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FACTORY DESIGN[1/]

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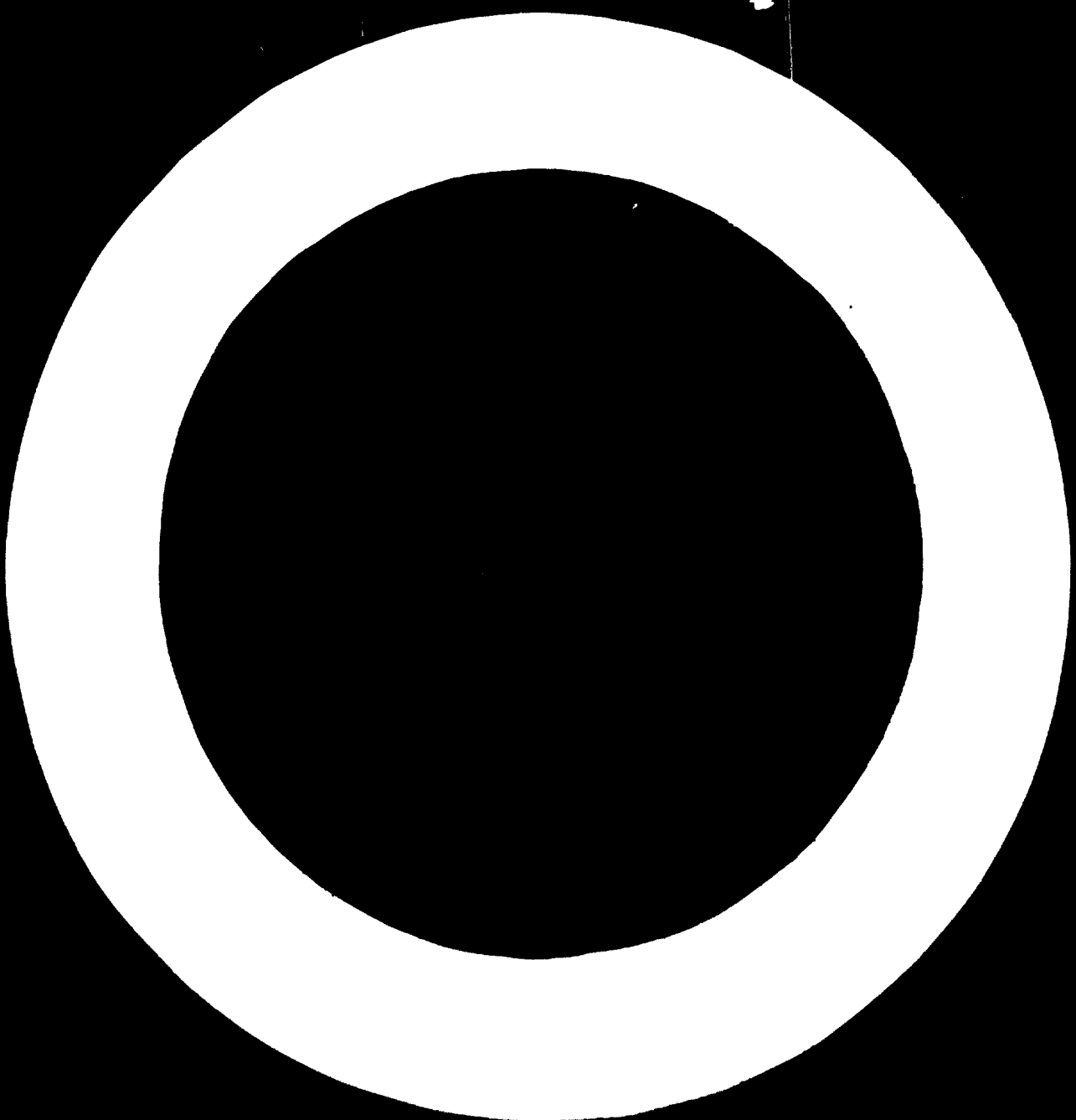


FACTORY DESIGN

The factory design has a fundamental effect both on the investment costs and, before all, on the production costs. The expenses sacrificed on the design do not generally raise the investment costs, rather the reverse is the case.

