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ESTABLISHMENT OF FURNITURE/JOINERY AND SCHOOL EXERCISE BOOK WORKSHOPS  
CO-OPERATION BETWEEN TURKEY AND TANZANIA

XA/URT/88/667

TANZANIA

Technical report: Appraisal of equipment needs for production  
of school furniture in Tanzania\*

Prepared for the Government of Tanzania  
by the United Nations Industrial Development Organization

Based on the work of Sinan Cinar, woodworking expert

Backstopping officer: Antoine V. Bassili  
Industrial Management and Rehabilitation Branch

75

\* This document has not been edited.

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EXPLANATORY NOTES

1. The rate of exchange of the Tanzanian Shillings (TS) to the United States Dollar (U. S. \$) in October 1988 was:  
TS 97.00=U. S. \$ 1.00.

2. The approximated rate of exchange of the Turkish Lira (TL) to the United States Dollar (U. S. \$) in October 1988 was: TL 1725.00=U. S. \$ 1.00.

3. The following abbreviations are used in this document:

HSS : High Speed Steel (for cutting tools).

MF : Machine Finished

PVAc : Poly Vinyl Acetate (glue).

SIDO : Small Industries Development Organization.

TCDC : Technical Co-operation Between Developing Countries.

TCT : Tungsten Carbide Tipped (tool).

UNDP : United Nations Development Programme.

UNIDO : United Nations Industrial Development Organization.

cu. m.: cubic meters.

kg : kilogram.

sq. m.: square meters.

ABSTRACT

There is a shortage in the supply of school furniture and exercise books demanded in the 10,428 primary and 246 secondary schools in Tanzania. To alleviate this existing shortage, the Governments of Tanzania and Turkey have agreed to co-operate within the context of a TCDC programme. UNIDO is complementing this with a technical assistance mission to identify the needs, assistance in negotiating and the allocation of the hard currency component needed for its realization.

The co-operation involves the supply of 4 furniture and 4 exercise book production workshops by Turkey to Tanzania, and the training of Tanzanian trainees in Turkey in the fields of machine woodworking, sawdoctoring and exercise book production.

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## INTRODUCTION

The primary and secondary education in the United Republic of Tanzania is given high priority by the Government. In this context, the Government provides free education and distributes free exercise books to students. The existing school buildings, furniture and other supplies are constantly upgraded.

In the spirit of the Solidarity Ministerial Meeting held in Arusha (Tanzania) from 23 to 26 July 1979 and the technical cooperation between developing countries (TCDC), an agreement was reached between the Industry Ministers of Turkey and Tanzania for co-operation to complement the above mentioned efforts of the Tanzanian Government. In this agreement, the following pledges were made:

By the Turkish Government:

- A grant to cover the cost of design, engineering studies, machines, equipment and spare parts for one exercise book production workshop;
- A soft loan in non-convertible Turkish Liras made available to Tanzania to cover the cost of machinery and equipment for four school furniture manufacturing and three exercise book manufacturing workshops, and to provide training to Tanzanian trainees in Turkey for the operation of workshops provided.

By the Tanzanian Government:

- A contribution in kind for the implementation of the project - buildings, power, and water supply and provision of local materials;
- Inland handling and transportation costs of the machinery and equipment;
- Secretarial and logistical support, provision of full-time counterpart experts for the International and Turkish experts in the implementation of the project;
- The costs for local transportation and lodging for the Turkish experts (Assembly teams) in Tanzania.

Until recently, the co-operation did not materialize due to unavailability of hard currency required for the implementation of the project. In view of this, UNIDO drew up a complimentary project to cover the hard currency requirements for the following inputs:

- Two international experts for one month each;
- Travel expenses of Turkish representative to Tanzania and Vienna;
- Cost of UNIDO staff mission to Tanzania and Turkey;
- Travel and full DSA for one Tanzanian to Turkey and Vienna to finalize and sign the agreement;
- Cost of freight for machinery for the eight workshops from a Turkish port to Dar Es Salaam;
- Travel expenses to and from Turkey, and DSA in Turkey for Tanzanian Trainees;
- Travel expenses to and from Tanzania, and DSA in Tanzania for Turkish experts (Assembly teams).

It is within the context of this project that UNIDO assigned Mr. Sinan CINAR, a woodworking expert, to Ankara and Dar Es Salaam to ascertain the technical viability of establishing furniture/joinery and exercise book production workshops at various locations in Tanzania. His job description is contained in Annex I.

This report covers the findings and recommendations of Mr. Cinar during his mission between 4 October and 15 November to Ankara, Dar Es Salaam, Vienna, Istanbul and Bursa. Upon completion of his mission, Mr. Cinar briefed UNIDO and Turkish authorities at their respective offices in Vienna and Ankara. The list of persons met is contained in Annex II.



I. FINDINGS

A. Demand and Supply:

1. School Furniture:

As of 1987, there were 10,428 primary and 246 secondary public and private schools in the country. The total number enrolled in primary schools is 3,159,726 compred with the 104,046 students in secondary schools. These figures are presented in the following table:

<u>Type of School</u>	<u>No. of Schools</u>	<u>No. of Students</u>
Primary Total	10,428	3,159,726
Public	10,403	3,157,200
Private	25	2,526
<hr/>		
Secondary Total	246	104,046
Public	103	45,821
Private	143	58,225

In the public education, the number of students in primary education shows a negative growth while the number of schools shows a positive growth.

In secondary education however, both the number of students and schools show a positive growth as shown in the following table:

<u>Type of Education</u>	<u>Years</u>		<u>Difference</u>
	<u>1983</u>	<u>1987</u>	<u>%</u>
<u>Primary:</u>			
No. of pupils :	3,553,144	3,157,200	(11.1)
No. of schools:	10,015	10,403	3.9
<u>Secondary</u>			
No. of pupils :	39,737	45,821	15.3
No. of schools:	85	103	21.2

The current shortfall in the supply of basic school furniture such as desks, tables, chairs and cupboards in the public primary schools is big. According to the latest statistical figures of the Ministry of Education, the school furniture requirements, availability and shortfall is as in the following table:

Type of Furniture	Total Required (pcs.)	Present in Schools (pcs.)	Shortfall (pcs.)
Desks	1,484,709	812,888	671,821
Tables	194,805	61,717	133,088
Chairs	230,500	59,977	170,523
Cupboards	132,796	29,628	103,168

The situation of primary school furniture supply and demand in the regions where the furniture/joinery workshops will be set-up is shown in the following tables:

Type of Furniture	Total Required (pcs.)	Present in Schools (pcs.)	Shortfall (pcs.)
<b>1. IRINGA REGION:</b>			
Desks	75,274	52,630	22,644
Tables	15,432	4,351	11,081
Chairs	19,937	4,410	15,527
Cupboards	8,462	1,018	7,444
<b>2. LINDI REGION:</b>			
Desks	37,605	25,302	12,303
Tables	4,018	1,865	2,153
Chairs	4,072	2,020	2,052
Cupboards	2,961	503	2,458
<b>3. TANGA REGION:</b>			
Desks	99,240	52,580	46,660
Tables	11,131	2,382	8,749
Chairs	14,442	2,642	11,800
Cupboards	9,257	1,470	7,787

The Ministry of Education have developed standardized technical drawings for the secondary school furniture in order to achieve standardization throughout the country and to enable the furniture manufacturers to comply with the specifications. (See Annex III). However, the standardization of primary school furniture and preparation of their specifications is still under way. It was understood from the discussions with the officials of the Ministry of Education and the Dar Es Salaam City Council that, at present, the primary school furniture measurements are set independently by the local education authorities in each district.

## 2. Exercise Books:

The annual exercise book requirement of primary school students is about 47.5 million pieces of 48 pages each. In addition to this, another 1.5 pieces of exercise books of 96 pages each are needed annually for the secondary school students. These figures are derived from the Ministry of Education's assumption that 15 exercise books per year are needed for each student. E.g.:

For primary schools:

3,159,726 students X 15 = 47,395,890 pcs. (48 pages).

For secondary schools:

104,046 students X 15 = 1,560,690 pcs. (96 pages).

