



TOGETHER
for a sustainable future

OCCASION

This publication has been made available to the public on the occasion of the 50th anniversary of the United Nations Industrial Development Organisation.



TOGETHER
for a sustainable future

DISCLAIMER

This document has been produced without formal United Nations editing. The designations employed and the presentation of the material in this document do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations Industrial Development Organization (UNIDO) concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries, or its economic system or degree of development. Designations such as “developed”, “industrialized” and “developing” are intended for statistical convenience and do not necessarily express a judgment about the stage reached by a particular country or area in the development process. Mention of firm names or commercial products does not constitute an endorsement by UNIDO.

FAIR USE POLICY

Any part of this publication may be quoted and referenced for educational and research purposes without additional permission from UNIDO. However, those who make use of quoting and referencing this publication are requested to follow the Fair Use Policy of giving due credit to UNIDO.

CONTACT

Please contact publications@unido.org for further information concerning UNIDO publications.

For more information about UNIDO, please visit us at www.unido.org

United Nations Industrial Development Organization

Austria

18385

Pre-Investment Studies for ASEAN Support Industries

--Promotion of Plant Relocation in the Philippines

(US/PHI/89/039)

CLOSED-DIE FORGING AUTO PARTS

Final Report

December 1989

74

Engineering Consulting Firms Association

(ECFA), Japan

United Nations Industrial Development Organization

Austria

Pre-Investment Studies for ASEAN Support Industries

-- Promotion of Plant Relocation in the Philippines

(US/PHI/89/039)

CLOSED-DIE FORGING AUTO PARTS

Final Report

December 1989

Engineering Consulting Firms Association

(ECFA), Japan

30 m. 20/89

TABLE OF CONTENTS

I. EXECUTIVE SUMMARY -----	1
II. INTRODUCTION	
Project background -----	3
Products of the project -----	3
III. MARKET AND PLANT CAPACITY	
Trend of Automobile Production -----	4
Government Policy of Automobile Production -----	5
Demand Forecast of Forged Automobile Parts -----	5
Present Situation of Forging Industry in the Philippines -----	8
Possibility of Export -----	9
Production Capacity and Production Schedule -----	9
IV. MATERIAL AND IMPUTS	
Material -----	11
Utilities -----	12
V. LOCATION AND SITE	
Site selection criteria -----	14
Possible suitable areas -----	14
VI. PROJECT ENGINEERING	
Production process -----	15
Equipment cost -----	16
Maintenance and spare parts requirements -----	17
VII. PLANT ORGANIZATION AND OVERHEAD COSTS	
Plant organizational structure -----	20
Manpower -----	20
Overhead costs -----	21
VIII. PROJECT IMPLEMENTATION	
Schedule and Activities of pre-production phase ----	23
Costs of pre-production activities -----	24

IX. FINANCIAL AND ECONOMIC EVALUATION

General assumptions -----	26
Initial investment costs -----	26
Sources of financing -----	27
Production costs -----	27
Sales -----	28
Financial internal rate of return -----	29
Sensitivity analysis -----	29
Break-even point -----	29
Pay-back period -----	30
Impact on local industries -----	30
Environment impacts -----	30

APPENDIX

Projected Financial Statements

LIST OF TABLES

Table 3.1. Trend of Vehicle Sales -----	4
Table 3.2. Trend of Vehicle Production -----	5
Table 3.3. Production Schedule of Vehicles -----	6
Table 3.4. No.of Forged Parts: Weight-wise Distribution ---	6
Table 3.5. Estimated Demand of Forged Automobile Parts in Number -----	7
Table 3.6. Forged Auto Parts Less than 4 kg -----	7
Table 4.1. Power Consumption -----	12
Table 6.1. Machinery and Equipment -----	16
Table 7.1. Manpower Requirement and Wages -----	20
Table 8.1. Pre-production Expenditures -----	24
Table 9.1. General Assumptions -----	26
Table 9.2. Depreciation Period -----	26
Table 9.3. Inflation Rates -----	26
Table 9.4. Initial Investment Costs -----	27
Table 9.5. Sources of Financing -----	27
Table 9.6. Annual production Costs (1996) -----	28
Table 9.7. Break-even Point -----	29
Table 9.8. Pay-back Period -----	30

LIST OF FIGURES

Figure 3.1. Share of Materials for Automobile Parts -----	10
Figure 6.1. Process Flow Chart -----	18
Figure 6.2. Layout Plan for Closed Die Forging Shop -----	19
Figure 7.1. Functional Organization Structure -----	22
figure 8.1. Implementation Schedule -----	25

I. EXECUTIVE SUMMARY

I. EXECUTIVE SUMMARY

This investment opportunity study examines the possibility of relocation of a forging automobile plant which produces connecting rods, main shafts, cam shafts, bevel gears, pinions, gear blanks, hubs, spindlers, fly wheels, ect.

Market Analysis

Annual production of passenger cars and trucks reached its peak in 1980 and declined dramatically during the economic recess. Along with the economic recovery, sales and production of automobiles has been increasing. Demand of forged automobile parts in general which share about 16 percent of automobile parts in terms of weight is estimated at some 10,000 tons in 1989. Before 2000, automobile production is estimated to reach 100,000 per annum. Thus, annual demand for forged parts shall increase to over 24,000 tons.

Plant Capacity

Plant capacity is set at 1,620 tons per year based on the target share of the market and economy of production scale.

Raw Material and input

In closed die forging, tool steel or die steel, plain carbon steel and furnace oil constitute major materials. Carbon steel and furnace oil will be imported. Furnace oil requirement at full operation is estimated at some 31,000 tons per year. Annual consumption of electricity and water is estimated at about 363,000 kwh and 1,500 kl, respectively.

Location and Site

Major criteria of site selection are accessibility, power supply, telecommunication and proximity from a port. A possible site would be in one of three industrial estates promoted by private sector in Cavite and Laguna Provinces.

Project Engineering

Process of closed die forging consists of seven stages - cutting the stock to size, heating the stock, forging, trimming, inspection, shot blasting and final inspection. Products will be shipped "as forged" and no heat treatment will be done in this unit in the beginning. Heat treatment can be done more economically by using a common facility.

Site for this plant is assumed at 5,000 sq.m, which is enough space to expand the plant when the operation gets on the right track.

Plant Organization and Overhead Cost

This unit is supposed to be a Filipino-Japanese joint-venture company, which consists of production and administration departments. The administration department is responsible for marketing as well as personnel, general affairs, purchase and accounting.

At full operation, 46 workers are required. Total annual salary is estimated at 7.5 million pesos in 1996.

Factory and administrative overhead costs are estimated at 1.3 and 4.4 million pesos, respectively.

Project Implementation

A two-year pre-promotion period is assumed. The major activities during the period are establishment of a joint venture, registration of related government agencies including the Board of Investment, fund raising, land purchase, detailed feasibility study and design, construction, employment and training of workers, trial production and pre-production sales.

Project Evaluation

Total initial investment costs are about 45.5 million pesos. Total production costs are 43.2 million pesos in 1996. 55 percent of the total investment is financed by equity and the balance by long-term loans. Sales price is assumed at 37,000 pesos per ton with one percent of annual price escalation.

Internal rate of return after tax is 26.7 percent, slightly over 25 percent hurdle rate. Net present value at 25 percent discount rate is 3.7 million pesos.

Forging automobile parts plant is expected to contribute to automobile industries in the Philippines. Forging technology acquired through production of auto parts can be applied to manufacturing of forging parts of other machinery.

II. INTRODUCTION

II. INTRODUCTION

Project background

In 1987, the United Nations Industrial Development Organization (UNIDO) launched a study on the requirements and options for promoting supporting industries in the Philippines. This study came from the recognition of the significance of a dense network of supporting industries in order to generate self-sustained industrial development. Upon completion of the report, UNIDO experts together with Japanese industrialists explored the concrete possibilities of development of supporting industries. As a result of the follow-up activities, forging was selected as one of the three prior industries.

In 1989, UNIDO engaged Engineering Consulting Firms Association (ECFA), Japan to conduct three opportunity studies as fundamental information so that the Philippine Government and potential investors may decide on their investment.

Products of the project

Closed die forged components for automobiles such as tractors, cars, engines, commercial vehicles, jeeps, scooters, motor cycles, mopeds, will be produced in this unit. Typical products are connecting rods, main shafts, cam shafts, bevel gears, pinions, gear blanks, hubs, spindlers, fly wheels, etc.

Steel forging industry plays a vital role as supporting industry in formulation of industrial structure. Steel forging are classified into open forging and closed die forging. Open forging are used in the manufacture of shafts for electric motors, shafts of turbines, agricultural machines, etc; and closed die forging, for automobiles, machine tools, etc. There are few operating forging factories in the Philippines and the quality of the products is not high. Under the recent trend of increasing automobile production, demand for forged products of good quality is expected to rise.

#142.

III. MARKET AND PLANT CAPACITY

III. MARKET AND PLANT CAPACITY

Trend of Automobile Production

Annual sales of vehicles reached the peak by some 70,000 in 1978. Compared to the peak, sales of passenger cars dramatically declined from 35,000 in 1979 to 3,600 in 1986, and those of the other vehicles also decreased from 35,000 in 1978 to 100 in 1986 due to the depressed national economy. Although sales have been turning upward along with recovery of the national economy, the record of 1988 still remained about one third of that at the peak (See Table 3.1).

Table 3.1. Trend of Vehicle Sales

Year	Car	AUV 1/	LCV 2/	Truck	Total
1973	16,737	6,562	5,105	3,867	32,271
1974	21,844	11,546	5,263	5,494	44,147
1975	26,592	11,976	4,188	6,256	49,012
1976	30,839	12,356	5,267	4,263	52,725
1977	31,539	18,003	4,809	5,006	59,357
1978	34,626	20,851	8,600	5,884	69,961
1979	34,973	20,685	6,932	5,893	68,483
1980	29,980	14,021	9,721	5,008	58,730
1981	28,697	9,976	9,773	5,219	53,665
1982	28,995	12,730	10,407	4,123	56,255
1983	27,967	9,056	9,742	3,485	50,520
1984	6,481	2,472	2,007	1,155	12,115
1985	4,769	375	373	90	5,707
1986	3,640	54	22	21	3,737
1987	5,543	341	210	162	6,256
1988	11,038				

Note : 1/ AUV: Asian Utility Vehicle
2/ LCV: Light Commercial Vehicle

Source : Philippine Auto Motive Federation, Inc.

