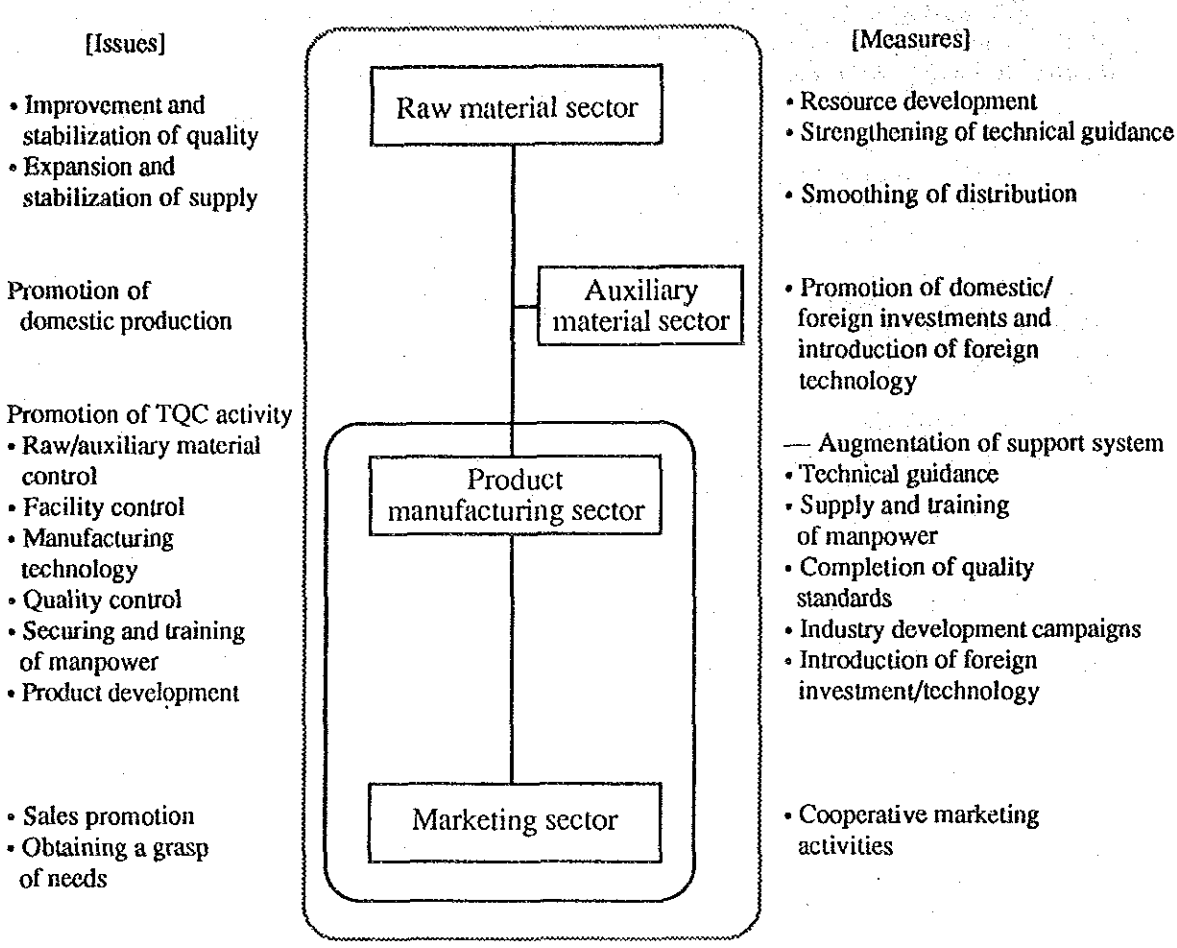
## 1-2 Measures by Products and Company Types

Major issues for the promotion of ceramic products industry in Indonesia are summarized in 1-1-1 of section III (Table III-2) by products and company types.

The following Fig. IV-1 illustrates issues and measures for promotion of ceramic products industry focusing on companies situated in the middle of the industry and deemed to have potential of export.

**Fig. IV-1: Main Issues and Measures for the Promotion of Middle Class Ceramic Products Companies (Types B and C)**



## 1-3 Recommendations on Main Programs

Recommendations were made for the ceramic industry as roughly divided into the raw material and auxiliary material sectors and the product manufacturing and marketing sectors. The focus, however, is on promotion of all sectors linking those organically. The central body behind the promotion of these programs is envisioned as being the support system mentioned earlier..

Program 1: Strengthening of development of raw materials and promotion of raw material and auxiliary material industries

It is recommended to [1] "conduct a full-scale survey of resources of raw materials" with the aim of development of raw materials and [2] "strengthen technological guidance to raw material producers" and "introduce foreign capital and foreign technology into the auxiliary material industries" with the aim of promotion of raw materials and auxiliary materials industries as well as provision of stable supply system for high quality raw materials and auxiliary materials for product manufacturers. The resource survey and technological guidance should be handled by the MTDC and IRDCRI and the introduction of foreign capital and foreign technology should be handled by the Industrial Mineral Association, ASAKI, and the large companies.

Program 2: Construction of raw material and auxiliary material estate

It is recommended to construct a comprehensive collection, delivery, and processing center for raw materials and auxiliary materials in Java island, the main consumer area. The aim of this idea is to fundamentally resolve the problems in communication and distribution arising due to the great distance between the raw material production areas and the product manufacturing centers so as to promote the raw material and auxiliary material sectors and also improve the environment for procurement of raw materials in the product manufacturing sector. It is hoped that the two industrial organizations and the companies under them, the central and local governments, and the public research and development institutes will extend their understanding and cooperation.

Program 3: Augmentation of public testing and research and development institutes and strengthening of ties among institutes and ties with industrial world

It is recommended that [1] the capabilities of the IRDCRI be strengthened, [2] the ties between the IRDCRI, MTDC, and other research and development institutes be strengthened further, and [3] the ties between research and development institutes and industrial organizations, companies be strengthened. This program aims at augmenting and comprehensively mobilizing the functions of the research and development institutes and launching practical technical promotion activities tailored to the needs of the industrial world. In particular, it is hoped that this will be effective in strengthening the testing and analysis services, technological guidance, and human resource development and training.

Program 4: Promotion of activities of industrial organizations

In particular, it is recommended to revitalize the activities of ASAKI. The fields to be stressed in these activities are envisioned as being [1] the strengthening of overseas marketing, [2] the promotion of the introduction of foreign capital and foreign technology, and [3] the promotion of industrial development campaigns and [4] the completion of industrial standards and introduction of an export inspection system. These activities of the organization are considered timely for the Indonesian ceramic industry which is in the process of development. It is hoped that member companies will coordinate activities and cooperation will be obtained from related ministries, research and

development institutes, the Industrial Mineral Association, etc.

Program 5: Establishment of policy coordination function

It is recommended that a consultative body comprised of the related ministries and agencies, public institutes, and industrial organizations be organized and coordinate policies and activities for promotion of the ceramic industry so that they match with each other. It is hoped that the relevant parties extend their understanding and cooperation in this regard. It is recommended that a "ceramic conference" be held about once every half year and that a taskforce be created to consider the feasibility of the plan of "construction of raw material and auxiliary material estate."

