OCCASION

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

DISCLAIMER

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

FAIR USE POLICY

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

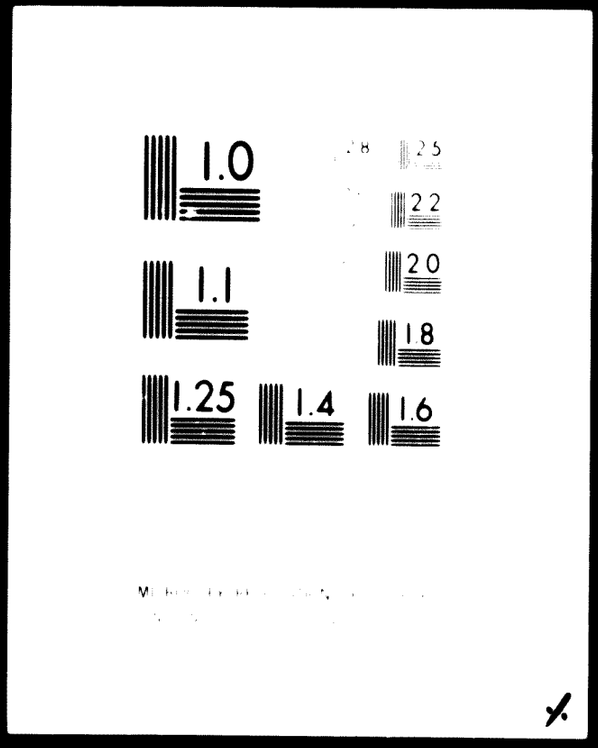
CONTACT

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

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

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

1 OF 1



24x
E

01099

Distr.
RESTRICTED

UNIDO/ICD.180
18 April 1973

ENGLISH

UNITED NATIONS INDUSTRIAL
DEVELOPMENT ORGANIZATION

DEVELOPMENT THROUGH DESIGN 1/

A working paper prepared for UNIDO
at the request of ICSID

by

Gui Bonsiepe
Consultant

000

1/ The views and opinions expressed in this paper are those of the author and do not necessarily reflect the views of the secretariat of UNIDO. This document has been reproduced without formal editing.

Table of Contents

FOREWORD

This paper was prepared in February 1973 in order to serve as a basis for discussion between representatives of UNIDO and ICSID.

The ideas and proposals expressed in this document do not pretend to reflect an official opinion, neither of ICSID nor of any other institution or group of industrial designers. The author considered the guidelines given by UNIDO which refer to the items this paper should cover and to its purpose: to serve as an "eye-opener".

The author has tried to given an account of the role industrial design could play as a development factor in developing countries.

This paper is based on a five years work experience as industrial designer in developing countries in Latin America, part of which was under contract of an international agency. Furthermore there have been consulted publications dealing with the subject matter "Industrial Design/Developing Countries/Development".

There exist today different opinions (reflecting different interests) about the role industry could and should play in developing countries. As no opinion can pretend to possess universal validity, the author has made use of the right to present a point of view which he can stand for and which he considers to do justice to the interests of developing countries.

I. Historical notes

As a profession Industrial Design became recognized about two generations ago, when for the first time university courses in this speciality were offered in Europe and the United States.

As an activity, however, it reaches back to the 19th century, when industrialization started to change the physiognomy of the material world.

As a tool for development, especially export promotion, its role was recognized as early as in the first decade of this century.

As a tool of marketing it became used at the beginning of the thirties.

As an area of government promotion it became established in the mid-forties.

II. Description of industrial design

(a) From art-inclined to technology-inclined interpretations

One interpretation of Industrial Design is as a marriage between Art and Technology or Art and Industry. This interpretation shows the difficulties which arise when a new phenomenon is explained in terms of already existing, known phenomena. It does not give information about the character of industrial design to call it a mixture of art and technology.

In its beginnings, industrial design, which was not called by that name, was assigned the task of embellishing ugly industrial products. Art (with capital letters) was thoughtof as a "civilizing" force for (brutal) industry.

According to another opinion industrial design can be explained as a result of the failure of engineering professions; assuming that engineers possess neither aesthetical sensibility nor the capacity of synthesis, i.e. to see the product as a whole. Whereas the industrial designer is considered as an especially gifted individual whose task consists of coordinating the efforts of other professionals. This opinion lacks empirical basis and results from wishful thinking. It has caused justified suspicion among industrialists and technologists and cannot be considered a tactically adequate way to introduce industrial design into industry.

The afore-mentioned opinions over-emphasize the aesthetical and cultural aspects of industrial design, neglecting other equally or even more important aspects such as use value, productivity and technological innovation.

In the history of industrial design one can observe a shift from art-inclined interpretations to technology-inclined, and even to science-inclined interpretations.

II. (b) The core of industrial design

Industrial design is tightly interwoven with and dependent on the socio-economic context in which it is exercised. Therefore it is unsound to try to formulate a universally acceptable definition of industrial design. There might exist general agreement as to what the industrial designer is doing, but disagreement may arise when the question "what for?" has to be answered. Method and content of this activity may be quite similar in the different parts of the world where industrial design is practised; objectives on the contrary will differ.

Nevertheless, during the course of the last two decades there have been proposed various formulations of industrial design which coincide in certain traits of this activity and which might form a meeting ground for general consensus.

Industrial design centres around the following topics:

(i) It is concerned with the improvement of useability of industrial products which forms part of the over-all quality of a product. From the point of view of industrial design, a product is primarily an object which provides certain services, thus satisfying needs of the user.

(ii) It is concerned with "formal properties" of industrial products. Formal characteristics refer to the over-all appearance of a product, including its three-dimensional configuration, its "physiognomy", its texture and colour. (The term "formal" is preferred to the term "aesthetical", being more descriptive than evaluative.)

(iii) It is an innovative activity. It is one special type of technological innovation.

(iv) It is concerned with the marketability of the product in that it relates the product to its sales market in terms of both raw material supply and product demand.

II. (c) Technological conditions for industrial design

Industrial design is connected with the satisfaction of needs as far as these needs can be fulfilled by physical structures conventionally called "products". In order to be able to fulfill these individual, collective or group needs, industrial design presupposes a technology of production (machinery, materials, labour force, methods of industrial organization, management techniques) and a technology of distribution (marketing including need analysis, product diversification, advertising, assortment policy, product evaluation, packaging). Without these two technologies industrial design cannot exist.

II. (d) Product areas of industrial design

Although the industrial designer deals with product innovation, it is not the total variety of industrial production he gets involved with. The division - taken from economics - between consumer goods and capital goods does not serve for purposes of industrial design. The decisive factor determining when and where industrial design could and should become involved differs from existing product taxonomies.

The core of industrial design is formed by those products where there exists a direct perceptual and/or manipulative operative interaction between user and object.

For this reason, industrial design is of little importance when the design problem consists in the design of a transoceanic cable - though obviously that is an industrial product.

For the same reason, industrial design is called upon or should be called upon when the design problem is

a tractor seat

a plough

a tool

a kitchen appliance

a medical instrument

a light source

a milk container
a food package
a food-conserving device
a transportation equipment
a toy
a component for prefabricated housing
a device for educational purposes
- to name but a few products.

The use qualities of this very broad spectrum of products are determined by a series of factors, such as:
comfort,
simplicity of use,
durability,
functionality,
safety,
ease of cleaning,
ease of maintenance and repair.

