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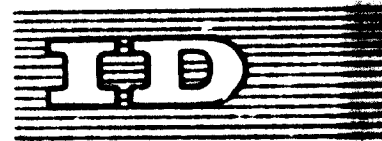
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DO 1248



United Nations Industrial Development Organization

Distr.
LIMITED

ID/WG.24/13
4 December 1968

ORIGINAL: ENGLISH

Expert Group Meeting on Design, Manufacture
and Utilization of Dies and Jigs
in Developing Countries

Vienna, 9 - 20 December 1968

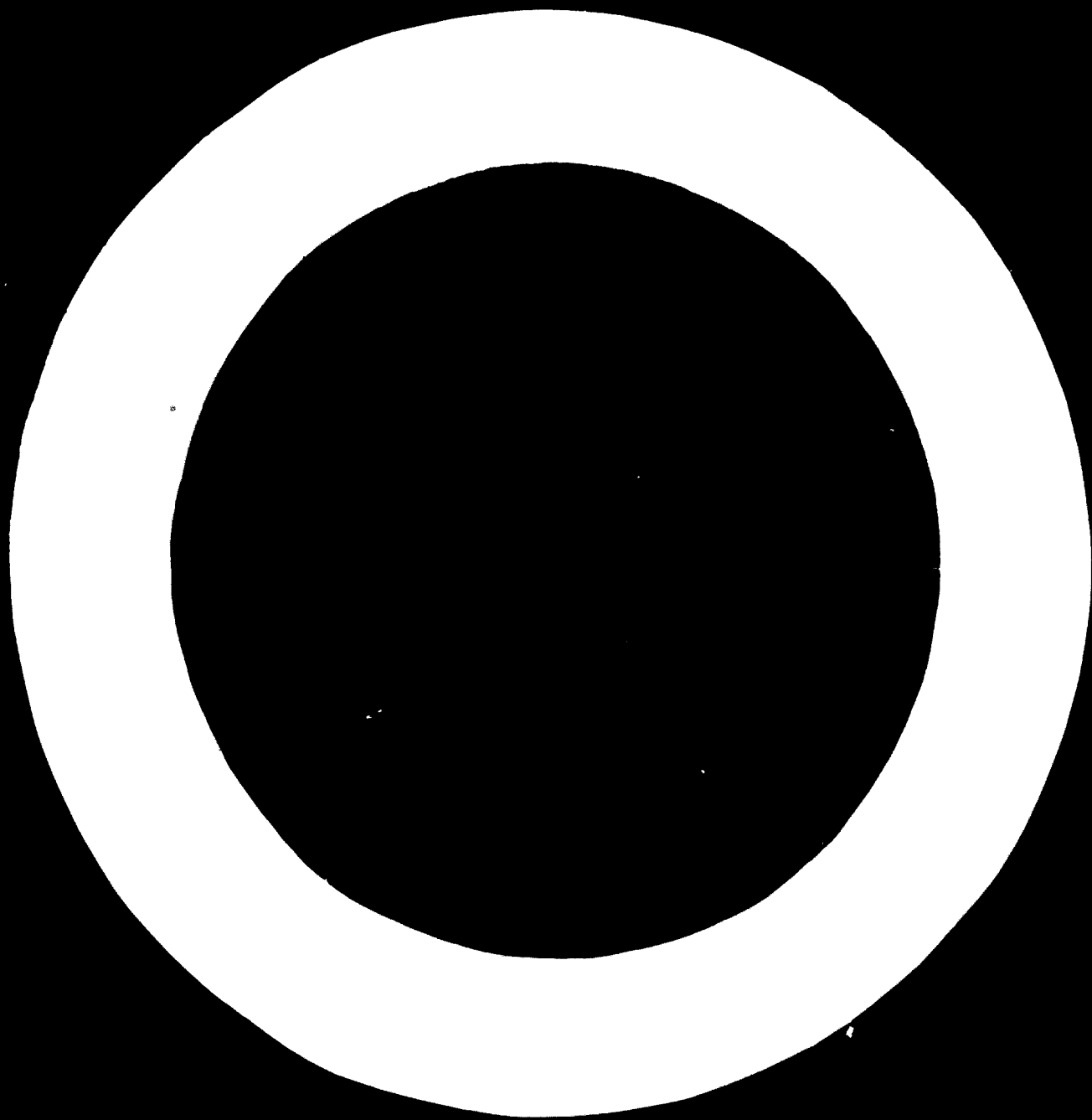
REPORT ON UTILIZATION OF DIES AND JIGS
IN DEVELOPING COUNTRIES^{1/}

by

M. Jusa
Consulting Engineer

^{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.

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INTRODUCTION (Industrialization of developing countries)

The world of today is marked by a violent social and scientifically-technical dynamism. Revolutionary changes are taking place in the organism of the world and thus discords, injustices and inequalities are coming to light which were hidden until recently. A matter which is coming to the forefront on the interests and activities of all international institutions and organs is that of the problems of developing countries, of the problems of huge social inequalities which not only are inconsistent with the spirit of the 20th century from the moral point of view but also are becoming a check of any scientifically-technical progress even where internal objective and subjective conditions exist for it.

Developing countries are now making justified efforts to approach, as closely as possible, the standard of economically advanced countries and to reach this standard if possible. A generally accepted means to achieve their economic development or, to be more explicit, one of the important **means** to this end is the industrialization of these countries. At the present time it would be difficult indeed to find, among the World's leading economists, any who would openly oppose the industrialization of economically less advanced countries, particularly from the point of view of a perspective economist development of these countries.

A question which remains less clear and, to a certain extent, controversial is what the individual economists understand by industrialization, i.e. the concept itself of this economic process. Also the methods of realization of industrialization, i.e. the questions connected with the structural changes in the national economy taking place in connexion with this process are remaining equally unsolved.

The difference of opinions on these questions arises, among other factors, from the fact that, at the present time, everybody who examines the problems of the development of a less highly developed or backward economy must occupy himself with the question of industrialization to a greater or smaller extent. The present science of economy understands industrialization as a highly complex process so that the scope of this concept is frequently so wide that, substantially, it almost merges with the concept of economic development of a developing country.

Industry and the establishment of it are undoubtedly always considered the foundation and core of the process of industrialization, yet the concept of industrialization is at present, though only exceptionally, identified merely with the development of industry but on the other hand the more frequent opinion is that a lot more than an industry is required if it is desired to industrialize.

While sometimes industrialization is identified with the development of the processing industry or some of its branches, another concept of industrialization emphasizes above all the establishment of the heavy industry which is considered the foundation of a modern economy and the key to any industrialization.

The most general definition of industrialization will be found in the materials accepted in May 1963 by the UNO Committee for Industrialization. It was worked out by a group of experts whose members were economists representing various schools of thought. This definition, in its final form, reads as follows:

"Industrialization is a process of economic development which continuously mobilizes an increasing part of nation's sources to create a diversified internal economic structure with the utilization of modern technology. It is marked by the dynamic nature of the branches of the processing industry which is supposed to provide the production means as well as the consumer goods which can ensure a high rate of growth of the national economy as a whole and facilitate development in the economic and social sphere."