(or, for the purpose of capacity calculations for exercise book workshops, 3,121,380 pcs. 48 pages).

Based on the above calculations, the total exercise book requirement for primary and secondary schools, both public and private, is about 49 million pieces per year irrespective of type and number of pages.

The current estimated supply of exercise books irrespective of types and number of pages, is about 16,318,860 pieces. In other words, 5 exercise books per student. Therefore, the current shortfall is 32,637,720 pieces per annum.

The demand and supply situation of exercise books in

the regions where the exercise book production workshops will be set up is shown in the following table:

<u>Region</u>	No. of <u>Students (P+S)*</u>	<u>No. of Exercise Books</u>		
		<u>Required</u>	<u>Supplied</u>	<u>Shortfall</u>
Iringa	212,866	3,192,990	1,064,330	2,128,660
Lindi	77,957	1,169,355	389,785	779,570
Mara	159,853	2,397,795	799,265	1,598,530
Shinyanga	234,625	3,519,375	1,173,125	2,346,250

\* Primary schools + Secondary schools, public and private

The measurements and types of exercise books are contained in Annex IV.

**B. Availability of Raw Materials:**

**1. For Furniture Production:**

Timber: The major timber and wood-based panels supplier in Tanzania is the Tanzanian Wood Industry Corporation (TWICO), a parastatal holding corporation. TWICO, with its 10 subsidiary companies, produces and markets different wood products ranging from sawn timber to wood particleboard, plywood and hardboard.

Apart from the TWICO mills, there are also privately owned and operated sawmills throughout the country.

Indicative sales prices of some timber species are as follows:

-Untreated softwood timber (Pinus patula) in common sizes:

Ex Sao Hill sawmill, Mafinga: TS 7000.-/cu. m.

Ex Sao Hill depot, Dar Es Salaam: TS 14,385.-/cu. m.

-Mninga and similar hardwood species in common sizes:

Ex Sao Hill depot, Dar Es Salaam: TS 27,546.-/cu. m.

The free-market prices are usually higher than the above semi-official TWICO prices.

Glue: PVAc based white assembly glue (Ponal) and neopren rubber based contact glue (Pattex) are manufactured and distributed locally by the firm Henkel Chemicals East Africa Ltd. in Dar Es Salaam. Ex factory sales price of a 5 kg. can of PVAc glue is TS 2,270.

Paints, Varnishes and Thinners: Oil based alkyd and cellulosic paints, matt and glossy cellulosic varnishes and cellulosic thinners are manufactured locally by the following firms:

- Barco Products Ltd., Dar Es Salaam.
- Kilimanjaro Paints (T) Ltd., Arusha.
- Sadolin Paints (T) Ltd., Dar Es Salaam.
- Organic Chemicals Co., Dar Es Salaam.

Polyurethane based varnishes and synthetic thinners have been imported. A 4 litre can of Valentine brand gloss polyurethane varnish imported from U. K. sells for TS 3,000 at a hardware store in Dar Es Salaam. On the other hand, a can of locally manufactured cellulosic thinner sells for TS 1,430 at a retail outlet.

Hardware: All the basic hardware items for furniture, such as butt-hinges, wood screws, nails and handles are readily available from retail hardware shops in and around the India street in Dar Es Salaam. Indicative retail prices for some items are as follows:

- Butt hinge (1.5 inch size): TS 14.-/pc.,
- " " (2.0 inches size): TS 20.-/pc.,
- Wood screws (3/4 x 4 inches size): TS 105.-/Gross,
- " " (1 x 8 inches size): TS 180.-/Gross,
- " " (1-1/4 x 7 inches size): TS 200.-/Gross,
- Wire nails (1 inch size): TS 175.-/kg.,
- " " (1-1/2 inch size): TS 170.-/kg.,
- " " (2 inches size): TS 160.-/kg..

Butt hinges, wood screws and wire nails are manufactured locally.

2. For Exercise Book Production:

Paper and Paper Board: The necessary MF quality white writing paper and MF Manilla quality paper board for covers for the production of exercise books are produced in Tanzania by the Southern Paper Mills Company Ltd., an integrated pulp and paper mill wholly owned by the Government of Tanzania through National Development Corporation. The factory is located at the Mgololo Valley in Mufindi district.

Printing Inks: Various types of printing inks such as offset, web offset and letterpress inks are manufactured locally by the firm:

Printpak Tanzania Ltd., Dar Es Salaam.

However, some of the exercise book manufacturers are using imported powder ink which is diluted with water when used.

Indicative sales prices for some inks made locally by Printpak are given below:

-Blue cyan printing ink: TS 1,405.-/kg.,

-Black printing ink: TS 1,130.-/kg.

Stitching Wire: Currently, there is no local production of stitching wire. It has to be imported for the exercise book production.

C. Workshop Locations and Buildings:

The previous locations such as Kagera, Mwanza and Kigoma are no more available for this project. The new locations are as in the following table:

Name of Location	Furniture Workshop	Building Status	Exercise Book w/s	Building Status
Iringa town	Yes	Ready	Yes	Ready
Lindi town	Yes	Ready	Yes	Ready
Musoma town	No	n. a.	Yes	Ready
Shinyanga town	No	n. a.	Yes	Ready
Njombe town (or Makembaku)	Yes	Not ready	No	n. a.
Mombo town	Yes	Not ready	No	n. a.

The two workshop buildings in Iringa town, one for the furniture workshop and the other for the exercise book workshop, were visited by the Expert. Further information on workshop locations and buildings are presented below under the appropriate headings:

1. Iringa Town: In Iringa town, two workshops, one for furniture and the other for exercise books will be set-up at the SIDO industrial estate. The necessary buildings for both workshops are ready. The Expert's notes on the buildings are as follows:

Furniture workshop building: The building is designated as "F" and it is 35 m. long and 10 m. wide. It has a concrete floor and a reinforced concrete frame. The walls are of cement blocks. There are continuous windows at eye height along both sides. The roof frame is of steel pipes and covered with galvanized metal roofing sheets. The machine layout proposed by the Expert is given in Annex V.

Exercise book workshop building: This building is designated as "E" and it is 25 m. long and 10 m. wide. The construction details are same as the furniture workshop described above.

2. Lindi Town: In Lindi town, two workshops, one for furniture and the other for exercise books will be set-up at the SIDO industrial estate. The Expert was unable to see the site and the buildings. According to SIDO headquarters

in Dar Es Salaam. the buildings are ready and their sizes are:

-Furniture workshop building: Length: 20 m.

Width : 20 m.

-Exercise book workshop building: Length: 15 m.

Width : 10 m.

and both buildings have access doors of 3.8 m. x 3 m. size.

3. Musoma town: Only one exercise book workshop will be set-up at the SIDO industrial estate in this town. According to SIDO officials, there is a vacant building at the estate which will be made available for this purpose. Its size is 20 m. by 10 m.

4. Shinyanga town: As in Musoma town, only one exercise book workshop will be set up at the SIDO industrial estate in Shinyanga town. The building selected is 25 m. long and 20 m. wide, with an internal partition deviding it into two equal areas, each with a large door.

5. Njombe town (or Makembaku town): These towns are located in the Iringa region. Either one of these towns will be chosen by SIDO for the location of the third furniture workshop. Currently there is no ready building in either of these towns. SIDO is hoping to find an entrepreneur with a suitable building.

6. Mombo town: Mombo is a town in the Tanga regio... It has been chosen by SIDO as the location of the fourth furniture workshop. The building situation is as in the Njombe/Makembaku towns above.

#### D. Equipment Requirements:

##### 1. Furniture and Joinery Workshops:

The purpose of furniture and joinery workshops is to produce general domestic furniture and specialised institutional furniture for schools and government and private offices. Such joinery items as flush doors, panel



doors and windows will also be produced. This wide variety of product mixture, dictated principally by the local market requirements, calls for general purpose workshops with universal woodworking machinery. The production flow chart of such a workshop is shown in Annex VI. The list of production machinery required to achieve this is given in Annex VII. Annex VIII contains the list of auxiliary equipment, and Annex IX the list of tool maintenance equipment. A list containing the names and addresses of some of the potential equipment manufacturers and suppliers whose equipment is technically acceptable is given in Appendix I.

