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PROJECT COMPLETION REPORT

TUNISIA

INDUSTRY IV (SOFOMECA FOUNDRY) PROJECT
(LOAN 2301-TUN)

MARCH 21, 1990

Country Department II
Industry and Energy Operations
Europe, Middle East and North Africa Regional Office

ACRONYMS AND ABBREVIATIONS

CMG	-	Complexe Mecanique de Tunisie
PMG	-	Project Management Group
SAR	-	Staff Appraisal Report
SOFOMECA	-	Societes des Fonderies et de Mecanique
STIA	-	Societe Tunisienne d'Industries Automobiles
tpy	-	tonne/tonnes per year

CURRENCY EQUIVALENTS

At Project Appraisal (1982): 1 Tunisian Dinar = 1.685 US dollars
November 1989: 1 Tunisian Dinar = 1.058 US dollars

THE WORLD BANK
Washington, D.C. 20433
U.S.A.

Office of Director-General
Operations Evaluation

March 21, 1990

MEMORANDUM TO THE EXECUTIVE DIRECTORS AND THE PRESIDENT

Subject: Project Completion Report on Tunisia
Industry IV (SOFOMECA Foundry) (Loan 2301-TUN)

Attached, for information, is a copy of a report entitled "Project Completion Report on Tunisia - Industry IV (SOFOMECA Foundry) (Loan 2301-TUN)" prepared by the Europe, Middle East and North Africa Regional Office, with Part II of the report contributed by the Borrower. No audit of this project has been made by the Operations Evaluation Department at this time.

Yves Rovani

Attachment

PROJECT COMPLETION REPORT

TUNISIA

INDUSTRY IV (SOFOMECA FOUNDRY)
(LOAN 2301-TUN)

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PROJECT COMPLETION REPORT

TUNISIA

INDUSTRY IV (SOFOMECA FOUNDRY) PROJECT
(LOAN 2301-TUN)

PREFACE

This is the Project Completion Report (PCR) on the Industry IV (SOFOMECA Foundry) Project in Tunisia, for which the World Bank approved Loan 2301-TUN in the amount of US$16.8 million on June 1983. The loan closed on June 30, 1988 and the Bank made the last disbursement in January 1989. The final disbursement amounted to 96% of the original loan amount. The remaining 4% was cancelled.

The Industry and Energy Division of the World Bank's Country Department II, Europe, Middle East and North Africa Regional Office prepared the PCR.

Parts I and III of the PCR are based on (a) the Staff Appraisal Report, (b) the President's Report, (c) Loan, Guarantee and Project Agreements, (d) Bank supervision reports, and (e) other available documents in Bank files related to the Project. Part II is translated from a report on the project, prepared in French by the present management of the Company.

The report prepared by the Bank focuses principally on the market and institutional issues raised by this project. The report prepared by the Company provides a detailed description of the management of the project design, construction and start-up. While the focus of these two reports differs, the views which they present are consistent.

PROJECT COMPLETION REPORT

Tunisia: Industry IV (SOFOMECA Foundry)
Loan 2301-TUN

EVALUATION SUMMARY

Introduction

i. Tunisia's development plans in the late 1970s and early 1980s had focused on the industrial sector to stimulate economic growth and employment. When the Bank appraised the Industry IV (SOFOMECA Foundry) Project in 1982, Tunisia's Sixth Development Plan was emphasizing the engineering subsector and the foundry industry, calling for increased levels of investment in these areas. The Bank and the Borrower designed the Project within this framework of an expanded, improved foundry sub-sector.

Objective

ii. The Project's main objective was to assist the development of the Tunisian foundry industry by meeting the growing demand for foundry products efficiently, improving operational productivity, enhancing product quality and establishing a sound basis for exports. The Project's main components consisted of (i) modernizing and extending SOFOMECA's existing iron and steel foundry capacity from 5,200 tpy to 7,500 tpy; (ii) constructing a new foundry with an initial production of 7,800 tpy; and (iii) installing a sand preconditioning plant with a capacity of 20,000 tpy. The Project also included a program to improve SOFOMECA's organization and management, the transfer of technical know-how, and a technical assistance component to improve efficiency.

Implementation Experience

iii. The Project modernized the foundry and extended capacity according to the original schedule but there was a substantial delay in the acquisition of equipment and start-up of the new unit. External factors such as low demand for foundry products and falling international prices along with internal factors such as shortfalls in product quality, cost overruns and management weaknesses greatly hindered Project effectiveness (paras. 11-13). Moreover, as highlighted in the report prepared by SOFOMECA, relations between a key consultant company and the SOFOMECA management deteriorated early on, which further impeded project implementation. In the early phases of the Project, Bank supervision missions recognized the adversities facing SOFOMECA and made recommendations to preserve the viability of the enterprise (para. 14) However, most of these recommendations, were not adopted.

Project Results

iv. The Project failed to meet most of its objectives (paras 17 -20). Actual results varied significantly from the Bank's original estimates -- shortfalls were 41% for sales, 49% for production and net income and 81% for the average gross margin. Because of the severe fall in domestic demand for foundry products, Sofomeca will have a serious problem of excess capacity in the medium term, particularly if and when the new plant begins operation.

Sustainability

v. SOFOMECA has major financial difficulties and will require an injection of 14 million dinars (US$14.8 million) over the next several years if it is to continue operation. The company is not expected to be profitable before 1993. However, prospects could improve if there is significant growth in the Tunisian engineering sector and if SOFOMECA makes substantial changes in its operations such as improved labor productivity, better product quality, more efficient management and a realistic, long-term marketing strategy (para. 22).

Findings and Lessons Learned

vi. Although the scope and scale of the Project were appropriate under the assumptions in the SAR, these assumptions proved highly inappropriate. The preparation of the Project should have given more attention to the problems of SOFOMECA's major clients, Tunisia's economic slowdown and increasing competition in the international steel market. Furthermore, although Project appraisal clearly defined the roles and responsibilities for effective Project management, inherent management weaknesses and failure to assume these responsibilities seriously hindered the implementation and effectiveness of the Project. If the responsiveness of Sofomeca's management and shareholders improves, there could be a role for the Bank in a possible restructuring of the company as outlined in para. 35. A major lesson the Project illustrates is that once the risk of failure has been clearly identified in the appraisal process (as in the case of this Project) the Bank should design specific, alternative operational scenarios. Then, if difficulties arise which threaten failure, the Bank would require the Borrower to adopt a specified course of action in one of the scenarios as a condition for further loan disbursement.

PROJECT COMPLETION REPORT

Tunisia: Industry IV (SOFOMECA Foundry)
Loan 2301-TUN

PART I: REPORT OF THE BANK

I. Project Identity

Project Name:	Industry IV (SOFOMECA Foundry)
Loan Number:	2301-TUN
RVP Unit:	EMENA
Country:	Tunisia
Sector:	Industry
Subsector:	Engineering Industry

II. Background

1. In the late 1970s - 1980s, the Tunisian industrial sector was singled out as a major vehicle for economic development and employment. In 1982, at the time of the SOFOMECA project appraisal, the sector operated under a complex system of administrative controls, creating distortions and negative secondary effects. Internally, the sector was plagued with inefficient operational planning and management, insufficient specialization of product mix, weak linkages among firms and subsectors, excessive capacity, and shortage of skilled personnel.

2. The engineering subsector, specifically, exhibited low levels of labor productivity and faced biases in the incentive framework against specialization, intra-sectoral integration and the production of capital goods. The foundry industry was underdeveloped and had a lower-than-average growth rate; its integration with other engineering industries was weak. Two foundry enterprises (SOFOMECA and Fonderies Reunies) accounted for 90% of total production. They showed low levels of labor productivity and low quality of final products. There were also obstacles to the emergence of engineering enterprises -- as *inter alia* light equipment for farmers could be imported with few restrictions -- which limited the development of the industry's natural clientele.

3. The Tunisian Sixth Development Plan envisaged a greater role for the engineering subsector and the foundry industry. It foresaw a significant increase in the investment levels for the subsector. It also identified specific measures to raise productivity in the foundry industry, to improve the quality of its products, to expand its capacity

to meet the expected rise in domestic demand, to further integrate locally produced castings, and to create a sound basis for exports.