The trend of automobile production is shown in table 3.2. The economic crisis led to the rapid shrink of production by 80 % for passengers cars and by 90 % for trucks in 1984 compared to the previous year.

Table 3.2. Trend of Vehicle Production

Year	Cars	Trucks 1/	Total
1980	26,402	23,407	49,809
81	25,033	26,675	51,708
82	24,792	26,033	50,825
83	27,740	17,283	45,023
84	5,875	2,237	8,112
85	3,470	na	na
86	3,706	1,073	4,779
87	5,152	2,830	7,982
88	10,777	9,790	20,567

Note : 1/ includes AUVs and LCVs

Source : Philippine Auto Motive Federation, Inc.

Government Policy of Automobile Production

Aquino Government announced Car Development Program (CDP) and Commercial Vehicle Development Program (CVDP). The policy aims at promoting industrialization while saving foreign currency and encouraging technology transfer. Automobile manufacturing companies are allowed to purchase foreign parts if they would lead to export of locally-made products. Otherwise they must use locally-made parts. The required minimum rates of local contents are 32.4 % in 1988, 36.6 % in 1989, and 40 % in 1990. Merely three companies registered in the CDP and all of them are backed by Japanese automobile makers: PAMCOR(Mitubishi), PNI(Nissan), and Toyota Motor Co. There is also a plan of exporting automobile parts to existing or planned plants in other Asian countries.

Demand Forecast of Forged Automobile Parts

The three automobile manufacturing companies are either expanding or planning expansion within a couple of years. Production schedule of the three companies during 1989-1991 is presented in Table 3.3. These companies will produce based on trend of local market after 1991. There is a dominant opinion in automobile makers that vehicle demand shall reach 100,000 per annum before year 2000 if the growth rate of national economy is maintained.

Table 3.3. Production Schedule of Vehicles 1/

Year	Car	Truck 2/	Total
1989	29,920	10,480	40,400
1990	35,720	14,680	50,400
1991	42,400	25,600	68,000
1992	48,000	30,000	78,000
1993	53,000	33,000	86,000
1994	57,000	35,000	92,000
1995	60,000	37,000	97,000

Note: 1/: Figures for 1989-91 are based on hearing, while those for 1992-1995 are estimation.
2/: Includes AUVs and LCVs

Numbers of forged parts required for heavy & medium commercial vehicles and LCVs are 132 and 27, respectively. Weight wise distribution of the parts shows that the parts which weigh less than 4 kg per unit constitute some 50% of all the forged components of automobile sectors in number, and those which weigh less than 10 kg constitute some 75%. (See Table 3.4.)

Table 3.4. No.of Forged Parts: Weight-wise Distribution

	Less than & 4 kg	4-10 kg	10-20 kg	More than 20 kg	Total
Heavy and medium commercial vehicles	57	63	9	3	132
LCVs	19	4	2	2	27
Jeeps	21	12	1	-	34
Scooters	19	-	-	-	19
Motorcycles	31	1	-	-	32
Mopeds	8	-	-	-	8
Tractors	43	25	14	2	84
Diesel Engines	16	3	2	-	21
Others	n.a	n.a	n.a	n.a	70
Total	214	108	28	7	427

Considering the technical difficulty of producing wide variety of parts, it is recommended to specialize in some product-groups at this stage. In this study, target is set to the market of parts less than 4 kg, assuming that production facility in this range has wider market spread available to it. Estimated demand of parts in this range is shown in Table 3.5.

Table 3.5 Estimated Demand of Forged Automobile Parts in Number
(Parts less than 4 kg) 1/

<u>Year</u>	<u>Number of parts</u>
1989	1,535,000
1990	1,915,000
1991	2,584,000
1992	2,964,000
1993	3,268,000
1994	3,496,000
1995	3,686,000

Note: 1/: It is assumed that 38 parts less than 4 kg are needed for each automobile production on average.

Typical parts in this range are shown below:

Table 3.6. Forged Auto Parts Less than 4 kg

<u>Name of part</u>	<u>Unit weight</u>
Tractors	

Paddle RHS	2
Fork P T O	0.5
Fork selector	1
Spindle for fork axle	3.1
Lock combined brake	0.3
Fork planet	0.55
Arm spindle	1.4
Lever planetary	0.5
Selector planetary	0.35
Hub PTO	2.2
Knuckle	0.5
Cap radius rod ball	0.65
Spacer	0.8
Lever gear shift	1.15
Clevis	1.5
Joint diff cross	2
Pedal clutch	1.8
Anchor	0.38
Rod draft control	1.5

Engines

T.6 connecting rod	1.5
P.6 cap	0.5
P.6354 connecting rod	2
A D 3152 connecting rod	1.5
Camshaft F.I pump year	1.8
Clutch withdrawl fork	1
Clutch withdrawl housing	1
First rotation shaft	3.7

Commercial vehicles

Driving flange	4
Wagglng socket	2.8
Support bracket	2.8
Timing gear	1
Spring shackle	3.4
Differential spider	1.9
End piece	3.5
Support bracket	2.8
Differential spider	1.9
Taper pin	2.6
Bevel gear side	2.65

Present Situation of Forging Industry in the Philippines

At present, there are only two forging companies in the Philippines. ANI, a joint venture with an Australian company, supplies automobile parts to Asian Transmission Co. (ATC), which assembles transmission for PAMCOR, by some 500 tons per year. The other one, ACME supplies some 3,000 gear blanks without tooth per year to ATC. ATC does not intend to increase parts supply from these two companies at present. In addition, The Atlantic, Gulf & Pacific Co. of Manila (AG&P) has just set up a forging company with a Japanese company. The new company will manufacture spare parts and components of machinery and equipment for use in various industries. The target forged products of the plant under preparation by a Taiwan company are hand tools.

Possibility of Export

ASEAN has become an integrated economic entity and division of manufactures within the region will prevail. On the other hand, since small scale forging companies in Japan have been recently suffering shortage of young labor force and would decrease their production, automobile companies may shift their ancillary production sections of the parts to abroad and import them. Therefore, in addition to the domestic demand, it is highly possible to export automobile parts to ASEAN countries and Japan.

Production capacity and production schedule

Market share is projected to be about 20% of the parts less than 4 kg.

The production capacity at full operation is set as follows;

Daily operation: Two shifts per a 16-hour working day

Annual operation: 300 working days per year

Production capacity: 2.7 ton per shift

= 5.4 ton per working day

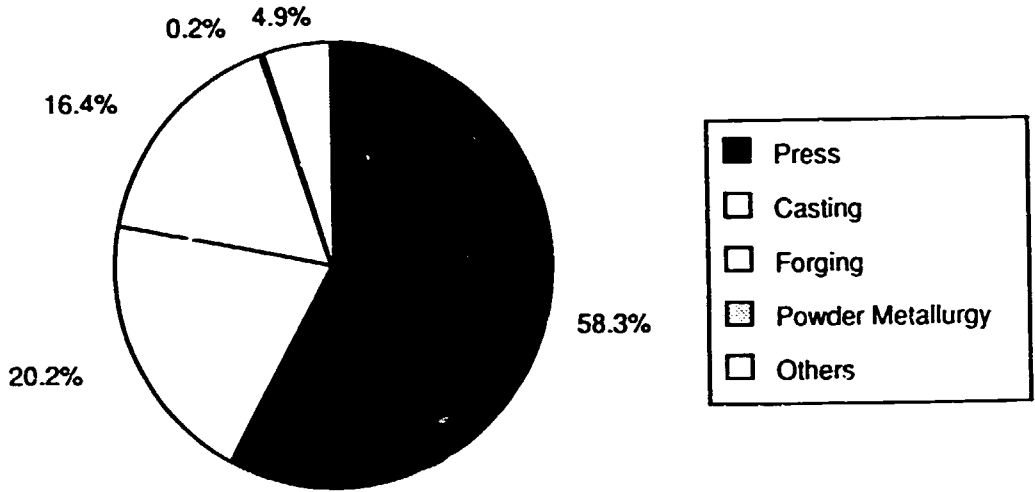
Annual production: 5.4 tons/day x 300 days = 1,620 tons

The production will reach full operation according to the schedule shown below:

1st year: 60% operation,	972 tons
2nd year: 70% operation,	1,134 tons
3rd year: 80% operation,	1,296 tons
4th year: 90% operation,	1,458 tons
5th year: 100% operation,	1,620 tons

As average weight of products is expected to be between 2-3 kg, number of parts produced by this unit at full operation is estimated between 540,000-810,000 per year.

Figure 3.1. Share of Materials for Automobile Parts



Source : Japan Economic Education Center Foundation,
"Graph of Industry", Vol.14, No.105, 1982

IV. MATERIAL AND INPUTS

IV. MATERIALS AND INPUTS

Materials

In closed die forging, tool steel or die steel, plain carbon steel and furnace oil constitute major materials. Carbon steel and furnace oil will be imported since it is not feasible to obtain their adequate and appropriate supply in the Philippines. The materials which are used for producing export goods are free from import duty. In the present case, all the finished products will be domestic use. Therefore, 10 % import duty is required.

In closed die forging, a die set is indispensable for a component to be manufactured. The die produces a number of identical components of a particular shape and size with close tolerances. The same die cannot be used for any other component other than those for which the die is designed and fabricated.

(1) Steel

The type of carbon steel used in production varies depending on the customers' demand. The amount of necessary steel is estimated at 1.1 times of the finished products by weight. The unit price is estimated at 83,000 yens/ton in the present study.

Therefore, the cost of the carbon steel is estimated as follows:

Net cost of carbon steel is 83,000 yen/ton x (1,620 x 1.1) tons/year = 148,000,000 yen/year.

Import duty is

$$148,000,000 \text{ yen/year} \times 0.1 = 15,000,000 \text{ yens/year};$$

Thus, total cost is their sum, 163,000,000 yen/year at full operation.

(2) Others

Cost of dies: 252 pesos/ton

cost of other consumable: 189 pesos/ton

Thus, total cost of the others is:

$$(252 + 189) \text{ pesos/ton} \times 1,620 \text{ tons/year} = 714,000 \text{ pesos/year}$$

Utilities

(1) Power consumption

Power consumption at full operation is estimated at 1,892 kwh/day as shown in Table 4.1.

