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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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Regional Seminar on Machine Tools
in Developing Countries of Europe,
Middle East and North Africa

Slatni Pjassazi (Golden Sands) near
Varna, Bulgaria, 18 to 27 October 1971

ROLE OF UNIDO
IN
THE MACHINE TOOL INDUSTRY

presented by

the secretariat of
UNIDO

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INTRODUCTION

The United Nations Industrial Development Organization (UNIDO) was established in 1967, as an autonomous organization within the Secretariat of the United Nations. The main purpose of this Organization is to promote and accelerate the process of industrialization in the developing countries.

The main legislative organ of UNIDO is the Industrial Board which meets once a year. The executive organ is the UNIDO Secretariat with its headquarters in Vienna, Austria.

UNIDO's activities cover a very large field of questions connected with technical assistance to developing countries in the planning and programming of their industrial development; the formulating and carrying out of industrial policies; the development of certain branches of industry; the establishment of research institutes and centres of industrial development; the training of local personnel; and the creation of pilot industrial plants, and other related activities.

The main sources of financing this technical assistance rendered to developing countries are the United Nations Development Programme (Special Fund), United Nations Regular Programme, and Special Industrial Services Programme (SIS), together with the General Trust Fund (G.T.F.)

As a part of their work UNIDO is promoting the development of the machine tool industry in developing countries and has convened this present seminar to examine matters of common interest.

PART I. REVIEW OF THE MACHINE TOOL INDUSTRIES OF THE REGION

1. World Machine Tool Production

The machine tool is the only product which is capable of reproducing itself. For this reason machine tools play a key role in the expansion of industrial production since nearly all products are manufactured by metalworking machines. The machine tool is never an end product per se but the means to manufacture end products. It should be noted that the quality of a finished product can never be better than the quality of the machine tool with which it has been made, that is, machine tool defines and limits the quality of the end product.

Revisions to the 1969 estimates of machine tools output by thirty countries 1/ have brought the total of US $6,997 million which is above the original estimate of US $6,831 million. In the seventh annual survey of world machine tool production by American Machinist the 1970 estimate was US $7,840 million more than twelve percent above the revised 1969 figure*.

The twelve nations of Western Europe accounted for more than 39 percent of the world output in 1970 while they covered 36 percent a year earlier. Eastern Europe was responsible for about 25 percent. Japan has now 14 percent of the world output as compared with 15 percent of the USSR; 18.3 percent of Federal Republic of Germany and 18.6 percent of the USA.

The estimated production of thirty countries is shown in Table 1.

The last survey of the countries of the region has shown that three more countries could be added to the list of machine tool producers; they are: Turkey, the Arab Republic of Egypt and Israel.

1/ representing the world production in this field

*) American Machinist, January 25, 1971

Table 1

Estimated Production of Machine Tools in 1970*

in millions of US dollars

	Country	% in World Production	Total	Cutting	Forming
1.	U. S. A.	18.6	1460.0	1015.0	445.0
2.	F. R. G.	18.3	1434.5	983.6	450.9
3.	USSR	15	1185.0 1)	1000.0 1)	185.0 1)
4.	Japan	14	1098.6	861.1	237.5
5.	U. K.	6.0	475.2	381.6	93.6
6.	Italy	5.0	400.0	320 .0	80.0
7.	France	3.7	290.9	218.2	72.7
8.	G. D. R.	3.5	275.0 1)	180.0 1)	95.0 1)
9.	Czechoslavakia	3.1	245.0	201.0	44.0
10.	Switzerland	3.0	240.0	228.0 1)	12.0 1)
11.	Poland	1.6	123.0	112.0	11.0
12.	Spain	1.1	90.0	79.0	11.0
13.	Sweden	0.8	66.0	45.5	20.5
14.	China	0.6	50.0 1)	-	-
15.	Hungary	0.6	50.0	47.0	3.0
16.	India	0.6	48.0	45.0	3.0
17.	Canada	0.5	39.5	23.8	15.7
18.	Austria	0.42	33.3	17.5	15.8
19.	Belgium	0.41	33.0	16.0	17.0
20.	Argentina	0.41	32.4	18.0	14.4
21.	Australia	0.38	30.0	8.2	22.1
22.	Bulgaria	0.29	23.3	21.0	2.3
23.	Brazil	0.28	22.4	13.2	9.2
24.	Yugoslavia	0.25	20.0 1)	15.0	5.0
25.	Romania	0.25	19.6 1)	17.5	1.8
26.	Netherlands	0.23	18.0	10.6	7.4
27.	Denmark	0.18	14.7	9.0	5.7
28.	Taiwan	0.18	14.0	7.8	6.2
29.	Mexico	0.07	5.5	-	-
30.	Portugal	0.04	3.0	1.5	1.5
	Other countries	0.06	0.1		
	Total	100.00	7,840.0		

1) Rough estimate from fragmentary data.

* The American Machinist, January 1971,

2. Region's share of the machine tool production

In spite of the fact that some developing countries have started to produce machine tools, their share in the world machine tool production is still a very low one. The Table 2 shows the volume of the machine tool production of Turkey, the Arab Republic of Egypt and Israel as well as their share in the world machine tool production.

Table 2.

Country	Machine tools production in millions US $	Share in the world machine tools production in %
Turkey	4.9	0.06
Arab Republic of Egypt	1.7	0.02
Israel	1.34	0.02
Total:	7.94	0.1

3. Import of Machine Tools

World trade increased a little faster than production. Exports by all thirty countries totalled US $2,567 million. This was 33 percent of production and an increase of 14 percent over 1969 exports. Imports by the countries which produce machine tools increased by 15 percent from US $1,821 million to US $2,094 million. Imports by countries not producing machine tools amounted to US $473 million in 1970.[1/]

The import figures of engineering products including machine tools, by the countries of Europe and the Middle East in 1967 and 1969 are shown in Tables 3 to 6. The main importers of machine tools are Spain, Israel, Turkey, Greece and Egypt.

1/ American Machinist, January 25, 1971

Table 3.

IMPORT OF ENGINEERING PRODUCTS BY

DEVELOPING COUNTRIES OF SOUTHERN EUROPE AND THE MIDDLE EAST 1/

Millions US Dollars f.o.b.