**Fig. IV-2: Measures for the Promotion of Ceramic Industry**

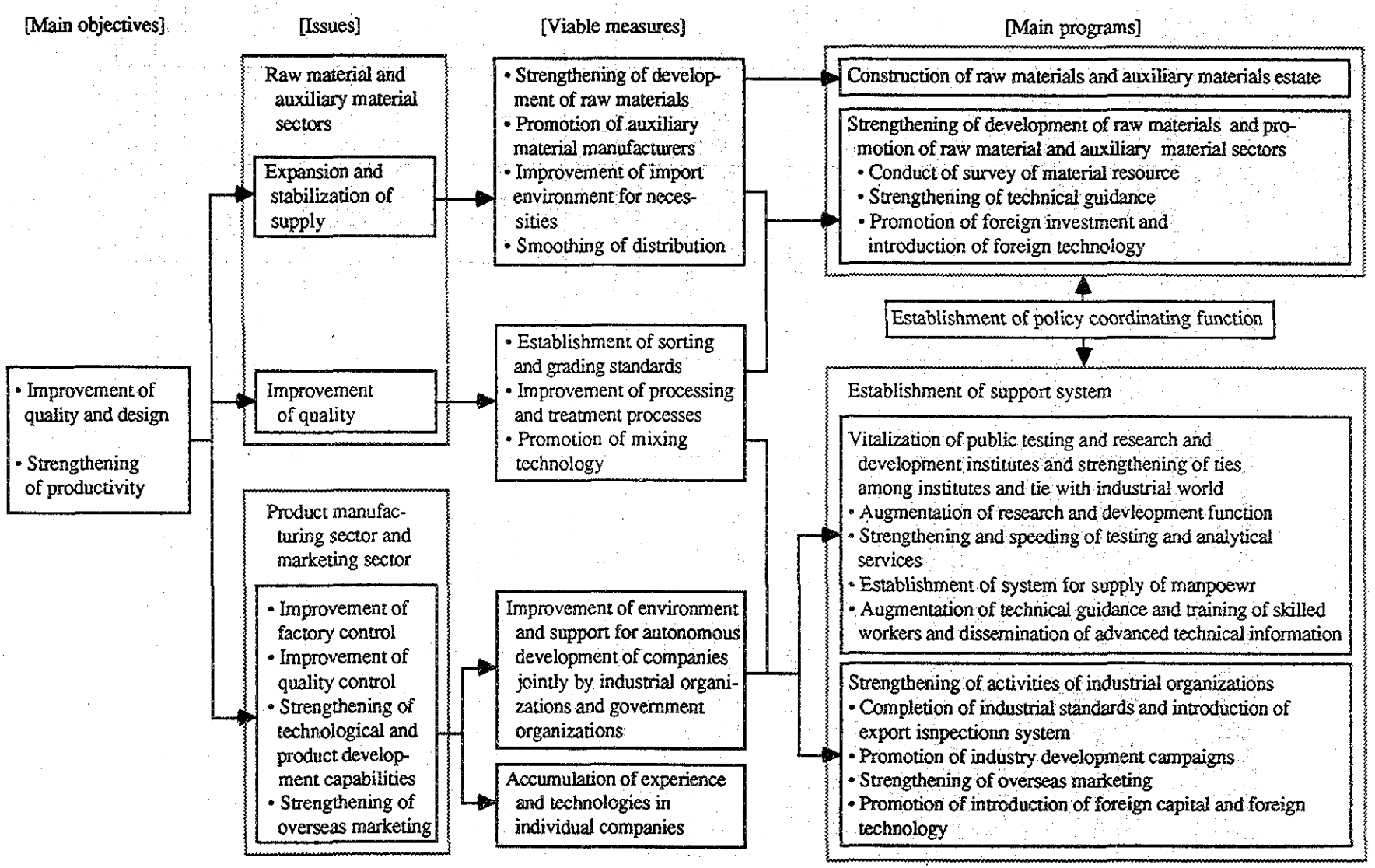


**Fig. IV-3:Schedule for Implementation of Promotion Programs for Ceramic Products Industry**

| | 1st year | 2nd year | 3rd year | 4th year | 5th year |
|---|---|---|---|---|---|
| **Strengthening of development of raw materials and promotion of raw material and auxiliary material sectors**<br>• Full-scale survey of resources of raw materials<br>• Strengthening of technological guidance to raw material manufacturers<br>• Introduction of foreign capital and foreign technology to auxiliary material sector | | | | | |
| **Construction of raw material and auxiliary material estate** | | | | | |
| **Promotion of activities of industrial organizations**<br>• Promotion of introduction of foreign capital and foreign technology<br>• Technological and managerial guidance to individual companies<br>• Strengthening overseas marketing<br>• Completion of industrial standards and introduction of export inspection system<br>• Promotion of development campaigns, etc. | | | | | |
| **Augmentation of public testing and research and development institutes and strengthening of ties among organizations and ties with industrial world**<br>• Augmentation of research and deveopment functions<br>• Strengthening of testing and analytical services<br>• Establishment of system for supply of manpower<br>• Augmentation of technological guidance, technical training, dissemination of advanced technical information, etc. | | | | | |
| **Establishment of policy coordinating function** | | | | | |

## 2. Aluminium Downstream Products Industry

### 2-1 Issues and Measures

The issues and measures in the aluminium product industry of Indonesia may be arranged into the following three groups of manufacturing processes: (1) rolling, extrusion, and platework, (2) die casting and other casting, and (3) aluminium manufacture as a whole and are summarized as below.

These measures should primarily be taken by private companies. When private companies would find it difficult to sufficiently handle them due to lack of funds, facilities, or manpower, support will become necessary. As support from outside the companies, consideration may be given to support from public organizations, technical transfers from foreign companies, and cooperation of overseas economic cooperation organizations.

The recommended goals of the improvement of the business environment for the aluminium industry are [1] the reduction of the high import tariffs on plate and [2] the introduction of tax incentives for capital investment.

(1) Rolling, Extrusion, and Platework

1) Modernization of rolling facilities

The pull-over system for rolling, a system which has already disappeared from the advanced countries is still in use. The coil rolling systems used are also antiquated. Exports would require that the international level of competitiveness be reached in terms of quality. It would be desirable if the antiquated facilities could be replaced.

2) Improvement of surface treatment

Treatment for providing composite films and control over film thickness

3) Improvement of quality of billets

Modernization of melting, casting, and soaking facilities for producing high quality billets

(2) Die Casting and Other Casting

1) Die casting machines

[1] Automation of manufacturing processes
[2] Establishment of system of control over maintenance.
[3] Improvement of layout of manufacturing facilities

2) Dies

[1] Learning design technology
[2] Measures for increasing lifetime of dies
Modernization of the heat treatment and surface treatment facilities is necessary.
[3] Maintenance of dies

Preventive measures before damage and periodic inspections

3) Quality control of alloys

[1] Improvement of quality of dies and establishment of inspection system for same
Strengthening of quality control system, introduction of inspection equipment, or testing and inspection by public organizations

[2] Improvement of storage methods of alloys

(3) Aluminium Manufacture as a Whole

1) Understanding and practical application of quality control

[1] Differentiation between good products and defective products
[2] Improvement of inspection methods and establishment of system for same
[3] Improvement of handling of products
[4] QC activities and development of human resources for the same

2) R&D and development of human resources

3) Establishment and dissemination of standards, augmentation of testing and inspection organizations, and support to private companies

[1] Establishment of industrial standards
[2] Strengthening and augmentation of testing and inspection organizations

4) Collection of information and provision to companies

[1] Collection and provision of technical and product development information
[2] Collection and provision of marketing information

5) Development of human resources through education and training

## 2-2 Measures by Products and Company Ranks

Major issues for the promotion of aluminium downstream products industry in Indonesia are summarized in 2-1-1 of section III (Table III-4). Measures to solve or improve these issues are shown in Table IV-1 by products and company ranks.

