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UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
Vienna International Centre, P.O. Box 300, 1400 Vienna, Austria
Tel: (+43-1) 26026-0 · www.unido.org · unido@unido.org


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The Plastics Industry in The Philippines

DP/PHI/77/004/A/01/37

Terminal Report

Prepared for the Government of the Philippines by the United Nations Industrial Development Organization executing Agency for the United Nations Development Programme.

Based on the Work of K.E. Andrews Consultant in Plastics Production and Processing

United Nations Industrial Development Organization

Vienna

003046

ACKNOWLEDGMENTS

I would like to thank the United Nations and the Government of the Republic of the Philippines for the opportunity to participate in this extremely interesting project. I would also like to thank my counterparts for their enthusiasm and industry during the mission and especially for the preparative work they had already done before my arrival without which it would have been impossible to complete the task in the alloted time.

SPECIAL ABBREVIATIONS USED

tpa	Metric tonnes per annum
BOI	Board of Investments
QC	Quality Control
PVC	Polyvinyl Chloride
PS	Polystyrene
GNP	Gross National Product
UK	United Kingdom
LDPL	Low Density Polyethylene
HDPE	High Density Polyethylene
PP	Polypropylene
BSMI	Bureau of Small and Medium Industries
000tpa	Thousands of metric tonnes per annum
TV	Television
VCM	Vinyl Chloride Monomer
HIPS	High Impact Polystyrene
GP	General Purpose Plystyrene
MIRDC	Metals Industry Research and Development Center
CIF	Carriage Insurance and Freight

I N D E X

4. Recommendations

4.1 Every effort should be made to press forward with the setting up of a Plastics Industry Development Centre for which a project document has now been finalized. This will do much to improve productivity quality and training facilities. The industry needs trained workers with a better understanding of the basic technology.

4.2 If the Centre proceeds it is recommended that some part of the Senior Projects Adviser time should be allocated to continued dialogue and consultancy within the industry to further strengthen the infrastructure and provide tangible evidence of continuing assistance during the period between a decision to proceed and opening of the centre itself. This particular expert will, therefore, need a flexible structured mission on a split basis including some travel in developed countries. Details are provided in the provisional job description in Appendix I.

4.3 It is recommended that every effort be made to site the centre in Valenzuela, Caloocan or Bulacan where 75% of the industry is already located.

4.4 Serious study should be made into the export potential of this industry sector which already contributes (159 million US dollars in 1980 and 29 Million in 1975) significantly. It is recommended that counterpart staff and UNIDO jointly [illegible] Government and other agency (International)

sources of funding for market research carried out by experts in target country markets.

4.5 Considerable progress has been made and if this impetus is to be maintained continuity of counterpart staff is essential and additional back up will become necessary if the project proceeds.

4.6 It is recommended that counterpart staff prepare proposals for additional fellowships for industry personnel in such subjects as mould making, plastics technology courses, and further marketing study tours. Exploration of methods of assisted funding through the country UNDP programme would be highly desirable.

3. Project Summary

3.1 The project document for a Plastic Industry Development Centre has been prepared and agreed with the Ministry of Trade and Industry. This project has received the support of the Philippines Plastics industrial association who have pledged support to the extent of ₱400,000 in the first three years toward operating expenses. This will in our view do much to ensure its success. There is still some question over the best location but we believe that this will be resolved to the satisfaction of all the participating parties.

The document has been endorsed from the Ministry of Trade and Industry (MTI) to National Economic and Development Authority (NEDA) and counterpart staff expect it to be passed to UNIDO within the next two months. It will provide the required stimulus in training, technology and market research necessary to uplift the quality and productivity of the industry's output. A number of seminars were held on injection and blow moulding with the primary emphasis on the cost effectiveness of using improved technology. These seminars were well attended with numbers in the 70's and 80's. Details of the seminars are appended to this report. Follow up work including group discussions in a number of factories took place both with [illegible] and work force and these proved so [illegible] that in some cases we were asked to

repeat the sessions. It is disapointing that most of the factories that availed themselves of this service were already the most effective but this response is to be expected and is common all over the world. Further assistance was provided in the development of the industry infrastructure through the association and an active unit has now been formed in Cebu. This will help to extend and improve dialogue between Government and Industry Sector.

Detailed consultancy help was given to particular factories with their problems and the types of work are listed in the body of the report. This also helps to improve relations with the industry in preparation for the setting up of the centre. Preliminary discussion took place on methods of assisting the industry with exports. Progress in this sector has already been remarkable between 1975 and 1980 exports of plastics products grew from 21 millions to 159 millions of US dollars. Further significant increases are possible but government or other agency assistance by partial funding of overseas research would considerably speed up market penetration. There is a reluctance to invest money in overseas research. Expert aid from professionals familiar with the markets of target areas is essential if rapid progress is to be made.

1. Introduction

1.1 Project background

This mission represents a single part of the total programme arising from Project Document No. Phi/77/004/A01/37 signed on November 9th 1978. The immediate objectives set out in the project document were as follows:

1.1.1 To determine the needs of the rural based small and medium industries with a view to improving product quality and productivity.

1.1.2 To develop the essential components of quality control and productivity improvement systems by co-ordinating the activities of existing public and private institutions in a nation-wide network that will, together with programmes designed and implemented during the project, serve as an infrastructure for further development.

1.1.3 To assess the adequacy of the infrastructure support developed, based on the identified needs and requirements of rural based small and medium industries.

1.1.4 To develop a model of a delivery system for the improvement of productivity as well as for quality control which will define ways and means to optimise services and resource utilisation.

1.1.5 To design and implement programmes geared to strengthen the infrastructure support developed during the project.

The prime Government body charged with implementation of the project is the "Bureau for Small and Medium Industries" (BSMI) which forms part of the Ministry of Trade and Industry. Other Government agencies playing an active role in the project implementation are as follows:

Design Center Philippines
Development Academy of the Philippines
National Manpower and Youth Council
National Sciences Development Board
Institute for Small-Scale Industries, University of the Philippines

Six key industries were chosen to test and develop the best approach which, when proven, will provide the model for all other sectors. Among these key industries were Metals, Food Processing, Leather and

Plastics. It is the last of these which is the subject of this mission.

The overall contributions budgeted for the initial project were UNDP $400,000 and the Philippine Government ₱3,005,000 spread over a period of two years. The current status of the Project is given in a revised project document presented to a tripartite review meeting which took place on November 4th 1980. Delays in implementation yield a new completion date in 1981/1982.

1.2 The Method of Project Implementation

The work programmes for each of the named industries has been split into three phases.

Phase I. An assessment of the "State of the Art."

Phase II. The development and evaluation of improvement programmes.

Phase III. Adjustment of the programmes for on-going use.

In each industry sector, the Ministry of Trade and Industry (BSMI) set up coordinating project teams targeted to help develop industrial associations which, together with government, could maximise use of the facilities of the technical resource institutes. These associations it was hoped would form the focus of long term dialogue with Government.

Significant progress had already been made in developing such a dialogue with industry associations in the Plastics industry, which was the subject of a 1st mission in 1978 The contacts already made did much to facilitate access to the industry and assist the progress of the work during that mission.

The principal counterpart for the new mission comprised:

Mr. Jose Du Ovilla - Project Development (BSMI)

Regular consultations also took place with:

Mr. Quintin G. Tan - Director BSMI

Mr. Raul Bandera - Other members of the Project Development Division of the BSMI

1.3 The Present Mission

The present mission concerned Phase II of the program, "The development and evaluation of improvement programmes" and most of the work concerned implementation of recommendations made in the mission report dated December 1980 project reference DP/PHI/77/004/A/01/37.

As a result of the initial study, a party of Philippine Plastics producers and government officials visited Europe in September 1980 to obtain an overall view of their industry in that area, to hold

discussion with industry associations in UK France and Germany and by plant visit to gain an initial in sight in to productivity and quality standards. This visit had three main objectives.

1.3.1 To give representatives of the Industry an insight into European standards of productivity and quality.

1.3.2 To provide detailed background on the role of associations in growth and progress in the industry.

1.3.3 To encourage the Philippines Plastics industrial association to participate with government in a positive role in the setting up of a Plastics Development Centre in the Philippines.

2. Work carried out during the mission

The work carried out during this mission comprised three separate parts.

The completion of a project document for a plastics development centre.

Seminars,discussions, consultancy and factory performance studies in the injection and blow moulding industries.

Other miscellaneous activities primarily targeted to develop further the plastics industry infrastructure to improve the focus of dialogue between the government and industry.

The project document was judged to be the priority and this was tackled first.

2.1 Completion of the Project document

2.1.1 Background

A provisional draft project document for a plastics development centre in the Philippines was prepared and formed an appendix to an earlier mission reported in December 1980. It represented one part of an overall six years programme designed to uplift and improve productivity and quality of the industry's products and to enhance the industry sector's performance in world markets. Prima facia agreement had been reached between UN, Government and the industry association on the need for such a centre but a-part from further detailed amplification and evaluation of the document itself many points of principle needed to be discussed and agreed.

The most important point that required to be clarified lay in the requirement of Government that industry should participate in the running of the centre and have a financial committment in order to ensure it became a successful and form a viable service unit to the industry,

2.1.2 The work content

The tasks to be completed in this section comprised:

Confirmation of the UNDP inputs primarily based on updated equipment quotations obtained in Europe prior to the start of the mission.

Evaluation and verification of the initial man month estimates of the government inputs together with preliminary estimates of the operational expense budgets to ensure that the overall cost picture could be presented for the life of the project.

Discussions between Government and the Philippines Plastics Industrial Association to reach formal agreement on the method and extent of the Industry's participation.

It was the last of these three which occupied the greatest amount of time.

The first two parts were completed during November and early December without too much difficulty and a new document draft prepared. Apart from minor modifications to meet various comments from all sides the new document was generally agreed as an acceptable starting point.

Immediately on arrival, we set ourselves to the task of seeking the industry's committment to the project and initial discussions proved promising some problems were apparent particularly the location. Government wished to use existing land and buildings on cost saving grounds and the Industry required an easily accessible position close to the main centre of the present industry. Although this argument has some validity, in the long term as the industry grows and spreads over the whole of the Philippines location of the Centre will lose much of its importance. Nevertheless, it could create a stumbling block from the associations point of view in the early stages. A careful evaluation of a location near to the centre of the industry in Bula[illegible]alenzuela should be made before any final decision is reached. Th[illegible]s been started. By earl, January, we were able to resolve most of the points on discussion basis and the formal exchange of letters required was put in hand. Even so prolonged negotiation over the form of letter took place and we did not receive an acceptable letter from the association until mid February. By the last week in February we were able to obtain [illegible]al endorsement from the Ministry to pass the document forward to UNIDA for processing. Counterpart staff will complete the process but it can be expected that the document will be formally presented to UN later than April 82.

2.2. Work on injection and Blow moulding

2.2.1 Seminars

Observations during the previous mission suggested that many of the inefficienties of this sector emanated from lack of attention to cooling water, inadequate cooling towers, and poor mold cooling channels. Very early in the mission we therefore fitted in a series of plant visits intended to identify the most important elements of cost so that we could relate these to the technical parameters.

This activities was carried on during December 1981 and a system of simple analysis was prepared to make a preliminary performance analysis of injection and blow moulding factories. The objective was to provide data on the real average cycle time measured over a period of days rather than spot isolated measurements taken at a particular point in time. Three factories were persuaded to participate in the trials and data showed the expected problems.

Using this information and comparing it with information obtained in a similar European study we were able to procure useful background material for presentation at our first seminar. The first seminar in Manila was planned in colla-

boration with the Industry association who requested that we include data on film extrusion.

We set up the seminar on the basis of profit improvement through technical change to illustrate the financial advantages of improving factory performance. At the meeting in Manila on the 17 January 1982, 78 industry representatives attended and a number of requests were received for individual help which were dealt with by separate factory visits to discuss the particular problems on a more in depth basis. Unfortunately, but quite predicably it is always the more advanced factories that avail themselves of this kind of assistance.

The first seminar was repeated in Cebu on the 20th January 1982 coupled with a number of factory visits. Attendance was fifteen factory staff. A copy of the main outlines of the seminar forms part of this report as appendix II. We were also asked to give a paper on Quality control in the Plastics industry to the Philippine Society of Quality control this was done to a group of 50-60 members on Friday 29th January 1982 and was well received. The paper is attached to this report as Appendix III.

One further seminar was conducted on Profit improvement by good mold design. In this instance a local mold maker lead the speakers based on his experience gained during a Government supported tour of West Germany and we followed with comment about cost effectiveness of design factors. Attendance was again high and over eighty people were present.

2.2.2 General Consultancy

A wide range of general consultancy work took place of which only a few typical examples are quoted here to illustrate the need for a source of specific technical information of the type that a plastics development centre can provide.

One such example which in all occupied some three days work spread over a number of visits concerned slow operating speeds due to poor screw back on an injection machine producing a bucket. We first found that the water cooling system on the hopper feed section of the machine was not operating inspite of apparently adequate availability of cooling water. Further study showed the screw and barrel showed significant wear in the vicinity of the metering and valve section and we made recommendations for building up the screw. The real problem however, lay in the fact that no machine drawings were available from which the parts could be brought back to specification.

This typifys many of the problems which the industry encounters in that lack of management understanding of the information required by factory engineers and operators and makes it impossible for them to operate efficiently. Lack

of adequate training of the engineers and operators makes them unable to make it clear to management what their real needs are to do an effective job. The plastics development centre will do much to improve this situation by providing practical training for both management and staff. Another simple example concerned the recovery of scrap in a company injecting and blow moulding in Cebu. In this case we were able to offer advice on the use of screen changing equipment to enable them to keep the material cleaner and at the same time obtain better running speed. We provided sketches of typical equipment for in-house fabrication. A further example concerned the design of a screw for a company extruding recovered twine in Manila. In this case a number of visits were required to examine the old screw after extraction. Other examples included:

Design of moulds for injection of a thin cap section

Design of dies for extrusion of PVC

Details of energy consumption in plastics processing

Use of cooling towers

Reversion tests in the manufacture of thick sheet

Selection of thermoforming equipment for shallow draw caps

Selection of Flexographic printing equipment for PE films.

Selection of equipment for extrusion of HDPE film.

2. Other Miscellaneous Activities

2 3.1 The Formation of a Cebu Industry Association

We visited Cebu in company with the President and Vice-President of the Philippine Plastics Industrial Association in order to persuade the Cebu Plastics Manufacturers to form themselves into a chapter of the Manila association. This proved so successful that temporary officers were appointed on the spot and elections subsequently took place about three weeks later. This type of activity although not directly connected with the brief does help to further develop the Industry infrastructure and strengthen Government industry links.