These factors are related to costs which depend on technological factors, such as:
simple assembly,
degree of standardization,
tolerances,
utilization of right production method,
utilization of right material,
finishing.

II.(e) What industrial design is not

From these observations one conclusion can be drawn about what industrial design is not.

Industrial design is not purely wrapping nice, attractive, fancy new shapes around (supposedly) ugly products.

Industrial design is not face-lifting.

Industrial design is not streamlining.

Industrial design is not "sexing up" out-dated unfashionable shapes.

Of course, industrial design can be all this, and it would be naive to overlook or to deny that industrial design is not practised in this way. But this orientation is hardly adequate for developing countries, and highly questionable in industrialized countries (waste of resources, ecological crisis).

III. Industrial design and neighbouring professions

(a) Its relation to mechanical engineering and marketing

Industrial design is not only a multidisciplinary, but also an interdisciplinary activity, i.e. an activity realized in direct interaction, and not only parallel to other disciplines involved in the design process. Except in rare cases (low-complexity products), it is not the industrial designer alone who designs the product in splendid isolation and who could be considered as the only authority responsible for design.

The industrial product, contrary to the craft product, results from a team effort, involving the participation of a number of other professions, including design professions such as mechanical engineering. The direct professional neighbours of industrial design, especially in case of more complex products, are mechanical engineering and production engineering on the one side, and marketing on the other side. All these professions influence the final design of a product. The industrial designer's share centres - as it has been mentioned before - around the use qualities, including the formal qualities of products.

The division between "guts designer" and "skin designer" is wrong and misleading because there does not exist a clear-cut borderline between inside and outside of an industrial product. Structure and form represent, or should represent, a coherent whole, and not a mix of separate, often incompatible components.

The difference between industrial design and mechanical engineering is not be to seen in method (art versus science), but in the emphasis put on certain aspects of the design problem. The industrial designer is dealing predominantly with non-quantifiable aspects of design problem-solving.

(b) Its relation to other design fields

Often the omnibus term "design" is used to cover a series of design specializations, such as:

Graphic design

Exhibition design

Packaging design

Interior design

Architectural design

Fashion design

Arts and crafts design (and crafts based design).

Interior design is a discipline of its own. The same holds for architecture, graphic design and fashion design.

Packaging design lies on the borderline between graphic design which is concerned with the bi-dimensional information on the package, and industrial design which is responsible for the three-dimensional shape, closure, stackability, etc. of the package. Indeed, industrial design offices often deal with package design and ICSID considers packaging as part of industrial design.

Thus, although industrial design primarily is concerned with the two areas, Product design and Package design, there are intermediate areas of concern such as the design of architectural components which is a field where industrial design and architecture merge and exhibition design which is often viewed as part of industrial design activity.

III. (c) Arts and crafts design

Arts and crafts design is often, especially in developing countries without technological infrastructure, considered a forerunner or preparatory step of industrial design, and sometimes even identified as the complete entity of industrial design. The latter is misleading.

There is a distinguished difference between arts and crafts design and design for craft-based industries. The former refers to piece by piece manufacture in areas such as pottery, weaving, weaving with cane and reed, jewellery, leather goods with simple technological means and work organization. While the latter refers especially to china-ware and textiles, produced on industrial scale, with corresponding machinery and work organization. These products may be included under the heading "Industrial design" but it would be a mistake to treat arts and crafts design as the only and primary strategy for developing countries. The development potential of arts and crafts design is quite limited. Industrialization is precisely a way of overcoming arts and crafts manufacturing methods and remaining on that level leads to a self-inflicted cut-off from development possibilities.

IV. Industrial Design and its importance for developing countries

Industrial design should be used as a tool in the process of industrialization of developing countries. As a matter of fact, industrial design constitutes an indispensable instrument for endeavours towards developments.

Its importance - and the necessity to formulate a design-policy in developing countries - is based on the fact that it can help to solve the following problems:

(i) Dependant economies rely on the import of manufactured goods (capital goods, consumer goods and social service goods for hospitals and schools). These imports exercise a negative influence on the already distorted balance of payments. By developing and producing their own designs developing countries can use their hard currency reserves and incomes for productive purposes, i.e. direct these financial resources to the creation of a diversified technological infrastructure.

(ii) Products designed in developed countries do not necessarily fit the requirements and needs of the developing countries. For this reason it is imperative that developing countries start designing their own products which correspond to their specific needs and which can be manufactured with the help of existing technology, or technology not requiring heavy capital investment and preferably local raw materials.

(iii) In developing countries one of the most urgent problems to solve is the creation of jobs in order to integrate the population in productive activities. Industrial design in developing countries could be directed towards the development of labour-intensive products, instead of capital-intensive products which characterize the tendency of industrialized countries. This is important since the local labour market will have a shortage of qualified labour force in manufacturing countries.

(iv) Developing countries suffer in general from the fact amongst others that their economies are not diversified and often existing production capacities of manufacturing industries are not fully used for the lack of innovative designs. Industrial design can help to promote full use of these production facilities and diversify industrial output.

(v) Industrial design as one type of technological innovation is a very effective means for export promotion. Internally developed designs with innovative character possess an export potential, especially in regions where trade arrangements between various countries have been established, particularly where the product design has been market oriented.

(vi) Industrial products, or in terms of anthropology, material artefacts constitute an ever increasing portion of the man-made environment. They are an expression of a culture. Every nation has to more or lesser degree its own cultural identity. As far as industrial products form a part of a culture, industrial design can help to create a cultural identity, overcoming the state of second-hand culture in developing countries.

(vii) There does not appear to exist a historical law or pattern that industrialization and development must follow. On the contrary, the ecological crisis caused by technology of "developed" countries raises the question whether it is justified to call these technologies "developed". Although industrial design is less concerned with the creation of new technologies than with the use of technologies to satisfy certain needs, it may nevertheless stimulate the development of alternative environmentally compatible technologies.

(viii) Income distribution is also one of the serious and explosive problems of developing countries. Often the majority of the population is excluded from access to industrial products because these lie beyond the range of their financial possibilities. Industrial design could find one of its noblest aims, and one of its very few really worthwhile justifications, in developing products for the needs of the poor majorities.

(ix) Developing countries need to utilize their limited resources in an optimal manner with the least waste possible. They are not well-advised when they copy life-styles and product assortments of industrialized countries. Confronted with the undeniable scarcity of means, the formulation of product policies and the definition of priorities becomes necessary; priorities which needs are to be satisfied first, and which needs are to be satisfied at a later stage of higher development, with a higher level of productivity. Rationalization and formulation of product assortment policies could become one of the chief areas of industrial design in developing countries.

Industrial design is thus important for developing countries because it can help to solve nine basic problems:

1. Relieving the balance of payment
2. Fulfill specific requirements and needs of the relevant market
3. Create new jobs
4. Diversify the industrial output
5. Create export markets
6. Create cultural identity
7. Stimulate the development of alternative technologies
8. Respond to the needs of the majorities
9. Rationalize the output of industrial production.

V. Possible fields of activity of industrial design in developing countries

Although in general public opinion industrial design is to a great extent associated with consumer goods, there are many product areas in which industrial designers can become, and already are, active.

