ Based on the exchange rate US$1 = 15.5 Din.

appear to be about in line with those of Western Europe.

20. In the case of the machine tool plant, an international comparison is difficult because of the differences in the range of products between plants. However, the investment cost for this plant is also considered realistic since the number of machines and facilities as well as the cost of machines and building construction have been estimated carefully.

YUGOSLAVIA – KIKINDA IRON FOUNDRY
Estimated Capital Cost Table
(000 Din)

	Malleable Iron Foundry			Grey & Nodular Iron Foundry			Fitting Finishing Plant			Machine Tool Plant			Others			Total		
	Domestic	Foreign	Total	Domestic	Foreign	Total	Domestic	Foreign	Total	Domestic	Foreign	Total	Domestic	Foreign	Total	Domestic	Foreign	Total
1. Buildings & Civil Construction	9,061	-	9,061	10,751	-	10,751	542	-	542	8,880	-	8,880	7,137	-	7,137	36,371	-	36,371
2. Equipment	10,234	71,528	81,762	4,241	38,216	42,457	507	15,300	15,807	11,054	44,251	55,305	18,508	2,420	20,928	44,544	173,432 1/	217,976 1/
3. Duty and Taxes	18,598	-	18,598	9,930	-	9,930	3,975	-	3,975	12,833	-	12,833	637	-	637	45,973	-	45,973
4. Transportation Costs	2,048	-	2,048	960	-	960	150	-	150	352	-	352	58	-	58	3,568	-	3,568
5. Installation Cost	4,273	-	4,273	2,486	-	2,286	717	-	717	2,974	-	2,974	4,403	-	4,403	14,653	-	14,653
6. Escalation Cost	3,682	-	3,682	1,669		1,669	314	-	314	1,096	-	1,096	202	-	202	6,943	-	6,943
Sub-total	47,896	71,528	119,424	29,037	38,216	68,043	6,205	15,300	21,505	37,179	44,251	81,430	30,945	2,420	33,365	152,052 4/	173,432 2/	325,484 2/ 4/
7. Contingency	4,790	7,153	11,943	2,983	3,822	6,805	620	1,530	2,150	3,054 4/	4,425	7,479 4/	3,094	242	3,336	14,541 4/	21,143 2/	35,684 2/ 4/
8. Price Escalation 5/	9,212	12,615	21,827	5,764	6,732	12,496	1,182	2,699	3,881	7,243	7,824	15,067	6,050	465	6,515	29,451	30,325 3/	59,776
TOTAL PROJECT COST	61,998	91,296	153,294	38,574	48,770	87,344	8,007	19,529	27,536	47,476	56,500	103,976	40,039	3,117	43,216	196,154 4/	224,800	420,954 3/ 4/
Project Cost/Ton (Din /Ton)			16,136			9,705			11,473									

1/ Cost of foreign specialists for erection and supervision (1,717,000 dinars) is also included
2/ Includes contingency pertaining to the cost of foreign specialists as well as the amount resulting from rounding off the Bank loan.
3/ Includes price escalation pertaining to the cost of foreign specialist
4/ No contingency has been included for machines supplied by Kikinda (value 6,664,000 dinars) itself.
5/ Price escalation is allocated on a pro rata basis.

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YUGOSLAVIA - KIKINDA IRON FOUNDRY PROJECT

WORKING CAPITAL REQUIREMENTS
(With Expansion)
(Din million)

	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
Cash*	10.6	13.5	16.7	23.2	26.4	27.2	28.0	28.8	29.7	30.6	31.5
Accounts Receivables	49.5	51.4	58.0	80.5	82.5	84.9	87.5	90.1	92.8	95.6	98.4
Inventory:											
(a) Raw Materials & Supplies											
- Foundry	13.9	16.7	20.5	30.2	37.3	38.4	39.6	40.7	41.9	43.2	44.5
- Machine Tools	19.2	27.0	34.1	44.1	48.8	50.2	51.8	53.4	55.0	56.7	58.4
- Hydraulic Parts	1.7	2.1	2.7	2.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(b) Semi-finished Products											
- Foundry	4.1	4.9	6.0	8.8	10.9	11.3	11.6	11.9	12.3	12.7	13.0
- Machine Tools	10.9	15.3	19.3	25.0	27.7	28.4	29.4	30.2	31.1	32.1	33.1
- Hydraulic Parts	4.0	5.5	6.9	6.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
(c) Finished Products (Foundry, machine tools and hydraulic parts)	4.0	4.9	6.1	8.5	10.0	10.4	10.9	11.3	11.7	12.5	13.0
(d) Stores	1.6	2.0	2.5	3.5	4.0	4.1	4.2	4.3	4.5	4.6	4.7
Total Inventory	59.4	78.4	98.1	129.7	138.7	142.8	147.5	151.8	156.5	161.8	166.7
Total Current Assets	119.5	143.3	172.8	233.4	247.6	254.9	263.0	270.7	279.0	288.0	296.6
Less: Accounts Payable	29.5	32.6	34.6	48.0	54.8	56.4	58.1	59.8	61.6	63.4	65.3
Other Payables	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
Sub-Total	41.5	44.6	46.6	60.0	66.8	68.4	70.1	71.8	73.6	75.4	77.3
Working Capital	78.0	98.7	126.2	173.4	180.8	186.5	192.9	198.9	205.4	212.6	219.3
Changes in Working Capital	-7.4	+20.7	+27.5	+47.2	+7.4	+5.7	+6.4	+6.0	+6.5	+7.2	+6.7

Note: For assumptions used in projections, refer to Annex 5-2, Page 2 .

* Excluding Surplus Cash.

YUGOSLAVIA - KIKINDA IRON FOUNDRY PROJECT

ASSUMPTIONS FOR WORKING CAPITAL ESTIMATES

	1973	1974	1975	1976	1977
1. Cash	4% of Sales 1/				
2. Receivables					
- Days	67	55	50	50	45
- % of Sales 1/	18.6	15.3	13.9	13.9	12.5
3. Payables					
- Days	40	35	30	30	30
- % of Sales 1/	11.1	9.7	8.3	8.3	8.3

4. Inventory:

(a) Raw Materials
- For Foundry - 7.5% of Sales 1/ (27 days)
- For Machine Tool Plant - 30% of Sales 1/ (108 days)
- For Hydraulic Parts - 9% of Sales 1/ - (32 days)

(b) Semi-Finished Products
- For Foundry - 2.2% of Sales 1/ (8 days)
- For Machine Tool Plant - 17% of Sales 1/ (61 days)
- For Hydraulic Parts - 23% of Sales 1/ (83 days)

(c) Finished Products (for all items) - About 2% 2/ of Total Production Cost

(d) Stores - 0.6% 3/ of Sales 1/

1/ Sales excludes revenue from servicing (of machine tools, machining of castings, etc.)
2/ The percentage was 1.2% in 1972.
3/ This was the percentage in 1972. It is assumed to remain constant.

Note: 1) Because of a new law passed in 1973, regarding working capital, the receivables and payables position is expected to improve considerably in the future.

2) Working capital requirement in foreign exchange is estimated to be about 10% of the total.

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ANNEX 5-8
page 2

YUGOSLAVIA - KIKINDA IRON FOUNDRY PROJECT
EQUIPMENT TO BE FINANCED BY THE BANK

Category	Amount of Loan Allocated (expressed in Dollar equivalent) (000 US$)
I. Material Handling Facilities and Auxiliary Equipment (includes air compressor station)	190
II. Malleable Foundry (Phase I), includes melting plant, disamatic molding lines, sand preparation and core room facilities and heat treatment shop	2,270
III. Malleable Foundry (Phase II), includes melting plant, molding line, sand preparation and core room facilities, heat treatment shop and convertor	3,150
IV. Gray and Nodular Foundry, includes melting Plant, molding line, sand preparation and core room facilities, convertor and heat treatment shop.	2,900
V. Fitting Finishing Plant, includes machines for fittings and couplings	1,160
VI. Machine Tool Plant, includes boring, grinding, milling, drilling and planing machines; climatized assembly room; heavy and light treatment shop; control tools and devices; and various other assembly tools and devices	3,330
VII. Unallocated	1,500
Total	14,500

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YUGOSLAVIA - KIKINDA IRON FOUNDRY PROJECT
DISBURSEMENT SCHEDULE OF US $13 MILLION IBRD LOAN
(In '000 US$)

		Disbursement	Amount Outstanding	Undisbursed Amount
1974				
	I Quarter	1,213	1,213	13,287
	II Quarter	1,987	3,200	11,300
	III Quarter	2,008	5,208	9,292
	IV Quarter	1,362	6,570	7,930
1975				
	I Quarter	1,861	8,431	6,069
	II Quarter	2,018	10,449	4,051
	III Quarter	1,659	12,108	2,392
	IV Quarter	-	12,108	-
1976				
	I Quarter	265	12,373	2,127
	II Quarter	1,093	13,466	1,034
	III Quarter	363	13,829	671
	IV Quarter	-	13,829	671
1977				
	I Quarter	671	14,500	-

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YUGOSLAVIA - KIKINDA FOUNDRY PROJECT

EX-PLANT SELLING PRICE ASSUMPTIONS

(Dinars Per Unit)

