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17 September 1991
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ASSISTANCE IN THE ESTABLISHMENT
OF A PILOT FURNITURE PLANT

DP/DRK/86/011

THE DEMOCRATIC PEOPLE'S REPUBLIC OF KOREA

Technical report: Revision and planning
of the project's extension*

Prepared for the Government of the Democratic People's Republic of Korea
by the United Nations Industrial Development Organization,
acting as executing agency for the United Nations Development Programme

Based on the work of R. Radmilo Malis,
expert in furniture production

Backstopping officer: Antoine V. Bassili,
Agro-based Industries Branch

United Nations Industrial Development Organization
Vienna

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INTRODUCTION

The furniture production expert, Radmilo Malis, who was assigned to the project to analyze the technical basis and prepare a revision to the project document, carried out his mission from 7 May to 21 June 1991. The project document for this project has been signed on 11 November 1987 by the Government of the Democratic People's Republic of Korea (DPR Korea), the United Nations Development Programme (UNDP) and the United Nations Industrial Development Organization (UNIDO) as the executing agency.

According to the project document, the existing furniture factory within the Pyongyang Wood Complex (PWC) was selected for transformation into a pilot furniture plant with combined new and old reconditioned equipment. The first idea was to design a universal factory for the production of both solid wood and case furniture made of panels. Owing to lack of money for purchase of all necessary imported equipment for such a factory, the counterpart changed its decision and ordered to establish the pilot furniture plant with only one production line specialized for case (box-like) furniture, mainly made of veneered particle board and plywood.

Based on the results, and experience gained during the project execution, the Government decided to request an extension of the project and additional funding in order to complete the pilot furniture plant with a solid wood furniture manufacturing line. Wishing to have specialized factories for manufacturing either case or solid wood furniture, the government selected another factory, belonging to the same wood processing complex, to be transformed into the pilot plant for solid wood furniture. This is the Pyongyang Solid Wood Branch Factory of the Pyongyang Wood Complex. This Complex (PWC) is part of the General Bureau for Building Materials in the City of Pyongyang.

Also UNIDO assistance was requested for preparation of a revision to the project document. In order to provide this assistance, the same furniture production expert, who executes the project as Chief Technical Adviser, was assigned to the project and the results of his work are this report.

The expert examined both the Government proposal and the existing situation in the proposed factory and his findings and assessments are summarized in the first part of the report entitled: Findings. The following points are discussed in this part of the report:

1. General Data.
2. Product Line.
3. Technology.
4. Equipment.
5. Raw Materials.
6. Other Production Materials.
7. Quality of products.
8. Maintenance.
9. Organization.
10. Economy.
11. Management.
12. Conclusions.

The second part of this report entitled "Activities", covers the expert's activities related to the preparation of the revision to the project document, and some suggestions with regard to: product line, new technology, equipment to be purchased and some other recommendations.

The proposed revision of the project document (Revision H) with the corresponding annexes is annexed to this report, as well.

1. Findings

Most data and information about the Pyongyang Solid Wood Branch Factory, used in this report, were obtained from the factory management or part of the expert's observations. The factory management showed an outstanding readiness for cooperation and provided the expert with all the requested information.

1.1 General data

The Pyongyang Solid Wood Branch Factory of the Pyongyang Wood Complex is a medium size furniture factory. It has 130 employees, out of which 90 or 69 percent work in direct production, and 40 or 31 percent are occupied with maintenance, transportation, protection and administrative jobs. 47 or 36 percent of the employees are women.

The total area of the factory is 7,017 m², and about half of that is under buildings (See annex II-1).

The total value of production, based on the achievement in 1990, was Wons 964,340 or approximately US\$ 436,353. The value of production planned for 1991 is roughly at the same level.

The factory gives the impression of a very carefully managed production. However, the level of productivity is extremely low. The annual value of production of US\$ 3,357 per employee is 25 times lower than the same figure in Germany (one of the developed countries) or six times lower than in Yugoslavia (one of the developing countries).

Other relevant information on the factory will be discussed later in this report.

1.2 Product Line

The product line consists of various products of household furniture and furniture for hotels, restaurants and offices. 22 various furniture items were produced in 1990, and 27 have been planned for production in 1991. ABC analysis based on values of single products for 1990 and 1991 are shown on ABC charts (see figures 1 and 2).

Approximately 50 percent are pure solid wood products, while the rest are combinations of solid wood with panel parts and upholstery. Seating items and bedroom furniture have the highest share of the total value of production.

The large variety of products of different kinds and styles, with a total absence of standardization and interchangeability of parts and components, keeps this production at a typical artisan level.

Most of the products were designed by the head of the Technical Department, Mr. Hyong Sung Chol, who is obviously a talented designer, but without the necessary knowledge of industrial design.

Most of the product tend to follow some traditional styles, sometimes exaggerating overcrowded ornaments. Lack of an appropriate costing system and cost control has, as a consequence, an incorrect pricing.

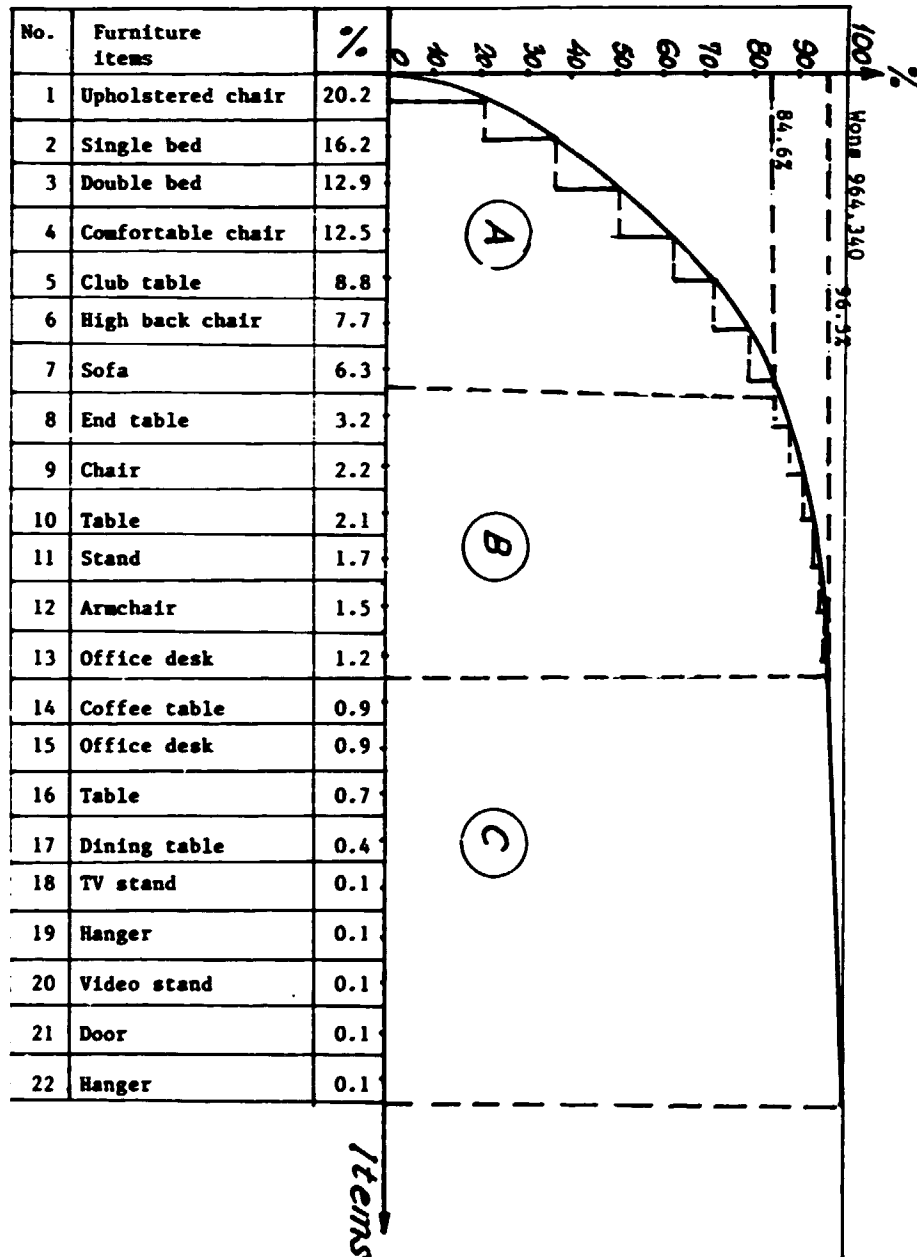


Fig.1: ABC chart of product line based on total value of products produced in 1990.

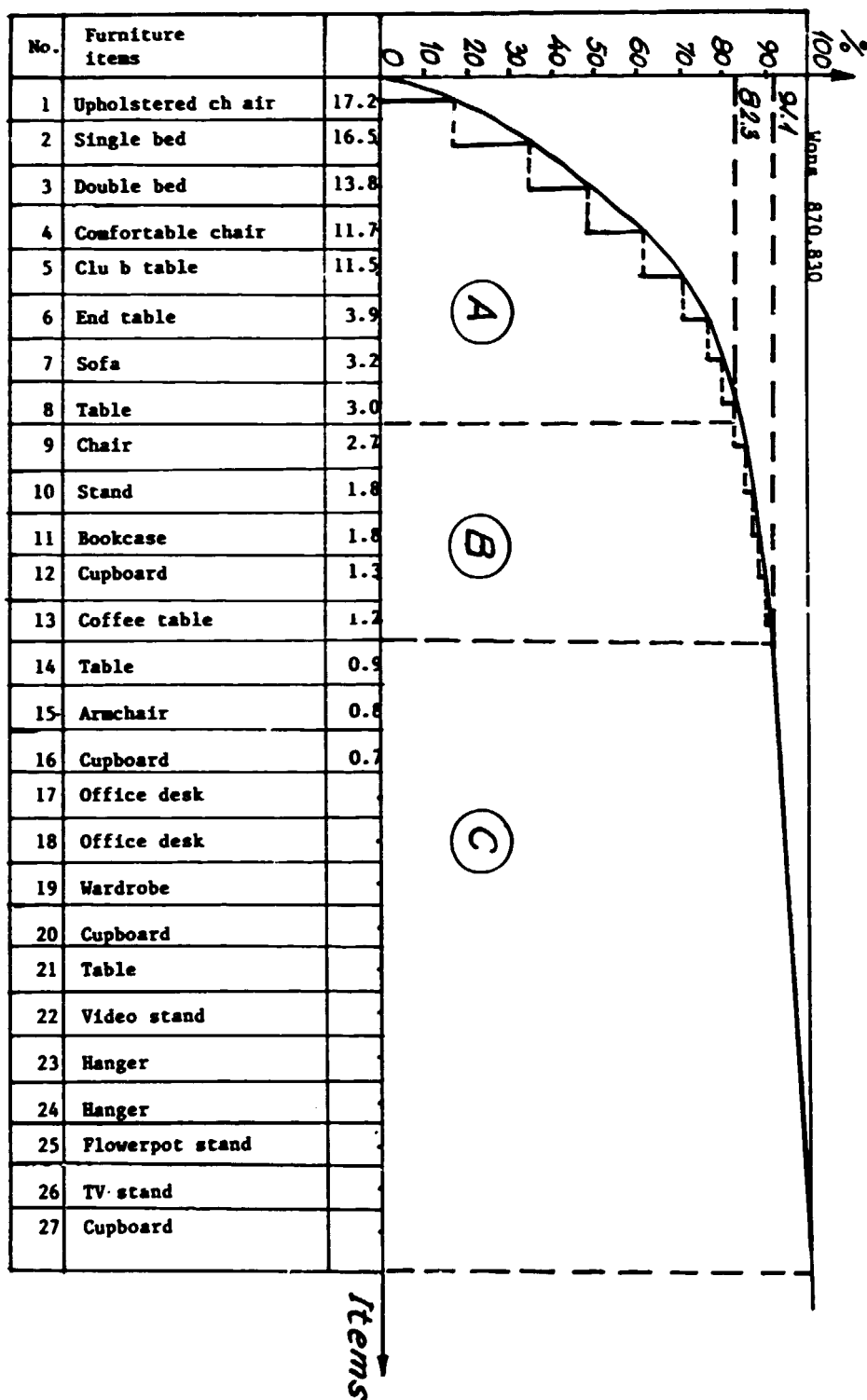


Fig. 2: ABC Chart of product line based on total value of products planned for 1991.

This results in a high demand for very complex and, though expensive, low priced products, making a wrong conclusion that people want only very rich stylish products. In fact, the main reason for customer preferences are insignificant price differences between very complex and very simple products. The factory's management is aware of this situation and they want to introduce into their product line more furniture items of modern style and suitable for an industrial production. For that reason, they emphasized importance of assistance of an industrial designer of furniture.

With regard to many furniture items presented produced in very small quantities they fully share the expert's view that they should specialize for certain groups of products that they could produce in larger quantities.

Some of the furniture items of the existing product line are shown in figures 3, 4, 5 and 6. Many representative restaurants, hotels and offices in Pyongyang are furnished with furniture made in this factory.