The above definition accepted by the votes of representatives of socialist, advanced capitalist and developing countries has become a sort of official limitation of the scope and substance of industrialization in the work of UNO. It represents progress from the narrow concept of industrialization as a mere development of the processing or, even worse, of only the heavy processing industry, even though I assume that even against it certain objections could be raised, chiefly on the grounds to its general nature and inadequate expression of the specific problems of the process of industrialization of developing countries.

The fact is that it disregards at least two important points. Firstly there is no mention in it that the countries concerned are agricultural countries, that is countries the main part of the national revenue of which

originates from agriculture and where it is very purpose of industrialization to change the structure of the building-up of the national revenue in such a way that industry, which is marked by a more highly dynamic nature, becomes the principal source of national revenue. Secondly in this definition industrialization is dealt with irrespectively of the position of the developing countries in the international division of work, even though, in actual fact, the very thing industrialization is expected to do in a conclusive manner is to contribute to the overcoming of economic backwardness and to the creation of conditions for a fairer international division of work due to which developing countries would assume a position which corresponds to their sources and possibilities.

The choice of actual industrial branches which would accelerate a further development of the national economy is based on the possibilities of the various countries. One of the factors of the industrial branches in the process of industrialization of developing countries is, first of all, a lack of skilled manpower, a lack of capital, an insufficiently great market and a lack of foreign currencies. The combination of these factors is decisive for the extent, kind and scope of industrial development, same as for the methods and priority of sequence of the branches to be established and for the choice of the technology introduced in the developing countries. It is the opinion of the majority of economists that, in these countries, it is necessary to develop, side by side, both a modern, technically advanced industry with a heavy demand for capital and a production with a less perfect technology based on the employment of a relatively large amount of human labour. Apart from in industry economical in labour and ambitious as regards capital (as, for instance, modern steel mills, aluminium production etc.). It is therefore recommended to introduce also a number of activities requiring a large number of workers (as, for instance highway construction, irrigation, etc.).

It is, however, absolutely essential to introduce the most modern technology in developing countries, regardless whether it does or does not require a large number of workers. At the same time it must not be forgotten that the period of introduction of a technology in these countries is longer than in advanced countries which has an effect on its quicker obsolescence. Perhaps only in the production of consumer goods for the home market may it be

permitted for a short time to introduce even a less sophisticated technology requiring a great number of labour, though relatively not highly skilled.

One of the most important aspects of the process of industrialization is the question of effectiveness of the newly established industry in connexion with the possibilities of the market. It has been shown in practice that developing countries make efforts, during the first phases of industrialization, toward substitution for imports of products of the foodstuffs and consumer goods industries by the processing of their own raw materials for the requirements of the home market. However, any industrialization directed toward the inside must comparatively soon come up against the obstacle of further development which follows from the extent of the market and, in the course of its progress, starts, true to economic principles, to turn in the outside direction, toward branches producing for exports. Thus the industrialization of developing countries, particularly its "strategy and tactics", especially during the period of the start, is closely linked to the international economic positions of these countries. It necessitates a high productivity of work and cannot manage without an extension of the market towards foreign countries and without a change in the position of economically less highly developed countries in the international division of work.

I am fully aware that, in this introduction of mine to the paper proper, I can by far not exhaust all the basic problems of the industrialization of developing countries. I did, however, consider it necessary to point out at least some of the fundamental questions of this process in order to be able, in connexion with its basic economic aspects, to produce better reasons for my proposals for the establishment of a production-technological basis of the production of tools for the processing industry.

Modern engineering production is unthinkable without specialized tool shops or independent works for the manufacture, repairs and overhauls of the basic kinds of tools, i.e. clamping tools, gauges, cutting tools, fixtures, drop forging dies, metal patterns, etc. The composition and scope of such tool shops will depend in particular on the nature of the basic production, on the peculiarities of production and organization, as well as on the whole structure of management of the tool shops in the individual works or in the entire engineering industry. The manufacture of tools is a production branch

which makes relatively high demands, particularly on the skill of the production workers the technical training of which must be a sufficiently long time in advance. Appreciation is therefore due to the efforts of UNIDO to make in time, and in the requires direction, all the preparations for the provision of an effective assistance to the developing countries in this field.

The cycle of construction of every industrial plant consists always of two stages, the prefeasibility stage and the feasibility stage. In conclusion of my introduction I should like to mention, at least briefly, the first, i.e. the preparatory phase of the plant construction activities which is completed by a technically-commercial feasibility study subjecting the intention with regards to investments to analyse from the points of view of marketing possibilities, location of the construction job, its capacity, demand for capital investment and profitability on the corporation and national economy level.

A decision concerning the materialization of any plant construction action must always be preceded by an elaboration of this technically-commercial feasibility study, in all three of its fundamental stages, i.e.

- a guiding feasibility study
- a study prepared on the basis of data ascertained individually
- a study for the final decision concerning financing.

This technically-commercial feasibility study is a tool for the achievement of objectivity of decision of a subjective factor. It is the result of a study of objective technical assumptions of production being confronted with the actual and specific conditions in the country where the construction work is to be done. Its elaboration necessitates a thorough knowledge of the future trend of the nationally economic policy of the country concerned and of the range of product of the proposed plant as well as a thorough analysis of the marketing possibilities on both the domestic and the foreign markets. An exceptional is due to the development of future requirements with the aim of determining the minimum capacity of the plant at which the industrial corporation concerned would still operate profitably on the corporation and national economy level.

The closing study for the final decision concerning financing must contain, in addition, a detailed chapter on financing in which an analysis

will be made of the financial means which are available or which it will be necessary and possible still to provide.

Technically commercial materialization studies require unavoidably the co-operation of foreign experts and consultants, the carrying-out of extensive laboratory and prototype tests as well as a direct investigation in the country concerned. They are, moreover, prepared in alternatives because various technological processes exist and also there are several possibilities of sighting the plant.

The process of industrialization which is taking place and will take place in developing countries can therefore not be examined, arranged and planned in some general plane regardless of the actual conditions of time and space such as exist in the various countries. Industrialization is taking place under definite, objectively existing conditions and any simplification of this fact, any disregard of many specific factors affecting this process would result in an oblique distorted picture of these problems.

Before proceeding to explain the methods used in the preparation of project for works specializing in the manufacture of tools and fixtures I should like to draw your attention to the problems involved in the preparation and processing of information prior to a final decision concerning the intentions with regard to investments. I can fully develop these problems on the basis of my own experiences and of the experiences of a group of engineers who dealt with similar problems during their long-term investigations in India.

I assume that a decision to erect a plant for the production of dies and jigs will be taken after a thorough investigation in the industrial field concerned and that all the specific peculiarities will be carefully judged in the given country, connected with the degree of development of industry, the specialization of industry by sectors and branches, any further planned development of industry and the rate of progress of this development the possibilities of team work and co-operation between developing countries and the cooperation of these countries with other industrially advanced countries.

It is on the quality of this investigation that the determination of a workable concept of investment actions and the efficiency of these actions in the industry and economy of the developing country in question will depend.