## 2-3 Recommendations on Main Programs

All of the measures for promotion of the aluminium industry are important and implementation of all of them would be desirable. Due to limitations in resources, manpower, etc., however, the realistic approach would be to start with the programs of the highest priorities. Therefore, recommendation is made of the following five programs for which there are existing implementing organizations, which would be easy to implement, which are high in urgency, and which it is believed there would be a great effect on industry.

(1) Program 1: Augmentation and Strengthening of Research and Development Institutes of Ministry of Industry

There are two research institutes which provide technical support for the aluminium product industry: the Institute for Development of the Metal and Engineering Industries (IDMMI) and the Institute for R&D for Material and Technical Products (IRDMTP). At the present time, these institutes do not have almost any facilities relating to the aluminium industry with the exception of some simple casting and heattreatment facilities and also lack staffs. They are not so sufficient in manpower or facilities as to provide support to the aluminium manufacturing industry.

Therefore, it is recommended that support be given to the industry as a whole by [1] improving facilities by strengthening and augmenting testing and inspection functions, [2] establishing a system of accreditation for engineers, [3] promoting exchanges with overseas research institutes and companies, [4] developing human resources both inside and outside of the institutes by strengthening the engineer training functions, and [5] strengthening the technical support system.

(2) Program 2: Technical Support from Experts to Private Companies

Regarding the determining factors of the level of technology, i.e., the "materials, machinery, methods, and manpower for controlling the same", experts will visit individual companies and make diagnoses and provide guidance so as to solve problems. This program would be comprised of a short term program for providing roving guidance to medium sized companies and medium and long term programs aimed at promoting leading companies into business leaders.

(3) Program 3: Export Promotion Program

It is proposed that an export promotion program be formulated with consideration given to the features of the products, the technical level of companies, the export markets, etc., that the increase of exports be promoted through overseas market research, enquiries services, provision of information, guidance in technology and design, and participation in exhibitions and seminars.

(4) Program 4: Promotion of Foreign Investment and Technical Tieups

Investment by export oriented foreign companies would both increase exports of the products and promote transfer of technology. Technical tieups with foreign companies would also be a way of effectively transferring technology and realizing exports. It is recommended that foreign investment and technical tieups be promoted focusing on the aluminium product industry.

(5) Program 5: Development of New Products

New product development requires production facilities and technical level able to handle manufacture of new products, research and development, and manpower able to handle development and marketing. There are limits to what can be done in this regard in the Indonesian aluminium product companies, and support from outside the companies is required. It is recommended that the above-mentioned programs (1) to (4) be organically linked for the promotion of development of new products.

## Table IV-1: Measures by Aluminium Products and Ranks of Companies (Extruded Shapes)

| | A | B | C |
|---|---|---|---|
| Manufacturing processes and level of technology | 1. Export of 80 percent of products to Japan. Quality also first rank even by world standards. Factory control of same level as in Japan. Company able to resolve problems and perform marketing in-house. Need not be covered by promotional measures.<br>2. Investment by foreign capital is desirable from viewpoints of increasing exports, developing domestic demand, and raising level of technology and disseminating same. | 1. Process control and quality control performed under guidance of overseas engineers. Working to raise level of production technology and stabilize quality. Should be covered by promotional measures.<br>2. Machinery and equipment are of old types over 20 years old. There are limits to mechanization and automation.<br>3. Therefore, there are problems in precision of products.<br>4. Modernization and automation of manufacturing facilities and assistance in same.<br>5. Raising of level of die design and fabrication technology and maintenance.<br>6. Modernization of billet manufacturing facilities and improvement of technology thereof.<br>7. Handling of increased demand for shapes of high strength alloys of 2000 series and corrosion resistant of 5000 series.<br>8. Acquisition and application of overseas technical information.<br>9. Acquisition and use of overseas marketing information. | The level of interest in quality, dimensional precision, etc. of products is in whether Indonesian standards are met. There is no hope for improvement of quality in so far as there is no competition among companies. Need not be covered by promotional measures. |
| Factory control and quality control | | Guidance in quality control and strengthening of product inspection. | |
| Product development | Content of OEM production will be made more sophisticated and quantity increased in accordance with level of technology and control. | OEM production of storm doors, fences, verandas, and other standard products. | |
| Development of human resources | Continuation of training and guidance by Japanese parent company. | Training of middle level engineers by education and training of engineers. | |

**(Aluminium Plate)**

| | A | B | C |
|---|---|---|---|
| Manufacturing processes and level of technology | 1. Acquisition and application of overseas technical information.<br>2. Technical tieup with foreign companies and guidance by foreign experts for raising level of technology, developing new products, and training engineers. | 1. Modernization and automation of facilities and assistance for same.<br>2. Modernization of slab manufacturing equipment and improvement of technology for same.<br>3. Improvement of surface treatment technology.<br>4. Acquisition and application of overseas technical information.<br>5. Guidance by foreign engineers for implementation of above 2 to 4. | In future, it will become necessary to changeover to coil rolling. |
| Factory control and quality control | 1. Upgrading of types and quality so as to gradually change over from current imports of window blind materials etc. to domestic products.<br>2. Export to advanced countries requires higher level of inspection in all processes. | 1. Introduction of inspection facilities in all processes and inspection using the same.<br>2. Guidance for the above. | |
| Product development | 1. Expansion of applications from utensils, roofing plate, and foil to electrical equipment parts, vehicular members, and packaging materials and development of new demand by same.<br>2. Currently there are no domestic competitors and tariff protection is enjoyed, so production is profitable even with current demand.<br>3. Surplus supply directed for exports. | 1. Possible expansion of application from utensils, roofing plate, and foil to electrical equipment parts, vehicular members, and packaging.<br>2. Positive development of new products and creation of new demand through government guidance. | |
| Development of human resources | Education and training of engineers | Education and training of engineers. | |

**(Plate Products (Aluminium Foil))**

| | B |
|---|---|
| Manufacturing processes and level of technology | 1. Necessity of dealing with [1] strain in shape of plate and [2] defects in material, the causes of foil breakage.<br>2. [1] may be dealt with by use of a system (AFC) for automatic control of the shape during rolling.<br>3. [2] may be dealt with by cleaning of the melt during casting, removal of roller scratches and slitter defects during rolling, and keeping all processes clean so as to prevent the intrusion of foreign matter.<br>4. Introduction of technology for production of foil of less than 7 microns thickness. |
| Product development | 1. Production of foil trays, gas range mats, and other foil products.<br>2. Production of laminates of foil with paper and vinyl. |
| Development of human resources | Receipt of guidance in development and education of human resources through technical tieups with companies of advanced countries. |
| Others | Promotion of investment by competing manufacturers so as to prevent problems caused by one company monopoly. |