These areas include for instance:

Passenger transport equipment (bicycles, buses, trains)
Cargo transport equipment (trucks)
Health equipment (mobile operation rooms for rural areas, surgical instruments)
Educational equipment (school furniture, kindergarten equipment, educational toys)
Agricultural machinery and tools
Building components for low-cost housing
Machine tools for medium and light industry
Food packages as well as methods for food distribution and conservation
Low-cost housing furniture
Consumer durable goods of all types.

VI. Some general rules for industrial design policy

When a developing country starts to work in the above-mentioned fields, the list of which does not pretend to be exhaustive, it might be useful to have in mind the following observations concerning a design policy:

(i) Industrial design activity in developing countries does not mean to develop cheap replicas or low quality versions of existing designs developed in industrialized countries. Rather it requires a definition and solution of the design problem in terms of existing (scarce) means and (abundant) needs.

(ii) Design activity in developing countries should not derive its standards of evaluation from industrialized countries; but should take its points of reference from its own reality. Only that reality can yield standards of evaluation for design efforts made in developing countries.

(iii) Generally it would not be viable to aim at complete design autarchy in developing countries. Therefore it becomes necessary to establish priorities of design projects or design areas according to their global social benefits and development potential (multiplier-effect).

(iv) When exercising design transfer as one type of technology transfer one can follow two strategies:

a) The imported foreign design is adapted to the technological possibilities of the developing countries, without sacrificing qualities of useability. This adaptation requires redesign taking into account technological resources and parameters. Machinery, materials, level of execution, possible tolerances, labour force, volume of production existing or attainable in the relevant country. The aim is to reproduce a foreign design with existing resources which requires modifications. Because of the redesign, the idea of fast and easy copying of foreign designs is an illusion.

b) The imported foreign design is adapted to the functional requirements and context-specific needs of the developing country. This adaptation implies a new formulation of performance specifications and may lead to major modifications of the existing design, and even to a development of a new product.

It is important to note that in both cases the foreign design serves as a starting point, and not, as in mere copying, as a terminal point. In adapting designs the adapting country needs to create a capacity for innovative work which helps to reduce its state of dependence. This practice is the opposite of reproductive technology transfer as in licenses or use of royalty schemes.

(v) Design transfer in the form of soft-ware or know-how, especially design methodology should be made in a flexible way, i.e. the software of industrialized countries should be adapted to the needs and contingencies of the developing countries, and not vice versa. Otherwise design know-how would tend to become superimposed on a reality which cannot assimilate the transferred knowledge. Design transfer both as hardware and software from industrialized countries to developing countries without modifications is hardly possible and would cause counterproductive effects.

(vi) Developing countries which want to use industrial design as a strategy for development need to assign highest priority to the training of local manpower resources in the areas of:
Design management
Design research
Design projects.
The second priority refers to the logistical support, especially equipment of prototype workshops and laboratories with adequate machinery and equipment of design offices.

VII. The specific differences in the role of industrial design in developing countries and industrialized countries

(a) The situation of industrial design in industrialized countries

Generally, industrial design in industrialized countries has at its disposal a sophisticated technology with a great variety of materials, manufacturing processes and skilled labour. Furthermore, there exists a highly diversified market structure, with a great variety of subtle consumer preferences.

The rate of obsolescence, both technological and psychological, is usually very high. In these "economies of abundance" industrial design has a decisive share in the creation of formal (aesthetical, visual) innovation, especially of consumer goods - a role which more and more gets criticised by a growing number of members of the profession. This

critical attitude holds that formal innovation with its high turn-over of merchandise has to be checked because of ecological considerations, not to mention social considerations.

Thus enterprises and corporate organizations in industrialized countries use industrial design as an instrument in their comprehensive strategy of growth.

In corporate planning industrial design plays an important role, co-ordinating the many different manifestations of an enterprise in the market place and the general public. These "messages" which build up the corporate image, can be emitted by the firm's products, interior and exterior architecture, packaging, graphics of stationary, vehicles, advertising, etc. These components altogether create the so-called house-style or corporate style.

Industrial design in industrialized countries finds itself in a situation where the relation between means (technology) and needs (demand) is precisely the opposite of developing countries. In the former the volume of needs is smaller than the volume of productive forces or means, whereas in developing countries the volume of needs is bigger than the capacity of the productive forces.

VII. (b) The different approach to industrial design in developing countries

The fundamental difference between the two opposite contexts implies, of course, a different approach to industrial design in developing countries. The different approach can be described as follows:

(i) Concerning the importance attributed to formal aspects: though undoubtedly important, and hardly to be eliminated from any industrial design effort, formal factors play a secondary role in developing countries compared with industrialized countries which can afford to indulge in aesthetical innovation and sophistication. Thus "Good Design" has a secondary place in developing countries unless export marketing is envisaged.

(ii) Concerning costs: if industrial design is aiming at the satisfaction of needs of the poor majorities, it is exposed to heavy economical constraints. Therefore the problem is: How to get a good, and not shabby, use value at low cost and low price! Generally the

flexibility of the price range in industrialized countries is bigger than in developing countries.

(iii) Concerning technological resources: Due to the lack of a technological infrastructure, the range of materials, manufacturing processes and skilled labour force on the use of which the industrial designer can draw, is quite limited. Industrial design in developing countries is forced to work under "imperfect" and restricted conditions.

(iv) Concerning the production volume: Developing countries often have rather limited markets whereas industrialized countries can count on enormous markets. The use of certain technologies is only economical when there is a great output and a market potential which can absorb the products. Industrial design in developing countries must therefore consider market limitations and possible economies of scale.

(v) Concerning use value: The scarcity of means imposes the search for a maximum of use value for a relative minimum of costs. That does not mean design of cheapest products. "Cheap" designs are not necessarily products with least cost. They result often from false economies.

(vi) Concerning utilization of resources: The restricted resources of developing countries require a rational approach which guarantees their optimal utilization. Concern for total social benefit of design activities is a pre-requisite. Any error made in this field weighs much more heavily than in industrialized countries.

(vii) Concerning ecological implications: Countries not yet industrialized still have the possibility, at least theoretically, to opt for a different pattern of industrialization which pays attention to ecological compatability and which contains built-in preventive measures against environmental sell-out.

(viii) Concerning food problems: Populations of a great part of developing countries do not receive sufficient food, neither in quantity nor in quality, especially protein-rich food. Design imagination and design effort might focus on the solution of this basic problem; production and conservation of more and better food for hundreds of millions of people. Industrial design can contribute to the solution of this problem by development of adequate tools and machinery for agriculture, and in the future perhaps agro-farming or other such innovations.

VIII. Settings for industrial design working groups

Industrial design becomes most effective when included as part of a product development team. With increasing complexity of design problems it becomes more and more necessary to work on an interdisciplinary team basis. The practice of "one man one-off jobs" is fit for only low-complexity problems.

A product development team is comprised typically of representatives of engineering sciences
behavioural sciences
management sciences
marketing
industrial design
consumer representatives
worker representatives.

For instance, when the problem is the design of hospital equipment, medical doctors and technical personnel from hospitals should be included in the team; or in case of design of agricultural machinery the collaboration of agronomists cannot be missed.

Furthermore, other participants may be representatives of the project sponsor, for instance export officials, officials of a ministry of industry, etc.

There are four different institutional settings in which industrial design can be exercised as a profession:

1. Private industrial design studios (freelance design).
2. Industrial design as a part of a product development team in a manufacturing firm.
3. Industrial design exercised in a faculty of the university.
4. Industrial design in a government institute or government agency, preferably with industry participation.