In this connexion I should like to emphasize applicable, rather important principles which will influence, to a considerable degree, the decisions on any intentions with regard to investments taken after the completed investigation.

First of all it will be necessary to choose, for the industrial region or country under investigation, the most suitable types of works to be proposed for the production of dies and jigs consider the regional and country-wide organization of the erection of these works and to consider the possibilities of a domestic as well as international co-operation and team work and the need for assistance from industrially advanced countries. This means that it will be necessary to take the following general principles into consideration:

- 1) Types of works considered for production of dies and jigs
 - a) Works specializing in definite industrial sector (branch) and kind of technology. Location of works near industrial centre (for definite industrial sector depending on specialization considered at one point. Optimum size 800 to 1200 employees.
 - b) Universal works for several industrial sectors (branches) such as heavy mechanical engineering, etc... Location of works near industrial centre (according to specialization considered) at one point. Optimum size 1000 to 12000 employees.
 - c) Works specializing in definite industrial sector (branch) and kind of technology. Works composed of several specialized units separate localities with optimum number of employees 300 with central management at most important production unit, preferably in industrial and commercial centre.

Optimum number of employees of entire works 1500 to 2000. Subordinate production units with special programme to be located according to industrial regions corresponding to specialization considered.
 - d) Universal works for several industrial sectors (branches). Works concerned again combining several production units with optimum number of employees 300, specialized according to industrial branches and located near industrial regions according to this specialization and managed by a directing superstructure of corporation established at most important production units which it is best to situate in commercial centre of country concerned.

It is not commended to erect production units, specialized or universal, with manpower of less than 300. Smaller units are not profitable in view of the overhead expenses involved in the directing superstructure and of the production costs proper as far as the application of modern technology and an effective utilization of the technological equipment of the production unit is concerned.

The project must consider, carefully and in detail, particularly in the case of universally organized production units and corporations, the diverse production technology of tools and fixtures and it will therefore also be necessary to determine a suitable universal technology and directing organization of corporation to make production as economical and efficient as possible. This is essential particularly for the reason that in every industrial branch a different technology predominates.

For example:

Electronics - stamping, forming, cold extrusion

Precision engineering - measuring technology, precision casting, grinding, machining

General engineering - cold forming, hot forming, machining

Heavy mechanical engineering - forging, casting, heavy duty machining, etc.

The organizational layout of production, management of production and technological equipment of the proposed corporation for the production of dies and jigs must therefore always correspond to the structure of all the industry in a given industrial region or in the country concerned. Only then it will be possible to satisfy, in a flexible manner and within short delivery periods, the requirements of these industrial corporations.

Thus, for instance, for normal engineering production where machining predominates the backbone of the production programme of a proposed plant will be the manufacture of cutting tools, gauges, clamping fixtures and single-purpose supplementary equipment of machine tools. Under these conditions the proportion of production by machining of such a production programme would exceed 90 per cent of the total volume of production. In such a case the project must deal with great care with the organizational arrangement and technological equipment to be used for production by machining. A matter of great importance will be the choice of universal toolmaker's machines and

conventional single-purpose machines. The point is to have, in the production process, all the technologically essential machine tools and also to ensure as uniform as possible a utilization of them. It must not happen that the machining section cannot cope with the demand for parts of the assembly section or that it produces inaccurately and the assembly section must modify the parts in a costly and tedious manner.

When production by machining is well organized for this production programme, then the fitting of clamping fixtures, production aids and cutting tools (i.e. built-up milling cutters, broaches, lathe tools, etc.) is not difficult and does not require highly skilled toolmakers.

On the other hand, the backbone of the production programme of the works for the telecommunications and electronics will be the production of dies and jigs for mould forming (cutting and drawing dies, push broaches, benders, assembling aids and fixtures, metallic moulds, dies for pressure, diecasting of light metals and mould for plastics, etc.). In such a case the proportion of production by machining of the total volume of production would drop to 50 to 60 per cent. In this case also the continuity and precision of production by machining is of great importance, particularly that of precision coordinate drilling, the technology of grinding of stamping dies and punches (segments of these parts). It is recommended to apply, for the grinding of stamping dies, punches and components of built-up stamping dies and punches, the Czechoslovak method of special aids with centres for grinding machines. With the help of this method the quality of punches and stamping dies can be considerably improved and their life extended.

Nevertheless, with this production programme the greatest difficulty rests in the details of design of the tools used in the assembling.

A matter which, in this case, is also of outstanding significance is the requirement of skilled toolmakers. Therefore the maximum possible use should be made in the project of auxiliary machines for assembling such as filing machines, power band saws, electric spark erosion machines, auxiliary milling and drilling machines, mechanical production aids etc.

Similarly examples could be given also for other industrial branches. For instance, the metallurgical industry and the heavy engineering industry demand primarily drop forging dies, positioners, blacksmiths and foundry

production aids, heavy clamping equipment etc. For the consumer goods and imitation jewelry industries, for single production, the manufacture is required of simple and inexpensive forming aids and for multiple production the manufacture of automatic and semiautomatic multi-stage forming and cutting tools, etc. In these cases, too, the different production technology and the different requirements of skill of the workers would have to be taken into account in the project.

An important role is played, in the determination of a suitable type of works, also by its organizational layout. For instance, with the technological layout of production which is used to best advantage in universal works there is a very effective utilization of the technological equipment of the works but the technological preparation of production and operative planning are quite difficult and require highly skilled workers. With the aforementioned layout of production which asserts itself most frequently in specialized production but also in universal production it is very difficult to achieve an effective utilization of all technologically essential and auxiliary machines. Difficulties are encountered in the commercial field when efforts are made to secure a permanent range of products. Operative production planning and control are, however, considerably simpler and therefore also have a very much lower demand for qualification of the engineering and managing staff. It will be noted from the examples given above that, in the choice of a suitable type of works, a number of important factors will have to be considered in the industrial region under investigation and that it will be not to merely make use of project of existing types with an assumed modern technological equipment.

2) Regional and countrywide organization of erection works for manufacture of dies and jigs. A matter which, in my opinion serves a very useful purpose and is of great importance is the co-ordination of the proposed erection of works for the manufacturing of fixtures with the general building-up of the national industry.

First of all steps must be taken to avoid the creation of duplicate or unprofitable production capacities. The obsolete idea that every industrial establishment, sometimes even a small one, must have its own production of fixtures and tools results in the erection of small tool shops of 50 to 100 employees which produce very unfavourably and expensively. This small capacity

then depends on extensive co-operation with other establishments both for power machining and for subdeliveries of parts. At the same time a situation often arises that the capacity of these small tool shops is insufficient when new productions are being introduced and remains unutilized even for considerable periods, after the new production has been introduced.

It is therefore clear beyond doubt that the most favourable solution is the building of independent works for the manufacturing of new dies and jigs, this being done in full co-ordination with the capacities and specializations of the individual industrial sectors and branches.