		1973 (actual)	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
1. Malleable Castings (per ton) 1/	CO	11200	11200	11800	12270	12270	12640	13020	13410	13810	14220	14650
	CL	-	-	-	-	12880	13268	13665	14080	14490	14930	15375
	D	9800	10400	10700	11000	11660	12010	12370	12740	13120	13505	13920
2. Finishing Fittings for Pipe (per ton)	CO	13400	14000	14600	15300	15912	16390	16880	17385	17905	18440	18995
	CL	16600	17600	18700	19800	20790	21415	22060	22720	23380	24080	24800
	D	25000	25000	24000	23500	23500	24205	24930	25675	26445	27238	28055
3. Gray Castings (per ton) 2/	I	8600	8760	9953	10510	10510	10825	11150	11485	11830	12185	12551
4. Nodular Castings (per ton)	CO	9620	10200	10800	10800	11000	11330	11670	12020	12380	12750	13130
	CL	11500	12000	12500	13000	13000	13390	13790	14200	14230	14655	15095
	D	10800	11000	12500	13200	13200	13595	14000	14420	14850	15295	15755
5. Machine Tools (per unit):												
a) Drilling Machines	CO	72000	76500	79373	82548	85850	88425	91080	93810	96620	99520	102505
	CL	79000	83740	87930	92920	96940	99860	102850	105940	109115	112350	115760
	D	79000	83740	88764	94090	99735	102727	105808	108982	112251	115620	119096
b) Universal Grinders	CO	231000	244860	254650	264840	275430	283700	292210	300970	310000	319300	328880
	CL	250000	265000	298250	292160	306770	315970	325450	335220	345270	355630	366300
	D	256800	272208	288510	305850	324200	333930	343950	354260	364890	375840	387110
c) Surface (Flat) Grinders	CO	135000	143100	148820	151780	160970	165800	170770	175890	181170	186600	192200
	CL	156000	165360	173630	182310	191420	197170	203080	209170	215450	221910	228570
	D	156600	165995	175955	186510	197705	202635	209745	216040	225510	231280	239250
d) Special Grinders	CO	620000	657200	683490	710830	739260	761440	784280	807810	832045	857005	882715
	CL	720000	763200	801360	841430	883500	910005	937305	965425	994380	1024210	1054940
	D	800000	848000	898880	952810	1009980	1040280	1071490	1103630	1136740	1170840	1205965
e) Bryant Grinders	CO	--	--	--	--	--	--					
	CL	--	--	--	--	--	--					
	D	--	504000	534240	566295	600270	618280	636830	655930	675610	695875	716750
f) Hydraulic Parts	CL	68000	68000	74800	74800	--	--	--	--	--	--	--
	D	--	--	--	--	--	--	--	--	--	--	---

1/ The Company will start selling malleable castings to the clearing area in 1977.

2/ Sold internally at production cost to the machine tool plant.

Note: CO - Convertible Area Sales
CL - Clearing Area Sales
D - Domestic Sales
I - Internal Sales

YUGOSLAVIA

KIKINDA IRON FOUNDRY PROJECT

SALES REVENUE FORECASTS
(Din Million)

		1973	1977	1983
1. Castings				
Malleable Castings	T	54.6	163.8	195.5
	CO	33.0	110.5	131.9
	CL	-	12.5	14.9
	D	21.6	40.8	48.7
Malleable Pipe Fittings	T	77.8	129.9	155.0
	CO	22.8	39.8	47.5
	CL	5.0	12.5	14.9
	D	50.0	77.6	92.6
Gray Castings	I	7.7	15.8	18.8
Nodular Castings	T	44.7	187.8	223.5
	CO	32.7	115.5	137.9
	CL	1.2	19.5	22.6
	D	10.8	52.8	63.0
Total Castings	T	184.8	497.3	592.8
	CO	88.5	265.8	317.3
	CL	6.2	44.5	52.4
	D	90.1	187.0	223.1
2. Machine Tools				
Drilling Machines	T	4.0	7.8	9.4
	CO	-	0.8	1.0
	CL	-	1.0	1.2
	D	4.0	6.0	7.2
Universal Grinders	T	38.7	59.2	70.8
	CO	7.4	11.0	13.2
	CL	-	7.7	9.2
	D	31.3	40.5	48.4
Surface Grinders	T	6.3	18.9	22.8
	CO	-	3.2	3.8
	CL	-	3.8	4.6
	D	6.3	11.9	14.4
Special Grinders	T	15.2	64.8	77.4
	CO	-	7.4	8.8
	CL	7.2	22.1	26.4
	D	8.0	35.3	42.2
Internal Grinders	D	-	12.0	14.3
Hydraulic Parts 1/	CL	17.2	-	-
Total Machine Tools	T	81.4	162.7	194.7
	CO	7.4	22.4	26.8
	CL	24.4	34.6	41.4
	D	49.6	105.7	126.5
3. Other Revenue 2/	D	31.7	52.6	62.7
4. Grand Total	T	297.9	712.6	850.2
	CO	95.9	288.2	344.1
	CL	30.6	79.1	93.8
	D	171.4	345.3	412.3

1/ Hydraulic parts are currently sold to Romania on a 5-year contract ending in 1976.
2/ Mainly from machine tool servicing.

Legend: T = Total
CO = Convertible Area Sales
CL = Clearing Area Sales
D = Domestic Sales
I = Internal Company Sales

Industrial Projects Department
June 1973

YUGOSLAVIA - KIKINDA IRON FOUNDRY PROJECT

RAW MATERIALS AND UTILITIES

A. Raw Materials for Foundries

1. The supply situation regarding the main raw materials for the production of castings and machine tools is not expected to be a bottleneck for Kikinda expansion as reflected in the following account.

2. Foundry Pig Iron: There are three steel plants which produce, among other items, foundry pig iron. Their production in 1972 is shown below:

Foundry Pig Iron Production in 1972
(in Tons)

Zenica (Bosnia-Herzegovina)	140,000
Store (Slovenia)	35,000
Sisak (Croatia)	5,000
Total	180,000

3. By 1975, the three steel plants are expected to increase their foundry pig iron production to 200,000 tons and the existing steel plant at Smederevo (Serbia) has plans to start producing 100,000 tons of foundry pig iron a year, thus raising the annual Yugoslav production to 300,000 tons.

4. In 1972, Yugoslavia consumed 220,000 tons of foundry pig iron of which 40,000 tons (19% of the total) were imported, mainly from the Soviet Union, Canada and West Germany. With the expansion of the local production, however, the country is expected to be self-sufficient in foundry pig iron by 1975.

5. In the case of Kikinda, its requirements of pig iron are met partly from the Store Steel Plant and partly from imports. Kikinda officials expect that the Store Steel Plant, after its expansion, would be able to meet all pig iron needs of Kikinda by 1975.

6. Scrap: The total scrap consumption by Yugoslav foundries in 1973 is expected to be 180,000 tons of which 10,000 tons (5.5% of the total) would be from imports. According to the Foundry Association of Yugoslavia, imports of scrap for foundries would not grow in the future, because of the availability of more foundry pig iron. For the industry sector as a whole, scrap imports are expected to decline from about 490,000 tons in 1973 to 230,000 tons in 1975.[1/]

7. In the case of Kikinda, the plant is not expected to encounter problems in getting adequate scrap supply for its expansion program. In March 1972 it signed a 10-year contract with Otpad, a scrap supply company of Zrenjanin, near Belgrade, to meet approximately 70% of Kikinda's annual needs.

1/ According to Yugoslav Steel Producers' Association.

Other sources of scrap for Kikinda are: Ferrotex, a scrap supplying company of Kragujevac, near Belgrade; and the Zastava Auto Plant.

8. Coke: Annual coke consumption by foundries in Yugoslavia is at present about 130,000 tons of which about 40,000 tons are imported mainly from Czechoslovakia, Poland, West Germany, France and Holland. Yugoslavia has plans to build two new coke plants at the following locations: Baker (a 800,000-ton/year plant) on the Adriatic Coast; Zenica (a 1.4-million-ton/year plant) in Bosnia. Further, the capacity of the only existing coke plant at Lukavac is expected to be increased to 1.4 million tons by 1975-76. When these projects are completed, no further coke imports, particularly for foundries, are expected to be needed.

9. The Lukavac plant is the major source of coke for the Kikinda Foundry. However, it has not been able to meet the foundry's needs fully. Kikinda has, therefore, invested some funds in the expansion of the Lukavac plant so that the latter would be able to meet a larger part of the former's requirements.

10. Anthracite: A local firm is able to meet all the anthracite requirements of Kikinda. The firm has plans to expand its production in line with the expansion of Kikinda.

11. Quartz Sand: Currently, Kikinda is able to meet almost all of its requirements of quartz sand from four domestic suppliers. However, these suppliers would not be able to meet Kikinda's needs fully after its expansion. Therefore, Kikinda is encouraging the opening of a new mine by the Yugoslav firm, Rudnici Nemetala Valjevo. Kikinda has offered to sign a long-term contract with the firm to purchase sand from the new mine.

12. Limestone: The local mine, Veljko Dugosevic at Kucevo, would continue to be able to meet all the limestone requirements of Kikinda.

13. Bentonite: Production of bentonite by the local firm, Bentomak, would continue to be adequate to meet Kikinda's needs. However, this firm is showing more interest in exporting than in selling at home because local bentonite prices are lower than export prices due to Federal price controls. Kikinda has approached the Federal Government to allow the local bentonite prices to rise to the level of export prices.

14. Resins: Resins are mostly imported from West Germany.

15. Ferroalloys: Kikinda would continue to cover part of its ferroalloy needs from the local supplier, 8 Mart, at Ada. Kikinda provides technical assistance to this supplier and also has a three-year supply contract with it. Part of the ferroalloy needs have to be met by imports.

16. Zinc: Most of the zinc requirements of Kikinda are met by the local firm, Zorka, with which Kikinda has a 10-year contract. Kikinda has also invested Din 1 million in the expansion of Zorka. No bottleneck is foreseen in the zinc supply to Kikinda.

B. Raw Materials for Machine Tools

17. All the gray castings required for machine tools would be provided internally by the foundry at cost. Apart from gray castings, machine tool production requires mainly various steel products including flat steel and steel pipes as well as electrical equipment (e.g. electrical motors, switches, wiring, etc.) In the case of grinders, in 1972, on an average about 13% by value of their needs of steel products and 40% of their requirements of electrical materials were imported. These percentages are expected to decline to less than 10% and 25% respectively by 1976 with the expansion of steel and electrical equipment industries in Yugoslavia.

18. At present, there are 8 steel plants in Yugoslavia with a total capacity of about 2.6 million tons per year of crude steel equivalent. Their capacity is expected to increase to about 5 million tons by 1975, and 7 million tons by 1980. As for electrical equipment, this is a fast-growing industry in Yugoslavia. It shows one of the most successful and profitable performances mainly because of the achievement of economies of scale, cooperation and trading agreements with some leading international producers, creation of a number of research and development centers, strong domestic demand and favorable raw material costs (e.g. copper and lead prices are lower than world prices).

C. Raw Material Import System

19. Raw material imports are allowed under three main systems: (a) the GDK system; (b) the RK system, and (c) the LB system. Under the GDK system, companies which export are allowed to import about 25% of their requirement of raw materials for export production. Under the RK system, imports of specific items (steel scrap, ferroalloy briquettes, pig iron, foundry coke, etc.) are allowed to be imported in quantities approved by industrial associations. Under the LB system, no limits are imposed on the import of specific items such as limestone, quartz sand, coal dust, zinc, etc. In addition, companies which export can use their retention quota to import freely the things they need. This quota amounts to 20% of the annual total exports of a company. However, the depreciation quota[1] cannot be used for the import of raw materials.