**(Plate Products (Utensils))**

| | A | B | C |
|---|---|---|---|
| Manufacturing processes and level of technology | 1. Necessity of use of high quality aluminium plate.<br>2. Improvement of access to imported plate through reduction of tariffs on imports and improvement of quality through intensification of competition between domestic plate and imports. | Due to rolling by pull-over system, use of old fashioned press machines, the inability to perform surface treatment, etc., "inexpensive and inferior" products are supplied to the domestic market. For the time being, the promotional measures will be aimed at the A rank companies. | Due to rolling by pull-over system, use of old fashioned press machines, the inability to perform surface treatment, etc., "inexpensive and inferior" products are supplied to the domestic market. For the time being, the promotional measures will be aimed at the A rank companies. |
| Product development | 1. Promotion of technical tieups (OEM production etc.)<br>2. Provision of overseas marketing information.<br>3. Making use of experience in press work etc. to go beyond utensils and advance into production of parts for electrical machinery and automobiles. | | |
| Development of human resources | Development of manpower able to perform quality and process control through technical tieups with companies in same fields in advanced overseas countries. | | |

## (Plate Products (Roofing Plate))

| | |
|---|---|
| | 1. Elimination of the monopoly on domestic supply caused by the tariff protection of raw material aluminium coil and creation of a state of competition with imports so as to improve the precision of thickness and flatness of the aluminium coil.<br>2. Use of high quality aluminium coil as materials and proceeding with development of new products in the field of roll forming such as siding materials for walls, stormdoors, and other building materials. |

## (Plate Products (Impact Tubes and Cans))

| A | B | C |
|---|---|---|
| Manufacturing processes and level of technology | Improvement of slab quality.<br>Improvement of finished printing. | Improvement of slab quality.<br>Improvement of finished printing. |
| Factory control and quality control | Analysis of composition in all melted lots. | Analysis of composition in all melted lots. |
| Product development | Manufacture of auto parts, optical parts, etc. through improvement of forging technology. | |
| Development of human resources | Guidance and education by engineers of advanced foreign countries. | |

**(Die Castings)**

| | A | B | C |
|---|---|---|---|
| Manufacturing processes and level of technology | 1. Analysis of elements of manual work in each process and replacement of same with automatic equipment able to deal with the same.<br>2. Examination and establishment of a measurement and control system for the melt temperature, die temperature, flow rate of the cooling water, and adjustment of the temperature.<br>3. Sufficient acquisition of basics of die design, casting theory, die casting machine performance, etc. sufficiently learned.,<br>[1] Product specifications and detailed product design<br>[2] Shrinkage allowance and dimensional precision<br>[3] Dynamic issues and die design<br>[4] Basic design and detailed design of casting plan<br>[5] Design of die cooling plan<br>[6] Die lifetime<br>[7] Behavior of injection apparatus of die casting machine and hydraulic considerations in conditions for charging products.<br>4. Implementation of heat treatment and surface treatment of dies.<br>5. Maintenance control of die casting machines and dies to be performed by making a system of checks comprised of daily, weekly, monthly, three monthly, six monthly, and yearly inspection items.<br>6. Selection from among the methods for prevention of porosity now being developed the method most suitable for Indonesia (vacuum die casting method, reduced pressure die casting method, oxygen atmosphere die casting method, gas free method, local pressured die casting method, high pressure coagulation method, squeeze casting method, etc.) | | 1. Analysis of elements of manual work in each process and replacement of same with automatic equipment able to deal with the same.<br>2. Examination and establishment of a measurement and control system for the melt temperature, die temperature, flow rate of the cooling water, and adjustment of the temperature.<br>3. Sufficient acquisition of basics of die design, casting theory, die casting machine performance, etc. sufficiently learned.,<br>[1] Product specifications and detailed product design<br>[2] Shrinkage allowance and dimensional precision<br>[3] Dynamic issues and die design<br>[4] Basic design and detailed design of casting plan<br>[5] Design of die cooling plan<br>[6] Die lifetime<br>[7] Behavior of injection apparatus of die casting machine and hydraulic considerations in conditions for charging products.<br>4. Implementation of heat treatment and surface treatment of dies.<br>5. Maintenance control of die casting machines and dies to be performed by making a system of checks comprised of daily, weekly, monthly, three monthly, six monthly, and yearly inspection items.<br>6. Selection from among the methods for prevention of porosity now being developed the method most suitable for Indonesia (vacuum die casting method, reduced pressure die casting method, oxygen atmosphere die casting method, gas free method, local pressurization die casting method, high pressure coagulation method, squeeze casting method, etc.)<br>7. Arrangement of cold chamber and hot chamber machines completely separated from each other. |

| A | B | C |
|---|---|---|
| | | 8. Introduction of hot charge system where alloys are melted in separate melting furnaces and the melt is supplemented by a holding furnace.<br>9. Improvement of deburring (work for removing of portions not part of product) and method of storing good products.<br>10. Storage in die receptacles, washing casted dies, applying rust preventing oil to them for storage, polishing seized portions, correcting dimensions, and repairing problematical portions of function portions (ejector pin, movable core, guide pin, sprue bush, sprue pin, cooling pipe). |
| Factory control and quality control | 1. Raising consciousness of employees as a whole of quality. During work, giving instructions as to quality demanded for the product.<br>2. Maintenance of machinery and tools.<br>3. Implementation of inspection of initial castings during mass production.<br>4. Standardization of work.<br>5. Livening up of QC activities. | 1. Raising consciousness of employees as a whole of quality. During work, giving instructions as to quality demanded for the product.<br>2. Maintenance of machinery and tools.<br>3. Implementation of inspection of initial castings during mass production.<br>4. Replacement of machinery<br>5. Improvement of work methods<br>6. Standardization of work.<br>7. Thorough attention drawn to organization, orderliness, and cleanliness. |
| Product development | Introducing foreign technology, checking the results of the casting, and using the design plan of the good products as the general rule so as to build up know-how. Basic design of [1] product design, [2] die design, [3] casting plan required as basic knowledge. | 1. Introduction of well-rounded facilities.<br>2. Introduction of technology. |
| Development of human resources | Periodic education of workers. Education starting from rudimentary issues relating to organization and orderliness and also alloys, dies, die casting machines, casting, quality, and safety. | Periodic education of workers. Education starting from rudimentary issues relating to organization and orderliness and also alloys, dies, die casting machines, casting, quality, and safety. |

**Measures (Low Pressure Die Castings)**

| A |
| --- |
| 1. Problems resolved by guidance from technical tieup partner and high export ratio. |