Country	Total Engineering Products		Machinery non electrical		Machinery Electrical		Transport Equipment	
	1967	1969	1967	1969	1967	1969	1967	1969
Cyprus	37.5	59.0	13.2	17.8	8.6	10.5	15.5	30.8
Greece	418.7	777.2	177.5	241.4	88.8	100.7	152.3	429.8
Spain	1,005.8	1,044.3	624.9	672.8	182.3	190.0	198.5	181.2
Turkey	352.9	400.8	196.8	200.9	56.0	75.0	100.1	100.5
Imports countries of southern Europe	1,814.9	2,281.3	1,012.4	1.132.9	335.7	376.2	466.4	742.3
Iraq	123.2	191.8	63.0	114.2	23.0	24.6	32.5	50.7
Israel	181.5	414.9	66.6	180.2	58.5	111.9	56.4	122.7
Jordan	33.4	46.4	16.1	16.2	8.3	16.4	9.0	13.8
Kuwait	184.3	258.3	77.9	74.0	48.0	49.8	58.5	134.5
Lebanon	97.0	153.9	41.6	52.2	25.6	37.6	29.7	64.2
Saudi Arabia	175.2	281.9	65.8	78.0	42.4	61.2	67.0	142.6
Syria	78.0	126.0	28.9	41.6	18.3	21.2	9.9	39.6
Egypt	277.1	313.8	86.9	120.2	33.4	35.8	76.3	102.5
Other countries 2/	88.8	140.1	39.3	52.0	20.1	27.4	26.5	57.0
Imports by countries of Middle East	1,261.1	2,004.3	495.8	738.4	286.0	395.0	370.7	735.9
Total world import	55,521.8	76,378.0	24,826.9	32.077.5	10,223.4	14,135.0	19,508.5	28,842.4

1/ Data taken from "Bulletin of Statistics on World Trade in Engineering Products-1967" and "Bulletin of Statistics on World Trade in Engineering Products - 1969"

2/ Bahrain, Aden, Muscat and Oman, Qatar, Trucial Oman and Yemen.

IMPORT OF NON-ELECTRICAL MACHINERY BY DEVELOPING COUNTRIES OF SOUTHERN EUROPE AND THE MIDDLE EAST 1/

Millions US Dollars f.o.b.

Country	Metal-working machinery		Machine Tools		Power generating machinery		Agricultural machinery		Office machinery		Textile & leather machinery		Special industrial machinery		other special machinery	
	1967	1969	1967	1969	1967	1969	1967	1969	1967	1969	1967	1969	1967	1969	1967	1969
Cyprus	0.2	0.3	0.2	0.2	1.5	1.6	2.8	3.1	0.3	0.5	0.9	1.1	2.6	4.0	4.9	7.1
Greece	8.0	7.8	6.5	6.2	22.2	35.1	27.5	31.6	3.7	8.4	20.8	23.0	21.2	43.0	74.2	92.4
Spain	64.2	55.2	6.0	31.9	76.9	74.5	44.1	62.3	47.6	55.0	54.9	54.0	94.9	104.2	242.5	267.6
Turkey	15.5	14.5	13.6	10.4	31.7	34.4	23.5	19.0	4.3	4.1	25.5	24.0	28.3	33.3	68.0	71.4
Imports by countries of southern Europe	87.9	77.8	26.3	48.7	132.3	145.6	97.9	116.0	55.9	68.0	102.1	102.1	147.0	184.5	389.6	438.5
Iraq	1.5	2.0	1.4	1.8	5.5	7.2	5.7	6.6	0.3	0.5	7.5	4.1	16.1	22.3	26.5	69.5
Israel	3.8	19.2	3.5	18.5	18.4	27.2	4.9	13.5	4.9	11.6	6.2	19.4	5.2	21.2	23.2	68.1
Jordan	0.2	0.3	0.2	0.2	3.6	3.2	1.7	1.6	0.2	0.3	0.4	0.5	1.8	2.2	7.2	8.1
Kuwait	0.8	0.6	0.7	0.4	11.5	19.0	0.4	0.1	0.7	0.7	0.4	0.7	5.5	5.3	58.6	47.6
Lebanon	1.2	1.1	1.0	1.0	5.2	9.6	2.5	3.4	1.8	1.9	3.8	4.7	6.7	9.3	20.4	22.1
Saudi Arabia	0.9	2.1	0.7	1.9	15.8	18.3	2.9	3.3	1.7	1.2	0.6	1.1	14.0	12.5	30.0	39.5
Syria	0.4	0.7	0.4	0.4	3.9	4.4	0.2	4.8	0.2	0.4	1.3	4.6	11.8	8.9	11.2	17.9
Egypt	10.3	5.5	6.1	3.5	9.9	12.8	6.3	6.0	1.2	3.4	1.3	9.5	19.8	21.1	30.6	62.0
Other countries	0.3	0.5	0.3	0.4	5.9	14.1	2.2	3.0	0.5	0.6	0.5	0.5	7.1	9.7	22.9	23.5
Imports by countries of Middle East	19.4	32.0	14.3	28.1	79.7	115.8	26.8	44.3	11.5	20.6	22.0	45.1	88.0	112.5	230.6	358.3
Total World Import	2,153.3	2,668.5	1,714.7	2,133.4	3,339.9	4,212.4	2,257.7	2,659.6	2,289.6	3,085.4	2,100.5	2,787.9	3,381.8	4,445.0	9,303.5	12,218.2

1/ Data taken from "Bulletin of Statistics on World Trade in Engineering Products - 1967" and "Bulletin of Statistics on World Trade in Engineering Products - 1969", prepared by Economic Commission for Europe, United Nations, New York, 1969

Table .

IMPORT OF TRANSPORT EQUIPMENT BY DEVELOPING COUNTRIES OF SOUTHERN EUROPE AND THE MIDDLE EAST 1/

Millions US Dollars f.o.b.

Country	Railway Vehicles		Road Motor Vehicles		Road vehicles other than motor(cycles etc.)		Aircraft		Ships & boats	
	1967	1969	1967	1969	1967	1969	1967	1969	1967	1969
Cyprus	0.1	-	11.3	16.2	0.2	0.4	0.2	4.7	3.6	9.4
Greece	19.0	0.5	62.6	84.4	2.4	2.2	7.6	45.7	60.5	297.0
Spain	16.1	9.5	88.5	93.2	1.1	1.3	88.6	71.4	4.2	5.9
Turkey	1.9	1.0	82.5	79.5	1.1	3.2	5.8	14.1	8.9	2.7
Imported by countries of southern Europe	37.1	11.0	244.9	273.3	4.8	7.1	102.2	135.9	77.2	315.0
Bahrein	-	-	3.6	6.7	0.2	0.2	2.0	0.8	1.4	0.6
Iraq	0.7	1.5	25.8	26.4	1.3	0.9	4.2	11.4	0.5	7.8
Israel	0.1	0.3	19.2	78.2	0.2	1.0	16.4	36.0	20.5	7.2
Jordan	-	0.4	8.0	11.7	0.3	0.6	0.6	1.1	0.1	-
Kuwait	-	-	48.5	46.0	0.9	0.8	2.5	32.3	6.6	55.1
Lebanon	0.1	-	22.5	30.5	0.2	0.4	5.1	31.2	1.8	2.0
Saudi Arabia	2.2	0.3	47.7	66.3	1.3	1.7	13.1	73.5	2.7	0.9
Syria	1.5	0.1	7.4	36.6	0.3	1.3	0.3	0.9	0.3	-
Egypt	5.4	5.7	50.1	62.8	1.6	2.0	11.5	28.2	7.8	1.5
Other countries 2/	-	0.1	20.2	34.5	0.5	1.1	1.4	15.8	0.9	5.6
Imports by countries of Middle East	10.0	8.4	253.0	399.7	6.8	10.0	57.1	231.4	42.6	80.7
Total world import	949.2	1,013.5	12,577.1	13,304.1	388.7	546.7	2,631.9	3,944.7	2,961.5	3,920.1

1/ Data taken from "Bulletin of Statistics on World Trade in Engineering Products-1967" and "Bulletin of Statistics on World Trade in Engineering Products - 1969"

2/ Aden, Muscat and Oman, Qatar, Trucial Oman and Yemen.