2 3.2 Discussion and Suggestions on Export Opportunities

A number of discussions on export opportunities took place both with Government and the industry generally. There is little doubt that the tour of Europe by the Philippines Plastics Industry representatives has helped to out some perspective on, and arouse further interest in, export possibilities. One single example in polythene bags has already generated over $200,000 worth of exports in the period since the tour and made the industry more aware of the need for further study. Some factories are beginning to explore and install new equipment designated solely for export markets.

The main area of weakness lies in the lack of understanding of the market needs in potential export countries not in the ability to satisfy the quality standards. Some provision has already been made

to carry out work as part of the Development Centre project but much more could be done, in my view with immediate results.

Apart from identifying specific products companies and the degree of competitiveness in the Philippines, money will have to be spent an expert consultancy advice on the demand, marketing outlets, competitiveness and quality standards in target countries. This must be done by professionals with detailed local knowledge in the country's concerned. A very brief outline of the methodology and an outline example of a consultant brief are given in Appendix (IV). It is recommended that government give serious consideration to attacking this problem in collaboration with the industry association. In most developed countries for example in the UK government supports industry export marketing research by direct grant of up to 50% of the cost of individual company studies. In my view this approach would be to wasteful of valuable foreign exchange in the Philippines, but that kind of support for collective industry studies would be worthy of very serious consideration.

A report by PDCP shows that exports of plastic products has grown from 20.9 millions US dollars in 1975 to 158.8 millions in 1980. If this can be achieved without concentrated help, much more could be achieved with assistance.

Summary of Work Carried Out During the Mission (Appendix)

Place or Person Visited	Contact	Activity
Week Commencing 23th November 1981		
1. Armel Plastics 2154 Pasong Tamo Makati, Metro Manila	A.T. Lippio D. Lippio	Discussion to obtain operating data in preparation for seminar presentation
2. Benhur Plastic and Rubber Corp. 95 Guayabano Rd. Malabon, Metro Manila	B. Ong	Discussion to obtain operating data in preparation for seminar presentation.
3. Plastics Industrial Corp. 619 Bank of the PI Bldg. Plaza Cervantes, Manila	Co. Buchang	Discussion to obtain operating data in preparation for seminar presentation
4. Philippine Plastic Industrial Association, Inc. Consolidated Bank Bldg. 317 Rizal Avenue, Cal. City	Chan Co An-President J. Pan -V. President & others	Informal discussion on Association role in the proposed plastics industry development centre.
5. Philippine Plastic Industrial Association, Inc. Manila Hotel, Roxas Blvd. Manila	All Officers	Inauguration of new officers short talk on the role of development and associations

Week Commencing 30th November 1981

6. Philippine Plastics — All Officers
   Industrial Association, Inc.
   Address as before

7. Perma Plastics Products — D. Sy
   15 Zapote St.
   Caloocan City, Metro Manila

Week Commencing 7 December 1981

8. No visits

Week Commencing 14th December 1981

9. SPAC and other factories — Ms. L Ong
   Cebu

Week Commencing 21st December 1981

No visits

Visit 1. Formal meeting of new officers explanations of the proposed plastics industry development centre and the part required of the industry.

Visit 2. Discussion in connection with the formation of an Asean Federation of plastics industry associations.

Discussion to obtain operating data in preparation for seminar presentation.

Preparation of draft Project Document for presentation to Minister.

Visit in company with officers of plastic assocation to encourage the formation of a Cebu Chapter of the Association.

Completion of draft project document.

Week Commencing 28th December 1981

No visits

Week Commencing 4th January 1982

10.	Benhur Plastics and Rubber Corp. Address as above	B. Ong)
11.	Plastics	M. Nang)
12.	Perma Plastics Products Address as above	D. Sy)
13.	BSMI (part of Ministry)	Q.G.Tan Director

Week Commencing 11th January 1982

14.	Benhur Plastics and Rubber Corp. Address as above	B. Ong)
15.	Plastics	M. Nang)
16.	Dynasty Enterprises 169 P. Burgos St. San Juan, Metro Manila	A. Ty

Week Commencing 18th January 1982

17.	Perma Plastics Products Address as above	D. Sy

Outline of seminar agreed and part written

To explain and canvas support for factory analysis of downtime to provide local management downtime data for comaparative discussion at seminar.

Discussion on the role of Plastics in subcontracting project.

Analysis of data collected in factory and explanation of the meaning and value of the procedure.

Consultation on process improvement

Visit 1. Analysis of production data and downtime performance

Visit 2. Examination and advise on repairs to injection moulding machine.

18.	Philippines Plastics Industrial Associations Inc. Address above		Seminar on Profit improvement in Injection Blow moulding and film blowing
19.	Visit Cebu		Repeat of above seminar and factory visits for general consultancy

Week Commencing 25th January 1982

20.	Soler Plastics Corporation 115 Mindanao Ave. Quezon City, Metro Manila	E.F. De Leon	Discussion on factory control and mold design.
21.	MRIDC Taguig, Metro Manila	Mr. Nolasco	Discussion on topics for further seminar on mould making
22.	PSQC P.O. Box 1556 Makati, Metro Manila	May Gatchalian	To deliver a paper on Quality control in relation to profit improvement in the Plastic industry.
23.	DAYLY Harvest MFC, Bo. Talon St. Km 19 National Highway Las Pinas Metro Manila	Sinco Siehetong	Discussion on methods of reprocessing waste and the manufacture of twine from polypropylene

Week Commencing 1st February

24	Rotary Sales 8 Mango Rd. Caloocan, Metro Manila	Mr. S. Go	Discussion on electroplating repairs of moulds
25	Solvic Plastics Inc. 50 Maisan Rd. Valenzuela, Metro Manila	Mr. J. Tan	Discussion on printing & laminating for export
26	Formy Plastics 27 Isabel Ave. Northern Hills, Malabon Metro Manila	Mr. H. Ng	Further discussion and assistance with analysis of machine downtime
27	Integrated Plastics 99 Governor Pascual Ave. Malabon, Metro Manila	Mr. J. Dychanco	Discussion of design of Extruder screws
28	Dayly Harvest Manufacturing Bo. Talon, St. Km. 19 National Highway Las Pinas, Metro Manila	Sinco Siehetong	Discussion on design of extruder screws and vacuum forming equipment
29	MRIDC Taguig, Metro Manila	H. Paez	Discussion on the requirements for moulds the use of standard pins and plates and the use of MRIDC facilities for the manufacture of these for the industry

Week Commencing 8th February

30	Benthur Plastics address as above	B. Ong	Further discussion on a paper for the second seminar on profit improvement through mold design.
31	Formy Plastics Address as above	Mr. H.Ng	Further aid on downtime analysis
32	Perma Plastics Products 15 Zapote St. Caloocan, Metro Manila	D. Sy	Further examination of injection molding machines for wear.

Week commencing 19th February

33.	Philippines Plastics Industrial Association Address same as above	Offices
34.	Philippines Plastics Industrial Associations Address same as above	Offices
35.	Dayly Harvest Manufacturing Address as above	S. Siehetong
36.	Philippine Plastics Industrial Associations address as above	Office & Modern Plastics representatives
37.	Marikina	E. Payoyo

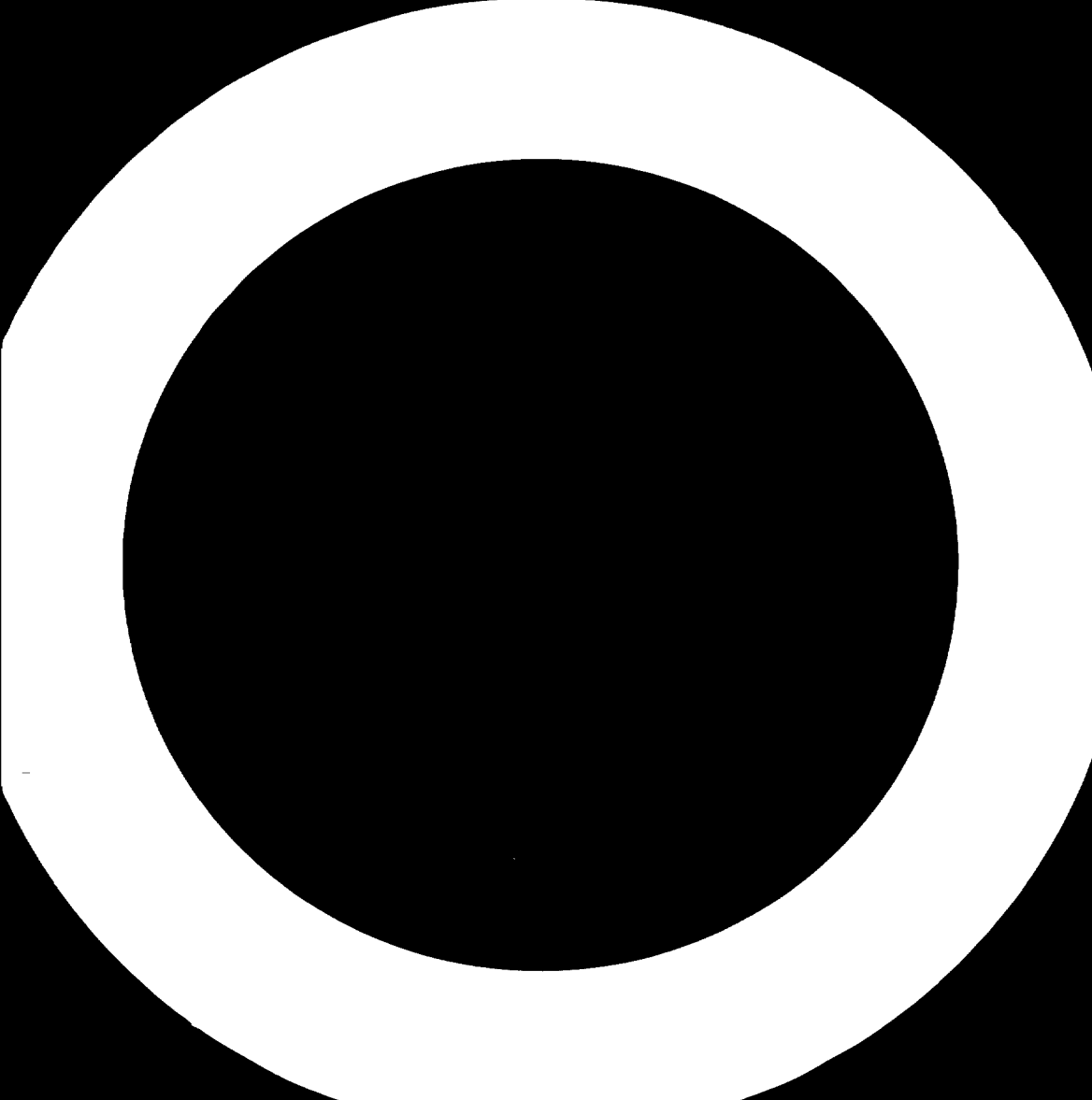
Additional discussion on the project for a development centre and the associations role.

Finalization and signature of the formal reply agreeing to participate in the Development Centre project.

Finalization of new screw design

Discussion on a modern plastics supplement on the Philippines Plastics Industry.

Further discussion on the advisability of placing the Research Centres at the Marikina site.



UNITED NATIONS DEVELOPMENT PROGRAMME

Project of the Government

Republic of the Philippines

Title Plastic Industries Development Centre (PIDC)

Number: Duration: 3 years & 9 months

Primary Function: Institutional Building

Secondary Function: Direct Support

Sector: (Government Class)

UNDP Class and Code) Industry

Sub Sector: Plastics UNDP Class and Code

Industrial Services and Institutions

Executing Agency: United Nations Industrial Development Organization (UNIDO)

Estimated Starting Date: March 1, 1982

Government Inputs 8,492,000 (in local currency) UNDP Inputs US$ 761,150

Signed _____ Date _____
on behalf of the Government

Signed _____ Date _____
on behalf of the executing Agency

Signed _____ Date _____
on behalf of the United Nations Development Programme

Part I Legal Context

This project document shall be the instrument therein referred to as a Plan of Operation envisaged in Article _____ paragraph _____ of the Agreement between the Government of the Philippines and the United Nations Development Programme concerning assistance under the Special Fund Sector of the United Nations Development Programme, signed by the parties on _____.

Part II A Development Objective

To develop a Plastic Industries Development Centre capable of providing consulting and training services to the plastics industry with a view of strengthening its productivity, quality standards and increasing its competitiveness and market penetration abroad.

The implementation of this project will assist in achieving the following long range objectives:

1. To improve the industry sector's ability to service other growing areas such as automotive, domestic appliances, television, etc.,
2. To strengthen and support the plastics industry, and make it more competitive in world markets,
3. To assist in the provision of specific market information from potential export areas and improve the Philippines plastic industry's sales in world markets,
4. To improve productive use of the present capacity of polymeric material produced within the Philippines for the betterment of the national economy,
5. To create new employment opportunities.

Part II B Immediate Objectives

The establishment of an operationally active and effective Plastic Industries Development Centre (PIDC) to undertake and provide technical support necessary, for both strengthening and expanding the Philippines' plastics industry, with specific reference to the following:

1. to assist with the setting up of physical facilities
2. to assist with the selection of equipment
3. advise on the management of the Centre
4. train manpower in management, engineering for the industry and in plastics technology
5. to carry out training consulting assignments
6. to undertake research activities concerned with productivity and quality improvement
7. provide guidelines for quality standards.

Part III C Background and Justification

There are approximately 400 plastics processors in the country concentrated primarily in Metro Manila. Some units exist in Provincial Centres but even these are associated with major cities. There are some large operators but the majority are small to medium companies who lack the resources to carry out the necessary work which is required to improve the quality and productivity of the industry as a whole such as, improve operator skills and take advantage of export markets and keep up

with the growing needs of the remainder of Philippine industry to whom they are important suppliers. The bulk materials are imported with the exception of polyvinyl chloride and polystyrene and utilization of these materials requires to be maximized. The total consumption of plastics raw materials is about 200,000 tons made up of polyoefins, polystyrene, polyvinyl chloride, nylon, acrylics and thermosetting plastics.

Shortage of trained personnel, good mould making facilities, base data from potential export markets, training facilities and specific equipment designated for problem solving are some of the immediate problems.

With a growth of the plastics industry, a communication system must be built up between the raw material producers, the equipment manufacturers, the plastics processors, and industries customers both at home and abroad, to ensure that all information is directed into the most beneficial channels for both the industry itself and the country as a whole.