## Fig. IV-4: Promotion Programs for Aluminum Downstream Products Industry

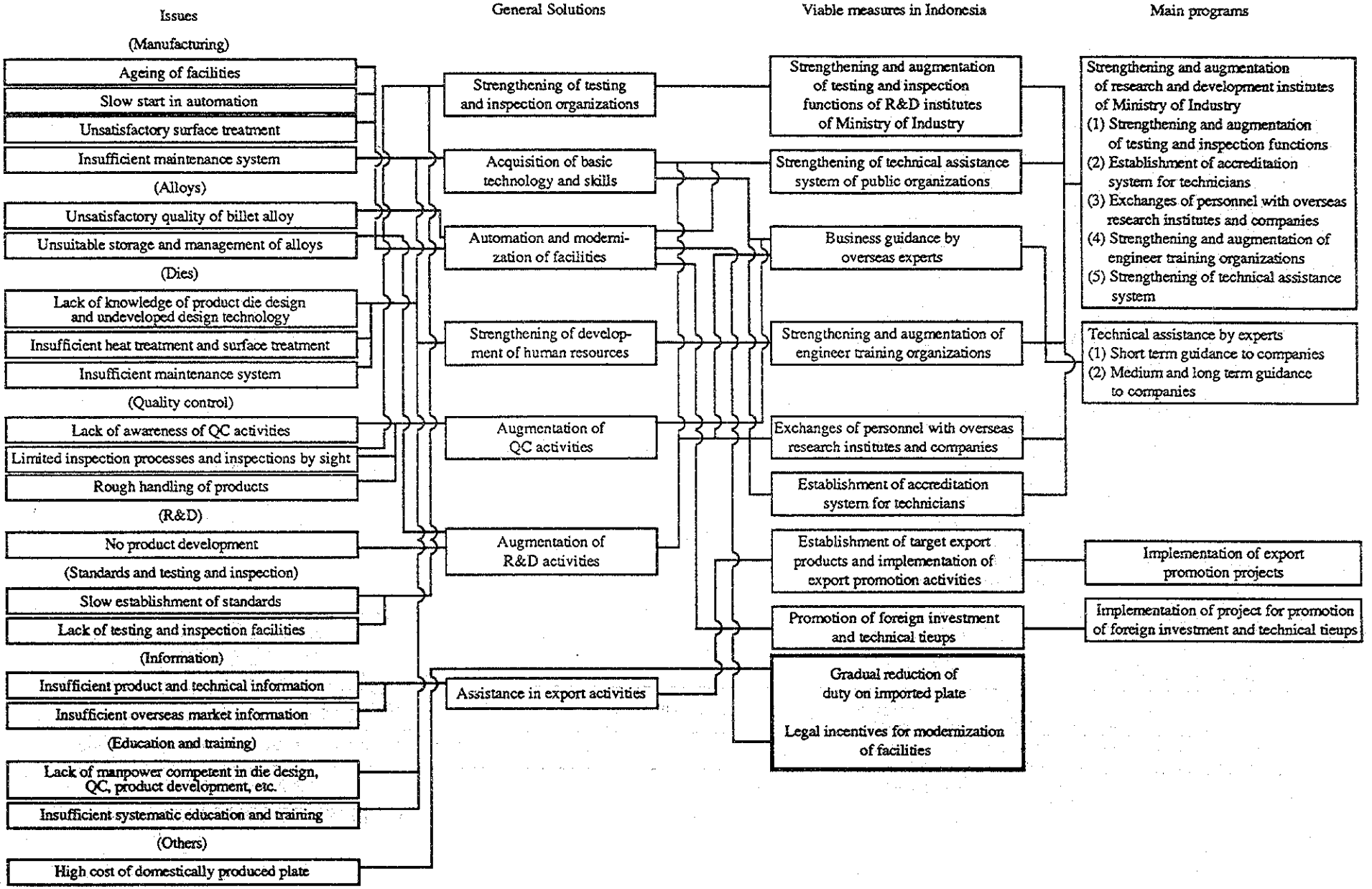
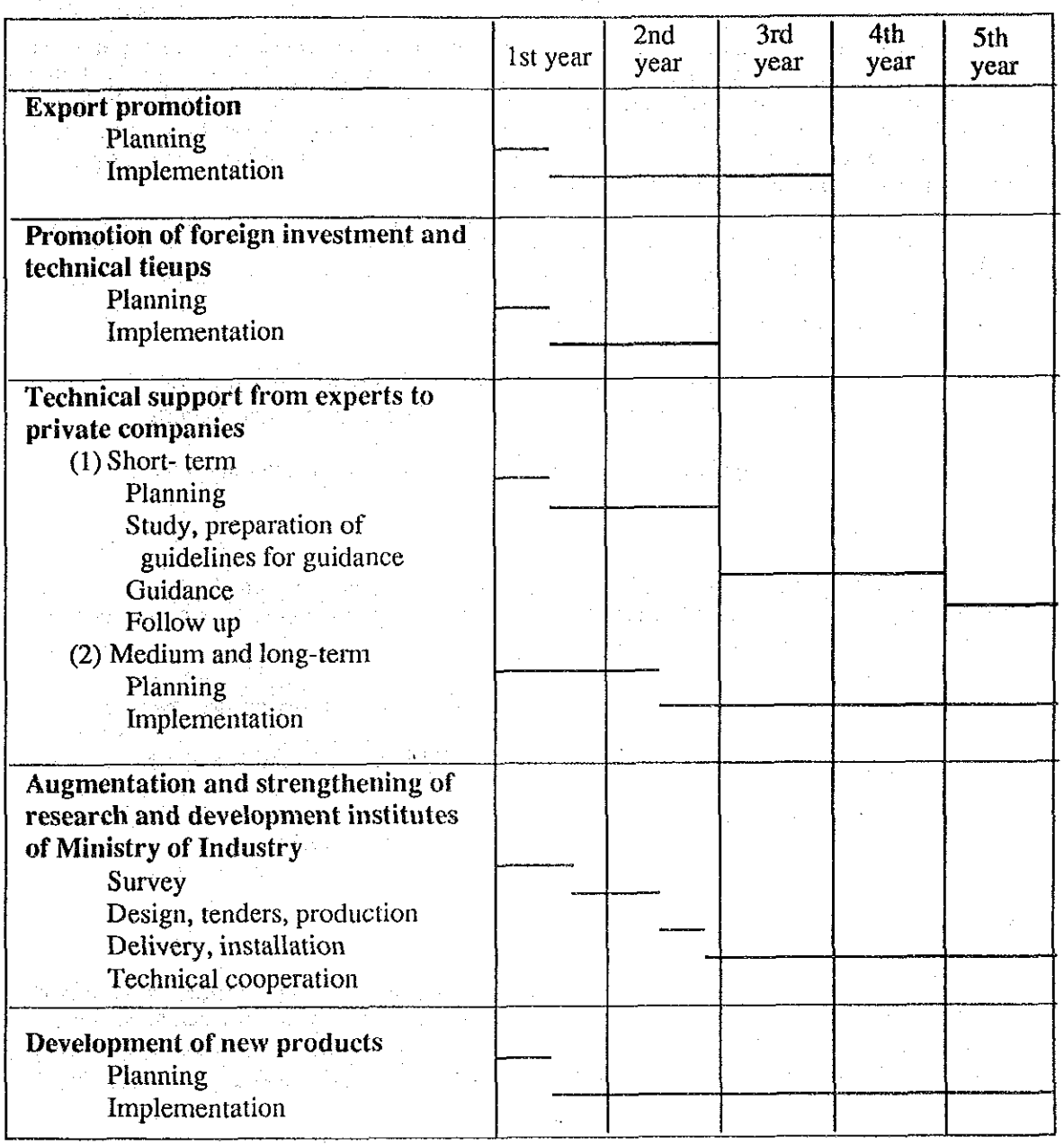


**Fig.IV- 5: Schedule for Implementation of Promotion Programs for Aluminium Downstream Products Industry**



# 3. Plastic Products Industry

## 3-1 Issues and Measures

At present, the Indonesian plastic products industry remains in the developing stages in terms of production volume, product quality and diversity.