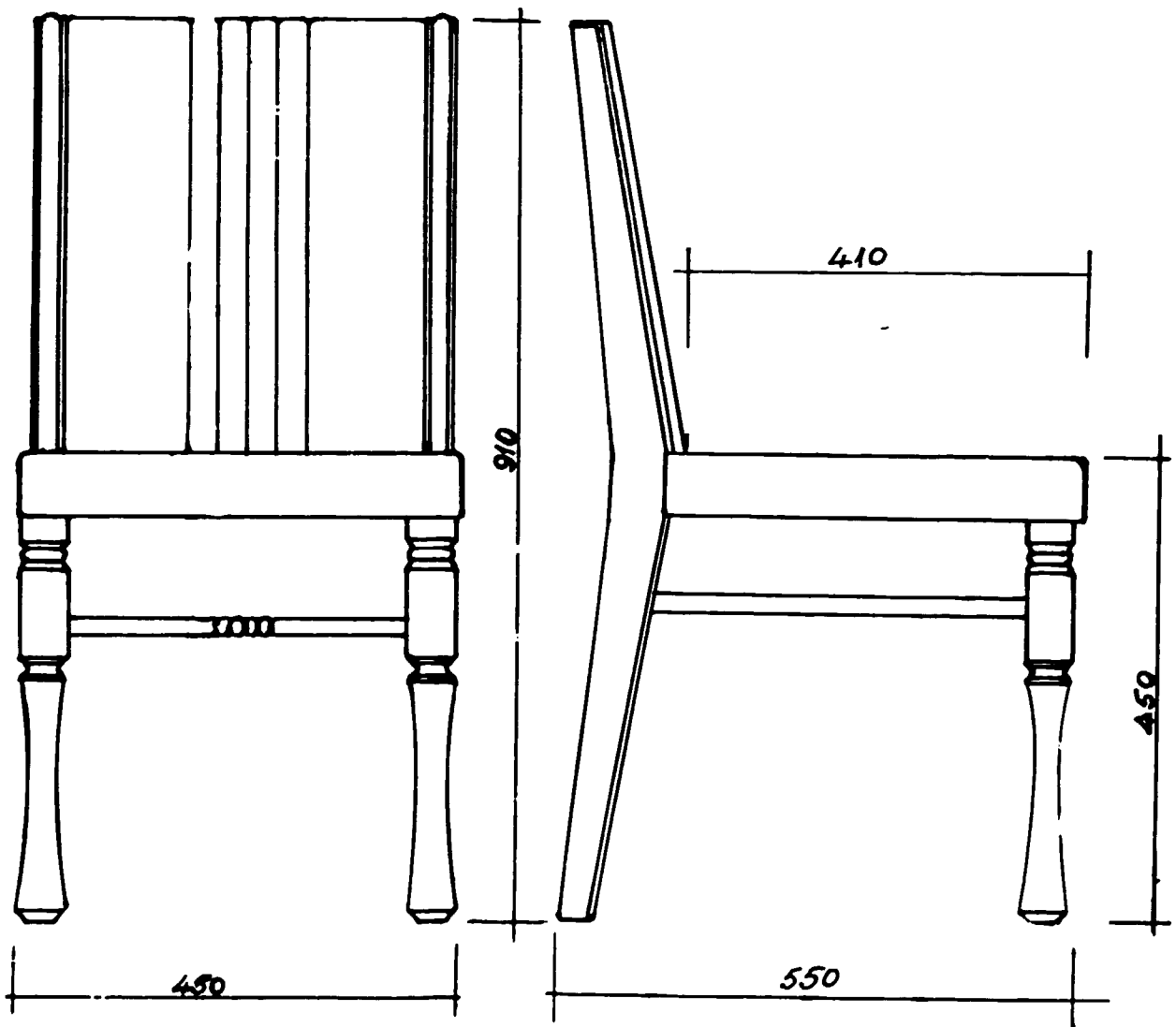


Fig. 3: Upholstered chair of the present product line.

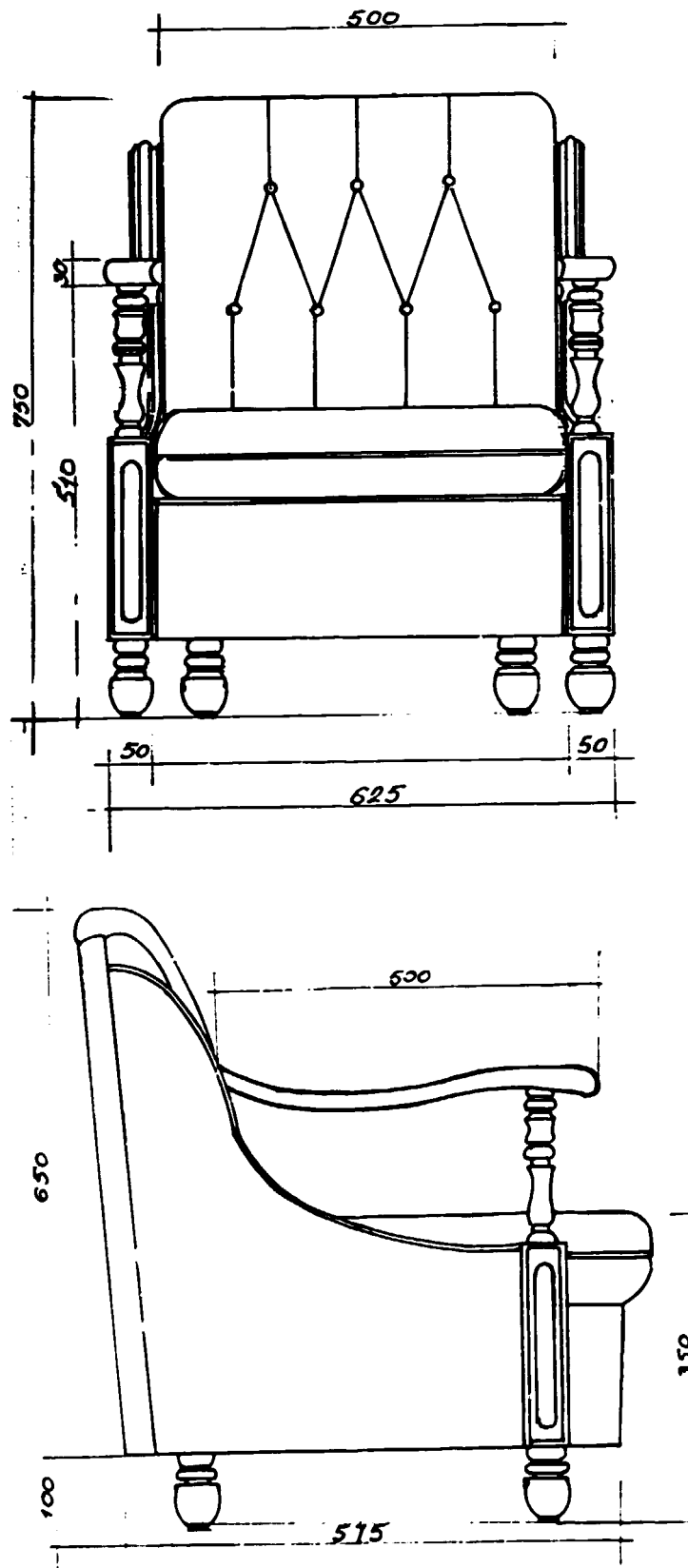


Fig. 4: Upholstered armchair of the present product line.

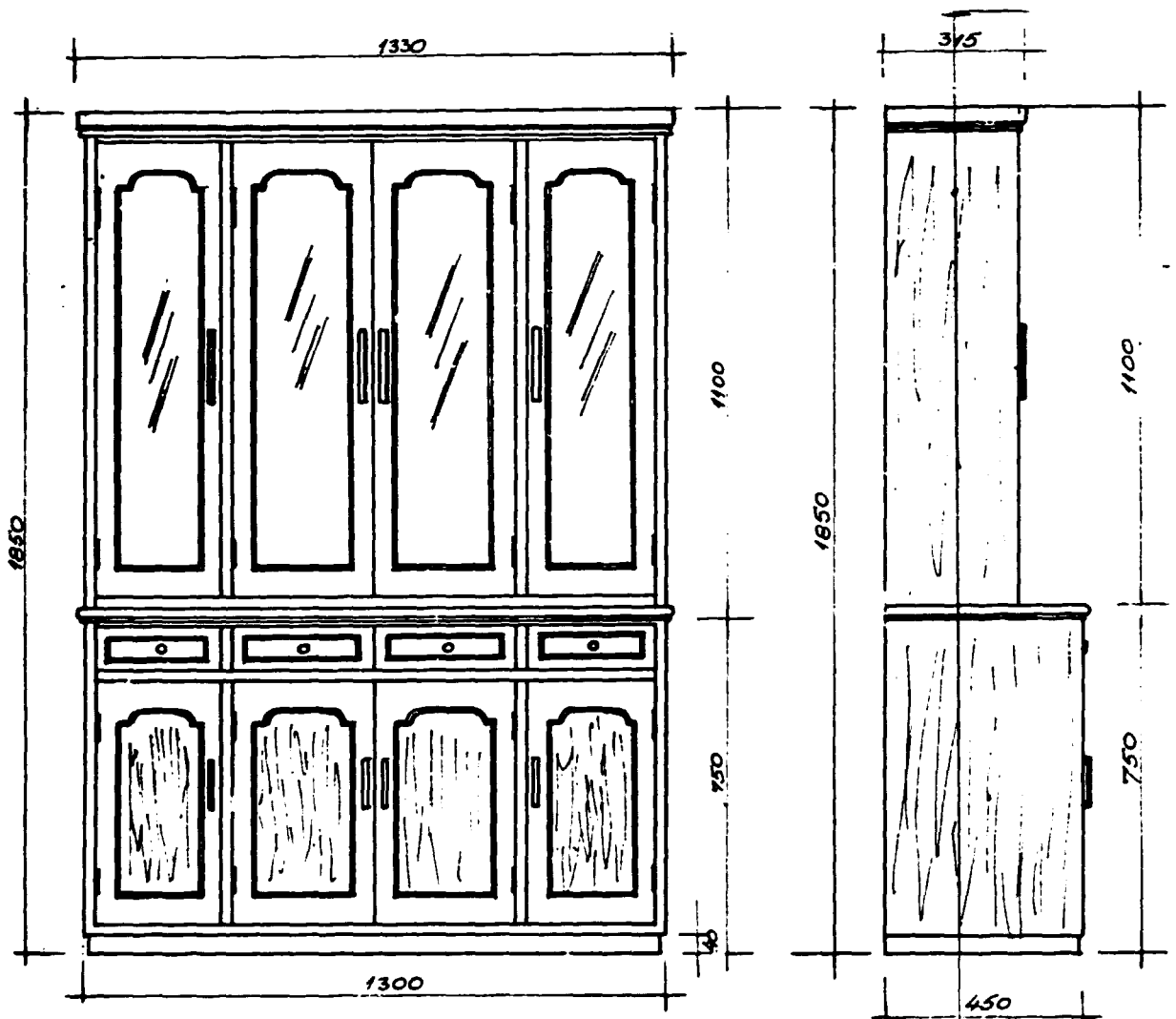


Fig. 5: Cupboard of the present product line.

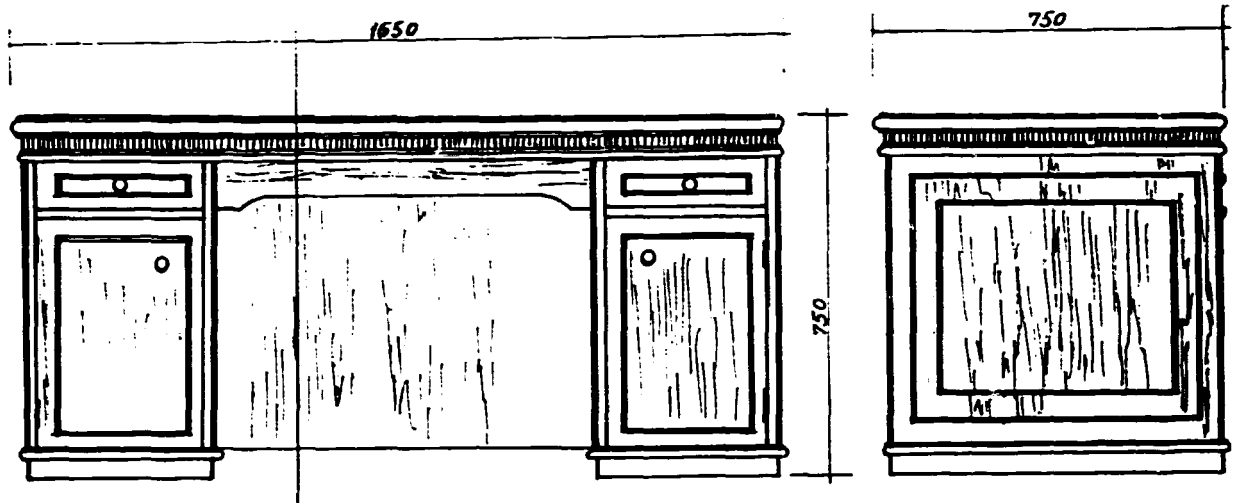


Fig.6: Office desk of the present product line.