2. Exercise Book Workshops

The equipment list for these workshops will be issued as a separate document.

E. Manpower Requirements:

1. Furniture and Joinery Workshops:

The manpower requirement of each workshop is estimated to be:

\*20 persons for direct production activities consisting of:

- 1 workshop supervisor,
- 1 Machining section foreman,
- 1 Finishing section foreman,
- 10 Skilled carpenters,
- 7 Unskilled labourers.

\*3 persons for indirect production activities consisting of

- 1 Storekeeper,
- 1 Production controller,
- 1 Quality controller,

\*3 persons for maintenance consisting of:

- 1 Sawdoctor,
- 1 Mechanic,
- 1 Electrician.

and sufficient administrative and clerical staff.

2. Exercise Book Workshops:

The manpower requirements for the exercise book workshops will be issued as a separate document.

F. Training Needs:

1. Furniture and Joinery Workshops:

Formal training in the field of carpentry and joinery is conducted by the National Vocational Training Division. This one year course is conducted at the training centres in Dar Es Salaam, Tanga, Mwanza and Dodoma regions. In these courses such topics as carpentry and joinery materials, technical drafting, joints in wood, cabinet making, interior and exterior joinery, basic woodworker machines and tools are taught up to the apprentice level. The graduates of these courses may enter the trade as apprentices. In addition to these formally trained apprentices, carpenters informally trained in the trade are also available. However, these people lack the skills in machine woodworking necessary for the proper use and operation of woodworking machinery that will be supplied for the workshops. Their skills should be upgraded through additional training.

The Expert suggests two different types of training:

Skill Training: This is a programmed instructor training in Turkey for 2 Tanzanian machine woodworkers and 1 sawdoctor for a duration of 3 months prior to the delivery of equipment under the present project. The tentative training programmes for machine woodworkers and sawdoctor are contained in Annexes X and XI respectively. After the completion of their training in Turkey, these trained instructors should be used by SIDO for the training of other workshop carpenters and sawdoctors by either visiting each workshop or through a national seminar organized by SIDO under a separate project and preferably

conducted at one of the workshops supplied by this project.

Operator Training: This type of training will be carried out during assembly, commissioning and test running of the workshop machinery by the Turkish assembly teams. Such aspects as machine setting, tool fitting and setting, machine operating, workpiece machining, and machine cleaning and lubricating will be covered in this training.

## 2. Exercise Book Workshops:

A vocational training course in printing and bookbinding is run by the National Vocational Training Division at its training centre in Tanga. In this one-year course the trainees receive general instruction in the printing technology up to apprenticeship level. They learn how to print such items as letterheads, address cards, and handbills. As for bookbinding, such topics as binding and finishing, imposition of pages and general work styles, binding of various book designs, bookbinding and finishing technology are covered.

The Expert suggests a two stage training programme for the exercise book workshops similar to the one for the furniture and joinery workshops:

Skill training: This will be a programmed training for 2 Tanzanian printers for a period of 3 months in Turkey. A tentative training programme will be prepared and issued as a separate document. After their training in Turkey, they will be used by SIDO as instructors for the training of other Tanzanians working at the exercise book workshops supplied under this project. The training programme should be as suggested for the furniture and joinery workshops above.

Operator training: Same as suggested for the furniture and joinery workshops above.

G. Installation of Equipment:

The assembly of all the workshops should be carried out by two Turkish assembly teams, one for furniture and joinery workshops and the other for the exercise book workshops, with the assistance and co-operation of the counterpart personnel provided by SIDO. The composition of each assembly team should be as follows:

For furniture and joinery workshops:

- 1 Mechanical engineer (English speaking).
- 1 Machine woodworker/woodworking technician.  
(With some understanding of English)

For exercise book workshops:

- 1 Mechanical engineer (English speaking).
- 1 Exercise book production technician.  
(With some understanding of English)

SIDO should provide two teams of counterpart staff, one for each assembly team. Each team of counterpart staff should be composed of:

- 1 Mechanical engineer.
- 1 Electric technician (fully qualified).
- Manual labourers as required.

It will be the responsibility of the Turkish assembly teams to conduct the operator training at each workshop as described above. It is assumed that the local staff at each workshop will already have been recruited and be ready for this training.

A 3-week period for each workshop is considered sufficient for assembly and operator training. Therefore, the total assembly time for 8 workshops should not exceed 6 man/months. Since the assembly of both furniture and exercise book workshops will be carried out simultaneously, only 3 calendar months will be required.

H. Equipment Costs:

The estimated total equipment cost for one furniture workshop is \$ 79,710, as shown below:

Main production equipment : \$ 40,500  
Auxiliary equipment : \$ 17,225  
Tool maintenance equipment: \$ 12,585

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Sub Total : \$ 70,310

+ Electricals : \$ 10,500  
(Switchboxes, cables etc)

Contingencies : \$ 6,000

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Grand Total : \$ 86,810

The equipment cost of 4 furniture workshops is:  
\$ 347,240

I. Shipping Costs:

The estimated packed volume in wooden crates of one furniture workshop is about 56 cu. m. based on the following calculation:

Main production equipment : 33.4 cu. m.  
Auxiliary equipment : 15 cu. m.  
Tool maintenance equipment: 7 cu. m.

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Total : 55.4 cu. m. (-56)

Shipping agents contacted in Istanbul are accepting container loads only to Dar Es Salaam. If the shipment is made in containers, it is estimated that 3 containers in 20 feet size will be needed for each workshop due to the fact that different sizes of wooden crates will not permit a tight filling of containers. The shipping cost of four

workshops is estimated to be \$ 38.000 based on the following calculation:

Shipping fee for 1 container (20 ft. size):	\$ 2.800
Loading, unloading fees and other costs	: \$ 200
	<hr/>
Total :	\$ 3.000

The shipping cost of one workshop in 3 containers is:  
\$ 9,000

The shipping costs for 4 workshops in 12 containers is  
\$ 36,000

The estimated cost for inland transport of equipment from the factory to the loading port in Turkey is:  
\$ 2,000

The firms contacted in connection with the shipping costs were:

\* Koctug Denizcilik ve Ticaret A. S.  
Bankalar Cad.. Bozkurt Han, Kat: 3  
80 000 Karakoy, Istanbul.  
Phone: 151 33 80 (16 lines).  
Telex: 24 534.

\* Arkas Denizcilik ve Ticaret A. S.  
Pehlivan Sokak, Mecidiyekoy, Istanbul.  
Phone: 167 66 33.

The possibility of shipping the equipment as packed in wooden crates without using containers need to be further investigated to reduce shipping costs.

## II. RECOMMENDATIONS:

1. Ground plans of workshop buildings should be made available to UNIDO for the preparation of machine layouts for each workshop because of the different sizes and shapes of buildings. The services of an expert for 0.5 m/m is needed for the preparation of these layouts.

2. Based on the machine layouts and the points of electricity supply, each workshop's electrical wiring diagrams, bills of electrical switchboxes, cables and other related materials should be prepared as soon as possible and these materials should be purchased and shipped with the equipment. The services of an expert for 0.5 m/m is needed for the preparation of these diagrams.

3. Based on the machine layout and the points of water supply, drawings of water distribution network for lacquer spray booths and fire extinguishing system and the bills of materials needed should be prepared and the pipe lay-up should be finished before the arrival of the equipment.

4. Based on the machine layout of each workshop, alterations and/or separations such as for spray rooms should be completed before the arrival of the equipment.

5. All the equipment should be supplied with recommended spare parts and standard cutting tools sufficient for at least 2 years of one shift operation.

6. The 5 Tanzanian trainees should be trained in Turkey before the arrival of the equipment in Tanzania and, to the extent possible, should participate in the assembly and commissioning of the workshop equipment.

7. Transportation of international experts and the workshop equipment to each workshop site should be very well organized to prevent delays in the assembly and commissioning of equipment and the training of operators.

8. Skilled and semi-skilled prospective workshop personnel should be further trained through seminars and workshops using Tanzanian trainers trained in Turkey and, if necessary, international experts.