Table 6.

IMPORT OF ELECTRICAL MACHINERY BY DEVELOPING COUNTRIES OF SOUTHERN EUROPE AND THE MIDDLE EAST 1/

Millions US Dollars f.o.b.

Country	Electrical power machinery		Equipment for distributing electricity		Telecommunication apparatus		Domestic electrical equipment		Medical apparatus		Electrical Machinery other	
	1967	1969	1967	1969	1967	1969	1967	1969	1967	1969	1967	1969
Cyprus	1.0	1.5	0.9	0.9	3.2	3.3	2.1	2.8	-	0.1	1.3	1.7
Greece	23.7	19.7	4.8	4.6	24.5	37.2	15.6	11.3	1.3	1.0	16.5	24.4
Spain	57.3	56.3	4.0	5.1	41.2	37.1	13.9	9.7	3.9	6.3	58.9	71.9
Turkey	17.4	30.2	4.1	4.1	9.9	18.5	1.9	1.2	1.5	1.3	19.5	19.1
Imports by countries of southern Europe	99.4	107.7	13.8	14.7	78.8	96.1	33.5	25.0	6.7	8.7	96.2	117.1
Bahrein	1.1	1.5	1.1	1.5	2.2	4.2	0.7	0.8	-	-	1.0	1.0
Iraq	5.7	6.6	3.9	3.9	5.0	5.6	3.3	2.1	0.3	0.2	4.2	5.8
Israel	10.4	21.1	6.7	4.9	24.7	47.2	1.4	5.0	0.9	1.2	12.5	28.3
Jordan	2.1	2.1	0.9	1.7	2.9	9.4	0.8	1.0	0.1	0.1	1.4	1.8
Kuwait	10.7	12.5	10.1	5.0	15.1	19.0	5.0	5.6	0.1	0.4	5.4	6.4
Lebanon	6.0	5.5	3.3	3.9	6.5	16.3	4.8	5.1	0.2	0.4	4.3	5.6
Saudi Arabia	11.0	12.6	5.9	8.2	13.2	23.3	3.9	6.2	0.2	0.2	7.0	9.3
Syria	9.9	7.0	2.0	1.7	4.1	7.8	0.4	1.3	0.1	0.3	1.6	2.4
Egypt 2/	16.7	7.5	1.6	4.1	7.1	11.4	0.3	0.9	0.5	0.5	6.7	9.7
Other countries	5.1	6.2	2.1	4.2	5.7	8.2	1.7	2.6	0.1	0.1	3.6	5.1
Imports by countries of Middle East	78.8	82.6	37.6	39.1	86.5	152.4	22.3	30.6	2.5	3.4	47.7	75.4
Total world import	2,424.0	3,052.2	633.4	797.6	2,771.2 / 4,014.5		1,304.8 / 938.9		220.9	287.2	3,234.2 / 4,597.8	

1/ Data taken from "Bulletin of Statistics on World Trade in Engineering Products-1967" and "Bulletin of Statistics on World Trade in Engineering Products - 1969"

2/ Bahrein, Aden, Muscat and Oman, Qatar, Trucial Oman and Yemen.

4. Labour required for the Operation of machine tools

The operation of machine tools and other related machinery and equipment by a developing country becomes only possible if there is highly trained personnel available, personnel that is not only able to read, but also to understand and interpret the most complicated blueprints, in order to make use of the most complicated means of dimensional and quality control with tolerances expressed fractions of millimeters. They must also be qualified to adjust at any given moment any deviation from the required tolerances in the operation of machine tools serviced by them.

Today developing countries of southern Europe and the Middle East can obtain the tools that are necessary for the most complicated manufacturing processes. They hire the necessary personnel highly skilled in management, as well as skilled foremen in the case of lack in the local labour market. However, skilled labour cannot normally, or not in sufficient numbers, be hired from foreign countries and to a large extent, would have to be trained locally.

5. Utilization of Machine Tools

The industrial development of a country depends to a considerable degree on the number, age, quality and type of machine tools which it possesses. The stock of machine tools and other related equipment in a country should be sufficient for its industrial development. However, the success of development of the engineering industry depends not only on the stock of machine tools and other related industrial equipment, but also on the way in which these are used in the country. Some countries have sufficient stocks of equipment which are not being fully and properly utilised. This means unnecessary expenditure for buying, servicing and repair and maintenance of machine tools and related industrial machinery.

The effective use of machine tools is a very important factor in increasing productivity. In considering the utilization of machine tools, the following questions must be answered by the industries of the countries:

(a) Is the machine tool suitable for the job in question? What are the alternatives for its use.

(b) Is the machine working at optimum capacity?

What is the utilization (in percentage of the total machine time available) of the equipment and how could it be improved?

(c) Is it better to have special-purpose machine tools or general purpose machine tools (the latter having more flexibility by being adaptable to a wider variety of jobs, while having a lower capacity than a special purpose tool)?

(d) Should machines and mechanical devices take over manual tasks, and if so, where?

6. Machine tool industries in the countries of the region

According to the degree of development of their machine tool industries, the developing countries of the region can be classified roughly into three groups:

a) Countries with established machine tool industries, such as Turkey, Arab Republic of Egypt and Israel;

b) Countries considering setting up machine tool manufacturing, such as Iran and Syria;

c) Countries with no machine tool manufacturing, such as Iraq, Jordan, Kuwait, Yemen Arab Republic and the People's Democratic Republic of Yemen.

For countries under Group a) the following situation exists:

Turkey began producing machine tools in 1967 and is manufacturing under various licences, such as Fritz Werner of Federal Republic Germany, Strojimport of Czechoslovakia, Technoimpex of Hungary and Elliot of England.

The production of machine tools including lathes, planers, milling, drilling and grinding machines in 1970, was US $4.9 million. By 1982 it is expected to reach US $16.5 million. The most important manufacturers in the country are Ahmet Par Machine Tools Factory, with an annual production of 100 lathes, and Türk Makina Imalât Sti, the Turkish Machine Manufacturing Co. There is a great demand for machine tools in Turkey. In 1970 Turkey produced a total of 820 lathes, planers, milling and drilling machine tools, and 4917 machine tools were imported. It is necessary to note that the Standardization Institute of Turkey has not yet established any standards for the country's machine tools.

