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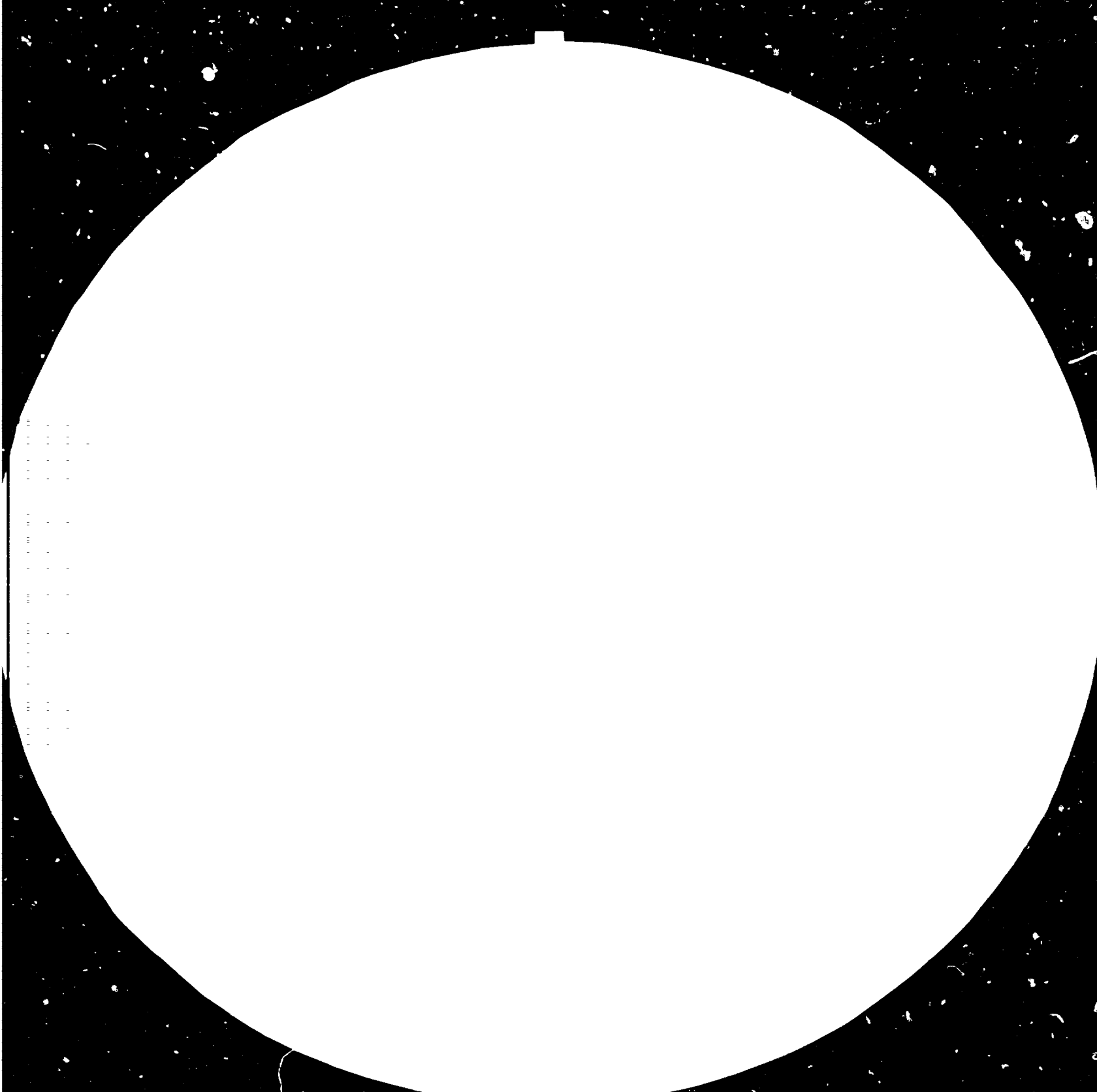