20. The following table shows the customs duties on the import of main raw materials by foundries and the import system under which they fall:

	Customs duties %	Import System
Pig Iron	3	RK
Steel Scrap	3	RK
Coke	8	RK
Anthracite	-	LB
Quartz Sand	3	LB

1/ Ten percent of total depreciation could be changed to foreign exchange at the National Bank to import equipment and spares, and also to repay foreign credits.

	Customs Duties %	Import System
Limestone	-	LB
Bentonite	3	GDK
Ferroalloy Briquettes	3	RK
Zinc	3	LB
Resins	10	RK
Steel Products	10-13	GDK
Electrical Equipment	19	GDK

D. Utilities

21. Electricity: The Company has already held negotiations with the electric power distribution agency, Electrovojvodina, to ensure adequate power supply for the expansion. The agency has agreed to meet all the power requirements of Kikinda by installing a new transformer station at its own cost.

22. The power requirements of Kikinda are expected to increase three-fold during 1973-77 as shown below:

	In Million KWH	Price Per KWH (Din.)
1973	21.6	0.29
1974	24.5	0.30
1975	40.0	0.32
1976	45.0	0.35
1977	60.0	0.37

23. Gas: The existing gas line has a flow capacity of 2,450 Nm^3/h. The Company plans to install a new gas line to supplement the existing one and raise the capacity to 3,750 Nm^3/h, including a 20% stand-by. These expanded facilities would be adequate to meet the need of Kikinda after expansion.

24. Water: The existing water supply system would be supplemented with additional facilities so that the needs of the expansion program estimated at 205 m^3/hr could be met fully.

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YUGOSLAVIA - KIKINDA IRON FOUNDRY PROJECT

PRODUCTION AND PRODUCTION COSTS

A. Production

Production in the various foundry units of Kikinda is expected to increase as follows:

	Production of Castings (in tons)				
	1973	1974	1975	1976	1977-1983
Malleable 1/	5,150	5,200	5,200	7,840	13,100
Pipe Fittings 2/	4,000	4,000	4,640	6,160	6,400
Nodular	4,500	7,500	9,900	15,000	16,000
Gray 3/	900	950	1,000	1,200	1,500

1/ Excluding castings for pipe fittings.
2/ Excluding losses from machining.
3/ Exclusively for internal production of machine tools.

The table shows that, as a result of the proposed expansion, production of malleable castings for the automotive and other industries would increase by over 2½ times; pipe fittings by about 1½ times; nodular castings for automotive and other industries by more than 2 times; and gray castings by about 1½ times.

2. Output figures have been calculated on the basis that at full production, the various foundries could operate at 80% of rated capacity; and the machine tool department at 75% of rated capacity. These assumptions are in line with results achieved by Kikinda and the experience of similar plants elsewhere. Further, the following assumptions have been made regarding yield in various departments:

	Average Yield (in percentage)	
	1972 (Actual)	1977 (Projected)
Malleable castings	41	42
Pipe fittings	36	40
Nodular castings	50	54
Gray	76	76

The average yield in a foundry depends on the size and complexity of castings produced. The yield is higher in the case of large castings than in the case of small ones. As gray castings produced by Kikinda for its machine tool production are large, their yield is higher than in the case of other types of castings. As a result of the expansion program, the yield in the malleable and gray foundries is not expected to increase; however, in the case of pipe fittings and nodular castings, there would be significant yield increases mainly because of better material handling. In pipe fittings, the yield increase is also due to the installation of the Disamatic molding line and the proposed production of larger fittings.

B. Principal Production Costs

3. Production cost forecasts for Kikinda are cumbersome mainly because of the following factors: (a) peculiarities of the accounting system; (b) a wide range of products produced; and (c) lack of effective cost centers. However, based on the Company's past experience, the following cost projections have been made:

Foundry Products

4. Major raw materials required for foundry operations are pig iron, steel scrap, ferro-alloys, coke, sand, limestone and resins. On the average, prices of metal groups are expected to increase annually by about 5.5%; of coke by 3%; of sand by 8.5%; of limestone by 6% and of resins by about 7%. During 1972-77, the consumption of major raw materials, based on the projected production volume, would be as follows:

Consumption of Major Raw Materials
(in tons)

	1972 (Actual)	1973	1974	1975	1976	1977 onward
1. Metals 1/	14,664	15,260	18,170	20,980	30,490	37,340
2. Coke 2/	1,914	2,050	2,550	2,520	2,360	2,730
3. Sand	24,410	25,870	31,560	37,200	54,180	66,000
4. Limestone	671	710	870	1,020	1,480	1,800
5. Resins	344	350	420	480	710	980

1/ Includes pig iron, steel scrap and ferro-alloys but excludes internal iron scrap.
2/ Drop in coke consumption in 1975 is attributable to the starting of electric furnaces in the melting shop.

5. Based on the above assumptions, total input cost of production (per ton of casting) including utilities, would be:

Input Cost Per Ton 1/
(Din)

	1972 (Actual)	1973	1974	1975	1976	1977	1983
Malleable	3,528	3,860	4,167	4,444	4,786	5,029	6,738
Pipe fittings	7,601	8,038	8,662	9,224	9,687	10,371	13,900
Nodular and gray	4,735	5,212	5,554	5,775	6,184	6,502	8,712

1/ Includes direct raw materials and utilities but excludes labor cost.

6. Total direct production cost of all foundry projects including indirect materials and labor is calculated to be:

Direct Production Cost of Foundries
(Din million)

	1972 (Actual)	1973	1974	1975	1976	1977	1983
Direct Materials 1/	70.3	80.3	103.3	128.9	197.4	246.1	329.7
Indirect Materials	12.5	13.7	17.1	21.0	32.0	40.7	54.5
Labor	30.8	32.7	40.5	41.7	47.7	51.5	69.0
Total	113.6	126.7	160.9	191.6	277.1	338.3	453.2

1/ Including utilities.

Machine Tools

7. The main raw materials required for the production of machine tools are castings, various steel products, electrical equipment and accessories, and small assembly parts such as bearings, screws, etc. The entire gray iron castings produced by Kikinda are meant for internal sales at cost for the manufacture of machine tools. Price increase of raw materials for machine tools are also expected to increase at a rate of 5.5% per year - gray castings 6% per year, steel 4% per year, electrical equipment 3.5% and other materials 4% per year. Based on the quantities required per machine, which is based on Kikinda's past experience, and the projected price increases, the following direct material costs per machine have been calculated:

Direct Material Cost per Machine 1/
('000 Din)

	1972 (Actual)	1973	1974	1975	1976	1977	1983
Universal Grinders	84.0	87.8	91.8	95.8	100.1	104.6	137.9
Flat Grinders	55.2	57.7	60.4	63.2	66.1	69.1	90.7
Special Grinders I	180.1	188.0	195.0	203.9	211.8	220.7	284.1
Special Grinders II	119.7	125.5	131.1	137.3	143.5	149.6	197.0
Internal Grinders	-	-	114.0	118.9	124.1	129.3	167.0
Radial Drills	35.3	37.1	39.0	41.0	43.1	45.3	61.2
Hydraulic Parts	16.3	17.0	18.3	18.9	-	-	-

1/ Including utilities.

8. The total direct production cost of the machine tool plant is as follows:

Total Direct Production Cost of Machine Tool Plant
(Din million)

	1973	1974	1975	1976	1977	1983
Direct materials 1/	25.2	33.9	40.3	47.8	46.0	60.5
Auxiliary materials	1.6	1.6	1.8	1.9	2.2	2.8
Services 2/	14.9	17.6	18.3	28.4	31.0	49.4
Labor	18.0	18.9	21.2	24.2	27.5	36.9
Total	59.7	72.0	81.6	102.3	106.7	149.6

1/ Including utilities.

2/ Cost associated with services rendered by Kikinda.

C. Total Direct Production Costs of Kikinda

9. Taking all the above costs - foundry costs as well as machine tool costs - into consideration, the total direct production cost for the entire enterprise can be summarized as follows:

Total Direct Production Cost of Kikinda
(Din million)

	1973	1974	1975	1976	1977	1983
Material Cost: 1/						
Foundry	94.0	120.4	149.9	229.4	286.8	384.2
Machine tool plant	41.7	53.1	60.4	78.1	79.2	112.7
Sub-Total	135.7	173.5	210.3	307.5	366.0	496.9
Labor:						
Foundry	32.7	40.5	41.7	47.7	51.5	69.0
Machine tool	18.0	18.9	21.2	24.2	27.5	36.9
Maintenance Shop	8.1	10.2	12.3	13.7	14.4	19.3
Sub-Total	58.8	69.6	75.2	85.6	93.4	125.2
Total	194.5	243.1	285.5	393.1	459.4	622.1

1/ Includes raw materials, supplies and utilities.