The Government wishes to encourage the industry to improve its performance through joint participation with the industry associations as has been done in the past in more developed countries.

The proposed Plastic Industries Development Centre will play a key role in these activities. It will be established and equipped to provide primarily technical and also market information support to the Philippines plastics industry to improve quality and productivity, to provide training facilities, to assist plastics processors with their immediate problems and to enable this industry sector to play its proper role in the economy as a whole and world markets.

The PIDC will be structured as a foundation, controlled by a Governing Council, responsible for the overall policy and plan of the PIDC and executed through the Director of the Centre. The PIDC will enable the plastics industry to make a positive contribution to rural industrialization and export development through the improvement and extension of appropriate applications of plastics. It will also increase output, productivity and material utilization. This will be achieved by the PIDC by ensuring that its outputs of information technology and training are communicated to the industry. The PIDC will also form a focal point for the dissemination of world market and technical data.

The Centre will also provide on-the-job training for selected individuals from the plastics industry so as to develop experience in processing technology and material testing. Technical seminars will be conducted periodically on new processing technology for the plastics processors and users.

During the initial phase of the project concerted efforts will be directed to two major areas, packaging and industrial projects. Particular attention will need to be paid to export markets.

These exports will ensure that the added-value benefits to be derived from increased quality and productivity are fully exploited to the advantage of the national economy.

Increasing energy cost are driving developed countries to broaden the use of plastics products and replace materials with a higher total energy content such as metals thus reducing costs and at the same time conserving diminishing natural resources. There will thus be a continuing incentive to improve productivity by updating processing technology.

In entering new market areas where product performance becomes a main criteria, there will be a need to manufacture to standards and to utilize quality control. For a large number of processors this will be a new experience and will require communication and back-up services to enable the industry to adapt itself to the changing circumstances. To reach the industry in the necessary depth it is required that the services of an organization be geared to plastic technolgy, application development, communication and service. Such an organization does not currently exist.

This new institution should have close ties with other institutional bodies which are operating in close relation to the field of plastics, for example, the Metal Industries Research and Development Centre, and have synergistic effects. This latter institution is already under the wing of the Ministry of Trade and Industry. Participation by the plastics industry associations will help to ensure the facilities offered by the plastic center will be utilized to the best advantage of all participants.

The need for a strong auxilliary industry in both mould and die design and manufacture is a key factor in the long term development of the plastics industry. However, such an activity falls more naturally into engineering tool design and manufacture as a specialized area of that industry. It would therefore be more appropriate to develop such activities under the wing of the Ministry of Trade and Industry as the MIRDC already operates under this Ministries portfolio of activities.

The Central Institute of Plastics Engineering and Tools (CIPET) located in Madras, India has been established with UNDP/UNIDO assistance and now offers courses in mould design and mould making on an international basis. Consideration can be given to the provision of long-term fellowships for appropriate courses at CIPET, which are of two and three years duration, although they also offer a selection of short specialized courses for personnel with some tool/mould-making experience, e.g. mould-polishing.

This institution (PIDC) will be developed to have the expertise and resources so that it can help identify market areas, undertake the application development programmes necessary to exploit new opportunites in collaboration with its industry and provide appropriate back-up services, such as communication library, technical information, technical services, external liason/training, etc.

The resources and expertise of the PDC would play a significant part towards the implementation of the country's Development Plan as a whole.

The use of plastics in packaging, industrial manufacturing, rural development, building and exports are all areas of interest and potential growth.

The PIDC will provide assistance and support to increase and improve the processing capacity of the industry thus playing a positiverole in employment generation and industrial development. Industrial growth in many sectors will increase the need for plastics parts. already there is evidence of increaseing interest in such as fan parts, blades, piping for wash basins, television parts and many others. The industrial growth will call for constant improvements and higher technology.

Some of industries which can be and are now served by the plastics industry are:

Domestic appliances

Automotive industries

Building & Construction industry

Food packaging

Agriculture, irrigation, drainage and water conservation

Business machines and office equipment

Communications and Telephone

Furniture

Display signs

Batteries and storage cells

Industrial pumps and similar artifacts

In rural development areas plastics can be used in a wide range of application, covering pipe and fittings for potable (drinking) water supply, drainage, for structures and particularly for building roof units, water storage systems, pumps, grain storage, etc. There is little doubt that suitable investigation will highlight other possible applications.

Other facilities will be developed to cover formulations, compounding, extrusion, blow, injection and compression moulding and recycling within this project. In addition, co-operation with existing institutional facilities will be sought to undertake the necessary chemical and instrumental analysis of plastics as part of the support operations for the Centre in its investigational programme.

~~Part II-0 Outputs~~

1. Establishment of a Plastic Industries Development Centre, controlled by a Governing Council, with an established organization structure and functioning management guided by an approved policy and implementing a comprehensive plan for the development of the Centre.
2. Buildings containing offices, lecture hall, pilot plants testing equipment, stores, information resource facilities, and engineering services.
3. Machinery, equipment and supplies, in place, tested and in use.
4. An inventory of expendable equipment and supplies, stores and operationally active stock control and purchasing system.
5. Trained staff personnel in specialized areas of plastics technology.
6. Interim and final reports of the development work, in hand, or complete, undertaken by the PIDC.
7. Nine active documents, approved as necessary, covering the following:

   7.1 output profiles of PIDC for a five-year period

   7.2 Operationally active development programmes designed to achieve:

   7.21. Improved products and extended applications of plastics in both industrial or rural development and export applications,

   7.22. Improved productivity of processors.

   7.23. Introduction of quality control in plastics processing operations.

   7.24. Production of quality control in plastics products in conjuction with the Philippine Standards Institute.

7.5. Improved extended and constantly up-dated knowledge of the application and technology of plastics in all application areas.

7.6. Interchange of knowledge, ideas, technology with other related institutions.

7.3) Physical resources inventory and management

7.4) Long term financial plan

7.5) Revenue sources

7.6) Annual budget estimates

7.7) Staff profile needs of the PIDC

7.8) Induction and staff development

7.9) Staff performance assessment

8. Three manuals containing information and data covering the following;

8.1) Establishing the profiles of outputs for the PIDC

8.2) Routine preventive maintenance procedures

8.3) Developing elements for the PIDC development programmes.

May 1982

Part II E Activities

This assume that the project is approved and becomes active on March 1st 1982.

Description of project activities	Location	Starting Date and duration
1. Appointment of Senior Project Adviser		September 1982

Description of project activities	Location	Starting Date and duration
2. Preparation of staff profile document incorporating job objectives, tasks descriptions qualifications and experience required and other elements of a profile of staff needed for operating the PIDC at optimum level and its implementation.	Manila	December 1982
3. Order equipment supplied by UNDP as agreed schedule	Europe	December 1982 onwards 12/
4. Appointment of National Staff	Manila	January 1983 onwards te nd duration
5. Provision of 4 fellowships for overseas training	Manila	
rovision of 4 fellowships for	Manila	
a. in plastics process,	Europe	2 m/m
formulation and compound technology process,	Europe	2 m/m
formulation and compound		
b. in plastics injection and blow moulding technology	Europe	2 m/m
. in plastics injection and	Europe	2 m/m
c. in extrusion technology with particular reference to film	Europe	3 m/m
extrusion on technology with particular reference to film	Europe	3 m/m
6. Preparation of a technical manual to support the development of a document detailing the outputs profiles of the PIDC for a 5-year period of the project and explaining (a) the approach methods and techniques as well as the information and data to be used in preparing the outputs forecast document; (b) how the approach, methods and techniques and what kinds of information and data should be used to modify the established profile of outputs;	Manila	Jan. 1983 2 months
	Manila	Jan. 1983 2 months
7. Preparation of an outputs profile document, to be approved by the Governing Council and implemented, indicating the following:	Manila	Jan. 1983 onwards

7.	Preparation of an outputs profile document, to be approved by the Governing Council and implemented, indicating the following: a. the different types, categories and levels of outputs (products or services) which the PIDC will produce over a five-year period; b. the quantitative and qualitative attributes of the outputs which will be produced; c. a time-phase schedule, where applicable, for the production of the different outputs; e. g. justification of categories, qualities, qualitative attributes, and schedule.	Manila	Jan. 1983 onwards
8.	Preparation of a manual explaining the approach (a) the techniques as well as the information and data to be used in developing the various elements which constitute for the PIDC programme for applied research; a) how the approach, methods and techniques and what kind of information and data should be used in modifying the established programme; b) what kind of machinery should be established within the Centre to review, and modify as necessary, the programme, from time to time; and c) which users or groups of users of the Centre's outputs or services should be consulted, and through what means, in regard to the contents of the programme and their modification.	Manila	Jan. 3. 1983 3 months

9.	Preparation of the PIDC's plastics technology programme setting out the purpose and scope of the applied research programme; the specific applied research activities of field of applied research, the methods and techniques to the used; the information data and related materials to be used; selection and scheduling of applied research activities or projects. These programmes will be expected to be designed to: a) increase productivity on indigenous equipment b) improve quality of products c) establish parameters for product performance d) initiate and draft quality standards e) evaluate raw materials, raw products, process, equipment and applications	Manila	Jan. 1983 onwards
10.	Preparation of job descriptions and training schedules of short-term consultants required for the PDC development programmes implementation; in total 12m/m to be advised to UNIDO to enable recruitment proce dures to be inititated.		June 1983 3 months and on onwards as required
11.	Building and office provision		Start Jan. 1983 Completion Jan. 1984.
12.	Establish stores, inventory stock control records	Manila	Sept. 1983
13.	install office equipment and supplies	Manila	Jan. 1984 onwards
14.	Establish PDC organization and management functions; allocation of personnel	Manila	Sept. 1983

Description of project activities	Location	Starting Date and duration
15. Install and testing of equipment, checking and listing spare parts	Manila	Jan. 1984 onwards
16. Collection indexing of service manuals provided by machinery and equipment suppliers	Manila	Jan. 1984
17. Preparation of annual budget estimates	Manila	April 1982 April 1983 April 1984 3 mos. ea. year
18, Initiation of discussion group meetings involving plastics technologies and counterparts from Industry & other relevant government agencies	travel within the country	and twice yearly
19. Provision of international-fellowship for Director for Study Tour and Consultations with European and U.S.A. plastics processing institutions.	Manila	June 1983 3 m/m
Consultations with machinery manufacturers organized by Technical Coordinator.	Europe and Vienna	Sept. 1982 1 m/m
20. Preparation of manual for routine preventive maintenance. Implementation with schedules and records	Manila	June 1984
21. Preparation of physical resources document setting out the following and appropriate updating:	Manila & Europe	Sept. 1982 onwards
a. an itemized list of buildings and other physical plant needed, with descriptions thereof in adequate detail, and with an indication of the parties responsible for carrying out repairs, etc., under contractual arrangements;		

Description of project activities	Location	Starting Date and duration
b. an itemized list of machinery and equipment and related spares needed, with specification in adequate detail; a list of sources of supply of machinery and equipment and related spares; and information on servicing agreements entered into with the institution by suppliers or other organizations:		
c. an itemized list of expendable equipment and suppliers, together with an indication of their purposes, sources of supply, optimum inventory levels, and storage and distribution arrangements;		
d. a description of an appropriate programme of maintenance established, its pruposes, mode of execution, roles of different units of the institution in it, roles of any outside parties in it, etc.;		
e. description of the organization and procedures implemented to plan, procure control and manage the physical resources of the institution.		
22. Preparation of a revenue sources document incorporating alternative and recommended proposals concerning sources of revenue and the arrangements for obtaining needed finances. This should include proposals, together with explanations of implications, on such matters as fees (e.g., for training, research and consultancy services), scholarships of fellowships, and official subventions.	Manila	April 1982

Description of project activities	Location	Starting Date and duration
23. Execution of development programmes	Manila	Jan. 1984 onwards
24. Develop an evaluation, testing and technology support service for the industry	Manila	Jan. 1984 onwards .
25. Develop contacts with plastics raw materials and machinery suppliers, with trade associations and appropriate Government organizations	Manila and travel within the country	Jan. 1983 onwards as required
26. Provisions of short term international specialist consultants		April 1984 onwards as required
27. Preparation and implementation of a system of PIDC staff introduction and development	Manila	Sept. 1983
28. Initiation of discussions and group meetings involving plastics technologists and counterparts from specific sectors of industry (as users of plastics products) to interchange information, ideas and experience. To develop coordination and cooperation in work programmes.		Jan. 1983 at regular interval
29. Investigate and identify areas of potential use of plastics in rural and industrial development	Manila and travel within the country	April 1983 3 months
30. Provision of 2 fellowships for Study Tour and consultations at selected European and American plastics institutions.	Europe and U.S.A. (Note: this tour is season dependant)	Aug. Sept. 1982 3 m/m
Technical coordinator as technical adviser/tour leader during Study Tour.		