The Arab Republic of Egypt started the production of machine tools in 1964. Centre lathes, bench drills, column drills, shapers, milling and grinding machine tools and eccentric presses are produced. In 1970/71 the value of machine tool production is amounting to US $1.7 million. About 80 percent of the existing stock of machine tools are used in different industries either for production purposes or in repair and maintenance shops. About 10 percent are used in the training centres and the remaining 10 percent in small private production shops. With the development of engineering industries in Egypt the demand for machine tools is increasing. General-purpose heavy machine tools, grinding machines, special-purpose machine tools and precision machines are required for the manufacture of special cutting tools, jigs and fixtures. At the present time ancillary industries exist in Egypt, covering all the needs of the machine tool industry.

Israel has been producing simple machine tools since 1955. In 1970 they produced 2,100 machine tools, including lathes, drilling machines, eccentric presses, hydraulic presses, mechanical saws and woodworking machinery. The country imported 10,000 units and 700 units were exported. The stock of machine tools acquired in 1970 was 45,000 units, the share of metalworking industries in the whole industry being about 30 percent. Today Israel possesses a large number of factories producing agricultural machinery, earth moving devices, transport equipment, electric motors and transformers, and electrical and electronic equipment.

The first numerically controlled machine tool was introduced in 1963. Now there are 53 N C machine tools used by industry. The demand for machine tools is increasing and expected to reach 27,900 units by 1980. It is expected that in 1980 Israel will produce 12,700 machine tools, import 25,800 and be able to export 7,900 units. The stock will then be 185,000 units including metal-cutting and metal-forming machines.

For the countries under Group b) the following situation exists:

Iran is expected to start soon on the production of simple drilling machine tools in the Metallurgical and Engineering Plant (MEP) in Tabriz. The plant was established with the help of the Government of Czechoslovakia, and will produce bench, column and radial drilling machines, double wheel grinding and polishing machines, centre lathes, milling machines, shaping machines, eccentric presses and other industrial equipment. The number of units of machinery and equipment is expected to be 650, the number of employees 2,327, and the total planned investment amounts to US $73 million.

Syria: There is an increasing use of machine tools in different fields of industry. The import of machine tools has increased from 1,150 units in 1960 to 1,950 units in 1970. Studies carried out in 1969 showed the desirability of the establishment of a machine tool building plant in Syria, and it was suggested that it begin with the production of simple machine tools. This project has not yet started because of certain economic conditions, but the Government is considering it seriously and seeking capital investment. Production could begin under licence agreement.

For countries under Group c) the following situation exists:

Iraq does not produce machine tools neither on a government level nor in the private sector. It is estimated that the (imported) stock of machine tools in 1971 is 3,367 units. Of this number 4.1 percent (133) are milling machines; 10.4 percent (352) are drilling machines; 55.5 percent (1,871) are lathes; 5.7 percent (193) are grinding machines; 12.2 percent (405) are presses and 12.2 percent (413 units) are other machines.

It was found that quite a number of machine tools are idle and others not fully utilized. Not enough attention is given to the problems of repair and maintenance of machine tools and accessories, therefore due to the lack of dies, jigs and fixtures, the machine tools cannot be utilized. The Government of Iraq is very interested in the adaptation of tools and accessories to local conditions.

Jordan has a few very small workshops producing such agricultural machinery as threshing machines, trailers, disc harrows and deep-well pumps. In the building sector, sanitary fittings and pipes production is satisfying the local market and the country can also export in this field. There are workshops producing various kinds of stone crushers, centrigugal and vertical pumps, etc. The existing machine tools are mainly used in the country for the repair of industrial equipment such as paper making equipment. Many workshops are not equipped up to an acceptable standard and the machine tools are rather old and worn out. The utilization of industrial equipment in many industries is about 50 percent.

Kuwait has five ministries dealing with industrial enterprises which are mainly using machine tools. These are: the Ministry of Public Works, the Ministry of Education, the Ministry of School Affairs, the Ministry of Finance (Department of Customs and Port), and the Ministry of Electricity and Water.

Machine tools are used for the repair and maintenance of a large fleet of imported road machinery, as well as for training local people in industry.

The machine tools in the Department of Customs and Port are primarily for maintenance of marine works, ships, tugs and boats. Their workshops have large capacity of lathes, shaping, drilling and welding machines and grinders. Besides marine works they manufacture all spare parts for cranes and trailers and transport engines.

The Ministry of Electricity and Water has the largest workshops in Kuwait and the Middle East and produces machine tools which are mainly used for maintenance of equipment in distillation plants and power stations.

Yemen Arab Republic has a certain stock of machine tools which is used for maintenance and repair of industrial equipment of the textile factory in Sanaa, the biscuit and sweets factory in Taiz, cement and tobacco factories, aluminum factories etc. Various mechanical workshops were established during the construction of the road network connecting the major cities, namely Hodeidah, Sanaa and Taiz. The metal working industry of the country employs about 260 people mainly engaged in the repair of industrial equipment and the production of spare parts for transport equipment and various agricultural machinery. There are also about 200 garages for repair of motor cars and truck which have machine tools.

The People's Democratic Republic of Yemen does not produce machine tools and the three year plan does not aim at doing so. The country does not produce iron and steel. The machine tools available in the country are mainly of the manual type or semi-automatic and are used in workshops for the repair and maintenance of vehicles, trucks, road construction and industrial equipment as well as agricultural machinery and implements.

The workshops in the country belong mainly to the following bodies: Public Works Department, Ministry of Agriculture and Agrarian Reform, Ministry of Defence, Port Trust, BP Refinery, National Shipping Co. and Dockyards and several small private job workshops.

The difficulties in obtaining foreign exchange for spare parts made the Government review the question of their local production. The Government is also interested in the establishment of pilot manufacturing units for the production of hand tools and pumps.

PART II. OUTLINE OF UNIDO's ACTIVITIES

1. UNIDO Technical Assistance

All UNIDO activities concentrated on technical assistance to developing countries are performed in three ways:

(a) providing experts, granting fellowships and supplying special equipment to these countries;

(b) giving support in the economic surveys and research and development;

(c) organizing expert group meetings, international, interregional and regional seminars, symposia as well as in-plant training courses for specialists from developing countries at the enterprises of developed countries.

Technical assistance is given in the development of the engineering and metalworking industries. In these fields UNIDO is dealing with the manufacturing industries of the developing countries which are engaged in the design and production of various fabricated metal products, machinery and industrial equipment, machine tools, agricultural machinery and implements, electrical, electronic and telecommunication equipment, apparatus, devices, metal cutting and measuring instruments, transport equipment, processing industry machinery and other equipment. It is also concerned with the problems of repair and maintenance of these machines and equipment.

Technical assistance providing for the development of various groups of metalworking machinery and equipment is shown in Figure 1.