Industrial Projects Department
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YUGOSLAVIA - KIKINDA IRON FOUNDRY PROJECT
PROJECTED INCOME STATEMENTS
(with expansion)
(Din Million)

	1972 (Actual)	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
Net Sales:												
Domestic	195.2	171.5	196.0	231.9	310.8	345.4	355.5	366.4	377.4	388.9	399.3	412.4
Exports:												
Clearing Area	44.3	30.5	52.0	70.5	92.8	79.0	81.2	83.8	86.4	88.3	91.0	93.7
Convertible Area	56.5	95.9	125.3	156.6	227.4	288.2	296.9	305.8	314.9	324.4	334.1	344.1
	296.0	297.9	373.3	459.0	631.0	712.6	733.6	756.0	778.7	801.6	824.4	850.2
Cost of Goods Sold:												
Material, Supplies & Utilities	144.4	135.7	173.5	210.3	307.5	366.0	385.5	401.9	421.5	433.1	463.0	496.9
Labor	53.2	58.8	69.6	75.2	85.6	93.4	98.1	103.0	108.1	113.5	119.2	125.2
Gross Profit	98.4	103.4	130.2	173.5	237.9	253.2	250.0	251.1	249.1	255.0	242.2	228.1
Operating Expenses:												
Selling and Administration Expenses	13.3	14.1	14.8	16.1	18.3	22.3	23.4	24.5	25.7	27.0	28.2	29.6
Maintenance and Repair	4.4	5.6	6.0	6.5	6.9	6.9	7.3	8.0	9.0	10.3	11.9	13.8
Depreciation 1/	30.2	4.3	6.0	20.9	39.8	46.1	45.3	45.9	44.2	44.9	45.8	44.6
Other Operational Expenses	12.2	12.5	13.3	18.5	18.7	19.0	19.1	19.3	19.6	19.9	20.2	20.5
Operating Profit	38.3	66.9	90.1	111.5	154.2	158.9	154.9	153.4	150.6	152.9	136.1	119.6
Other Income	5.9	3.5	3.5	3.6	3.6	3.7	3.7	3.8	3.8	3.9	4.0	4.1
Other Expenses	7.4	3.5	4.0	4.5	2.8	0.9	0.9	1.0	1.0	1.0	1.0	1.0
Financial Charges	9.3	4.6	8.8	18.1	22.3	23.7	22.2	20.0	18.0	16.0	13.8	12.0
Income Before Taxes & Contribution	27.5	62.3	80.8	92.5	132.7	138.0	135.5	136.2	135.4	139.8	125.3	110.7
Taxes & Contribution	0.5	0.4	0.5	0.5	0.6	0.6	0.7	0.7	0.7	0.8	0.8	0.8
Net Income	27.0	61.9	80.3	92.0	132.1	137.4	134.8	135.5	134.7	139.0	124.5	109.9
Distribution of Net Income												
Business Funds	21.3	53.5	70.2	80.4	117.5	121.9	119.0	119.6	118.5	122.1	108.2	94.0
Reserve Funds	2.1	2.9	3.5	4.2	5.2	5.5	5.6	5.6	5.7	5.9	5.7	5.7
Collective Consumption Funds	3.0	2.8	3.1	3.4	3.7	4.1	4.4	4.5	4.7	5.0	5.2	5.5
Mutual Reserve Funds	0.6	2.7	3.5	4.0	5.7	5.9	5.8	5.8	5.8	6.0	5.4	4.7

Note: Explanation of terms used and assumptions for projections are given in Annex 7-3, pages 2 to 7.

1/ For projections depreciation rates comparable to those of foundries in developed countries have been assumed, Kikinda has been using accelerated depreciation rates (See Annex 7-3, page 7)

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May 1973

YUGOSLAVIA - KIKINDA IRON FOUNDRY PROJECT
SOURCE AND APPLICATION OF FUNDS
(with expansion)
(Din million)

	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
Sources											
Net Income	61.9	80.3	92.0	132.1	137.4	134.8	135.5	134.7	139.0	124.5	109.9
Depreciation	4.3	6.0	20.9	39.8	46.1	45.3	45.9	44.2	44.9	45.8	44.6
	66.2	86.3	112.9	171.9	183.5	180.1	181.4	178.9	183.9	170.3	154.5
Loans:											
Foreign Currency (IBRD)	-	101.8	85.8	26.7	10.5	-	-	-	-	-	-
Short term (local) 2/	-	-	13.5	-	-	-	-	-	-	-	-
Recovery of Investment Deposit 1/	-	1.6	7.7	7.6	2.6	-	-	-	-	-	-
Decrease in Financial Assets	5.3	-	-	-	-	-	-	-	-	-	-
Decrease in Working Capital 3/	7.4	-	-	-	-	-	-	-	-	-	-
Total	78.9	189.7	219.9	206.2	196.6	180.1	181.4	178.9	183.9	170.3	154.5
Applications											
Fixed Investments											
(a) Project: Foreign	-	101.8	85.8	26.7	10.5	-	-	-	-	-	-
Domestic	16.3	77.3	76.3	26.3	-	-	-	-	-	-	-
Sub-total	16.3	179.1	162.1	53.0	10.5	-	-	-	-	-	-
(b) Replacement Investments	5.0	5.0	5.0	5.0	5.3	5.6	6.0	6.7	7.5	8.8	10.2
Investment Deposit on the Project 1/	1.6	7.7	7.6	2.6	-	-	-	-	-	-	-
Repayments of loans:											
(a) Foreign Exchange: IBRD (Project)	-	-	-	-	-	22.5	22.5	22.5	22.5	22.5	22.5
IBRD (Old)	1.8	2.0	2.1	2.2	2.3	2.5	2.7	2.9	1.6	-	-
Others	0.4	0.5	0.5	0.4	0.0	-	-	-	-	-	-
(b) Local Currency (Fixed Assets)	1.5	2.8	2.6	2.7	2.0	1.3	-	-	-	-	-
(c) Local Currency (Working Capital)	4.0	4.5	2.4	2.3	1.3	1.0	0.4	0.2	0.2	0.2	0.2
(d) Local Currency (Short-Term)	-	-	-	13.5	-	-	-	-	-	-	-
Sub-total	7.7	9.8	7.6	21.1	5.6	27.3	25.6	25.6	24.3	22.7	22.7
Appropriations:											
Reserve funds	2.9	3.5	4.2	5.2	5.5	5.6	5.6	5.7	5.9	5.7	5.7
Collective Consumption Funds	2.8	3.1	3.4	3.7	4.1	4.4	4.5	4.7	5.0	5.2	5.5
Mutual Reserve Funds 4/	2.7	3.5	4.0	5.7	5.9	5.8	5.8	5.8	6.0	5.4	4.7
Sub-total	8.4	10.1	11.6	14.6	15.5	15.8	15.9	16.2	16.9	16.3	15.9
Increase in Working Capital	-	20.7	27.5	47.2	7.4	5.7	6.4	6.0	6.5	7.2	6.7
Cash Surplus (deficit)	39.9	(42.7)	(1.5)	62.7	152.3	125.7	127.5	124.4	128.7	115.3	99.0
Total	78.9	189.7	219.9	206.2	196.6	180.1	181.4	178.9	183.9	170.3	154.5
Surplus Cash B.O.Y.	4.3	44.2	1.5	0.0	62.7	215.0	340.7	468.2	592.6	721.3	836.6
Surplus Cash E.O.Y.	44.2	1.5	0.0	62.7	215.0	340.7	468.2	592.6	721.3	836.6	935.6

1/ 10% of the total annual local cost of the project is deposited with the National Accounting Service at the beginning of each year. The amount is returned the next year if the total domestic investment on the project is more than 100 million dinars.
2/ Project needs local borrowing only in 1975.
3/ Excluding surplus cash.
4/ Since 1971, part of Business Funds.

Industrial Projects Department
May 1973

YUGOSLAVIA - KIKINDA IRON FOUNDRY PROJECT

BALANCE SHEET PROJECTIONS
(With Expansion)
(Din Million)

	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
ASSETS												
Current Assets:												
Cash Required	11.8	10.6	13.5	16.7	23.2	26.4	27.2	28.0	28.8	29.7	30.6	31.5
Surplus Cash	4.3	44.2	1.5	0.0	62.7	215.0	340.7	468.2	592.6	721.3	836.6	935.6
Accounts Receivables	56.0	49.5	51.4	58.0	80.5	82.5	84.9	87.5	90.1	92.8	95.6	98.4
Inventory	71.2	59.4	78.4	98.1	129.7	138.7	142.8	147.5	151.8	156.5	161.8	166.7
	143.3	163.7	144.8	172.8	296.1	462.6	595.6	731.2	863.3	1000.3	1124.6	1232.2
Gross Fixed Assets	176.2	197.5	381.6	548.7	606.7	622.5	628.1	634.1	640.8	648.3	657.1	667.3
Less: Accumulated Depreciation	124.6	128.9	134.9	155.8	195.6	241.7	287.0	332.9	377.1	422.0	467.8	512.4
Net Fixed Assets	51.6	68.6	246.7	392.9	411.1	380.8	341.1	301.2	263.7	226.3	189.3	154.9
Other Assets	18.0	23.7	30.3	37.9	46.8	56.4	66.4	76.5	86.9	97.8	108.7	119.9
Financial Assets	19.5	16.9	20.4	24.4	30.1	36.0	41.8	47.6	53.4	59.4	64.8	69.5
Deposits with SDK for Project	-	1.6	7.7	7.6	2.6	-	-	-	-	-	-	-
TOTAL ASSETS	232.4	274.5	449.9	635.6	786.7	935.8	1044.9	1156.5	1267.3	1383.8	1487.4	1576.5
LIABILITIES												
Current Liabilities												
Accounts Payable	38.0	29.5	32.6	34.6	48.0	54.8	56.4	58.1	59.8	61.1	63.4	65.3
Other Payables	15.6	12.0	12.0	25.5 1/	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
Current Portion of L/T Debt	7.7	9.8	7.6	7.6	5.6	27.3	25.6	25.6	24.3	22.7	22.7	22.5
	61.3	51.3	52.2	67.7	65.6	94.1	94.0	95.7	96.1	96.3	98.1	99.1
Long-Term Debt												
IBRD	-	-	101.8	187.6	214.3	202.3	179.8	157.3	134.8	112.3	89.8	67.3
Others	51.5	41.7	34.1	26.5	20.9	16.1	13.0	9.9	8.1	7.9	7.7	7.6
	51.5	41.7	135.9	214.1	235.2	218.4	192.8	167.2	142.9	120.2	97.5	74.9
Equity:												
Business Funds	100.8	154.3	224.5	304.9	422.4	544.3	663.3	782.9	901.4	1023.5	1131.7	1225.7
Reserve Funds	7.6	10.5	14.0	18.2	23.4	28.9	34.5	40.1	45.8	51.7	57.4	63.1
Collective Consumption Funds	10.4	13.2	16.3	19.7	23.4	27.5	31.9	36.4	41.1	46.1	51.3	56.8
Mutual Reserve Funds	0.8	3.5	7.0	11.0	16.7	22.6	28.4	34.2	40.0	46.0	51.4	56.1
	119.6	181.5	261.8	353.8	485.9	623.3	758.1	893.6	1028.3	1167.3	1291.8	1401.7
TOTAL LIABILITIES	232.4	274.5	449.9	635.6	786.7	935.8	1044.9	1156.5	1267.3	1383.8	1487.4	1576.5
Current Ratio 2/	2.3	2.3	2.7	2.6	3.6	2.6	2.7	2.8	2.8	2.9	2.9	3.0
L/T Debt: Equity Ratio	30:70	19:81	34:66	38:62	33:67	26:74	20:80	16:84	12:88	9:91	7:93	5:95

1/ Short-term borrowing of 13.5 million Dinars is included.
2/ Excluding Surplus Cash
Note: For explanation of terms used, see Annex 7.3, page 2.