Table 4.1. Power consumption

Name of machinery and equipment	No. of unit	Kw/ unit	Operating hour/day	kw/ day
1. Air clutch type 100 ton press	1	7.5	16	120
2. 75 kw air compressor	1	75	16	1200
3. Oil fired heating furnace	1	3	16	48
4. Shot blasting machine	1	9.38	16	150
5. Power hack saw	2	0.5	16	16
6. Bench drilling machine	1	1.5	16	24
7. Bench grinder	1	0.75	16	12
8. Arc welding set	1	10.40	16	166
9. Hardness tester	1	0.19	8	2
10. Over travelling hoist	1	7.15	16	114
Sub total		114.52		1852
11. Miscellaneous load				40
Total				1892

Thus, annual power consumption is

$$1892 \text{ kwh/day} \times 300 \text{ days} = 567,600 \text{ kwh/year}$$

Applying a load factor of 0.80 and utilization factor of 0.80, the actual power consumption is

$$567,600 \text{ kwh} \times 0.8 \times 0.8 = 363,264 \text{ kwh/year.}$$

Given 1.45 peso/kwh as unit price, the cost of power is:

$$1.45 \text{ peso/kwh} \times 363,264 \text{ kwh} \approx 527,000 \text{ pesos/year}$$

(2) Water consumption

Estimated water consumption: 5,000 l/day

Annual water consumption: 1,500 KL/year

Given 6 pesos/KL as unit price, the annual cost of the water is

$$6 \text{ pesos/KL} \times 1,500 \text{ KL/year} = 9,000 \text{ pesos/year}$$

(3) Fuel consumption

Workpieces are heated in an oil fired furnace before forging. The requirement of furnace oil per a ton of steel heated is estimated at 160 liters.

Annual fuel oil requirement at full operation is

$$160 \text{ l/ton} \times 1,620 \text{ tons/year} \times 1.2 = 311,040 \text{ l/year}$$

(Yield ratio = 1.2)

Given 3.2 pesos/l as unit price, the annual net cost of fuel oil is

$$3.2 \text{ pesos/l} \times 311,040 \text{ l/year} = 995,000 \text{ pesos/year}$$

Import duty of 10 % is added. Thus, actual cost is

$$995,000 \text{ pesos} + 99,500 \text{ pesos} = 1,095,000 \text{ pesos/year.}$$

V. LOCATION AND SITE

V. LOCATION AND SITE

Site selection criteria

A site for a plant of die casting auto parts will be selected according to the following criteria:

1. good accessibility
2. sufficient and stable power supply (no black out)
3. good telecommunication facility
4. proximity to a port

Possible suitable areas

Metro Manila is no more attractive site for factories because of high land price and no investment incentives. As for regions outside of Metro Manila, due to limited service areas of telephone and electricity, it will take a long time to start operation if the plant site is not in an industrial estate. At present, however, no industrial estate can satisfy all the selection criteria mentioned above in the Philippines.

There are three industrial estate projects promoted by Japanese companies in Cavite and Laguna Provinces. Two of them will be constructed by the end of 1990. The Board of Investment designated these three areas, namely, Dasmarias in Cavite, Carmona in Cavite, and St. Rosa in Laguna, as core areas for investment promotion. These core areas receive the top priority to provide telephone and power, and to improve access roads. Thus, these three industrial estates are possible suitable areas for production of auto parts. An alternative site would be Cavite EXport Processing Zone, Phase II, which will be available in 1991 at earliest.

VI. PROJECT ENGINEERING

VI. PROJECT ENGINEERING

Products will be shipped "as forged," and no heat treatment will be done in this unit. In a small scale forging factory, it is common that only forging facilities are installed without costly facilities for machining and heat treatment. Heat treatment can be done by using common facility in the site for the beginning. This plant site is 5,000 m² which is enough space for the unit to install more facilities. It is advisable to expand the unit when the operation gets on the right track.

Production process

The process of closed die forging is shown in Figure.6.1.

Cutting the stock to size

To produce a perfect forging adequate raw material is needed. If the stock is deficient the material will not fill the cavity in the die and when excessive, will result in wastage as flash. Depending on the bar stock's width and height, the length is determined to get the required volume. This length is marked on the bar stock and it is cut to size using a power bucksaw machine.

Heating the stock

For forging, metal must be heated to temperature at which it will possess highly plastic properties both at the beginning and the end of the forging process. To heat the whole stock uniformly, it is locked in a oil fired muffle furnace.

Forging

Forging is an operation in which the metal is worked in compression. To be precise, materials either of cold or hot conditions are squeezed into the contour of the die thereby reproducing their shape and size. As for small components, cold forging is usually adopted. As for large components, heating material beforehand will be less energy consuming than forging it at cold state.

The heated stock is placed inside the cavity of lower die housed on the anvil of the power hammer. The upper die fixed to the ram, stamps the stock with enough energy and forms the shape of the cavity.

Trimming

After the forging operation, the part must be trimmed to remove the flash. If the carbon content is low and the forging is small, it is usually removed when it is cold. Most medium-sized and large forgings are trimmed when they are hot. Along with the trimming, the punching operations are also performed to punch holes in forged parts as required by the drawing.

Inspection

The forged parts are inspected at this stage for seams, cracks, laps, etc. which are caused mainly by improper placement of the metal in the die and improper trimming of the flash. The parts without defects are sent for further operation.

Shot blasting

This is a cleaning operation. It is done at a cold state after trimming. By shot blasting the remainders of flash, if any, and the scales formed during the forging are removed. Shot-blasting machines are employed for cleaning surface of light medium and heavy forging.

Final inspection

The forged parts are inspected again for defects such as cracks, seams, pipings, scales, etc. and dimensions. The defective components are separated and qualified ones are packed and stored for shipment.

Equipment cost

As for the machinery and equipment, costs of major ones which significantly influence the quality of the products and productivity are estimated based on imported price from Japan since there are not appropriate ones currently available in the Philippines. However, this does not restrict the future use of domestic machines.

Table 6.1. Machinery and Equipment

a) Foreign

<u>Machinery and Equipment</u>	
1 high drop air drop forging hammer	
1 trimming and punching press	
1 air compressor	
<u>an overhead travelling hoist</u>	
Estimated total cost	52.75 million yen

b) Domestic

Machinery and Equipment

1 oil fired heating furnace	
1 furnace oil service tank	
1 shot blasting machine	
2 power hack saws	
1 bench type drilling machine	
1 bench type grinder	
1 arc welding and gas welding set	
1 hardness tester	
1 measuring instrument	
1 electrification charges	
Estimated total cost:	809,000 pesos

Thus, the total cost in pesos is 8,722,000 pesos.

Layout of them is shown in Figure.6.2.

Maintenance and spare parts requirements

Maintenance costs are estimated at the sum of 2.5 % of the cost of machinery and equipment and 1 % of the building value. Five percent of the equipment and machinery cost is allowed for supply of spare parts.

machinery and equipment: 8,722,000 pesos
building value: 23,860,000 pesos

Thus, maintenance cost is

$$(8,722,000 \times 0.025 + 23,860,000 \times 0.01) \text{ pesos/year} \\ = 457,000 \text{ pesos/year}$$

Allowance for spare parts is

$$8,722,000 \text{ pesos/year} \times 0.05 = 436,000 \text{ pesos/year}$$

Figure 6.1 PROCESS FLOW CHART

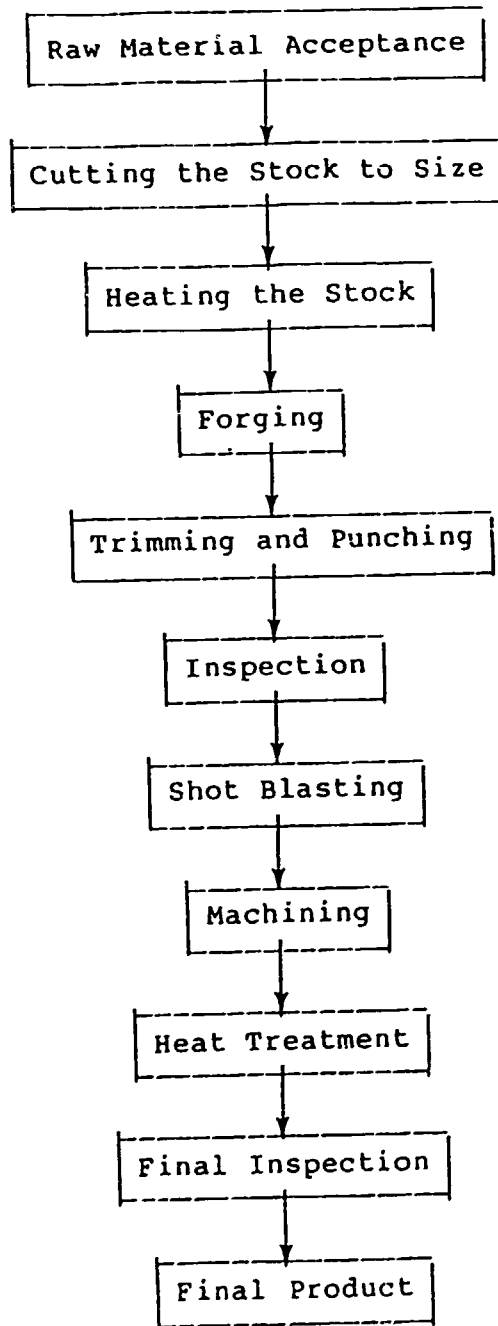
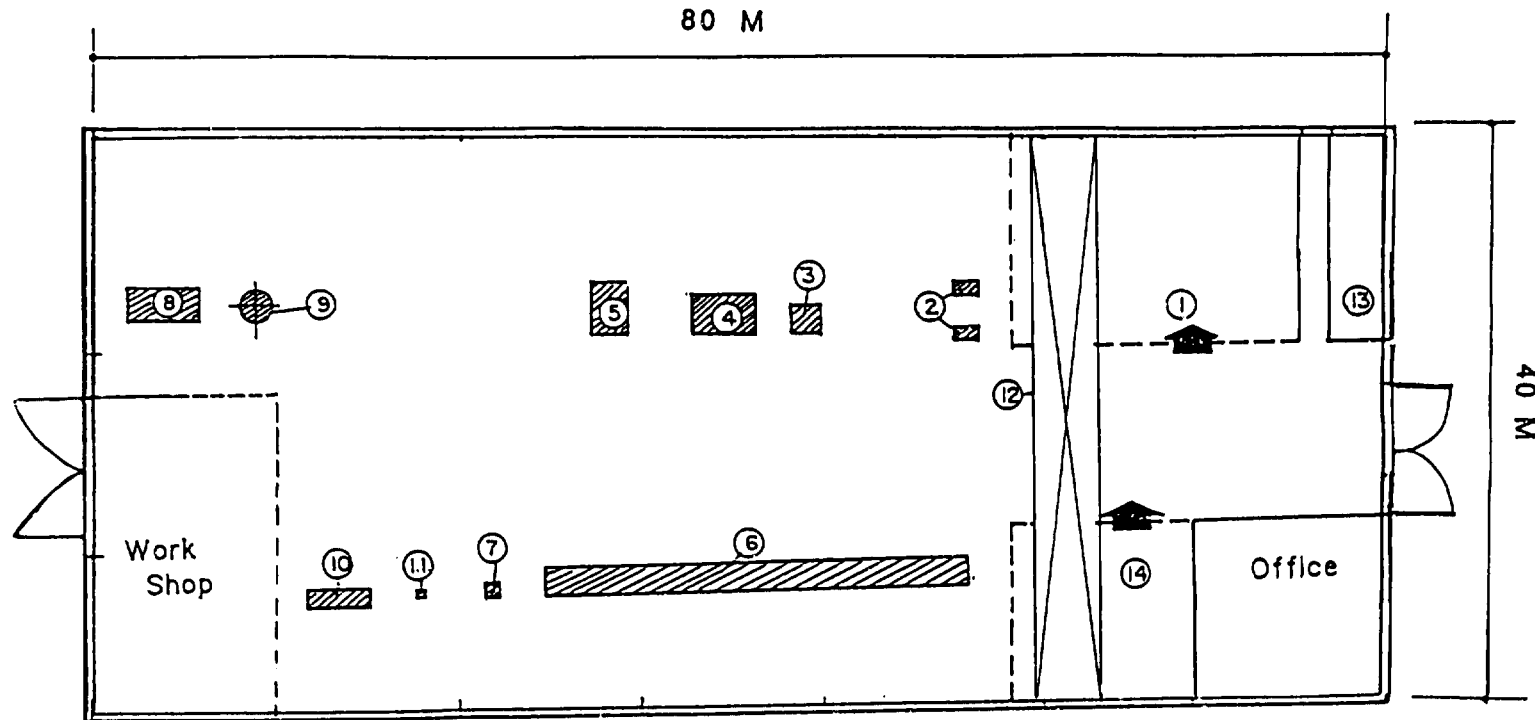