III. Project Objectives and Description

4. The objective of the SOFOMECA project (the Project) was to contribute to the development of the Tunisian foundry industry by: (a) meeting efficiently the expected growing domestic demand for foundry products; (b) improving the quality, productivity and competitiveness of castings; and (c) creating a sound basis for exporting.

5. These objectives were to be achieved through (i) the modernization and extension of SOFOMECA's existing iron and steel foundry capacity from
5,200 tpy to 7,500 tpy; (ii) the construction of a new foundry with an initial production of 7800 tpy; and (iii) the installation of a sand preconditioning plant of 20,000 tpy capacity. The project also included a program to improve SOFOMECA's organization and management, the transfer of technical know-how, and a technical assistance component to improve efficiency. The original Project loan was for US$ 16.8 million to meet
about one third of total Project costs (US$ 54 million) estimated at the time of project appraisal.

IV. Project Design and Organization

6. The Tunisian industrial sector, in general, and the engineering and foundry industries, in particular, were facing serious constraints at the time of the Project's appraisal. Through a series of studies and strategy papers, the Bank assisted the Tunisian Government in identifying these constraints and in developing a consistent strategy to deal with them; elements of this strategy were prominent in the Government's Sixth Development Plan. Efforts were made during the Project preparation to ensure that its components were consistent with the overall sector and subsector strategies. The Tunisian Government, then a major shareholder of SOFOMECA and other engineering enterprises, approved the Project and SOFOMECA's overall development strategy.

7. Considering the SAR's assumptions, the Project was appropriate in scope and scale. Expanding the enterprise's capacity was needed to satisfy the expected increase in domestic demand and exports. The appraisal report also reviewed the specific reasons for the enterprises's low efficiency, productivity and product quality. Modernizing the production facilities and providing financing for technical and managerial assistance were meant to significantly improve SOFOMECA's operations.

8. A major finding of this Project Completion Report is that the underlying assumptions of the SAR, while appearing reasonable at the time, were seriously flawed in retrospect. The SAR failed to foresee

the problems of SOFOMECA's major clients (Complexe Mecanique de Tunisie (CMT) and Societe Tunisienne d'Industries Automobiles (STIA)), Tunisia's economic slowdown, and the increasing competitiveness of the international steel market. Also, the SAR did not foresee the enterprise management's inability to adopt recommendations made by the World Bank after external factors began to adversely affect the enterprise.

9. Although the responsibilities and roles of the parties concerned were clearly defined at the time of the Project appraisal, implementation was adversely affected by problems resulting from the ineffective way in which these responsibilities were assumed. For example, a Project Management Group (PMG) was established as the entity to control the implementation of the Project. In effect the Bank missions soon found PMG "weak, understaffed,... and lacking the ability to plan and follow up on its operations".

V. Project Implementation

10. The modernization capacity extension components of the Project were completed approximately according to the original schedule. The acquisition of new equipment and the start-up of the new unit were substantially delayed (see Part II). Also, the improvements expected in SOFOMECA's operational and managerial efficiency and in its financial results were grossly over optimistic (par. 18). These delays and overruns could be explained by the inefficient management of the Project's implementation, difficulties with consultants, the Banks and the Government.

11. At the time of the Project appraisal, the Project's main risks were clearly as well as accurately identified as evidenced by the fact that the Project's eventual failure was due largely to risks mentioned in the SAR, and partly to weaker than expected project and enterprise managerial capacity. Following are the risks as identified by the SAR, the method by which they were addressed, and the actual outcome:

i) The inability of the domestic market to absorb new capacity. Such a risk was addressed by a flexibility in the Project design to permit changes in the product mix in response to changes in the anticipated clientele's operations. Unfortunately, SOFOMECA's major customers collapsed: CMT have ceased its operations and STIA is operating substantially below capacity. New significant domestic customers did not emerge.

ii) Shortfalls in cash flows (needed for the expansion) and lower-than-anticipated improvements in efficiency. The SAR estimated that shortfalls in internal cash generation could be minimized through agreements on product pricing and reductions in investments. Once shortfalls materialized, raising sales prices was impossible due to falling international prices and to the trade liberalization program later adopted by the Government; on the other hand, the appropriateness

of SOFOMECA's choice of investment reductions was questioned by the Bank missions.

iii) Delays in the implementation period, overruns in operating costs, and shortfalls in levels of product quality and productivity achieved. To alleviate these risks, the SAR included a significant allocation for cost overruns, and assumed that the modernized plants and SOFOMECA's ability to attract high caliber technicians would keep product quality and productivity high. The complexity of implementing the project, the inexperience of the Project Management Group (PMG) and the poor relations with consultants contributed to implementation delays. Furthermore, product quality and productivity problems persisted; not because the modern plants were technologically inferior (they met international standards), but because SOFOMECA's management was unrealistic and slow to respond to adverse changes and because its salary incentive system limited its ability to attract sufficient numbers of highly qualified personnel.

12. Two shortcomings of the SAR's risk analysis could be identified. First, in analyzing the risk of reduced cash flow generation, the SAR suggests possible changes in 'product pricing'. To achieve these changes, sustained protection of foundry products would have been required, a recommendation which is not consistent with efficiency gains or the liberalizing direction which the Bank was advocating for Tunisia. Second, in analyzing the risk of falling domestic demand, increased exports was not defined as a method by which such a risk would be reduced. Even though the actual outcome was a heavy reliance on exports, little discussion of SOFOMECA's export capabilities and projections on export market demand was provided in the document. Indeed, in the sales projections made by the SAR, less than 3% of total sales were estimated to be for export markets.

13. Though the risk of a falling domestic market for foundry products was identified in the SAR, its magnitude could not have been anticipated. SOFOMECA's viability depended on the position the automobile enterprises (STIA and CMT) were supposed to maintain. The Tunisian Government's decision to liberalize car imports coupled with the poor competitiveness of the Tunisian car industry led to the latter's collapse and, consequently, to many of SOFOMECA's difficulties.

14. Bank supervision missions realized early on the adverse changes facing SOFOMECA, and submitted to SOFOMECA related recommendations. These, if followed, may have helped preserve the enterprise's viability. These recommendations included:

(i) at the Project level: securing alternative financing of expenditures originally expected to be financed from company cash flows, and securing external technical assistance;

(ii) at the company level: hiring international marketing experts to help identify and secure export markets, analyzing production costs and designing a program to reduce them, recruiting new staff in

the areas of finance and marketing, and carrying out realistic financial forecasts on the basis of which a remedial package would be designed; and

(iii) at the Government level: in light of Tunisia's structural adjustment program (especially on the trade liberalization side) the Bank missions suggested that the Government reformulate its strategies concerning the automobile and foundry industries. Providing public financial assistance to SOFOMECA was to be conditional on the latter's managerial improvements.

15. At a later stage, SOFOMECA was also encouraged to endeavor to find an international partner that would provide assistance and support in the relevant technical and marketing areas. The more radical option of selling the whole company was also suggested.

16. SOFOMECA's management did not adopt most of these recommendations. The Bank missions approached the Company's shareholders[1/] who, though appreciating the seriousness of the Company's difficulties, did not pressure the management to either adopt the Bank recommendations or pursue viable alternatives; neither did they provide the necessary financing.

VI. Project Results

17. To a large extent, the SOFOMECA project failed to achieve its objectives. Because of the severe fall in the domestic demand for foundry products , SOFOMECA will have a serious problem of excess capacity in the medium term; especially if and when the new plant starts its operations In the modernized unit, the product quality level and international competitiveness, the value added, and the labor productivity are all below expectations as well as international standards[2/]. The Project's third objective, that of establishing a sound export base, was met "by default". As opposed to the SAR's estimates of exports to sales ratio of 3% for the period 1983-88, the actual ratio was 45% in 1988. This reflected more declining sales and less export growth. Moreover, SOFOMECA's exports over the period 1983-88 were circumstantial and of a preferential nature, and therefore, their level is not expected to be sustainable.

18. Actual results were at great variance with the Bank's original estimates. In 1987, sales fell short of the SAR estimates by 41%, production by 49%, net income by 49%, and the average gross margin by

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[1/] At that stage, the majority of the Company's shares were held by Tunisian DFIs. The Government held, directly, a minority position.

[2/] As an indicator, the capacity utilization rate (due to poor maintenance) is around 60%, while the rate of defects is double the international standards.