The first alternative requires a certain volume of demand for industrial design and financial resources in the industries. Often medium and small scale industries, which prevail in developing countries, cannot afford to invest in technological innovation. The existence of freelance design studios may not be possible within the commercial structure of a developing country.

The second alternative is only feasible for an enterprise which can afford to finance an in-plant permanent staff for product development. A team of this kind requires a certain "critical mass" before it can become effective otherwise it would not work on an interdisciplinary basis. While this critical mass may not be large the requirement exists but may be overcome by suitable training of designers from the appropriate discipline.

The third alternative suffers from the difficulty of linking universities to immediate and urgent problems of industry which often require in-plant work. The organization of a university faculty or department dealing with industrial design or generally product development, must be very flexible in order to permit effective work.

The fourth alternative seems to be the most promising way to organize industrial design working groups in developing countries. As has been mentioned before, medium and small scale industries generally do not have sufficient budget to finance industrial design activities as part of technological innovation. Often they do not consider it their task to invest in technological innovation. In that case it is the government which could assume the responsibility to promote and finance industrial design activities. It is also at this level where international agencies could become effective.

Depending on the specific circumstances, industrial design activities could be exercised under the responsibility of the ministry of economics, or ministry of foreign trade, or ministry of industry. Furthermore there may be created specialized product development teams for certain product sectors, such as agriculture, housing or health.

IX. Promotion of industrial design in developing countries

(a) Information

Since industrial design should be used as a tool for development the first pre-requisite to be fulfilled is to clear ideas about the role and function of industrial design.

Consequently, the first step of introducing and/or promoting industrial design would consist of making available information about the nature of the activity.

Without information about industrial design there cannot be well-defined objectives for assistance programmes and design policies.

The information should be directed towards:

government agencies
universities
industry (management)
general public.

Appropriate methods should be used to communicate information about industrial design to the different "receivers". Typical channels of communication are:

expositions
booklets
films
audio-visual programmes
TV programmes
seminars
conferences.

The information should be geared to the specific interests of the audiences and cover the following items:

1. History of industrial design
2. Definition of industrial design
3. Functions and objectives of industrial design
4. Institutional settings
5. Work method (methodology) of industrial design
6. Case studies of product development
7. Sources of information about industrial design (bibliography)
8. Professional practice
9. Education of industrial designers

IX. (b) Logistical support for design promotion and information

In many industrialized countries governments have created Design Centres. Their purpose is basically design promotion, and they use the following methods:

1. Organization of exhibitions
2. Organization of permanent shows of selected products
3. Organization of design indices (detailed information about products of various industrial sectors)
4. Organization of conferences
5. Organization of yearly awards for achievements in the field of industrial design
6. Organization of working seminars and design workshops
7. Organization of a specialized library

8. Organization of a slide collection
9. Publication of a journal dealing with industrial design

Furthermore these Design Centres may work as advisers for industry and as liaison points for contact with international organizations, such as ICSID.

Apart from these two main functions, to inform and promote Design Centres may offer industrial design services to industry. This point is very important for developing countries, because design promotion without design services could easily cause frustrations and even have counter-productive effects. Industry might recognize the role of industrial design and be willing to introduce it into its policies; but this requires the availability of industrial designers.

IX. (b) Training of industrial designers

One of the main handicaps of developing countries consists in the lack of skilled industrial design personnel. Therefore high priority must be assigned to the training of industrial designers in developing countries. Industrial development programmes and projects should answer this need.

Today general agreement does not exist about the question of where industrial design should be taught. Until there is a design university created which embraces all design specializations (both vertically and horizontally) every solution will be a "patch" solution.

Industrial design is taught today at the following institutions:
Academies of Fine Arts
Schools of Applied Arts
Departments or Schools of Architecture
Institutes of Technology (Generally as a course in mechanical engineering)
Polytechnical Schools
Schools or Institutes for Design
Faculties or Departments for Environmental Design.

Content (curriculum), methods of teaching (didactics) and general orientations of industrial design education are still controversial issues which will have to be settled in the future. But taking into account

that industrial design is a profession exercised in a technological environment (industry) it should also be taught in a technological-scientific educational environment, with corresponding orientation. Only in that way can it become a serious and effective tool for development.

While it is realized that design training is in the process of evolution, the developing countries should participate in existing courses in order to ensure that the curricula would eventually include their requirements as well as those of the developed countries.

Scholarships given to students in developing countries in order to study in industrialized countries can be useful to a certain degree when they are linked to specific problems which have to be solved in developing countries, e.g. design of agricultural machinery. In that respect educational institutions of industrialized countries are not well prepared, because study programmes do not (and hardly can) at present correspond to the needs and realities of developing countries. Industrial design study programmes which pretend to "help" the developing world have in the best case an ideological function and serve more for calming the bad conscience or discontent with consumer society of students and professors in industrialized countries. Their practical value for developing countries is nil, because design solutions for developing countries can only be found and worked out within the developing countries, and not be imported from outside.

Furthermore, it might occur that the student gets alienated from his own country by succumbing to the advanced technologies and working conditions of industrialized countries.

IX (d). Industrial design in technical assistance programmes

International agencies such as UNIDO concerned with industrial development can become an effective channel to introduce and implement industrial design activities in developing countries by the initiation of suitable programmes.

Within the framework of these industrial development programmes and projects industrial designers could contribute their know-how in the different phases of the product development process, for example:

(i) The detection and formulation of needs. Definition of an industrial design policy for certain industrial branches.

(ii) Formulation of the design task brief with performance specifications and financial, technological, social and cultural constraints which define the decision space in which the design solution has to be found.

(iii) Analysis of existing design solutions and evaluation.

(iv) Development of possible basic alternatives to solve the problem.

(v) Critical evaluation and selection of the most promising alternative (or alternatives).

(vi) Detailing of the selected alternative in terms of ergonomics, technical and formal details; finish, colour, product graphics, etc.

(viii) Construction of models and prototypes.

(ix) Adaptation of the design proposal to particular production facilities.

By working on the solution of real design problems in developing countries, the industrial design expert should train counterpart personnel.

Furthermore, he can give industrial design appreciation lectures and courses to other design professions such as engineering and management. He may give assistance for the establishment of prototype workshops and for the promotion of industrial design.

Apart from assistance in design projects, emphasis should be put on design management and design research. All three specializations within the field of industrial design should be promoted, because they depend mutually on each other.

Design management without design projects becomes a mere bureaucratic pastime.

Design research within design projects becomes a mere academical pastime.

Design projects without design research and design management become mere routine work without innovation and implementation.

X. The role of ICSID

ICSID (International Council of Societies of Industrial Design) as an organization representing the professional organizations from countries all over the world could offer assistance to UNIDO in the following areas:

(i) Preparation of information and promotion material about industrial design for developing countries.

(ii) Formulation of industrial design development programmes and projects.

(iii) Organization of seminars about industrial design in developing countries.

(iv) Transmit requests for specialised personnel to the national industrial design societies.

(v) Establish contact with specialists in countries not yet formally represented in ICSID and inform UNDIO about the situation of industrial design in those countries.

(vi) Inform UNIDO about industrial design education and courses which might be of use for students of developing countries.

(vii) Co-ordinate information about industrial design projects and industrial design research relevant for developing countries.

(viii) Preparation of specialized technical literature concerning industrial design.