Description of project activities	Location	Starting Date and duration
31. Design and execute programmes for the development of applications, particularly in: Rural development, and packaging, and other industrial applications a. design and development of required products b. evaluation of existing and new products c. demonstration of applications, installation and use of training facilities	Manila	Feb. March 1984 onwards
32. Development of sister institutional arrangements in plastics technology to ensure continous interchange and updating of technical and technological information and services. Provision of specialised experts at short-notice. Regular visits to sister institutions.	Manila	Jan. 1984
33. Preparation of long-term and perspective financial plan for the PIDC to be approved by the Governing Council and implemented		
34. Preparation and implementation of a system of staff assessment	Manila	Jan. 1984 onwards
35. Preparation and implementation of a comprehensive plan approved by the Governing Council for the phased development of the PIDC as a whole, specifying to what extent and how each of the specific aspects are to be further developed following the termination of the UNDP-assisted project.	Manila	

Description of project activities	Location	Starting Date and duration
36. Promote and assist introduction of quality control at plastics processors	Manila	Sept. 1984
37. Commence technical information publications for the plastics processors with particular reference to small scale and potential entrepreneurs	Manila	Sept. 1984
38. Design, develop or improve plastics products for specific applications at optimal cost/ performance ratio	Manila	June 1985
39. Transfer the technology of improved processing, products, or applications to processors and users through demostrations and training, lectures, seminars, workshop, industrial clinics and literature as appropriate	Manila and travel within the country	Jan. 1985 onwards
40. Project mid-term review	Manila	April 1984
41. Annual reports	Manila	Dec. 1982 Dec. 1983 Dec. 1984
42. Terminal report	Manila	Dec. 1985

SUGGESTION ONLY FOR

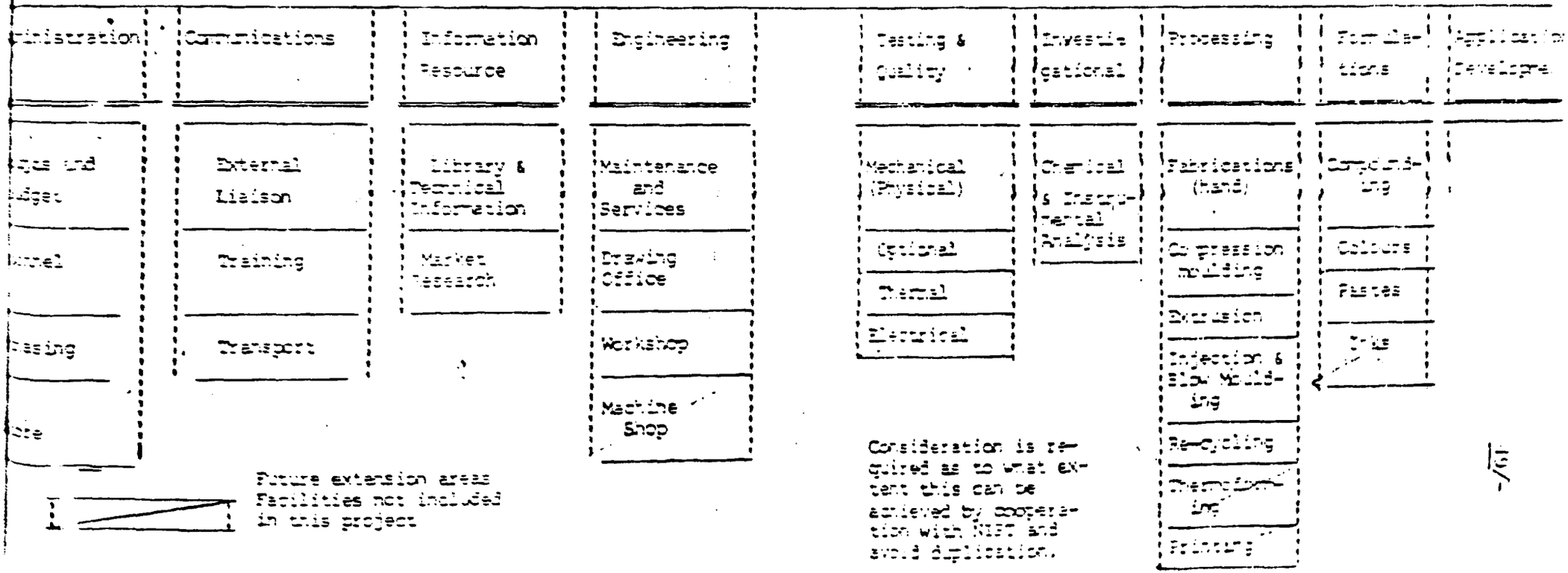
FUNCTIONAL AND ADMINISTRATIVE OUTLINE FOR PHILIPPINES PLASTIC INDUSTRIES DEVELOPMENT CENTRE

Governing Board

(Comprising industry and Gov't. representatives)

Director

Deputy Director



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Part II F Inputs

A. Description of Government Inputs

1. Assignment of National Staff	Location	Starting Date
a. Appointment of Director of PIDC (1)	Manila	Jul. 1982
b. Deputy Dir. of PIDC (1)	Manila	Oct. 1982
c. Technologist	Manila and travel within the country	Jan. 1983 as required
d. Engineers (1)	Manila	Aug. 1983
e. Assistant technologists (4)	Manila	Sept. 1983
f. Technicians (7)	Manila	Jan. 1984
g. Technical Information Officer (1) (Librarian)	Manila	Sept. 1983
h. External Liason and training officer (1)	Manila	Jan. 1984
i. Market research officer (1)	Manila and travel within the country	Sept. 1982
j. Officers for Administration	Manila	Sept. 1982
2. Provision of servicing Personnel		
a. Process workers (6)	Manila	Jan. 1984 as required
b. Craftsmen for fabrication workshop & for general maintenance (2)	Manila	Jan. 1984 as required
c. General workers (6)	Manila	Jan. 1984 as required
d. Foremen (stores, Crafts) (3)	Manila	Jan. 1984
e. Secretaries and shorthand typist (4)	Manila	May 1982 as required

f. Clerks (4)	Manila	Jan. 1984
g. Drivers (3)	Manila	May 1982
h. Guards (9)	Manila	Sept.1983

3. Training provisions

Maintenance of trainees and participants on study tours and training programmes.

4. Government provided buildings, equipment and supplies

Expendable equipment and supplies

Description	Location	Delivery	Cost in Phil. Pesos
a. Raw Materials and semi-finished goods	Manila	As required	2,000,000
b. Film, pipes, fitting & other items, etc. for comparative trials	Manila	as required	40,000
c. Miscellaneous items for application trials	Manila	as required	40,000
d. Office supplies, (Photo-copy paper, carbons, pencils, etc.)	Manila	as required	250,000
e. Acquisition of technical information through access to appropriate data sources		Jan. 1983 Jan. 1984 Jan. 1985	80,000 80,000 80,000
		SUB-TOTAL	2,570,000

Non-expendable equipment

Description			
a. Buildings (offices, stores, processing, testing, lecture hall) etc. about 850 sq. meters bldg. area required with possibility of future extensions.	Manila	Jan. 1984	2,125,000*

* P 2,500/sq.m. current cost

			5/
b. Office furniture and equipment (chairs, desk, filing cabinets, telephones, teleprinter, electronic calculators, etc.)	Manila	as required	250,000*
c. Plastics fabrication workshop: benches, stools handtools (chisels, spanners, screwdrivers, saws, planes, vices, drills, and bits, etc.)	Manila	Jan. 1984	20,000
d. Photocopier	Manila	Jan. 1984	50,000
e. Loudspeakers (2)	Manila	Jan. 1984	3,000
f. Microphones, amplifier & control unit loudspeakers (for lecture hall) and spares	Manila	Jan. 1984	12,000
g. Transport:			
1. Car for Director	Manila	Apr. 1982	60,000
2. Estate wagon for gen. use	Manila	Jan. 1984	80,000
h. Maintenance workshop equipment: power drill, lathe, mechanical saw, grinding wheel, work benches	Manila	Jan. 1984	150,000
		SUB TOTAL	625,000
		GRAND TOTAL	5,320,000

B. Description of UNDP Inputs

1. International personnel

a. Project coordinator (30/mm)

He should be a plastics technologist with extensive experience in both a wide range of plastics processing technology, and also in development and application work. He should also be particularly experienced in the development of organizations, the conduct of experiments and trials, and to be able to collaborate effectively.

He must have managerial experience and be a skilled administrator since his duties will be the overall technical coordination of the project. Previous experience of developing countries is highly desirable.

Language : English

The Technical Coordinator shall undertake his duties on a split mission basis. One part by visits to the PIDC and Vienna during the early phases and by maintaining continuity through appropriate communication to up to approximately 3m/m per year, followed by an intensive period during the start up by monitoring and assistance in the final two years.

The essential element is flexibility of arrangements to suit the project needs. He will additionally accompany some of the study tours as technical advisor. Within the local project requirements the project coordinator should have latitude to set visits in collaboration with the governing council to suit requirements.

b. Consultants (12 m/m)

The following descriptions of consultants are given to assist in setting out some of the potential expert needs. They will be made available to the project for short-term assignments. these are by way of example only and do not in any way restrict the nature of specialist expertise that may be required:

1. Consultant in extrusion technology

He should be a plastics technologist with production, in blown film preferably covering both PVC and PE. He should have had development experience and with knowledge of extruders and instrumental control. He should also have had experience in pipe and profile extrusion knowledge of the current take-off and pipe sawing systems. Some experience of pipe installation would be advantageous. Previous experience of working in a developing country desirable.

Language : English

2. Consultant in injection moulding and blow moulding

He should be a plastics technologist/engineer with experience of both hand operated and automatic equipment.

He should be capable of training in machine setting, and have a knowledge of injection blow mould setting. He should have experience of the properties of polymers and be able to advise on fault finding and corrective technology. Previous experience of developing countries is advantageous.

Language : English

3. Consultant in testing plastics

He should be a plastics technologist/testing engineer with experience of product testing. He should be capable of setting up test equipment and carrying out routine test programs. Experience in interpretation of results obtained is essential and should be related to corrective technology. He should be able to sketch and advise on the making of simple test equipment like the dart-impact tester and demonstrate its use. He should have experience in determining performance parameters and designing draft quality standards.

Previous experience in developing countries essential.

Language : English

4. Consultant in plastics formulation, compounding and recycling

He should be a plastics technologist with a wide range and in depth experience of the development of formulations for plastics compounds and the preparation of coumpounds and masters batches both at pilot plant and full scale production. He should be able to evaluate ploymers and raw materials available locally and to use a Brabender Plastograph, to interpret results of the compound formulations. He should be able to advise on the interpretation of the results in terms of formulation construction and modification.

It is essential that he has detailed experience of PVC compounds and in both rigid and plasticised grades. Experience is also required in formulations of additives of polyolefins. Experience of lecturing on this subject is desirable, as is previous experience in developing countries.

Language : English

2. Training Provisions

a. The Government will submit a total of four candidates from the plastics technologists who will be supported in their travel and subsistence expenses by UNIDO to attend technology training courses in specified subjects, starting February 1983 in overseas countries. These courses will cover the following:

I. plastics processing, formulations and compounding technology and film extrusion technology (6m/m)

II. plastics products development evaluation and market analysis 3m/m

b. The Government will submit one senior candidate (the director of the PIDC) who will be supported in his travel and subsistence expenses to attend a tour consisting of consultancies and visits to selected plastics technology institutes in Europe and U.S.A. to discuss and investigate possible sister-international arrangements. The Technical Co-ordinator will accompany him on the tour and act as technical adviser. (3m/m)

3. UNDP provided supplies and equipment

A. Expendable	Delivery date	Cost in US $
a. Special grades of film, pipes fittings, etc. for comparative trials.	as required	10,000
b. Special grade raw materials for processing technology development	as required	20,000
	Sub total	US$ 30,000

B. Non-expendable

Equipment for testing and quality control	Source	Delivery	Cost in US $
a. Melt flow indexer, accessories and spares	Davenport, UK	1984	6,000
b. Tensile tester with accessories for tensile strength, elongation at break, modules, compression set (D638-68, D695-69, D790-70)	Instron, UK	1984	65,000
c. Elmendorf tear test (D1004-66)	Davenfort UK.	1984	3,000
d. Non-contact temperature (infra-red)	Germany	1984	3,000
e. Brabender Plasticorder complete with recording unit, accessories and viscosity compensator	Brabenden, Germany	1984	50,000

Equipment for testing and quality control	Source	Delivery	Cost in US $
f. Pressure tester for pipes	various	1984	1,000
g. Haze and optical meter with accessories	Gardener U.S.A.	1984	10,000
h. Oven, electrically operated up to 200 °C with shelves and fan ventilated. Stainless steel internally.	various	1984	3,000
i. Dart impact tester (for film)	Davenport UK	1984	5,000
j. Universal Izod impact test with accessories and spares (D256-70)	various	1984	9,000
k. Moisture vapour permeability	Yarsley,UK	1984	2,500
l. Gas permeability (1434-66)	Davenport UK	1984	4,000
m. Multipurpose 100 ton hydraulic press, fitted with automatic programming, platten size approximately 350 X 350mm, fitted with heated and water cooled plattens.	various	1984	20,000
n. Metrology equipment (thickness meters, temperature indicators, pyrometers, etc., pressure indicators and recorders, travelling microscope)	Manila	Jan. 1984	10,000
o. Density column	Manila	Jan. 1984	1,000
p Shore hardness tester	Manila	Jan. 1984	250
q. Balance, single pan, automatic tare C-1,0-3 and 0-5 kg. to 1 mg. accuracy	Manila	Jan. 1984	2,500
	Sub-total		195,250

Pilot plant for plastic processing	Source	Delivery	Cost in US $
a. Impulse heat sealer	various	1984	1,200
Pilot plant for processing			
Extrusion unit			
b. Multipurpose 32mm extruder, variable speed controlled screw, fitted with bottom fed, centre mandrel die for blown film processing	various	Jan. 1984	
c. Adjustable slot cooling rings, one for 32 mm extruder-die positionable bubble length	various	Jan. 1984	80,000
d. Film assembly unit with adjustable height nip-rolls, take-off unit for centre and surface wind-up, and equipped with air blower unit	various	Jan. 1984	
e. Rotating die for blown film extrusion and assembly trolley	various	Jan. 1984	
f. Granulator	various	Jan. 1984	4,000
g. Magnetic separator	various	Jan. 1984	2,500
h. Vacuum sizing and cooling bath (for 32mm extruder) for pipe and section extrusion	various	Jan. 1984	50,000
i. Caterpillar take-off, with speed control and pipe saw cutter	various	Jan. 1984	
j. Dies for pipe and section	various	Jan. 1984	5,000
k. Additional extruder screws (4)	various	Jan. 1984	4,000
Injection moulding unit			
l. Automatic injection machine 60 ton clamping pressure, 4 ounce shot capacity	various	Jan. 1984	20,000
m. Test moulds	various	Jan. 1984	4,000

Compound operations	Source	Delivery	Cost in US $
n. Balance: 0-1 kg. single pan type	various	Jan. 1984	2,000
o. Scales: 0-5 kg. direct reading	various	Jan. 1984	1,500
Processing operations			
p. Scales: 0-50 kg.	various	Jan. 1984	2,500
q. Single pan balance 0-5 kg.	various	Jan. 1984	2,000
	SUB TOTAL		176,700
Audio-visual equipment for demonstration and training			
a. 35mm automatic slide projector with QI light source and spares	various	1984	300
b. Tape recorder with eletronic cueing equipment for automatic slide operation, with accessories and spares	various	1984	300
c. Screen	various	1984	100
d. Photographic facilities - darkroom equipment, 35mm still camera, 16mm movie camera editing and lighting units, etc.	various	1984	2,500
e. 2 UNIDO project cars for international staff	various	Oct. 1983	20,000
f. Books & journals	various	Jan. 1984 Jan. 1985	1,000 1,000
	SUB-TOTAL		25,200
	GRAND TOTAL		429,150
	CONTINGENCY		42,000
			471,150

For Information Only

ADDITIONAL EQUIPMENT REQUIREMENT

The following equipment will be required for the project at a later date but is currently not included.

The plastics industry should be persuaded to make some equipment available to the project on a temporary loan basis, as a gesture of their involvement, however old a design it may be. This could enable the P.I.D.C. to undertake some programmes in blow moulding.

