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UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
Vienna International Centre, P.O. Box 300, 1400 Vienna, Austria
Tel: (+43-1) 26026-0 · www.unido.org · unido@unido.org

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COUNTRY STUDY REPORT
ON
THE MACHINE TOOL INDUSTRY
IN
HUNGARY 1/

by

András Koltai
Research Engineer
Machine Tool Industry Works
Halásztelek, Pest Megye,
Hungary

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PART I.

POLICIES AND GENERAL ASPECTS

1.1. Status of machine tools in the country

The present stock of machine tools in the Hungarian machine industry is a total of 113000./Apart from the machine tools listed in the form attached, the following ones were taken into account as machine tools, according to the proposed outline of the report: shapers, sawing machines, forging machines, special machines, special-purpose machines, sheet-, bar-, and profile-material working machines and draw benches.

The majority of the existing stock consists of universal machine tools, but in the latest years the number of progressive machine tools has increased considerably. The average age of the roughing machine tools corresponds to the international one, but that of the finishing machine tools, especially in the machine tool industry, is much lower than the international average and scarcely exceeds the age of 6. About 60 per cent of the existing stock consists of home made machine tools.

Machine tool building has been carried on in Hungary since 1872. At the end of the 19th century three machine tool factories worked, which in addition to simple types produced machine tools of advanced design for that period. The largest of these factories, which is said to have been one of the most important in Europe, was rewarded by a gold medal for its universal milling machine at the Paris World Fair, 1889. Since then the Hungarian machine tool industry has won gold medals and grand prizes at several world fairs and international fairs.

At present the total output of the Hungarian machine tool industry is about 60 m$ annually /about 20 000 units/ which amount is the 0,67 per cent of the total output of machine tools in the world. By this number Hungary is placed 15 th on the world list.

Some 95 per cent of the total Hungarian output of machine tools is produced by 11 factories, which belong to three organizations.

To the largest organization also belongs a development institute, which affords centralized facilities for research, development, and testing.

In addition 7 further factories and 2 development institutes can be ranked to the machine tool industry, for they basically serve the machine tool industry by their activities. These factories make auxiliary equipment, hydraulic units, tools, and machine elements. One of the 2 institutes is engaged in investigating technological problems of machine industry while the other is developing electric automatic units and numerical control systems. In addition, the two technical universities and two technical high schools also assist the machine tool industry very much by elaborating machine tool research projects.

75 per cent of the produced machine tools are normal and high-accuracy metal cutting machines belonging to the light- and middle-weight category. The proportion of metalforming machines is 10 per cent.

The Hungarian machine tool industry produces machine tools of several hundred types. The number of basic types is 145. The most important ones are:

Lathes: universal, capstan, turret, copying, toolroom, chucking, high-accuracy and fine boring lathes.

Milling machines: universal, horizontal, vertical, copying, toolroom and pantograph milling machines in knee-type form and planer-type milling machines.

Drilling machines: column, radial, bench drilling machines and tapping machines.

Grinding machines: universal, surface, internal, centreless, thread, tool, optical profile, and gear grinding machines.

Other cutting machines: shapers, sawing machines, midget aggregate units, spark erosion machines, special-purpose machines, and production lines.

Metalforming machines: plate shears, edge-bending, eccentric presses, trimming presses, hammers with moving bottom anvil , air hammers, spring hammers, wire drawing machines for the manufacture of copper, aluminium, iron, and steel wires down to 0,01 mm /slip drawing, and combined drawing variations/, wire drawing and annealing sets.

It is worth mentioning the most important progressive and NC machines produced:

Machine tools with advanced control: Programme controlled milling machines and copying lathes, copying milling machines, automatic cycle universal cylindrical and internal grinding machines, punch card controlled chucking lathes and milling machines.

Numerically controlled machine tools: turret lathes, high-precision boring lathes, chucking lathes, milling machines, jig borers, and maching centres.

Some 60 per cent of the value of total Hungarian output of machine tools has been exported in the latest years. The major part of the export has been delivered to industrially developed countries.

The Hungarian machine tool industry has produced production lines for 10 years, which are machining mainly cases and lids of elektromotors. The total output on production lines produced till now is 2,5-3 million motor cases and lids annually. The machining is fully automatized from loading to unloading.

Besides this it is planned to build more intricate production lines and machine systems from NC machines, that meet technologically higher requirements and are suitable for machining groups of similar parts. Their production will start in 2-3 years. Our newest machine tools are even now suitable to be integrated in such production lines.