Note:

It is necessary, however, to build tool shops and tool grinding shops (even of a small number of employees) at industrial establishments for the purpose of maintenance and repairs of dies and jigs. To organize this activity separately from industrial establishments is unprofitable and not flexible enough for the requirements of the industrial establishments. The whole concept of the organization of regional or government works for the manufacture of fixtures must not only fit harmonically into the over-all industrial production but also ensure that the works for the manufacturing of fixtures and tools can assume the initiative in the commercial field. This means that they must react in a sensitive manner to the requirements of the industry and adapt their production possibilities in such a way that modernized and new products will appear in the market as quickly as possible. They must ensure their prosperity and, above all, a continuous development of a progressive technology in industrial plants by achieving acceptance of their offers of technically best production aids, dies and jigs, proved in practice and typified as far as possible. It must be reckoned that the technical standard of the dies as well as jigs and the moderate price level necessary for them to assert themselves on the largest possible scale will be in direct proportion to the level of the productivity of work in the principal industrial production. In brief, toolmaking works, too, must apply a special marketing of their own.

3) International team work and co-operation between developing countries. The concept of a countrywide organization (network) of work for the manufacture of dies and jigs will also make possible the putting into practice of an extensive co-operation between individual developing countries. First of all there may be mutual deliveries of special dies and jigs and thus a satisfactory

will be found of the problems involved in the utilization of capital assets and of the pay-out-time, on investments. It may also be possible to solve in this way the problem of shortage of skilled workers.

It would be highly advisable, even every time before a decision is made concerning the construction of tool manufacturing works, to consider a proposal for mutual co-operation, at least between certain friendly developing countries. The co-operation suggested would consist in the participating countries becoming general agents for deliveries of a given specialized kind of fixtures. For instance, one country would establish the manufacture of drop forging dies, pressure diecasting dies, metallic moulds, moulds for plastics, etc. A second country would manufacture difficult tools for the general and precision engineering industries and a third one for heavy industry. In this arrangement it would, of course, be recognized that each country would erect a plant for the manufacturing of the kind of fixtures concerned and would become the general agent for their deliveries for which it would have the greatest demand in its own industry. Needless to say, this proposal does not exclude the possibility of several general agents for a given kind of fixtures.

The co-operation in this field between several developing countries can be extensive indeed and, at the same time, be guided by an endeavour to achieve a maximum benefit for all the participating countries. These commercial activities would be greatly helped by the application of standardization and typification in the manufacturing of fixtures which would be complied with on the basis of mutually concluded agreements and would enable the designers and technologists of the fixtures in all the participating industrial establishments to choose, without great difficulties, the most advanced technology without fear that the materialization of it might encounter complications of some sort.

What I have in mind in this case is the use of standardized rangers of clamping elements, cutting dies, branches, benders, cutting tools and unit assembly fixtures.

4) Assistance to developing countries from industrially advanced countries.

I assume that industrially advanced countries will participate in the electrification of works for the manufacturing of dies and jigs first and foremost by supplying: project; technological equipment; licenses for technical documents (work's organization schemes, standard specifications of special

rangers of clamping element, cutting dies etc.), expert's and consulting services; assistance in education and training of personnel.

I am dealing with the assistance of the abovementioned countries in a more detailed division and in a successive sequence in a later part of this treatise.

I should like to give, in connexion with the search for a method of education of personnel and of their training, an example of a method which in my opinion, is a useful one. I recommend the establishment in the individual industrial regions, or also for the benefit of the entire industry, or assembling and loaning stations of unit assembly fixtures simultaneously with the erection of the works for the manufacturing of fixtures or even before such an erection.

At the present time scores of various unit assembly rangers are already being manufactured for the use of the precision, general as well as heavy engineering industries. From these unit assembly rangers all kinds of clamping fixtures (for turning, milling, welding, grinding etc.) are assembled. In actual practice this is a question of establishing a storehouse for unit assembly rangers of components of fixtures and hydraulic, pneumatic and mechanical clamping elements and an assembly shop.

Under the guidance of an experienced engineer a group of workmen assembles clamping fixtures by fitting (belting) together and adjusting unit assembly and clamping elements. The fixtures are assembled without previous design, directly according to a detailed drawing of the portion to be clamped.

The loaning station lends the fixtures for a definite period of time against the payment of a certain fee so that its continuously repeated assembling and dismantling can be utilized also for training.

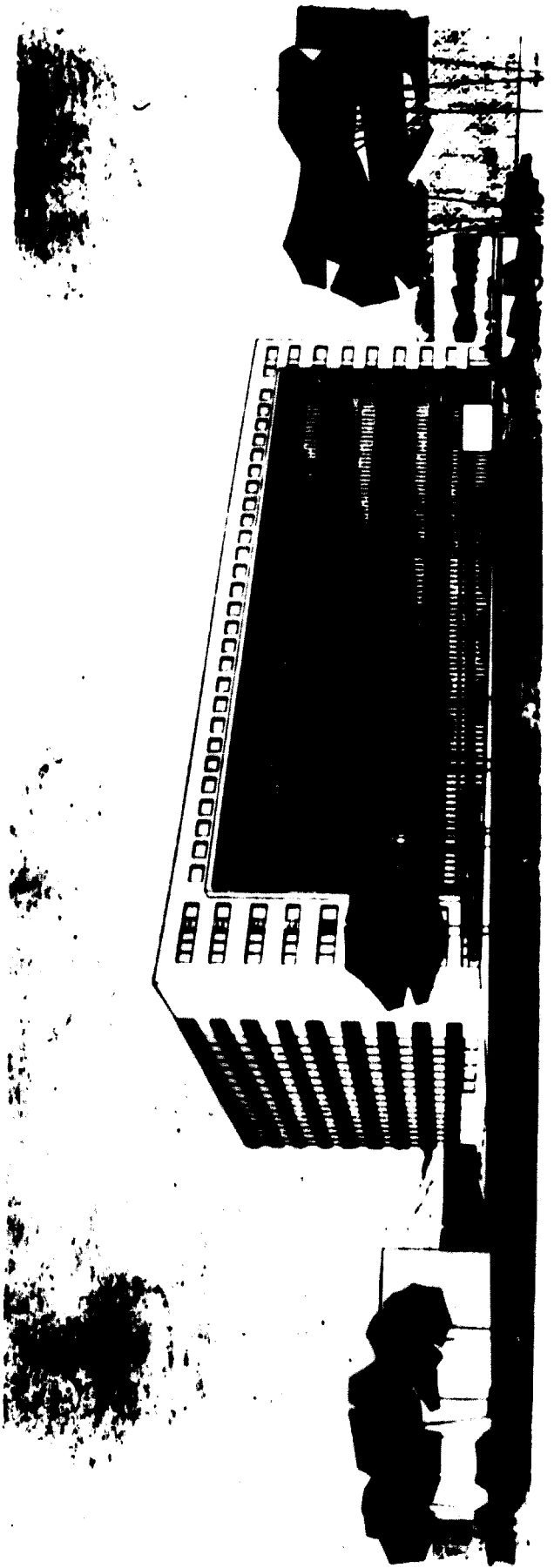
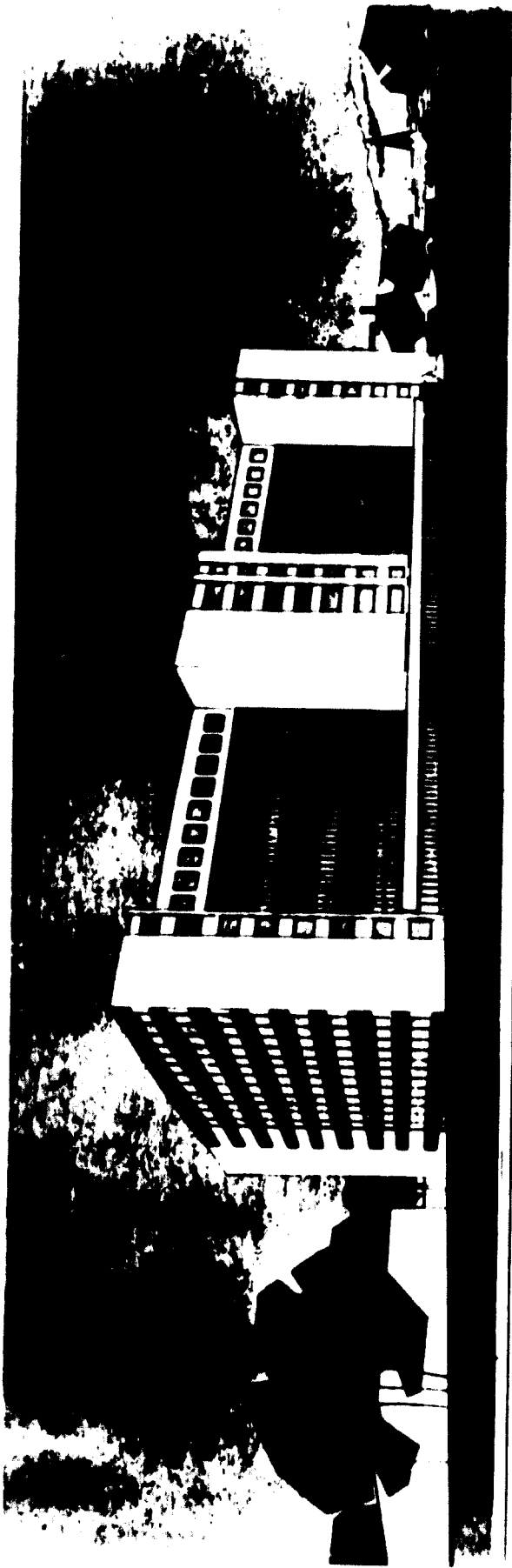
In these loaning stations it would be possible to train gradually groups of workers as a preliminary preparation for their subsequent assignment to more difficult tool making and engineering work. In this manner even several teams could be trained in the course of a year, towards the cultivation of tool shop mindedness and manual skill of these teams.