Pilot plant for processing section:

Blow moulding unit	Source Delivery	Cost in US $
1. Blow moulding equipment with table action	Bekum	40,000
2. Mould cooling unit	various	4,000
3. Mould cooling unit	various	4,000

Part II C - Preparation of Work Plan

1. See attached table (page 39).
2. A detailed Work Plan for the implementation of the project will be prepared by the project co-ordinator in consultation with the Director of the Project. This will be done at the start of the project and brought forward periodically. The agreed Work Plan will be attached to the Project Document as Annex I and will be considered part of the document.

Part II H - Preparation of the Framework for Effective Participation of National and International Staff in the Project

The activity necessary to produce the indicated outputs and achieve the project's immediate objective will be carried out jointly by the national and international staff assigned to it. The representative of the national and international staff will be determined by their leaders, through mutual discussion and agreement at the beginning of the project and set out in a Framework of Effective Participation of National and International Staff for the project. The Framework, which will be attached to the Project Document as an annex, will be reviewed from time to time. the respective roles of the national and international staff shall be in accordance with the established concept and specific purposes of technical co-operation.

Part II I - Development Support Communication

The results of the trials leading to cost-effective applications of plastics in industry will need to be disseminated to the producers and the ultimate users. This will be achieved through utilization of the existing MTI & SBAC organizations together with the Philippine Plastics Industrial Association. Additional support communications may be required but this cannot be identified at this stage.

Part II J - Institutional Framework

To supervise the implementation of the PIDC a foundation will be formed with a governing body comprising equal representation from government and the Philippine Plastics Industrial Association. Members should be limited to ensure effective operation. Suggested sources of Government representatives are as follows:

1. Ministry of Trade and Industry
2. Metals Industries Research Development Center
3. National Institute of Science and Technology
4. National Economic Development Authority

The governing body will be responsible for the policy and coordination necessary to meet the objectives of the project, as set forth in this project document, preparing reports, evaluating the progress of the project and reporting to the UNDP about the project.

It will be the administrative body controlling the policy of the PDC and will thus have the necessary to make such changes as may be required to ensure that the Centre fully serves the interest of the plastic industry in the future.

The Ministry of Trade and Industry will initially fund the large proportion of PIDC operational running cost from its own budget but with on going support from the Philippine Plastics Industrial Association.

The location of the center has to be selected, and should be in situation close to the centre of plastics' activity in Caloocan City or Bulacan.

Part II K - Prior obligations and prerequisites for project implementation

1. By the Government - prior obligations

   a) The Government, through the concerned Ministries, will take budgetary action, make financial appropriations and release funds in such a manner as to enable the PDC to meet its financial commitments in respect of the project as and when they fall due. In this respect a sum of _____ will be

assigned in the name of PIDC as a starting point for funding a rotation account. This assignment will be made at the start of the project in April 1982.

Note: The sum to be assigned should represent approximately 25% of the estimated annual running costs of the PIDC.

b. the Director of the PIDC should be selected and identified so that he is available to the project at the beginning of July 1982, to enable the project timetable to be maintained.

c. A plan of the building, together with land, which is to be made available for the exclusive use of the project, including land for future expansion, shall be drawn up and submitted to UNDP for their approval.

By the Government - prerequisites

1. This project document has been drafted on the basis that there would be available to the project, through Ministry of Trade and Industry expertise for general administration and management, planning and control of both human and financial resources.
2. The land shall be transferred to the project immediately it starts otherwise implementation slippage will occur. the project is drafted on the basis that the first of the buildings will be completed in January 1984.
3. The Governing Council will be formed and functioning as soon as the legal framework has been agreed so as to ensure that the project has a controlling organization to whom the director of the PIDC is responsible upon his appointment.

Schedule of prerequisite activities	Location	Starting Date and duration
1. Formation of Governing Board	Manila	March 1982 1 month
2 Preparation and signatures to Articles of Incorporation	Manila	April 1982 1 month
3. Appointment of Director of PIDC	Manila	July 1982
4. Development of a policy statement for PIDC to be approved by the Governing Council and implemented.	Manila	July 1982 3 months
5. Development of suitable organizational structure for PIDC (Page 20 gives a possible outline) and modified as necessary from time to time	Manila	July 1982 3 months
6. Identification and development of necessary management functions, objectives and tasks which includes policy making; administrative management (including resources management); programme management; evaluation and forward planning; co-ordination and relations with governing authorities, Goverment other organizations and institutions. Particular attention will need to be paid to the design and target dates for the building which should be scheduled for completion January 1984.	Manila	July 1982 3 months

By UNDP/UNIDO - prerequisites

The training arrangement facilities for the following covering: plastics processing, formulation, compounding technology, plastics product development, plastics product injection etc. shall be completed by January 1983 to enable the fellowhips to start by June 83 at the latest.

By the Philippine Industrial Plastics - prerequisites

The Philippine Plastics Industrial Association will make available to the PDC Foundation such sums as have been agreed in an exchange of letters between them and the Ministry of Trade and Industry in advance on a quarterly basis.

Part II L - Future UNDP assistance

During the course of implementation of this project it will be possible to assess if additional facilities are required to strengthen the Philippines plastics industry. Further, it is to be expected that this project will become a key reference project through arousing the interest and needs of the Asean regions. In order to serve those needs adequately the facilities of the PDC will undoubtedly require expansion.

In addition this document indicates additional equipment required for the project to the value of US dollars 48,000 we hope that by the time this is required industry will have appreciated the value of the centre and will be willing to make a contribution to its purchase. The purchase of this equipment will also involve additional fellowships and experts estimated at US dollars 12,000. UNDP assistance will be required to meet these needs.

Part III - Schedules of Monitoring Evaluation and Reports

A. Triplicate Monitoring Review

This project will be subject to periodic review in accordance with the policies and procedures established by UNDP for monitoring projects and programme implementation

A technical review will be undertaken by UNIDO.

B. Evaluation

This project will be subject to evaluation, in accordance with the policies and procedures established for this purpose by UNDP. The organization, terms of reference and timing of the evaluation will be decided by consultation between Government, UNDP and the Philippines Plastics Industrial Association. The evaluation will be undertaken towards the end of the second year of operation.

Country ; Philippines

Project No. :

Title : Plastics Industries Development Centre

	TOTAL		1982		1983		1984		1985	
	m/m	US$	m/m	US $	m/m	US $	m/m	US $	m/m	US $
Personnel										
Project technical co-ordinator	30.0	180,000	3	18,000	3.0	18,000	12	72,000	12	72,000
Consultants (short-term)	12.0	72,000	-	-	-	-	6	36,000	6	36,000
Component Total	42.0	252,000	3	18,000	3.0	18,000	18	108,000	18	108,000
Training										
Fellowships	12	24,000	-	-	6	12,000	6	12,000		-
Study tours group training	6	14,000	-	-	3	6,000	2	4,000	2	4,000
Component Total	19	38,000				18,000	8	16,000	2	4,000
Equipment										
Expendable		30,000	-	-	-	4,000		13,000		13,000
Non-expendable		399,150	1			270,000		129,150		-
Component Total		429,150	1			274,000		142,150		13,000
Miscellaneous										
Non-specific inputs, (reporting costs, documentation costs, contigency etc.)		42,000		6,000		15,000		15,000		6,000
Component Total		761,150		24,000		325,000		281,150		131,000

TOTAL UNDP CONTRIBUTION US $

Project Budget Covering in Contribution in Kind(in Pesos)

Country : Philippines

Project No. :

Title : Plastics Industries Technology Centre

Project Personnel	TOTAL (₱'000)		1982		1983		1984		1985	
	m/m	₱	m/m	₱	m/m	₱	m/m	₱	m/m	₱
Director	42	256.2	6	36.6	12	73.2	12	73.2	12	73.2
Deputy Director	36	194.4	0	0	12	64.8	12	64.8	12	64.8
Operations Mgr.	36	151.2	0	0	12	50.4	12	50.4	12	50.4
Staff Service Chief	39	163.8	3	12.6	12	50.4	12	50.4	12	50.4
Engineer	39	97.5	3	7.5	12	30.0	12	30.0	12	30.0
Technologists	138	220.8	0	0	18	28.8	60	96.0	60	96.0
Asst. Technologists	96	144.0	0	0	0	0	48	72.0	48	72.0
Technicians	72	61.2	0	0	0	0	36	30.6	36	30.6
Librarian	30	93.0	0	0	6	18.6	12	37.2	12	37.2
Training Officers	27	37.8	0	0	3	4.2	12	16.8	12	16.8
Market Research Officer	42	58.8	6	8.4	12	16.8	12	16.8	12	16.8
Asst. M. R. Officer	36	39.6	0	0	12	13.2	12	13.2	12	13.2
Process Worker	192	153.6	0	0	0	0	96	76.8	96	76.8
Craftsman	54	51.3	0	0	6	5.7	24	22.8	24	22.8
Store Foreman	27	37.8	0	0	3	4.2	12	16.8	12	16.8
Clerks	111	94.4	3	2.6	12	10.2	48	40.8	48	40.8
Secretaries and Typists	153	107.1	9	6.3	24	16.8	60	42.0	60	42.0
Utility Personnel	144	93.6	0	0	0	0	72	46.8	72	46.8
Drivers	105	68.3	9	5.9	24	15.6	36	23.4	36	23.4
Security	234	327.6	18	25.2	72	100.8	72	100.8	72	100.8
Component Total	1653	₱2452.0	57	₱105.1	252	₱ 503.7	672	₱ 921.6	672	₱ 921.6

Expendable	2,570	30	380	970	1,190
Non-Expendable	625	110	150	315	50
Premises	2,125	220	1,685	220	-
Total	7,772	465	2,719	2,427	2,161
Contingency	720	20	100	300	300
GRAND TOTAL	8,492	485	2,819	2,727	2,461

*Note:

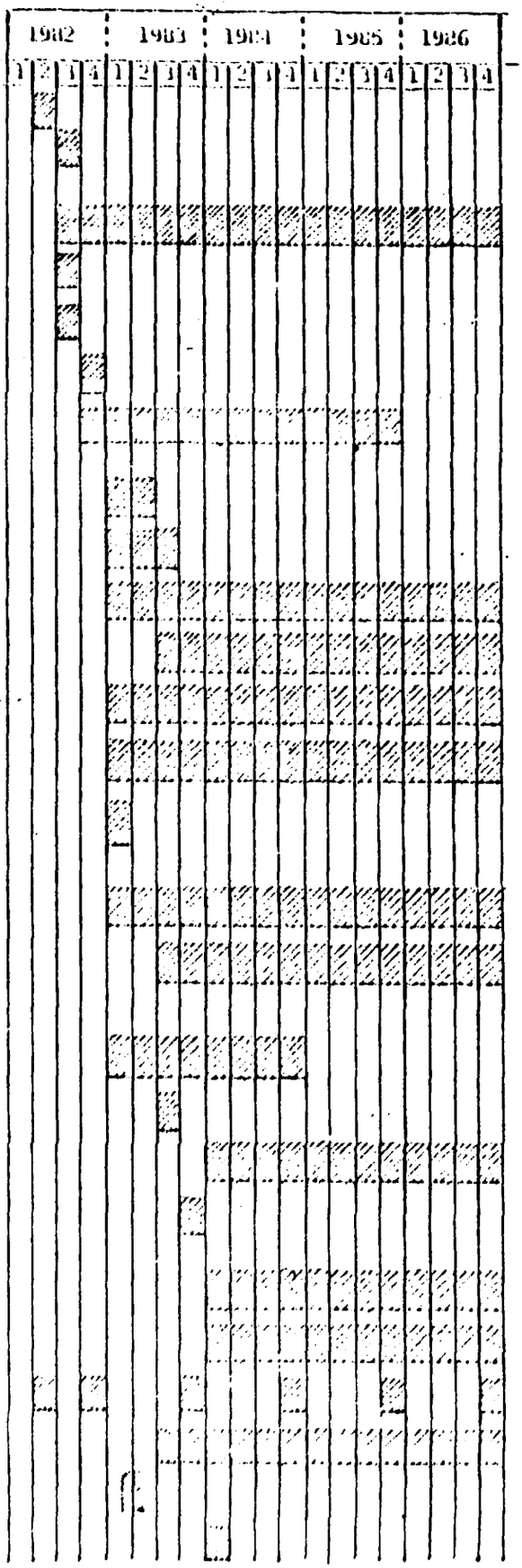
1. It is anticipated that in order to attaract good quality staff to the foundation somewhat higher salaries that applies in government departments would be paid. On a weighted average basis we evaluate this would add 25% to the whole salary bill.
2. Per estimate of the revenue operating costs of the total operation must be prepared in detail once a decision to proceed has been made but an appropriate 1st order is estimated is given below. This includes the up-lifted salaries.
3. A ten percent contribution for the Philippines Plastics Industrial Association is also shown.

Expressed in P000..