ANNEX

Case studies from developing countries

Design of a seed sowing machine

At first the problem consisted of adapting an imported sowing machine to the technological (production) facilities in Chile. However, a detailed analysis of the use qualities of the imported machine showed that the "model" product did not fulfil a series of decisive requirements of the country:

(i) Imported machines are designed for use of synthetic powder fertilizer, whereas in Chile farmers are using granular fertilizer from the northern deserts. The feed control mechanism of the imported design does not work with granular grain fertilizers.

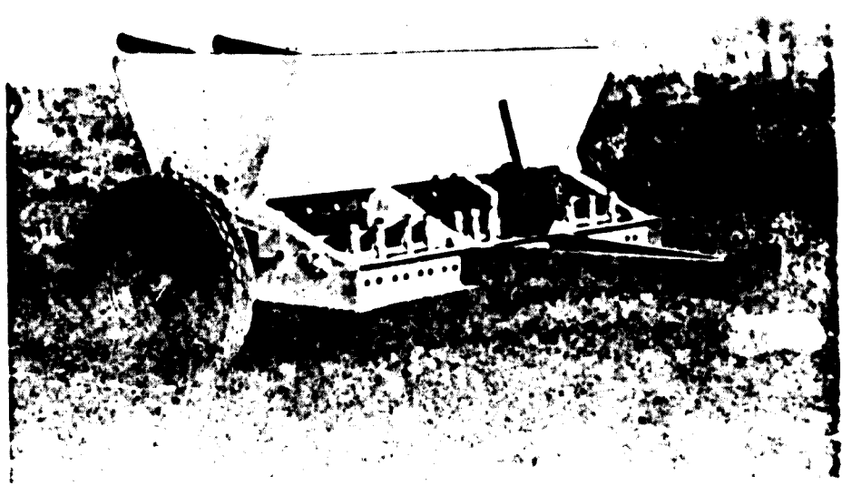
(ii) Chilean agronomists recommended that the fertilizer should be located neither above, nor below, but at 45° below the seed. No imported sowing machine responded to that special requirement.

The definition of the list of requirements took about two months. Once formulated the design brief started on the development of the two "strategic" sub-systems. Passing through five different alternatives experimentally proven with prototypes, the final solution of the two subsystems was reached.

After that the remaining subsystems were designed. It took ten months from the first scratch to the finished prototype.

The project was carried out by two industrial designers and two mechanical engineers (recent graduates from Chilean universities), without any previous experience in the field of agricultural machinery.

The only imported components are the roller bearings. The annual savings in foreign exchange currency amount to 800.000 US dollars.



Design of low-cost furniture

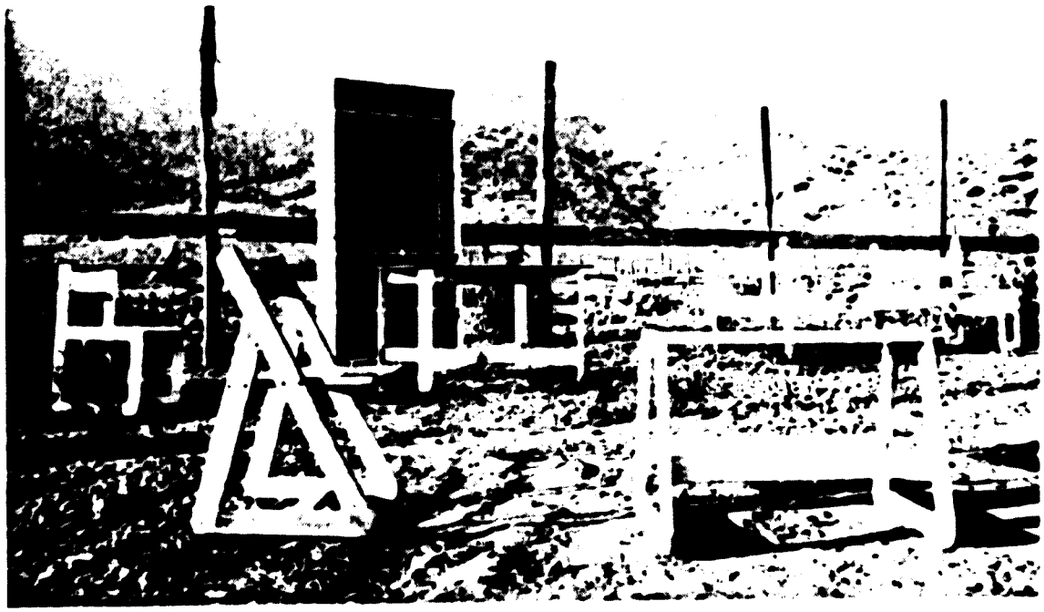
There did not exist a simple, functional and economical set of furniture for low-cost housing in Chile. The general dimensions of traditional furniture proved to be incompatible with the architecture of low-cost housing (groundplans with 36 m^2).

The first task was to define the pieces which should form part of the system (table, bed - also stackable -, chair, storage unit, night table, chair for children).

Then the dimensions of the different furniture pieces were established according to ergonomical standards and modular co-ordination schemes.

Wood and materials derived from wood, as well as simple production processes were given as constraints.

The aim was a good-quality product at low price. This was achieved by using dried pine wood and standardized components which permit easy assembly.



Design of a wholesale packaging of eggs

In Zambia about one million egg trays per annum are required for distribution to satisfy the needs generated by a successful government campaign. The egg trays were imported. The idea to use commercially available packaging equipment proved unfeasible. Furthermore conventional egg trays made of paper pulp have the great disadvantage that the stacks have to be put into closely fitting cardboard boxes or wooden crates.

The main feature of the new egg tray design is that these boxes or crates are no longer required. Empty volume transportation can be reduced by as much as 40/45 per cent because the new design makes the trays inter-locking.

The next step was to design and build a machine to make them. After preliminary investigation of a variety of waste materials available in dependant countries - from bagasse to elephant grass - it was decided to use ordinary waste paper as it is usually readily available and the pulping process involved is relatively simple.

After several months of research work a prototype machine has been made and tested. At the same time a drier 35 feet in length was made. The output of the whole plant is around 300.000 units a year.

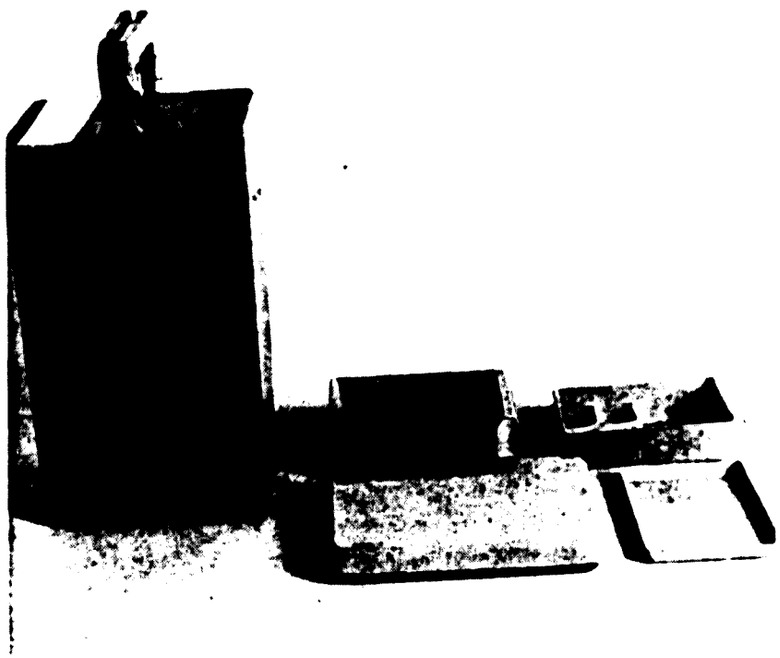
The machine uses local labour, and local waste paper. Moreover, with different moulds a wide variety of other paper pulp articles can be produced.