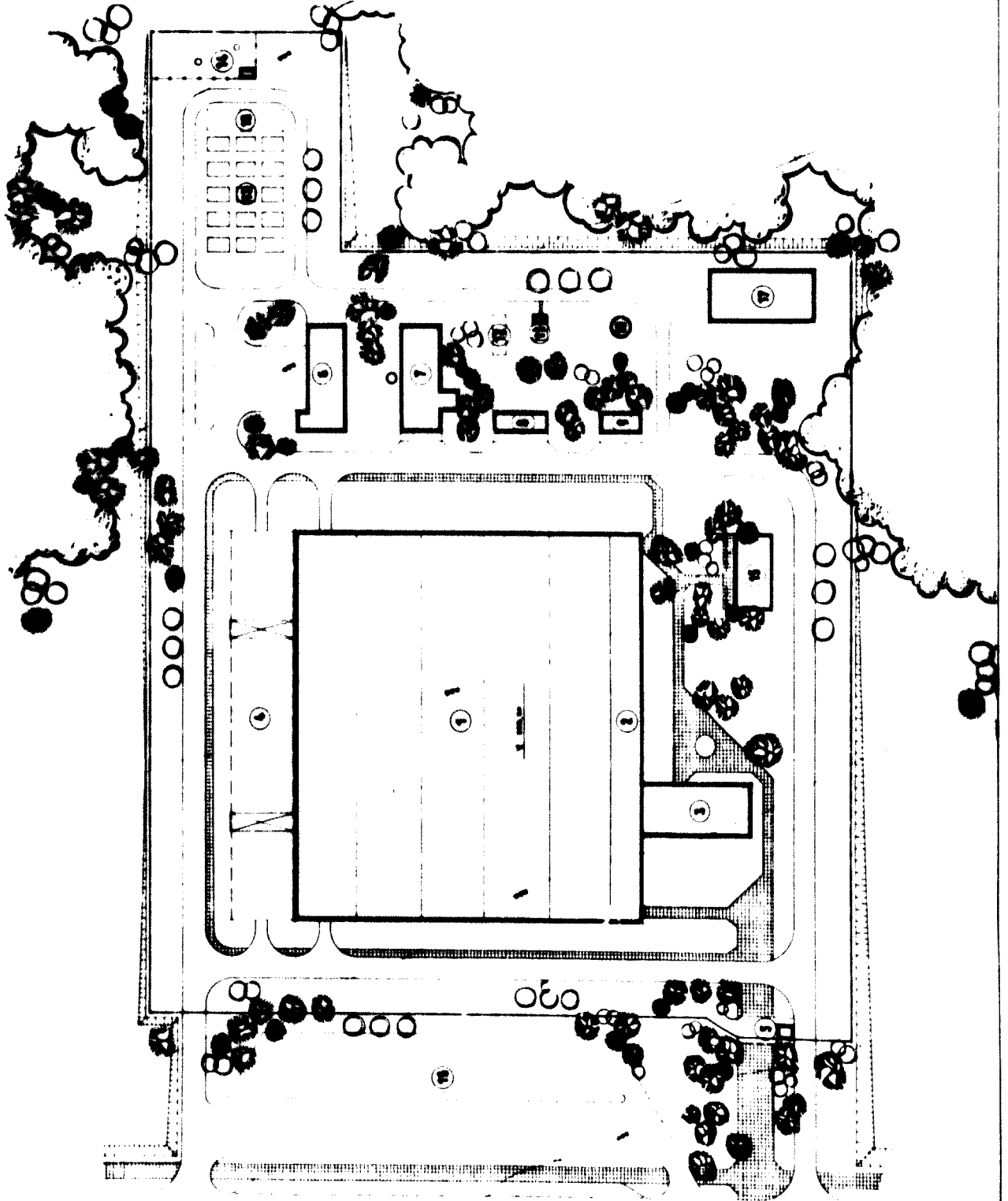
Since unit assembly fixtures are used to advantage only in small scale multiple and single production an application of this method is, of course, limited.

The possibility cannot be excluded that, under certain special conditions, an investigation will confirm that the establishment of a loaning station of unit assembly fixtures will be more favourable than the election on a plant for the manufacturing of new fixtures, from the points of view both of economy and of the possibility of practical materialization. In most cases, however, a loaning station of unit assembly fixtures and unit assembly clamping elements can suitably supplement the production of new fixtures. At the present time the use of unit assembly clamping fixtures and clamping elements is asserting itself on a steadily increasing scale.