Figure 6.2 Layout Plan for Closed Die Forging Shop



- | | |
|--------------------------|---|
| ① Raw Material Storage | ⑧ Air Compressor |
| ② Power Hacksaw | ⑨ Air Tank |
| ③ Heating Furnace | ⑩ (Working Table with Bench
Drill and Bench Grinder |
| ④ Drop Forging Hammer | ⑪ Arc Welding Set |
| ⑤ Trimming Press | ⑫ Over Head Travelling Holst |
| ⑥ Forging Die Stock Rack | ⑬ Bath and Toilet |
| ⑦ Shot Tumblast | ⑭ Finished Goods Storage |

VII. PLANT ORGANIZATION AND OVERHEAD COSTS

VII. PLANT ORGANIZATION AND OVERHEAD COSTS

Plant organizational structure

This unit is supposed as a Filipino-Japanese joint venture company. The company is managed under a Filipino president and Japanese executive. The company consists of Production department and Administration department (See Figure 7.1). The administration department is responsible for marketing as well as personnel, general affairs, purchase, and accounting.

Manpower

It is assumed that the production department needs 32 workers, and that the administration department needs 14 workers. The detailed requirements is shown in Table 7.1.

Table 7.1. Manpower Requirement and Wages

a) Production Department

	No.	Salary/mo	Total/mo	Total/year
Manager	1	145,131	145,131	1,741,572
Shift supervisors	3	6,321	18,963	227,556
Engineer	2	6,321	12,642	151,704
Skilled labour	10	3,160	31,600	379,200
Unskilled labour	14	2,528	35,392	424,704
Janitor	1	2,528	2,528	30,336
Driver	1	3,950	3,950	47,400
Total	32		250,000	3,002,000

b) Administration Department

	No.	Salary/mo	Total/mo	Total/year
Manager (Jap.)	1	170,171	170,171	2,042,052
(Phil.)	1	43,150	43,150	517,800
Accountant	2	5,318	10,636	127,632
Senior clerk	2	6,321	12,642	151,704
Clerk	2	3,160	6,320	75,840
Secretary	1	3,950	3,950	47,400
Messenger	1	2,528	2,528	30,336
Janitor	1	2,528	2,528	30,336
Driver	2	3,950	7,900	94,800
Watchguard	1	2,528	2,528	30,336
Total	14		259,000	3,148,000

Overhead costs

(1) Factory overhead costs

Factory overhead costs of the present unit consist of property tax and insurance. Indirect labour costs and miscellaneous which are often included in factory overhead costs are put on the list of manpower requirement and administration overhead cost in order to ease the calculation. Annual property tax is 2 % of buildings and land value, and annual insurance cost is assumed to be 2 % of the cost of depreciable fixed assets.

Thus property tax is

$$(23,860,000 + 4,000,000)\text{pesos} \times 0.02 = 557,000 \text{ pesos/year};$$

and insurance cost is

$$(23,860,000 + 8,722,000)\text{pesos} \times 0.02 = 652,000 \text{ pesos/year}.$$

In sum, the factory overhead cost is 1,209,000 pesos/year.

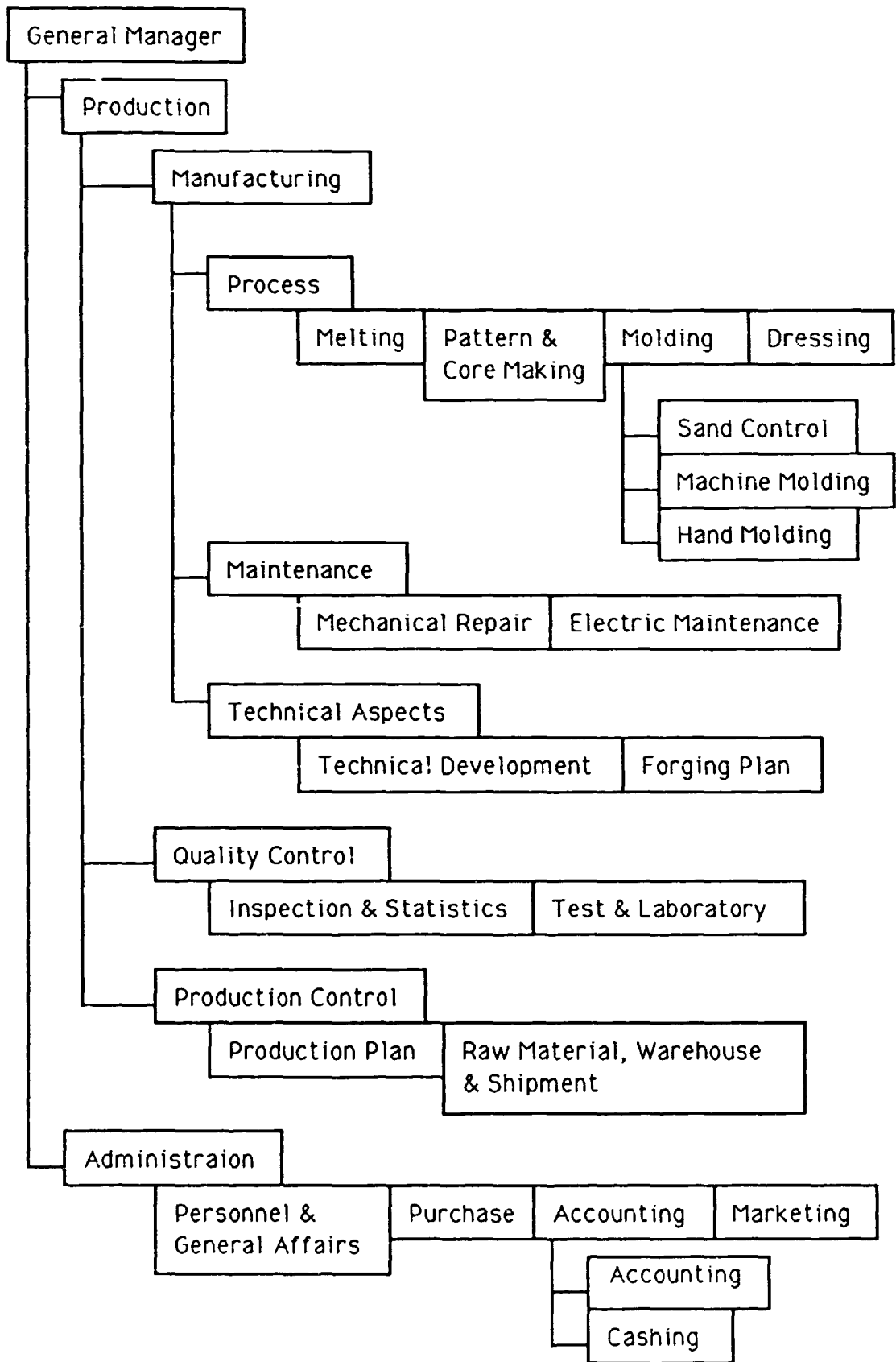
(2) Administrative overhead costs

Administrative overhead costs mainly consist of labour costs, office supplies and equipments, telephone, security costs.

Labour costs are, as mentioned above, 3,148,000 pesos/year; and other costs are estimated 470,000 pesos/year.

In sum, the administrative overhead cost is 3,618,000 pesos/year.

Figure 7.1. Functional Organization Structure



VIII. PROJECT IMPLEMENTATION

VIII. PROJECT IMPLEMENTATION

Schedule and Activities of pre-production phase

In case that the plant site is located in an industrial estate, the following activities should be done before the factory is constructed:

To establish a joint-venture---selection of a partner is most crucial in order to succeed the project. Technical level, precedent business achievement, composition of equity, and business attitude should be thoroughly investigated;

To register in related government agencies---to start a business, registration in the Security Exchange Commission is required. Registration at Central Bank is required to receive permission to transfer foreign currency to the other country of the foreign partner. Other requirements are application for a trade mark at the Department of Trade and Industry, clearance from a local government, and clearance from the Environment Management Bureau;

To apply for investment incentives at the Board of Investment--the company can obtain investment incentives from the Board of Investment since this industry is recognized as a pioneer industry by the 1989 Investment Priorities Plan;

To ascertain financial backup---since the financial market of the Philippines is limited, loan negotiation should be begun as early as possible;

To purchase land---from the economical viewpoint, purchase of land is more recommended rather than lease of land;

To conduct detailed feasibility study and design of the factory.