13 July 1988

**UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION**

**Project of the Government of the United Republic of Tanzania**

**ESTABLISHMENT OF FURNITURE/JOINERY AND SCHOOL EXERCISE BOOK WORKSHOPS:  
COOPERATIONS BETWEEN TURKEY AND TANZANIA**

**JOB DESCRIPTION  
XA/URT/88/667/11-01/J-12209**

**Post title**                   Woodworking Expert (team leader)

**Duration**                    One month

**Date required**             As soon as possible

**Duty station**              Ankara with travel in Turkey: 2 weeks  
Dar es Salaam with travel in Tanzania: 2 weeks

**Purpose of project**         The establishment of four furniture/joinery workshops and four exercise book workshops in Tanzania including the training of the local personnel.

**Duties**                     The expert will head a team, comprising also an expert in production of stationery, that will assist in the establishment of workshops to produce furniture/joinery and exercise books in Tanzania, financed from a soft loan provided by Turkey. This will be carried out in the following sequence:  
First week (Travel and Ankara):  
- Briefing by UNIDO, the Turkish authorities (concerning the conditions of the soft loan)  
- Visit to selected woodworking machinery manufacturers in Turkey  
- Travel to Tanzania  
Second and third weeks (in Tanzania)  
- Reassessment of the current demand for the various products to be produced, and a study of current supply and purchasing procedures by the authorities.  
- Assessment of the raw material situation (both quantitative and qualitative)  
- Obtention of the technical specifications of the products to be manufactured (including technical drawings)  
- Appraisal, with the Tanzanian Small Industries Development Organization (SIDO), of the proposed workshop locations and facilities, both existing and planned,

.... / ..

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Applications and communications regarding this Job Description should be sent to:  
Project Personnel Recruitment Section, Industrial Operations Division  
UNIDO, VIENNA INTERNATIONAL CENTRE, P.O. Box 300, Vienna, Austria



- Assess the manpower situation at all levels, and identify training needs
- Draw up a preliminary list of equipment, including spares and tooling giving price estimates and shipping weights,
- Draw up a preliminary layout for the equipment,
- Identify the measures to be taken by SIDO to bring the sites to the required standards,
- Advise on the selection and training programmes and duration of training for the Tanzanians to be trained in Turkey under the project.

**Fourth week (Ankara):**

- Advise the UNIDO, Turkish and Tanzanian representatives on all technical matters that may arise during the finalization of the loan agreement and administrative aspects related to it.
- Clarify technical specifications, costs, weight, spare part lists, tooling requirements etc. of the machinery to be included in the agreement,
- If need be, contribute to the re-drafting of the project document, especially with regard to the technical assistance project.

Prepare a short technical report outlining the tasks referred to above, carried out under the project.

**Qualifications** Wood technologist or engineer, with long experience in the production of furniture and joinery in semi-artisanal methods. Experience with a wide range of equipment and in developing countries desirable.

**Language requirements:** English.

**Background information:**

Under its Industrial Development Decade for Africa (IDDA) and Economic and Technical Cooperation between developing countries (ECDC/TCDC) programmes, UNIDO is complementing an agreement between the Governments of Tanzania and Turkey, reached at the Solidarity Ministerial Meeting held in Arusha from 23 to 26 July 1979. In this agreement, the Turkish authorities undertook to supply the machinery and equipment for four units of school furniture manufacturing and four units of exercise books manufacturing as well as to provide training programmes for the Tanzanian trainees. The value of the 8 units was then estimated at US\$ 750,000. The financial modalities would consist of a soft loan in non-convertible Turkish liras made available to Tanzania to cover the cost of seven workshops. Design, engineering studies, machines, equipment and spare parts of one of the exercise book workshops will be provided by the Turkish Government on a grant basis.

The Tanzanian counterpart for the implementation of the project is the Small Industries Development Organization (SIDO), a parastatal organization directly under the Ministry of Industry. During the past few years, SIDO has successfully built up a basic institutional framework to implement the policies of Government for development of small industries from self-employed artisans to small factories during various stages of their activities. These services may be summarized as follows:

Industrial estate with rural linkage, training, marketing services, raw material supply, provision of equipment and machinery, industrial consultancy.

The woodworking workshops are intended for the establishment of mechanized units for the production of good quality school and office furniture and other wood products like doors, windows, etc. The proposed project is to be located in the Industrial Estates of Iringa, Njorube, Kagera and Mwanza. It will provide employment for 26 workers. The proposed furniture will be marketed directly to educational institutions, business centres, Government and private offices, hotels and restaurants.

The annual capacity has been estimated to produce the following quantity of various wooden furniture (pieces) on single shift of eight hours basis: school desks (600), office tables (900), office chairs (2,700), stools (300), bed frames (900), two-door cupboards (300). The total area of 4000 sq.ft. is considered sufficient for the project and will be allotted to sponsors by SIDO on rent.

The requirements of water and power will be provided by the local authorities concerned. The major raw material (wood, estimated at 10,000 cubic ft. annually) required for the proposed project will be available from the local market. All other raw materials such as varnish, glue, nails, wood screws, etc. are also locally produced and are easily available in the market.

LIST OF PERSONS MET

A. In Ankara:

Ministry of Trade and Industry:

Mr. Faik Koc, Deputy Undersecretary.

Mr. Sakir Ozcan, Head, Foreign Relations Dept.,

Ms. Alev Bac, Director, " " "

Ms. Sema Canci, Expert, " " "

Machinery and Chemical Industries Organization. (MKEK):

Mr. Gunay Gungen, Asst. General Manager, (Technical),

Ms. Kamuran Icmeli, Group Head, Planning and  
Coordination.

Mr. Mete Ertung, Manager, Wood Products Factory,

Industrial Facilities, Engineering and Consulting  
Corporation, (TUSTAS) :

Mr. Mustafa Ayranci, Head, Dept. of Projects.

UNDP Office:

Mr. Kamal Hussein, SIDFA (UNIDO),

Melkuc Woodworking Machinery Industry:

Mr. Fikret Melkuc,

Dates TCT Circular Saw Manufacturing and Trade Inc.:

Mr. Ibrahim Ergil, Member of the Board.

Turanlar Woodworking Machinery Manufacturing and Trade:

Mr. Ibrahim Turan,

MATMAS, Printing Materials Manufacturing and Trade Inc.

Mr. Erol Karakurt,

B. In Dar Es Salaam:

Ministry of Lands, Natural Resources and Tourism:

Mr. Kessi, Forest Reserve Officer.

Ministry of Education:

Mr. Itatiro and several other officers.

Small Industries Development Organization, (SIDO):

