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ENGINEERING AND INDUSTRIAL DESIGN DEVELOPMENT CENTRE ACTIVITIES IN CAIRO, UAR [1]

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1. During the last fifteen years rapid industrialization has taken place in the United Arab Republic. Large funds have been devoted to building and equipping new factories and new branches of industry, such as automotive, domestic appliances, agricultural machinery, steel, etc., have been established. A great number of foreign licences for the production of various products have been purchased from known foreign firms.

Such rapid industrialization has brought with it a lot of benefits to the country but naturally has created a series of problems, one of the biggest being the lack of enough experienced engineers capable of absorbing the experience and know-how coming together with the licences. As in practically all other developing countries primary attention had been paid in the past to the problems of erection of suitable buildings, ensuring good and up-to-date equipment necessary for the production and naturally to the production itself. But other things including design and development and production engineering problems have been somehow left behind, having as a result in some cases, old fashioned products and expensive production.

The first step taken by the UAR Government in order to overcome such difficulties was to strengthen and increase the capacity of various training centres, technical schools and Universities, resulting in a good number of young experts being constantly fournished for the needs of industry.

Creation with the assistance of United Nations, of the "Engineering and Industrial Design Development Centre" in Cairo, is another effort to help industrial enterprises in their design and development and production engineering activities as well as to have a place which may serve as a sample as to how similar departments in the factories should look like and where a number of engineers could obtain necessary experience needed for their future work.

The organization chart and brief description of the Centre are given in the next paragraph.

2. **The Engineering and Industrial Design Development Centre (EIDDC) is a** service to industry project and according to its ability, takes care of a number of products needed in greater quantities. It trains experts in design and development of serially produced products, in prototype execution and testing as well as in planning, technological processing and tooling of the production by doing the real job for smaller or bigger workshops and factories.

To fulfil its duties the EIDDC uses the UN and UAR engineers working as permanent staff of the Centre. They are always assisting a number of experts from the shops and factories for which the specific job is being done. The work is performed either in the premises of EIDDC or in the factories. In the first case after completing such work the factory engineers are returning to the factories together with the documentation prepared in the Centre to continue the started work. In the second case EIDDC engineers are regularly going to the factories where they are advising and assisting existing factory personnel. In addition to this a number of young engineers is employed in the Centre where they work in various divisions so as to specialize in particular directions. They could be transferred later to the corresponding departments in the shops and factories where they are needed.

The assistance of the EIDDC to the factories is in a certain way preconditioned by the request that they should start, if they do not exist, the Design and Development and Engineering Departments which should later continue the job done by the Centre, thus enabling the future independent products development and organization of the production in such enterprises.

The EIDDC consists of the Management and four Divisions, i.e.

a. Product Development Division
b. Industrial Design Division
c. Engineering Division
d. Prototype Execution Division

a. **Products Development Division**

It handles all aspects of development and design of a variety of products when they are to be manufactured in greater quantities (serial or mass production). It provides the Engineering Division of the Centre, or other factories and shops, with the technical documentation (consisting of assembly and details drawings, Parts Lists and Specifications) proved, when so requested, through the constructed and tested prototypes. Together with the Industrial Design Division it also takes care of the attractive appearance, functional and nice shape of products.

This Division is responsible for introducing National and International Standards when designing as well as reducing, through the Centre's Internal Standards and regulations, a great variety of materials, parts, etc., used in products. Further responsibility of the Division is to supply all UNIDO experts with necessary data concerning patents and to take care of patents invented in the Centre. The Division's Standardization Section is responsible for the described job.

The development and design work in this division is organized in the design groups formed to suit the products being taken care of.

UN experts are connected to the Management of the Division and serve as consultants and help to all sections and groups.

The Products Development Division is responsible for and takes care of the Technical Documentation Archive in which printing, storing, distribution and recording of technical documents is being done.

b. Industrial Design Division

This Division handles, in very close co-operation with the Products Development Division, all aspects of creating external shape and outlook of products designed in the Centre or, when and if necessary, outside of it.

2. Sketches, photographs, models (made of clay, plaster, wood and other convenient materials) etc. prepared in this Division, make possible choosing of the best model thus enabling the Products Development Division to make the necessary documentation for future production.

The Industrial Design Division co-operates with specialized Institutions, outside the Centre, their experts and cabinets in order to utilize their skill and experience.

