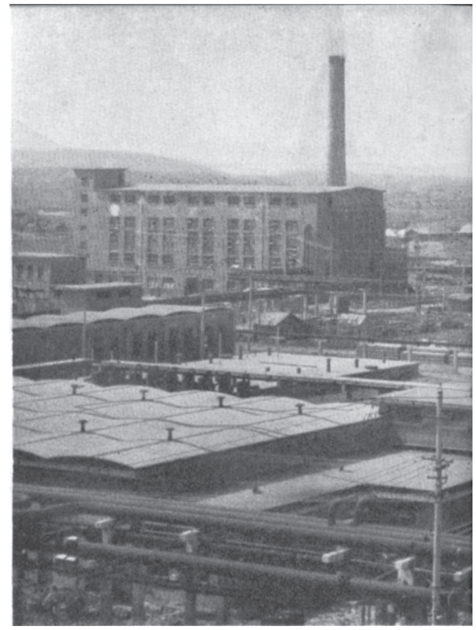
China Builds Her Own Chemical Fibre Industry



The Nanking Chemical Fibre Plant.

HO CHENG-CHIEH

THE Nanking Chemical Fibre Plant is the first such plant to have been built entirely with Chinese skills and resources. Its annual production of viscose yarn and staple fibres has added 40 million metres of cloth per year to the country's textile capacity — enough to provide a suit of clothes for 8 million people.

Except for two small out-dated experimental plants, there was practically no chemical fibre industry in the old China. A new plant was set up in Paoting in Hopei province shortly after liberation, but all the machinery and equipment was imported. For this reason, when we began to build such a plant on our own, we faced a host of difficult problems.

Power of Collective Strength

Before 1960, Chinese engineers had never designed a complete chemical fibre plant. Over 1,000 major pieces of equipment are involved, 20,000 valves of varying size, nearly 1,000 control instruments and 70 kilometres of pipelines. To design and make the types of equipment needed, the Ministry of Textile Industry assembled a working group of engineers and technicians from the country's textile machinery plants, the several old chemical fibre plants, and design and research units. It was the collective experience and work of this group which enabled some hundred key technical problems to be solved.

One such problem was the manufacture of the spinnerets — small gold and platinum spinning nozzles the size of a watch dial, containing several thousand tiny holes almost microscopic in size from which the fibre is extruded. Such holes must be perfectly round and very highly polished, otherwise the viscose being extruded becomes clogged. The Chingwei Textile Machinery Plant in Shansi and the Shanghai No. 1 Textile Machinery Plant took on the task of making them. Administrators, engineers and workers from the two plants experimented together. By converting a high-frequency electric furnace to smelt the nozzles, making a precision rolling machine, and studying and improving various polishing operations, they were able to solve the key technical problems involved. Mass production of the spinnerets began at once.

Perfecting Technique in Practice

Many other pieces of complicated equipment for the plant were designed and made in the same way — pumps which must supply viscose into nozzles with a speed not varying more than 0.07 millilitre per minute, motors with a speed of 8,000 revolutions per minute, positive speed variators, for example.

To shorten the time of construction, we went ahead with designing the buildings for the plant at the same time that the machines were being manufactured and tested. This assignment went to the Designing Institute of the Ministry of Textile Industry. While technicians there had accumulated extensive experience in the design of cotton and woollen mills, this was their first attempt at designing the buildings needed for a chemical fibre plant. A group, led by the institute director, was formed of four engineers who knew something of chemical fibre production, others who were specialists in ordinary textile plants and students majoring in chemical fibres at the East China Textile Engineering College. The group studied all the available Chinese and foreign material on the subject and accumulated experience in actual practice before designing the plant. They sent their drafts to other research units and to different textile plants for comments, criticisms and suggestions. Throughout the construction period, the designing group stayed at the site explaining their final blueprints, consulting with the workers, and making revisions on the spot whenever the actual conditions of building made them necessary.