Mr. E. B. Toroka, Director General,

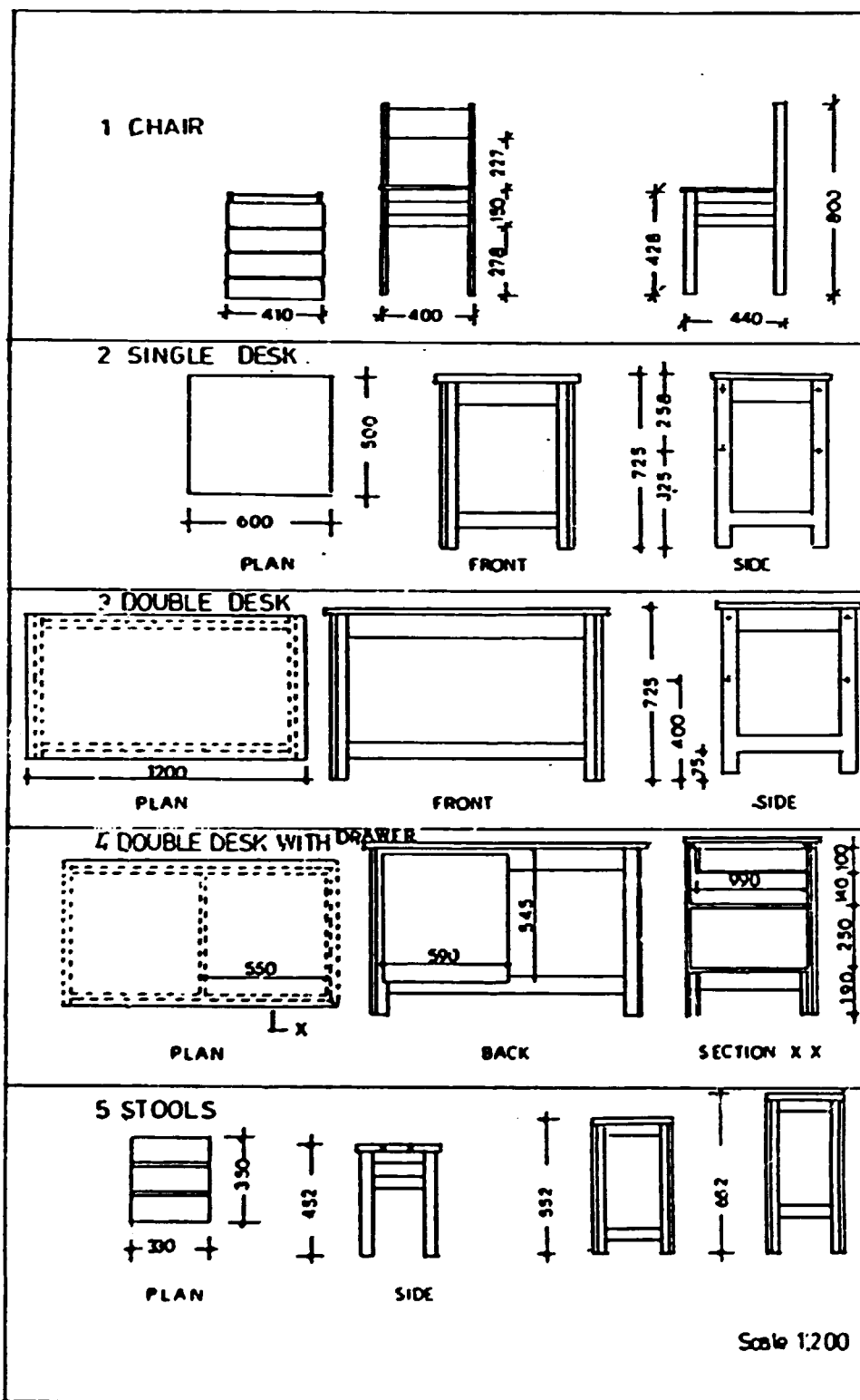
Mr. C. M. N. Ntabajana, Manager, Planning and Strategy

Mr. E. S. A. Ndongole, Technical Officer.  
Tanzania Stationery Manufacturers Ltd.:  
Mr. Deo K. Nalwendela, Sales Manager.  
Tanzam International Marketing (T) Ltd.:  
Mr. Zulfikarali T. Adamjee, Managing Director.  
Tanzania Wood Industry Corporation, (TWICO):  
Ms. Edna Mbagu, Operations Manager.  
Southern Paper Mills Co. Ltd., (SPM):  
Mr. J. M. Seni, Marketing Services Manager.  
Dar Es Salaam Small Ind. Coop. Soc. Ltd., (DASICO):  
Mr. Libent R. Mutatembwa, Marketing and Sales Officer.  
National Vocational Training Centre, (NVTC):  
Ms. Evelyn Nkurlu, Training Administrator.  
Dar Es Salaam Technical College:  
Mr. Salim Msoma, Vice Principal.

C. In Istanbul:

Cemil Usta Woodworking Machinery Industry:  
Mr. Yurdaer Kiziltas, Managing Director.  
Miras Woodworking Machinery Industry:  
Mr. Turkecan Miras, Managing Director.  
Rodoslu Printing Machinery and and Materials Trade and  
Industry Ltd.:  
Mr. Nuri Rodoslu, Managing Director.  
Gensoy Machinery Industry and Trade Ltd.:  
Mr. M. Hayati Sevgen.  
Sabri Yaman Woodworking Machinery Industry:  
Mr. Celal Yaman, Marketing Manager.  
Ege-Bant Sanding and Grinding Materials Industry:  
Mr. Salih Egeli, Member of the Board.  
Makinsan Machinery Industry and Trade Inc.:  
Mr. Haydar Sezal, Factory Manager.  
Mr. Husamettin Bostan, Production Manager.  
Ms. Binnaz Ozkan, Sales Officer.

DIMENSIONS OF  
SECONDARY SCHOOL FURNITURE



Source: Kwongozo wa usajili wa shule zisizo za serikali. (Kumb. Na. Edi/R5/I).  
Wizara Ya Elimu Ya Taifa, Dar Es Salaam, Tanzania, 1982.

Annex IV

TYPES AND MEASUREMENTS  
OF EXERCISE BOOKS

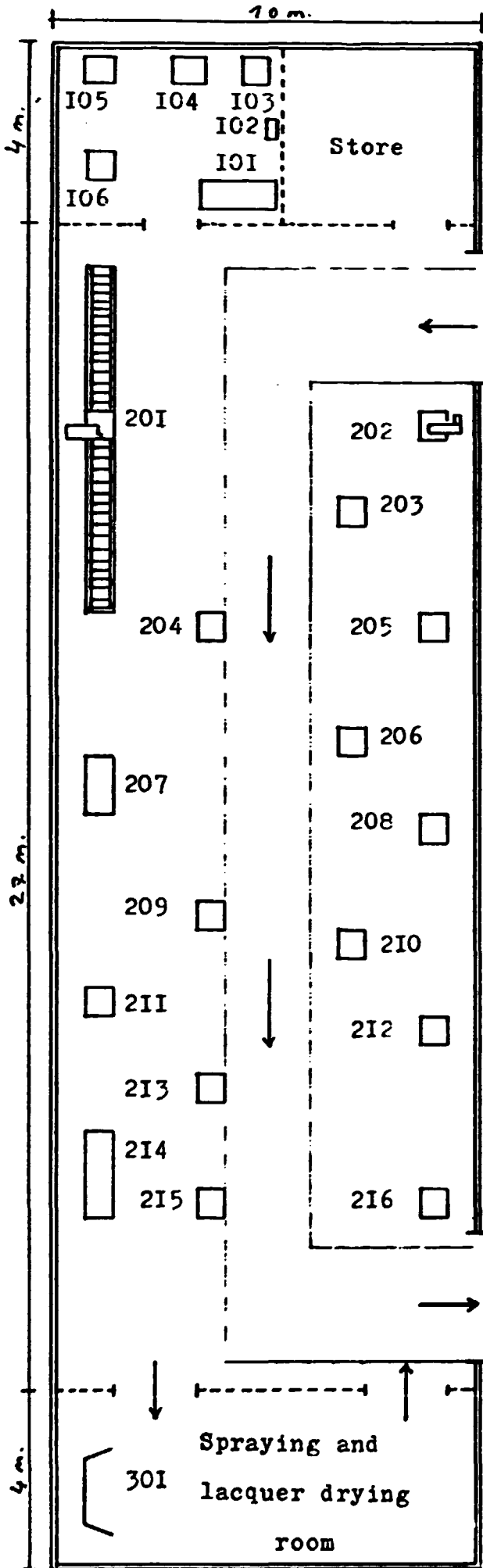
<u>Types</u>	<u>Measurements</u>	<u>No. of Pages</u>	<u>Remarks</u>
A	165 x 203 mm.	48/96	Plain.
B	165 x 203 mm.	48/96	Double lined.
C	165 x 203 mm.	48/96	Square lined.
D	165 x 203 mm.	48/96	Graphic lined.
E	165 x 203 mm.	48/96	Uniform lined.

MF quality 60 gr./sq. m. writing paper for pages and MF Manilla quality 100 gr./sq. m. paper board or Kraftliner quality 125 gr./sq. m. papers are used for covers.

The most widely used exercise book type is the "E" type. All the exercise books have the emblem of the Ministry of Education and information on the student's identity printed on the front cover, and mathematical tables on the back cover. These are printed using rubber stereotypes.

The exercise books used in primary schools have 48 pages. In secondary schools, exercise books with 96 pages are used.