1.3 Technology

There are two essential characteristics of the technology in the Pyongyang Solid Wood Branch Factory. First, this factory, like many other furniture factories in the DPR of Korea, tends to have full autarchy and to produce by itself sawnwood, veneer, wooden panels etc. This tendency is simply a result of very bad experiences with the supply of raw materials. It seems that it is much easier to get logs from the forest than products of the primary wood processing industry. The factory is now producing sawnwood for its own use, and some insignificant quantities of plywood and veneer. The second characteristic is an artisanal method of production. The woodworking machines are used as craftsmen tools, and most of the work is done in the assembling area.

From the technological point of view the factory is divided into four sections, as follows:

- Preparation of raw materials,
- Machining,
- Assembling, and
- Finishing.

The section dealing with the preparation of raw materials is actually the production of raw materials out of logs and drying sawwood to the required moisture content. Four dry kilns, each for only one pile of approximately 1 to 1.5 m³ are rather obsolete. They are heated with smoke gases and without any regulation or control of the drying process.

In the machining section, woodworking machines are installed in a random arrangement without taking into consideration the technological sequence and flow of materials. Internal transport of materials, component parts and assembled products is not addressed.

Assembling is done in a typical handicraft way, by using hand tools and with many adjustments of parts to fit into a product.

Finishing is done with dark-brown stain and with lacquers. Two kinds of lacquers are used. Nitrocellulosic lacquer is used for less exposed parts and for cheaper products, while polyurethane lacquer is used for table tops and for frontal or face parts of more expensive products. Stains and lacquers are applied mostly by using brushes or with an improvised spraying operation.

A great deal of furniture, like chairs, armchairs, sofas and beds, is upholstered with foam and fabrics as the only upholstering material.

Furniture is delivered to the customer by trucks and without packaging.

1.4 Equipment

In 1990, the factory imported from Italy fourteen machines: 12 woodworking machines, one universal tool grinder and one small compressor. The woodworking machines delivered by the Italian company Griggio are rather cheap and not of the best quality. Seven woodworking machines were imported from Japan, two from Poland and one from Romania. They are all 10 to 15 years old. The rest of the woodworking machinery, 18 items, as well as all other equipment for energy supply, transport and maintenance, are made in Korea.

With the exception of equipment imported from Italy a year ago, all other machines are almost unusable for any precise and good quality wood processing.

A list of the existing equipment in the factory, with major characteristics, year of production and origin follows hereunder:

I. WOODWORKING MACHINES:

No.	Description of equipment	Model or basic characteristics	Year of production	Made in
1.	Log sawing bandsaw	Bandwheel diameter φ 1100 mm	1978	Korea
2.	Log cross-cutting circular saw	Blade diameter φ 750 mm	1978	Korea

No.	Description of equipment	Model or basic characteristics	Year of production	Made in
3.	Veneer peeling machine	L-1650 mm	1990	Korea
4.	Veneer slicing machine	Height of flitch 650 mm	1991	Korea
5.	Glue mixer	Q - 300 l	1983	Korea
6.	Glue spreading machine	2 rollers, ϕ 250 mm, L- 1300 mm.	1983	Korea
7.	Cross-cutting circular saw	Saw blade ϕ 350 mm	1978	Korea
8.	Multi-blade circular saw	C 250	1990	Griggio, Italy (I)
9.	Thicknesser	PS 500	1985	Poland
10.	Thicknesser	PS 400	1990	Griggio (I)
11.	Planer	PS 330	1990	Griggio (I)
12.	Circular saw with a sliding table	SCs 1000	1990	Griggio (I)
13.	Single blade panel sizing circular saw	SC 3000	1990	Griggio (I)
14.	Circular saw with sliding table	SC 500	1985	Japan
15.	Wide belt sanding machine	LC 1300 E	1990	Griggio (I)
16.	Spindle moulder	T-1000	1990	Griggio (I)
17.	Spindle moulder		1975	Poland
18.	Narrow bandsaw	SN/AC 440	1990	Griggio (I)

No.	Description of equipment	Model or basic characteristics	Year of production	Made in
19.	Horizontal single spindle driller	TRC/N	1990	Griggio (I)
20.	Horizontal single spindle driller		1975	Japan
21.	Chain mortiser	G-281	1990	Griggio (I)
22.	Vertical single spindle driller		1975	Japan
23.	Single side tenoner for open tenons with circular saw and profiling heads	GT-4	1990	Griggio (I)
24.	Disc sanding machine	Disc ϕ 700 mm	1975	Korea
25.	Wood turning lathe	L= 1200 mm	1982	Korea
26.	Wood turning lathe	L= 1200 mm	1982	Korea
27.	Six daylight hydraulic hot press		1975	Romania
28.	Four daylights hydraulic hot press	4 LiZ 33.13	1990	Griggio (I)
29.	Planer	PS 400	1975	Japan
30.	Panel sizing circular saw		1982	Japan
31.	Planer	PS-300	1982	Japan
32.	Jigsaw		1982	Korea
33.	Combined carpenters' machine	L = 400	1986	Korea
34.	Wood turning lathe	L = 400	1989	Korea
35.	Thicknesser	PS-300	1978	Japan

II. TOOL MAINTENANCE EQUIPMENT:

No.	Description of equipment	Model or basic characteristics	Year of production	Made in
1.	Knife grinder	L - 30-500	1990	Korea
2.	Bandsaw blade sharpening machine	Grinding wheel ϕ 150 mm	1978	Korea
3.	Bench grinder	ϕ 400 mm	1985	Korea
4.	Bandsaw tensioning rollers	H - 120 mm	1985	Korea
5.	Universal tool grinder	SM 175 H	1990	Griggio (I)
6.	Bench grinder	ϕ 100 mm	1989	Korea
7.	Bench grinder	ϕ 400 mm	1975	Korea
8.	Bandsaw blade welding machine	30 K	1975	Korea

III. MAINTENANCE EQUIPMENT:

No.	Description of equipment	Model or basic characteristics	Year of production	Made in
1.	Metal turning lathe	S1-250	1970	Korea
2.	Metal turning lathe	S1-200	1975	Korea
3.	Metal shaper	P-650	1975	Korea
4.	Metal drilling machine	B-32	1975	Korea
5.	Grinder	ϕ 400 mm	1975	Korea
6.	Electrical welding equipment	33 K	1975	Korea
7.	Metal cutting shears		1979	Korea

IV. ENERGY SUPPLY EQUIPMENT:

No.	Description of equipment	Model or basic characteristics	Year of production	Made in
1.	Steam boiler	0.5 t/h	1979	Korea
2.	Hot water boiler	1.0 t/h	1979	Korea
3.	Electric transformer	180 kVa	1973	Korea
4.	Electric switch box		1990	Korea
5.	Compressor	8 bars, 500 l	1990	Griggio (I)
6.	Compressor	Q - 300 l	1990	Japan
7.	Mobile compressor		1975	Japan
8.	Compressor	SI - 250	1970	Korea
9.	Various fans (7 pieces)		1975-1991	Korea
10.	Various pumps (4 pieces)		1975	Korea

V. OTHER EQUIPMENT:

No.	Description of equipment	Model or basic characteristics	Year of production	Made in
1.	Sewing machines for upholstery (2 pieces)		1991	China
2.	Belt conveyor	L - 20 m	1978	Korea
3.	Crane	4 tons	1975	Korea

1.5 Raw material:

Sawnwood is the principal raw material used by the factory. All the sawnwood is produced by the factory itself by sawing some 1400 m³ of logs. More than 50 percent of these logs are coniferous species, mostly pine, while broadleaves: birch, ash, oak, make less than 50 percent of the total quantity

of wood. The logs are rather thin, ranging in diameter from 15 to about 40 cm, with an average diameter between 25 and 30 cm. Some 300 to 400 m³ of logs per year are used for the production of peeled and sliced veneer. All the logs delivered to the factory are Korean forest products.

According to information given by the factory management, there will be no problem to get two or three times more logs if they would have the capacity for an increased production of furniture. The management considers the production of sawnwood as an important prerequisite for the production of furniture, because otherwise the supply of sawnwood could cause some problems regarding continuous supply.

With regard to the production of plywood and veneer they could accept stoppage of this production because of its uneconomic scale, and obtain these small quantities from the PWC plywood factory.

1.6 Other production materials:

Glues, finishing materials, foams and fabrics are the major other production materials. Both domestically produced and imported materials are used. The main imported materials are polyurethane lacquers, some high quality fabrics and foam. Hardware is produced locally and the range and quality of hardware products is rather poor.

Woodworking and grinding tools are mainly imported. Import that should be with hard currency is rather limited. But contrary to such convictions, many machines, tools and production materials imported during the last two years can be seen in this factory.

1.7 Quality of products

As was mentioned before in the report, the existing equipment in the factory is neither sufficient nor of satisfactory quality, and selection of materials is rather poor as well. But the finished products of this factory are, doubtlessly, among the best made in Korea. The credit for this should be given to the good management and good workmanship of the craftsmen.

No special quality control system exists and there is no organized quality control unit. This could be considered as a favourable condition for further improvement of quality of products in a more efficient and less expensive way.

1.8 Maintenance

On the whole, the maintenance service in the factory is satisfactory. The maintenance unit has all the basic equipment, necessary for this size of a factory, in a pretty good condition. This could be supported by the fact that the woodworking machines in the factory were in working condition all the time during the expert's visit there.

However, maintenance of woodworking tools is not at a satisfactory level, mostly because of insufficient or totally worn out equipment for grinding and repairing tools.

1.9 Organization

The organizational structure of the factory is shown in Fig. 7. The factory is formally part of the Pyongyang Wood Complex, belonging to the General Bureau for Building Materials in Pyongyang, but it acts as an independent enterprise and its organizational structure is adapted to such a function. The production organization is simple and with a minimum of production documentation. Its main shortcoming is the lack of evidence about actual costs of products and utilization of capacities.

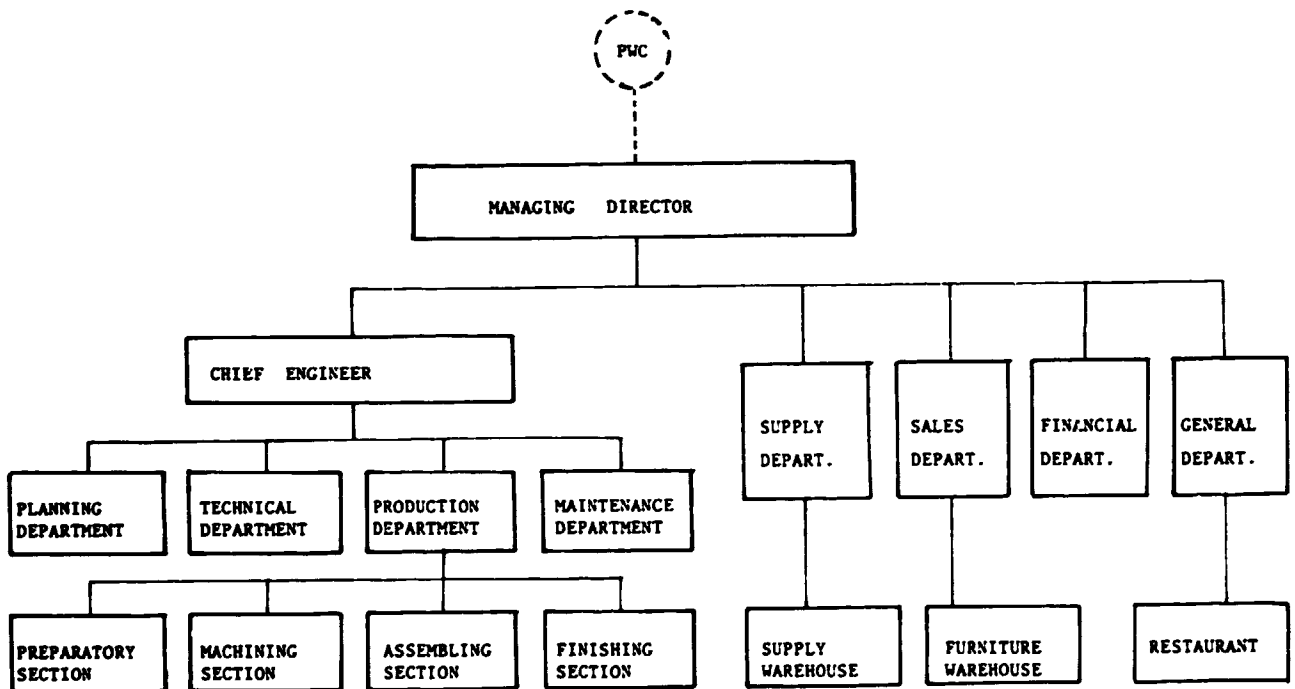


Fig. 7: Factory's organizational chart - present situation.