Industrial Projects Department
May, 1973.

EXPLANATION OF TERMS USED AND ASSUMPTIONS MADE IN FINANCIAL PROJECTIONS

A. Assets

1. Cash[1/] includes cash in hand, bank deposits and special funds for small investment (e.g. for repairs and maintenance, etc.)

2. Receivables[1/] include receivables from domestic customers (including those under litigation), and advance payment for imports not covered by commercial bank credits, and prepayments for maintenance, workers' travel, etc. Receivables from foreign buyers, and from products sold locally on credit for two or more years are not included because they are covered by commercial bank credits at 4% interest per annum.

3. Inventory[1/] includes raw materials, semi-finished products, finished products and stores. On December 31, 1971, inventories were revalued as part of the general revaluation of assets.

4. Gross Fixed Assets include land, buildings, machinery and equipment, fixed assets under construction, license fees, etc. Under the Yugoslav accounting system, preoperating and start-up expenses are not capitalized; they are shown as cost items and deducted from sales revenue in the income statement. On December 31, 1971, there was a complete revaluation of fixed assets (excluding land).

5. Depreciation: The legal minimum depreciation rate for machinery in Vojvodina Province continues to be 7%. But since 1969 companies have been allowed to use higher depreciation rates. With the modification of the law, the Company used a straight line depreciation of its fixed assets at the rate of 20% a year during 1971 and 1972. Further, on December 31, 1971, when there was a general revaluation of assets, the accumulated depreciation was also revalued.

6. "Other Assets" include collective consumption assets (e.g., cash from rent, credit to workers for housing, current value of assets such as canteen, business office, etc.) and reserve fund assets (e.g. cash, time deposits for over 5 years, etc.)

7. Financial Assets include investments in other enterprises, banks and chambers of commerce as well as time deposits for more than 13 months and Mutual Reserve Assets.

B. Liabilities

8. Accounts Payables[1/] include payables to suppliers, and short-term credit from other enterprises. Credits from commercial banks to cover

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1/ Assumptions used in the projections are contained in Annex 5-2.

receivables from foreign buyers as well as to make advance payments on raw materials imports for export production, are excluded. (These items are netted out from both sides of the balance sheet.)

9. "Other Payables" include overdue payments (to employees, banks, etc.) at the end of a year to be paid in the early part of the following year.

10. Current Portion of Long-Term Debt includes repayment of principal due within the next 12 months to creditors - both domestic and foreign.

11. Long-Term Debt includes all outstanding debt (domestic and foreign) excluding current maturities.

12. Reserve Fund could be used to cover losses; to pay wages and salaries to employees when the company is faced with liquidity problems; and to comply with court decisions to pay overdue debts. Every year, an amount equivalent to 2% of "Dahodak" (i.e. net sales minus cost of materials, supplies and utilities as well as depreciation) is allocated to the Reserve Fund from the net income ("Dobit").

13. Collective Consumption Fund is mainly used to build houses and recreational facilities for workers, to meet travelling expenses during vacation, to defray hospitalization charges, and to pay scholarships to attend Workers' universities, etc. However, the company can borrow without interest from this Fund up to one year for the following purposes: (a) to pay wages and salaries in times of liquidity problems; (b) to comply with court decisions to pay off overdue debts; and (c) to finance inventories and short-term credit sales in case of working capital shortage. In cases of borrowing from the Fund, the company has to contribute 2% of the amount to the Fund for the Development of Underdeveloped Regions. Every year at least an amount equivalent to 4% of the gross personal income of the employees is to be allocated to the Fund from net income ("Dobit"). The rate could be higher depending on the decision of the Workers' Council of each enterprise. In the case a company earns low profit, it has to appropriate money first to the Collective Consumption Fund. Then comes the Reserve Fund appropriation. If the company suffers losses, no appropriation is obligatory to any Fund.

14. Mutual Reserve Fund is meant to cover the losses of the company. Until 1970, the annual allocation to the Fund was a kind of Federal Tax. Since then, it is treated as a loan to the Provincial Government to be repaid every third year with about 4% interest. The annual contribution to this Fund is calculated on the following basis: (Net Profit - Reserve Fund Allocation) x 4.5%. As the contribution to the Fund is recoverable since 1970, it

is considered as part of the Business Fund.

Each Republic in Yugoslavia sets the rate of annual contribution for the Mutual Reserve Fund. In Vojvodina, out of 4.5%, 4.0% goes to the local commune and the rest to the Province of Vojvodina.

When a company faces a severe working capital shortage and/or when it cannot get adequate resources from outside for expansion, it could approach both the local commune and the Republic/Provincial governments for loans. However, credit is not available from the Fund to cover losses.

In 1968, Kikinda sought and received a loan of 1 million Dinars from the commune of Kikinda to construct a building for machine tools.

15. Business Fund: After making allocations to the Reserve, Collective Consumption, and Mutual Reserve Funds, the remaining amount from the net profit is allocated to the Business Fund which constitutes the main part of the equity of companies in operation. At the end of 1971, Business Fund was also revalued along with fixed assets.

16. Interest (Tax) on Business Funds was in force until December 1971. It amounted to 3.5% of the Business Fund.

17. Contribution for the Development of Underdeveloped Regions: Since 1971, the Interest on Business Funds has been replaced by an annual loan to the Federal Government for the development of underdeveloped regions. It amounts of 1.95% of the Business Fund. The loan is to be repaid over 8 years at an interest rate of 4% a year, with part of the repayment starting after 3 years. This Fund is considered as a part of the Business Fund.

18. Contribution for the Development of Disaster-Hit Areas: The Company has to contribute annually an amount equivalent to 0.75% of the gross personal income for the development of disaster-affected areas.

C. Income Statement

19. Net Sales exclude commissions, rebates, etc.

20. Domestic Sales include revenue from machine tool servicing, etc. This normally amounts to about 11% of total sales.

21. Material Costs include costs of raw materials, supplies (including office supplies) and utilities. Material costs of medium-scale repairs are also included.

22. Labor cost is gross personal income received by all employees except those in sales and administration (excluding extra allocation of income to workers).

23. Maintenance and Repair expenses exclude personnel costs and also material costs for normal maintenance.

24. Selling and Administration costs include only personnel costs. Costs of office supplies are included in material costs.

25. Depreciation of fixed assets in the past was calculated at the following rates:

1968	-	7%
1969	-	10%
1970	-	10%
1971	-	20%
1972	-	20%

However, for projections beyond 1972, the following rates are used:

(a)	Long-life equipment	10%
(b)	Short-life equipment 1/	20%
(c)	Buildings	3%
(d)	Land	0%

26. Other Operational Expenses include costs of insurance, land and water taxes, water contribution, contribution for the Development of Disaster-hit Regions (an annual amount equivalent to 0.75% of the gross personal income), payment to industry associations and chambers of commerce, etc.

27. Other Income includes interest received on: domestic credit sales, delayed payments, loans to other enterprises and the Federal Government, time deposits, etc.

28. Other Expenses include the extraordinary expenses including pre-operating and start-up costs, etc.

29. Financial Charges include interest on all loans, bank fees, etc.

D. Foreign Fund Sources

30. Retention Quota: Yugoslav exporters are entitled to a foreign exchange quota equivalent to 20% of their annual export earnings to be used without any restriction.

31. Depreciation Quota: Companies in Yugoslavia can change 10% of their total depreciation amount into foreign exchange at the National Bank to repay foreign credits and/or to import equipment and spares.

1/ Including pollution control equipment, transport vehicles, office equipment, etc.

Industrial Projects Department
June 1973.

YUGOSLAVIA - KIKINDA IRON FOUNDRY PROJECT
PROJECTED INCOME STATEMENTS
(Without Expansion)
(Din Million)

	1972 (Actual)	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
Net Sales												
Domestic	195.2	171.5	183.3	188.7	193.5	199.7	205.5	212.0	218.0	225.1	232.0	238.7
Exports:												
Clearing	44.3	30.5	37.0	40.0	41.0	42.6	44.4	46.1	47.4	49.8	51.6	53.7
Convertible	56.5	95.9	122.8	129.7	133.4	135.8	139.8	144.1	148.3	152.6	157.4	162.0
	296.0	297.9	343.1	358.4	367.9	378.1	389.7	402.2	413.7	427.5	441.0	454.4
Cost of Goods Sold												
Material Supplies and Utilities	144.4	135.7	161.3	172.0	180.3	196.6	206.5	217.2	227.5	239.4	251.4	268.1
Labor	53.2	58.8	61.7	64.8	68.0	71.4	75.0	78.8	82.7	86.9	91.2	95.7
Gross Profit	98.4	103.4	120.1	121.6	119.6	110.1	108.2	106.2	103.5	101.2	98.4	90.6
Operating Expenses:												
Selling and Administration	13.3	14.1	14.8	15.7	16.6	17.4	18.3	19.2	20.1	21.2	22.3	23.4
Maintenance and Repair	4.4	5.6	6.0	6.6	7.3	8.0	8.8	9.7	10.6	11.7	12.4	13.0
Depreciation	30.2	4.3	5.0	5.8	6.8	8.1	8.3	9.5	10.0	12.5	14.2	11.6
Other Operating Expenses	12.2	12.5	12.6	12.7	12.8	12.9	13.0	13.1	13.2	13.3	13.4	13.5
Operating Profit	38.3	66.9	81.7	80.8	76.1	63.7	59.8	54.7	49.6	42.5	36.1	29.1
Other Income	5.9	6.1	5.0	4.6	4.5	4.0	3.5	3.5	3.3	3.2	3.1	3.0
Other Expenses	7.4	2.0	2.0	2.0	2.0	2.3	2.5	2.6	2.8	2.8	2.8	2.8
Financial Charges	9.3	4.6	3.7	3.3	2.9	2.4	2.2	1.9	1.8	1.6	1.5	1.5
Income before Taxes & Contributions	27.5	66.4	81.0	80.1	75.7	63.0	58.6	53.7	48.3	41.3	34.9	27.8
Taxes & Contributions	0.5	0.4	0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.7	0.7	0.7
Net Income	27.0	66.0	80.5	79.6	75.2	62.5	58.0	53.1	47.7	40.6	34.2	27.1
Appropriations												
Business Funds	21.3	57.1	70.4	69.4	65.0	52.7	48.3	43.4	38.1	31.1	24.5	17.7
Reserve Funds	2.1	3.2	3.5	3.6	3.6	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Collective Consumption Fund	3.0	2.9	3.1	3.2	3.4	3.6	3.7	3.9	4.1	4.3	4.5	4.8
Mutual Reserve Funds	0.6	2.8	3.5	3.4	3.2	2.7	2.5	2.3	2.0	1.7	1.4	1.1

Note: For explanation of terms used, refer to Annex 7.3, page 2.