Design of a lunch box

A lunch box for carrying food from home to work is a commonly used product in a city such as Bombay. There are regular organizations which undertake the work of collecting these boxes from the houses of individuals and delivering them at their working places.

In the existing design the outside box is made of galvanized iron sheet and the inside container is made of aluminium. The inside container normally gets corroded in the course of time. The food gets cold in these boxes. The identical round containers do not provide sufficient flexibility for different kinds of food.

An analysis was made about the standard facility required for typical Indian food. Sizes and shapes of the containers were designed accordingly. A separate flat container is incorporated for items such as chapathi or papad which have to be kept dry. The exterior cover and interior container are made of injection moulded polypropylene with thermocole in between for insulation. This keeps the food hot for four to five hours. The cost of the product comes within the range of the buying capacity of the average consumer.



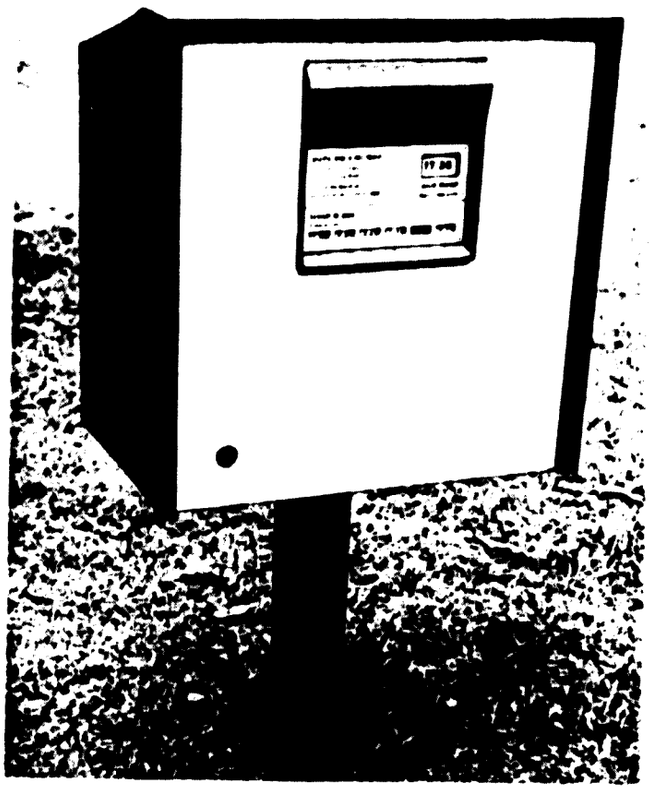
Design of a post box

The newly designed post box in India provides easy identification through its shape and colour scheme. The height of the mouth of the letter box permits comfortable posting. A separate plastic bag inside the post box protects the letters in monsoon. The letters can be cleared easily by taking out the plastic bag. The clearing operation has been simplified so that one-handed operation of the post man is possible.

The box is made of steel sheet. It is formed by press work using standard dies. The box can be easily demounted from the base for re-painting or maintenance.

The box is made of steel sheet. It is formed by press work using standard dies. The box can be easily demounted from the base for re-painting or maintenance.

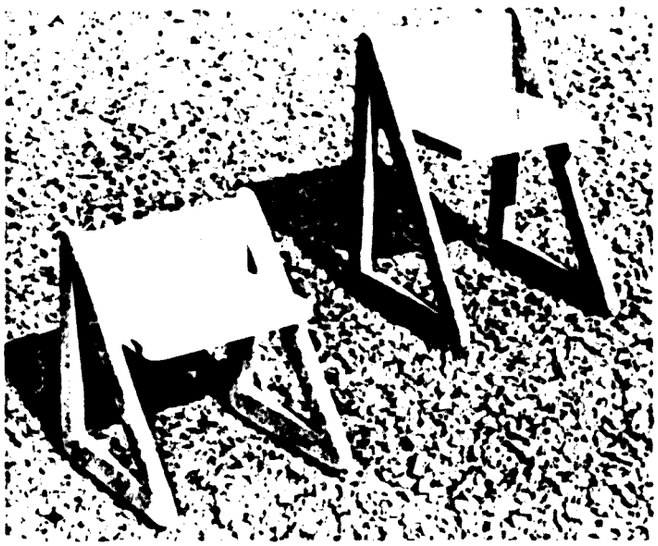
Comparison between existing design (left side) and new design (right side).

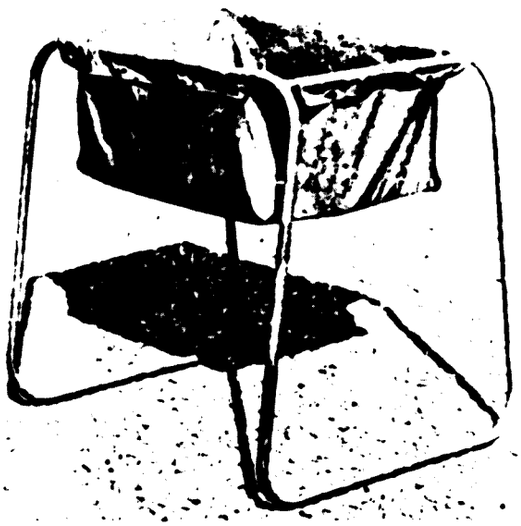


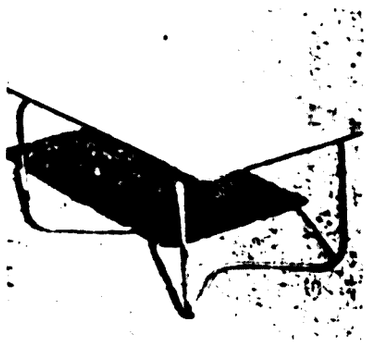
Design of equipment for kindergartens

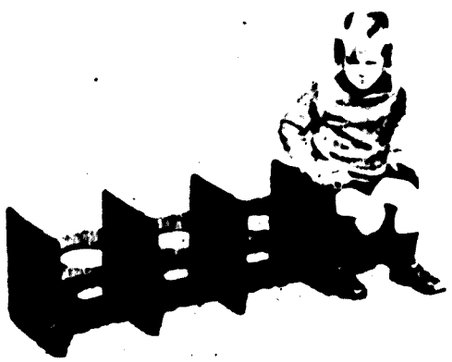
The problem consisted of developing an equipment system for about two hundred kindergartens throughout Chile, since there was no functional equipment with good ergonomical qualities and of moderate cost available. Primarily wood was used but in some cases metal tubes were utilized. With the help of a questionnaire the type of equipment necessary for children between 45 days and five years of age was established. As no ergonomical data existed measurements were made of about 300 children, especially to determine the dimensions of chairs and tables.