The factory design should not be started by first erecting a building and trying to find out if the machines will or will not get room inside, but the running of the process ought to be the guiding principle for the location of the machines. A process description, operation list and schemes on the working procedure are the first design phases when the products and the capacity have been settled. In the joinery industry several processes often take place simultaneously on the same machines. This renders the location planning difficult. All working procedure schemes have to be investigated side by side, taking also the loading extent into consideration. The minimizing of transports and intermediate storing is one of the most important points, as both these are phases where the value of the product, despite expenses sacrificed, does not increase. With these principles in mind the preliminary machine location layout would be made. This task is facilitated by making from cardboard or similar material models according to the space required by the machines, thus making the examination of alternative locations more easy.

Only after this phase should the machines be selected and the building design be started with all different tasks involved.

The basis for the chouce of machines and equipment must be not only the price, but also technical aspects and, in particular, suitability for the purpose in question.

Marketing c anges and future re uirements have to be carefully considered and the enlargement and modernization possibilities duly observed. Especially small industries are apt to underestimate planning at a sufficientlyt long sight.

The money involved in factory design is normally a guarantee for ability to compete and one of the most profitable investments. In case of insufficient knowledge of the subject, it is recommendable to use competent consulting engineers.

1. Introduction

The factory design has a fundamental effect both on the investment costs and also - later on - on the production costs. In respect of the investment costs the effect is surely not that the design would increase the investment costs in proportion to the share used herefore, but often the effect is just the opposite, since by a careful design unnecessary investments are avoided and building and installation costs are reduced. But a still greater importance has the design for the production, because an insufficient and faulty design will cause continuous cost increases. My intention is not to go into details with the factory design for the project as a whole, but just to deal with one phase, namely, how to plan the location of machinery and equipment.

2. General

Regrettably often the starting point for the factory design is a ready built factory hall, into which machines and equipment for the process have to be installed. This is, however, by far the wrong order. The building should only be the most economical shell around the process. Without going further into the primary design, it may be established that the process description is the ground for the location design. It seems strange to speak about a process, especially in connection with a small joinery industry, but anyhow it is the question of a definite production process. Often in the joinery factories several processes take place on the same machines, and this makes the design difficult. Various processes have to be investigated side by side. For the processes operation lists and working procedure schemes have to be prepared, on the basis of which a preliminary location plan or lay-out for the machines and equipment has to be made. At this stage the running of the work should still be examined. After that the machine choice has to be finally settled, so that a detailed location dimensioning may be started. Now the building can also be planned. Hence onward it is recommendable to run parallelly the machine and equipment design and the building design, taking also into account

required powsr, compressed air- and water piping etc. In good time the installation has to be planned, too. In this way the best operating unity will be obtained.

3. Process description and working procedure schemes

Even in the simplest cases it is worth-while to prepare a process description, a list on the phases of work and a working procedure scheme. For instance, in a joinery factory where frames for upholstered furniture are being made the process runs as follows:

- stocking of raw material
- drying
- cutting
- splitting
- planing
- machining
- levelling