The trend of product development agrees with the international tendency, because the greater part of the produced machine tools goes to foreign customers. Therefore the proportion of the high-accuracy and special-purpose machine tools will be increased on. Moreover, in order to speed up productive efficiency of the produced machine tools, their automatization will be greatly increased by means of equipping them with different accessory devices and modern controls. In addition, in order to meet the increasing home and international demands, more and more machine tools tooled up and fixtured for given parts will be produced, which can be set to work at once.

The appearance of the NC machines causes the most important change in the product structure. Their proportion in the Hungarian machine tool production will be considerably increased in the next years.

The home and export demands drive the machine tool industry to widen the selection of machine tools, while the economic production and the limits of enlarging the production base inspire to tighten it. Therefore to facilitate production, when constructing new types, considerable attention is given to the development of "families" of machine tools of similar type, but of different sizes or affording different facilities, to enable large proportion of identical assembly units, components, and standardized machine elements to be employed. This is advantageous also for the users because the costs of maintanence are less.

The number of machine tools to be produced and exported in 1980, that can be seen in the form attached, does not show the considerable increase of production /threefold in production value compared to 1970/, because the product structure will change towards the more valuable progressive and NC machine tools.

Ancillary industries, excluding the one that produces electric control units, can not satisfy the machine tool industry properly

because of the lack of capacity. Therefore the international cooperation is greatly utilized in obtaining castings, special units of machine tools, tools, and machine elements.

In the interest of the technological development the state supervisory authorities give financial assistance to the enterprises to get machine tools and equipment of high level. In addition, by means of limiting financial instructions, the authorities put these enterprises into unfavourable position, which install or neglect scrapping machine tools preserving old technology.

1.2. External technical assistance in the development of the machine tool industry in the country

The Hungarian machine tool industry equally buys and sells licences. The most important ones bought recently are: Matrix thread grinder, Rexroth hydraulic units, Natier Forest NC milling machine family and machining centre, Stromag electromagnetic brake and clutch, Gamet hydraulic chuck, Schenkke edge bending machine. Even at present negotiations in several subjects are being carried on.

In the future the machine tool enterprises intend to speed up their product development by further buying of licences. Besides, several machine tool enterprises are in very successful co-operation relation with important West-European machine tool works. Several Hungarian machine tool factories have sold licences of some of their machine tools abroad, e.g. to Switzerland, Turkey. Further significant negotiations concerning selling licences and co-operation with several enterprises of Latin America and Asia are being carried on.

Co-operative producing relations are intended to be widened. Hungary is ready to enter into mutually favourable relations also with developing countries and help the development of the machine tool industry in these countries. The co-operation relations are mainly held together by the Hungarian Machine Industries Foreign Trade Company /TECHNOIMPEX/, therefore

it is advisable to contact it or the Machine Industries Co-operation Foreign Trade Bureau /MUNIKOOP/, when looking for relations.

Hungary takes part in the co-operation of the COMECON countries in the field of machine tool industry. Within the multilateral co-operation the COMECON partners accepted proposals for the specialized production of the most important types of machine tools.

Successful bilateral co-operation developed among Hungary and the other COMECON countries in many research and product development themes. Some of the most important themes are: developing of NC systems and their building units, production systems and their conveyor systems, computer-aided programming and design, tooling systems for NC machines, high-accuracy grinders, and turret lathes.

1.3. Co-operation and technical assistance needed

The proportion of the building units and equipments produced in co-operation is only 10 per cent in the home made machine tools. This number is intended to be increased at least to 25 per cent by organizing the national and international co-operation.

The most important problems of the Hungarian machine tool production and the ancillary industries to be solved are the further modernization of a few type of preliminary metalforming technology, the grinding wheel production and the organization of production. It would promote the development of the Hungarian machine tool production if the UNIDO organized study-tours into the developed countries and gave scholarships to experts to study the following themes:

- modern kinds of preliminary metalforming technology /foundries, forgings, and press works/,
- technology of the production of up to date abrasive materials and grinding wheels,

- organizational problems concerning the introduction and use of NC machines,
- modern methods of the organization of production and the mechanization of administration,
- computer-aided design and mechanization of the engineers' work,
- study of some up to date research institutes.

In return Hungary is ready to be at the service of the UNIDO to receive experts in other themes.

Part II.