The scope of functions arising within this framework of technical assistance in the development of metalworking machines is shown in Figure 2.

GROUPS OF METALWORKING MACHINERY AND EQUIPMENT

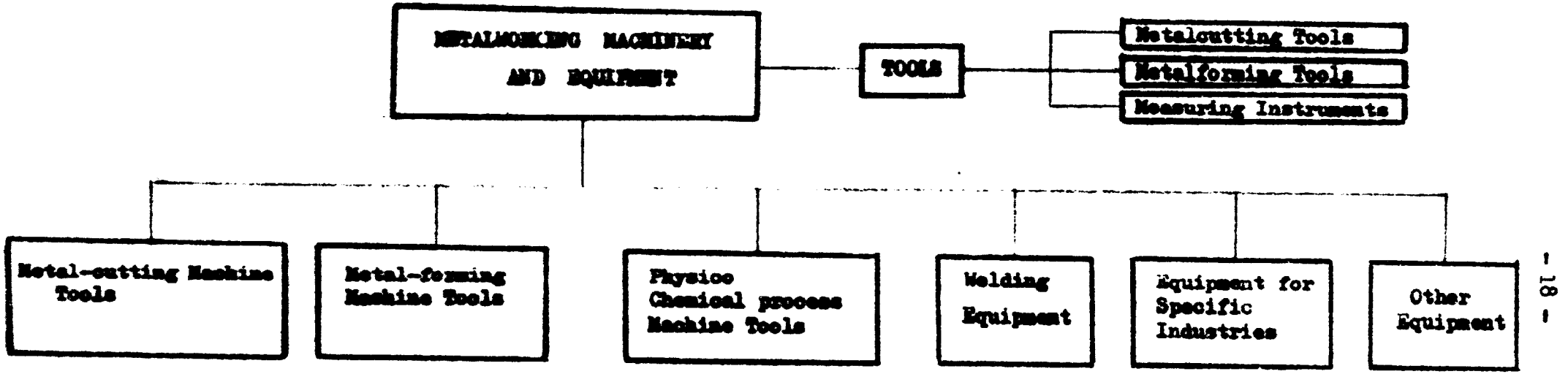


FIGURE I

Scope of Functions

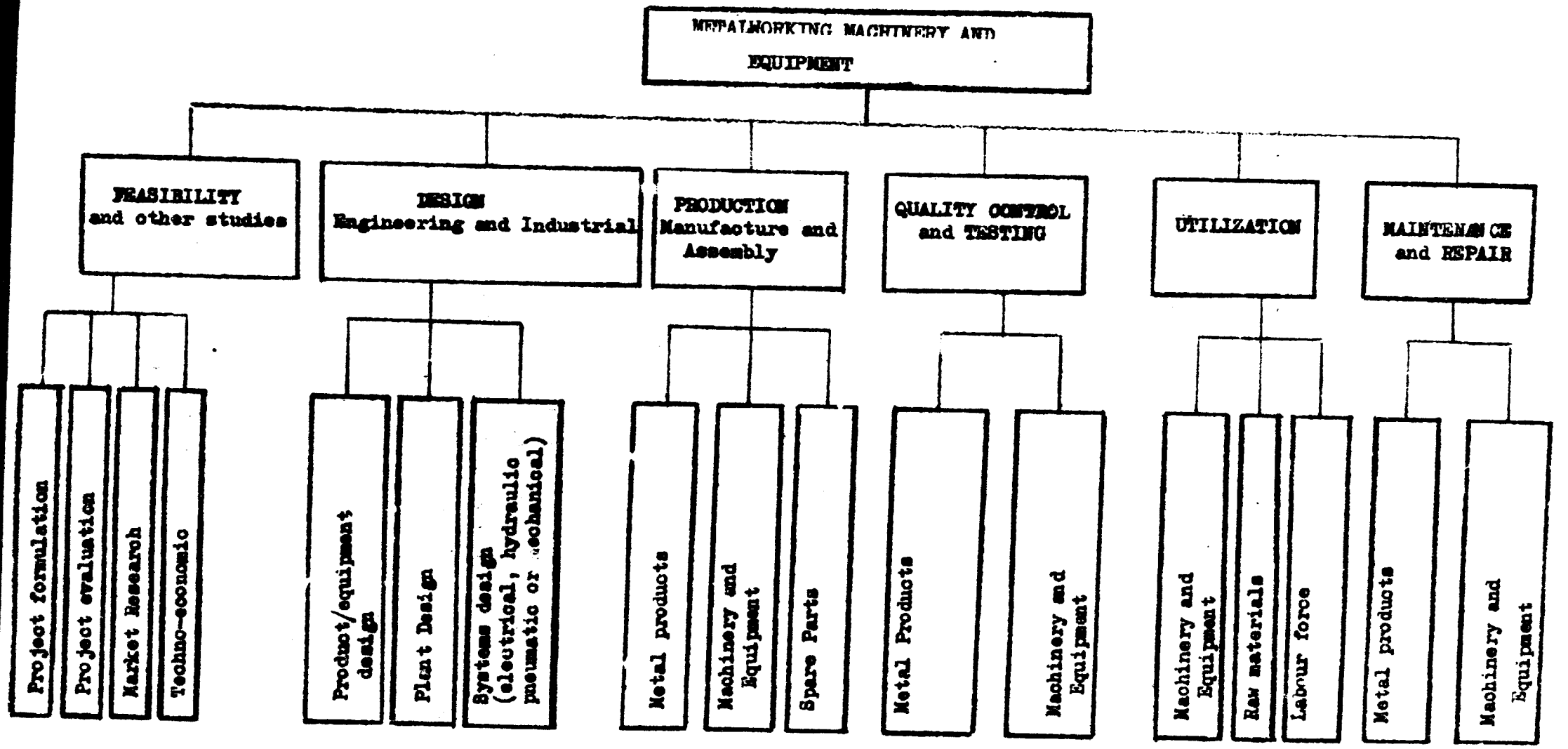


FIGURE 2

2. Typical Field Projects in Metalworking

The following UNIDO typical field projects in the metalworking industry could be mentioned:

- Manufacture of Mining and Mineral Processing Machinery (Chile)

  Development and Manufacture of Mining and Processing Equipment and Spare Parts (Peru)

  Production of Mineworking Equipment and Spare Parts (Tunisia)

  Study on the Production of Machine Tools (Algeria)
- Materials Handling Equipment (Yugoslavia)
- Assistance in the Organisation of Manufacturers' Association (Indonesia)
- Study on the possibility of the establishment of Engineering Design and Development Centres in Kenya, Argentina and Yugoslavia
- Feasibility Study on Cutting Tool Production (Iran)
- Assistance to Ghana Industrial Holding Corporation
- Utilization of Machine Tools (Pakistan)
- Application of Numerically Controlled Machine Tools (Brasil, Romania)
- Application of Advanced Industrial Automation (Israel)
- Technical assistance in the manufacture of household appliances (Uganda)
- Establishment of mechanical workshop and foundry (Sudan, Somalia)
- Metalworking Industry Testing Centre (Chile)
- Assistance in quality control of engineering products (Korea)
- Quality Control Centre for Engineering Industries (Arab Republic Egypt)
- Engineering and Industrial Design Development Centre (ARE)
- Metal products industry adviser (Indonesia)
- Centre for the Development of Prototype Tools (Tunisia)
- Metal Industries Development Centre (Philippines)
- National Design and Consulting Centre (Chile)

It is perhaps of interest to examine more fully some of the more important of these projects, as follows:-

Centre for the Development of Prototypes in Tunisia

The main objectives of the Centre are the development, design and production of tools, dies, jigs, fixtures and gauges. Six international experts will train local people in the design and prototype production of tools and jigs. UNIDO is co-operating with the International Labour Organization in the implementation of this project.