		1982	1983	1984	1985
Estimated Salaries at the highest Rate	3,064	131	629	1,152	1,152
Estimated Operating Expenses	6,619	283	1,360	2,488	2,488
10% of Operating Exp.	661	29	136	249	248
Total Estimated Cost Capital Operating expenses	15,109	868	4,176	5,414	4,949

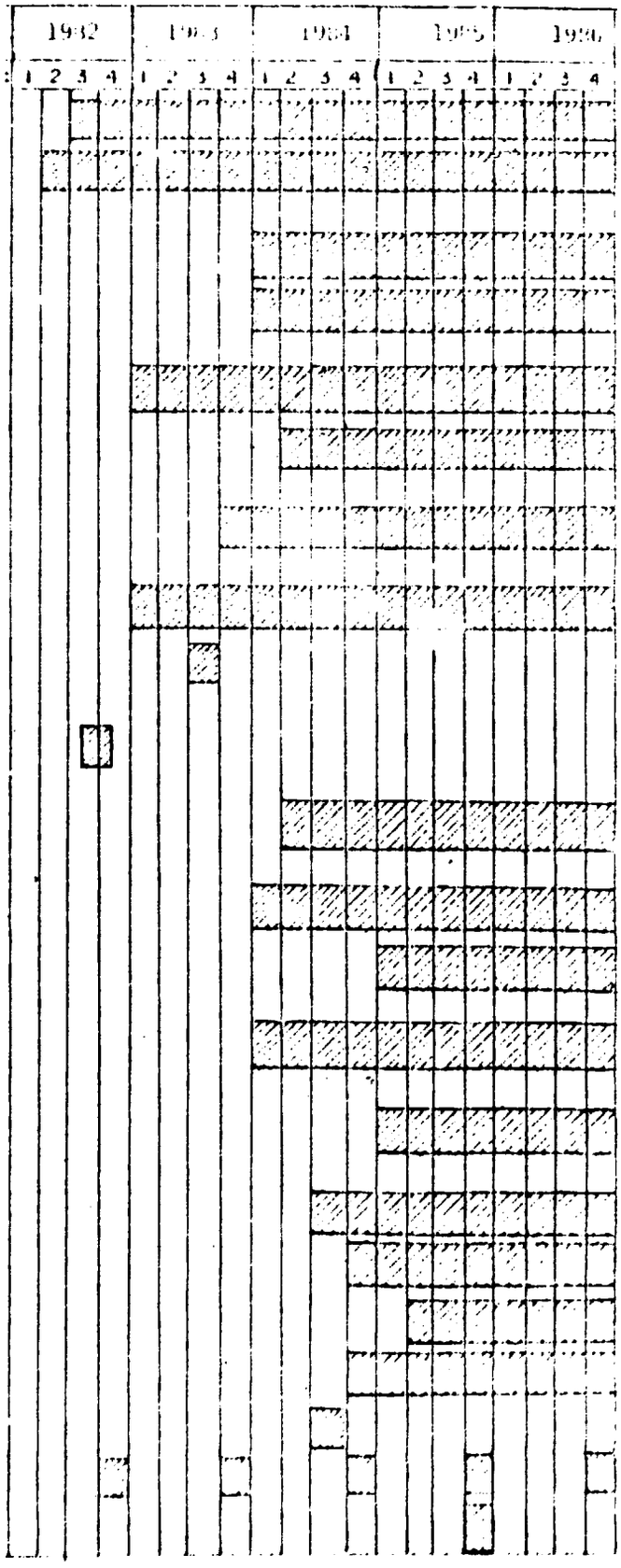
WORK PLAN BAR CHART

Activities



1. Establishment Governing Board
2. Preparation of Articles of Incorporation
3. Appointment of Director PHC
4. Develop Policy Statement
5. Develop Organizational Structure
6. Develop management functions
7. Appointment Project Technical Co-ordinator
8. Preparation staff profiles
9. Selection & ordering equipment
10. Appointment of national staff
11. Overseas training programme
12. Preparation manual output profiles
13. Prepare and Implement Output profiles document
14. Preparation manual elements for Development Programmes
15. Preparation technology programmes
16. Preparation job descriptions and schedules for short-term consultants
17. Building
18. Establish stores
19. Install offices and supplies
20. Allocation personnel management functions
21. Installation and testing equipment
22. Collection service manuals
23. Preparation Annual budget
24. Discussion groups
25. Study tour plastics institutions
26. Preparation manual preventive maintenance

Activities



27. Preparation physical resources document
28. Preparation of revenue sources document
29. Execute development programmes
30. Develop, test and support service to industry
31. Develop contacts plastics industry
32. Provision of short-term consultants
33. Prepare and implement staff development programmes
34. Discussion groups industry
35. Identification areas for plastics in rural and industrial development
36. Overseas technical study tours and visits to sister-institutions
37. Design and implement programmes rural & industrial development
38. Sister-institutional arrangement
39. Preparation long-term financial plan
40. Prepare & implement Staff assessment system
41. Prepare & implement comprehensive plan for phased development of PIDC
42. Introduction of quality control
43. Technical information publication
44. Develop plastics Systems
45. Transfer technology to Users
46. Mid-term project reviews
47. Annual Reports
48. Terminal Reports

Appendise II

Profit improvement in injection and blow moulding and film extrusion

Introduction

The object of being in the plastics business as any other business is to make a fair profit, a good return on the capital employed and to use some part of that profit to make the business grow. In time this leads to better products at more competitive prices and makes sure the business survives. Today, I propose to talk about some of the factors that can,and do,affect the profitability of the moulding business. In the Philippines three parts of the operating costs make up from 60-80% of the total costs. They are:

- Materials
- Production Labour
- Electricity

The following table shows some examples of figures from both Philippine and European businesses. The European data is taken from an average of six factories.

Table I

	Philippine Factories				European Factories
	Moulding Factor				
	A	B	C	D	
Production Materials	42%	51%	47%	50-80%	39%
Production Labour Costs	13%	4%	17%	5- 8%	15%
Power Costs	8%	10%	11%	6- 8%	4%

You will see there are differencies but they are not as large as you would expect. These figures are average. For example, the material part of the cost of a moulding varies according to the size of the mould and its complexity. In a simple large moulding like a bucket the material part of total cost may be as high as 80%. In a complicated battery box in polypropylene the material costs maybe

only 30%, much will depend on size, degree of complication, run length and many other factors. On average a material content of 40-50% is normal in the Philippines and 35-40% in Europe. In film manufacture the same type of variations occur. On a machine producing say 1.5 meter film for packaging matresses the material cost as a percentage of selling price will be as high as 80% whereas in small bags it can be as low as 50%. On average the material content of film operations are higher than in moulding and hence material control is more important. One point you will notice, factory B in the Philippines group shows a very low labour content and I will return to this later. Let us examine each of the three factors and their effect on profitability.

Materials

Generally materials represent a higher proportion of selling price here in the Philippines than in Europe and you might expect this to be due to the local import tariffs. Overall your material prices are similar to typical internal selling prices in Europe. For example, prices in Europe are in the region of ₱8500 for LDPE, ₱10,000 for HDPE and ₱10,500 for PP per tonne for ten tonne lots, here present prices are in the region of LDPE ₱9500-10,000 per tonne ₱10,000 for PP this is landed duty paid in the Philippine market. Since the tariff included in these prices is 20% you should be very competitive in export markets. In the context of the home market, I pose some questions which you should ask yourself.

Do you control your material adequately?

Do you know accurately how much waste you make?

Do you recover as much as possible of your scrap?

In moulding material usage can and does vary under apparently stable conditions and I want to illustrate this by reference to one example. The following graph shows the variation in shot weight with change in temperature of hydraulic oil on a particular machine.

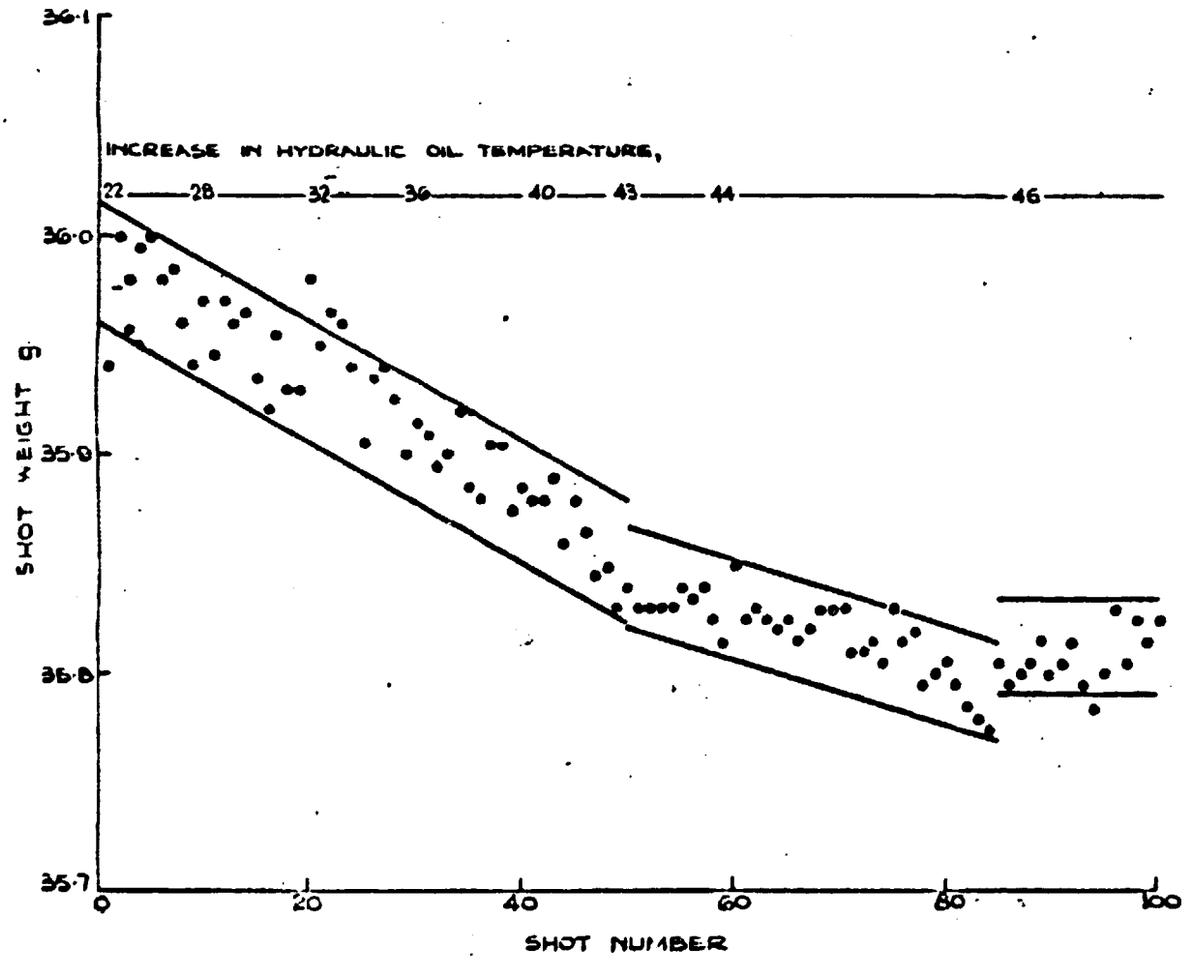


Fig. 2. Variation of shot weight with hydraulic oil temperature

Variations in melt viscosity can affect the weight of a product and nominally identical feed stock can very from batch to batch. Studies in Europe have shown that shot weights can very as much as 5% and regular checking is a

simple procedure but affords a method of identifying drift in machine conditions and from this savings in materials. This type of checking does not require elaborate machine control systems.

To illustrate this one example of the procedure is as follows:

Take a machine that has been set up with a new mould and the mould setter has got the machine to a point where he is of the opinion that the conditions are right and the machine is producing good product.

Weigh one shot every five minutes for the first hour. A gradual rise or fall will identify whether the machine is truly stable or drifting, if shot weight is increasing adjustments can be made to minimize the weight and make materials savings.

When a new bag or batch of material is started a check on say 10 consecutive shots at five minute intervals for the first 15 minutes will indicate whether machine conditions need to be adjusted for the new material.

Periodic shot weight checks at hourly intervals will indicate how good the machine controls are operating. Even to the point of cooling water changes as the temperature rises. Operating conditions frequently need to change between day & night shifts as outside temperature varies, to obtain best results.

It must be remembered that these simple techniques serve to indicate a change is taking place. The skilled operator must make a judgement as to what that change is and what to do about it. Caution is required in making machine changes, to many changes can be as bad as too few.

Now let us turn to film blowing and consider it in relation to material control. Here the most important aspect is gauge variation. Remember good gauge control is not just a quality requirement it is also an economy requirement. Let us assure that the gauge of a given film vaias by ±10% as it normally does on many machines. The film producer must set his average gauge to ensure that at all times the minimum thicknees meets the end users requirements otherwise some of the film will fall below specification. On average therefore the film producer is always manufacturing product which is 10% thicker than the customer needs. Although film sold on the reel is sold in pounds a customer quickly notices over thick material as he gets less pieces per pound in his packaging or conversion operation.

A net reduction to ±5% gauge variation will therefore give a 5% reduction in material usage immediately to gained in bag making and slightly longer term by demonstration of savings to the film on the reel. Unfortunately the methods of control of gauge in film blowing are more complex than in moulding operations and generally inherent in the basic extrusion and winding equipment. I do not however wish to dismiss this subject with that simple statement and say sophisticated equipment is too expensive for the Philippines. Let us examine a typical case.

Take a moderate sized extruder making say 25 kilos per hour of film run for 6000 hours per year. This is equivalent to 150 tonnes per annum. A five percent saving in material consumption producing the same number of metres of film would give a saving of approximately ₱65,000 per annum. On 3-5 year payback is better gauge control equipment really beyond your reach? I do not propose to

try and answer the question today because there are too many variables in your different businesses but I would suggest you separately make an evaluation of any new project you are considering. The cheapest machine in initial capital terms often ends up being the most expensive. 5% material saving over a ten year life will buy outright quite a good machine.

Let us consider waste recovery first in moulding. Waste and recovery of waste materials is a much discussed subject and Production managers tend to view it subjectively. When questioned 24 production managers of moulding factories in the UK gave their estimates of their factory's waste and the average of these answers was in the regions of 2%. During a survey in the same factories the actual average waste was found to be 5.6%, 4.2% rejects, 1.2% non recoverable scrap and 0.2% setting up waste. Do you as injection and blow moulders know what percentage of your material ends up as non recoverable scrap or do you merely have an opinion of what it is. It is not necessary to have elaborate control procedures but periodic checks to keep waste under control are desirable. One simple way of finding out what is happening is to check factory input and weigh all product output for say a period of one week and compute the difference. There will be recoverable waste in the factory all the time but this tends to remain at a fairly constant level. A check over three to four consecutive weeks will identify the exact waste levels you have. How do you recover your waste, by chopping and direct feed or by reextrusion. You may consider that sprue weights for example are unimportant but on small moldings they can be as much as 50% of the total shot weight. Each time you reprocess this material you need energy i.e. power consumption, to mould and inject it. The melt viscosity falls due to thermal degradation and this increas shot weights, minimization of all waste is very important regardless of wnether you can recover

it or not, careful consideration of sprue design when you order molds can give considerable savings and improve profits and competitiveness. Recovery of waste is important. If care is not exercised in the handling of scrap from whatever source dust will accumulate in the scrap and its reuse then generates more scrap through nozzle blockage, gate blockage, part filled cavities and a host of similar problems. Waste and recovery of waste in film blowing is just as important. 5-8% waste in film manufacture from granule to finished product is not uncommon and in this sector of the industry its reuse is even more complex. Chopped film waste has a very low bulk density 5-10 lbs. per cubic ft. is not an unusual figure. This type of product has a high affinity for dirt and dust particles which are disastrous in the film die where the dimensions of the die gap are very small and penalties of a blocked die gap are high. Unless great care is taken most film waste must be either processed back to pellet before reuse or applied to less demanding applications.

Appart from the film blowing operation itself down stream operations such as printing and bag making in themselves generate waste and here particularly in printed waste it becomes impossible to reinject the scrap into the original process. It can only be used for less exacting and colored operations.