18. Actual results were at great variance with the Bank's original estimates. In 1987, sales fell short of the SAR estimates by 41%, production by 49%, net income by 49%, and the average gross margin by 81%. The major reasons for these marked variances were a domestic demand for foundry products 55% lower than expected, marked delays in the Project implementation (with ensuing larger financial charges) and excessive delays in reorienting the Company towards exports. While the latter approach might not have been successful, it is and was the only possible way to turn the Company around. The actual disbursement of the Bank loan amounted to US$ 16.1 million or about 96% of the original loan amount. The remaining 4% was cancelled. The estimated actual Project costs were about US$ 58.4 million, slightly higher than the appraisal estimate of US$ 54 million.

19. The impact of the Project can be described as follows:

i) on sectoral growth: The foundry industry has benefited little from the Project. Most of the capacity increase will, in the foreseeable future, constitute an excess capacity. Moreover, the integration achieved in SOFOMECA is a relative waste due to the collapse of the Tunisian car industry;

ii) on the human resource development: SOFOMECA's labor force grew at 28% annually between 1983-85, a rate much higher than economically justified. In 1988, the company employed 659 workers; 117 more than estimated by the SAR. This growth in the labor force was not matched by appropriate training programs, while the salaries incentive system of the enterprise was not suitable for attracting highly qualified personnel;

iii) on the technological environment: the modernized as well as the new foundry are comparable to international standards with respect to input utilization. Problems persist, however, in the productivity and quality of products, as well as in the computerization of the management system;

iv) on the national institutions: SOFOMECA is one of the two major operating foundries in Tunisia (para 2). To the extent that its economic and financial viabilities could not be achieved, the foundry industry is seriously affected. Such negative implications are likely to be extended to the whole engineering subsector.

20. Due to the major uncertainties surrounding SOFOMECA's future, a calculation of the economic and financial rates of return for the Project is irrelevant at this juncture. Projections of the company's future sales (domestic and exports), the prices it can charge, its costs and its financing needs under various possible scenarios will be speculative at best. Furthermore, the current state of available data (para 34) and the company's highly aggregated past data will make any such ex-ante calculations highly inaccurate. It is clear, however, that

the economic and financial rates of return estimated by the SAR (18% and 16% respectively) are much higher than the actual rates.

VII. Project Sustainability

21. SOFOMECA is in major financial trouble. For the enterprise to continue its operations over the next six years, it will require an injection of 14 million Dinars. Profitability is not expected to be positive before 1993.

22. Such an outcome could be reversed if i) the Tunisian engineering subsector substantially grows; ii) SOFOMECA succeeds in rationalizing its production, improving the quality of its products, increasing their value added[1/], and increasing its labor productivity; and iii) SOFOMECA establishes a realistic long term marketing strategy ensuring that its exports become a lasting and growing part of its sales. Even if positive exogenous shocks materialize, the reversal of the outcome is conditional on the ability of SOFOMECA's management to efficiently adapt to them.

23. The Tunisian heavy engineering subsector was initiated as part of the import-substitution policies of the Government. It is not expected to revive unless it succeeds in the difficult transformation to an internationally competitive sector. Currently, It still exhibits structural problems paralleling those of SOFOMECA. CMT and STIA's (para 11) situations are indicative of these problems.

24. Until very recently, SOFOMECA's management has been very slow in responding to the Bank's operational, managerial and financial recommendations. The company's top management, often civil servants, have had little prior technical and managerial experience and no incentive to make hard choices. Central to SOFOMECA's future is increasing the productivity of its labor force which can only be achieved with top level Government support (to approve rationalization as necessary).

25. Concerning the export market option, the enterprise's prices are not competitive internationally. This can be explained by the high costs of production resulting from low maintenance, high level of defects, and unsatisfactory product quality. In 1987, a marketing study intended to enhance the export option was conducted by a local consultant. Though the study was useful in recommending changes in the company's marketing organization, further work was deemed required to define the future market/product strategy of the company. Given SOFOMECA's managerial, financial, and operational difficulties, an export led growth strategy seems, at present, unrealistic.

26. The present problematic situation of SOFOMECA remains unresolved. In the short run, four options could be envisaged: i)

[1/] Currently at the low level of 50%.

continuing operations, though this entails, in the medium term, massive injection of funds (par. 21) and further losses; ii) seeking an international partner; iii) dismantling the company, or iv) a combination of options (i) and (ii) coupled with an organizational restructuring of the company. The Bank would be willing to play a role within the last option (para 35).

VIII. The World Bank Performance

27. As indicated above, the Bank's appraisal report correctly identified some risks associated with the Project and sought ways to address them, albeit inadequately. Beyond that, the Project identification, its preparation and appraisal process were rigorous and analyzed all relevant questions. Because the assumptions made in the SAR were soon found erroneous, that document could not subsequently be used as an effective and useful frame of reference.

28. A more fundamental short-coming of the appraisal report was ignoring managerial and institutional issues within SOFOMECA. A case-in-point is the design of the Project Management Group. The SAR vaguely mentions that 'assurances with respect to the maintaining and adequate staffing of the PMG have been obtained'. Clearly, these assurances were insufficient as evidenced by the ineffectiveness of the Group in managing project implementation. More generally, the SAR paid little attention to issues of management and non-operational institutional building, and shortcomings could be defined in its risk analysis (para 12).

29. The supervision missions were able to promptly identify the problems facing the Project. Their findings were thoroughly discussed with the relevant Tunisian parties and at Headquarters. Although these missions were led by different task leaders, the recommendations of various missions were consistent and complementary.

30. A lesson to be derived from the Project is that, once the risk of failure is clearly identified in the appraisal process, alternative operational scenarios should be designed. The adoption of these (or of acceptable alternatives) by the Borrower could then be a condition of continued disbursement of Bank funds. The appraisal report should also focus on issues of institutional development, managerial flexibility, and project sustainability as prerequisites for the efficient solution of unanticipated problems.

IX. Borrower's Performance

31. SOFOMECA's management either did not, or was very slow to adopt the Bank recommendations. The result was that, by the time these recommendations were effectively adopted, their relevance had been considerably reduced by the worsening of the situation. There resulted further weaknesses in SOFOMECA's operations, marketing, product quality and financial management, all leading to the enterprise's very difficult current situation.

32. The PMG did not perform efficiently. The result was costly delays. The utilization of external consultants was erratic, with their recommendations often ignored. As an indicator, SOFOMECA's cost cutting approach included discontinuing the services of a Bank-financed consultant company (RVI) which was involved in the Project implementation. Their responsibilities were assumed by the PMG, much to the objection of Bank supervision missions.

X. Consulting Services

33. Consultants were used at all levels of the Project preparation, appraisal and implementation. Two Tunisian and British firms were engaged during the identification and appraisal process; one of them prepared the estimates for future domestic demand for foundry products. The Project was designed by a German firm, while another provided technical assistance in the design process. Subsequently, several international firms were hired (financed in one case, by the World Bank) to provide technical assistance on questions related to quality improvement, inter-sectoral technological integration, marketing, personnel training, and production. Performance of these consultants was judged by the Bank missions as satisfactory. However, tensions in consultant/client relations appear to have inhibited project implementation.

XI. Project Documentation and Data

34. During the Project's life, responsibility for its supervision changed several times in the Bank. It was transferred to another division after the 1987 Bank reorganization, and it involved a large number of outside consultants. Consequently, the quality of the documentation suffered. Major portions of relevant data and documents are missing, as evidenced by some omissions in the tables annexed to this report.

XII. Possible Future Role for the Bank

35. As already mentioned, the Bank has tried to play an active role in providing technical assistance to SOFOMECA. However, this assistance was generally not pursued by the company's management or shareholders in the past. Repayments on the Bank Loan commenced in April 1987, and to date these have been timely and paid directly by the Government as guarantor. SOFOMECA's difficulties are clearly detrimental to the Tunisian economy and to the Bank's reputation in that country. The Bank, therefore, would be willing to make one final effort to provide technical assistance, on a cost sharing basis with the shareholders, to restructure the company (assuming full commitment of SOFOMECA management to implement the technical and financial recommendations of this effort is assured). Such a plan should focus on identifying: i) a new product mix better suited to existing market needs; ii) new export markets; iii) a market-responsive internal organizational structure; and iv) the prospects for attracting foreign capital to the company. These

institutional and financial recommendations would require the participation of specialized industry experts. The above assistance would not, of course, address the existing financial disequilibrium of SOFOMECA, whose debt repayment obligations far exceed its cash flow. But this assistance could, at least, ensure that the greatest possible return is realized from the substantial sunk cost invested in SOFOMECA.