Note:

In Czechoslovakia large industrial corporations are manufacturing unit assembly rangers for their own use. In the German Democratic Republic a specialized corporation was established for the manufacture of these unit assembly kits and clamping elements.





KEY :
LEGENDA :

- 1 HALL AND DIE PRODUCTION HALL
VÝROBY HÁLA
- 2 PRODUCTION AREA GRINDING
PROVOZ PŘÍSTAVK
- 3 OPERATIVE AND SPECIAL AREA EMPLOYEES
OPERAČNÍ A SOCIÁLNÍ PŘÍSTAVK
- 4 SPECIAL AREA WARE
SPECIALIZED WARE MATERIALS
- 5 STORAGE YARD
- 6 STORAGE - PRODUCTION STATION
SPECIAL DIE CASTING A MACHINERY HALL AND
SPECIAL WARE - WARE PRODUCTION STATION
SPECIAL WARE WARE A PRODUCTION STATION
- 7 STORAGE - PRODUCTION STATION
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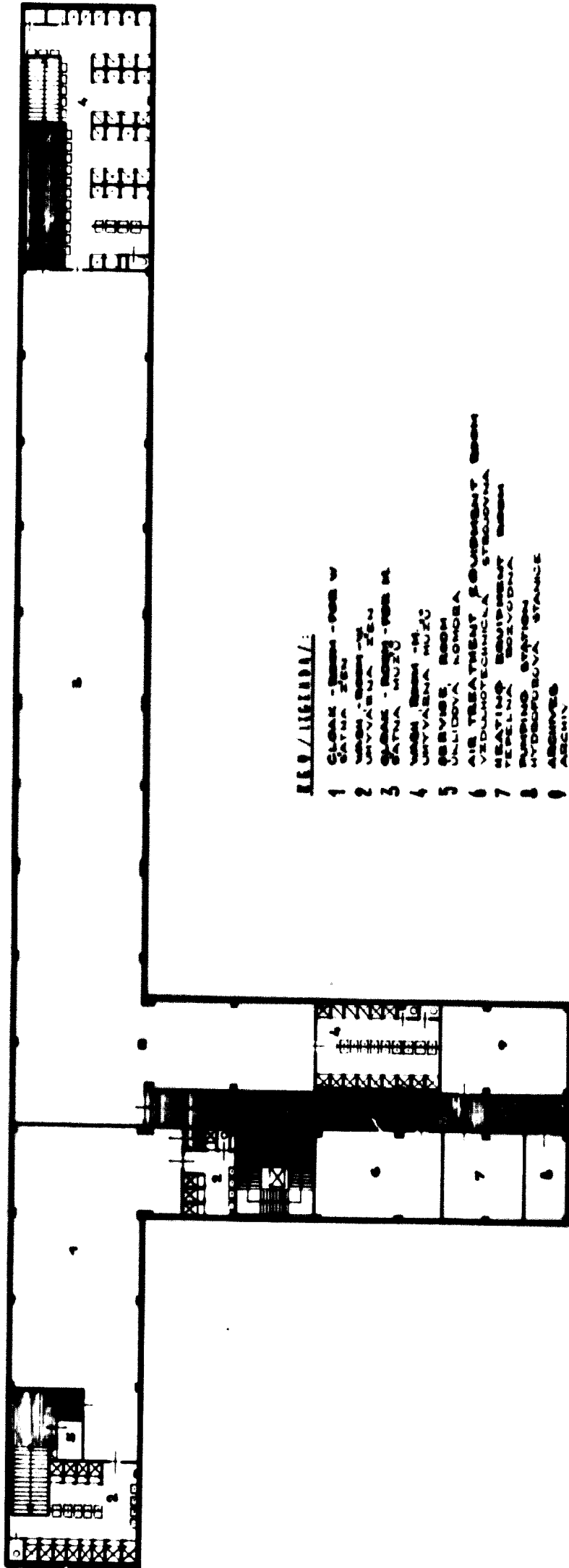
EXAMPLE :
LAY-OUT OF A PLANT FOR A
PRODUCTION OF DIES AND JIGS
WITH ABOUT 1000 EMPLOYEES

ADMINISTRATIVE AND SOCIAL AGROE BUILDING AND PRODUCTION AGROE BUILDING
SPRÁVNÍ A SOCIÁLNÍ PŘÍSTAVEK A PŘÍRODNÍ PŘÍSTAVEK

BASEMENT

SUTERÉN

M - 1:200



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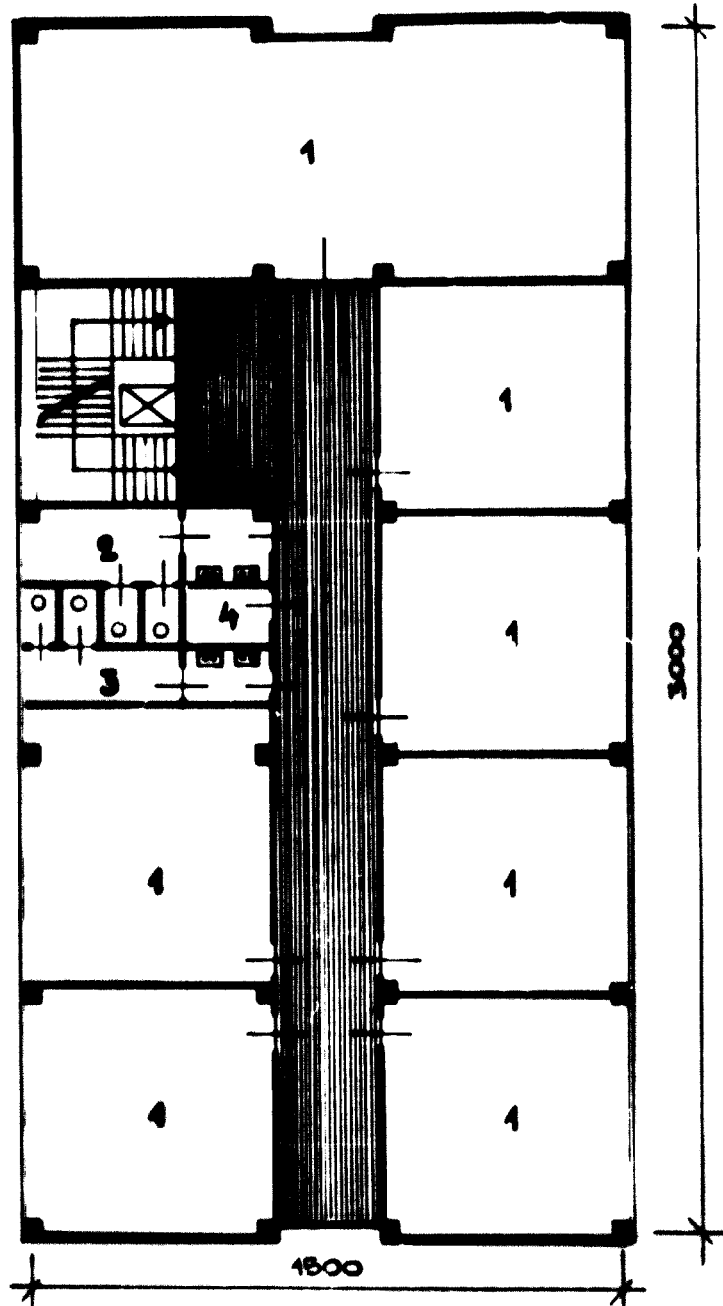
- 1 CLOAK - ROOM - FOR V
KAPKA ŽEN
- 2 WASH - ROOM - FOR
UMYVÁRNA ŽEN
- 3 CLOAK - ROOM - FOR M
KAPKA MUŽŮ
- 4 WASH - ROOM - FOR
UMYVÁRNA MUŽŮ
- 5 SERVICE ROOM
SLUŽBOVÁ KUCHYNA
- 6 AIR TREATMENT EQUIPMENT ROOM
VĚTRNĚTECHNICKÁ STROJOVNA
- 7 HEATING EQUIPMENT ROOM
VĚTRNĚTECHNICKÁ STROJOVNA
- 8 PUMPING STATION
HYDROFOROVÁ STANICE
- 9 ADMIN