Summarizing therefore in all sectors that we have examined,"The essentials of good waste control" are:

1. don't make if you can avoid it
2. if you do make it, keep it clean

Labour Costs

Suprisingly the Labour Costs moulding operations expressed as a % of total sales in many of your factories are similar to those prevailing in European

factories. That is around 15% of selling price. We quoted one obvious exception of 4% and we have found other factories in the Philippines with similar figures. We could easily dismiss these as exceptions. Let us examine these costs in some more detail. In an examination of six European factories ranging from the smallest with 9 machines to the largest with 43 machines, average manning levels in spite of some automation was 0.8 men per machine. From observation here you normally have one operator per machine. Now let us examine the cost of labour in pesos per man day after including all elements such as bonus; allowances, etc,. In the Philippines operational costs are in the region of 45-50 pesos per man day. In the UK the costs are 300-350 per man day-nearly six times as high. If your productivity per man day was the same as ours 3-4% of selling price as a labour cost would be about right. It is the 15% average that is wrong not the apparently odd 4% ones.

How does your productivity compare with European Industry. We present here a table showing the output parameters of a group of injection moulders in the UK.

Factory	No. of Machines	No. of Mould Changes per Week	Ave. No. of Mold changes per machines per week	Production Time as % of available hour	Output Shots	Available hours	Prod. hours	Ave. Cycle Times
1	41	25	0.61	65	7100	168	109	55
2	17	16	0.94	43	5300	120	51.6	15
3	22	25	1.13	66	8100	100	66	29
4	9	11	1.22	45	4800	100	45	34
5	20	5	0.25	62	10300	100	62	22
6	54	25	0.46	38	4900	100	38	28
man.			0.77	53	6750	114.7	61.9	33

Notes

1) The variation in available production hours is due to different shift patterns.

2) Measured cycle times were much less than average performance many small stoppages due to a moulding jammed, a short shot, a blocked nozzle etc. are not recorded as their duration is usually only a few minutes. The cycle times shown in this table are based on good finished production at the end of the week exclusive of rejects.

This shows a numbers of factors:

1) Overall productive utilization of production time is only 50% in spite of the fact than run lengths coveraged more than one week.

2) After taking only actual production hours, average cycle times were in the region of 30 secs. not too different from your own apparent performance.

So where are the differences in labor utilization. Frankly we do not know.

Philippine Moulding Factories

Factory	Machines	Mould Change	Time available	Production Time as %	Ave. Cycle
1	1	0	138	70.3%	27.6
2	7	0	72	84.0%	56.0

We have examined production data from two of your factories and although both of these show average cycle times at the higher end of the range of the six UK factories, they both show good time utilization. Certainly there is insufficient data to reach any positive conclusions. We also made a study of a further factory and looked at over all manning levels. We found that the total manpower was very high for the level of activity. We have been unable to obtain data on turnover per

employee for Philippines operations but we show the following table for UK expressed in £ Sterling per employee per year which you will be able to examine against your own figures.

In an appendice to this paper we offer a method of determining overall productivity in your moulding factories which would provide initial information on your performance and highlight areas of inefficiency. They are only meant to be a beginning not a comprehensive system. May we suggest that you study these techniques, we would be happy to advise and help in the implementation of such studies in any of your factories.

In film blowing labor cost will show a much greater degree of variability when examined in this simple way as a % of selling price dependent entirely on the amount of finishing in printing bag making etc. It is therefore more difficult to examine labor costs in relation to overall operations. Each part must be examined separately extrusion, printing, bag making, even in extrusion the labor content will be dependent on film width, machine output, etc. We will offer some points for examination by you as managers. In extrusion generally your machine output can be increased by increasing motor ratings and screw speed and frequently extrusion gear boxes will transmit as much as twice the original motor power but the limiting factor in many of your factories is height You cannot extrude film at high rates without sufficient distance to cool the product before it enters the nip rolls otherwise blocking will occur. This is a much more difficult problem to overcome and will always result in slow speeds and excessive labor costs.

Power

In Manila, on average, the total cost of power as a percentage of sales in your factories is twice what it is in Europe, around 10%, and therefore is worthy of careful control and study. Let us examine some of the factors which affect consumption of power.

1. Power is related to material processed.
2. Power is related to total time the machine is switched on.
3. Power cost is related to maximum demand.

Taking these factors in reverse order, firstly your account from meralco is calculated not only on the number of units consumed but on the basis of the maximum demand in any one period of 15 minutes. If on a Monday morning you switch all the machines on at the same time this causes a high demand during heat up and costs extra power. It is much better to bring one worker in early and phase the switch on over a period of two or three hours and hence reduce maximum demand.

If a machine is switched on regardless of whether it is producing or not its heaters consume power. Of course this is less than when the machine is actually producing product but if downtime due to ordinary production factors is say 30% each machine will consume at least 50% rate while it is idle. Your operators should consider carefully the likely duration of the stoppage and decide whether it is more economic to switch the machine off or continue to run it.

Finally consider material processed. If sprue weights equal say 30% of each shot that sprue material must be reheated and reinjected and will consume not only the same amount of power per kilo again in the injection machine but more power to grind it into a form suitable for reuse. This extra cost of labour and material you should consider when ordering

moulds.

Let us examine an example:

Take a moulding where the sprue weight of 30% of the total shot.
Suppose the material is 10,000 pesos per tonneand the selling price of the product is 20,000 pesos per tonne.
Suppose labor costs and power costs represents 5000 pesos per tonne. as they do in your average factories (i.e. 15% and 10% of Selling price respectively)
Downgrade this 5000pesos to 4000pesos to represent actual pre profit production cost per tonne.
Now the sprue material represents 300 kilos of every ton processed. Therefore, for each 700 kilos of finished product produced 300 kilos of sprue are produced, costing about 1000 pesos in labour and electricity to process. A reduction of 30% in sprue weight will therefore save approximately 300 pesos on every 700 kilos of finished products. This would yield 450 pesos of additional profit on every tonne of finished product (an extra 2% profit).
On the basis of mould life you can calculate how much extra you can spend on the mould and still improve profit margins.
These figures are very approximate generalizations each case must be computed and examined on it in merits. All I have tried to do here is illustrate the broad out line technique.

In extrusion, as in moulding, power is an important factor and savings in maximum demand are as important in extrusion as they are in moulding likewise the cost of reprocessing scraperies the same penalties. Generally speaking the through puts in film factories tends to be higher in annual tonnage terms than in moulding factories

I have tried here today to draw to your attention some of the factors which effect productivity quality and hence profitability. I hope this will provoke you to consider control in your factories. If you have any questions either now or privately or require direct assistance in your factory to make a start at studying your factory's performance we will be happy to help you.

APPENDIX I

Table I

Table II

1) These tables illustrate a method of collecting data in your factories.
2) You merely record what each machine is doing, either operating normally, stopped for a fault or mold charge each hour on the hour. The fact that the machine may not have worked for the whole hour or you record a machine as stopped when it may only be inoperative for 15 mins. This does not affect the results. It can be shown statistically that the mean result is the same as actually recording the number of minutes or hours the machine is in operation. Recording details on all machines consumes too much operator time and achieves no more.
3) Once you have the data for a period of say a month, analysis will show where you must work to improve productivity. Then recording data at say three monthly intervals will help to maintain continuous control. It is not necessary to do it all the time in small factories.

Quality control and its implications in the Plastics Industry Sectors:

Introduction:

First, I want to define what we mean by "Quality Control". These two words are some of the most misused in industry. Quality control is a system of examining the products of a factory against predetermined standards and deciding whether the factory has produced articles conforming to those standards. Of course since it is based on sampling techniques the answer can only be relied upon to within fixed probability limits dependant on the sample frequency and size. However, the important point to remember is that the test procedures do not of themselves alter the quality of the article being produced. That is a function of the method of production the men and the machines. Quality control per se does little to change product quality.

Let me try to illustrate this from the plastics industry. In the manufacture of polyethylene film the thickness of the product varies by about $\pm$15% on reasonable equipment and a well run machine, well set, will produce at about this level consistantly. If therefore a target thickness of 100 microns is required to meet the specification, it would be no use setting a quality control specifications at $\pm$10% as a significant proportion of the production would be rejected and the factory concerned would quickly become bankrupt. Quality control can only be used to reject that product which falls outside the

normal limits of capability of the production process. If you want to improve on that standard you must change the process.

I will give you one more example. Many years ago when I was employed in the canning industry, we supplied containers to a manufacturer of pet food and our standard was 2% of maximum faulty cans. Our process on average gave about 1.7% faulty cans and the inspection and sampling processes were based on one can tested in 100 on a random sample basis. We were asked if we could meet a standard of 1% faulty cans. We knew that we could not economically improve the manufacturing process so our only method was to examine all process variables and decide how often the manufacturing unit produced cans of better than one percent level. We found that it was possible by batching and selection to achieve a 1% level but only 1 one out of ten batches would pass and the result would has been that the quality standard would drive the remainder of the cans supplied to our other customers much more near to the 2% level to the extent that occasionally a batch would occur with 2.5% faults. A careful economic analysis of the case showed that in order to supply cans to the 1% defective level to the pet food manufacture, we would have had to increase the cost by 50% to take care of the extra work involved in testing and to allow for the rejects on the occassional batch with 2.5% faulty containers out of supplies to other customers.

I think this serves to illustrate the point "Quality Control" tells you the standard of your process, serves

identify product which falls outside the normal operating condition of that manufacturing process but will not and I repeat will not improve your process. What it will do if provide the means to measure the efficiency of process improvements and guide you to maximize process variables.

Now let us examine the value of quality control and the methods by which it can be used to bring about a general improvement in the quality of the output of a factory. First we set up a series of test procedures designed to ensure that say 95-98% of production passes the tests and in so doing we have to define the limits of our production process. In the plastics industry, I will give you some examples. But first for the benefit of may of you who come from other industrial sectors, let us try to put some perspective on what we mean by the plastic industry. In general the plastic industry starts with Petrochemicals and many people think in terms of finished throw away packaging like the polythene bag you associate with the suppermarket. This represents only one aspect of our Industry and by no means the biggest part.

Approximately, 4% of oil is consumed by the plastics industry to make a wide variety of products.

Polythene bags for packaging
Bottles for packaging
Barrels for storage
Land drainage pipes
Waste pipes
Parts for cars
Parts for fans & airconditioners
Refrigerators
Television cases
Blinds & Shutters

The list is almost endless and will continue to grow as the cost of energy rises. In the USA plastics defined in cubic metres has already supposed the consumption of steel and is growing rapidly because the energy required to smelt a cubic metre of steel far out weights the energy content of the same volume of plastics even after allowing for the fact that it comes from oil in the first place. The plastics industry is a growth industry and will remain so. The growth will be in areas of high technology and the applications will become increasingly more important in countries who rely heavily on imported energy sources.

It would be too difficult to describe here the endless range of quality control tests that are employed by the industry because of the wide range of products but I will list a few. The main emphasis lies in defining tests which are required to determine whether the product is suited for its end use application.

1) In the manufacture of polythene film one of the important criteria is uniformity of thickness and this can be monitored on the basis of test samples or continuously by sophisticated equipment. The most important thing is to ensure that sampling methods are desinged to test during the process to control without cutting samples and spoiling the continous nature of th process.

2) In bag making, tear strength and seal strength are important. Both are tests to destruction and hence sample procedures must be limited to yield the highest level of assurance for the minimum sample.

3) In waste pipe and pressure pipe, we are testing to ensure maintenance of the enclosed system, so that pressure is the vital factor here usually not to destruction, however, reliability of the test procedure is vital as once installed plastic pipe system can remain in use for as long as 20-30 years.

4) In a polypropylene battery box resistance to acids is important but choice of material takes care of this. Dimensions are the most important from a quality point of view.

Now how can quality control help us to become

more profitable

more competitive

produce better products.

In continuous production processes the quality of the product changes imperceptably after time and those changes can often result in production of significant quantities of substandard product before the change becomes obvious particularly when the operation is during the night, when supervision is perhaps less strict. Routine quality control checking at every hourly intervals enables us to make process changes to bring the product back to standard generally before the product has

reached the unacceptable stage and in so doing our overall production of acceptable product is better, waste and scrap are reduced, and hence profitability is enhanced.

We are more competitive not only because our products can be slightly cheaper but because Quality control makes our product more reliable. We can dispatch our product with confidence. We can assure our customers that what we send will meet certain standards with say a 90% probility, not all our competitors can do that. A word of warning here when QC isintroduced into a factory this tempts Sales managers to succomb to customers demands for higher and higher quality which the production manager cannot produce. This leads to disappointment all round and the downhill road in profit.

How does Quality Control produce better products. It does not, but it identifies the weakest links in the chain it helps us to pinpoint those parts of our process which need improvement. From this a step by step programme of product improvement can be implemented, first identify the area of poor performance, second improve the process third, lift the standard. By this technique we can obtain the best from the available machinery. Profit improvements always results and careful evaluation will encourage investment in better process machinery leading to a new round of process improvement. No discussion of this sort would be complete without reference to Quality in relation to

exports. Ability to compete in world markets is not a simple question of quality. Price and Quality are just as important as each other. In some markets customers will accept reductions in quality standards if the price is right. In others, quality paramount and no reduction will compensate. It is the duty of your sales and marketing people to seek out those markets where you can compete.

When I first visited the Philippines, I was told that you could not expect of any significant exports in my Industry sector because your quality was not good enough. Further in depth examination of that statement has convinced me that it is largely false and generally represents an excuse to cover up weaknesses in marketing information. One of my Philippine friends admitted all his exports were based on "Walk in customers" he went on to say that his exports could , he was sure be quadrupled if he had the marketing resources. Many of the members of your plastics industry already produce products that compare favorably with world quality standards. Whatever industry you are from don't give-up. If you are determined to succeed you will.

MOULD DESIGN IN RELATION TO PROFIT IMPROVEMENT

It would be easy for me to come here today and say all your molds are terrible and you should use the type of sophisticated technology that we use in Europe if you are to produce the quantity and quality that we do. No purpose would be served by this and you would all go away saying the Philippines is different and go on doing the same things you do now. We do not use these sophisticated systems for fun or to show how much better we are at doing things we use them because they are the most cost of effective way of doing it.

What I propose to do today is examine some of the first steps which you could take on the road to improved technology of mold design and try to demonstrate how these steps should be evaluated in cost terms. The results will be self evident and once you begin to look at every improvement in terms of cost effectiveness the road forward becomes self evident and the pace accelerates of its own accord.

During the last seminar we looked at some of the larger elements of cost which were materials labour and power. We talked about the need to minimize sprue in order to avoid double processing of material. This is an important element but the most important e'ements in productivity and design of all molds are:

Sprue in relation to total shot weight

Cooling channels in relation to cycle time

Degating in relation to labour utilization

So that we can examine the cost effectiveness of all the three let us first remind ourselves of the cost breakdown of your factories.