PROJECT COMPLETION REPORT

Tunisia: Industry IV (SOFOMECA Foundry)
Loan 2301-TUN

PART II: REPORT OF THE BORROWER

(Translation from the original document in French)

Project Completion Report on the SOFOMECA Expansion and Modernization Project

I. Introduction

The SOFOMECA foundry expansion and modernization project is a component of the development plans for the Tunisian foundry industry aimed at making it capable of performing its motor function for the mechanical industries.

Up till 1982 the development of the foundry industry had been held back by three major obstacles:

(i) Low productivity;
(ii) Mediocre quality of the end product;
(iii) The low level of development of the mechanical industries and of intrasectoral industry.

In 1982 the World Bank prepared a strategy document on the foundry industry, focusing primarily on measures to:

(i) Raise productivity;
(ii) Improve product quality;
(iii) Expand product ranges or introduce new ones when it would be advantageous for Tunisia to substitute domestically produced items for its growing imports;
(iv) Compensate for the smallness of the domestic market by greater integration of foundry products at the national level;
(v) Place exports on a sound footing.

The main thrusts of the conclusions of the Bank's strategy document were incorporated into the Sixth Development Plan by the Tunisian authorities.

The authorities also decided to go ahead with two foundry modernization and expansion projects, one for SOFOMECA (the project) and the other for Fonderies Réunies, who will continue to be the two main suppliers to the domestic market.

The Fonderies Réunies project was designed to modernize and expand the enterprise's existing facilities, raising their production capacity from 3,500 to 5,000 t/a and focusing primarily on production of traditional castings.

The two projects, intended to resolve the main problems identified in the foundry sector, should help toward accomplishment of

the strategic aims set forth above for development of the foundry sector.

To improve product quality, the SOFOMECA project envisaged utilizing local sandpits and setting up a sand-treatment facility to provide the SOFOMECA plant and the other foundries with good quality casting sand. Modernization of the existing facilities and labor training were also included.

II. Project Overview

The SOFOMECA project was therefore identified in the context of the government foundry sector strategy as outlined above.

The market study for castings in Tunisia made by Atkins Planning (United Kingdom) showed that local production (7,800 t in 1982) fell short of meeting demand (which was 21,000 t in 1982).

In addition, market projections for 1990 made by the same firm showed local demand for castings (iron and steel) growing by an average of 6.5% p.a., from 21,000 t in 1982 to 35,000 t in 1990.

This significant growth was expected to derive from the very marked increase in demand anticipated from the construction and mechanical industries sector as a result essentially of the entry into production of several industrial-vehicle assembly units in the country, the two main ones being:

- STIA (Société Tunisienne des Industries Automobiles)
- CMT (Complexe Mécanique de Tunisie)

These two units were expected to take 1200 t/a and 4,200 t/a respectively of castings (diesel engines, brake drums, clutchcases, etc.).

In light of the foregoing, the Government asked IBRD to assist SOFOMECA in appraising its expansion and modernization project.

An advance (PPF) against the IBRD loan to be granted to SOFOMECA enabled SOFOMECA to retain the GF (Georges Fischer) firm of international engineering consultants specialized in the foundry field, following an international call for bids issued in accordance with the relevant IBRD procedures. This firm was entrusted with the following tasks:

- project feasibility study;
- planning and engineering of facilities and buildings;
- supervision and guidance of execution.

An initial technical meeting between SOFOMECA and GF was held in September 1982 in order to establish the main thrusts of the project. Next GF prepared a preliminary technical and financial assessment of the project, on the basis of which an IBRD appraisal mission visited Tunisia

in November 1982 and spent about three weeks in the country. This mission made it possible to finalize the different aspects of the project by means of:

- The GF feasibility study;
- The contacts with the different banks invited to participate in the financing;
- The contacts with the potential customers, CMT and STIA, and the authorities and ministries involved.

An initial appraisal report on the project by IBRD served to enable the different banks to prepare their participation in the project.

The project as finally adopted comprised:

(a) Modernization of the old foundry by rationalization of production, with expansion of the capacity of the iron foundry to 4,800 t/a in two-shift operation and of that of the steel foundry to 2,200 t/a in three-shift operation.

This modernization consists of introduction of an automatic casting line for cast iron and procurement of a medium-frequency electric induction furnace, together with installation of new heat-treating equipment for steel that will make it possible to increase pellet production for the cement plants.

(b) Establishment of a new iron foundry of 7,000 t/a capacity in single-shift working and 12,000 t/a in two-shift working, equipped essentially with a low-frequency electric induction furnace, two automatic casting lines, automatic sand-preparation equipment, and an automatic core-making shop using the Ashland process.

It is also planned to use this new foundry to produce 500 t/a spheroidal graphite pig iron for export.

The products of this new foundry will be intended for the tractor and industrial-vehicle industry.

(c) Establishment of a sand-treatment plant with a capacity of 20,000 t/a in two-shift working in order to improve the quality of the sand used for casting and core-making in the foundries and thereby the quality of the products.

The cost of the project was estimated at TD 34.055 million, broken down as follows:

	(in TD 1000s)
Civil engineering and construction	3,261
Equipment + parts	15,590
Freight and installation	4,521
Duties and taxes	1,641
Engineering, tech. assistance and training	1,979
Project management	703
Physical contingencies	2,769
Interest during construction	1,624
Working capital	1,967
Total cost	34,055

The financing arrangements for the project were to be based on this estimate, observing an own funds/total financing ratio of at least 40%.

The other 60% was to be in the form of long-term foreign exchange and dinar loans, including that from IBRD.

Securing the capital increase set at TD 11.1 million required participation by two further Tunisian institutions in addition to those identified at the time of appraisal, namely:

- BTQI (Banque Tuniso-Qatari d'Investissement)
- Best Bank (a private offshore bank).

These changes also increased the amount of loan funds granted. In addition, a new form of financing was introduced, namely leasing, which was imposed by BID and Best as a condition for their participation in the capital increase.

The last financing agreement was signed on July 17, 1989; this was the leasing agreement with Best Bank. Since this was a formula for the financing of equipment in Tunisia, the BCT approval procedures took much longer than expected.

The loan agreement with IBRD for US$16.8 million was negotiated in April 1983.

The other loan and leasing agreements were signed as follows:

STUSID	TD	4,050,000	Aug. 31, 1983
BTKD		2,700,000	Oct. 26, 1983
BTQI		1,200,000	Nov. 29, 1983
BTEI		1,500,000	Dec. 20, 1983
BID	US$	2,170,000	Nov. 9, 1983
BEST	TD	700,000	Jul. 17, 1986

The capital was to be paid in by the various shareholders as follows:

25% in 1983; 25% in 1984; 40% in 1985; 10% in 1986.

III. Implementation and Management of the Project

1. Achievement of Project Objectives

A. Modernized Iron Foundry

In general we can say that the timetable initially set for the modernized iron foundry was adhered to. The technical studies were started on schedule and execution of the modernization was spread over two years: 1983 (civil work inside the foundry) and 1984 (assembly of equipment after the annual shutdown).

It should be noted that the assembly of the equipment caused a longer stoppage of iron production than was planned. However, the foundry was able to start up again in December 1984 with the new equipment.

Nineteen eighty-five was a good production year since net tonnage produced reached 5,560 tons. The new real capacity is 5,500 t/a in two-shift operation.

B. Modernized Steel Foundry

The modernization of the steel foundry comprised improvement of the casting shops by means of better maintenance plus rationalization of the layout with reduction of the number of molding box sizes.

The technical studies for modernization of the steel foundry were made at the same time as those for modernization of the iron foundry. However, the actual modernization work was deferred to December 1985 and January 1986 in order not to have the two foundries out of operation at the same time.

As regards the heat-treatment bid package, the timetable could not be observed for the following reasons:

- A technical deficiency found in the specifications prepared by GF. This led us to draw up another set of specifications.
- The financing for this package was programmed on the Best Bank leasing agreement, which did not enter into effect until July 17, 1986. This delayed signature of the supply contract and hence fabrication, delivery, assembly and production.