TECHNICAL ASPECTS

2.1. Problems in the development and utilization of machine tools

The existing stock of the factories producing machine tools yet consists mainly of universal cutting machines. As a result of this fact the manufacturing is carried on presently mainly in a cyclic production system i.e. in a system that is characterized by groups of similar machine tools and not by proper technological order. The modernisation of the machine stock has begun and significant results can be seen. On the basis of the examination of component statistics being already in progress the factories will establish machine tool systems optimally applicable for the character of components for centralized and specialized production of groups of parts in the near future by means of new vast production reorganisation and by using more and more progressive machine tools.

At the same time the enterprises will continue the modernization of their computer aided data processing systems and ensure the optimal utilization of machine tools by means of effective production organization.

The quality control is adequate in the machine tool factories. By means of regular inter-production control and the thorough control of part units and the finished machines they ensure, that the accuracy of the produced machine tools suits specifications.

The acceptance tests of the machine tools are carried out in two phases. The accuracy of machines is measured equally statically, accordingly in standstill, and dynamically, that is under load. In order to increase the efficiency of the quality control, fatigue tests are done on some machine tools selected out of the series. Besides, in order to observe defects arising in use of new types, the factories are in relation mainly with home customers.

The quality control departments are generally well equipped with instruments.

The mounting and the final inspection of the high-accuracy machine tools are carried out in air-conditioned shops. In addition to these there are air-conditioned measuring rooms for measurings parts of higher accuracy.

There are definite endeavours in the country to utilize the machine tools in an optinally economic way. The machine tool factories make efforts to meet these demands. They equip the machine tools with more and more accessories in order to widen the field of utilization. They maintain close relations with users, give them special advice, in the form of offer they work out the technology to be applied to the work pieces sent in, and in the case of order they deliver their machine tools with tooling up.

Major part of the machine tool stock used in the machine industry consists of home made machine tools. This fact is favourable from the point of maintenance, because so the costs of maintenance are less.

Third part of employees engaged in maintenance and repair is employed in regeneration. They regenerate 6-8 per cent of machine tools, by preference the bottle-neck tools, annually according to plan.

The factories producing machine tools also undertake regeneration of machine tools in a centralized way. However the capacity of these sections is not satisfactory and therefore a company has been established, which organizes planned regeneration of home-maid and foreign machine tools.

The skilled labor training for young people is solved in the country. The machine tool factories considerably take their share of practical training of apprentices.

In addition to training of apprentices education concerning trade in special secondary schools contribute to training of future craftsmen, for young people educated here become skilled workers or technicians on the base of their dispositions and practical activities. There is possibility also for further training of grown-up unskilled and semi-skilled workers.

The enterprises producing machine tools have prepared themselves for further training of their workers and technical staff to adapt them for manufacture and operating of the progressive and NC machines to be produced in an ever increasing number, and for using up to date production organization methods.

2.2. Considerations for introduction of numerically controlled machine tools in the country

After preliminary research of several years in 1968 started the production of NC machines more intensively in Hungary.

by development financed from central development base, appeared the advanced numerically controlled machine tools realizing many operations as a result of co-ordinated co-operation of several enterprises. Till now seven prototypes have been completed /lathes, milling machines of different types/. Four types are already manufactured in series and presently 50-60 NC lathes are exported annually.

In 1967 a representative plant of NC machine tools was established in the Csepel Machine Tool Works, comprising 10 NC machines /5 lathes, 2 milling machines, 2 boring mills, and 1 drilling machine/. This representative plant is well organized and well utilized. Its aim is to supply the Hungarian metalworking industry direct workshop experiences on introducing NC techniques, establish the ways and methods of workshop and labour organization best fitted for NC, to demonstrate and propagate these experiences and afford a basis to the practical training of the specialists for complex automation.

In the years to come prototypes of several NC machines will be ready and also their production in series will be initiated /lathes, milling, boring machines, machining centres, jig-borers and cylindrical grinding machines/.

These NC machines will be supplied with Hungarian control equipment and, upon desire, also with NC of other type.