The following activities should precede actual production;

To employ factory workers---both provincial and municipality governments hope that the factories will employ labor force in the vicinity to diminish unemployment rate and achieve good relationships with the neighboring community. The regional office of the Department of Labor has registration system of qualified workers and offer a service of screening of the workers;

To train factory workers---training engineers and technicians is important to produce forged products of high quality. Training in a factory in Japan is considered most effective. Association for Overseas Technical Scholarship will be applicable;
to register at Department of Labor---the company is obliged to register at the Department of Labor regarding working conditions;

To arrange supply of materials, power, water, and telecommunication accommodation;

To try test-production---for the purpose of smooth operation, some trial production is necessary upon the completion of the construction. Working level of employees and other issues will be checked and solutions should be identified if there are any problems;

These activities are supposed to take about two years to be accomplished.

Costs of pre-production activities

Costs of pre-production activities except for land purchase and construction are shown in Table 8.1.

Table 8.1. Pre-Production Expenditures
(in Thousand Pesos)

	1 st year	2nd year
Feasibility study	500	
Detailed design	1,000	
Manpower training	447	
Labour		3,075
Administration		923
Property tax	557	557
Total	2,504	4,555

Figure 8.1. Implementation Schedule

Activity	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8
feasibility study	xxx							
joint-venture set-up		x						
registration to government agencies		xx				x		
application to BOI		xxx						
fund raising		xxx						
land purchase		x						
detailed design		xxxx						
construction			xxxxxxxxxxxxxxxx					
recruitment						xx		xxx
manpower training				xxx	xxx	xxx	xxx	
supply arrangement					xx		xx	
trial production								xxx
pre-production marketing								xxx

IX. FINANCIAL AND ECONOMIC EVALUATION

IX. FINANCIAL AND ECONOMIC EVALUATION

General assumptions

The financial analysis is based on the assumption that this project is able to enjoy BOI incentives. General assumptions of the analysis are;

Table 9.1. General Assumptions

Construction period:	2 years
Production period:	15 years
Exchange rate:	1 yen = 0.15 Philippine peso
Interest rate:	Foreign loan 8%, Local loan 24%
Grace period:	2 years
Income Tax:	35%
Tax holidays:	6 years
Amortization period:	7 years

Table 9.2. Depreciation Period

Buildings	20 years
Plant, Machinery, and Equipment	10 years
Auxiliary and Service Facilities	10 years

Table 9.3. Inflation Rates

Products	1%/year
Raw Materials	1%
Spare Parts	1%
Labour Costs	5%
Water and Electricity	1%
Administration Expenses	1%

Initial investment costs

Total initial investment costs are about 45.528 million pesos. Costs of items are shown in Table 9.4.

Table 9.4. Initial Investment Costs
(in Thousand Pesos)

Fixed Investment Costs:

Land (5,000 m ²)	4,000
Site preparation	100
Buildings and civil works	22,360
Auxiliary and service facilities	1,500
<u>Plant, machinery and equipment</u>	<u>8,722</u>
Total	36,682

Pre-production expenditures(See Table 8-1): 7,059

Inventory (30 days of main raw material, fuel oil, and labour):
1,787

Total 45,528

Sources of financing

Financial sources of the project are equity and loans. Equity will cover 55% of the total investment costs and the foreign-local ratio is 4:6. Loans will cover 45% of the total initial investment costs and the foreign local ratio is 3:7.

Table 9.5. Sources of Financing
(In thousand pesos)

		Total	Foreign	Local
Equity	1st year	21,552	8,621	12,931
	2nd year	3,489	1,396	2,093
<u>Total</u>		<u>25,041</u>	<u>10,017</u>	<u>15,024</u>
Loans	1st year	17,634	5,290	12,343
	2nd year	2,854	856	1,998
<u>Total</u>		<u>20,488</u>	<u>6,146</u>	<u>14,341</u>

Production costs

Variable Costs

Production will begin in 1992 and reach full operation in 1996. Costs of raw materials and consumables are estimated at 25.4 million pesos and 0.74 pesos respectively and utilities including fuel for furnace 1.7 million pesos in 1996. Direct labour cost for 32 workers is estimated is estimated at 3.6 million pesos in 1996, of which 50 percent is calculated as variable cost and the other 50 percent is calculated non-variable.

Non-variable costs

Factory overhead costs consists of insurance (2% of depreciable fixed asset) and property tax (2% of building and land value). Annual spare parts expense is estimated 5% of machinery and equipment, while maintenance costs are estimated 2.5% of plant & machinery plus 1% of building value. Administrative overhead costs are sum of labour costs shown in Table 7.1 and 470 million pesos of administrative expenses. In addition, corporate income tax is computed at 35% of annual taxable income. With BOI incentives, this project shall be entitled to six-year income tax holiday.

The break downs of Production costs in 1996 are shown in Table 9.6.

Table 9.6. Annual production costs (1996)
(in thousand pesos)

Cost items	Cost
Factory costs	
Raw materials	25.443
Other raw materials	0.743
Utilities	1.697
Direct labour	3.649
Repair, maintenance	0.476
Spares	0.454
Factory overhead	1.258
Sum	33.719
Administrative overheads	4.316
Sales and distribution	0.810
Depreciation	2.140
Financial costs	2.247
Total production costs	43.233

Sales

The sales price is set at 37,000 pesos per ton based on current level of the market which is between 36,000 and 40,000 pesos per ton.

In addition, 500 pesos/ton is allowed for miscellaneous sales costs apart from labour cost.

Financial internal rate of return

As a result of the calculation based on the information above, internal rate of return is 26.7%, which is slightly higher than the hurdle rate, 25 %.

Sensitivity analysis

This project has been analyzed based on the assumption that all the finished products will be sold in the domestic market. However, as mentioned in Chapter III, there is future possibility of exporting the automobile parts. Since the import of materials which are used for producing export items are free from import duty, the production costs will be less in case of producing automobile parts for export than in case of producing for domestic market.

When 50% of the finished products are exported and the other 50 % are for domestic market, the internal rate of return will be 28.2%.

If all the finished products are exported, the internal rate of return will be 29.6%.

Break-even point

Break-even point is moderate at the beginning and declines as the production increases.

Table 9.7. Break-even Point

Year	Point(percent)
1992	51.3
1993	44.2
1994	39.4
1995	35.8
1996	31.9
1997	33.6
1998	34.6
1999	35.1
2000	35.9
2001	36.7
2002	34.6
2003	35.5
2004	36.5
2005	37.6
2006	38.7

Pay-back period

Pay-back period for the Project is 6 years including the 2-year pre-production period as shown below:

Table 9.8. Pay-back period
(Annual net profit plus interest plus depreciation)

	Amount paid back	(in pesos) Balance at end of year
1990	-	39,186
1991	-	45,528
1992	11,307	34,203
1993	14,284	19,899
1994	17,328	2,609
1995	2,609	0.00

Impact on local industries

Generally speaking, the metal-working industry takes an important role on the industrialization. It is because the metalworking industry supports various industries through providing parts. Particularly, forging is, as well as casting, is one of the most important fundamental materials for the machine industries including automobile.

Production of high quality auto-parts enables to produce high quality automobile. Development of technology for production of auto-parts can be applied to that of other types of machines.

Environment impacts

Appropriate countermeasure should be taken against smoke, noise and vibration to minimize pollution.

APPENDIX

PROJECTED FINANCIAL STATEMENTS

Supporting Industry in the Philippines
 November 1983
 Closed die forging/domestic market only

3 year(s) of construction, 16 years of production
 currency conversion rates:

foreign currency 1 unit = 0.1500 units accounting currency
 local currency 1 unit = 1.0000 units accounting currency
 accounting currency: in thousand pesos

Total initial investment during construction phase

fixed assets:	43740.50	18.099 % foreign
current assets:	1787.80	68.246 % foreign
total assets:	45528.30	30.099 % foreign

Source of funds during construction phase

equity & grants:	25040.90	40.000 % foreign
foreign loans :	6146.40	
local loans :	14341.00	
total funds :	45528.30	35.500 % foreign

Cashflow from operations

Year:	1	2	3
operating costs:	24198.60	27529.47	30939.96
depreciation :	2140.15	2140.15	2140.15
interest :	3933.55	3933.55	3371.62
production costs	30272.30	33600.17	36451.73
thereof foreign	52.70 %	55.26 %	58.07 %
total sales :	35964.00	42377.58	46915.93
gross income :	5223.70	8210.41	11816.10
net income :	5223.70	8210.41	11815.10
cash balance :	3525.01	6997.13	10481.44
net cashflow :	7458.57	13747.45	16779.63

Net Present Value at: 25.00 % = 3738.10
 Internal Rate of Return: 26.74 %
 Return on equity1: 34.04 %
 Return on equity2: 31.93 %

Index of Schedules produced by COMPAR

Total initial investment	Cashflow Tables
Total investment during production	Projected Balance
Total production costs	Net income statement
Working Capital requirements	Source of finance

Total Initial Investment in in thousand pesos

Year	1990	1991
Fixed investment costs		
Land, site preparation, development	4100.00	0.00
Buildings and civil works	12000.00	0.00
Auxiliary and service facilities . .	1500.00	0.00
Incorporated fixed assets	0.00	0.00
Plant machinery and equipment . . .	6701.50	0.00
Total fixed investment costs	24301.50	0.00
Pre-production capital expenditures.	3504.00	4555.00
Net working capital	0.00	1787.80
Total initial investment costs . . .	27805.50	6342.80
Of it foreign, in %	20.19	19.24