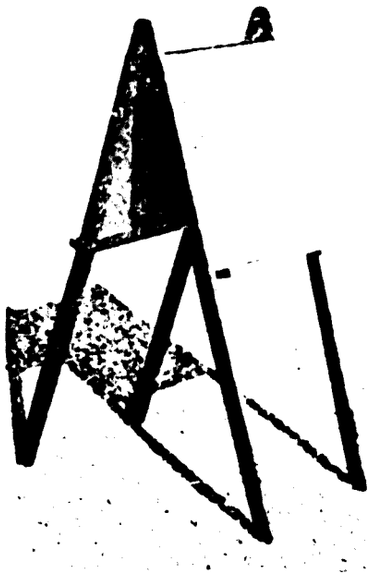
The system comprises the following pieces:
chair (in two different heights), tables for 4, 6 and 8 children in different shapes, storage unit, working bench, siesta-bed, baby bed, bed for small children; table for medical examination, for changing diapers; and furniture for administrative personnel.









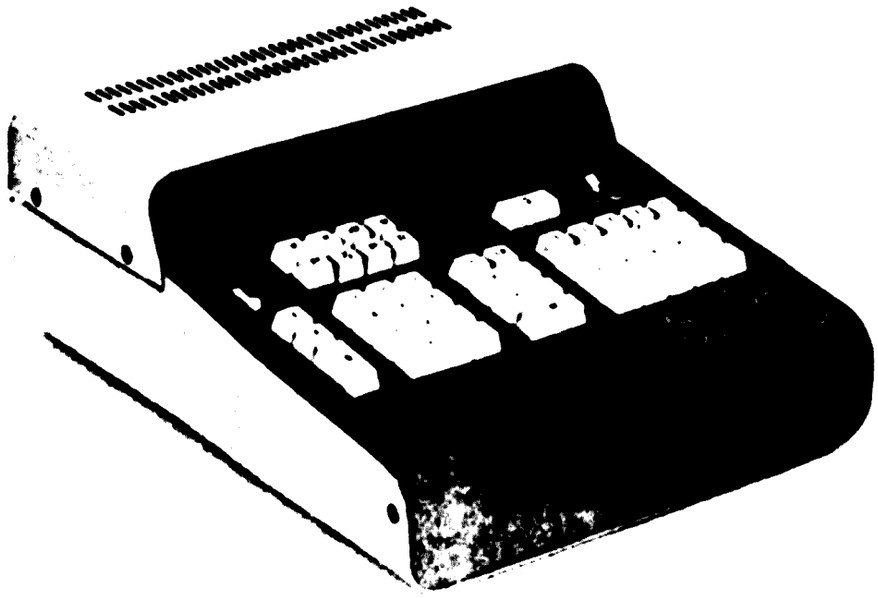


Housing for an electronical desk-calculating machine

This product will be manufactured in relatively small series (1,000 units per annum). Therefore the design had to rely on simple production methods (no high-cost injection dies, etc.). The chassis had to permit easy assembly and checking of electronical components.

The housing consists of five pieces (four pieces of bent metal sheet - all bending radiuses are the same -, and one aluminium die-cast piece). The keys of the keyboard are imported.

Colours: orange for upper and lower part of the housing; dark-brown for keyboard, front part which serves as a hand support and back cover.



Economical chinaware set

Tradional china sets in Chile are quite expensive due to the high variety of different pieces (usually 25 in number). Furthermore, existing sets are designed with very little concern for functional characteristics.

The number of different pieces in the new design has been reduced to nine, thus reducing drastically production costs by rationalizing production lines. The set is stackable using a "step"-form and interchangeable parts (modular co-ordination).

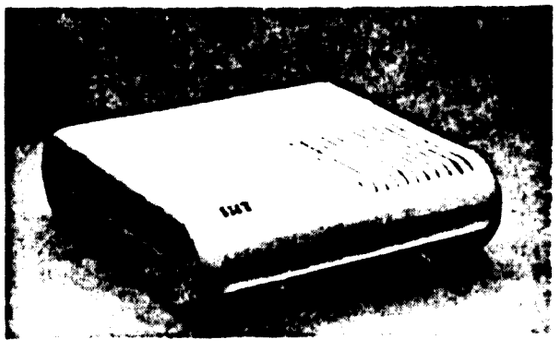
The set permits different types of decoration, but is especially apt for line-decoration.

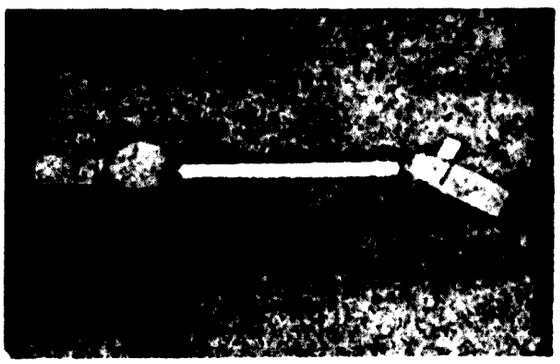
Record-player

The task was to develop a new product image not derived from other portable products such as attache cases. This was achieved by integrating a "handle" in the lower side of the housing. The top of the housing is used as a resonance amplifier avoiding the transmission of vibrations between main chassis and loud-speaker. The subdivision line between top and bottom of the housing is determined by technical reasons (moulding without additional moving parts).

Material: ABS or high-impact polystyrene.

Colours: Plastic parts: mustard-yellow; metal sheet for disc plate: charcoal grey.

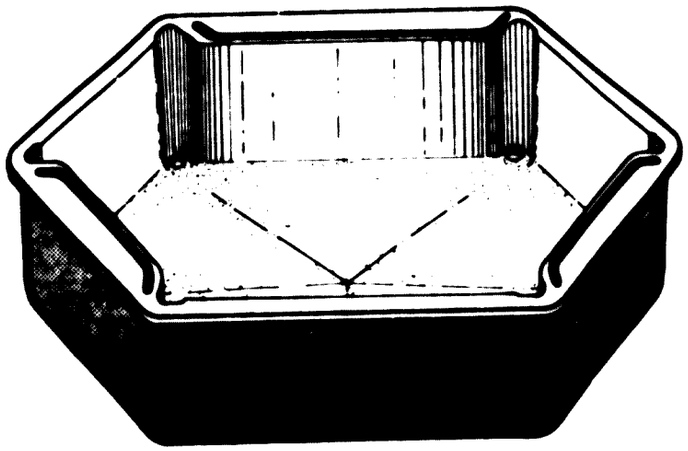




Plastic box for transport of seafood

Imported designs do not meet user requirements, especially dimensionally. The present wood boxes have a series of disadvantages, particularly:- nails and wood splinters which cause injuries to the fishermen, accumulation of dirt, difficulty in cleaning, water absorption, impossibility of formation of safe stacks, inability to offer volume reduction during empty-state transport, bad presentation at point of sale and low number of use-cycles.