1.10 Economy

Some elementary questions with regard to the economy of production are rather vague to the factory staff. Only direct costs are counted and that gives them a totally wrong picture in respect to utilization of capacities, economical size of order, etc. As mentioned earlier, this results in a wrong pricing policy and as a final consequence endangers the self-sustaining production in the factory.

The existing cost accounting method is part of the cost accounting system of the country. Everything is based on a plan and measured as an accomplishment of the plan. More attention is paid to the quantity than to the real value in monetary terms of production.

1.11 Management

The factory is managed by the Managing Director. He acts as a team leader of the management staff. The second authority in the factory is the Chief engineer who is responsible for all technical and production activities. Each department has its own director. The expert's impression is that this team works in a harmonious way and that the factory is managed rather smoothly.

There was no delay in providing information requested and all questions were answered very competently and knowledgeably. The staff trust their Managing Director and believe that he is capable to solve any problem.

1.12 Conclusions

A short analysis of the situation in the Pyongyang Solid Wood Branch Factory can be summarized as follows:

- (a) The factory has some shortcomings common to the furniture producing industry in the country, such as: own production of plywood and veneer in an obsolete and very expensive way, lack of adequate equipment, a very diversified product line, lack of standardization, inadequate design of products, and, as a consequence, an extremely low productivity.
- (b) The production methods in the factory are still at an artisanal level, lacking an appropriate industrial organization, production planning and control.
- (c) An inadequate costing and pricing system and pressure for quantity at any price in order to accomplish a plan results in disregarding profitability and, in general, economy of production.
- (d) Despite the rather poor conditions, the factory has good maintenance service and the quality of products ranging among the best that the expert saw in the country.
- (e) This furniture factory is, because of its optimal size and good management, very suitable for transformation into a pilot plant for manufacturing solid wood furniture.

2. Activities

The main task of the expert's mission was to prepare the revision to the project document. Since the Government has proposed the factory, located on another site, and with separate infrastructural installations, it was necessary to survey the conditions in this factory regarding its suitability for its transformation into a pilot furniture plant. The findings are given in the first part of this report.

In order to select adequate equipment to be included in the revision to the project document as additional UNDP inputs, the production line and technology were analyzed. As a result, a new improved technological process has been proposed, necessary equipment defined and a factory layout with dispositions of woodworking machines has been worked out.

2.1 Revision to the project document

Due to the amount of US\$ 400,000 requested for the extension of the project and an estimated execution time of approximately 15 months, a major project revision was requested, and an appropriate document has to be prepared in accordance with the prescribed format.

The document for the project revision "H" has been prepared by the expert and made to conform with the Government's and UNDP's requirements. The revision of the project document with six annexes is enclosed to this report as Annex II.

2.2 New product line

The counterpart wants to develop a product line containing some of the presently produced items and also add newly designed products in modern style.

An idea about standardized products with interchangeable parts is accepted though not fully understood. The counterpart wants an expert for design of furniture to help them develop some new products of modern design and to train factory's designers in proper product development procedures and techniques.

2.3 Design of a new factory layout

Based on an assumed product line a new technological process has been proposed by the expert (see fig. 8).

The counterpart accepted the proposal and a new factory layout has been worked out. It was also discussed and accepted by the counterpart's engineers.

Both the existing and the proposed new layout of the factory are annexed to this report in Annex III.

2.4 Specification of equipment

The list of equipment for the new factory layout is attached to the layout (see annex III). This list contains the existing machinery and the machines to be provided as the UNDP input to the project.

Some of the existing machines have to be reconditioned, but the majority is almost new and in good working condition. A detailed specification of equipment to be purchased by the project is given hereunder, on page 20.

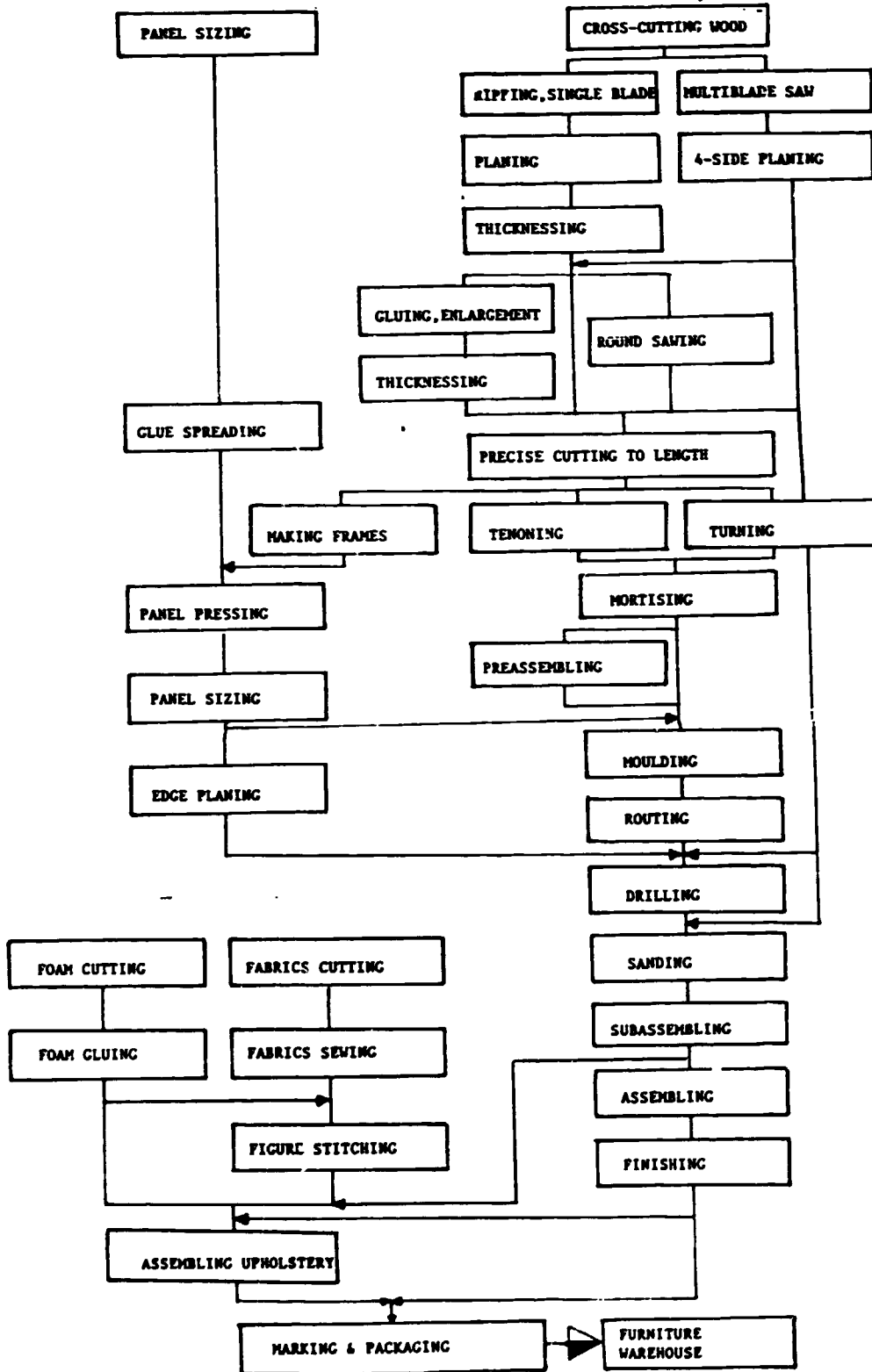


Fig. 8: Proposed new technological process.

Technical specifications of woodworking machines
to be provided by UNDP inputs

1. HIGH SPEED ROUTER
(Eumabois classification No. 12.315.12)

Throat clearance: min. 750 mm
Vertical stroke of spindle: 100 mm
Vertical movement of table: 200 mm
Adjustable fence included
Spindle speeds: 10 000/20,000 r.p.m.
Motor power: 4 kW, 220 V, 60 Hz, 3 phases.
Producers: SCM Industry Spa. (Italy)
Models: R8 or R9
Address: 47037 Rimini, Italy
Telex: 550578

or Frommia, Model FS-100 (see picture 1A)
Address: Ferdinand Fromm G.m.b.H. & Co. Maschinenfabrik
P. O. Box 1440
D-7012 Fellbach/Stuttgart (Germany)
Telex: 7254665 From

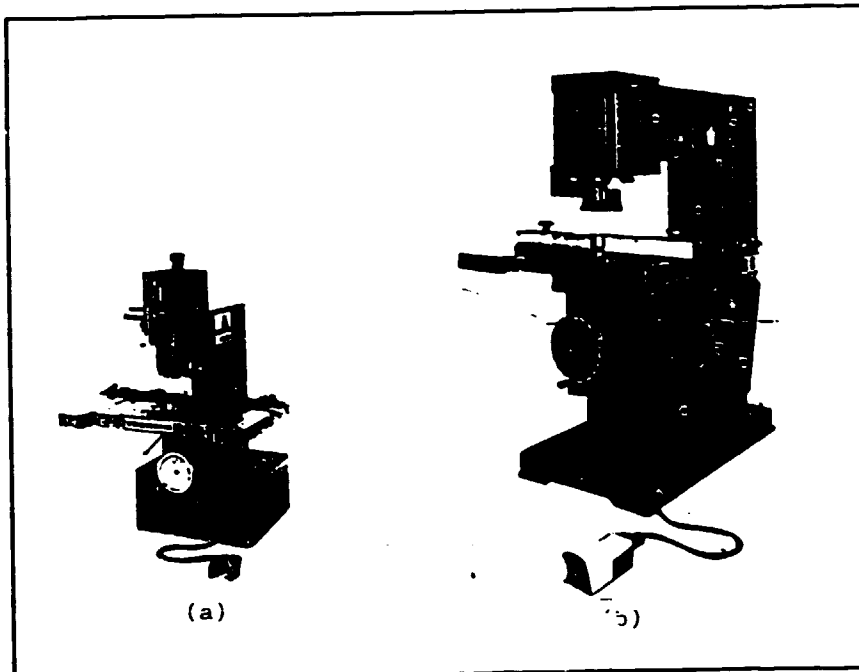
Some other producers: Baeuerle, Knoevenagel, Mayer, Neu-Ulm

2. FOUR SIDE MULTI-SPINDLE PLANING AND MOULDING MACHINE
(Eumabois Classification No. 12.34)

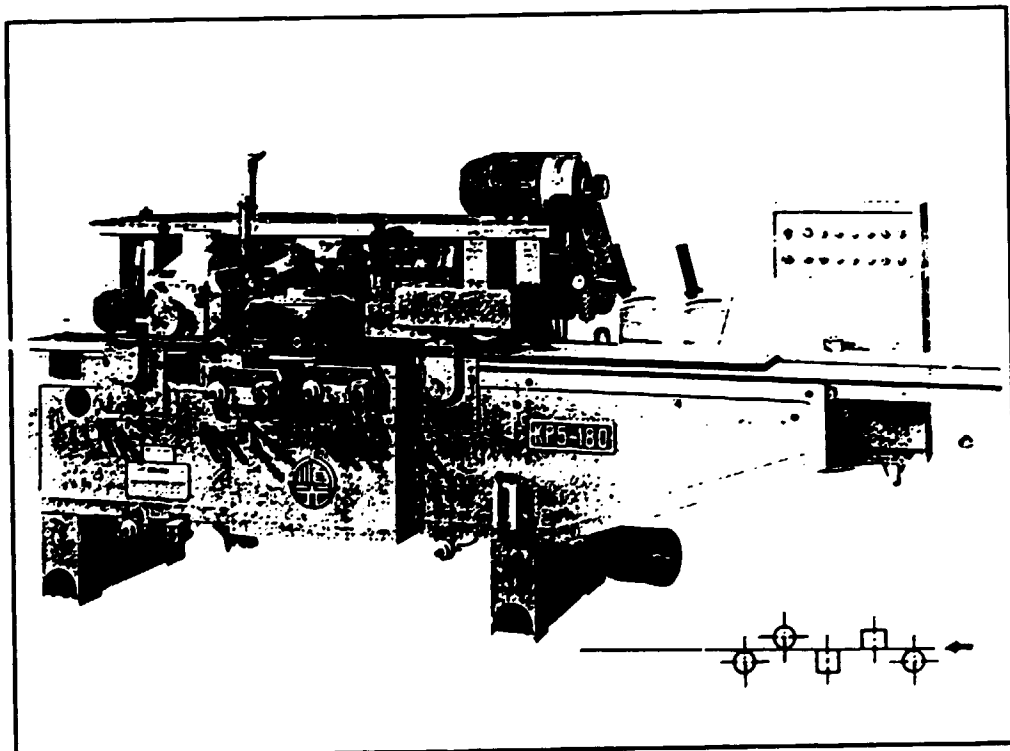
Maximum width and thickness of workpiece: 180 x 100 mm
Minimum thickness and width of workpiece: 10 x 20 mm
Spindle diameter: ϕ 40 mm
First bottom spindle: ϕ 100 - 150 mm, 5.5 kW
Right vertical spindle: ϕ 100 - 180 mm, 5.5 kW
Left vertical spindle: ϕ 100 - 180 mm, 5.5 kW
Top horizontal spindle: ϕ 100 - 180 mm, 5.5 kW
Last bottom spindle: ϕ 100-180 mm, 5.5 kW
Individual spindle adjustment: 35 mm
Feed drive motor: 1.5 kW
Elevation motor: 0.4 kW
Variable feed speed: 7-30 m/min.
Feed roller (diameter x width): ϕ 140 x 40 mm
Characteristics of electric current: 3 phase, 220 V, 60 Hz
Dust chute diameter: ϕ 150 mm
(Based on model KP5-180, see picture 2)

Producers: Shun Kuang Machinery Factory
Model KP5-180
Address: 866 San Feng Road
Feng Yuan City
Taichung Hsien
Taiwan province of China
or SCM, Italy
Model: COMPSCT 22

Some other well known producers: Weining, Gubisch, Kupfermuhle, Harbs etc.