ADMINISTRATIVE AND SOCIAL ANNEX BUILDING SPRÁVNÍ A SOCIÁLNÍ PŘÍSTAVEK

3-6. FLOOR

3-6. PODLAŽÍ

M. - 1:200

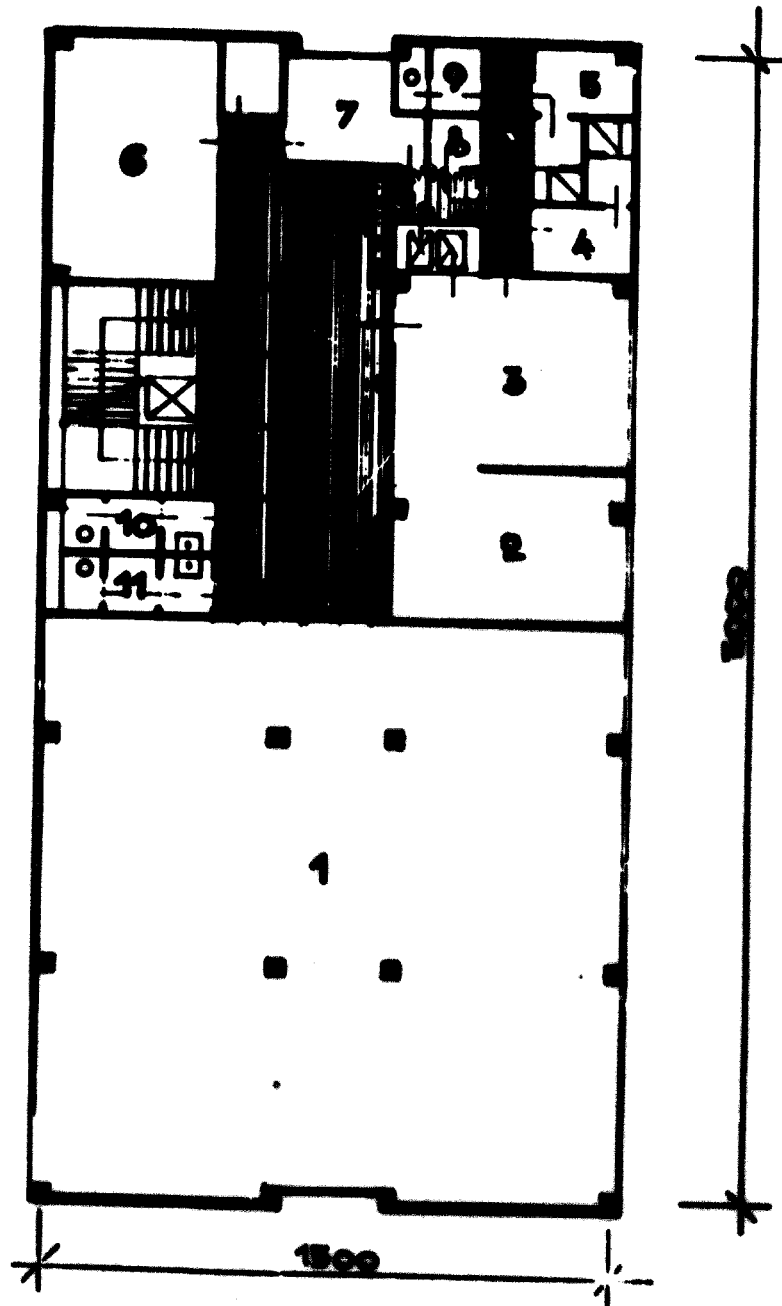


KEY / LEGENDA / :