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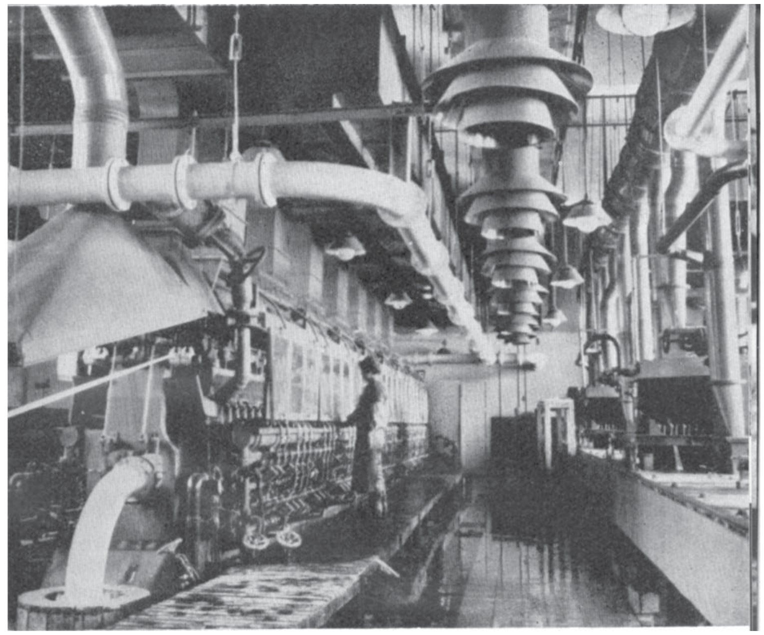

The staple fibre spinning room. *Photos by Wang Wen-hua*

The Nanking No. 1 Construction Company put up the plant buildings and here too the workers had to tackle new technical problems. One of these was to pave the shop floors with bricks and mortar which were both water and acid resistant so that the concrete foundation underneath would not be damaged and weakened. In the spinning shop the floor was over a hectare in size, and conditions required that it be not only acid proof but that its surface not vary in level more than 2 mm. in a 3-metre-square area. Where heavy machines were to be located, bricks and mortar had to support a weight of several hundred kilograms per square centimetre.

Working closely with the designers, the construction workers made over a thousand experiments and sample bricks, seeking the best acid-resistant materials. This same careful effort went into all their work, with the result that all quality targets in putting up the plant buildings were met.

Man Is the Decisive Factor

The training of staff and workers for the new plant began before the ground was broken for construction. Most of the administrative and technical personnel were new to the chemical fibre industry, having worked previously only in cotton or woollen mills. The new workers were almost all young junior or senior middle school graduates with no production experience and even less knowledge of chemical fibres. But everyone, staff member or worker, had the greatest determination to do their part in making the country into a strong socialist state, and from this came the will to study hard and practise diligently. This was the decisive factor in getting the plant into operation in such a short time.

The plant did many things to train workers and staff, making learning through practice the key. Workers were first sent to other plants to learn the basic operational skills as apprentices. When they returned, they took part in installing the equipment in order to become acquainted with the whole process and the performance of the machines. Then technical classes were held to give them a systematic knowledge of both production and separate skills so that they would know the principles and theory behind the things they had learned to do. Long before the day of the first trial run of the plant, workers practised operating their machines in the order of the production process which turns out chemical fibres.

The Success of Self-reliance

The completion of the Nanking Chemical Fibre Plant was another victory for China's policy of industrialization through self-reliance. Late last year the plant conducted its test run of the whole process successfully on the first try and went over into regular production. The output capacity and the technical and economic levels planned for in the original designs have been reached or surpassed. Many machines compare favourably with advanced standards. For example, the high-temperature maturing tube in the room where the viscose solution is prepared takes up only a tenth of the space that it does in the Paoting plant which uses imported machinery, while its output is a third higher. The continuous steeping, pressing and shredding unit is four times more efficient than the one in Paoting, yet takes less than half the manpower to run it.

Quality is high. The percentage of first-grade viscose staple fibre is over 90 per cent. The four quality targets for dry strength, wet strength, denier and elasticity have all reached advanced world standards.

Following the pilot Nanking plant, other chemical fibre plants have been built in different parts of the country and gone into production. They mark a new stage in the progress of China's chemical fibre industry.

CORRECTION. In the September 1965 issue, p. 4, in the second line of the caption at upper left, *for* Gulf *read* area.