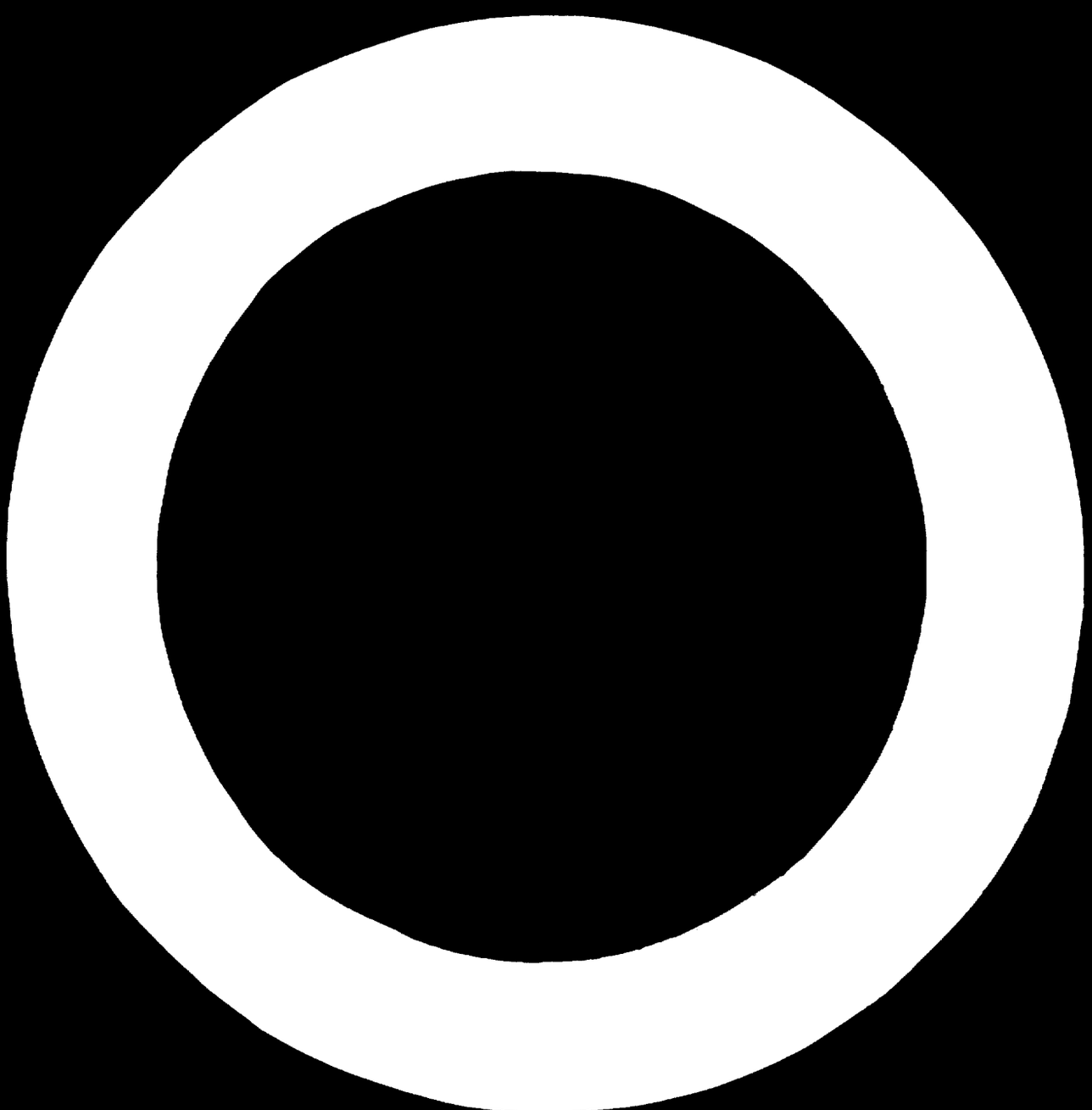
Although production costs run higher in the initial stage of NC machines' utilization, their necessary propagation is emphasized by the following known factors in this country: less rejects, increased reliability, decreased costs for devices, alleviation of labour-shortage.

In consideration of these factors the state affords support from the central means to the enterprises of machinery to establish NC machine groups. This support can be obtained in competition by those companies, whose production assortment offers reasonable possibilities for the economic use of NC, and who are willing to undergo all liabilities indispensable

to the successful repatriation of NC techniques. Such liabilities are:

Continuous and planned operation of the NC machines' group and the creation of an organizational environment enabling at least 5000 hours of productive running of each machine in a year. This level of utilization must be reached within two years running.