Industrial Projects Department
May 1973

YUGOSLAVIA: KIKINDA IRON FOUNDRY PROJECT

BALANCE SHEET PROJECTIONS

(without expansion)
(Din Million)

	1972 (Actual)	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
ASSETS												
Current Assets:												
Cash	11.8	10.6	11.0	11.5	11.8	11.5	11.7	12.0	12.4	12.8	13.2	13.5
Surplus Cash	4.3	65.7	125.9	181.3	231.9	282.6	318.6	351.8	379.7	403.9	424.7	439.1
Accounts Receivables	56.0	49.5	42.1	39.9	41.0	35.8	36.5	37.6	38.7	39.9	41.1	42.3
Inventory	71.2	59.4	62.0	65.0	67.8	64.4	66.3	68.4	70.5	72.9	75.2	77.4
	143.3	185.2	241.0	297.7	352.5	394.3	433.1	469.8	501.3	529.5	554.2	572.3
Gross Fixed Assets	176.2	181.2	188.2	196.2	206.2	219.0	232.4	246.3	260.5	274.9	289.5	304.2
Less: Accumulated Depreciation		128.9	133.9	139.7	146.5	154.6	162.9	172.4	182.4	194.9	209.1	220.7
Net Fixed Assets	51.6	52.3	54.3	56.5	59.7	64.4	69.5	73.9	78.1	80.0	80.4	83.5
Other Assets	18.0	24.1	30.7	37.5	44.5	51.6	58.8	66.2	73.8	81.6	89.6	97.9
Financial Assets	19.5	17.0	20.5	23.9	27.1	29.8	32.3	34.6	36.6	38.3	39.7	40.8
TOTAL ASSETS	232.4	278.6	346.5	415.6	483.8	540.1	593.7	644.5	689.8	729.4	763.9	794.5
LIABILITIES												
Current Liabilities:												
Accounts Payables	38.0	29.5	26.7	23.8	24.4	23.8	24.2	25.0	25.7	26.5	27.3	28.1
Other Payables	15.6	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
Current Portion of L/T Debt	7.7	9.8	7.6	7.6	5.6	4.8	3.1	3.1	1.8	0.2	0.2	0.0
	61.3	51.3	46.3	43.4	42.0	40.6	39.3	40.1	39.5	38.7	39.6	43.1
Long-Term Debt	51.5	41.7	34.1	26.5	20.9	16.1	13.0	9.9	8.1	7.9	7.6	7.6
Equity:												
Business Funds	100.8	157.9	228.3	297.7	362.7	415.4	463.7	507.1	545.2	576.3	600.8	618.5
Reserve Funds	7.6	10.8	14.3	17.9	21.5	25.0	28.5	32.0	35.5	39.0	42.5	46.0
Collective Consumption Funds	10.4	13.3	16.4	19.6	23.0	26.6	30.3	34.2	38.3	42.6	47.1	51.9
Mutual Reserve Funds	0.8	3.6	7.1	10.5	13.7	16.4	18.9	21.2	23.2	24.9	26.3	27.4
Total Equity	119.6	185.6	266.1	345.7	420.9	483.4	541.4	594.5	642.2	682.8	716.7	743.8
TOTAL LIABILITIES	232.4	278.6	346.5	415.6	483.8	540.1	593.7	644.5	689.8	729.4	763.9	794.5

Note: For explanation of terms used, refer to Annex 7.3 , page 2 .

Industrial Projects Department
May 1973

YUGOSLAVIA - KIKINDA IRON FOUNDRY PROJECT
ASSUMPTIONS FOR FINANCIAL AND ECONOMIC RATE OF RETURN AND FINANCIAL SENSITIVITY ANALYSIS

Description	Base Case		
	Financial Return		Economic Return*
	Domestic	Export Convertible Area	For both domestic and export
1. Selling Prices (for 1973)			
Malleable (Din/T)	9,800	11,200	11,300
Fittings (Din/T)	25,000	13,400 1/	18,200
Nodular (Din/T)	10,800	9,620	9,720
Machine Tools	(Prices given in Annex 6-1)		Kikinda export prices to convertible area (c.i.f. Yugoslav border)

1/ In the case of pipe fitting export prices are lower than domestic prices largely because Kikinda exports mostly low-quality black fittings while using the better quality fittings at home. The use of black fittings is not allowed in Yugoslavia.

* As Kikinda produced a wide range of castings and machine tools of different sizes and intricacies, it is difficult to find strictly comparable products in other countries and hence the determination of international prices is rather cumbersome. Moreover, most items of the type produced by Kikinda are not imported to Yugoslavia. Therefore, Kikinda's output has been valued at export prices (C.I.F., Yugoslav border) of the Company as these prices are the best approximations available to international prices.

	Financial	(Din per ton)	Economic 1/
2. Raw Material Prices (for 1973)			
Pig Iron	1340		1275
Scrap	920		870
Coke	1250		1060
Sand	250		250
Ferroalloys	7910		7360
Resins	11950		9950
3. Labor (avg Din/man-year in 1973)	31630		28500 2/
4. Project Cost (Din Million)	524		478 3/
5. Construction Period	4 years		4 years
6. Production Period	10 years		10 years
7. Scrap Value	zero		zero

1/ Comparable international prices.
2/ 9% taxes and contributions to Government has been excluded.
3/ Excluding duties and taxes.

YUGOSLAVIA - KIKINDA PROJECT

INPUTS FOR FINANCIAL RATE OF RETURN*
(Din Million)

Without Expansion			With Expansion						Incremental				
Investments[1]	Operating Cost[2]	Revenue[3]	Investments[1] Project: Fixed Assets	Project: W.C	Other	Total	Operating Costs[2]	Revenue[3]	Investment[1] Project	Other	Total (5-1)	Operating Costs[2]	Revenue[3]
5.0	228.7	304.0	16.3	0.0	5.0	21.3	230.2	301.4	16.3	0.0	16.3	1.5	-2.6
7.0	256.4	348.1	179.1	20.7	5.0	204.8	281.2	376.8	199.8	-2.0	197.8	24.8	28.7
8.0	271.8	363.0	162.1	27.5	5.0	194.6	331.1	462.6	189.6	-3.0	186.6	59.3	99.6
10.0	285.0	372.0	53.0	47.2	5.0	105.2	439.8	634.6	100.2	-5.0	95.2	154.8	262.6
12.8	306.3	382.1	10.5	7.4	5.3	23.2	508.5	716.3	17.9	-7.5	6.6	202.2	334.2
13.4	321.6	393.2	-	-	5.6	5.6	534.3	737.3	-	-7.8	-7.8	212.7	344.1
13.9	338.0	405.7	-	-	6.0	6.0	557.7	759.8	-	-7.9	-7.9	219.7	354.1
14.2	354.1	417.0	-	-	6.7	6.7	584.9	782.5	-	-7.5	-7.5	230.8	365.5
14.4	372.5	430.7	-	-	7.5	7.5	604.8	805.5	-	-6.9	-6.9	232.3	374.8
14.6	390.7	444.1	-	-	8.8	8.8	643.5	828.4	-	-5.8	-5.8	252.8	384.3
14.7	413.7	457.4	-	-	10.2	10.2	687.0	854.3	-	-4.5	-4.5	273.3	396.9
14.7	430.3	470.7	-	-	14.7	14.7	728.2	877.8	-	0.0	0.0	297.9	407.1
14.7	451.8	484.3	-	-	16.2	16.2	771.9	903.3	-	1.5	1.5	320.1	419.0
14.7	474.4	498.4	-	-	17.8	17.8	818.2	929.5	-	3.1	3.1	343.8	431.1

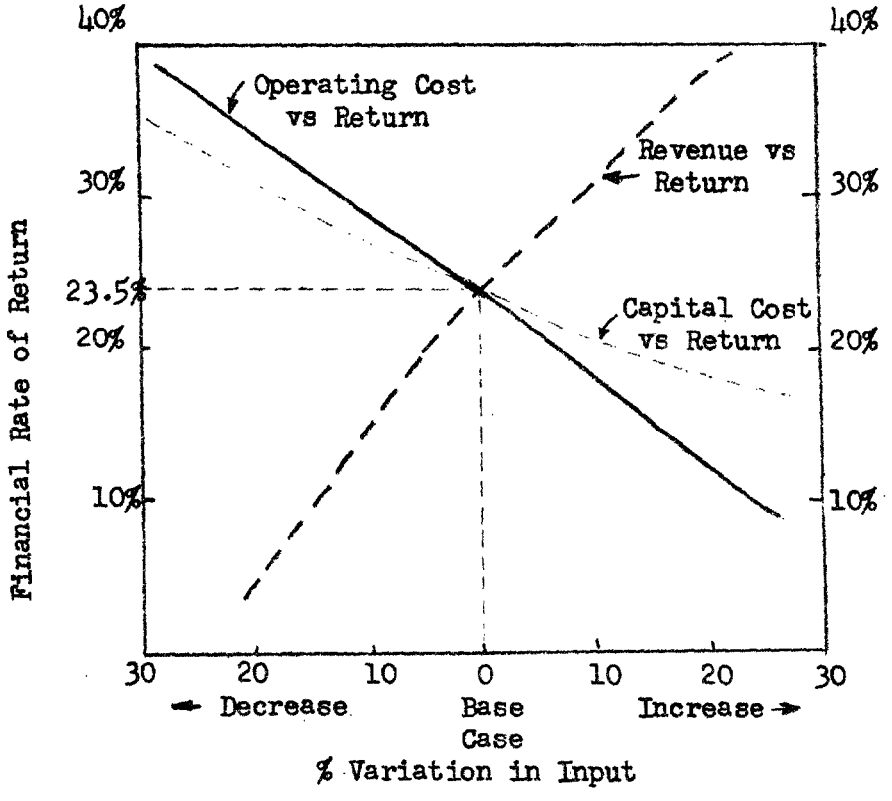
Including Replacement Investment

Excluding Depreciation, Financial Charges and Taxes, but including Pre-operating, Start-up, and Engineering expenses.