Engineering Division

This Division is responsible for the Production Engineering, Planning and Evaluation of the production.

The Division takes care only of products which are going to be produced on the serial or mass production basis for specific, pre-determined shops or factories. The Technical documentation (drawings) of products which are to be taken care of by this Division may come from the Product Design Division of the Centre or directly from some shop or factory in which case the other Divisions of the Centre are not concerned with the job. But in both cases, all drawings, specifications, Parts Lists, etc. should be already proved through the constructed and tested prototypes.

This is purely Service to Industry work and the Division performs it through the following sections:

Production Planning and Processing Section which

- Prepares processing sheets for the parts to be produced, giving all necessary data needed as: sequences of operations for manufacturing, data concerning equipment and tools, etc.
- Lists necessary machine tools and equipment on the basis of data received from the processing sheets and time study charts.
- Makes machine tools and equipment lay-outs.
- Projects the organization of the production.

Time Study and Cost Evaluation Section which

- Determines the working time for each production operation on the basis of technical drawings and processing sheets for each part and product.
- Evaluates the cost of production for each operation, part and product on the basis of data about the enterprise where the production is going to take place and documents received from the other divisions and sections.

Tool Designing Section which

- Designs non-standard tools, dies, jigs, fixtures and gauges and special equipment necessary for production.
- Takes care and helps in the production and testing of tools designed by them and supervises the initial production together with planning and processing engineers.

Standardization Section which

- Supplies the Division with national and foreign standards dealing with the processing and tooling and standardizes as much as possible parts, materials, semi-finished products, standard parts, etc., of the tools to be designed and produced both in and out of the Centre.

Technical Library which

- Provides experts with the necessary technical books and documents. It stores them and keeps records of them.

UN experts are connected to the Management of the Divisions and serve as consultants and help to all sections.

Prototype Execution Division (Prototype Workshop)

The duty of the Prototype Execution Division is to carry out the production of both prototypes and tools, this being the most suitable and economical way of work for the initial period of the EIDDC.

The prototypes are constructed on the basis of the prototype technical documentation received from the Product Development Division with which a close collaboration during the construction and testing period must exist. The Prototype Execution Division is responsible for enabling and organizing testing of the prototypes which are carried out together with the Products Development Division.

The prototypes may be erected as well on the basis of the drawings coming from outside of the Centre in which case the Prototype Workshop is dealing directly with the corresponding outside designers.

Some of the tools (non-standard) necessary for serial production outside of the EIDDC are also to be constructed in the Prototype Workshop's Tool-Room according to its capacities and on the basis of the documentation received from the Tool Design Section of the Engineering Division with which the Prototype Execution Division co-operates closely.

The duties of the Prototype Execution Division are performed through:

Prototype Department which

does machining, welding and assembling of prototypes.

Tool and Die Department which

builds up non-standard tools, dies, fixtures, gauges, etc., does machining (on the special machine tools in the possession), heat treatment and fitting jobs as well as sharpening of cutters.

Inspection Department which

carries all metrological, metalographical, metallurgical and chemical tests and analysis in and outside the Centre for the needs of the EIDDC.

Does all necessary inspection of parts and materials for the Centre on the basis of the technical documentation.

Assists in solving, when and if necessary, the inspection problems in the shops outside the Centre.

Material Stores which

store and handle materials and tools for the Division, and keep records of them.

UN experts are connected to the Management of the Division and serve as consultants and help/all sections and groups.

3. On the basis of previously described organisation and principles, the actual work is organized in two ways:

a) With a number of factories (El Nasr Automotive Company, El Tramco Bicycle Producing Co., Cairo Metal Company producing metal household items, etc.) the Centre has concluded contracts for long term co-operation covering the Centre's assistance in improving organization of Design and Development and Engineering Departments, if they exist, or starting new ones if they do not. In addition to this, concrete problems of designing and re-designing of products from their production programme as well as problems concerning organizing planning, processing and tooling of the production are being treated in co-operation with the factories' personnel.

b) A number of products which the Centre's Management found to be needed on the market are being designed independently from the factories. It is then up to the Centre to find suitable manufacturers for such items (electric iron, solar water heater, cigarette lighters, etc.).

It should be underlined that in both cases the Centre's Board of Directors approves the working programme.