Materials	45-50%
Labour	13-15%
Electricity	8-10%
All other Cost	15-35%

So first let us examine sprue weight and I will repeat the comments that I made during last seminar on this particular subject.

If sprue weights equal say 30% of each shot that sprue material must be reheated and reinjected and will consume not only the same amount of power per kilo again in the injection machine but more power to grind it into a form suitable of reuse. This extra cost of labour and material you should consider when ordering moulds.

Let us examine an example:

Take a moulding where the sprue weight of 30% of the total shot. Suppose labor costs and power costs represents 5000 pesos per tonne as they do in your average factories (i.e. 15% and 10% of Selling price respectively).

Downgrade this 5000 pesos to 4000 pesos to represent actual pre-profit production cost per tonne.

Now the sprue material represents 300 kilos of every ton processed. Therefore, for each 700 kilos of finished product produced 300 kilos of sprue are produced, costing about 1000 pesos in labour and electricity to process. A reduction of 30% in sprue weight will therefore save approximately 300 pesos on every 700 kilos of finished products. This would yield 450 pesos of additional profit on every tonne of finished product (an extra 2% profit).

On the basis of mould life you can calculate how much extra you can spend. These figures arevery approximate generalizations each case must be computed and examined on it in merits. All I have tried to do here is illustrate the broad out line technique.

Let us now examine the subject of cooling channels and cooling of molds generally and their effect on profitability. I cannnot stress this aspect of mold design to much.

Let us examine a typical injection or blow moulding machine running in a Philippine factory and let us say that that factory has 20 machines all of which are on an average cycle time of around 40 seconds. Supppose as new molds are made careful design is adopted and as eachnew mold is introduced a reduction of 10 seconds is achieved to 30 seconds, well within the capability of your mold makers and without the capital expense of centralized chilled water systems. Let us also assume that this process takes place over a period of one year and that during that time the company increases it sales by 10%.

If we now compare the situation in case A where no improvments in mold design are made and case B where the postulated improvements are made. In case A a 10% increase in through put has to be achieved which means

a) at least 4 more employees on three shifts this means 12 men at ₱500 total per day or on 300 days operate ₱150,000 per year.
b) 2 new machines say ₱100,000 each ₱200,000.
c) Electricity and other costs at least ₱50,000.

So total cost of the increased out put is in the region of ₱400,000 per annum purely for operating and maintaining the extra equipment.

Now let us examine Case B here the machines are all now operating at 25% greater out put because they all run at 30 seconds instead of 40 seconds.

a) no new operators are required.

b) no new machines are required.

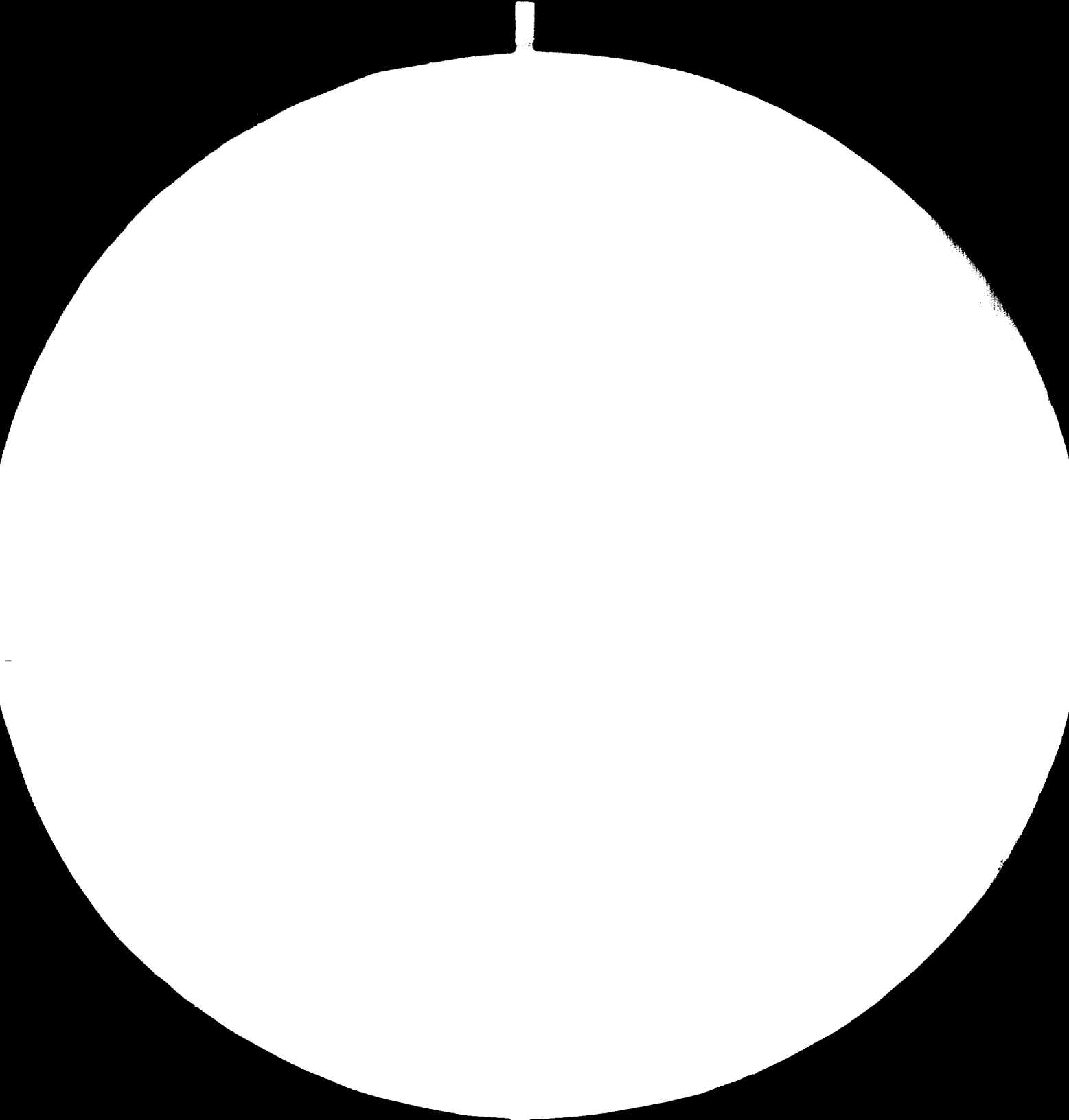
c) no additional expense is incurred except a minimal increase in consumption of electricity to convert 10% extra materials.

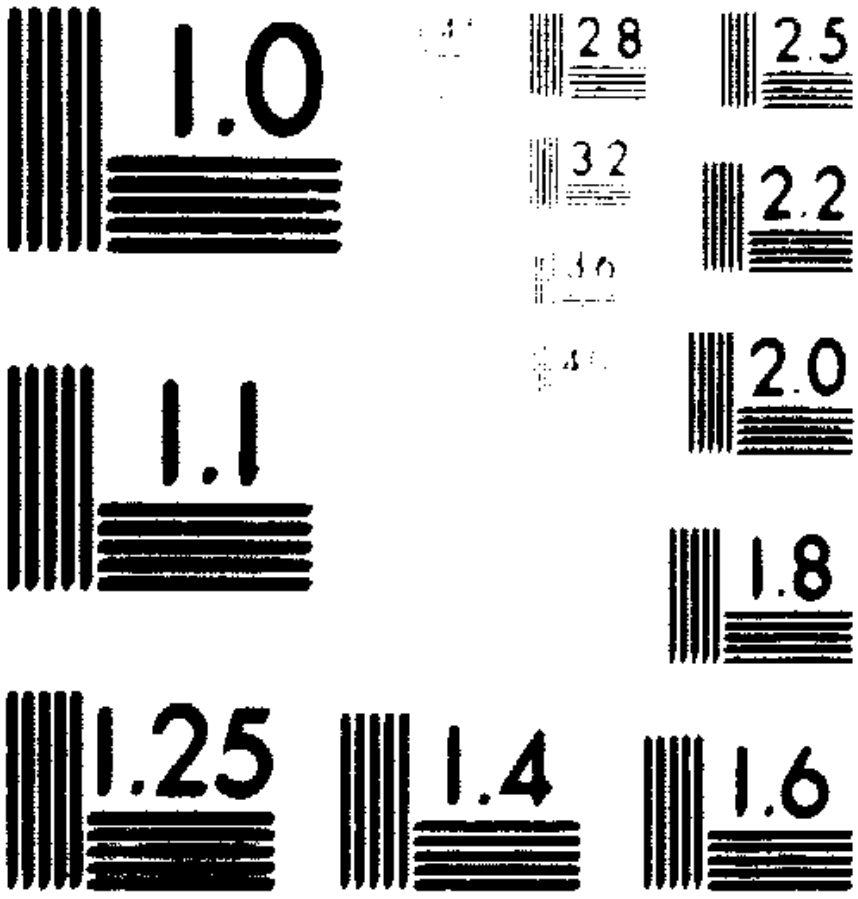
In addition to this 15% spare capacity has been achieved to cater for the following years expansion so over too and half years 25% increased out put can be achieved at minimal cost whereas without this effort about a million and a half pesos would be required because you must remember that the labor and other costs occur in every year only the machines are once only capital costs. Of course, this is a simple way of looking at it when acutal numbers in a particular factory are calculated they would be a little different, but it serves to illustrate the very large numbers in money that are being examined. Some of the saving would be spent on better moulds etc.but a cost analysis in a particular case will show the best approach I will say that in another factory where growth is slower cost effective mould design might enable you to throw away old inefficient machines without the need to replace them. The combinations are numerous. Do not just buy moldson the basis of the cheapest mold examine the cost effectiveness of what you

buy and shop around for the mold that does it the most effective way and gives you best value for money.

In Europe and the States computer programmes have been designed to estimate the heat flow and material flow in molds, use of these programs for one mold design can be as much as $2000 yet studies have shown that this high cost can be got back in efficiency. Sometimes with in a week you have a lot way to go in this technology why not make a start and improve your profit.

The third item which we mentioned was degating in relation to labour utilization. As I mentioned before most of your factories have labour content which costs around 15% of selling price, a few exceptional ones are much lower. One of the elements of this high labour costs comesin the fact from molds and designs are such that the sprue and product does not separate and on most machines a man sits opens the machine removes the article and cuts of the sprue. I have seen only a few machines with three plate molds, submerged gates and automatic ejection. Not only does this approach cost you the extra of opening the machine and taking out the sprue but this adds about 1.5 seconds to the cycle i.e.3.5% on the labour costs. I am certain that if you sat down and calculated the costs of this simple work element you would be appalled at the cost in pesos per year. In most countries one man to 3-4 machines can easily cope with inspection and cleaning operations but you can only prove the validity of this statement when it is no longer necessary for him to sit and open the machine at every cycle. I cannot do this particular piece of arithmetic for you only you can do it. I suggest you do.





Finally, I want to talk about one or two other aspects of mould design which I have observed in visiting your factories. Firstly, I notice that frequently you have significant amounts of flash on large area moldings which bring in its train the inevitable labour cost of trimming sometimes unsightly products. For those of you who are not aware of it remember the locking force required for a moulding is related to the surface area of the moulding not the shot weight, is this adequately catered for in design and do you always use the right size machine.

Another factor is that I have been told that the ejection pins you use are poor because imported ones carry 100% duty. This may be one of the factors in going to automatic ejection. In the Philippines we believe that mold demand is no more than about 2000 per annum and if all these were fitted with proper pins the total would not exceed 100,000 pins per annum. In Europe all our mold makers buy these items from specialists who make nothing else and are specially set up to do the job.

You cannot expect your government to understand detailed technical problems of this sort and the ensuing difficulties which it gives your industry. It is part of the task of your association to make them aware of the problems that high duties give in areas of specialization and my discussion with government officials makes me confident that such matters would receive a fair hearing.

To summarize therefore each element of mould design must be examined on a cost effective basis, stepby step improvement of the moulds you buy should be examined in terms of cost effectiveness, more money spent on a good mould can often mean more profit at the end of the job.

Appendix IV

Export Marketing Studies for the Philippines Plastics Industry

Introduction

A significant number of Philippines plastics producers already export their products at profitable levels. examples of which are:

Specialized blown bottles

Polyethylene bags

Injection moulded products

Toys

Games

The bulk of these products are sold on the basis of "Walk in" customers primarily on the basis of lack of c contact and marketing information on the potential outlets. Opportunities are available and one entrepreneurs made one single contact in Europe during a study tour in September 1981 which has already yields nearly $100,000(US) worth of exports. Target areas for Philippines exports would be Australia because of geographic proximity and Europe where home consumption values of polymers are high there to basic petroleum tones. And there is already significant penetration by other Asean countries.

Method

To study these opportunities the following steps need to be taken.

1) In collaboration with the Philippines Plastics Manufacturers Association, the Ministry of Trade and Industry should prepare a list of potential export products with price levels and availability together with an complete a list of as possible of interested companies.

2) A brief should be prepared and funds should be allocated (1st estimate $30,000 for each of the two target areas) to carry out marketing studies through consultants to identify agents, local prices, demand for imported products, quality standards etc.

3) Studies should be commissioned and the information fed back to the industry and pilot export schemes initiated with suitable identified product areas.

Brief of Consultants to Quote against:

Introduction and Background:

The Philippines plastics industry already exports a limited range of its products amongst which are film bags blown bottles toys and injection moulded products. Most of this is done on the basis of direct approach from shore companies seeking in the main to fill medium quantity orders which cannot be economically executed in their own countries. Examples of these are say, 50,000 8" x 4" polyethylene bags 500,000 polycarbonate feeding bottles and quantities of toys made under licenses.

The Ministry of Trade and Industry will supply a detailed list of companies, products and price levels in the following areas of the industry.

Injection moulded products
Blown film products
Blown bottle products
Laminated printed products

Requirements

1) The areas of study are Australia and the European Economic Community.

2) To identify present levels of inputs in these industry sectors prevailing landed prices, tariff rates and countries of origin.

3) To identify as complete a list as possible of importing agents and companies and the operating methods.

4) To compare and contrast the available demand in the specified geographic areas and identify the best opportunities for Philippine exporters.

5) To set up initial contacts between ofshere buyers and Philippine plastic industry producers.

Quotations

These should include consultancy cost and other expenses shown separately in budget form, anticipated time span for completion and one visit to the Philippines to make a presentation of the results. All air fares should be budgeted at economy rates although the Philippines government may opt to supply tickets if they so decide. An outline proposed report content should be supplied as part of the quotation.