Including Other Income.

For financial rate of return calculation, the current value of the Company's existing fixed assets is assumed to be Din 500 million.

SENSITIVITY TESTS ON FINANCIAL RATE OF RETURN



Case		Capital Cost	Operating Cost	Revenue	Rate of Return
1.	(Base Case)	100	100	100	23.5
2.		110	100	100	20.7
3.		100	110	100	17.2
4.		100	100	110	31.1
5.		120	100	100	18.3
6.		110	110	100	15.5
7.		100	110	90	7.6

Industrial Projects Department
June 1973

YUGOSLAVIA - KIKINDA IRON FOUNDRY PROJECT
FOREIGN FUND SOURCES AND USES
(Din Million)

	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
Net Exports	100.8	126.4	177.3	227.1	320.2	367.2	378.1	389.6	401.3	412.7	425.1	437.8
1. Rights												
Retention Quota(20%)1/	20.1	25.3	35.5	45.4	64.0	73.4	75.6	77.9	80.2	82.5	85.0	87.6
Depreciation Quota(10%)1/	3.0	0.4	0.6	2.1	4.0	4.6	4.5	4.6	4.4	4.5	4.6	4.5
Total Rights	23.1	25.7	36.1	47.5	68.0	78.0	80.1	82.5	84.6	87.0	89.6	92.1
2. Funds Available*		23.1	25.7	36.1	47.5	68.0	78.0	80.1	82.5	84.6	87.0	89.6
3. Fund Uses		17.6	25.4	34.9	45.6	51.5	74.2	74.3	74.5	73.2	71.9	72.3
Raw Materials		12.5	15.8	18.2	24.3	28.9	30.4	31.8	33.4	35.1	36.9	38.7
Spare Parts		1.2	1.6	1.8	2.3	2.7	2.9	3.0	3.2	3.3	3.5	3.7
Interest		1.7	5.5	12.3	15.6	16.7	15.4	13.7	11.9	10.1	8.4	6.8
Royalty Fees		-	-	-	0.8	0.9	0.9	1.0	1.0	1.0	1.0	1.0
Debt Repayment:												
IBRD(Projects)		-	-	-	-	-	22.5	22.5	22.5	22.5	22.5	22.5
Others		2.2	2.5	2.6	2.6	2.3	2.5	2.7	2.9	1.6	0.0	0.0
Surplus (deficit) (2) - (3)		5.5	0.3	1.2	1.9	16.5	3.4	5.4	7.6	11.0	14.7	16.9

* Funds become available in the following year for the rights acquired in a particular year.

1/ For explanation of quotas, see Annex 7-3, page 5.

Industrial Projects Department
June 1973

YUGOSLAVIA -KIKINDA IRON FOUNDRY PROJECT

BREAK-EVEN POINT

The profit break-even point of the Kikinda plant in 1978 is estimated to be around 57% of the plant's effective capacity (75% and 80% of rated capacity for machine tool plant and foundries, respectively). The year 1978 is selected because that is the year in which repayment of the Bank loan will begin.

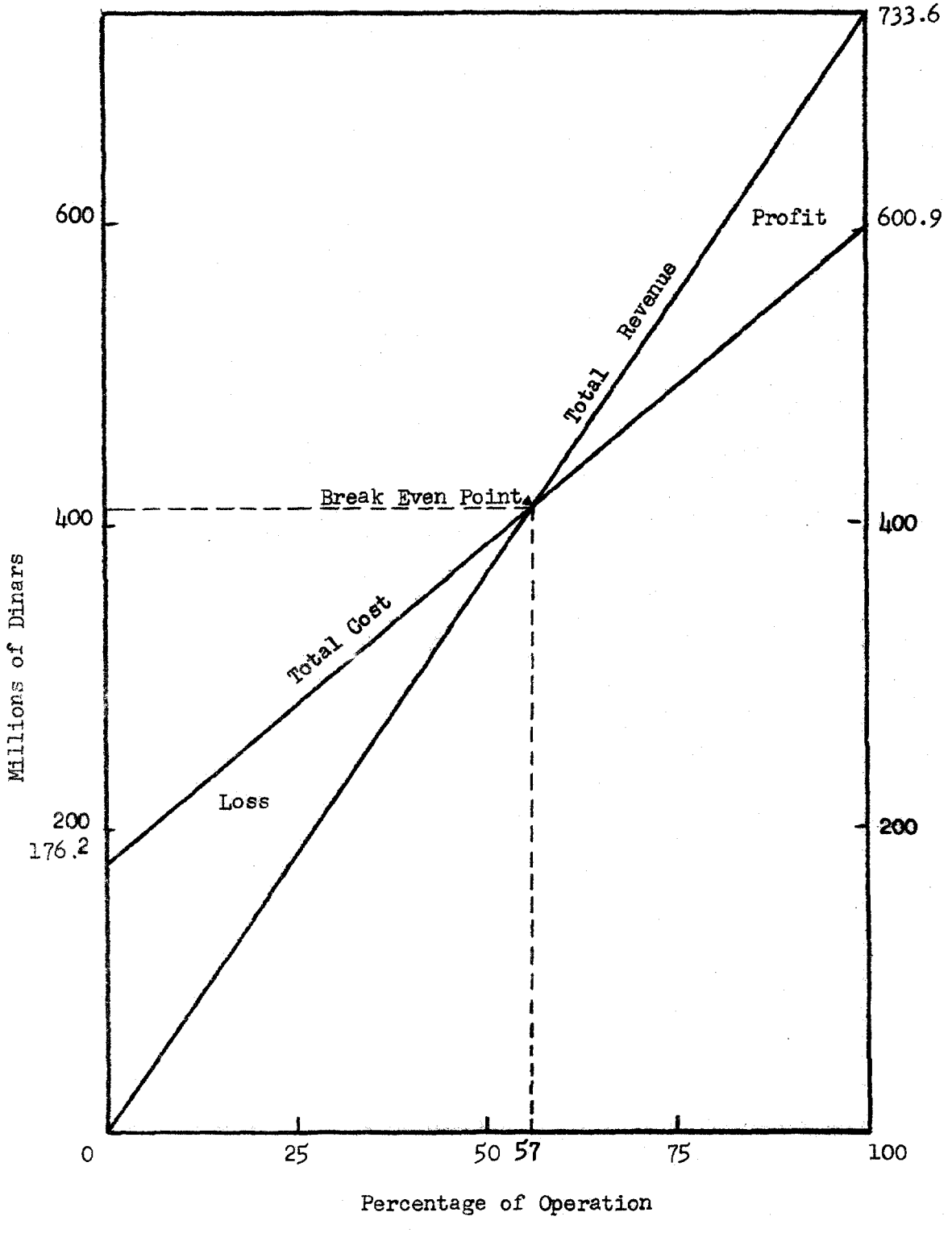
	In Din Million	
	Variable Cost	Fixed Cost
Materials and Utilities	366.2	19.3
Labor	43.5	54.6
Selling and Administration	4.6	18.8
Maintenance	6.6	0.7
Other Operating Expenses	3.8	15.3
Financial Charges	-	22.2
Depreciation	-	45.3
Total	424.7	176.2

Revenue	Din 733.6 million
Profit Break-even (capacity %)	57%
Debt Repayment	Din 27.3 million
Cash Break-even (capacity %)	51%

The profit break-even of each plant in 1978 should be the following:

	% of Effective Capacity
1. Malleable iron foundry	60
2. Fitting Finishing Plant	48
3. Gray and Nodular Foundry	55
4. Machine Tool plant	40

BREAK-EVEN POINT
YEAR 1978



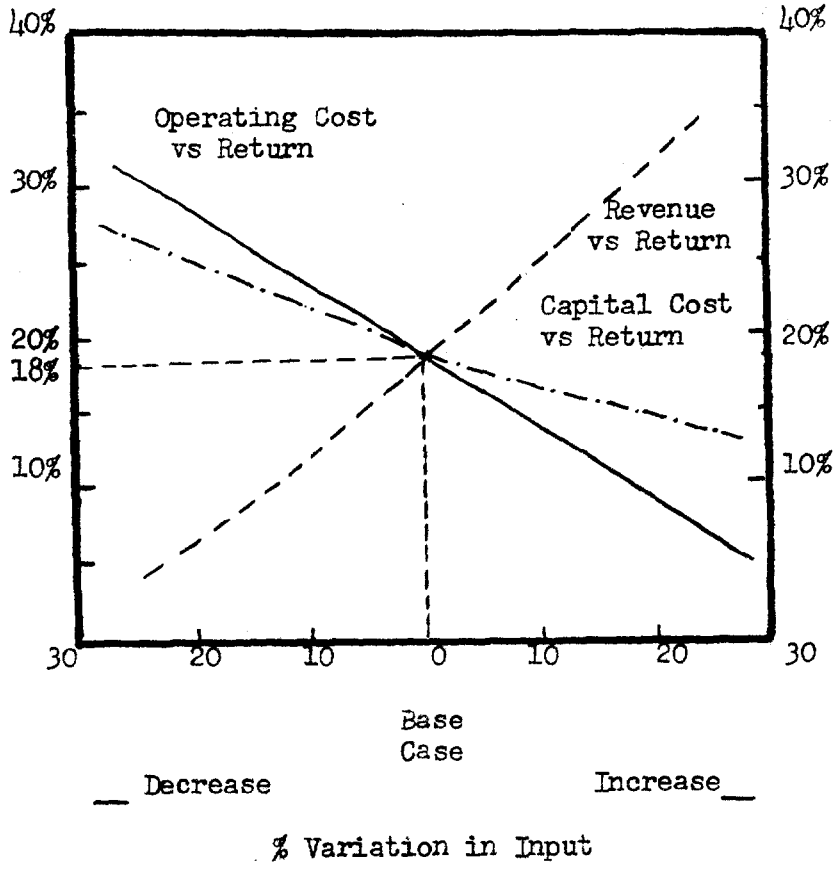
Industrial Projects Department
June 1973

YUGOSLAVIA - KIKINDA IRON FOUNDRY PROJECT
INPUTS FOR ECONOMIC RATE OF RETURN AND ECONOMIC SENSITIVITY ANALYSIS

Year	Capital Cost C_1	Other Investments C_2	Operating Cost C_3	Revenue B_1
1973	14.7	0.0	1.5	0
1974	173.0	-1.7	29.4	36.3
1975	160.7	-2.8	62.3	92.4
1976	88.5	-4.5	151.3	212.6
1977	16.8	-7.1	195.1	288.2
1978	0.0	-7.3	195.1	288.2
1979	0.0	-7.4	195.1	288.2
1980	0.0	-7.1	195.1	288.2
1981	0.0	-6.5	195.1	288.2
1982	0.0	-5.5	195.1	288.2
1983	0.0	-4.2	195.1	288.2
1984	0.0	0.0	195.1	288.2
1985	0.0	1.4	195.1	288.2
1986	0.0	2.9	195.1	288.2

Note: Assumptions used are given in Annex 7-6.