Picture 1: High-speed routers.



Picture 2: Four-side planer moulder.

3. WOOD TURNING LATHE WITH TOOLS CONTROLLED BY TEMPLATES
(Eumabois classification No. 12.64)

Required copying length of workpiece: up to 900 mm

Producers: HAPFO, Wood Turning Lathes
Model: AP 5000 M (see picture 3)
Address: PFOHL Handelsgesellschaft mbH.
Thierseestrasse 9
8205 Kiefersfelden, Germany

Other well known producers: HEMPEL, SCHEPPACH (Germany)

4. SINGLE SIDE TENONING MACHINE FOR OVAL TENONS
(Eumabois classification No. 12.312)

Length of tenon: 4 - 100 mm

Thickness of tenon: 4 - 30 mm

Depth of tenon, min-max: 5 - 50 mm

Table adjustments - vertical: 100 mm
- horizontal: 20 mm

Tilting on both sides: 15°

Frontal tilting: 20°

Scale fence on table for mitre positioning to: 45°

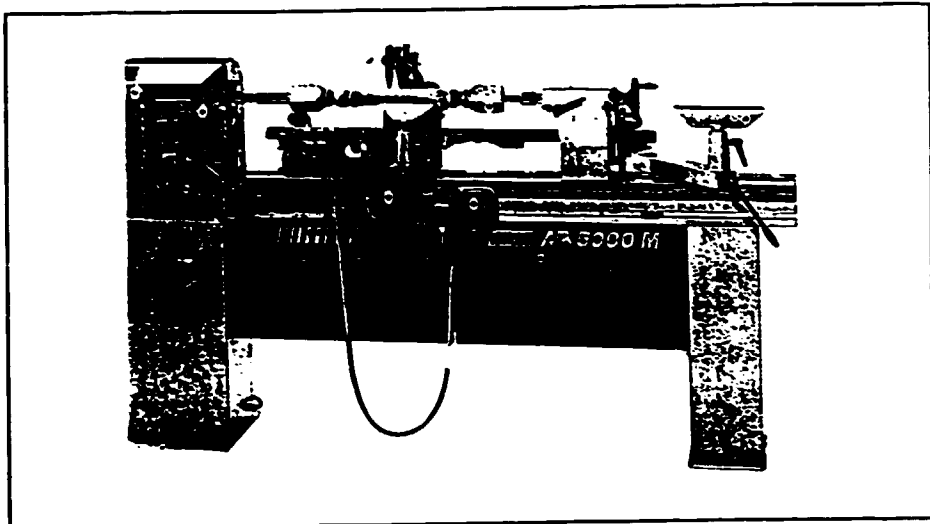
Main motor: 3 HP, 8000 r.p.m.

Motor for drum rotation: 0.5 HP

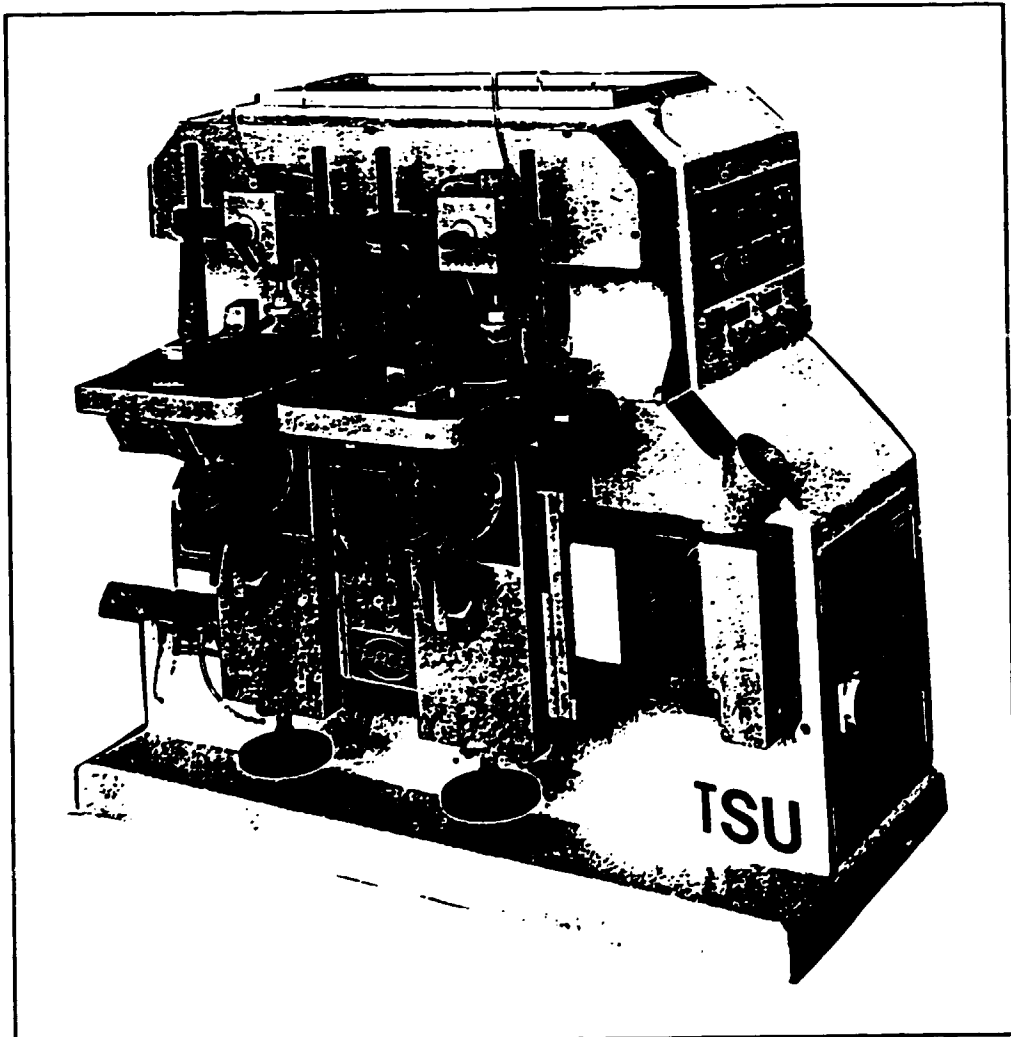
Connection to electric current: 3 phases, 220 V, 60 Hz

Producers: Industria Machine Speciali per la Lavorazione del Legno
Model: TSU (see picture 4)
Address: Cabiato (Co), Italy
Telex: 380454 Pade

Some other well known producers: COSMA, Knoevenagel, etc.



Picture 3: Automatic wood turning lathe.



Picture 4: Single-side tenoner for oval tenons.

5. SINGLE SPINDLE MORTISING MACHINE WITH ROTATING AND OSCILLATING TOOL
(Eumabois Classification No. 12.522)

Maximum length of mortise: 100 mm

Maximum depth of mortise: 55 mm

Bit shank: 13 mm

Rotations of spindle shaft: 10,000 r.p.m.

Motor of spindle: 3 HP

Motor of spindle oscillation: 1.5 HP

Producer: Industrial Machine Speciali per la Lavorazione del Legno

Model: MSO (see picture 5)

Address: See 4. above.

Some other well known producers: Mayer, Neu-Ulm, Reichenbacher, FROMMIA,
Hofmann Dubelfix, etc.

6. DOVETAILING MACHINE FOR DOVE TAIL CORNER GROUP JOINTS
(Eumabois classification No. 12.313.2)

Maximum width of workpiece: 400 mm

Maximum thickness of workpiece: 30 mm

Producer: Excellent Woodworking Machines

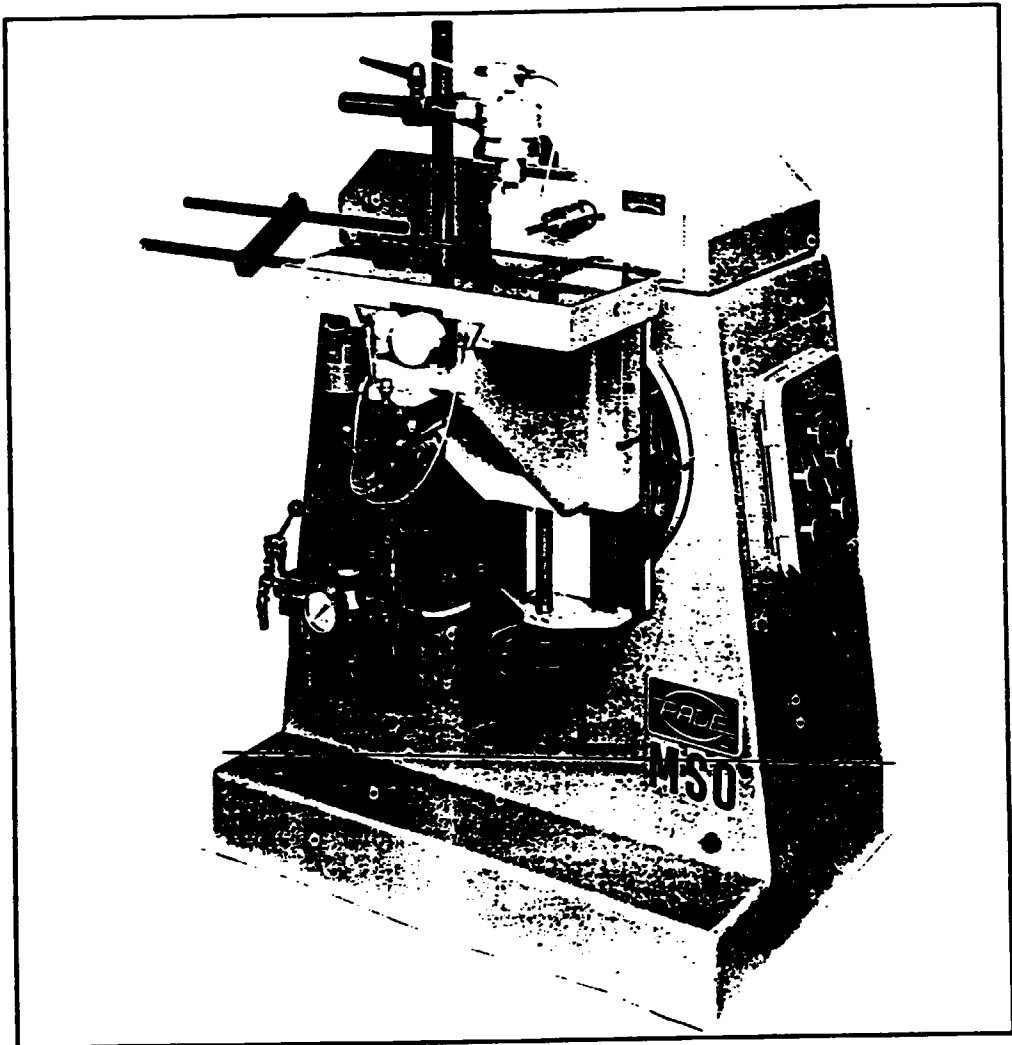
Model De-16 (see picture 6)

Address: Lane 61, Da-Fu Rd., Sheng Kang Shiang,

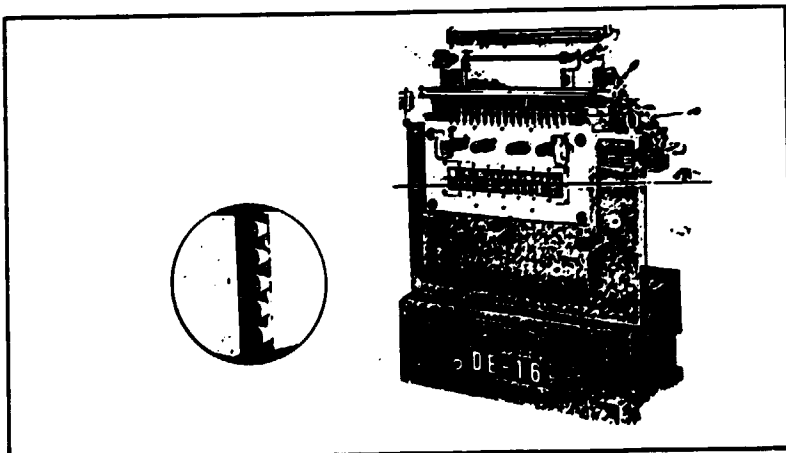
Taichung, Taiwan Province of China

Telex: 58310

Some other well known producers: Bauerle, Kolle, Knoevenagel, etc.