Metal Industries Development Centre in Singapore

This Centre is to survey the problems and requirements of the metal industries; train local personnel for metal industries; provide facilities for manufacturing prototype mechanical engineering products; and to improve production processes by the introduction of new methods.

The project is being implemented by ILO and UNIDO. The UNIDO will provide experts in machine tool repair and maintenance, metrology and industrial cost accounting.

Metal Industries Development Centre in the Philippines

The task of this Centre is to solve the problems in the metal-working industry by way of technical advisory services, quality control, management and technical training. The ILO is co-operating in the field of training.

Metalworking Industry Testing Centre in Chile

The purpose of the Centre is to test raw materials and finished products (refrigerators, motors, washing machines, heaters, etc.); to control and calibrate jigs, gauges and measuring instruments and to improve technical standards of products. Three experts and a number of consultants will work in the Centre.

Metalworking Industries Development Centre in Ceylon

The Government of Ceylon has expressed interest in the establishment of a Metalworking Industries Development Centre to be engaged in the selection, utilisation and development of machine tools, tools, dies, jigs and fixtures. The UNIDO expert and a UNIDO staff member will visit Ceylon to study the present industries and to assist in the preparation of a draft request for the establishment of the Centre. It is expected that the Centre will be involved in the research, design and prototype manufacture of units for machine tools and other industrial equipment.

The Centre will identify the product lines to be developed or to be adapted by industry and will serve the needs of the metalworking industry. The UNIDO will supply equipment, provide internationally experienced experts and grant fellowships while the Government will provide the facilities, simple equipment and counterpart staff for training.

3. UNIDO Assistance to the Countries of the Region

The following outlines where UNIDO technical assistance is given and/or could be given to the Middle East countries in this field:

Turkey

The Government of Turkey has decided to develop its local tool making industry including the production of tools, dies, jigs and fixtures. Realizing the importance of establishing an independent centre with modern equipment for the manufacture of tools and dies, their heat treatment and inspection in the country, the Government of Turkey has requested UNIDO technical assistance for the implementation of this project. An expert from UNIDO will visit Turkey to study the requirements in tools, dies, jigs and fixtures; the possibility of the establishment of the centre, and assist the Government in drafting the request for UNDP/UNIDO technical assistance in the form of a Special Fund project. To increase productivity, UNIDO could assist the country in the field of proper utilization of machine tools.

Arab Republic of Egypt

In 1968 the Engineering and Industrial Design Development Centre was established in Cairo with the assistance of UNIDO. Ten UNIDO experts are giving technical assistance in the development of engineering design capabilities. In accordance with the Government's request, the Centre designs and produces prototypes of such products as electric irons, bicycles, cigarette lighters, belt conveyors, concrete mixers, solar water heaters, solar stills etc. The Centre has established good contacts with local industries and is assisting them in the improvement of production processes and the establishment of engineering and design departments within the factories. The UNIDO experts also train local people in the design and production of tools, dies, jigs and fixtures. This Organization also selects and arranges for Egyptian engineers for training abroad. Upon request from the Government the Centre could concentrate its activities on the services of machine tool building and tool making industry of the country.

In addition to the above, UNIDO has been requested by the Government to assist in the planning and preparation of a Quality Control Centre for the purpose of serving the engineering industries in the country.

Israel

In 1967 a United Nations team consisting of eleven experts studied the metalworking industries situation in Israel. Based on the survey, the outcome of the mission, a number of recommendations on future assistance were submitted to the Government.

Early in 1971 UNIDO provided services in the utilization of N C machine tools for the manufacture of certain engineering products. Furthermore, UNIDO will also provide technical assistance in the field of automatic process control and organize two training courses in industrialized countries for engineers in this field. The outcome of the described assistance might be the establishment of a Centre for Advanced Industrial Automation.

Iran

The Government of Iran has requested UNIDO technical assistance in the preliminary work for the establishment of a plant for the production of cutting tools. After an investigation of the market in Iran and taking into account the establishment of the Arak Machine Building Plant and Metallurgical Engineering Plant in Tabriz, the establishment of a metal-cutting tool plant proved feasible, and could be attached to one of the machine tool building plants.

On request from the Government, UNIDO could assist the Iranian industry in proper utilization and repair of machine tools.

Syria

At the end of 1970 UNIDO provided a complex service team in repair and maintenance of industrial equipment. Two mobile workshops were supplied to train local personnel in how to repair industrial and agricultural equipment. It was also recommended that two centres be established: one for the manufacturing of spare parts in Homs, and the other for production and repair of some industrial equipment in Damascus.

If requested by the Government, UNIDO could assist Syria by making a general survey of existing machine tools, their utilization and application, and also in the establishment of a centre for machine tool re-building. If feasible, UNIDO could also help to find suitable foreign companies which would invest in the setting-up of machine tool building plants.

Jordan

Up to the present time UNIDO technical assistance has been given in the field of maintenance and repair of industrial equipment. It might be desirable to carry out a general survey of the existing stock of machine tools, their utilization and repair facilities, in order to select new machinery to replace that which is old and obsolete.

Kuwait

Upon request from the Government, UNIDO could provide technical assistance in the selection, utilization, maintenance and repair of machine tools that are available in the country. It could be desirable for the Government of Kuwait to have a general survey made of the existing stock of machine tools in order to identify their working value. Assistance could also be given in the field of the development of locally produced tools, dies and jigs.

Yemen Arab Republic

UNIDO has been requested to assist the country in the maintenance and repair of road making machinery and equipment. Two UNIDO experts equipped with two mobile workshops will implement the project, which is expected to be carried out in co-operation with the ILO.

In the field of machine tools, UNIDO could assist in making a general survey of the existing stock of machine tools, and giving recommendations on selection and utilization.

People's Democratic Republic of Yemen

Two UNIDO experts and mobile repair workshops are providing technical assistance in the organization and implementation of maintenance and repair services for industrial machinery and equipment.

Upon request, UNIDO could assist the Government in studying the existing stock of machine tools and in identifying possible assistance in the field of selection, utilization maintenance and repair of machinery, tools, dies and jigs.