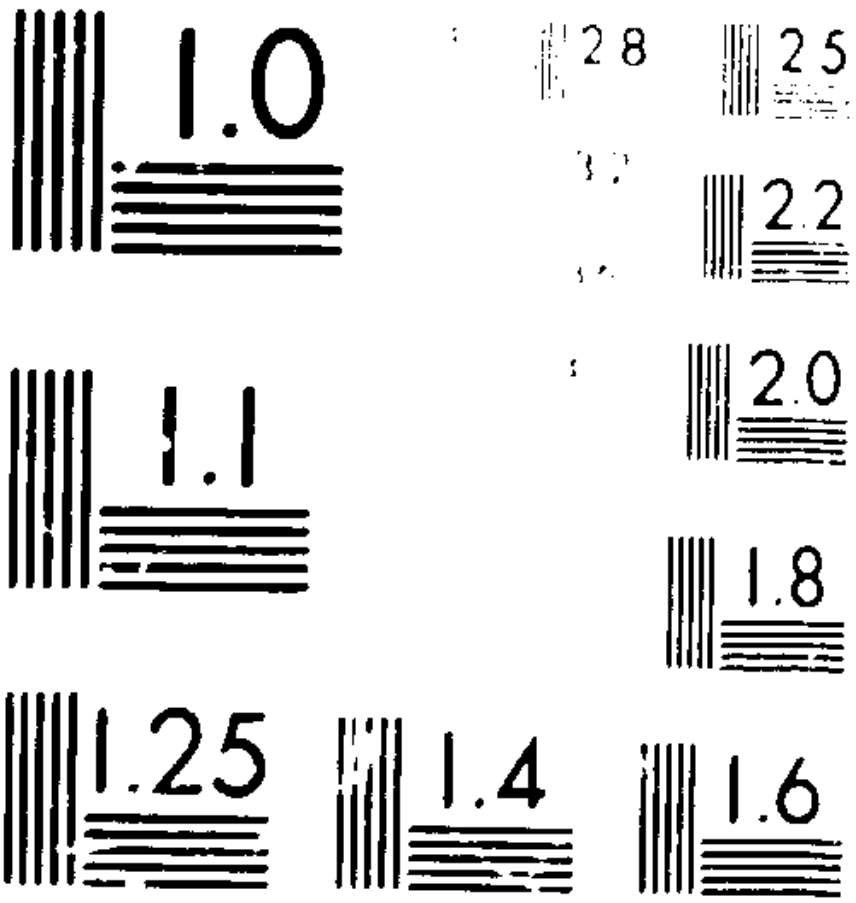
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PROMOTION OF LOCAL DESIGN AND MANUFACTURING OF EQUIPMENT AND AUXILIARIES*

by

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Introduction

The development of hydropower may entail significant contribution to local industry, primarily civil works and mechanical components. Cooperation between contractor and local industry might even lead to local production of small hydroturbines, generators, transformers, cables, switchgear and control equipment.

The range of products and depth of production is greatly dependent upon local conditions:

- market size and development
- available workshops, trained personnel, technological potential
- balance of payment, raw materials

Assessment of these factors will determine the possibility of co-operation and different steps in developing local industry through contractors:

- establishing a subsidiary
- cooperating with existing company on licence agreement
- subcontracting specified products, parts and services
- entering joint ventures with local industry

Cooperation should be institutionalized and supported by the governments involved by establishing the necessary general conditions to ensure a profitable operation for both parts.

The various types of cooperation imply various degrees of technological transfer, which would be of great importance for maintenance and thereby reliability of the electricity supply.

Experience shows that maintenance in most cases is neglected and leads to expensive out-of-service periods, repair and the need for spare parts. It might therefore be wise to consider maintenance and repair workshops as the first step towards local industrial development. This leads to the following logical steps:

- maintenance and repair workshop with testing equipment
- assembly and testing based on imported parts and components
- manufacture and testing based on licence agreement
- product design and development, adaptations and innovations will be the final step

These steps may be realized within the described kind of contractor's cooperation with existing companies. However, assessment of the basic local conditions is of paramount importance.

Market size and development

Before establishing any kind of industrial activities, we have to discuss some fundamental questions:

- What would be the geographical limitations of the market?
- Would export to other developing areas be possible?
- Is the inland demand for equipment sufficient for profitable production?
- Is local production prerequisite from the beginning?

In any case, the existence of local facilities is decisive in how to proceed.

Local workshops - technological potential

For maintenance, repair, production, assembly and testing, we need different types of welding, machining and testing equipment. Such equipment would have to be identified - depending not only on the type of activity, product or service we intend establishing, but also on which step of industrial development it seems realistic to achieve. Most of the operations require general purpose equipment suitable for a whole range of products within a small-scale hydroplant. This also applies to the testing equipment for electrical and mechanical non-destructive testing.

Inspection of local workshops has to be carried out by the contractor, and a detailed programme for investments and training of personnel must be established. This might differ considerably from area to area. Experience shows, however, that the necessary technological transfer is a minor problem - merely a question of time. A much more difficult issue is the balance of payment.

Balance of payment - raw materials

Assuming a positive result from investigations on market development and local facilities, serious attention must be paid to the balance of payment - i. e. the availability of foreign currency. This applies not only for the initial phase. Here the problem might be solved by a developing aid programme but grows even more significant the following phase - where industrial activity is supposed to be self-supporting. Necessary funds of foreign currency for the purchase of spare parts for tooling machines and raw materials - with no local supplier - must be available on longer terms. If not, one will very soon run into difficulties with delays and power plants out of service for lengthy periods.

Possible support from Norwegian industry

In the field of hydropower development, Norwegian industry has considerable experience, embracing all the necessary equipment from water inlet to the electricity consumer. Brief presentation in pamphlet form is available at this Seminar.

The industry is interested and prepared to discuss the above matter in order to find the most suitable and realistic mode of operation.

As to personnel training programmes, the industry together with NORAD (Norwegian Agency for international Development) continuously runs such programmes with trainees from different developing countries.

In conclusion, I may mention that Norwegian industry has received interesting orders for small-scale hydropower plants to a number of developing areas in Asia and Africa.