Picture 5: Single-side mortiser for oval mortises.



Picture 6: Dove-tail tenoner.

7. COMPLETE LOW COST SAWMILL WITH HORIZONTAL LOG SAWING BANDSAW, STATIC MODEL, ELECTRIC VERSION
(Eumabois classification No. 12.121.111.2)

Maximum log diameter: 800 mm
 Maximum log length: 5 m
 Maximum depth of cut: 450 mm
 Band wheel diameter: 900 mm
 Blade width: 100 mm
 Electric motor power: 22 kW
 Feed speed: 0-45 m/min.
 Blade speed: 30 m/sec.
 Electric connection: 3 phases, 220 V, 60 Hz
 Producer: Forestor
 Model: "Tom Sawyer" static bandmill (see picture 7)
 Address: Anton Mill, Anton Mill Lane
 Andover, SP10 2NW, England
 Telex: 47111 Forest G

(THE MACHINE WAS EXHIBITED AT HAMNOVER FAIR, MAY 1991 AND OFFERED FOR A PRICE OF DM 90,000.)

8. GRINDING (SHARPENING) MACHINE FOR CIRCULAR SAW AND BAND SAW BLADES WITH STRAIGHT AND BEVELLED GRINDING
(Eumabois classification No. 55.11)

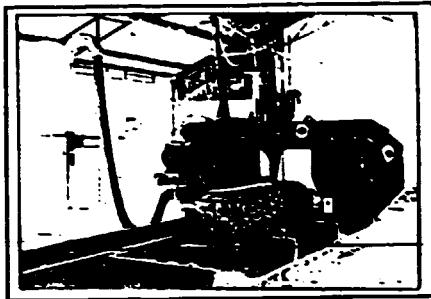
Circular saw diameter: ϕ 120-2000 mm
 Bandsaw width: max. 260 mm
 Tooth pitch: 10 -100 mm
 Tooth depth: max. 40 mm
 Hook angle: (-10°)-(+30°)
 Blade thickness: 0-6 mm
 Bevel grinding: 5°, 10°, 15°, 20°
 Grinding wheel: ϕ 250 mm
 Feeding speed: 30, 50, 75 Z/min.
 Connected load: 1.5 kW, 3 phases, 220 V, 60 Hz
 Producer: Vollmerwerke
 Model Cana/e (see picture 8)
 Address: Vollmer Werke Maschinenfabrik G.m.b.H.
 P. O. Box 1760; D-7950 Biberach/Riss 1, Germany
 Telex: 71817

Some other well known producers: Stehle, Alber, Loroch, Vollmer Dornhan, etc.

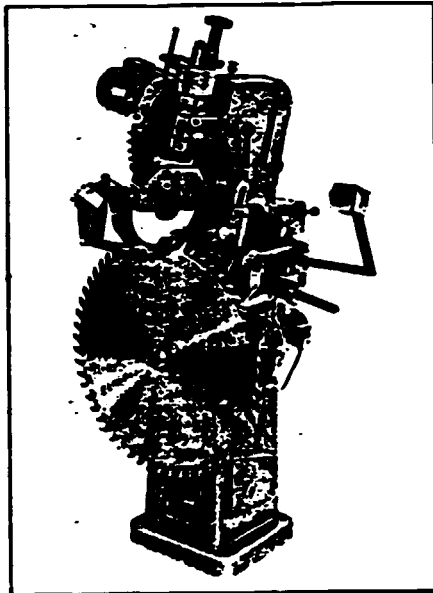
9. ROLL STRETCHER FOR TENSIONING AND LEVELLING BANDSAW BLADES
(Eumabois Classification No. 55.15)

Bandsaw blade width max.: 260 mm
 Rolling speed: 9/15 m/min.
 Connected load: 0.37 kW, 3 phase, 220 V, 60 Hz
 Bandsaw length: 6 m
 Levelling and anvil block: 800 x 200 mm
 Width of bench: 500 mm
 Length of bench: 2 m
 Number of stands: 3
 Producer: Vollmer Werke
 Model: VRB (see picture 9)
 Address: See 8. above

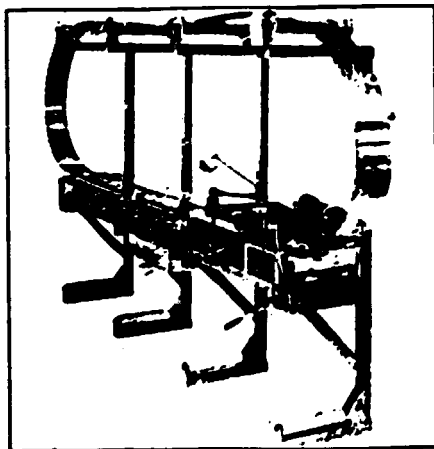
Other well known producers: ALBER



Picture 7: Horizontal log-sawing bandsaw.



Picture 8: Circular and bandsaw blades grinding machine.



Picture 9: Bandsaw blade rolling stretching machine.

10. **TEETH SETTING MACHINE FOR CIRCULAR SAW AND BANDSAW BLADES**
(Eumabois classification No. 55.13)

Circular saw blade diameter: ϕ 105-800 mm

Bandsaw blade width, max.: 220 mm

Tooth pitch: 5-65 mm

Blade thickness: 0.6-4 mm

Feeding speed, 45, 90 Z/min.

Connected load: 0.25 kW, 3 phase, 220 V, 60 Hz.

Producers: Vollmer Werke

Model Adn V (see picture 10)

Address: See 8. above.

Other well known producers: Alber, Loroch, Panhans, Vollmer Dorhan.

11. **BRUSH BACKED AND DRUM SANDING MACHINE**
(Eumabois Classification No. 12.749)

Hand feed sanding machine with cylindrical brush sander on one end and drum sander on the opposite end of axles, for sanding profiled workpieces, curves and forms.

Electric connection: 3 phases, 220 V, 60 Hz.

Producers: Union-One Machines, Taiwan Province of China

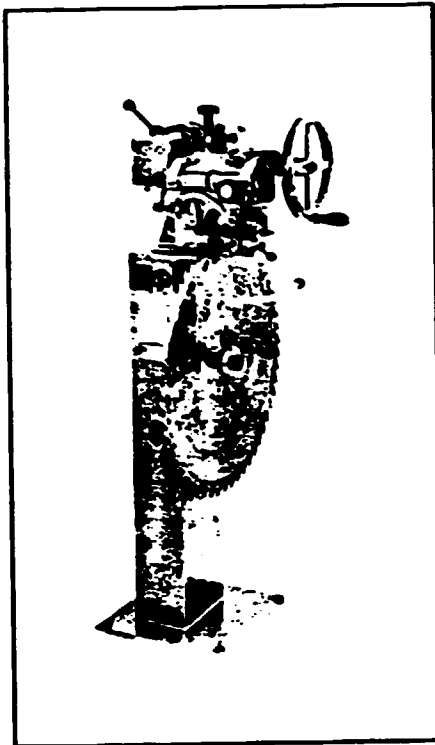
Model UO-301 (see picture 11)

Address: Union One Machinery Co. Ltd.

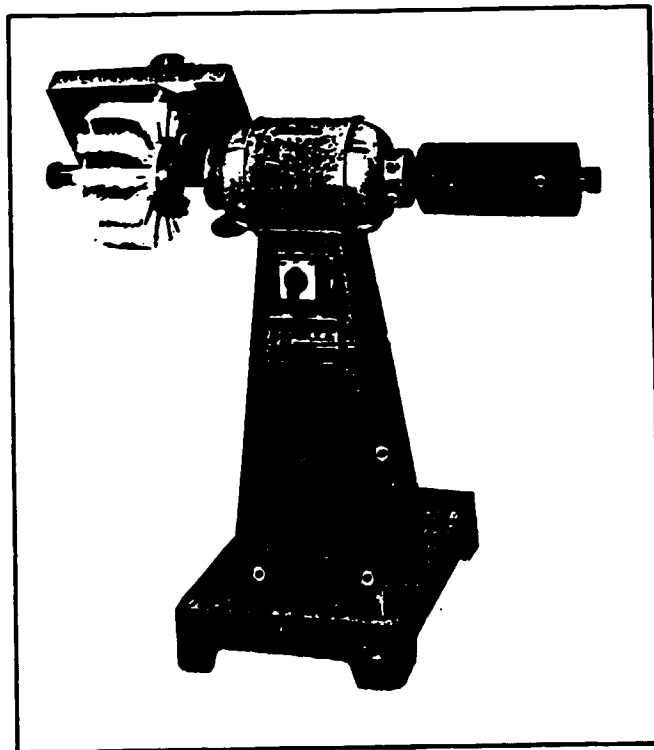
Alley 5, Lane 287, Section 2, Shi-Tou Road

Shi-Tou Dist., Taichung, Taiwan Province of China

Other producers: FROMMIA (Germany), Chun Wei, Wen Sheng Machine (Taiwan Province of China).



Picture 10: Teeth-setting machine for circular saw and bandsaws.



Picture 11: Brush/drum sanding machine.

12. PNEUMATIC AIRLESS SPRAY GUN WITH PUMP
(Eumabois Classification NO. 34.24)

Capacity: 3.4 l/min.

Ratio: 28:1

Producers

Wagner

Type: 28-40

Address: I. Wagner G.m.b.H.

Otto-Lilienthal Strasse 18

P. O. Box 1120

D-7778 Markdorf, Germany

Telex: 734 610

Other producers: WIWA (Germany), type 3514B or Lung Cheng Coating Machinery Works Co., Taiwan Province of China (see picture 12).

13. LONG NECK STITCHING MACHINE FOR STITCHING HEAVY UPHOLSTERING FABRICS WITH UP TO 20 MM FOAM AND BACKED LINEN

Required figurative stitching

Throat clearance: min. 1 m, one head.

With sliding table

Possible producers: Adler, Pfaff (Germany)

14. MULTI SPINDLE DRILLING MACHINE WITH SIX ADJUSTABLE DRILLING HEADS AND LIFTING TABLE

(Eumabois classification No. 12.422)

Producers:

Jin Sen Woodworking Machines (Taiwan Province of China)

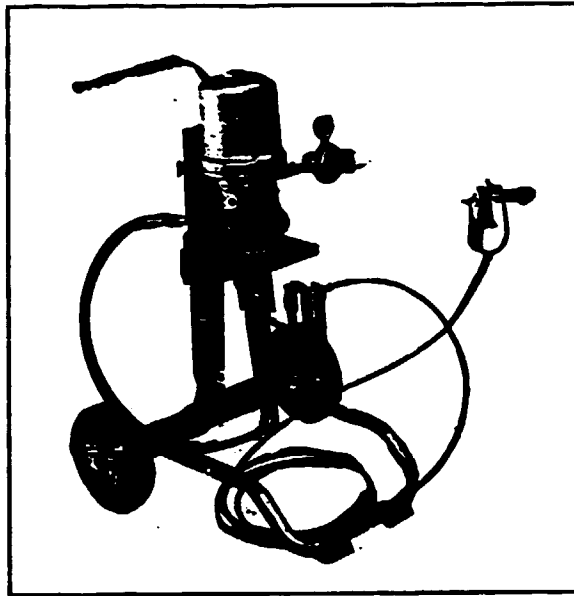
Model: RS 308 (see picture 13)

Address: No. 38-9 Ln 160, Hotso St.

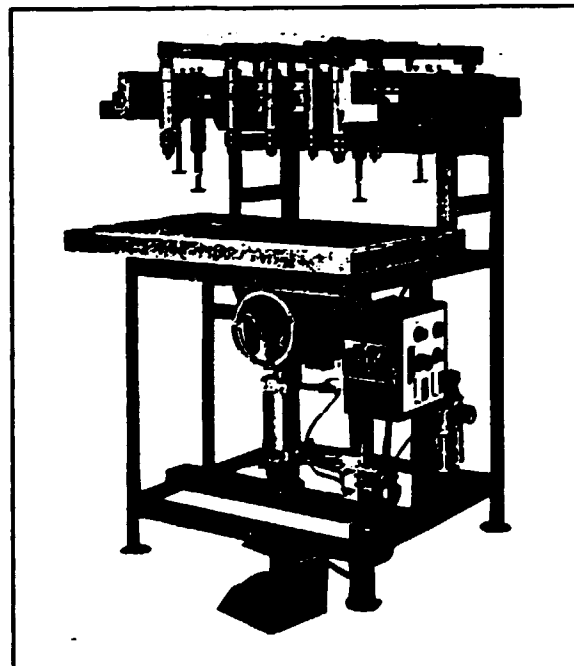
Feng Yuan, Taiwan Province of China

Fax: 886-4-6239168

Other producers: HOLZMA, LEWECKE, METABO, HOFMANN-DUBELFIX, KNOEVENAGEL, etc.



Picture 12: Airless spray gun with pump.



Picture 13: Multi-spindle driller with six adjustable drilling heads.

15. UNIVERSAL VERTICAL EDGE SANDING MACHINE WITH OSCILLATING SANDING BELT
(Eumabois classification No. 12.721.41)

Belt width: 150 mm

One side for sanding straight edges, and the other for concave edges and profiles.