The increase in the steel foundry's capacity was programmed on the basis of procurement of a small medium-frequency electric induction

furnace as part of the New Foundry component. It was brought into production on November 6, 1988.

C. New Foundry

The schedule set for construction of the new foundry was not kept. Significant slippages occurred compared with the programming initially projected in the feasibility study.

The total delay is estimated at 32 months and was due to a variety of reasons that can be summarized approximately as follows:

1. Late start of engineering studies for new foundry	10 months
2. Execution of piling work not included in the project	6 months
3. Inadequate performance of consultant (GF), import formalities, project management	7 months
4. Blocking of loan funds by the local banks	9 months
	32 months

The new foundry started operation as of October 26, 1988.

The contractual installed capacity is as forecast; however, since this was the first year of operation the real full capacity has yet to be reached. Up till November 30, 1989 and on the basis of the orders to hand, the tonnage of good castings produced was 3,100 tons.

D. Sand Treatment

The schedule set for the sand-treatment component was not kept. The total slippage was 26 months, due to the following reasons:

- Technical inadequacy of the treatment arrangements recommended by GF.
- Development of another solution, final appraisal of which did not take place until January 1986.
- Delay in approval by the Tunisian authorities of the BID leasing contract plus additional time required by BID to approve the procurement contract and the first release of funds.
- Delay in customs clearance procedures (because the equipment was totally exempt).
- Delay in assembly for financial reasons.

The unit started operation in December 1987.

The capacity and quality objectives were achieved. SOFOMECA is currently selling treated sand to the main Tunisian glassworks.

E. Cost Objectives

As regards implementation cost, a total overrun of TD 6.73 million excluding working capital was posted. The final cost of the project was TD 38.81 million, i.e. 21% over estimate.

The base cost was 5.7% above estimate, at TD 32.18 million, while interest during construction was 307% higher, amounting to TD 6.63 million.

The main reasons for this overrun can be quickly summarized as follows:

- Underestimation of the civil engineering item and addition of new bid packages;
- Cost of bringing in electricity not included to begin with;
- Increase in the minimum duties payable on imported equipment;
- Fluctuations of the dinar and its deep devaluation with respect to the currencies to be used for procurement;
- The delay in startup of the new foundry, as a result of which the interest during construction item was larger than anticipated.

Details concerning these additional costs will be given further on.

As is apparent from the foregoing, the schedule and cost targets were not met because of a number of technical, administrative and financial reasons that will be detailed further on. It should be noted that the New Foundry and Sand-Treatment components were impacted by the economic crisis suffered by the country through the 1986-88 period and the consequences of the recovery measures in the context of the adjustment plan.

2. Scale of Project

The SOFOMECA expansion and modernization project was dimensioned to attain the following useful capacity goals:

-Modernization of iron foundry	4,800 t/a two shifts
-Modernization of steel foundry	2,200 t/a three shifts
-Establishment of new foundry	7,000 t/a one shift
-Establishment of sand treatment plant	12,000 t/a two shifts
	20,000 t/a two shifts

The initial feasibility study made by GF indicated a project comprising the following numbers of bid packages:

- Modernization component (iron + steel)	35 packages
- New Foundry component	46 packages
- Sand-Treatment component	2 packages
	83 packages

The studies, technical assistance and training packages should be added to the above 83.

The basic technical studies which followed the feasibility study led to some changes in the composition of the packages as a result of some additions, eliminations and combinations. These changes are summarized in the same table in the list of packages under the heading "Final Package."

Some changes in the process adopted in certain shops were made in the initial project prepared by GF, following the consultations with Klockner Humboldt Deutz (KHD) under the technical assistance contract concluded with KHD on December 1, 1983.

The main adjustments made in the scale of the project can be summarized as follows:

a. Modernization component

- Addition of facility for preparation of the cold charge to the furnace;
- Cancellation of the pellet grinding machine;
- Separation of the iron packages from the steel packages.

b. New Foundry component

Many basic changes were made to the initial project. No capacity changes were made. Other changes, or rather additions and complementary items necessary in the civil engineering packages, were made during project execution.

These changes can be summarized as follows:

- Construction:
  - addition of deep foundations on 30-m-deep piles;
  - addition of a package for electricity supply by underground cable;
  - increase in civil engineering package quantities following preparation of the detailed preliminary engineering in March 1984. The initial estimate of the value of the civil engineering packages was not based on a preliminary design, with the result that there were considerable increases in this package during execution.

- Equipment
  - dropping of the vertical-channel furnaces recommended by GF in the initial project for crucible furnaces for both smelting and holding;

- dropping of the knockout with sand-cooling by swinging drum procedure and its replacement by the simple vibrating plates system;
- replacement of the use of an electric monorail for molten metal transport between smelting and casting by a lift-truck system;
- switch from a decentralized system for producing gas catalyst for Ashland coring to a centralized system;
- dropping of the vertical core-drying stove system in favor of the horizontal system;
- increasing of the initially undersized green sand preparation plant.

In general, the design of all the bid packages for the new foundry was reworked with the assistance of KHD and of Renault Véhicules Industriels (RVI).

c. Sand-Treatment component

The technical solution proposed by GF for dry washing the sand was not adopted; a visit made to a prototype facility using this process did not confirm its effectiveness. The wet washing process was finally adopted, which did of course entail a quite significant increase in the scope of the civil engineering work required.

In general, the civil engineering, structural steelwork, electricity, fluids and offices packages were not well defined in terms of quantities at the time the initial project cost estimate was made, as was the case with the equipment packages. This resulted in numerous surprises during execution. Moreover, GF did not produce the first detailed preliminary design until March 1984, and then only for the buildings and not for the machine foundations and fluid requirements, which were determined as the equipment and materials orders progressed.

3. Project Management and Training

Instead of entrusting execution to a single contractor on a turnkey basis, SOFOMECA opted to split it into a number of packages.

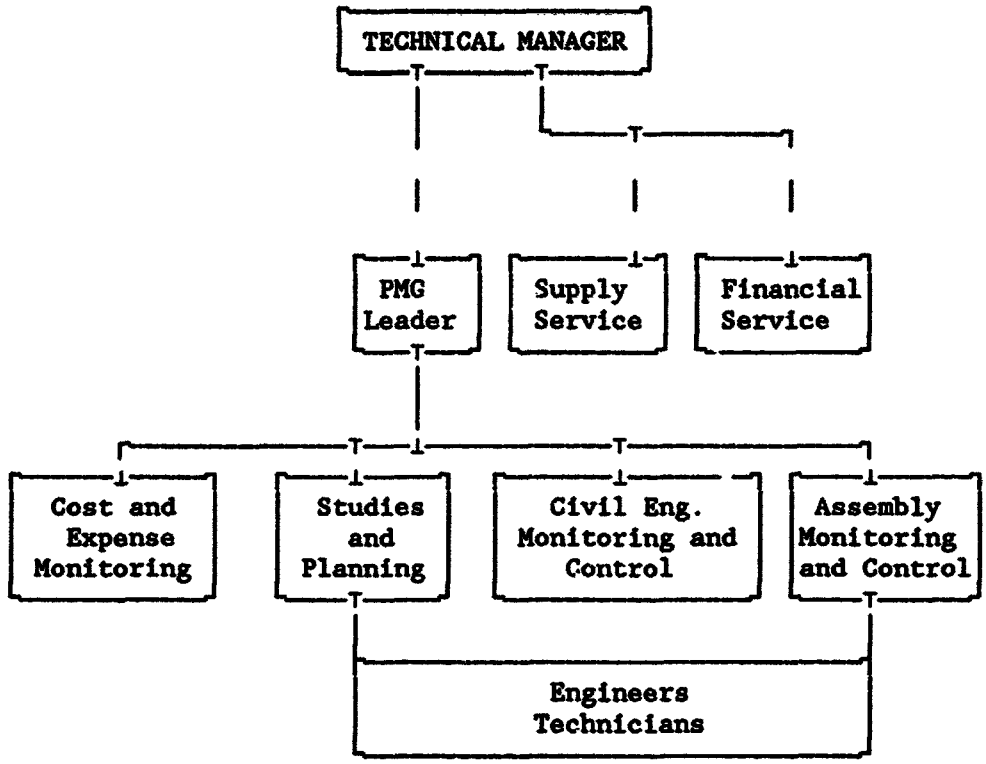
This meant that SOFOMECA had to set up a project management group (PMG) for the purpose of implementation.