Although some firms have achieved technical standards almost on a par with international levels, many others stay in the developing stages. Concerning the latter group of companies, there are numerous issues which remain to be resolved. There are limits, however, to what individual companies can accomplish on their own, and progression to the next stage of development will clearly require a great deal of public support in addition to independent efforts by companies.

Suggested measures will be offered for the following nine common issues for all products and company levels.

(1) Raw Materials Procurement

Measures
- 1) Standardization of raw material acceptance quality
- 2) Creation of a reliable supply system for raw materials
- 3) Review of the current tariff system
- 4) Promotion of localized production of raw materials

(2) Production Process

Increased production efficiency and the improvement of product quality will require the promotion of standardization, the improvement of measurement and control technologies, and the modernization of facilities.

Measures
- 1) The improvement of maintenance and other facility management technologies
- 2) The modernization of machinery, metal dies and other facilities
- 3) Improvements in measurement and control technologies
- 4) Promotion of standardization (establishment of operation standards and other standards by individual companies)

(3) Technical Standards (Facilities and Technology)

The plastic products industry suffers from a shortage of specialized technicians and technical information. Individual companies are limited in what they can accomplish, and assistance from public support systems will be indispensable to quantitative and qualitative increases in the pool of specialized technicians and the collection of information.

Measures
- 1) Securing and training of specialized technicians
- 2) Collection and effective utilization of technical information from local and foreign sources
- 3) Establishment and improvement of manufacturing and molding technologies
- 4) Promotion of blending technologies
- 5) Promotion of new product development

(4) Product and Design Development

Greater competitiveness on the international market will require the ability to develop original product designs. Therefore, product and design development technologies must be introduced from the industrialized nations, and at the same time the pool of development-related industrial designers must be increased both qualitatively and quantitatively.

Measures
- 1) Introduction of industrialized nation technology for the development of products and designs
- 2) Training of industrial designers

(5) Plant Management and Quality Control

At present, most quality control at individual companies consists simply of visual inspections, and quality inspection equipment maintained by the firms is inadequate.

Measures
- 1) Introduction of quality control systems
- 2) Establishment of education programs
- 3) Thoroughgoing delivery management
- 4) Improvement of safety and hygiene management
- 5) Thoroughgoing pollution-prevention measures

(6) Staff Training

Training programs for mid-level technicians will require (a) enhancement of skills among graduates of technical colleges and universities and other technicians newly entering the industry; and (b) enhancement of skills among currently employed technicians. (a) will require both quantitative and qualitative improvements — the latter involving renovation of curriculum content and the expansion of facilities — at training institutes such as technical schools, technical colleges, and polytechniques. (b) will require the expansion of government research institutes capable of helping companies with employee training.

Measures
- 1) Expansion of the pool of mid-level technicians
- 2) Creation of in-house and external educational programs

(7) Fostering of Related Industries

The plastic products industry is closely tied to the metal die industry and spare parts industries for reparing molding equipment and metal molds as well as user sectors. Without growth and development in these fields, it is impossible to hold much hope for the future development of the plastic products industry.

Measures
- 1) Promotion of metal die industry
- 2) Promotion of spare parts industry for reparing molding equipment and metal molds
- 3) Promotion of user industries

(8) Establishment of Support Systems

There are limits to what individual companies can accomplish in terms of problem solving, and the main role of public support systems is to provide concentrated assistance to companies in the necessary fields.

Measures
1) Establishment of government research and testing facilities
2) Establishment and enhanced application of SII standards
3) Enhancement of the export inspection system
4) Creation of a manpower training system
5) Collection of technical information from local and foreign sources

(9) Marketing Strategies

The strengthening of marketing activities is of the first priority for both export promotion and the development of the domestic market.

Measures
1) Introduction and establishment of marketing concepts
2) Collection of information concerning foreign markets
3) Participation in domestic and foreign trade fairs and exhibitions
4) Exchanges of information with foreign buyers
5) Training of personnel well-versed in the export business

## 3-2 Measures by Products and Company Levels

Major issues for the promotion of plastic products industry in Indonesia are summarized in 3-1-1 of section III (Table III--6) by products and company levels. Measures to solve or improve these issues are shown in the following Table IV-2 by products and company levels.

**Table IV-2: Measures by Plastic Products and Company Levels (Injection Molded Products)**

| | Level A | Level B | Level C | Level D |
|---|---|---|---|---|
| Raw materials procurement | • A stable supply — in terms of quantity, quality and cost — of general-purpose raw material resins<br>• Domestic production of general-purpose raw material resins<br>• Diversification of raw material resin grades | • A stable supply — in terms of quantity, quality and cost — of general-purpose raw material resins<br>• Domestic production of general-purpose raw material resins<br>• Diversification of raw material resin grades | • A stable supply — in terms of quantity, quality and cost — of general-purpose raw material resins<br>• Domestic production of general-purpose raw material resins<br>• Diversification of raw material resin grades | • A stable supply — in terms of quantity, quality and cost — of general-purpose raw material resins<br>• Domestic production of general-purpose raw material resins<br>• Diversification of raw material resin grades |
| Production process | • Introduction of automatic control-systems for molding conditions<br>• Improvement of metal die maintenance technologies<br>• Establishment of molding technologies for highly-functional raw materials | • Systematization of raw material measurement, blending and transport<br>• Improvements in maintenance technologies for molding facilities and metal dies<br>• Enhancement of measurement and control equipment<br>• Introduction of an objective inspection system | • Establishment and standardization of molding conditions<br>• Modernization of raw material blending and transport facilities<br>• Improvements in maintenance technologies for molding facilities and metal dies | • Establishment and standardization of molding conditions |
| Technical standards (facilities, technology) | • Training of highly-skilled production technicians<br>• Extensive independent efforts to improve productivity and product quality<br>• Improvement of metal die repair and maintenance technologies<br>• Training of technicians for the design of molding machine screws, metal dies, etc. | • Training of mid-level production technicians<br>• Efforts to improve productivity and product quality<br>• Improvement of metal die repair and maintenance technologies<br>• Improvement of in-house maintenance technologies for molding equipment<br>• Securing of technicians | • Training of ordinary machine operators<br>• Improvements in molding facility maintenance technologies<br>• Improvement and enhancement of blending technologies<br>• Securing of technicians | • Training of ordinary machine operators<br>• Improvement of molding facilities |
| Product and design development | • Utilization of government plastic research institutes<br>• Training of industrial designers<br>• Acquisition of advanced expertise in product and design development<br>• Introduction of technology from the industrialized nations | • Utilization of government plastic research and development institutes<br>• Training of industrial designers<br>• Improvements in product and design development expertise | • Utilization of government plastic research and development institutes<br>• Promotion of product and design development expertise | • Recognition of the importance of product and design development |