LAYOUT FOR IRINGA FURNITURE WORKSHOP



LEGEND:

- I01 Workbench.
- I02 Butt-welder.
- I03 Band saw sharpener.
- I04 Planer knife sharpener.
- I05 Circular saw sharpener.
- I06 Universal tool sharpene

- 201 Cross cutting saw.
- 202 Band saw.
- 203 Circular saw.
- 204 Circular rip saw.
- 205 Spindle moulder.
- 206 Overhead router.
- 207 Surface planer.
- 208 Turning lathe.
- 209 Thickness planer.
- 210 Dovetailer.
- 211 Tenoner.
- 212 Drum sander.
- 213 Kortiser.
- 214 Narrow belt sander.
- 215 Vertical drill.
- 216 Radial cut-off saw.

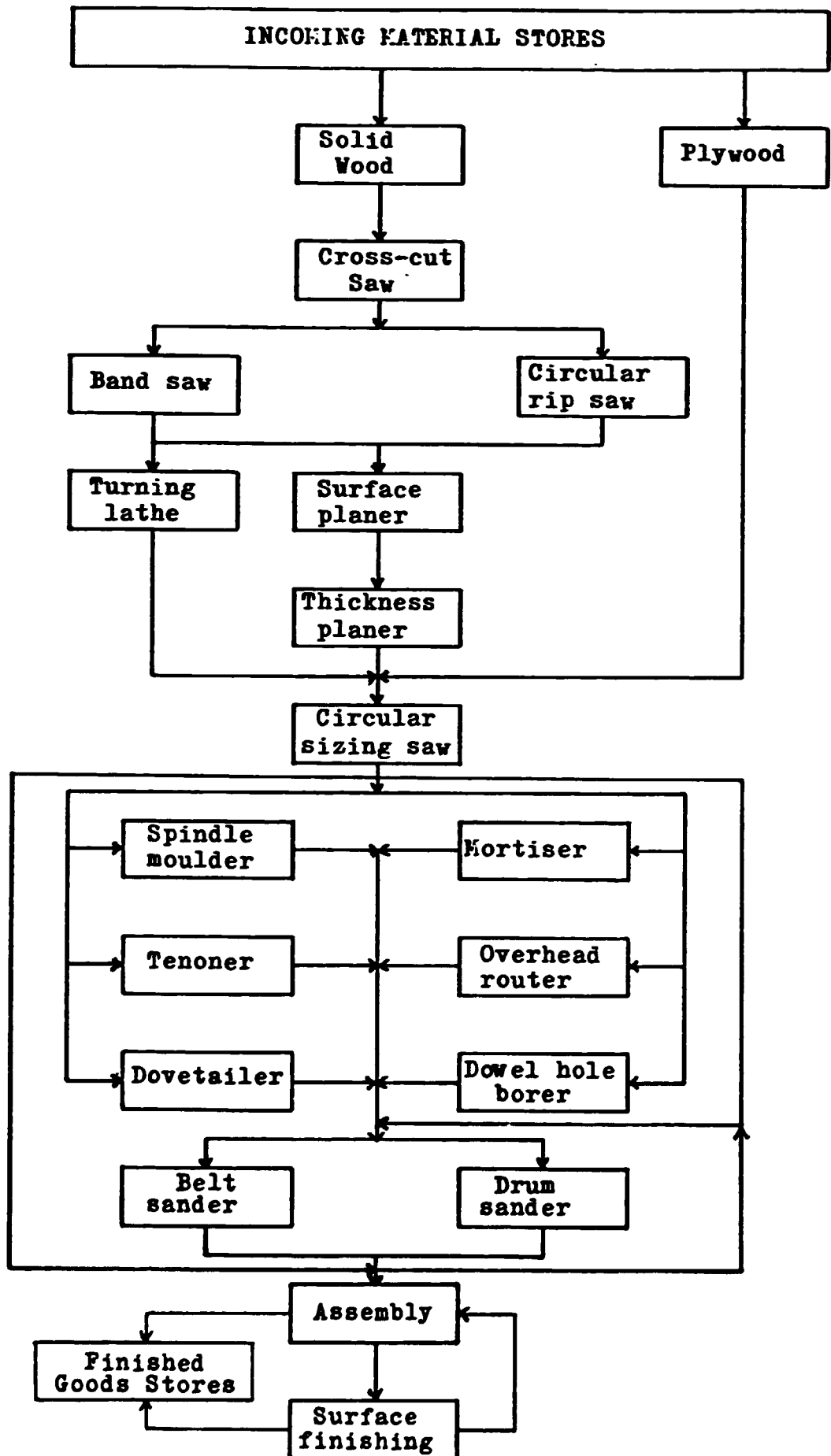
301 Spray booth.

.... Walls to be built.

Note: Offices to be located on top of store and sharpening rooms.

Scale: 1/150

PRODUCTION FLOW CHART FOR FURNITURE WORKSHOPS





Annex VII

THE LIST OF MAIN PRODUCTION EQUIPMENT  
FOR FURNITURE AND JOINERY WORKSHOPS

<u>Item</u>	<u>Estimated</u>
<u>No.</u>	<u>Cost (\$)</u> **
1. Cross cutting saw. Complete with foot operated under table travelling saw. Saw blade diameter: 400 mm. Motor power: 5.5 HP. Table size: 1,000 x 800 mm. Max. cutting thickness: 100 mm. Max. cutting width: 400 mm. Length of infeed roller table: 3 m. Length of outfeed roller table: 2 m. Shipping volume: 2.7 cu. m. Gross weight: 650 kg.	1 2,200
2. Band saw. Pulley diameter: 600 mm. Motor power: 4 HP. Shipping volume: 3.5 cu. m. Gross weight: 1,100 kg.	1 2,700
3. Circular rip saw. Table size: 950 x 950 mm. Saw blade diameter: 400 mm.	1 2,150

\* All the equipment should be wired for 380 Volts, 3 Phase and 50 Hz. electricity and motors should be equipped with overload protection where applicable.

\*\* Estimated costs are ex-factory and in U. S. Dollars. Seaworthy packing in wooden crates are included in the cost where applicable.

Spindle diameter: 30 mm.  
Motor power: 10 HP.  
Shipping volume: 2 cu. m.  
Gross weight: 900 kg.

4. Surface planer. 1 3.500

Table width: 500 mm.  
Table length: 2.600 mm.  
Cutterblock speed: 4.000 rpm.  
No. of knives: 4 .  
Motor power: 5.5 HP.  
Shipping volume: 2 cu. m.  
Gross weight: 900 kg.

5. Thickness planer. 1 2.200

Working width: 500 mm.  
Max. working thickness: 230 mm.  
Cutterhead rotation: 4000 rpm.  
No. of knives: 4 .  
Feed rate: Variable,  
8 to 16 m./min.  
Motor power: 7.5 HP.  
Shipping volume: 1.5 cu. m.  
Gross weight: 800 kg.

6. Circular sizing saw. 1 2.250

(With tilting arbor and  
travelling table).  
Table size: 1,000 x 1,100 mm.  
Saw blade diameter: 350 mm.  
Spindle diameter: 30 mm.  
Arbor tilt: 45 degrees.  
Motor power: 4 HP.  
Shipping volume: 2 cu. m.  
Gross weight: 750 kg.

7. Spindle moulder. 1 2.300  
Table size: 1,000 x 1,000 mm.  
Spindle diameter: 30 mm.  
Spindle stroke: 160 mm.  
Spindle rotation: 7,000-10,000 rpm.  
Spindle inclination: 45 degrees.  
Motor power: 5.5 HP.  
Shipping volume: 2.3 cu. m.  
Gross weight: 1,000 kg.
8. Horizontal boring/mortising machine. 1 800  
Table size: 500 x 300 mm.  
Transversal stroke: 200 mm.  
Vertical stroke: 210 mm.  
Max. boring depth: 150 mm.  
Mortising bit rotation: 2,800-  
5,600 rpm.  
Max. bit diameter: 20 mm.  
Motor power: 3 HP.  
Shipping volume: 1 cu. m.  
Gross weight: 400 kg.
9. Vertical drill (Column drill). 1 300  
Movable table size: 250 x 200 mm.  
Vertical stroke: 70 mm.  
Morse taper No.: III  
Drill capacity: 13 mm.  
Mandrel speed: 470, 950, 1,800,  
rpm.  
Motor power: 0.5 HP.  
Shipping volume: 0.8 cu. m.  
Gross weight: 70 kg.
10. Overhead router. 1 1.750  
(With inclining head)  
Head movement: by mechanical  
foot pedal.