SOFOMECA hired Georges Fischer (GF), an industrial engineering firm specialized in the foundry field, for this purpose, to assist the PMG in managing the project. The engineering contract was signed in September 1982.

The main tasks entrusted of GF were:
- Feasibility study
- Planning and engineering
- Supervision and direction.

GF subcontracted the civil engineering work to a Swiss firm, Suter and Partner, which in its turn subcontracted the detail designs to STUDI in Tunisia.

The organization of the PMG as set up by SOFOMECA was as follows:



The complete PMG structure was reached in 1986 with the start of assembly of the new foundry.

The Modernization component assembly activities were carried out by the maintenance and new works teams of the old plant and these were not included in the PMG staff.

The PMG was broken down into four subgroups:

a. Studies subgroup

The function of this subgroup was to follow the progress of the engineering work up to contract award, package by package and in close liaison with GF and STUDI. Each of the engineers involved was responsible for a certain number of packages grouped by functional area (smelting, casting, etc.).

b. Financial Monitoring subgroup

This subgroup was responsible for monitoring expenditures on a package-by-package basis, and for updating the cost of the project every three months. It consisted of a senior financial officer and a bookkeeper.

c. Civil Engineering Monitoring subgroup

This subgroup was responsible for monitoring progress on the construction site (piles, structural steelwork, civil engineering). It was made up of a civil engineer hired from STUDI for the duration of the project, who set up site meetings, followed the planning and served as liaison between the study engineers and STUDI.

d. Assembly Monitoring subgroup

The tasks assigned to this subgroup were coordination and direction of the assembly work with the different equipment suppliers. It managed the material and human resources of SOFOMECA together with its subcontractors. Each package was tracked by the engineer who had monitored the studies for it. The subgroup leader had been given a six-month training course at KHD and was subsequently to take care of equipment maintenance in the new foundry.

In conjunction with these subgroups, SOFOMECA's supply services were made responsible for the administrative side of the contracts, i.e. approval formalities, and arrangements for importation, transit, customs clearance, etc., and up to shipment of the equipment to the site. They were also responsible for local procurement for site requirements.

In the same way, SOFOMECA's financial services handled the organizing and management of the capital increase and the setting up of the financing and leasing credit arrangements.

The number of staff assigned to the PMG grew with the progress of the studies and as of 1986 with the start of the assembly work the group was fully staffed. However, in 1987 the numbers were appreciably cut back owing to the slowdown in the works due to the blocking of the financing. In the course of the second half of 1988 the numbers were again strengthened, especially at technician and labor level, prior to startup, which took place in October 1988.

The average number of persons in the PMG (excluding laborers for assembly work) was 16.

The PMG produced monthly reports on the physical progress of the project, on a package-by-package basis, and quarterly financial progress reports on expenditures and commitments, together with an updated project cost figure.

We feel that the PMG's main weakness lay in its lack of experience in this type of work, especially the planning and scheduling side.

Moreover, this weakness became all the more evident as the problems and frictions between GF and SOFOMECA grew.

The fact is that the first problems surfaced at the beginning of January 1983 when GF requested an upward adjustment of its fees only three months after the signing of the engineering contract and after appraisal of the project, on the grounds that it had underestimated the labor cost.

SOFOMECA and GF reached a compromise, with IBRD's agreement. The GF project manager was replaced by another person, who did not unfortunately prove any more effective in facilitating the work. A climate of mistrust developed between the two teams.

At the same time SOFOMECA insisted that GF replace its local subcontractor for civil engineering studies by a more experienced firm. The new subcontractor selected was STUDI.

Then in March 1984, when the detailed preliminary civil engineering was delivered, GF submitted a new estimate for the civil engineering for the new foundry that far exceeded its initial estimate.

In the course of May 1984 and following receipt of the first bids for the casting equipment, GF quite simply demonstrated its bad faith. Since it had not been consulted for the supply of the equipment, it threatened to halt its services if SOFOMECA did not once again increase its fees, which it wanted to index on the cost of the project, which estimated cost had been revised by GF, and especially for the civil engineering packages.

From that point until August 1984 the engineering work remained at a standstill.

SOFOMECA once again worked out a compromise which consisted in eliminating the first part of GF's services relating to guidance and assigning the relevant fees to the planning phase. The GF project manager was replaced once more and handled all the rest of the planning phase work with transfer of certain actions to the PMG.

The civil engineering services were entrusted to STUDI through a direct contract between SOFOMECA and STUDI, which helped to enhance coordination at the PMG level.

All these difficulties had a negative impact on the progress of the project. In this context it was of course very hard to ensure real motivation on the part of GF for satisfactory and on-schedule performance of its work.

In June 1986, once the assembly work had started, SOFOMECA requested the assistance of Renault Véhicules Industriels (RVI), who had agreed to assign one individual full time to assist the PMG in the direction of the assembly work with a project officer who was present one week per month for the monitoring and to review the planning of the secondary packages not yet ordered at that time in order to reduce the project cost.

As of the end of 1986 all the engineering work had been completed for all the packages. However, the placing of orders for the secondary packages was delayed by the blocking of the loan funds by the local development banks (BTEI, BTKD, STUSID). This delayed the packages for at least nine months, since the funds were not released until early November 1987.

The blocking of the funds also slowed the assembly work already started and essentially that on the fluids and sand-treatment packages.

In light of the foregoing, it was hard for the PMG to make up the delays in execution of the project and especially for it to maintain consistent overall progress in all the packages.

A considerable amount of training work was carried out without too many problems.

In December 1983 SOFOMECA had signed a technical assistance and training contract with KHD, under which the following training actions were carried out:

- Six-month maintenance course for the Assembly Monitoring subgroup leader;
- Four-month course for the Foundry Methods chief;
- Four-month course for the Pattern Making chief;
- Four-month course for the Inspection chief;

A training contract was also signed with RVI in 1986 for the following:

- Two-month induction smelting course for the Smelting chief and the crew foreman
- Two-month course in Ashland coring for the Coring chief.

Finally, various other training courses were organized in the training cycles for smelters in France.

4. Consultants

SOFOMECA utilized several foreign and local consultants for the implementation of this project:

Foreign consultants:

GF	industrial engineering in smelting
KHD	technical assistance and training
RVI	direction of assembly and training
ECTI	specific assistance in startup of smelting plant

Local consultants:

STUDI	civil engineering for project
SECURAS	technical supervision for the project
SIDES	SOFOMECA computerization study.

SOFOMECA's first experience with the consultants was with GF, which unfortunately did not turn out too well for various reasons, mainly of a financial nature. However, we also observed certain technical weaknesses in the choices proposed by GF, and especially a major weakness in the estimating of the labor cost necessary for the project, on the one hand, and the value of the civil engineering packages, on the other.

GF was originally selected primarily on account of its low bid and its reputation.

Moreover, we also observed that the GF experts had difficulty in integrating and assimilating the local constraints and difficulties. Finally, human contacts between the two teams were not very easy.

On the other hand, the other tasks were performed with fewer problems.

5. Planning

As noted in section 3, the Modernization component was carried out on schedule, but the New Foundry component posted a very significant slippage of 32 months compared with the initial projections.

This 32-month slippage can be broken down quite accurately as follows:

a. Late start of engineering studies for new foundry	10 months
b. Execution of piling not included in project	6 months
c. Poor performance of GF engineer, import formalities, PMG	7 months
d. Blocking of loan funds by local banks	9 months

The main factors involved concerning these points are set out below:

a. Late start of engineering studies for new foundry

The feasibility study for the project was made by GF after the IBRD appraisal mission conducted during three weeks in November 1982.

The intention was that the project engineering studies should be started in January 1983, and this in fact is what happened for the Modernization component.

However, as regards the new foundry, GF was not authorized by SOFOMECA to start the engineering studies until the technical choices and procedures proposed by GF in the feasibility study had been discussed with KHD, this requirement being specifically imposed by IBRD.

However, SOFOMECA was unable to conclude a technical assistance contract with KHD until December 1983, and then with the assistance of Mr. Sethi of IBRD. Nevertheless, technical meetings with KHD experts went ahead, but the final designs for all the new foundry's shops were not ready till October 1983.