Annexures

The following pages are samples of typical job descriptions covering the services of UNIDO experts. These job descriptions might form a basis of a request for assistance in any one of the following fields : -

1. General survey of machine tools
2. Utilization of machine tools
3. Repair of machine tools
4. Establishment of Metalworking Industry Development Centre
5. Development of tools, dies, jigs and fixtures
6. Design of tools and jigs

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

U N I D O

Request from the Government of

for Special Industrial Services 1/

JOB DESCRIPTION

POST TITLE	Expert in general survey of machine tools
DURATION	Six months with possible extension
DATE REQUIRED	As soon as possible
DUTY STATION	
PURPOSE OF PROJECT	To assist the Government of in the assessment of existing stock of machine tools in the country taking into concideration the development of metalworking and other industries.
DUTIES	The expert, in co-operation with the corresponding governmental body will be expected to: (a) study the existing stock of machine tools and its planning for metalworking and other industries; (b) investigate the demand, production if any, import and possible export of machine tools; (c) select machine tools by types to be imported and/or to be produced; (d) recommend on the future UNIDO long term assistance in this field.
QUALIFICATIONS	Industrial Engineer or Economist with experience in machine tools industry
LANGUAGE	
BACKGROUND INFORMATION	The UNIDO Regional Seminar on Machine Tools in the Developing Countries of Europe and the Middle East held in 1971, stressed the importance of availability of machine tools and industrial development. The Government has decided to study the existing stock of machine tools in the country in order to know what kind of equipment will be required in future for successful development of local industries. UNIDO technical assistance is requested in order to make general surveys on the machine tools available in the country. The Government should supply additional information as is available on the status and plans for the industry.

1/ Request to be submitted through the UNDP Resident Representative residing in the respective country

To be completed by the Government

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

[illegible]

Request from the Government of

for Special Industrial Services 1/

JOB DESCRIPTION

POST TITLE	Expert on [illegible] of machine tools
DURATION	Six months with possible extension
DATE REQUIRED	As soon as possible
DUTY STATION	
PURPOSE OF PROJECT	To assist the Government of in the selection and utilization of machine tools, through the evaluation of the production lines.
DUTIES	The expert is expected to assist the local enterprises to (a) examine machine tools by size and type through evaluation of the production lines; (b) identify the causes of underutilization of machine tools; (c) make recommendations on proper utilization of machine tools in order to increase productivity and improve quality of production; (d) train local personnel in proper utilization of machine tools.
QUALIFICATIONS	Mechanical Engineer with experience in utilization of machine tools
LANGUAGE	
BACKGROUND INFORMATION	The UNIDO Regional Seminar on Machine Tools in the Developing Countries of Europe and the Middle East held in 1971, noted an approximate 50-percent utilization of the machine tools in the countries of this region. This underutilization causes unnecessary expenditure and an increase in stock of machine tools requiring additional services, maintenance and repair. The Government is requesting UNIDO technical assistance in order to improve the situation concerning underutilization. The Government should supply additional information as is available on the status and plans for the industry.

1/ Request to be submitted through the UNDP Resident Representative residing in the respective country

* To be completed by the Government

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

U N I D O

Request from the Government of
for Special Industrial Services 1/

JOB DESCRIPTION

POST TITLE	Expert in repair of machine tools
DURATION	Six months with possible extension
DATE REQUIRED	As soon as possible
DUTY STATION	
PURPOSE OF PROJECT	To assist the Government of in the organization of services for maintenance and repair of machine tools
DUTIES	The expert will be attached to the Government organization and is expected to: (a) study the existing maintenance and repair services for machine tools; (b) make recommendations on how to improve these services; (c) study the possibility of the establishment of a machine tool re-building centre in the country; (d) train local personnel in maintenance and repair of machine tools.
QUALIFICATIONS	Mechanical engineer with experience in maintenance and repair of machine tools.
LANGUAGE	
BACKGROUND INFORMATION	The UNIDO Regional Seminar on Machine Tools for the Developing Countries of Southern Europe and the Middle East stressed the importance of establishing proper maintenance and repair services for machine tools. In order to keep equipment in permanent working order with minimum time and resources it is necessary to institute a repair and maintenance system in the country. Realising the importance of this, the Government is requesting UNIDO technical assistance in this field. The Government should supply additional information as is available on the status and plans for the industry.

1/ Request to be submitted through the UNDP Resident Representative residing in the respective country

To be completed by the Government

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
UNIDO

Request from the Government of .....
for Special Industrial Services 1/

JOB DESCRIPTION

POST TITLE	Expert in metalworking industry
DURATION	Six months with possible extension
DATE REQUIRED	As soon as possible
DUTY STATION	*
PURPOSE OF PROJECT	To assist the Government to study the possibility of the establishment of a Metalworking Industrial Design Centre (MIDC).
DUTIES	The expert, in collaboration with local officials, is expected to:- (a) study the existing situation in the field of design and production of dies, jigs, tools and other related industrial equipment in the metalworking industry; (b) formulate and recommend a long-term programme for the development of the metalworking industry; (c) study the possibility of the establishment of a Metalworking Industry Development Centre which will serve the local industry in improvement of quality of production.
QUALIFICATIONS	Mechanical engineer with experience in metalworking industry.
LANGUAGE	*
BACKGROUND INFORMATION	The UNIDO Regional Seminar on Machine Tools for developing countries of Europe and the Middle East held in 1971 stressed the importance of the development of metalworking industries in the countries of this region. The Government is requesting UNIDO technical assistance in the establishment of a Metalworking Industry Development Centre. The purpose of the Centre is to identify product lines to be developed or to be adopted; design and prototype production, quality control, testing and cost analysis; development of manufacturing techniques and processes; selection, development, utilisation maintenance and repair of machine tools and instruments, technical service to local industries in the design and development of specific products. The Government should supply additional information as is available on the status and plans for the industry.

1/ Request to be submitted through the UNDP Resident Representative residing in the respective country.

* To be completed by the Government.

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

U N I D O

Request from the Government of

for Special Industrial Services 1/

JOB DESCRIPTION

POST TITLE	Expert in tools, dies, jigs and fixtures
DURATION	Six months with possible extension
DATE REQUIRED	As soon as possible
DUTY STATION	
PURPOSE OF PROJECT	To assist the Government of in the development of a local production of tools, dies, jigs and fixtures
DUTIES	The expert, in collaboration with the corresponding government department, will be expected to: (a) study the requirements of the country in tools, dies, jigs and fixtures; (b) assist in design, adaptation and production of tools, dies, jigs and fixtures; (c) make recommendations on the choice and use of the correct materials for tools and dies; (d) study the possibility of the establishment of a centre for design and prototype production of tools and dies; (e) train local personnel in using modern technology for production of the above-mentioned tools.
QUALIFICATIONS	Mechanical engineer with extensive experience in research, design and production of tools, dies, jigs and fixtures
LANGUAGE	English, French or Spanish, depending on the country
BACKGROUND INFORMATION	The Government of has decided to develop its local tool making industry including the production of tools, dies, jigs and fixtures. Realizing the importance of establishing an independent centre with modern equipment for the manufacture of tools, dies, jigs and fixtrues, their heat treatment and inspection in the country, the Government of has requested UNIDO technical assistance for the above-mentioned project. It is expected that the Centre will train local personnel in design, production of prototypes and use of dies and moulds, jigs and fixtures. The Government should supply additional information as is available on the status and plans for the industry.