4. Experience from the past period has shown that there is no problem in getting real jobs for the Centre. The Centre's experts were welcomed after the Project had been introduced to the factories and after their Chairmen and Technical Managers had been thoroughly acquainted with the Project's possibilities, which happened through several meetings between the factories' and Project's Managements organised by the corresponding Organisation in the Ministry of Industry.

Since the unsolved production problems such as processing, production planning and tooling are influencing the productivity and quality in practically every factory, the Centre is always being approached with requests to provide assistance in solving them. The question of further development of products has been o secondary importance due partly to restricted import and protected local industry and partly to the fact that production problems requiring immediate solutions are practically completely consuming an insufficient number of engineers and technicians in the factories. But in spite of such a situation the idea of the design and development is gaining more and more strength and the Centre's efforts in this respect are beginning to be fruitful. In order to explain the problems, ways and needs of product development, the Centre is preparing courses concerning this matter and in 1968/69 a booklet giving data about the Centre's activities was prepared and distributed among the industrial enterprises.

5. As mentioned before, the lack of experienced engineers is badly affecting industry. In this respect the Centre has not been an exception but the policy adopted was to accept many young, newly graduated engineers from the faculties and to let them work on the real problems for the factories together with UN experts and a smaller number of more experienced senior engineers, which we succeeded in getting from the administration and factories. This policy has shown to be successful and after a certain period of time, a number of younger, experienced engineers will be trained.

6. Discussing the establishment of new Centres, similar to this Project, in other countries, certain experiences gained from here could be used since basic principles concerning the design and development activities are the same. The important thing is to make as clear as possible the future working programme of the institution, e.g. to decide whether it is going to take care of processing industries and single production or serially produced products, since the way of work and training of experts is completely different for these jobs. If it is possible to specialise the future Projects even more (for automotive, machine tools, domestic appliances, etc.) so much the better but in the majority of cases we do not think that would be possible.

It is important to underline that the Centres are to work and co-operate with industry, e.g. factories and not to become parts of administrative bodies.

In this respect it is worth considering the idea to attach in some cases the Projects to bigger factories having a number of sub-suppliers and being of greater importance for the economy of the corresponding country. Such a solution should have as a result the establishment of good and strong design and development as well as engineering (processing, tooling, time study) activities in the "mother factory" which will definitely result in spreading similar organization and ideas to the smaller sub-supplier's works.