It was only on the latter date that SOFOMECA authorized GF to start the engineering studies (preparation of specifications, bidding documents, etc.).

These delays put the planning of the new foundry 10 months behind schedule.

b. Execution of piling

The soil studies made in 1983 showed that deep (30 m) piles would be needed to provide the base foundation for the new foundry's main building.

The detailed preliminary engineering for the metal and concrete structures was not prepared by SPC, GF's Swiss subcontractor for civil engineering, until March 1984.

On the basis of this preliminary engineering, the Tunisian firm STUDI was to prepare the detailed designs and bidding documents for the package consisting of piling, structural steelwork and civil engineering.

The piling work was started in August 1984 and took six months, which time was additional to the execution period.

The time needed for execution of the piling cannot be attributed to negligence on the part of GF.

c. Poor performance of GF engineer, PMG, import formalities

It is very difficult to pinpoint the individual delays caused by each of the factors involved under this head.

The first two aspects have already been discussed earlier.

As regards the third, as of the second half of 1985 additional restrictions were imposed by BCT on equipment imports. During the execution of the modernization component, no more than an import certificate was required. However, in 1985 and 1986, when the bulk of the equipment was ready for shipment, an import license had to be obtained, which added at least two months to the time required for each package. This situation also continued up till 1988, during which period we imported the secondary equipment packages the financing for which had been blocked by the development banks in 1987.

The delay caused by these three factors together can be put at seven months.

d. Blocking of loan funds

Following the SOFOMECA Board's decision to have an external audit conducted of SOFOMECA and of the project, the local development banks--STUSID, BTKDD and BTEI--blocked the remainder of the loan funds granted for financing the project. The external auditor's report was submitted in February 1987 and showed a financing deficit of the order of TD 5.144 million.

SOFOMECA was asked to cut back capital expenditures and a study was made to that end.

At the same time, SOFOMECA updated the study on the return obtainable, which showed very significant cash-flow shortfalls for the first five years.

A request for assistance was accordingly submitted to the government to help the company resolve these problems, especially following the difficulties being encountered by the new foundry's two main customers, CMT and STIA.

BTEI was less forthcoming and made continuation of the financing subject to resolution of the financial situation.

The matter was not resolved until after intervention by SOFOMECA's supervisory ministry and the funds began to be released in November 1987.

The trimming of the cost and the reallocation of certain packages also caused delays in the placing of orders, these delays being attributable to BID in particular.

In the event, the first secondary packages were not shipped until the end of 1987 and the last assembly work was done in July 1988.

We consider that at least nine months were lost through all this.

6. Project Cost

As of December 31, 1988, the cost of the project stood at TD 38.81 million excluding working capital, i.e. TD 6.73 million more than the initial estimate.

This cost can be broken down and compared with the original figures as follows:

Item	as of 6/30/83 (TD'000s)	as of 12/31/88 (TD'000s)	% difference	Difference in TD'000s
Civil Eng. + Utilities	3260	7330	+125%	4070
Equipment	20110	19720	- 2%	- 390
Duties + Taxes	1640	2580	+ 57%	940
Studies, Technical Assist. + Training	1970	1340	- 32%	- 630
Project Management	700	1210	+ 73%	510
Contingencies	2770	0	-100%	-2770
Base Cost	30450	32180	+ 5.7%	1730
Interest during constr.	1630	6630	+307%	5000
Total Cost	32080	38810	+ 21%	6730

The total overrun amounted to 21% of the initial figure. The base cost was only 5.7% above estimate, and that despite the cuts made in the investment in March 1987.

Interest during construction, however, eventually amounted to 307% more than estimated, as a result of course of the late start, which meant that the interest payable had to be placed under this head since

the grace periods on the financings expired for the most part as of the end of 1986 or in 1987.

Detailed examination of the different causes of these overruns points up four main reasons, both internal and external, which can be summarized as follows:

A. Underestimation of Civil Engineering item

The cost of the Civil Engineering item, which included both the expenditures on concrete and steelwork structures, the technical packages (electricity, fluids), and infrastructure facilities, proved to be 125% above estimate, i.e. TD 7.33 million instead of TD 3.26 million.

We would note that in the first place there were the additional packages not initially included by GF in the feasibility study.

*/ Soil studies and piling packages

The soil studies were not started until 1983, at a total cost of about TD 0.03 million. This cost was not budgeted at the start.

The final findings of these studies, which were made in two phases, pointed to the necessity of deep foundations, in the form of 30-m-deep piles, for the main building.

The cost of these piles, about TD 0.6 million, was not included by GF to begin with.

**/ Electric energy supply

In the same way, the question of electric energy supply for the new needs resulting from the expansion was not given full attention and no budget for the purpose was included. During execution it was found to be necessary to install a new electricity supply line for the new foundry, involving an additional cost of TD 0.24 million.

***/ Size of the civil engineering packages

In addition to the above points, quantities were very considerably underestimated for the civil engineering packages.

The fact is that back in March 1984, after preparation of the first detailed preliminary engineering by Suter for the structure packages, the new estimate for the New Foundry component alone had risen from TD 2.65 million to TD 4.01 million, without counting the figures for the machine foundations.

The cost of the Civil Engineering item was adjusted as the detailed studies progressed and also after the bidding on each package. The adjusted figures were always included in the quarterly project progress reports.

It was very difficult to determine the cost of the Civil Engineering item without a sufficiently detailed reference base, as is the case with the equipment packages.

We can estimate the overrun, together with the impact of domestic inflation on construction costs from 1983 to 1987, at about TD 3.2 million, a good part of which consisted of contingencies.

B. Increase in Minimum Customs Duties

The SOFOMECA project benefited from the advantages offered by the Industrial Investments Code, which meant that it only had to pay 11% as minimum duty.

As of 1985 this rate was adjusted upward by a 4-point increase.

This increase in fact only applied to the lots for the new foundry, importation of which began at the end of 1985.

The additional cost caused by this adjustment is estimated at about TD 0.5 million.

C. Monetary Fluctuations

The very significant fluctuations of the Tunisian dinar as of the second half of 1985, aggravated by the 10% devaluation of 1986, also resulted in a quite sizable cost increase in imported machinery payable in foreign exchange. The depreciation of the dinar continued in 1987 and 1988.

We estimated the impact of these fluctuations on all packages not fully completed and taking an annual decline in value of the dinar of 6% as normal.

This calculation indicated an additional cost of about TD 1.3 million. The impact of these fluctuations on the customs duties is already included in B above.

Moreover, the depreciation of the U.S. dollar (the currency in which SOFOMECA's indebtedness to IBRD is denominated) with respect to the other currencies required for equipment procurement, and especially the German mark and French franc, brought about a revaluation of at least 20% of the principal owed to IBRD.

This additional cost has been entered as interest during construction for the years 1987 and 1988 and is estimated at TD 0.57 million.

For reference, we give below the movements of the main procurement currencies with respect to the dinar.

(In TD)

Currency	June 83	June 86	June 87	June 87/ June 83
US$1	0.681	0.789	0.826	+ 21%
DM 1	0.270	0.352	0.466	+ 73%
FF 1	0.090	0.110	0.139	+ 54%
1000 pesetas	4.753	5.500	6.656	+ 40%

D. Startup Delays

Since the delay in startup of the new foundry ran beyond the end of the grace periods for the different financings, there was a very pronounced increase in interest payable during construction, which rose by 307%, i.e.
TD 5 million, to TD 6.63 million.

This figure includes the interest on loan payments due after the grace periods, which for the IBRD loan alone is estimated at TD 3 million.

It should be noted that the estimated interest figure announced in the June 1988 project cost update, for startup in September 1988 and communicated to the IBRD mission, was TD 7.11 million.

The difference between that estimate and the one used in this report is explained by the fact that previously the interest due after December 1984 in respect of the part of the loans that financed the modernization, and amounting to TD 1.28 million, was posted as interest during construction instead of operating cost. The total amount of interest due computed as of the end of December 1988 is TD 7.91 million, which breaks down as follows:

Interest during construction	TD 6.63 million
Interest in respect of modernization from 1985 to 1988	TD 1.28 million
	TD 7.91 million

Of this TD 7.91 million only TD 6.93 has been paid to the different banks, including TD 3.07 million to IBRD thanks to bridging facilities provided by the Tunisian Treasury.