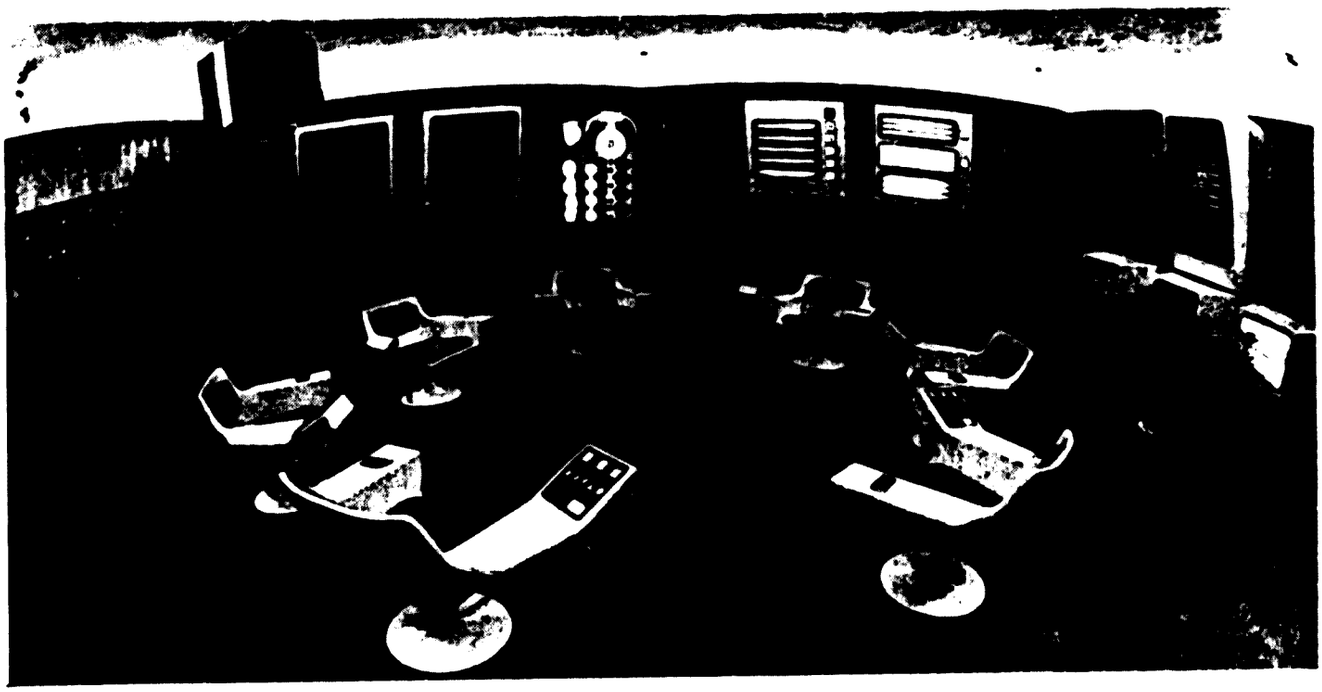
Therefore it was decided to use high-density injection-moulded polyethylene, taking into account that the box, apart from fishing on an industrial scale, is also used in small boats. The hexagonal shape is determined by an ergonomical factor: ease of handling.



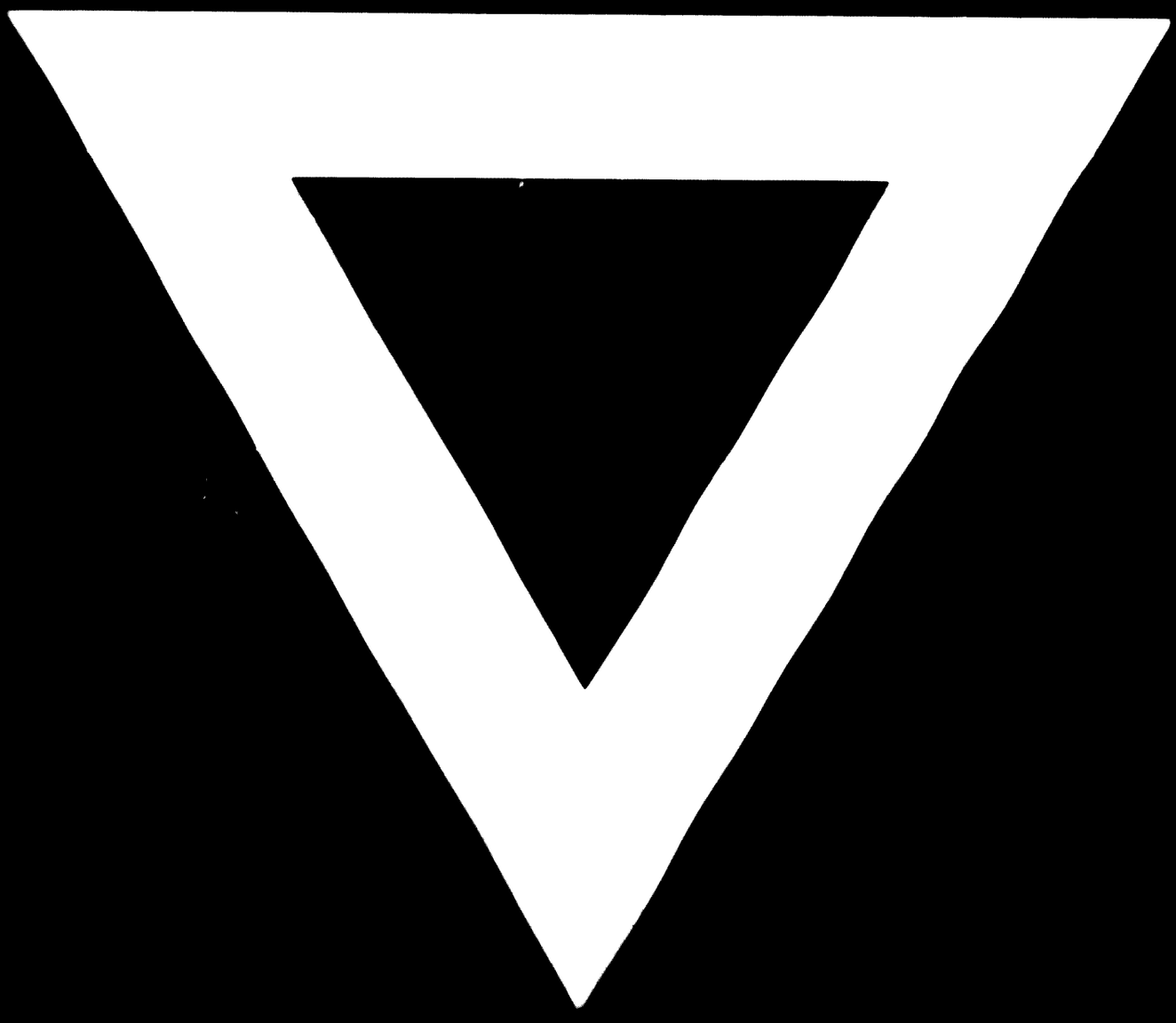
Operation room for a MIS (Management Information System)

Traditional (pre-cybernetical) management techniques suffer from a series of short-comings, the most severe being that they do not permit rapid access and efficient presentation of relevant information (usually there is an information overload for managers), which forms a pre-requisite for rational decision making on the three levels of programming, planning and formative planning.

A team of 60 specialists (economists, operation research, industrial engineers, mathematicians, computer scientists) developed a new MIS which serves for planning the Chilean economy and industry, especially the enterprises under government and worker control. The task of the industrial design team was to create an interface for this information system which would correspond to the new management and planning approach. The operation room, kind of industrial headquarters, contains a series of projection screens and animated displays, and control chairs with an integrated key-board for access to select the colour-slides (1,200 per level of recursion). The graphic design included the preparation of a manual with rules for codifying the visual informations projected on the screens.



G-941



82.11.11