Work table size: 950 x 700 mm.  
Vertical head movement: 85 mm.  
Vertical table movement: 100 mm.  
Throat depth: 425 mm.  
Spindle speed: 17, 000 rpm.  
Motor power: 2 HP.  
Shipping volume: 1.8 cu. m.  
Gross weight: 500 kg.

11. Narrow belt sander. 1 2,250

Work table size: 2,500 x 750 mm.  
Sanding belt size: 7,100 x 150 mm.  
Max workpiece height: 530 mm.  
Motor power: 5.5 HP.  
Shipping volume: 6 cu. m.  
Gross weight: 700 kg.

12. Profile drum sander. 1 1,650

(Complete with suction fan,  
one rigid and one pneumatic  
sanding head).  
Sanding head lengths: 250 mm.  
Pneumatic drum diameter: 200 mm.  
Rigid rubber drum diameter:  
100 mm.  
Sanding motor power: 1.5 HP.  
Suction motor power: 0.75 HP.  
Shipping volume: 1.25 cu. m.  
Gross weight: 250 kg.

13. Radial cut-off saw. 1 500

Max. cutting thickness: 60 mm.  
Max. cutting width: 140 mm.  
Saw blade diameter: 300 mm.  
Motor power: 1.5 HP.  
Shipping volume: 1 cu. m.  
Gross weight: 150 kg.

14. Turning lathe.	1	1.000
Max. turning length: 1,200 mm.		
Max. workpiece thickness: 200 mm.		
Turning speed: 1,500, 2,200,		
3,200 rpm.		
Motor power: 2 HP.		
Shipping volume: 1.9 cu. m.		
Gross weight: 350 kg.		
15. Dovetailing (Corner locking) machine	1	1,500
Spindle rotation: 14,000 rpm.		
Max. working width: 600 mm.		
Tooth width: 24 and 30 mm.		
Motor power: 1 HP.		
Shipping volume: 0.5 cu. m.		
Gross weight: 300 kg.		
16. Tenoning machine.	1	2,500
Spindle rotation: 7,000 rpm.		
Spindle diameter: 30 mm.		
Table size: 1,000 x 1,100 mm.		
Motor power: 5.5 HP.		
Shipping volume: 2.4 cu. m.		
Gross weight: 900 kg.		

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Sub Total: \$ 29,550

+ Recommended spare parts sufficient  
for 2 years operation for one shift : \$ 6,000

+ Recommended standard cutting tools  
and sand paper sufficient for 2 years: \$ 4,950

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Grand Total: \$ 40,500

LIST OF AUXILIARY EQUIPMENT  
FOR FURNITURE AND JOINERY WORKSHOPS

Item		Estimated
<u>No.</u>	<u>Description and Specifications *</u>	<u>Qty.</u> <u>Cost (\$)**</u>
1.	Lacquer and paint spray booth. (With water wash system) Working width: 2,000 mm. Working height: 1,880 mm. Exhaust motor power: 4 HP. Water pump motor power: 1 HP. Water tank capacity: 365 Litres. Shipping volume: 11 cu. m. Gross weight: 1,300 kg.	1        7,000
2.	Compressor. (Single stage type, complete with horizontal air tank). Max. pressure: 10 bar. Max. working pressure: 7 bar. No. of cylinders: 2 Free air delivery: 500 l/min. Air tank capacity: 350 litres. Motor power: 4 kW. Shipping volume: 2 cu. m. Gross weight: 350 kg.	1        3,500

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\* All the equipment operating on electricity should be wired for 380 Volts, 3 Phase and 50 Hz. electric supply and motors should be equipped with overload protection where applicable.

\*\* Estimated costs are ex-factory and in U. S. Dollars. Seaworthy packing in wooden crates are included in the cost where applicable.

3.	Spray gun set. (Complete with air filter, die-cast aluminium alloy gun, and 5 m. rubber hose quick release couplings and pressure regulator).	1	150
4.	Hydraulic pallet truck. Load capacity: 2,000 kg. Shipping volume: 1 cu. m. Gross weight: 250 kg.	2	1,000
5.	Tool and maintenance truck. Carrying capacity: 250 kg. Shipping volume: 1 cu. m. Gross weight: 60 kg.	1	300
6.	Steel measuring tapes. Measuring capacity: 3 m.	5	25
7.	Precision vernier calipers. Capacity: 150 mm.	3	150
8.	Set of carpenter hand tools. (Including: level, hand planer, hand saw, set of hammers, chisels, angles etc.). Shipping volume: 0.2 cu. m. Gross weight: 50 kg.	5	500
9.	AC Arc welder. (Complete with welding helmet, safety goggles, hand held welding shield, electrode holder	1	350

and cable, work cable with ground clamp and sufficient welding rods).  
Welding range: 30 to 225 amperes.  
Shipping volume: 0.3 cu. m.  
Gross weight: 40 kg.

10.	Set of mechanic`s hand tools.	1	150
11.	Set of electrician`s hand tools. (Complete with measuring instruments).	1	500
12.	Carpenter`s benches	2	600

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Sub Total: \$ 14.225

+ Recommended spare parts sufficient  
for 2 years operation for 1 shift : \$ 3,000

---

Grand Total: \$ 17.225



Annex IX

THE LIST OF TOOL MAINTENANCE EQUIPMENT  
FOR FURNITURE AND JOINERY WORKSHOPS

Item		Estimated
<u>No.</u>	<u>Description and Specifications *</u>	<u>Qty.</u> <u>Cost (\$)**</u>
1.	Combined band saw and HSS circular saw blade sharpener. Min. band saw blade width: 10 mm. Max. band saw blade width: 120 mm. Max circular saw diameter: 600 mm. Grinding wheel speed: 2,800 rpm. Grinding wheel diameter: 180 mm. Motor power: 0.75 HP. Shipping volume: 0.7 cu. m. Gross weight: 250 kg.	1 1.000
2.	Automatic planer knife grinder. Max grinding length: 600 mm. Grinding capacity : 1 to 4 knives. Grinding feed speed: 10 m./min. Grinding wheel speed: 2,300 mm. Motor power: 0.75 HP. Shipping volume: 1.7 cu. m. Gross weight: 275 kg.	1 1.950

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\* All the equipment should be wired for 380 Volts, 3 Phase and 50 Hz. electricity and the motors should be equipped with overload protection where applicable.

\*\* Estimated costs are ex-factory and in U. S. Dollars. Seaworthy packing in wooden crates are included in the cost where applicable.

- |   |   |       |
|---|---|-------|
| 3. Automatic TCT circular saw sharpener.<br>(Complete with liquid cooling system)<br>Max. saw blade diameter: 600 mm.<br>Min. saw blade diameter: 140 mm.<br>Sharpening wheel diameter: 125 mm.<br>Sharpening wheel bore: 20 mm.<br>Sharpening motor power: 0.55 KW.<br>Shipping volume: 1.5 cu. m.<br>Gross weight: 375 kg.  | 1 | 2,250 |
| 4. Universal cutter grinder.<br>(Complete with liquid cooling pump)<br>Max. cutter diameter: 360 mm.<br>Max. knife length: 350 mm.<br>Vertical movement of cutter head:<br>360 mm.<br>Horizontal movement of table:<br>180 mm.<br>Max. wheel diameter: 200 mm.<br>Grinding motor power: 1 HP.<br>Pump motor power: 0.15 KW.<br>Shipping volume: 2.1 cu. m.<br>Gross weight: 650 kg. | 1 | 2,400 |
| 5. Band saw blade butt welder.<br>Max. welding width: 60 mm.<br>Shipping volume: 0.4 cu. m.<br>Gross weight: 60 kg.   | 1 | 975   |
| 6. Band saw blade swaging apparatus.<br>(Manually operated)   | 1 | 160   |
| 7. Machinists' bench vise.<br>Stationary base. Max. opening: 160 mm.<br>Jaw width: 100 mm.  | 1 | 60    |