The development and updating of the cost of the project was monitored regularly by the PMG through the quarterly financial progress reports.

However, the difficulties began in September 1986 since it was then that a financing shortfall for the project estimated by the PMG at that time at TD 1.919 million first appeared.

The external audit of the project confirmed that there was a shortfall in the financing and estimated it at TD 4.35 million excluding working capital and for a November 1987 startup.

A project cost reduction study was then made by SOFOMECA at the request of the development banks, which focused on two objectives:

- Reduction of the cost by eliminating bid packages or cutting their size so as to remain within the budget still available.
- Ensuring that through the end of the project the interest due to the development banks would be paid.

The following lots were eliminated:

	Initial estimate (TD '000s)
- NF 17 manipulators	121
- NF 22 paint install	310
- NF 31 block adjust. machine	274
- NF 41 machine tools	1007
- NF 47 pattern plates	1000
	2712

E . Financing

The cost reductions and compressions made it possible to complete the physical investment without compromising the startup of the new foundry, which took place at the end of 1988. The working capital was financed with some difficulty from the company's cash flow.

The interest paid to the development banks since March 1987 is approximately TD 0.84 million and was taken from the balances of loans not yet used as of the end of March 1987.

The total financing available at the end of 1988 excluding cash flow amounted to TD 39.689 million, broken down as follows:

	TD '000s
Capital increase	11000
Treasury facility	3067
IBRD loan	13545
STUSID loan	4050
BTKD loan	2700
BTEI loan	1500
BTQI loan	1152
BID leasing	1875
Best leasing	700
	39689

The sum of TD 0.255 million still blocked in the STUSID loan and that of TD 0.054 million still blocked in the BTEI loan should be deducted from this total of TD 39.689 million, thus making the total financing furnished to SOFOMECA TD 39.380 million.

The total amount of the financial requirements excluding working capital as of December 31, 1988 is:

-	Base cost of project	TD 32.180 million
-	Total interest due	TD 7.910 million
		TD 40.090 million

There is therefore a shortfall as of the end of 1988 of TD 0.710 million. If the STUSID and BTEI loan balances are released this shortfall then becomes TD 0.401 million.

7. Conclusion

In conclusion, the following lessons can be drawn from the handling of this project:

(a) The feasibility study should have been separated from the other two tasks, since after the feasibility study and following due consultations the scope of the latter two tasks could have been determined more precisely.

(b) As soon as the first disputes with GF developed, the contract should have been canceled and a different consultant selected rather than proceeding with the project with an unmotivated consultant.

(c) During the feasibility study it would have been wise to require GF to produce a detailed preliminary design for the packages in the civil engineering and utilities item, which would have made more precise determination of quantities possible.

(d) The initial planning for the New Foundry component was too optimistic, the more so since the final project design was not yet available.

(e) The engineering contract concluded with GF was not very specific as to time limits and overall progress, which could have been tied in with the payment arrangements.

(f) After the initial delay in starting the studies and following the increase in the estimate for the Civil Engineering item in March 1984, it would have been wiser to recalculate the project rate of return.

(g) Following the change in Tunisia's economic policy toward greater liberalization of the economy, with the resultant difficulties for SOFOMECA's main local customers, viz. CMT and STIA, who have virtually abandoned their plans to use castings, it is true that SOFOMECA could have been more aggressive in redeploying its marketing strategy to take advantage of export openings which offered the sole opportunities for sales in the quantities necessary to ensure efficient utilization of production capacity.

PROJECT COMPLETION REPORT

Tunisia: Industry IV (SOFOMECA Foundry)
Loan 2301-TUN

PART III
STATISTICAL ANNEX

Table 1
Related Bank Loans and/or Credits

Loan/Credit Title	Purpose	Year of Approval	Status
1.Electro Mechanical Industries	Finance subprojects in EMI sector	1982	Preparing PCR
2.Small Scale Industries	Finance SSI investments/ T.A. Component	1984	Preparing PCR
3.Electro mechanical Industries	Finance subprojects in EMI sector	1985	Next superv. mission 04/89
4.Export Industries II.	Finance export sub-projects	1985	Next superv. mission 04/89
5.Small & Medium Scale Industries	Finance SMI subprojects finance SMIs	1988	Last superv. mission 11/88

Table 2
Project Timetable

Item	Date Planned	Date Revised	Date Actual
1. Project Brief	11/24/81	-	11/24/81
2. Department Approval	10/25/82	-	10/25/82
3. Yellow Cover	03/04/83	-	03/04/83
4. Negotiations	04/18/83	-	04/18/83
5. Board Approval	06/02/83	-	06/02/83
6. Signing Date	06/16/83	-	06/16/83
7. Effective Date	12/31/83	04/16/84	04/16/84
8. Closing Date	12/31/86	06/30/88	06/30/88
9. Loan Completion Date	04/30/87	12/30/87	01/30/89

Table 3
Loan Disbursements
Cumulative Estimated and Actual Disbursements (in 000 US$)

Appraisal Estimate (1983)	16,800
Actual (December 1988)	16,145[1/]
Actual as percent of Estimate	96.1
Planned Disbursement	12/31/86
Revised Disbursement	06/30/88
Actual Disbursement[1/]	12/31/88

1/ The rest of the committed funds ($655,000) were cancelled.

Table 4
Project Implementation

Indicators	Appraisal Estimate	Actual/or PCR Estimate
1. Detailed Design Criteria		
Modernization	February 1983	February 1983
New Foundry	April 1983	April 1983
Sand Plant	February 1983	February 1983
2. Technical Engineering		
Modernization	December 1983	December 1983
New Foundry	June 1984	December 1987
Sand Plant	September 1983	September 1983
3. Civil Works		
Modernization	February 1984	December 1984
New Foundry	May 1985	July 1987
Sand Plant	February 1985	May 1987
4. Delivery and Installation		
Modernization	September 1984	July 1987
New Foundry	November 1985	November 1987
Sand Plant	May 1985	July 1987
5. Commercial Production		
Modernization	December 1984	July 1987
New Foundry	August 1985	September 1988
Sand Plant	March 1986	October 1987

Table 5a
Project Costs and Financing

A. Project Costs (1000 D.T.)

		Appraisal Estimate 1/	Actual (June 1988)	Variation %
1.	Civil Works	3,261	7,390	127.0
2.	Equipment	15,590	16,800	7.8
3.	Installation	4,521	2,700	-40.0
4.	Taxes	1,641	2,580	57.0
5.	Technical Assistance	1,979	1,300	-34.0
6.	Project Management	703	1,070	52.0
7.	Contingencies	2,769	-	-
8.	Interest Payments	1,624	3,110	91.5
9.	Payments Due (30/9/88)	-	4,000	100.0
	Total	32.088	38.950	21.4

1/ Fall 1982

Table 5b
Project Costs and Financing

B. Project Financing (US$'0000)

	Planned	Estimated Actual	Variation %
IBRD	16,800	16,300	-3
STUSID	6,430	7,700	19
BTKD	4,280	5,100	19
BTEI	4,280	5,100	19
Commercial Banks	0,950	1,200	26
Equity	21,320	23,000	8
Total	54.060	58.400	8 1/

1/ Variation in U.S.$ is lower than corresponding T.D., due to devaluation of T.D.

Table 6

Use of Bank Resources

C. Missions

Stage of Project Cycle	Month/ Year	Number of Persons	Days in Field	Specialization Represented [1/]	Performance Rating Status [2/]
1. Through Appraisal					
1.	12/79	1	5	IND	
2.	11/80	1	4	IND	
3.	04/81	3	7	IND/FIN	
4.	06/81	1	10	IND	
5.	11/81	2	10	IND/FIN	
6.	12/81	1	2	FIN	
7.	04/82	3	9	IND/FIN	
8.	07/82	2	4	IND/FIN	
2. Supervision					
	01/83	7	6	IND	1
	09/83	2	6	IND/FIN	1
	04/84	2	6	IND/FIN	2
	03/85	2	25	IND/FIN	2
	06/85	1	7	FIN	2
	03/86	2	8	IND/FIN	2
	07/86	1	10	IND	3
	07/87	1	7	IND	3
	06/88	2	13	IND/FIN	4

1) IND - Industry Specialist
IND - Financial Specialist

2) 1. Minor Problems
2. Moderate Problem
3. Major Problem
4. Failure