Supporting Industry in the Philippines --- November 1991

COMPAR 2.0 - ECPA, ENGINEERING CONSULTING FIRMS, TOKYO

Total Current Investment in in thousand pesos

Year	1982	1983	1984	1985	1986	1987
Fixed investment costs						
Land, site preparation, Development	0.00	0.00	0.00	0.00	0.00	0.00
Buildings and civil works	0.00	0.00	0.00	0.00	0.00	0.00
Auxiliary and service facilities	0.00	0.00	0.00	0.00	0.00	0.00
Incorporated fixed assets	0.00	0.00	0.00	0.00	0.00	0.00
Plant, machinery and equipment	0.00	0.00	0.00	0.00	0.00	0.00
Total fixed investment costs	0.00	0.00	0.00	0.00	0.00	0.00
Preproduction capitals expenditures.	0.00	0.00	0.00	0.00	0.00	0.00
Working capital	3839.64	559.88	548.04	581.33	575.08	148.04
Total current investment costs	3839.64	559.88	548.04	581.33	575.08	148.04
Of it foreign, %	58.74	75.83	75.38	74.89	74.39	33.11

Supporting Industry in the Philippines --- November 1988

COMPAR 3.0 - ECPA, ENGINEERING CONSULTING FIRMS, TOKYO

Total Current Investment in in thousand pesos

Year	1988	1989	2000	2001	2002	2003
Fixed investment costs						
Land, site preparation, Development	0.00	0.00	0.00	0.00	0.00	0.00
Buildings and civil works	0.00	0.00	0.00	0.00	0.00	0.00
Auxiliary and service facilities	0.00	0.00	0.00	0.00	0.00	0.00
Incorporated fixed assets	0.00	0.00	0.00	0.00	0.00	0.00
Plant, machinery and equipment	0.00	0.00	0.00	0.00	0.00	0.00
Total fixed investment costs	0.00	0.00	0.00	0.00	0.00	0.00
Preproduction capitals expenditures.	0.00	0.00	0.00	0.00	0.00	0.00
Working capital	151.80	155.73	159.84	164.13	168.62	173.31
Total current investment costs	151.80	155.73	159.84	164.13	168.62	173.31
Of it foreign, %	32.33	31.57	30.60	30.38	29.35	25.81

Supporting Industry in the Philippines --- November 1993

Total Current Investment in in thousand pesos

Year	1964	1965	1966
Fixed investment costs			
Land, site preparation, development	0.00	0.00	0.00
Buildings and civil works	0.00	0.00	0.00
Auxiliary and service facilities . .	0.00	0.00	0.00
Incorporated fixed assets	0.00	0.00	0.00
Plant, machinery and equipment . .	0.00	0.00	0.00
Total fixed investment costs	0.00	0.00	0.00
Preproduction capitals expenditures.	0.00	0.00	0.00
Working capital	178.23	183.37	186.75
Total current investment costs . . .	178.23	183.37	186.75
Of it foreign, %	27.90	27.19	28.49

----- Supporting Industry in the Philippines --- November 1966

Total Production Costs in in thousand pesos

Year	1961	1962	1964	1965	1966	1967
% of nom. capacity (single product)	80.00	70.00	80.00	80.00	100.00	100.00
Raw material I	14870.00	17266.15	12669.12	22271.77	26446.77	26667.09
Other raw materials	428.40	504.80	560.29	282.07	740.99	750.42
Utilities	678.60	1166.12	1281.06	1512.66	1697.06	1714.01
Energy	0.00	0.00	0.00	0.00	0.00	0.00
Labour, direct	2431.60	2879.26	2379.79	3601.42	3646.26	3631.47
Repair, maintenance	457.00	421.57	488.19	470.85	475.68	450.00
Spares	426.00	443.66	444.72	449.21	453.73	458.24
Factory overheads	1229.00	1221.02	1233.09	1246.83	1259.02	1270.27
Factory costs	20560.60	23746.37	19969.65	30313.34	33719.28	34203.43
Administrative overheads	3618.00	3790.10	3950.12	4123.44	4315.50	4511.71
Indir. costs, sales and distribution	0.00	0.00	0.70	0.00	0.00	0.00
Direct costs, sales and distribution	468.00	567.00	648.00	729.00	810.00	810.00
Depreciation	2140.15	2140.15	2140.15	2140.15	2140.15	2140.15
Financial costs	3933.55	3933.55	3371.62	2663.69	2247.74	1666.62
Total production costs	30740.30	34187.17	37039.73	40130.62	43232.67	43359.03
Costs per unit (single product)	31.63	30.13	28.63	37.52	28.69	28.78
Of it foreign, %	51.90	54.35	57.05	59.36	61.33	61.59
Of it variable, %	56.75	60.33	64.26	67.64	70.59	71.25
Total labour	5549.60	5964.66	5449.40	6345.83	7475.36	7649.13

Total Production Costs in in thousand pesos

Year	1968	1969	1970	1971	1972	1973
% of ass. capacity (single product).	100.00	100.00	100.00	100.00	100.00	100.00
Raw material I	35984.17	38218.71	38478.84	39743.80	37808.01	37078.19
Other raw materials	787.93	788.80	778.18	730.89	788.80	788.89
Utilities	1731.34	1748.88	1738.14	1783.80	1801.84	1819.88
Energy	0.00	0.00	0.00	0.00	0.00	0.00
Labour, direct	4022.97	4024.11	4438.80	4387.08	4888.84	6124.44
Repair, maintenance	488.11	488.97	484.87	488.81	604.81	608.81
Spare	488.81	487.45	478.18	478.88	481.80	488.44
Factory overheads	1088.88	1088.81	1088.17	1088.87	1088.48	1088.84
Factory costs	34687.71	35208.81	38728.83	38281.31	38810.20	37378.80
Administrative overheads	4717.53	4938.46	5158.97	5387.81	5648.98	5908.81
Indir. costs, sales and distribution	0.00	0.00	0.00	0.00	0.00	0.00
Direct costs, sales and distribution	810.00	810.00	810.00	810.00	810.00	810.00
Depreciation	2140.15	2140.15	2140.15	2140.15	1118.00	1118.00
Financial costs	1128.97	0.00	0.00	0.00	0.00	0.00
Total production costs	43489.27	43088.21	43836.74	44689.07	44388.18	45210.41
Costs per unit (single product) .	26.85	28.80	27.08	27.54	27.40	27.81
Of it foreign, %	61.82	62.87	62.20	61.72	60.85	60.84
Of it variable, %	71.89	73.45	73.10	72.73	74.02	73.88
Total labour	8241.89	8653.87	9388.35	9540.87	10017.70	10518.88

Supporting Industry in the Philippines --- November 1969

Total Production Costs in in thousand pesos

Year	1964	1965	1966
% of nom. capacity (single product)	100.00	100.00	100.00
Raw material 1	27550.87	27550.00	26114.84
Other raw materials	804.55	810.00	800.70
Utilities	1837.85	1858.00	1874.78
Energy	0.00	0.00	0.00
Labour, direct	5381.18	5361.70	5348.75
Repair, maintenance	514.82	500.00	505.51
Spares	481.00	488.00	501.07
Factory overheads	1362.00	1375.95	1393.71
Factory costs	37953.02	38548.00	39160.10
Administrative overheads	6182.96	6470.92	6775.07
Indir. costs, sales and distribution	0.00	0.00	0.00
Direct costs, sales and distribution	810.00	810.00	810.00
Depreciation	1118.00	1118.00	1118.00
Financial costs	0.00	0.00	0.00
Total production costs	46063.98	46947.12	47861.18
Costs per unit (single product)	28.43	28.98	29.54
Of it foreign, %	59.81	59.27	59.72
Of it variable, %	73.16	72.71	72.25
Total labour	11044.51	11596.74	12178.57

Net Working Capital in in thousand pesos

Year	1992	1993	1994	1995	1996
Coverage mdc coto					
Current assets &					
Accounts receivable . . . 30 12.0	2055.55	2341.12	2632.33	2930.90	3237.06
Inventory and materials . 30 12.0	3164.55	3440.47	3721.04	4006.32	4296.36
Energy 0 ---	0.00	0.00	0.00	0.00	0.00
Spares 30 12.0	36.33	36.70	37.06	37.43	37.81
Work in progress 7 51.4	400.18	461.73	524.80	589.43	655.65
Finished products 15 24.0	1008.27	1146.94	1289.17	1435.07	1584.78
Cash in hand 30 12.0	676.80	715.20	756.09	799.63	845.98
Total current assets	7341.69	8142.16	8960.49	9798.78	10657.67
Current liabilities and					
Accounts payable 30 12.0	1715.05	1978.86	2249.15	2526.11	2809.94
Net working capital	5626.64	6163.30	6711.34	7272.67	7847.73
Increase in working capital	3938.84	536.66	548.04	561.33	575.06
Net working capital, local	2287.54	2446.31	2609.12	2777.76	2952.57
Net working capital, foreign	3339.10	3716.99	4102.22	4494.91	4895.17

Note: mdc = minimum days of coverage ; coto = coefficient of turnover .

Net Working Capital in in thousand pesos

Year	1997	1998	1999	2000	2001
Coverage mdc coto					
Current assets &					
Accounts receivable . . . 30 12.0	3293.68	3352.10	3412.42	3474.72	3539.08
Inventory and materials . 30 12.0	4356.62	4417.09	4477.79	4538.73	4599.91
Energy 0 ---	0.00	0.00	0.00	0.00	0.00
Spares 30 12.0	38.19	38.57	38.95	39.34	39.74
Work in progress 7 51.4	665.05	674.68	684.55	694.68	705.08
Finished products 15 24.0	1613.09	1642.30	1672.46	1703.61	1735.79
Cash in hand 30 12.0	879.36	914.32	950.93	989.29	1029.47
Total current assets	10845.98	11039.06	11237.11	11440.37	11649.06
Current liabilities and					
Accounts payable 30 12.0	2850.20	2891.48	2933.80	2977.22	3021.78
Net working capital	7995.78	8147.58	8303.31	8463.15	8627.28
Increase in working capital	148.04	151.80	155.73	159.84	164.13
Net working capital, local	3063.86	3178.54	3296.79	3418.76	3544.65
Net working capital, foreign	4931.92	4969.04	5006.52	5044.39	5082.63

Note: mdc = minimum days of coverage ; coto = coefficient of turnover .