8. Bench grinder.	1	120
		<hr/>
	Sub Total:	\$ 8.915
+ Recommended spare parts sufficient for 2 years operation for 1 shift	:	\$ 2,000
+ Recommended standard tools and other consumables such as grinding wheels sufficient for 2 years operation	:	\$ 1,670
		<hr/>
	Grand Total:	\$ 12.565

TENTATIVE TRAINING PROGRAMME  
FOR MACHINE WOODWORKERS

- A. Characteristics and uses of wood and wood-based panels:
  - 1. Hardwoods,
  - 2. Softwoods,
  - 3. Plywood,
  - 4. Particle board,
  - 5. Fibreboard (Hardboard),
- B. Characteristics and uses of ancillary materials:
  - 1. Glues,
  - 2. Paints,
  - 3. Stains,
  - 4. Varnishes,
  - 5. Thinners,
  - 6. Hardware,
  - 7. Veneer,
  - 8. Laminates (rigid melamine foils),
  - 9. Upholstery materials,
- C. Joints in cabinet work:
  - 1. In solid timber
  - 2. In wood based panels,
- D. Joints in joinery work:
  - 1. Partitions,
  - 2. Doors,
  - 3. Windows,
  - 4. Staircases,
- E. Woodworking machines (operation, maintenance and safety)
  - 1. Sawing machines,
  - 2. Planing "
  - 3. Moulding "
  - 4. Mortising "
  - 5. Tenoning "
  - 6. Boring "
  - 7. Sanding "
  - 8. Dovetailing "
  - 9. Routing "

10. Turning machines (lathes).

F. Portable power tools:

1. Circular saw.
2. Boring machine.
3. Planer.
4. Jig saw.
5. Plunging router.
6. Orbital sander.
7. Belt sander

G. Paint and lacquer spraying equipment:

1. Conventional spray guns.
2. Airless spray guns.
3. Airmix spray guns.
4. Dry back spray booths.
5. Water wash spray booths.
6. Compressors.
7. Compressed air systems.
8. Spray rooms.
9. Spray room lighting.
10. Spray room exhaust fans and ventilators.

H. Woodworking hand tools:

1. Hand planer.
2. Hand chisel.
3. Hand saws.
4. Other hand tools.

I. Wood cutting tools:

1. Circular saw blades.
2. Band saw blades.
3. Planer knives.
4. Cutter blocks and heads.
5. Boring bits.
6. Cutting knives for hand tools.

J. Production jigs:

1. Machining jigs.
2. Assembly jigs.

K. Technical drafting:

1. Parts drawings

2. Detail drawings.

3. Perspectives.

4. Exploded views.

L. Wood machining and finishing practice: (\*)

---

(\*) The total duration of training is 12 weeks. It is envisaged that 2 to 4 weeks will be theory depending on the existing knowledge of trainees. The remaining 8 to 10 weeks will be devoted to practical work.

TENTATIVE TRAINING PROGRAMME  
FOR SAW DOCTOR

- A. Principles of cutting theory.
- B. Types of wood cutting tools.
- C. Types of tool maintenance equipment.
- D. Narrow band saw blade maintenance.
  - 1. Tooth types,
  - 2. Butt welding,
  - 3. Sharpening,
  - 4. Swaging,
  - 5. Blade fixing and adjustment
  - 6. Blade control during operation,
  - 7. Damage identification and repair,
- E. Circular saw blade maintenance.
  - 1. Tooth types,
  - 2. Sharpening,
  - 3. Dressing,
  - 4. Tooth swaging for HSS blades,
  - 5. Blade fixing and adjustment,
  - 6. Blade control during operation,
  - 7. Damages and their repair,
  - 8. Tooth replacement of TCT blades.
- F. Planer knife maintenance.
  - 1. Sharpening,
  - 2. Dressing,
  - 3. Blade fixing and adjustment,
  - 4. Typical damages and their repair,
- G. Boring bit maintenance.
  - 1. Types of boring bits,
  - 2. Sharpening by hand,
  - 3. Sharpening by machine,

4. Dressing.
  5. Boring bit fixing and adjustment.
  6. Typical damages and their repair.
- H. Cutter block maintenance.
1. Types of cutterblocks.
  2. Sharpening.
  3. Dressing.
  4. Fixing on machine and adjustment.
  5. Typical damages and their repair.
- I. Profile knife maintenance.
1. Types of profile knives.
  2. Sharpening on cutterblock.
  3. Sharpening loose.
  4. Dressing.
  5. Fixing on cutterblock and adjustment.
  6. Typical damages and their repair.
  7. Profile preparation from blanks.
- J. Maintenance of knives of hand tools.
1. Turning lathe knives.
  2. Hand planer knives.
  3. Hand saw blades.
  4. Hand chisels etc..
- K. Wood cutting tool maintenance and repair practice: (\*)

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(\*) The total duration of training is 12 weeks. It is envisaged that the theoretical part will not exceed 2 to 4 weeks depending on the existing knowledge of the trainee. The main emphasis will be on the practical part of the training and is expected to last 8 to 10 weeks.



LIST OF POTENTIAL EQUIPMENT SUPPLIERS

<u>Name and Address of Supplier</u>	<u>Potential Supplier for Items as per Annexes</u>		
	<u>Annex VII</u>	<u>Annex VIII</u>	<u>Annex IX</u>
1. Makinsan, Buyukdere Cad. No: 28/A, Mecidiyekoy, Istanbul. Tel: 1749860 Fax: 1670562	5, 12, 13	---	---
2. Melkuc Eregli Sokak No: 20, Siteler, Ankara. Tel: 3485277	10, 11, 15	---	---
3. Cemilusta, Eski Halkali Cad. No: 59, Besyol-Sefakoy, Istanbul. Tx: 28773 yupa-TR	1, 3,	---	1
4. Gensoy, Ortamahalle, Kilicalipasa Sok. 42/A, Soganli, Kartal-Istanbul. Tel: 3534296	---	1	---

5. Miras Makina. --- --- 1. 2. 3. 4  
Kalayci Bahce 5. 6.  
Sokak No: 32-36  
Haskoy, Istanbul.  
Tel: 1500502  
Fax: 1503214
6. Sabri Yaman. 2. 3. 4. 5 --- ---  
Kisla Caddesi. 6. 7.  
Incirlik Sok..  
No: 16. Topcular.  
Rami, Istanbul.  
Tel: 5760243  
Fax: 5765411.
7. Burselkur. 2. 3. 4. 5. --- ---  
P. O. Box 63. 6. 7. 8. 16  
Bursa.  
Tel: 148950.  
Tx : 32031 ksb-TR
8. Turanlar. 10 --- ---  
Demirhendek Cad.,  
No: 78. Siteler  
Ankara.  
Tel: 3494954
9. Sencer/Niltas. 2. 3. 4. 5. --- 1. 2. 5.  
Ulu Cadde 6. 7. 8. 9.  
No: 63, Bursa. 11. 13. 14.  
Tel: 43500 16  
Tx: 32053 ntex-TR.
- 10 As Metal. 3. 6. 7. --- ---  
Numunebag Cad.,  
Civelek Sitesi,  
No: 5/A, Topkapi,  
Istanbul.  
Tel: 5674458.

11. Arbomak A. S. --- 4. 5. ---  
Tasocagi Cad..  
Yasarbey Sok..  
No: 2.  
Mecidiyekoy.  
Istanbul.  
Tel: 1665938  
Tx: 27546 arbm-TR.  
Fax: 1746714
12. Havamak A. S. --- 2. 3 ---  
Meclisi Mebusan  
Cad. No: 19  
Findikli.  
Istanbul.  
Tel: 1442853  
Tx: 23523 buza-TR.
13. Ege-Bant. (Sanding belts for sanding machines and  
Kurekciler grinding wheels for sharpening machines)  
Cad. No: 20.  
Karakoy.  
Istanbul.  
Tel: 1441945  
Tx: 25392 esav-TR.
14. Dates, (TCT circular saw blades and, HSS and TCT  
Yagiz Sokak, cutter heads knives and bits)  
No: 18/B,  
Siteler,  
Ankara.  
Tel: 3493210  
Tx: 44279 dtes-TR.