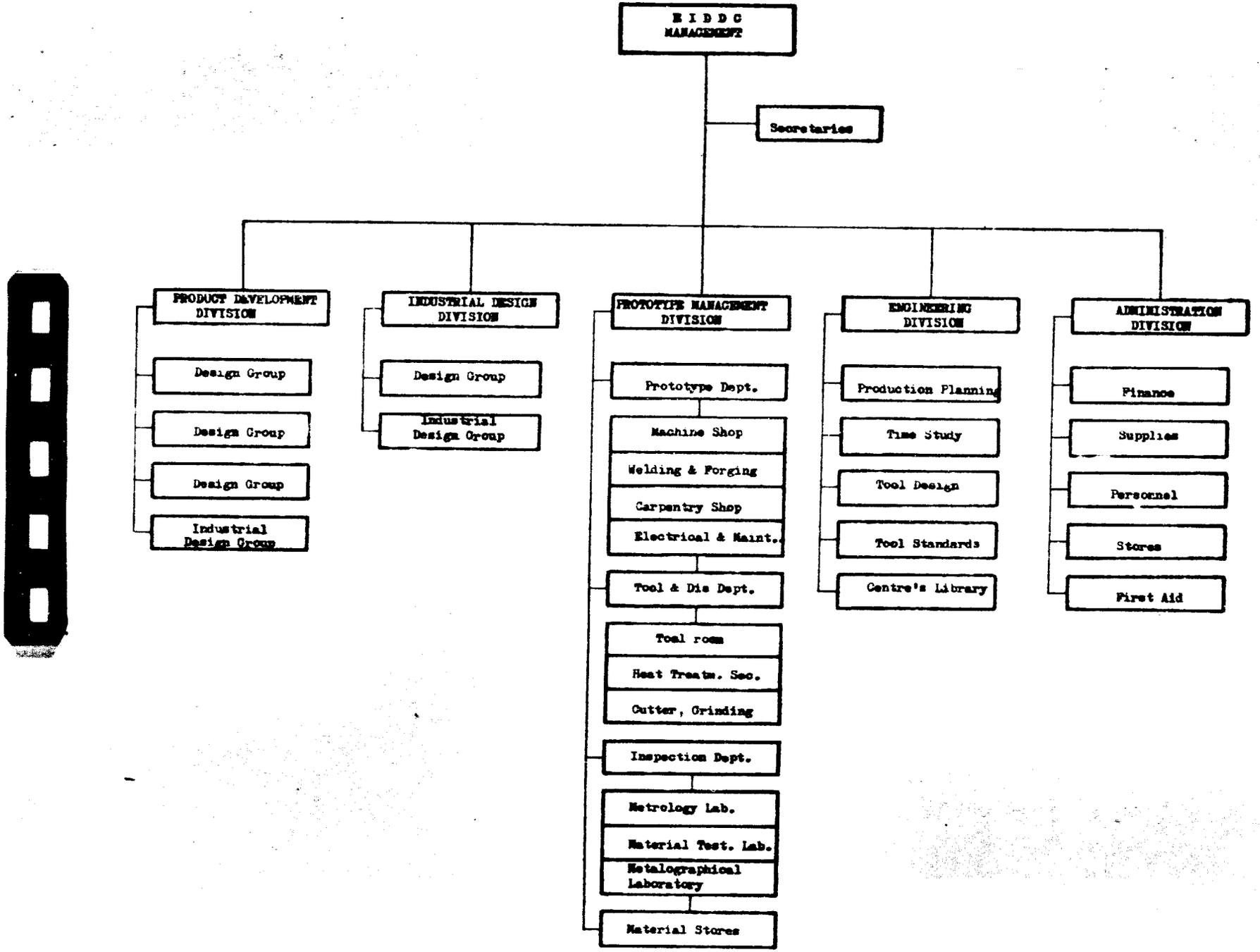
The idea of having in the Project, besides the Design and Development Division, the Engineering Division, taking care of the production problems in the factories, has proved to be excellent since the exchange of opinion between designers and processing and tooling engineers during the design period is of the utmost importance. In addition to this the unsolved production problems in the factories are preoccupying the factory personnel so that in this respect they need help and if left without it they simply could not devote enough time to the problems of developing their products.

It seems to us that too much attention has been paid in the past to the establishment of quite large and well equipped prototype workshops. Usually everywhere the prototype workshops are sections of the Design and Development Offices and serve to designers as a means for checking their drawings - dimensionally and functionally. But balancing the capacities of workshops to suit the number of designers and the quantity of design work is rather difficult especially when the designers are practically without experience and when the products are of rather simple nature. In many cases when co-operating with the factories we found out that they have been able and willing to produce their prototypes. The logical conclusion to the above would be to establish only small prototype workshops with basic equipment and to use to the maximum already existing various shops, factories, training centres and other Projects and to allocate as much funds as possible for UN Experts and Fellowships.

7. As a conclusion to this paper we would like to underline that Engineering and Industrial Design Development Centres could be very useful institutions in starting and creating design and development activities in developing countries provided they are given necessary support and understanding from the counterpart Governments and are supplied with good and experienced experts from the Agency.

But it should be avoided to declare and expect that such relatively small institutions (having 25 to 30 engineers - corresponding to the Development Departments of the medium sized factory) would solve the design and engineering problems of the country's industry. Spectacular things and miracles in the field of product design and development are not happening anywhere but our projects should be expected:

- to succeed in establishing a sample of a good organization and in spreading the idea of the importance of the development work;
- to start nucleuses of similar institutions in the factories; and
- to train a number of engineers, enabling in this way the continuation of the work after completion of the UN assistance to the Project.


E I D D C
MANAGEMENT
Secretaries
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Design Group
Design Group
Design Group
Industrial Design Group
INDUSTRIAL DESIGN DIVISION
Design Group
Industrial Design Group
PROTOTYPE MANAGEMENT DIVISION
Prototype Dept.
Machine Shop
Welding & Forging
Carpentry Shop
Electrical & Maint.
Tool & Die Dept.
Tool room
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Cutter, Grinding
Inspection Dept.
Metrology Lab.
Material Test. Lab.
Metalographical Laboratory
Material Stores
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Production Planning
Time Study
Tool Design
Tool Standards
Centre's Library
ADMINISTRATION DIVISION
Finance
Supplies
Personnel
Stores
First Aid


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