SENSITIVITY TESTS ON ECONOMIC RATE OF RETURN



Case	Capital Cost	Operating Cost	Revenue	Rate of Return
1 (Base Case)	100	100	100	18.0
2	110	100	100	16.0
3	100	110	100	13.9
4	100	100	110	24.1
5	120	100	100	14.3
6	110	110	100	11.7
7	100	110	90	7.1
8				

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YUGOSLAVIA - KIKINDA IRON FOUNDRY PROJECT
FOREIGN EXCHANGE EARNINGS
(Din Million)

	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983
Flat Position(without expansion)											
Gross Earnings 1/	123.3	156.1	165.7	170.3	174.1	179.8	185.6	191.0	197.4	203.8	210.3
Less:Raw Materials-foundry 2/	8.4	8.6	8.7	9.2	9.6	10.1	10.6	11.2	11.7	12.3	12.9
-machine tool 2/	5.1	6.3	6.6	7.0	7.3	7.7	8.1	8.5	8.9	9.4	9.8
Spare parts 2/	1.2	1.5	1.6	1.7	1.8	1.9	2.0	2.1	2.2	2.3	2.4
Interest	1.7	1.4	1.2	0.9	0.8	0.6	0.5	0.3	0.1	-	-
Amortization	2.2	2.5	2.6	2.6	2.3	2.5	2.7	2.9	1.6	-	-
Royalty fees 3/	-	-	-	0.3	0.4	0.6	0.7	0.7	0.7	0.7	0.7
Net Earnings (A)	105.7	135.8	145.0	148.6	151.9	156.4	161.0	165.3	172.2	179.1	184.5
Expanded Position(with expansion)											
Gross Earnings 1/	123.3	172.1	220.0	310.9	359.2	377.2	381.2	392.7	403.9	416.0	428.4
Less: Raw Materials-foundry 2/	7.4	9.5	11.1	16.2	20.1	21.1	22.1	23.2	24.4	25.6	26.9
-machine tool 2/	5.1	6.3	7.1	8.1	8.8	9.3	9.7	10.2	10.7	11.3	11.8
Spare Parts 2/	1.2	1.6	1.8	2.3	2.7	2.9	3.0	3.2	3.3	3.5	3.7
Interest	1.7	5.5	12.3	15.6	16.7	15.4	13.7	11.9	10.1	8.4	6.8
Amortization	2.2	2.5	2.6	2.6	2.3	25.0	25.2	25.4	24.1	22.5	22.5
Royalty Fees 4/	-	-	-	0.8	0.9	0.9	1.0	1.0	1.0	1.0	1.0
Net Earnings (B)	105.7	146.7	185.1	265.3	307.7	302.6	306.5	317.8	330.3	343.7	355.7
Incremental Net Foreign Exchange Earnings (B) - (A)	0.0	10.9	40.1	116.7	155.8	146.2	145.5	152.5	158.1	164.6	171.2

1/ Price assumptions are same as those used for economic rate of return calculations, but at current prices.
2/ Excluding duties and taxes
3/ According to the agreement between Kikinda and Bryant Corporation, Kikinda has to pay minimum of this amount even if the company does not produce internal grinders.
4/ In the case of internal grinder production, Kikinda has to pay 7.5% of the net sales of such grinders to the Bryant Corporation.

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YUGOSLAVIA: KIKINDA IRON FOUNDRY PROJECT
INDIRECT EMPLOYMENT GENERATION

1. The Kikinda Iron Foundry produces iron castings and machine tools for about 30 major enterprises, using various raw materials and semi-products from over 20 companies. The proposed expansion of Kikinda will have a ripple effect on the production programs of those 50 and odd Yugoslav enterprises. An attempt is made here to get an approximate estimate of the jobs likely to be created upstream in the supplier industries, and also in the transportation and electric power sectors as a result of Kikinda expansion.

2. The latest data for incremental capital output ratio (ICOR) and incremental capital labor ratio (ICLR) for industry in Yugoslavia are available only for the period 1962-70, expressed at 1966 prices. Such data for selected sub-sectors are given below:

	Incremental Capital-Output Ratio (ICOR) 1/	Incremental Capital-Labor Ratio (ICLR) 2/	Employment Coefficient (ICOR/ICLR)
Total Industry	2.91	78.0	0.028
Ferrous Metals	15.25	700.0	0.022
Non-ferrous Metals	5.09	414.3	0.012
Metal Products	1.27	83.4	0.015
Electrical Equipment	1.12	48.3	0.023
Non-metallic Minerals	2.26	321.9	0.007
Coal and Coke	5.32	355.4	0.015
Electric Power	7.80	2058.5	0.004

1/ At 1966 prices, gross fixed investment during 1962-1970 is divided by the incremental social product for 1962-1971.
2/ At 1966 prices, gross fixed investment during 1962-1970 is divided by the increment in employment during 1962-1971 and expressed in thousand Dinars.

Source: Investicije, 1947-1969 and Statisticki Godisnjak, Jugoslavije

3. Kikinda uses a variety of raw materials and semi-products in the production of castings and machine tools. However, the incremental production of Kikinda is not likely to stimulate the production expansion of all supplier enterprises. But it is conceivable that firms producing items such as pig iron, steel scrap, coke, anthracite, quartz sand, electrical goods, metal products, and electricity would be expanded considerably as a result of the Kikinda project. In the case of coke, anthracite, and quartz sand supply, Kikinda has invested or is planning to invest funds in the main supplier enterprises to increase production to meet the needs of the proposed project.

4. It is estimated that Kikinda's incremental requirement of the following items because of the project would be: pig iron, 7,375 tons; steel scrap, 14,500 tons; coke 680 tons; anthracite, 690 tons; quartz sand, 40,130 tons; electricity, 40.5 million kwh. It is most likely that these requirements would be met entirely from domestic sources considering the expansion program of various supplier industries. Based on 1966 prices, the value of incremental raw material requirements for Kikinda's expansion of castings production would be:

	Incremental Needs By Quantity (tons)	Price Per Ton (1966 Dinars)	Incremental Needs By Value ('000 Dinars)
Pig Iron	7,375	850	6,270
Steel Scrap	14,500	590	8,555
Coke	680	820	558
Anthracite	690	480	330
Quartz Sand	40,130	130	5,220

5. The total incremental electric power requirements for castings as well as machine tool production expansion of Kikinda is estimated at 40.5 million kwh, each unit costing 0.185 Dinars per kwh (at 1966 prices). On this basis, the value of incremental power needs of the project would cost 7.5 million Dinars.

6. For machine tool production expansion, two important groups of outside semi-products required are electric goods (i.e. electric motors and components, fuses, wiring, etc.) and metal products 1/ (i.e. ball bearings, fastening parts, jigs and fixtures, forgings, non-ferrous and steel products, etc.). In 1972, the weighted average value of requirements of electrical goods and metal products at 1966 prices per machine tool were 10,800 Dinars and 32,800 Dinars respectively. Assuming the same requirements per machine for the future, the total incremental requirements of Kikinda would amount to about 1.4 million Dinars for electrical goods and 4.3 million Dinars for metal products. It is likely about 80% of these requirements would be met from internal sources while the rest would be imported. Based on this assumption, the incremental needs of Kikinda for local electrical goods and metal products would cost 1.12 million Dinars and 3.5 million Dinars, respectively (at 1966 prices).

7. Using the employment coefficients stated earlier for various subsectors and the estimated requirements of raw material and semi-products for Kikinda's expansion, the incremental employmental generation in the supplier industries is shown below:

	Incremental Needs to be Supplied Locally ('000 Dinars at 1966 prices)	Employment Coefficient ICOR/ICLR	Incremental Employment Generation (Nos.)
Pig Iron	6270	0.022	138
Steel Scrap	8555	0.022	188
Coke	558	0.015	8
Anthracite	330	0.015	5
Quartz Sand	5220	0.007	37
Electric Goods	1120	0.023	26
Metal Products	3500	0.015	53
Electricity	7500	0.004	30
			485

1/ Excluding gray iron castings which are supplied within the enterprise.

Employment Effect on Transport Sector

8. Kikinda expansion will also have considerable employment effect on the transport sector. It is estimated that the total traffic generated from Kikinda expansion would be nearly 26 million ton km, taking into account the transportation of various raw materials, semi-products and finished products. Assuming that one person is required for every 56,000 ton km of transportation, the incremental production at Kikinda would result in about 465 jobs in the transportation sector.

Total Job Creation

9. Thus Kikinda expansion would result in the creation of about 950 jobs indirectly in the supplier industries, and electric power and transportation sectors alone, without taking into account the jobs created in the user industries which are difficult to pinpoint. This estimate also excludes employment generation likely to be triggered by increased consumption of goods by those benefiting from the project.

Negative Effect

10. Currently, a total of about 34,000 persons are employed in Yugoslav iron foundries. Of them, less than 10% are engaged in the operation of 100 and odd small foundries with less than 500-ton annual capacity each. It is conceivable that some small, inefficient foundries may be adversely affected by Kikinda expansion. But it is difficult to foresee with any degree of certainty what effect this would have on the present employment in small foundries.

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