Net Working Capital in in thousand pesos

Year	1982	1983	1984	1985	1986	
Coverage	mdc	coto				
Current assets &						
Accounts receivable	30 12.0	3805.59	3874.37	3745.50	3813.03	3898.08
Inventory and materials	30 12.0	4861.00	4722.89	4784.31	4847.07	4913.48
Energy	0 ---	0.00	0.00	0.00	0.00	0.00
Spares	30 12.0	40.13	40.54	40.94	41.35	41.76
Work in progress	7 51.4	715.75	728.71	737.98	749.55	761.45
Finished products	15 24.0	1789.05	1833.43	1839.00	1875.80	1913.88
Cash in hand	30 12.0	1071.57	1115.67	1161.69	1210.33	1261.05
Total current assets		11863.43	12683.72	13310.21	13543.16	13782.82
Current liabilities and						
Accounts payable	30 12.0	3067.52	3114.49	3162.75	3212.35	3263.34
Net working capital		8795.91	8969.23	9147.46	9330.83	9519.58
Increase in working capital		168.62	173.32	178.23	183.27	188.75
Net working capital, local		3674.65	3698.96	3947.79	4091.37	4239.92
Net working capital, foreign		5121.26	5160.27	5199.67	5239.47	5279.66

Note: mdc = minimum days of coverage ; coto = coefficient of turnover .

Source of Finance, construction in in thousand pesos

Year	1989	1991
Equity, ordinary ..	31559.45	3458.45
Equity, preference.	0.00	0.00
Subsidies, grants .	0.00	0.00
Loan A, foreign .	5099.05	559.05
Loan B, foreign..	0.00	0.00
Loan C, foreign .	0.00	0.00
Loan A, local....	12346.00	1368.00
Loan B, local....	0.00	0.00
Loan C, local....	0.00	0.00
Total loan	17633.05	2554.35
Current liabilities	0.00	0.00
Bank overdraft	0.00	0.00
Total funds	39165.50	6343.50

Supporting Industry in the Philippines --- November 1993

Source of Finance, production in in thousand pesos

Year	1992	1993	1994	1995	1996	1997	1998
Equity, ordinary ..	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Equity, preference.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Subsidies, grants .	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Loan A, foreign .	0.00	-878.06	-878.06	-878.06	-878.06	-878.06	-878.06
Loan B, foreign..	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Loan C, foreign .	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Loan A, local....	0.00	-2048.71	-2048.71	-2048.71	-2048.71	-2048.71	-2048.71
Loan B, local....	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Loan C, local....	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total loan	0.00	-2926.77	-2926.77	-2926.77	-2926.77	-2926.77	-2926.77
Current liabilities	1715.05	263.81	270.23	276.96	282.93	49.26	41.27
Bank overdraft	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total funds	1715.05	-2662.96	-2656.54	-2649.81	-2643.84	-2676.51	-2685.50

Supporting Industry in the Philippines --- November 1999

Source of Finance, production in in thousand pesos

Year	1999	2000	2001	2002	2003	2004	2005
Equity, ordinary ..	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Equity, preference.	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Subsidies, grants .	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Loan A, foreign .	-578.06	0.00	0.00	0.00	0.00	0.00	0.00
Loan B, foreign..	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Loan C, foreign .	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Loan A, local....	-2048.71	0.00	0.00	0.00	0.00	0.00	0.00
Loan B, local....	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Loan C, local....	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total loan	-2626.77	0.00	0.00	0.00	0.00	0.00	0.00
Current liabilities	43.32	43.42	44.56	45.74	46.97	48.26	49.60
Bank overdraft	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total funds	-2583.45	43.42	44.56	45.74	46.97	48.26	49.60

Supporting Industry in the Philippines --- November 1999

Source of Finance, production in in thousand pesos

Year	1978
Equity, ordinary ..	0.00
Equity, preference.	0.00
Subsidies, grants .	0.00
Loan A, foreign .	0.00
Loan B, foreign..	0.00
Loan C, foreign .	0.00
Loan A, local....	0.00
Loan B, local....	0.00
Loan C, local....	0.00

Total loan	0.00
Current liabilities	50.99
Bank overdraft	0.00

Total funds	50.99

Supporting Industry in the Philippines --- November 1988

Cashflow Tables, construction in in thousand pesos

Year	1988	1989
Total cash inflow . . .	39185.50	3342.80
Financial resources . . .	39185.50	3342.80
Sales, net of tax . . .	0.00	0.00
Total cash outflow . . .	39185.50	3342.80
Total assets	39185.50	3342.80
Operating costs	0.00	0.00
Cost of finance	0.00	0.00
Repayment	0.00	0.00
Corporate tax	0.00	0.00
Dividends paid	0.00	0.00
Surplus (deficit) . . .	0.00	0.00
Cumulated cash balance . . .	0.00	0.00
Inflow, local	25274.85	4991.00
Outflow, local	31273.00	5102.70
Surplus (deficit) . . .	-5998.15	-1091.70
Inflow, foreign	13910.65	2251.80
Outflow, foreign	7912.50	1209.10
Surplus (deficit) . . .	5998.15	1031.70
Net cashflow	-39185.50	-3342.80
Cumulated net cashflow . . .	-39185.50	-45526.30

Supporting Industry in the Philippines --- November 1988

Cashflow tables, production in in thousand pesos

Year	1983	1984	1984	1985	1986	1987
Total cash inflow	37675.08	42841.89	48189.12	56957.57	62927.26	69127.91
Financial resources	1725.08	225.81	570.09	578.98	288.98	41.29
Sales, net of tax	35950.00	42616.08	47619.03	56378.59	62638.28	69086.62
Total cash outflow	34164.24	38764.27	38724.88	41745.86	44878.08	44255.06
Total assets	5556.89	610.49	618.33	625.59	638.99	169.61
Operating costs	24888.80	28283.47	31587.98	35170.78	36644.78	36624.28
Cost of finance	3333.55	3333.55	3371.82	3378.88	3347.74	2888.81
Repayment	0.00	3328.77	3328.77	3328.77	3328.77	3328.77
Corporate tax	0.00	0.00	0.00	0.00	0.00	0.00
Dividends paid	0.00	0.00	0.00	0.00	0.00	0.00
Surplus (deficit)	3511.84	4077.62	16641.24	14811.71	17049.18	19102.85
Cumulated cash balance	3511.84	7589.46	24230.70	39042.41	56091.59	75194.44
Inflow, local	36456.55	42423.38	48283.87	56931.02	62428.71	69118.80
Outflow, local	16669.80	18502.45	18844.50	17225.54	17645.21	17481.10
Surplus (deficit)	20000.73	23920.93	29439.37	39705.48	44783.50	51637.70
Inflow, foreign	1222.53	218.51	222.25	226.55	239.55	21.20
Outflow, foreign	14503.21	18251.82	21680.17	24520.32	27232.87	38843.84
Surplus (deficit)	-17280.68	-17933.31	-21457.92	-24293.77	-26993.32	-38622.64
Net cashflow	7456.57	13747.45	16779.83	19643.50	22090.26	23015.06
Cumulated net cashflow	-35069.73	-21322.28	-4804.45	12038.04	34128.30	57143.36

Supporting Industry in the Philippines --- November 1983

Cashflow tables, production in in thousand pesos

Year	1988	1989	2000	2001	2002	2003
Total cash inflow . . .	86888.78	84508.11	84848.88	88811.78	88888.78	88801.18
Financial resources . . .	41.87	48.88	48.48	48.88	48.78	48.87
Sales, net of tax	86846.91	84459.23	84800.40	88762.90	88840.00	88752.31
Total cash outflow . . .	81817.88	81484.88	82874.88	81008.88	81001.88	81884.87
Total assets	188.88	188.88	208.88	218.88	218.87	211.88
Operating costs	41888.88	40848.88	41888.88	42488.88	42887.14	44888.48
Cost of finance	1188.87	1.00	0.00	0.00	0.00	0.00
Repayment	888.87	888.87	0.00	0.00	0.00	0.00
Corporate tax	7848.88	7411.10	7874.88	7881.88	7888.87	7881.88
Dividends paid	0.00	0.00	0.00	0.00	0.00	0.00
Surplus (deficit) . . .	18881.48	18821.18	18878.88	18891.18	18188.21	18825.48
Cumulated cash balance . .	88848.88	88470.41	118148.88	127787.88	148878.48	187888.88
Inflow, local	86847.88	84584.48	84888.87	88877.88	88884.81	88887.88
Outflow, local	84488.11	84884.11	82788.88	82887.88	84851.88	84888.87
Surplus (deficit)	88181.88	88888.88	42188.81	42870.88	42188.88	42488.88
Inflow, foreign	31.41	31.88	31.84	31.88	31.88	31.81
Outflow, foreign	27881.84	27188.88	28888.88	28888.81	27888.88	27888.81
Surplus (deficit)	-27888.88	-27188.88	-28888.81	-28778.88	-27848.84	-27317.10
Net cashflow	18888.87	18747.88	18878.88	18891.18	18188.21	18825.48
Cumulated net cashflow . .	74787.42	88888.88	108810.88	121888.18	138888.88	181888.88

Supporting Industry in the Philippines --- November 1989

Cashflow tables, production in in thousand pesos

Year	2004	2005	2006
Total cash inflow . . .	87590.08	88088.91	88950.48
Financial resources . . .	48.08	48.00	50.00
Sales, net of tax . . .	87541.99	88040.91	88899.48
Total cash outflow . . .	60888.74	60578.68	64548.82
Total assets	328.48	328.97	338.74
Operating costs	44848.88	45828.18	48748.17
Cost of finance	0.00	0.00	0.00
Repsment	0.00	0.00	0.00
Corporate tax	7817.57	7444.57	7388.41
Dividends paid	0.00	0.00	0.00
Surplus (deficit) . . .	14800.41	14780.25	14804.16
Cumulated cash balance	178888.88	187588.50	202188.70
Inflow, local	87587.48	88248.88	88927.88
Outflow, local	26078.74	35817.58	26178.30
Surplus (deficit) . . .	42488.88	48828.40	42748.88
Inflow, foreign	32.78	52.96	23.19
Outflow, foreign	27818.00	27888.18	38188.00
Surplus (deficit) . . .	-27880.22	-27886.18	-38144.84
Net cashflow	14800.41	14780.25	14804.16
Cumulated net cashflow	188884.20	191884.40	198228.60

----- Supporting Industry in the Philippines --- November 1988 -----

Cashflow Discounting:

a) Return on Equity 1:		
Net present value	12165.44	at 35.00 %
Internal Rate of Return (IRREI) ..	34.04 %	
b) Return on Equity 2:		
Net present value	3768.83	at 35.00 %
Internal Rate of Return (IRREI) ..	31.83 %	
c) Internal Rate of Return on total investment:		
Net present value	3768.10	at 35.00 %
Internal Rate of Return (IRR) ..	33.74 %	
Equity 1 = Total equity paid : Net income		
Equity 2 = Initial equity paid : Net cash return		