| | Level A | Level B | Level C | Level D |
|---|---|---|---|---|
| Plant management, quality control | • Utilization of government plastic research and devleopment institutes<br>• Use of computerized production and plant management systems and development of TQC activities | • Utilization of government plastic research and development institutes<br>• Introduction of quality inspections and inspection equipment<br>• Mastery of statistical quality control methods<br>• Standardization of product quality, manufacturing conditions and operations | • Utilization of government plastic research and development institutes<br>• Introduction of necessary quality inspections and inspection equipment<br>• Introduction of statistical quality control methods<br>• Standardization of product quality, manufacturing conditions, and operations | • Recognition of the importance of quality control |
| Fostering of related industries | • Promotion of metal die manufacturers<br>• Promotion of local user industries | • Promotion of metal die manufacturers<br>• Promotion of local user industries | • Promotion of metal die manufacturers<br>• Promotion of local user industries | • Promotion of metal die manufacturers<br>• Promotion of local user industries |
| Staff training | • Training of research personnel and managers<br>• Improvement of in-house education programs | • Training of mid-level technicians and managers<br>• Improvement of in-house education programs | • Training of mid-level technicians and managers<br>• Improvements in the skills levels of ordinary machine operators | • Improvements in the skills levels of ordinary machine operators |
| Establishment of support systems | • Enhancement of government support systems | • Enhancement of government support systems | • Enhancement of government support systems | • Enhancement of government support systems |
| Marketing strategies | • Gathering of foreign market information<br>• Greater diversification of product lines, higher added value | • Gathering of foreign market information<br>• Establishment of marketing strategies | • Gathering of foreign market information<br>• Introduction of marketing concepts | • Introduction of marketing concepts |

## Films and sheets

| | Level A | Level B | Level C | Level D |
|---|---|---|---|---|
| Raw material procurement | • A stable supply — in terms of quantity, quality and cost — of general-purpose raw material resins<br>• Domestic production of general-purpose raw material resins<br>• Diversification of raw material resin grades | • A stable supply — in terms of quantity, quality and cost — of general-purpose raw material resins<br>• Domestic production of general-purpose raw material resins<br>• Diversification of raw material resin grades | • A stable supply — in terms of quantity, quality and cost — of general-purpose raw material resins<br>• Domestic production of general-purpose raw material resins<br>• Diversification of raw material resin grades | • A stable supply — in terms of quantity, quality and cost — of general-purpose raw material resins<br>• Domestic production of general-purpose raw material resins<br>• Diversification of raw material resin grades |
| Production process | • Introduction of foreign technology for the manufacture of high value-added products and foodstuff packaging | • Introduction of foreign technology for the manufacture of high value-added products and foodstuff packaging | • More advanced equipment and facilities | • Establishment and standardization of manufacturing conditions |
| Technical standards (facilities, technology) | • Fostering of capabilities for the development of advanced technology | • Fostering of capabilities for the development of new technology | • Fostering of capabilities for the development of basic technologies | • Reevaluation of production facilities<br>• Securing of technicians |
| Product and design develoment | • Establishment of a research structure for high value-added products | • Establishment of a product development structure | • Introduction of a product development structure | • Recognition of the need for product development |
| Plant managment, quality control | • Improvements in delivery management systems | • Effective utilization of inspection results | • Enhancement of equipment | • Recognition of the need for quality control |
| Fostering of related indus tries | • Promotion of development in user industries | • Promotion of development in user industries | • Promotion of development in user industries | • Promotion of development in user industries |
| Staff training | • Training of high-level technicians and managers<br>• Establishment of effective in-house and external training programs for technicians | • Training of mid-level technicians and managers<br>• Improvements in in-house education programs | • Training of mid-level technicians and managers<br>• Improvements in the skills levels of ordinary machine operators | • Improvements in the skills levels of ordinary machine operators |
| Establishment of support systems | • Enhancement of government support systems | • Enhancement of government support systems | • Enhancement of government support systems | • Enhancement of government support systems |
| Marketing strategies | • Gathering of foreign market information<br>• Greater diversification of product lines, higher added value | • Gathering of foreign market information<br>• Establishment of marketing strategies | • Gathering of foreign market information<br>• Introduction of marketing concepts | • Introduction of marketing concepts |

## Woven bags

| | Level A | Level B | Level C | Level D |
|---|---|---|---|---|
| Raw material procurement | • A stable supply — in terms of quantity, quality and cost — of general-purpose raw material resins<br>• Domestic production of general-purpose raw material resins<br>• Diversification of raw material resin grades | • A stable supply — in terms of quantity, quality and cost — of general-purpose raw material resins<br>• Domestic production of general-purpose raw material resins<br>• Diversification of raw material resin grades | • A stable supply — in terms of quantity, quality and cost — of general-purpose raw material resins<br>• Domestic production of general-purpose raw material resins<br>• Diversification of raw material resin grades | • A stable supply — in terms of quantity, quality and cost — of general-purpose raw material resins<br>• Domestic production of general-purpose raw material resins<br>• Diversification of raw material resin grades |
| Production process | • Automation of systems for raw material measurement, blending and transport | • Improvement of systems for raw material measurement, blending and transport<br>• Utilization of measurement and control equipment<br>• Improvement of objective inspection systems | • Modernization of systems for raw material measurement, blending and transport<br>• Establishment and standardization of manufacturing conditions<br>• Enhancement of measurement and control equipment<br>• Introduction of objective inspection systems | • Establishment and standardization of manufacturing conditions |
| Technical standards (facilities, technology) | • Training of highly-skilled production technicians<br>• Independent efforts to improve productivity and product quality | • Training of mid-level production technicians<br>• Training of skilled workers in production technology | • Training of production technicians<br>• Securing of technicians | • Training of ordinary machine operators<br>• Reevaluation of production facilities |
| Product and design development | • Greater promotional activities for new products by industry and companies | • Fostering of capabilities for the development of new products | • Establishment of a product development structure | • Recognition of the need for product development |
| Plant management, quality control | • Improvements in delivery management systems | • Training of technicians well-versed in plant management and quality control | • Enhancement of facilities and equipment for plant management and quality control<br>• Establishment of inspection standards<br>• Thorough plant standards | • Recognition of the need for quality control |

| | Level A | Level B | Level C | Level D |
|---|---|---|---|---|
| Staff training | • Training of mid-level technicians and managers<br>• Improvement of in-house education programs | • Training of mid-level technicians and managers<br>• Improvements in in-house education programs | • Training of mid-level technicians and managers<br>• Improvements in the skills levels of ordinary machine operators | • Improvements in the skills levels of ordinary machine operators |
| Establishment of support systems | • Enhancement of government support systems | • Enhancement of government support systems | • Enhancement of government support systems | • Enhancement of government support systems |
| Marketing strategies | • Gathering of foreign market information<br>• Greater diversification of product lines, higher added value | • Gathering of foreign market information<br>• Establishment of marketing strategies | • Gathering of foreign market information<br>• Introduction of marketing concepts | • Introduction of marketing concepts |

## 3-3 Recommendations on Main Programs

Based on the issues and measures described before, those areas thought to be necessary for providing an immediate boost to the plastic products industry and those thought to require work in the medium and long-term were brought together in the following four programs.