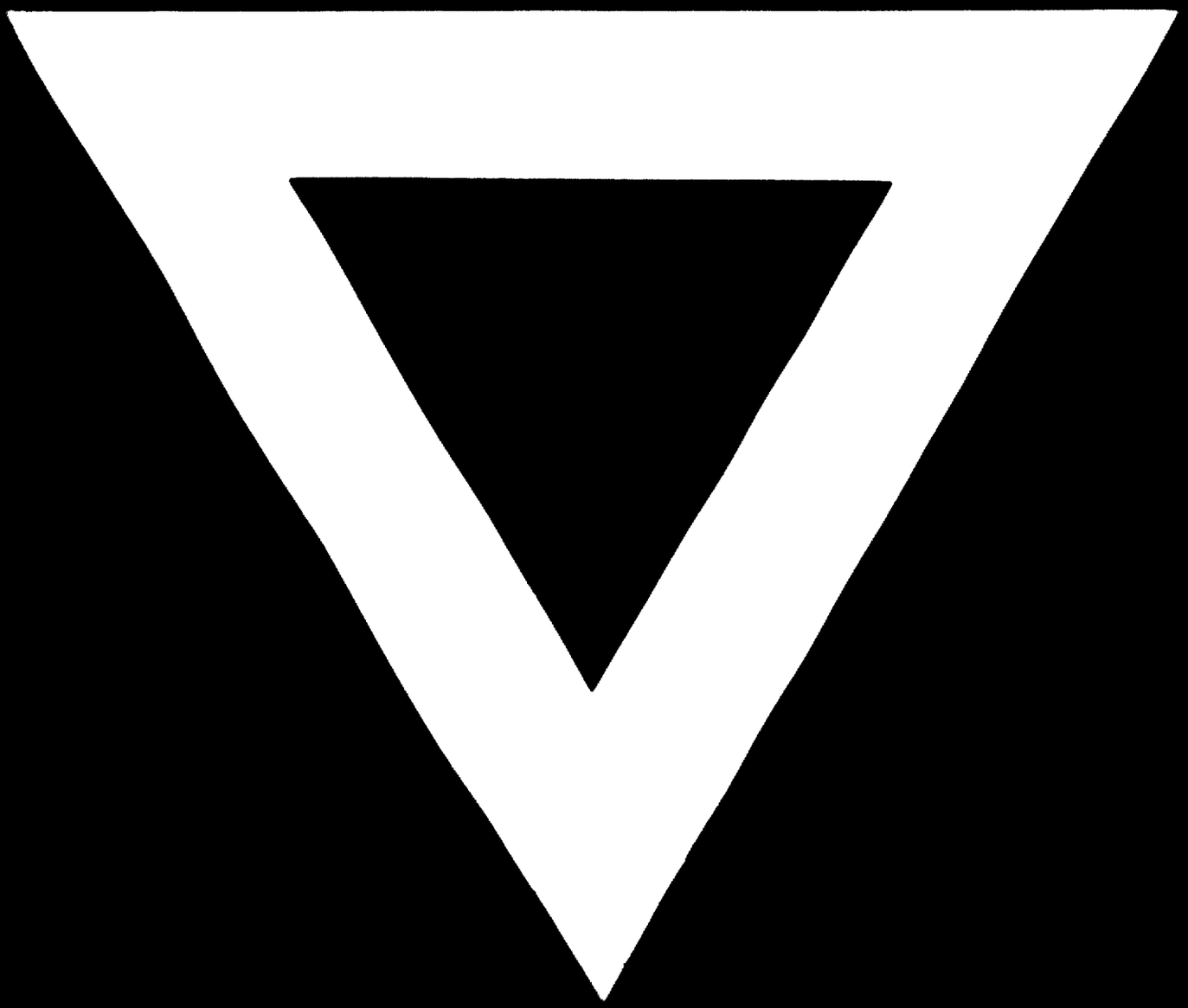
Training of the personnel for operating, programming and maintenance is running and it is assured also for the future.



Appendix
Hungary

STATE OF MACHINE TOOLS

Years	Number of Machine tools produced	Number of Machine tools imported	Number of Machine tools exported	Stock of Machine tools	Demand
1960	12238	3098	4479	85088	
1970	19470	1507	4559	114832	
1980	23700	1650	4860	134000	
A. Milling Machine Tools					
1960	1175	498	200	7990	
1970	1042	162	603	10199	
1980	800	800	500	10500	
B. Drilling Machine Tools					
1960	3054	303	1001	12790	
1970	4128	145	1095	23631	
1980	3900	150	1000	30000	
C. Lathes					
1960	2729	989	1452	20411	
1970	3395	390	1720	24237	
1980	3000	500	1600	25000	
D. Grinding Machine Tools					
1960	2422	576	325	15699	
1970	3010	303	347	21977	
1980	3000	500	400	26000	
E. Presses					
1960	1059	391	207	11381	
1970	961	155	11	12429	
1980	900	200	60	12500	
F. Others					
1960	1728	341	594	13817	
1970	6914	152	783	22349	
1980	10100	300	1300	30000	



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