Free pulley with separate table for sanding curved edges having small radius.

Producers: Hammond-Liu Ind. Co. Ltd. (Taiwan Province of China)
Model AK-108 (see picture 14)

Other producers: FROMMIA, HEESEMANN, HOMAG, RECKMANN, etc.

16. VARIOUS PNEUMATICALLY POWERED TOOLS

16.1 PNEUMATIC HAND NAIL GUN (2 pieces)
(Eumabois classification No. 61.31)

16.2 PNEUMATIC STAPLER FOR UPHOLSTERING (2 pieces)
(Eumabois classification No. 61.32)

16.3 PNEUMATIC SCREW DRIVER (2 pieces)
(Eumabois classification No. 61.33)

16.4 PNEUMATIC PORTABLE BORING MACHINE (2 pieces)
(Eumabois classification No. 61.24)

Producers: FESTO, HAFNER, METABO (Germany)

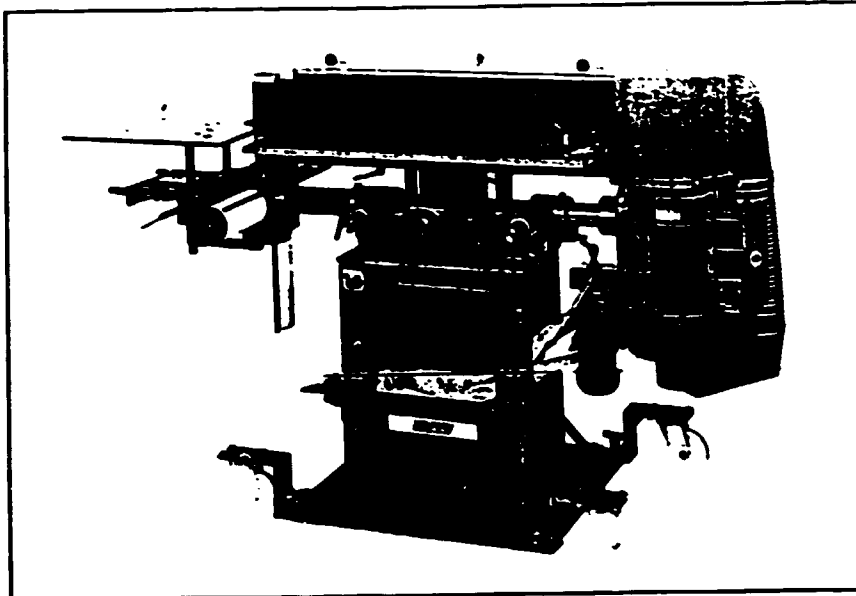
17. POWER FEEDER FOR PLANER AND MOULDER
(Eumabois Classification No. 51.4)

Feeding Speed: 10-30 m/min.

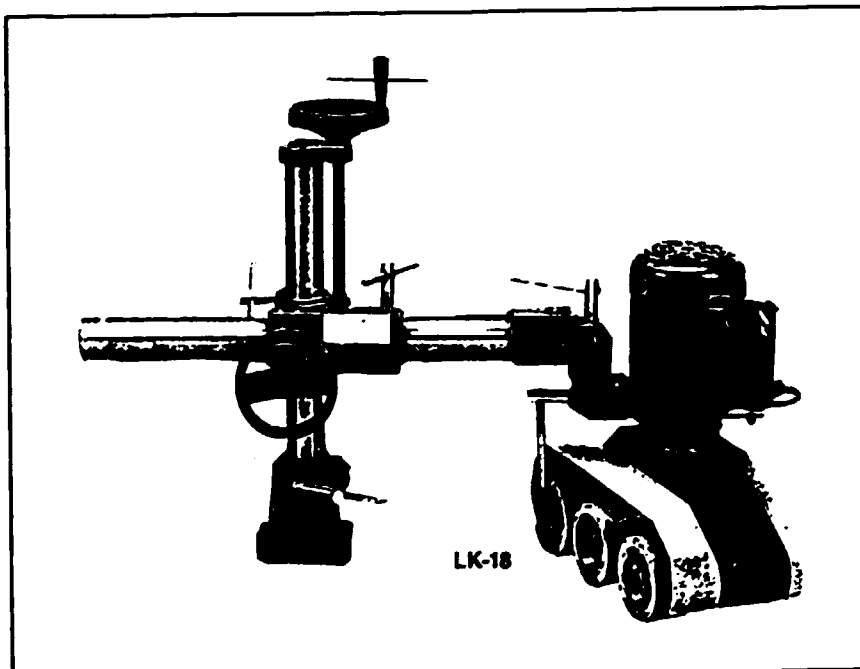
Preferable 4 feeding rollers.

Producers: Feng An Iron Works (Taiwan Province of China)
Models FA-300 and FA-202

Some other producers: COMATIC MACHINERY (Taiwan Province of China), Hafner, Reich, Scheppach (Germany).



Picture 14: Vertical oscillating universal belt-sanding machine.



Picture 15: Powered feeder.

2.5 Reconstruction of the dry kiln

As mentioned earlier, the existing dry kilns are not satisfactory. They must be reconstructed in order to enable the control of the wood drying process and to increase the capacity which is hardly enough to satisfy the present level of production.

The outline of the new dry kilns is given on the factory layout (in annex III), but this will require complete technical design for building, and technological assistance for the selection of simple installations and regulating equipment.

2.6 Identification of training needs

By studying working methods and management practice in the factory training needs have been identified. About 40 people should be included in in-service training, while some key people of the factory staff should be sent abroad in order to learn some essentials of an industrial production of furniture.

The outlines of the training programmes for in-service training, training abroad and for the study tour have been drafted and are enclosed to the revision of the project document as an annex.

2.7 Other recommendations

The pilot furniture plant for manufacturing solid wood furniture should give a good example of a modernly equipped and organized production unit, having satisfactory utilization of capacities, materials and energy. In order to achieve this, the following changes are recommended:

- (a) The factory product line must be reduced to the limited number of technologically related products that could be produced in small and medium series.
- (b) Production of veneer and plywood must be stopped, because of the very small quantities produced and their high production costs.
- (c) Since the factory cannot assure the provision of sawnwood, but only logs, the small horizontal log bandsaw has been recommended to replace an old unusable bandsaw and to produce sawnwood for its own needs.
- (d) In order to assure a profitable production and further development, a proper costing and pricing system must be applied.
- (e) In order to increase productivity, a better production planning and production control system must be designed and used.
- (f) Motivation is an essential factor of success in any production and the factory management should take this into consideration. The wages of employees should be linked to the achievements in productivity and quality of products.

ANNEX I

JOB DESCRIPTION

Date: 4 March 1991

PROJECT OF THE GOVERNMENT OF PEOPLE'S DEMOCRATIC REPUBLIC OF KOREA

DP/DRK/86/011/11-04 (J-12209)

Post title: Furniture Production Consultant

Duration: 6 weeks

Date required: As soon as possible

Duty station: Pyongyang

Purpose of project: To establish a pilot plant producing solid wood and panel furniture in series and train its personnel in these fields.

Duties: The consultant will undertake a six week mission to finalize, in collaboration with the national project authorities and UNDP, the project's extension to cover also the production of solid wood furniture.

In particular he will:

1. Evaluate the suitability of the buildings and equipment that the counterpart body will make available.
2. Establish the project's objectives and activities, bearing in mind local conditions and limitations in funds.
3. Based on the above determine the UNDP financed inputs.
4. Incorporate all the above in a project document, along the prescribed format.
5. Prepare detailed technical specifications for the equipment to be provided by the project.

Qualifications: Engineer or wood technologist with considerable experience at policy making level in the industrial production of furniture. Experience in developing countries highly desirable.

Language requirements: English.

Background information: The Democratic People's Republic of Korea is a predominantly mountainous country with some 9 million hectares (or 74 percent) of its land, designated as forest areas. The total growing stock of wood is estimated to be about 620 million cubic meters, allowing an average annual cut of approximately 6.5 million cubic meters. The primary wood processing industry is supplied with some 1.8 million cubic meters of sawlogs domestically produced and with a limited quantity of logs imported from the Soviet Union. The furniture production in the country has been developed

wood processing industry is supplied with some 1.8 million cubic meters of sawlogs domestically produced and with a limited quantity of logs imported from the Soviet Union. The furniture production in the country has been developed mainly within the wood processing complexes which produce also sawnwood, joinery, and various wood based panels.

The level of development of the wood processing industry, and of the furniture manufacturing in particular, is lagging behind the general level of development of the country. Productivity and product quality are at a very low level in the factories where machines are old. Furthermore, although a large number of professionals are educated at the University level and at various other specialized schools, they could benefit further by being exposed to new technologies in the field of furniture production. The lack of know-how and modern equipment are major impediments to the development of this industry.

On the other hand, the Government is giving high priority to the improvement of the living standard of the population. This calls for the increase in production and improvement of the quality of the furniture produced in the country. To this end, the Government has requested UNDP/UNIDO assistance in this field.

The furniture factory within the Pyongyang Wood Complex has been selected for its transformation into a Pilot Furniture Plant. This complex also has a sawmill with a nominal annual capacity of 100,000 cubic meters of sawn logs, a plywood factory with a nominal capacity of 600,000 square meters of plywood and 500,000 square meters of veneer, a particle board factory with a nominal capacity of 5,000 cubic meters, a joinery factory with a nominal capacity of 100,000 square meters of doors and windows and a furniture factory with a nominal capacity of 100,000 pieces of furniture per annum. It employs 1,100 people and has an annual value of production of approximately 8 million Wons. The Pyongyang Wood Complex belongs to the General Bureau for Building Materials which is an independent government sector enterprise controlling about 20 percent of the country's wood processing industry. The balance is controlled by the Ministry of Forestry.

The Pilot Furniture Plant was originally intended to produce both solid wood and panel furniture. Due to shortage of funds it was subsequently decided to produce only panel furniture. Because the results achieved were deemed satisfactory, the authorities decided to allocate additional funds and inputs in kind to expand the project again to its original aims.

ANNEX II

UNITED NATIONS DEVELOPMENT PROGRAMME

PROJECT REVISION H

COUNTRY: Democratic People's Republic of Korea

PROJECT TITLE: Assistance in the Establishment of a Pilot Furniture plant.

PROJECT NO.: DP/DRK/86/011

The above project is amended as follows:

The project revision "H" has been prepared to reflect an increase of the project budget by an additional US\$ 400.000 in order to extend the project for 15 months, with its original objectives.

The purpose of the changes is:

The extension of the project and additional funding are needed to permit the attainment of the project's original objectives, as foreseen in the project document, of producing both solid wood and panel furniture, as it is explained in the justification for the revision, attached.

The change to the UNDP budget is as follows:

Previous UNDP input - Project budget code "G"	US\$ <u>360,779</u> (line 99 total)
Revised UNDP input - Project budget code "H"	US\$ <u>760,779</u> (line 99 total)
UNDP input - increase	US\$ <u>400,000</u>

Agreed on behalf of the Government

Date

Agreed on behalf of the Executing Agency

Date

Agreed on behalf of the UNDP

Date

A. JUSTIFICATION FOR REVISION

Background and reasons for project extension

The initial UNDP/UNIDO assistance to the woodworking sector in the DPR Korea was agreed to in June 1986, in the form of an SIS project (SI/DRK/86/880). It resulted in the engagement of a UNIDO consultant to undertake the survey of the present status of the furniture industry in the country, and prepare a draft for an IPF project oriented towards improvement of furniture production for local consumption and for export. Following the analysis of data relating to the furniture manufacturing industry, collected by the consultant, and matching them with the Government's expectations, the Government and UNDP authorities accepted the expert's view that the establishment of a small-scale pilot furniture plant would suit the particular needs of the industry in the most beneficial way.

The furniture factory within the Pyongyang Wood Complex has been selected for transformation into the pilot furniture plant for production of solid wood and case furniture.

The execution of the project started in March 1988. Due to the limited project budget of US\$ 300,000 the funds were insufficient to equip the pilot furniture factory with both solid wood and panel processing lines. For this reason the objectives of the project were limited (TPR in June 1988) to the production of panel (case) furniture only.

Execution of the project lasted from March 1988 to November 1989. The Pilot Furniture Plant was completed with necessary equipment for production of case furniture including the existing reconditioned equipment, equipment provided by the Government and equipment purchased, as a UNDP input. The UNDP input for the equipment amounted to US\$ 169,993. Consultancy services with a total duration of 15.7 m/m were provided in production of furniture, furniture design and maintenance of woodworking tools. A three-week study tour for two persons, and a four-week group training abroad for four persons were provided as well. Forty wood technicians, operators and team leaders were trained in machining and assembling operations, maintenance of tools, construction of jigs, quality control, furniture design and so on. As a result, the Pilot Furniture Plant was fully completed and has become operational for successful manufacture of simple case furniture made of panel elements, applying industrial methods of serial production.