(1) Program 1: Strengthening and Vitalization of Public Support Systems

The promotion of plastic exports will require products capable of competing on the international market. In order for products to become competitive, improvements will be required in technology (mainly for quality and price) and marketing, which will involve the development of products suited to the target market coupled with sales promotion activities. Strong support from public support systems will be needed to improve the technical standards of current products. The following improvements are suggested for public support systems:

(1) Provision of public research and development institutes (IRDLAI and IRDCRI)
(2) Establishment of national standards and enhancement of their application
(3) Creation of an export inspection system
(4) Creation of a manpower training program
(5) Collection of technological information from local and foreign sources

(2) Program 2: Technical and Management Guidance for Individual Companies

In addition to policies such as those in Program 1 targeting industry as a whole, one-to-one guidance for individual companies is also effective in improving technical standards in the plastic products industry. Local experts should be hired as instructors and experienced foreign experts invited to Indonesia. Their cooperation would be a shortcut to progress. Technical and management-related guidance for individual firms can be broken down into two categories: 1) short-term corporate guidance to level B and C firms, 2) medium- and long-term corporate guidance to potential level A firms.

(3) Program 3: Promotion of Industry Associations

In the plastic products industry, products and applications are wide-ranging, and there is a wide range of related sectors, both upstream and downstream. And technological progress is rapid, and the industry must take steps to catch up. Consequently, industry associations must strive towards industry development while cooperating with government, the academic community, and industry. Industry associations under the supervision of the Federation of Indonesian Plastics Industries (FIPLASIN) were discussed in the subsector report, and it is suggested that in addition to independent efforts FIPLASIN also undertake joint activities with these associations when the need arises.

(1) Stronger ties with the academic community
(2) Providing a forum for talks with user industries
(3) Implementation of local and foreign PR activities and industrial promotion campaigns
(4) Development of export marketing strategies (acquisition and dissemination of foreign market information, assistance for participation in foreign exhibitions, dispatch and acceptance of missions, etc.)
(5) Manpower training efforts such as implementation of technical training course
(6) Publications (member directory for industrial associations, industry-related statistics and information bulletin, etc.)

(4) Program 4: Promotion of Foreign Investment and Technical Tie-ups

The introduction of foreign capital and technology will be indispensable in bringing Indonesian plastics manufacturers to a level at which they are capable of competing on the international market. Creation of a suitable climate for the introduction of foreign investment and technology should include: (1) preparation of information concerning the Indonesian plastics industry; (2) collection and supply of information concerning foreign companies and investors; and (3) holding of seminars and meetings of study groups concerning joint venture investment and technical tie-ups. Possible activities to promote the introduction of foreign capital and technology are: (1) dispatch of investment and technology attraction missions abroad; (2) acceptance of investment and technical exchange missions.

Following is a graphic representation of promotion policies for the Indonesian plastic products industry.

**Fig. IV-6: Policies for the Development of Plastic Products Industry**

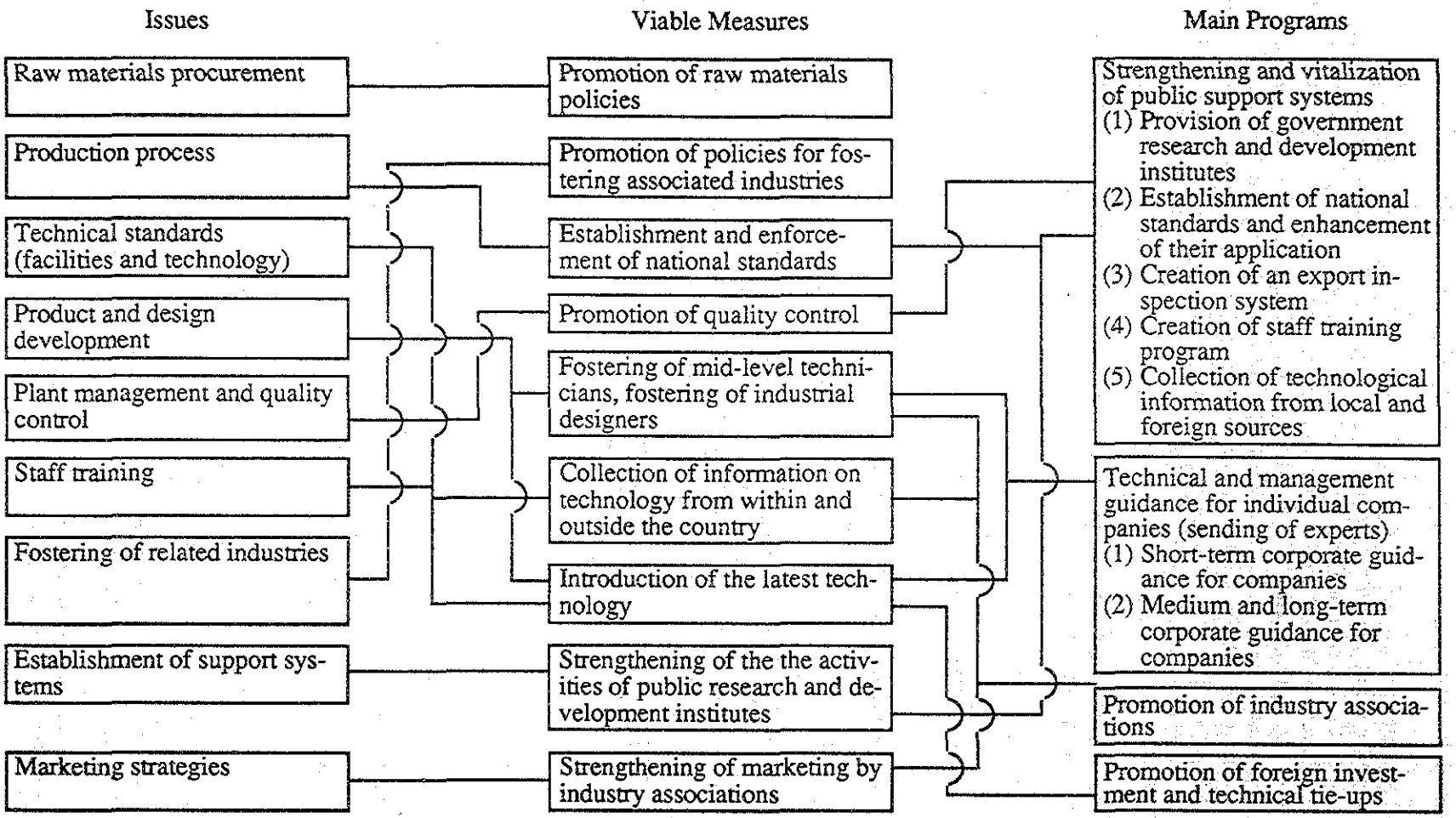


**Fig. IV-7: Schedule for the Implementation of Promotion Programs for Plastic Products Industry**