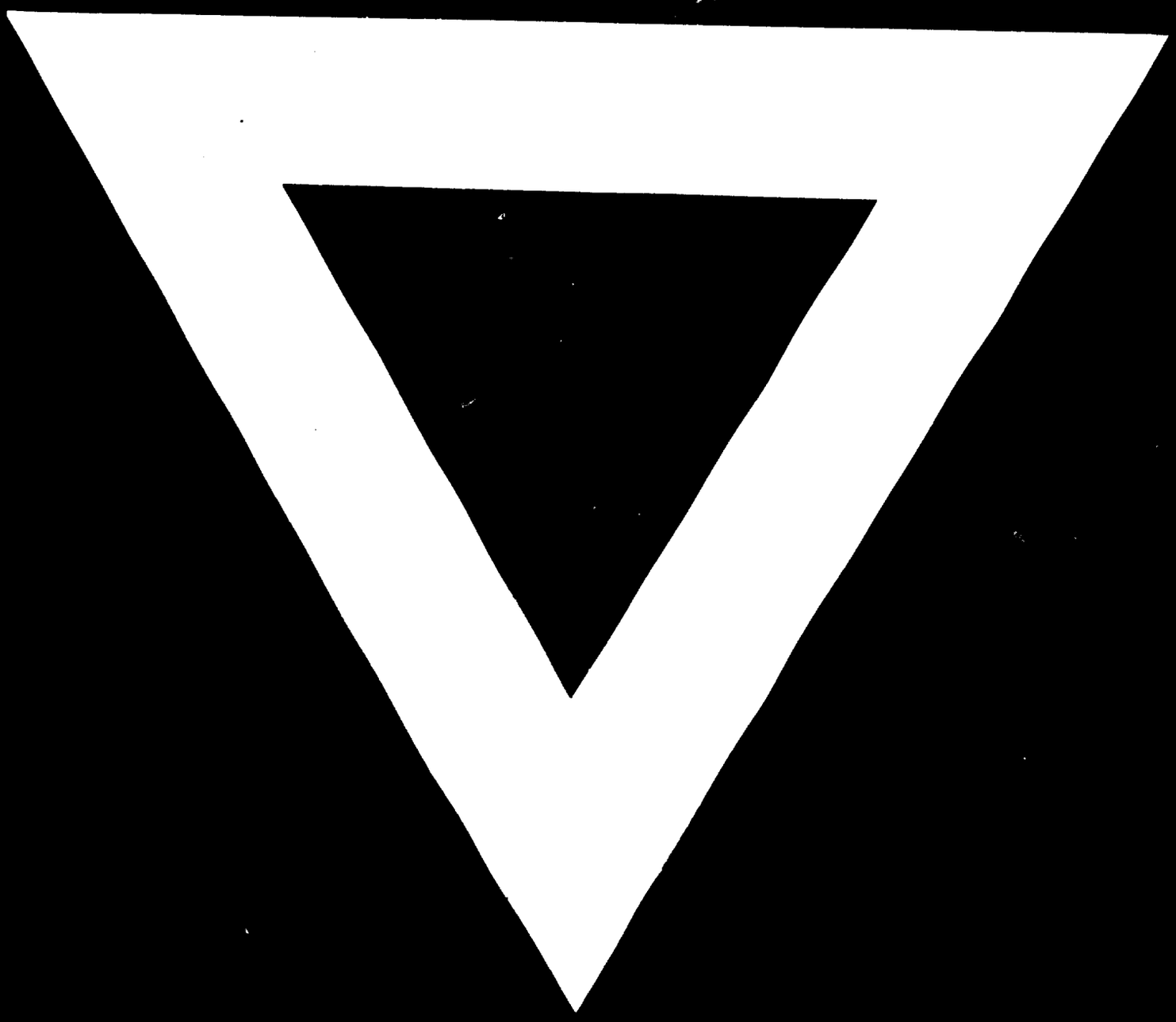
Through a more detailed dividing up in different working phases and by drawing diagrams on these, a so-called working procedure scheme is obtained. Should on the same machine several processes or working phases be handled, the working procedure schemes have to be parallelly dealt with. Into the working procedure schemes also the required capacities and other details needed for specifying the machine capacity and loading have to be marked. The required intermediate storing must not either be forgotten. Then follows the working procedure scheme, drawn up on the basis of the above processes.

4. The machine choice and lay-out

With the working procedure schemes as a basis the machine choice and the machine location, lay-out, would be made. Normally these cannot yet at this stange be final, and consequently the dimensioning, for instance, need not be absolutely exact. To facilitate the lay-out work it is recommendable to cut from cardboard horisontal projections of the machines and equipment, or, to make the task more illustrative, three-dimensional mini models.

In the lay-out should be observed, besides the space required for the actual machines, also the working and transportation spaces, as well as spaces for intermediate storing. Particular attention should be paid to the storing and transportation, as these are phases where the value of the product does not change, despite the expenses sacrificed. Few products are like the wines, which improve during storing and rise in value. The lay-out should be started from a sufficiently early stage, or generally from the etage when the raw material comes to the factory, thus observing also the storing and transportation of the raw material. Ultimately the storing and delivery of the ready products have also to be considered.

Around the preliminary lay-out the outlines of the building would then be drawn, the heights should be checked as also the electric power, compressed air, water, dust removal etc. operating points and numbers. On this basis the building designers, the designers for



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