Net Income Statement in in thousand pesos

Year	1986	1985	1984	1983	1982
Total sales, incl. sales tax	35384.00	42377.55	45315.53	55551.82	52673.50
Less: variable costs, incl. sales tax.	17445.60	20814.30	23335.75	27133.02	30817.42
Variable margin	18516.40	21763.25	21977.09	28441.55	31256.04
As % of total sales	51.43	51.36	51.07	51.07	51.07
Non-variable costs, incl. depreciation	3661.15	3619.32	3693.97	10171.68	10467.47
Operational margin	3157.25	13149.96	15187.73	16269.69	21368.87
As % of total sales	35.46	28.66	31.95	32.67	34.89
Cost of finance	3933.55	3933.55	3371.82	2609.65	2247.74
Gross profit	5223.70	8210.41	11816.10	15460.00	19141.13
Allowances	0.00	0.00	0.00	0.00	0.00
Taxable profit	5223.70	8210.41	11816.10	15460.00	19141.13
Tax	0.00	0.00	0.00	0.00	0.00
Net profit	5223.70	8210.41	11816.10	15460.00	19141.13
Dividends paid	0.00	0.00	0.00	0.00	0.00
Undistributed profit	5223.70	8210.41	11816.10	15460.00	19141.13
Accumulated undistributed profit . . .	5223.70	13434.11	25250.21	40710.21	59951.34
Gross profit, % of total sales	14.52	19.37	24.16	27.32	30.69
Net profit, % of total sales	14.52	19.37	24.16	27.32	30.69
ROE, Net profit, % of equity	20.66	32.79	47.19	61.74	76.44
ROI, Net profit+interest, % of invest.	18.55	24.33	30.10	35.81	41.46

Supporting Industry in the Philippines --- November 1983

Net Income Statement in in thousand pesos

Year	1987	1988	1989	1990	1991
Total sales, incl. sales tax	82997.64	86807.60	84026.78	84809.46	86665.43
Less: variable costs, incl. sales tax.	60667.61	61064.81	61849.31	60440.80	62443.64
Variable margin	22330.04	25742.79	22177.47	24368.66	24221.79
As % of total sales	50.87	50.39	50.78	50.89	50.81
Non-variable costs, incl. depreciation	10776.73	11100.45	11499.09	11793.96	12165.03
Operational margin	11553.31	14642.34	10678.38	12574.70	12056.76
As % of total sales	33.66	33.45	30.92	32.49	31.95
Cost of finance	1885.81	1133.87	0.00	0.00	0.00
Gross profit	19647.45	20138.25	21174.58	21069.68	20946.42
Allowances	0.00	0.00	0.00	0.00	0.00
Taxable profit	19647.45	20138.25	21174.58	21069.68	20946.42
Tax	0.00	7045.93	7411.10	7374.93	7331.95
Net profit	19647.45	13092.32	13763.48	13694.75	13614.47
Dividends paid	0.00	0.00	0.00	0.00	0.00
Undistributed profit	19647.45	13092.32	13763.48	13694.75	13614.47
Accumulated undistributed profit	79498.78	92589.64	106353.10	120047.40	133662.60
Gross profit, % of total sales	31.19	31.65	32.95	32.46	31.95
Net profit, % of total sales	31.19	20.57	31.42	31.10	20.77
ROE, Net profit, % of equity	76.46	52.27	54.36	54.63	54.37
ROI, Net profit+interest, % of invest.	41.23	27.39	28.45	28.23	28.00

Supporting Industry in the Philippines --- November 1989

Net Income Statement in in thousand pesos

Year	2002	2003	2004	2005	2006
Total sales, incl. sales tax	66011.05	66673.16	67541.63	66017.31	66533.43
Less: variable costs, incl. sales tax.	33553.32	33371.55	33633.65	34135.57	34552.13
Variable margin	32457.73	33301.61	33907.98	31881.75	31981.30
As % of total sales	49.33	50.05	50.21	48.45	48.21
Non-variable costs, incl. depreciation	11531.81	11333.66	10326.13	10311.65	10273.14
Operational margin	21825.91	21967.94	21477.84	21570.10	21708.16
As % of total sales	32.96	32.93	31.80	31.15	32.63
Cost of finance	0.00	0.00	0.00	0.00	0.00
Gross profit	21825.91	21967.94	21477.84	21570.10	21708.16
Allowances	0.00	0.00	0.00	0.00	0.00
Taxable profit	21825.91	21967.94	21477.84	21570.10	21708.16
Tax	7333.67	7531.96	7517.27	7444.57	7333.41
Net profit	14492.24	14435.98	13960.57	14125.53	14374.75
Dividends paid	0.00	0.00	0.00	0.00	0.00
Undistributed profit	14492.24	14435.98	13960.57	14125.53	14374.75
Accumulated undistributed profit . . .	147849.40	161930.20	175590.80	189716.50	203391.40
Gross profit, % of total sales	32.96	32.93	31.80	31.15	32.63
Net profit, % of total sales	21.43	21.05	20.67	20.27	19.85
ROE, Net profit, % of equity	56.65	56.23	55.75	55.21	54.61
ROI, Net profit+interest, % of invest.	27.00	25.71	26.40	26.05	25.63

Supporting Industry in the Philippines --- November 1983

Projected Balance Sheets, construction in in thousand pesos

Year	1990	1991
Total assets	39185.50	45528.30
Fixed assets, net of depreciation	0.00	39185.50
Construction in progress	39185.50	45528.30
Current assets	0.00	1757.80
Cash, bank	0.00	0.00
Cash surplus, finance available	0.00	0.00
Loss carried forward	0.00	0.00
Loss	0.00	0.00
Total liabilities	39185.50	45528.30
Equity capital	21552.45	25040.90
Reserves, retained profit	0.00	0.00
Profit	0.00	0.00
Long and medium term debt	17633.05	20497.40
Current liabilities	0.00	0.00
Bank overdraft, finance required	0.00	0.00
Total debt	17633.05	20497.40
Equity, % of liabilities	55.00	55.00

Supporting Industry in the Philippines --- November 1991

Projected Balance Sheets, Production in in thousand pesos

Year	1992	1993	1994	1995	1996	1997
Total assets	52467.05	56014.50	67174.12	79984.30	96482.48	113243.40
Fixed assets, net of depreciation	41600.35	39460.20	37320.05	35179.91	33039.78	30699.81
Construction in progress	0.00	0.00	0.00	0.00	0.00	0.00
Current assets	6664.89	7439.38	8204.40	8999.15	9811.69	9986.82
Cash, bank	676.80	715.20	758.09	739.83	845.95	879.38
Cash surplus, finance available	3525.01	1043.14	25893.57	35005.82	52795.05	71497.54
Loss carried forward	0.00	0.00	0.00	0.00	0.00	0.00
Loss	0.00	0.00	0.00	0.00	0.00	0.00
Total liabilities	52467.05	56014.50	67174.12	79984.30	96482.48	113243.40
Equity capital	25040.90	25040.90	25040.90	25040.90	25040.90	25040.90
Reserves, retained profit	0.00	5223.70	13434.11	25250.21	40710.21	59851.34
Profit	5223.70	8210.41	11816.10	15460.00	19141.13	19647.45
Long and medium term debt	20487.40	17560.63	14633.86	11707.08	8780.31	5853.54
Current liabilities	1715.05	1978.86	2249.15	2526.11	2809.94	2850.20
Bank overdraft, finance required	0.00	0.00	0.00	0.00	0.00	0.00
Total debt	22202.45	19539.49	16883.01	14233.20	11590.25	8703.74
Equity, % of liabilities	47.73	43.16	37.28	31.31	25.95	22.11

Supporting Industry in the Philippines --- November 1989



Projected Balance Sheets, Production in in thousand pesos

Year	1998	1999	2000	2001	2002	2003
Total assets	123447.80	134326.80	148065.50	161725.30	175957.80	190085.60
Fixed assets, net of depreciation	28759.46	26619.31	24479.16	22339.01	21221.01	20103.01
Construction in progress	0.00	0.00	0.00	0.00	0.00	0.00
Current assets	10124.74	10286.18	10451.08	10619.59	10791.86	10368.05
Cash, bank	914.32	950.93	989.29	1029.47	1071.57	1115.67
Cash surplus, finance available .	83649.28	96470.39	112146.00	127737.20	142873.40	157899.90
Loss carried forward	0.00	0.00	0.00	0.00	0.00	0.00
Loss	0.00	0.00	0.00	0.00	0.00	0.00
Total liabilities	123447.80	134326.80	148065.50	161725.30	175957.80	190085.60
Equity capital	25040.90	25040.90	25040.90	25040.90	25040.90	25040.90
Reserves, retained profit	79498.78	92588.64	106352.10	120047.40	133662.60	147849.40
Profit	13089.86	13763.49	13695.29	13615.17	14186.84	14080.78
Long and medium term debt	2926.77	-0.00	-0.00	-0.00	-0.00	-0.00
Current liabilities	2891.48	2933.80	2977.22	3021.78	3067.52	3114.49
Bank overdraft, finance required.	0.00	0.00	0.00	0.00	0.00	0.00
Total debt	5818.25	2933.80	2977.22	3021.78	3067.52	3114.49
Equity, % of liabilities	20.28	18.64	16.91	15.48	14.23	13.17

Projected Balance Sheets, Production in in thousand pesos

Year	2004	2005	2006
Total assets	204094.50	217969.70	231695.60
Fixed assets, net of depreciation	18995.01	17937.01	16749.01
Construction in progress	0.00	0.00	0.00
Current assets	11148.32	11332.66	11521.64
Cash, bank	1161.89	1210.33	1261.08
Cash surplus, finance available .	172799.30	167559.50	202163.70
Loss carried forward	0.00	0.00	0.00
Loss	0.00	0.00	0.00
Total liabilities	204094.50	217969.70	231695.60
Equity capital	25040.90	25040.90	25040.90
Reserves, retained profit	161930.20	175890.80	189716.50
Profit	13960.64	13825.63	13674.90
Long and medium term debt	-0.00	-0.00	-0.00
Current liabilities	3162.75	3212.35	3263.34
Bank overdraft, finance required.	0.00	0.00	0.00
Total debt	3162.75	3212.35	3263.34
Equity, % of liabilities	12.27	11.49	10.81

Supporting Industry in the Philippines --- November 1989