- 1 OFFICE
KANCELÁŘ
- 2 WC - M.
WC - MUŽI
- 3 WC W.
WC - ŽENY
- 4 SERVICE ROOM
UKLIDOVÁ KOMORA

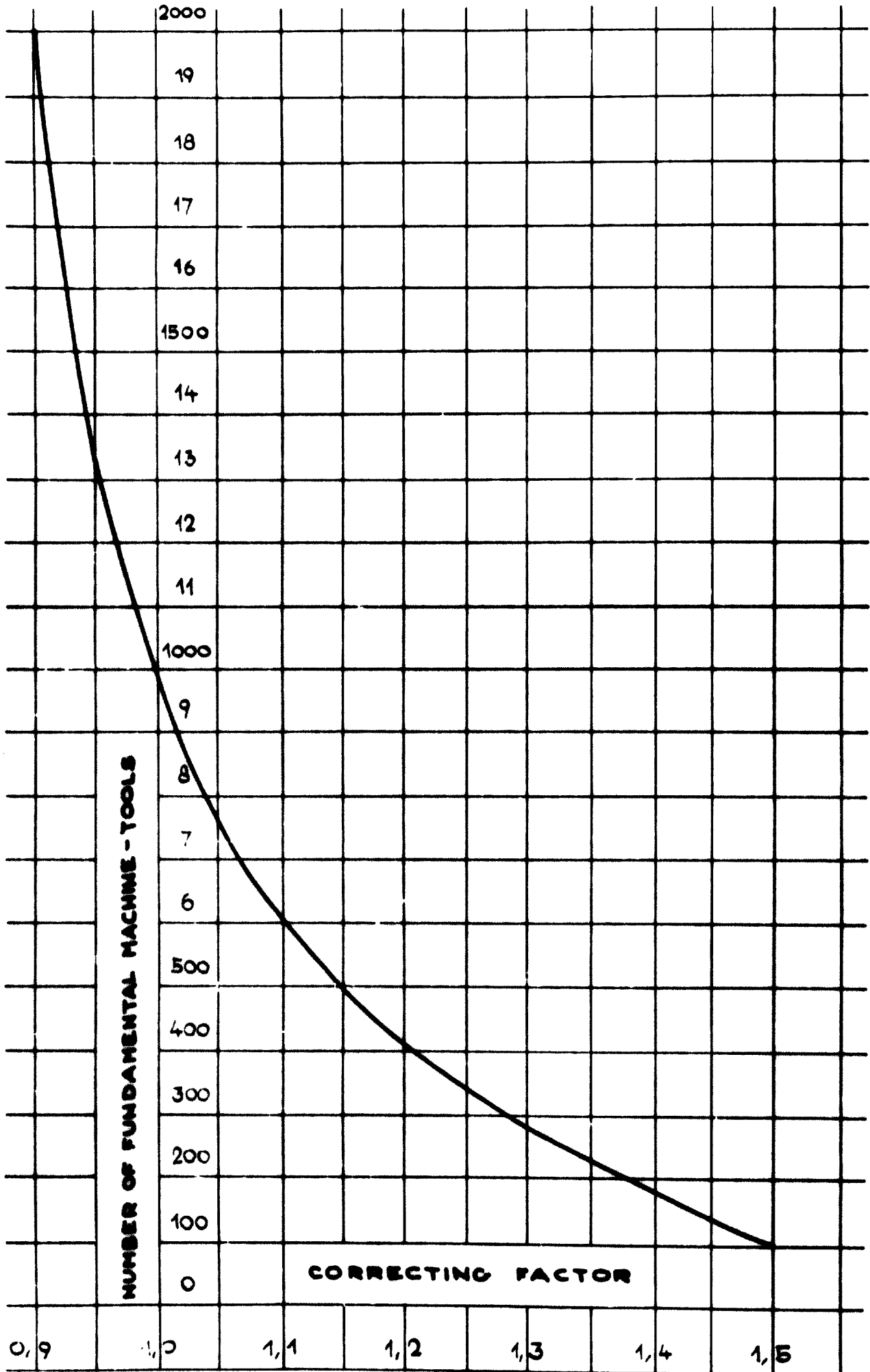
ADMINISTRATIVE AND SOCIAL ANNEX BUILDING
SPRÁVNÍ A SOCIÁLNÍ PŘÍSTAVEK

2. FLOOR
2. PODLAŽÍ
M. - 1:200

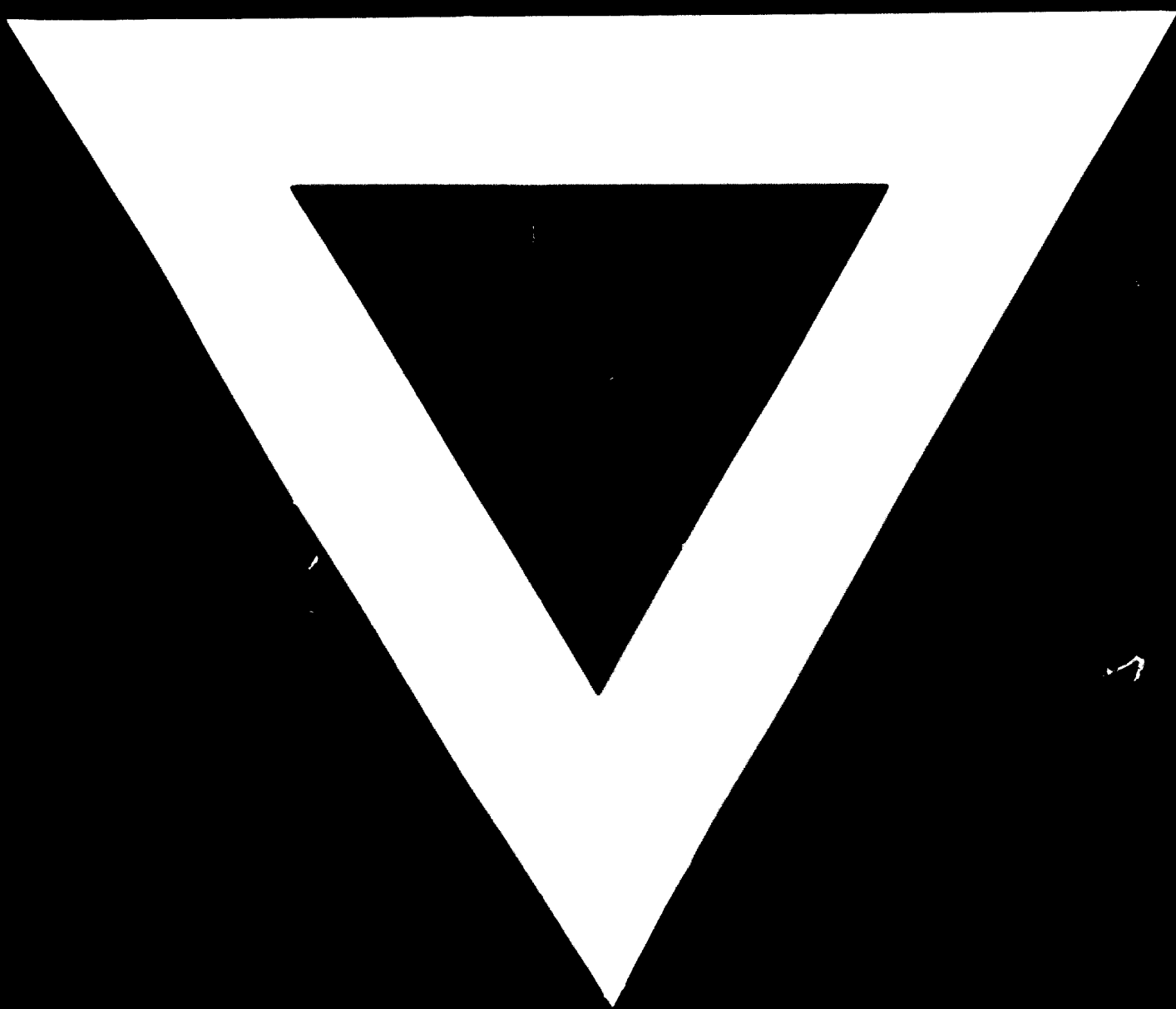


KEY / LEGENDA /:

- | | | | |
|---|---|----|---|
| 1 | CANTEEN
JIDELNA | 7 | STORAGES
SKLAD |
| 2 | DISTRIBUTION OF FOOD
VYDEJNA JIDEL | 8 | SERVICE ROOM
UKLIDOVÁ KOMORA |
| 3 | WASHING OF DISHES
UMYVARNA NÁDOBÍ | 9 | WC - CANTEEN EMPLOYEES
WC - PERSONÁLU ONLY |
| 4 | CLOAK - ROOM - FOR W.
SÁTIA PERSON. - ŽENY | 10 | WC - M.
WC - MUŽI |
| 5 | CLOAK - ROOM - FOR M.
SÁTIA PERSON. - MUŽI | 11 | WC - W.
WC - ŽENY |
| 6 | SNACK BAR
BUFET | | |



CORRECTING FACTOR FOR TIME OF MACHINING AND NUMBER OF MACHINE - TOOLS IN THE TOOLSHOPS IN REGARD TO THE WHOLE NUMBER OF FUNDAMENTAL MACHINE - TOOLS IN THE WORK - SHOPS OF THE PLANT.



4 . 4 . 74