1/ Request to be submitted through the UNDP Resident Representative residing in the respective country

To be completed by the Government

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
UNIDO

Request from the Government of *.....

for Special Industrial Services 1/

JOB DESCRIPTION

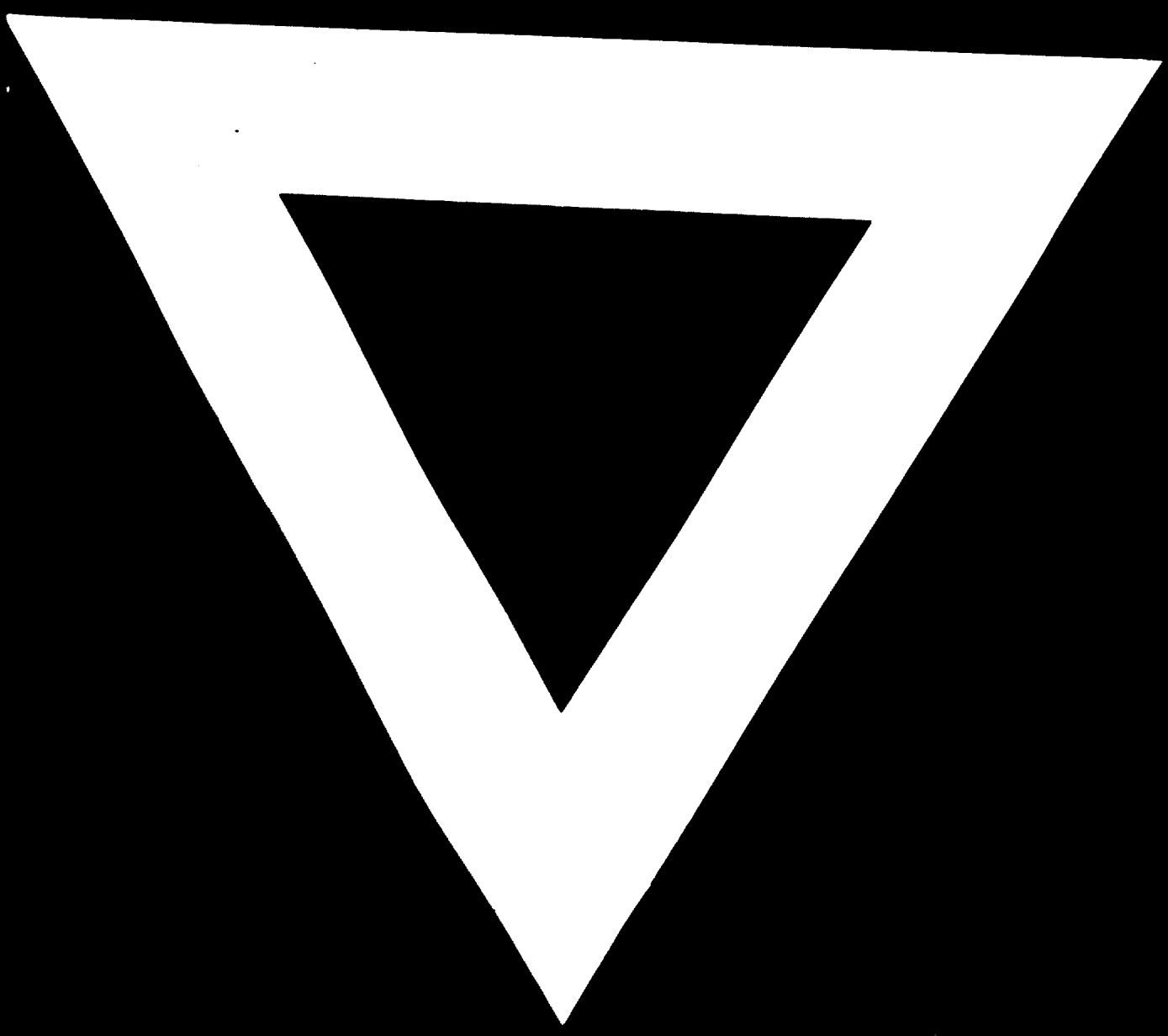
POST TITLE	Expert in design of tools, dies, jigs and fixtures
DURATION	One year
DATE REQUIRED	As soon as possible
DUTY STATION	*
PURPOSE OF PROJECT	To assist the Government to improve the quality of tools, dies, jigs and fixtures produced.
DUTIES	The expert, in co-operation with the corresponding Government organization, is expected to: - design tools, dies, jigs and fixtures; - provide modern designing of special tools needed for industry; - make recommendations on standardization of components of dies, jigs and other tools; - participate in testing of prototypes; - train local counterpart staff in design and production of prototypes.
QUALIFICATIONS	Mechanical engineer with extensive experience in designing of tools, dies, jigs and fixtures.
LANGUAGE	*
BACKGROUND INFORMATION	The UNIDO Regional Seminar on Machine Tools for Developing Countries of Europe and the Middle East held in 1971 stressed the importance of the development of the local tooling production in the countries of the region. Taking into account that a considerable saving in foreign currency can be obtained if more attention will be given to the problems of designing and production of tools, dies, jigs and fixtures, the Government is requesting a UNIDO technical assistance in this field. The Government should supply additional information as is available on the status and plans for the industry.

1/ Request to be submitted through the UNDP Resident Representative residing in the respective country.

* To be completed by the Government.

UNIDO INDIVIDUAL FELLOWSHIPS IN THE FIELD OF METALWORKING INDUSTRIES

EUROPE	Number of People	Field of training
1. Hungary	9	mechanics, electronics, production of vehicles
2. Poland	71	mechanical and electrical engineering
3. Romania	13	N.C. machine tools
4. Yugoslavia	6	material handling equipment
5. Bulgaria	17	production and quality control, electronics
6. Spain	1	refrigeration industry
7. CSSR	8	N. C. machine tools
Middle EAST		
1. Iran		
2. Iraq		
3. Israel	2	machine tools and bolt manufacture, N.C. machine tools
4. Jordan	1	mechanical engineering
5. Kuweit		
6. Peoples Democratic Republic of Yemen		
7. Syria		
8. Turkey	9	machine tools industrial engineering
9. Arab Republic of Egypt	19	production and layout
10. Yemen Arab Republic		



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