During the project implementation, the counterpart realized that the Pilot Furniture Plant was not being completed for processing solid wood components. So, in order to enable production of components and furniture products made of solid wood, the Government decided to request an extension of the project. This would permit the achievement of the project's original objectives. The Government has requested that the budget be increased by US\$ 400,000 in order to extend the project and to permit attainment of its original objectives, namely of producing both solid wood and panel furniture. This equipment meets UNDP policy with respect to the provision of equipment to the pilot plant. The existing equipment, because of its low accuracy and technological limitations, does not provide conditions for the introduction of an industrial method of production.

From the technological point of view, the processing of panels differs from that of processing solid wood components. Different machines and

technological lines are used. But from the product point of view, almost all products of case furniture contain parts made of solid wood and most of the solid wood products contain panel components. In the case of the DPR Korea the link between the case and the solid wood furniture is even stronger, because of strong customer preferences towards traditional furniture styles dependent on solid wood components.

This will also assure a better permanent supply of raw materials due to the fact that the DPR of Korea is a predominantly mountainous country with over 9 million hectares, or 74 percent, of its land designated as forested areas. The total growing stock of wood is estimated to be about 620 million cubic metres, allowing an average annual cut of approximately 6,5 million cubic metres. The primary wood processing industry is supplied with some 1.8 million cubic metres of domestically produced logs.

Bearing in mind that the pilot furniture factory should also serve as a testing ground for new equipment and the place where the wood technicians from the other factories can learn new technological solutions, completeness of the Pilot Plant with both case and solid wood processing lines is exceptionally important.

Problem to be addressed under the proposed revision

The Pyongyang Wood Complex has been recommended by the UNIDO furniture production experts and selected by the Government for transformation into a pilot furniture plant. It belongs to the General Bureau for Building Materials in the city of Pyongyang, which is the Government independent enterprise in charge of producing various building materials and all kinds of furniture, within the city.

The Pyongyang Wood Complex has 130 employees engaged in the production of solid wood furniture. The product line consists mainly of household furniture and furniture for hotels and restaurants. These products are made predominantly of solid wood with some panel and upholstered components.

The factory has its own sawmill for production of sawnwood for its own needs only. Coniferous (pine) and broadleaves (birch, ash, oak) logs are supplied from domestic forests.

The sales volume of this factory in 1990 was Won 964,340 of solid wood furniture. Besides, special orders for furnishing apartments in newly built buildings, furniture is delivered to the furniture stores in Pyongyang and other major cities in the country.

All items are produced on demand and according to the specifications of the customer. As most items are produced according to customer specification, production planning is totally dependent on the intake of orders. The product line consists of various products, without standardized, interchangeable parts and components. Therefore, production organization is geared towards meeting the customer preferences and relies heavily on the skills of the individual craftsmen to produce the items required. Consequently most of the production techniques used in the factory are still of an artisanal level. Given the lack of appropriate equipment and technological know-how, the factory has only been able to achieve limited product and production innovation, thus retaining low quality of products and a low level of labour productivity. These attributes can apply to the other furniture factories within the General

Bureau for Building Materials and to the majority of furniture production elsewhere in the country as well.

Lack of adequate woodworking machines and tools, lack of technical know-how, inadequate costing methods and insufficient knowledge of design of furniture and of industrial organization and management are major problems hindering both quality and productivity in the local furniture producing industry.

The main problem is unsatisfactory supply of furniture to the market.

Based on positive results gained during execution of the project in the production of panel furniture, the Government decided to request the extension of the project to cover production of solid wood furniture as stated earlier.

The proposed Pyongyang Wood Complex has the infrastructural installations and maintenance capacities sufficient to assure continuous use of the new equipment.

The existing capacity for drying of wood will not suffice for increased production and that investment does not depend on hard currency.

Expected end of project situation as a result of
the project's extension

The extension of the project aims at upgrading production of solid wood furniture by increasing productivity and improving the quality of products in order to generate more benefits for end-users and producers.

During the extension of the project, it will upgrade quality and productivity in the Pilot Furniture Plant for production of solid wood furniture and facilitate the upgrading of related furniture production in the country as a whole. This is to be achieved by combining modern, more productive and accurate equipment with the existing reconditioned one. The following results are expected:

- (a) Design and modification of the design of solid wood furniture items to be produced for the local market and export, with a view to the most effective use of raw materials, quality improvements, use of interchangeable parts and further introduction of serial production.
- (b) Knowledgeable and efficient use of woodworking machines and tools in production and keeping the same machinery in good operational condition through appropriate maintenance.
- (c) Improvement of production organization, with production planning, cost accounting and management procedures based on modern industrial production methods.

The knowledge acquired through the study tour, training abroad and in-service training will result in many positive changes in the production, such as: improved quality, increased productivity, improved work protection and safety measures, better utilization of materials and higher satisfaction and morale of employees. At the end of the project's execution, the output of the factory will be more than double.

Since the majority of the furniture manufactured in the country is predominantly made of solid wood, it is reasonable to have a good example in the country showing advantages of good design and modern technology in this kind of production. Solutions implemented in the Pilot Furniture Plant, once proven as more efficient, will be disseminated throughout the country giving a strong stimulus to the development of the furniture producing industry.

The project also foresees the transfer of technology in the design of furniture components for industrial production compatible with the equipment being provided. The project will also be the testing ground to introduce modern management methods, production planning and control, industrial costing and quality control in the plant. The implementation of the project will be assisted by two internationally recruited consultants. A furniture production expert will visit DPR Korea on split missions: three missions, two months each, plus two months to accompany a study tour and group training abroad, in total eight months. The split mission is a useful monitoring mechanism for the execution of the project and will allow structural adaptation of the work plan if the achievement of the outputs so require. The expert is expected to provide assistance in selection, commissioning and installation of new equipment, to design and introduce appropriate technological systems and production organization, and to train operators and counterpart staff in proper use of machinery and various fixtures for efficient production of solid wood furniture. Additionally, more emphasis will be placed on rudiments of marketing and management of production.

A furniture design expert will assist the counterpart in improving existing designs and designing new solid wood furniture products in accordance with available materials and technological possibilities of the plant, emphasizing improvement of construction details through the introduction of standardized interchangeable parts and components.

To get better knowledge and understanding of production of furniture on an industrial scale, a four-week study tour for four persons and a four-week group training abroad for three persons, both accompanied by the furniture production expert, are included in the project.

B. INSTITUTIONAL FRAMEWORK

The Government Implementing Agency for this project would be the General Bureau for Building Materials in the city of Pyongyang (GBBM). GBBM is an independent Government body under the Pyongyang Municipal and Administrative and Economic Guidance Committee. The main task of the GBBM is to produce and distribute all kinds of building materials and furniture products within the city. About 20 percent of the country's wood processing industry is under the control of the GBBM. The Government has specially emphasized the improvement of production in this part of the wood processing industry.

All Government inputs will be assured and provided by the Implementing Agency, as it is described in paragraph E.1 (Additional Government Inputs).

The United Nations Industrial Development Organization (UNIDO) will be the executing agency for the execution of the project. The role of UNIDO is to provide technical assistance, transfer of technology and training of the counterpart personnel, as it is described in paragraph E.2 (Additional UNDP/UNIDO inputs).

Output 1.1

A modern flexible pilot furniture plant established in the existing furniture factory, equipped partially with modern woodworking machines and with existing reconditioned equipment, to produce solid wood furniture of medium quality, with a limited possibility of board processing and veneering.

Activities for output 1.1

		Carried out by:	Duration in months:	Timing:
1.1.1	Define production programme for the Pilot Furniture Plant	Furniture expert/ counterpart	0.5	December 1991
1.1.2	Select New equipment to be purchased and old to be reconditioned	Furniture expert/ counterpart	0.5	December 1991
1.1.3	Design of new technology	Furniture expert/ counterpart	0.5	December 1991
1.1.4	Reconditioning and testing reconditioned machines	Counterpart/furniture expert	6.0	December 1991 to June 1992
1.1.5	Purchase of new equipment	Executing agency	7.0	December 1991 to June 1992
1.1.6	Install and commission equipment according to the new technological design	Counterpart/Furniture expert	2.0	June/July 1992

Output 2.1

Four fellows from the management and supervisory staff with better knowledge obtained abroad of the requirements for the successful production and export of furniture.

Activities for output 2.1

		Carried out by:	Duration in months	Timing
2.1.1	Select a country for the study tour abroad	Counterpart/UNIDO	0.5	October 1991
2.1.2	Prepare study tour programme	Furniture expert	0.5	October 1991
2.1.3	Select four participants for the study tour	Counterpart/furniture expert/UNIDO	3.0	November 1991 January 1992
2.1.4	Conduct the study tour	Furniture expert	1.0	May 1992

		Carried out by:	Duration in months	Timing
2.1.5	Report on the study tour	Furniture expert/ participants	0.5	June 1992

Output 2.2

Three wood technicians trained abroad with better knowledge of the requirements for successful machining, assembling and finishing operations in the production of solid wood furniture.

Activities for output 2.2

		Carried out by:	Duration in months	Timing
2.2.1	Select country for the group training abroad	Counterpart/UNIDO	0.5	October 1991
2.2.2	Select three fellows for the group training	Counterpart/furniture expert	3.0	November 1991. February 1992
2.2.3	Prepare a separate training programme for each of the three fellows	Furniture expert	0.5	November 1991
2.2.4	Conduct the group training	Furniture expert	1.0	September 1992
2.2.5	Report on the group training	Furniture expert, fellows	0.5	October 1992

Output 2.3

The efficient use of available manufacturing equipment, with 20 wood machinists, 10 assemblers and four supervisors (team leaders) trained to manufacture furniture of medium quality acceptable for export.

Activities for output 2.3

		Carried out by:	Duration in months	Timing
2.3.1	Prepare a training programme for manufacturing solid wood furniture	Furniture expert	1.0	December 1991
2.3.2	Prepare training manuals for the major production operations	Furniture expert	5.0	December 1991 to October 1992

		Carried out by:	Duration in months	Timing
2.3.3	Train 20 machine operators, 10 assemblers, and 4 team leaders to manufacture furniture of acceptable quality	Furniture expert	6.0	December 1991 to November 1992

Output 2.4

Two wood technicians trained to design and make required production fixtures aimed at attaining accurate machining of component parts.

Activities for output 2.4

		Carried out by:	Duration in months:	Timing
2.4.1	Prepare a training manual for design, construction and use of jigs in the furniture production	Furniture expert	1.0	June 1992
2.4.2	Train two wood technicians to design and make jigs	Furniture expert	0.5	July 1992

Output 2.5

Establish a system for internal standards for products, based on interchangeable parts and components and two technicians trained to maintain and further develop product standards.

Activities for output 2.5

		Carried out by:	Duration in months:	Timing
2.5.1	Make a survey of the existing standards for products and components	Furniture expert	0.5	December 1991
2.5.2	Establish a new system for international standards for products, component parts and materials	Furniture expert	1.0	December 1991 to January 1992
2.5.3	Implement the new standards	Furniture expert/ counterpart	0.5	January 1992
2.5.4	Train two technicians in maintaining and further developing standards	Furniture expert	0.5	January 1992

Output 2.6

A system of internal quality control established with 6 technicians trained as controllers.

Activities for output 2.6

		Carried out by:	Duration in months	Timing:
2.6.1	Make a survey of the existing quality control system	Furniture expert	0.5	October 1992
2.6.2	Design a new system for integral quality control	Furniture expert	0.5	October 1992
2.6.3	Develop a training manual for controllers	Furniture expert	1.0	October 1992
2.6.4	Train six controllers in the procedures and techniques of quality control	Furniture expert	1.0	November 1992

Output 2.7

One week workshop held at the Pilot Furniture Factory to familiarize staff of other Korean furniture factories with the technology introduced.

Activities for output 2.7

		Carried out by:	Duration in months:	Timing
2.7.1	Conduct a one-week workshop in the Pilot Furniture Plant	Furniture expert/ counterpart		November 1992

Output 3.1

The design and production of two new items of solid wood furniture and the training of two factory designers in product development techniques and procedures.

Activities for output 3.1

		Carried out by:	Duration in months	Timing
3.1.1	Survey the existing products in the factory and the city of Pyongyang	Design expert	0.5	January 1992
3.1.2	Survey materials available and technological possibilities	Design expert	0.5	January 1992

		Carried out by:	Duration in months	Timing
3.1.3	Design two new products with standardized interchangeable parts and components	Design expert	2.0	January/February 1992
3.1.4	Prepare production documentation and prototypes and bring the new products into production	Counterpart/design expert	1.0	March 1992
3.1.5	Train two of the factory's designers in product development techniques	Design expert	1.0	March 1992

Output 4.1

New production organization and procedures for planning, cost accounting and control of production designed and introduced.

Activities for output 4.1

		Carried out by:	Duration in months:	Timing:
4.1.1	Review and analyze the present production organization and procedures in the factory.	Furniture expert.	0.5	December 1991
4.1.2	Design new production organization and procedures for production planning, cost accounting and control of production	Furniture expert.	0.5	January 1992
4.1.3	Design appropriate production documentation in accordance with the production organization and procedures.	Furniture expert	1.0	January 1992
4.1.4	Introduce new production organization, procedures and documentation to be used in the pilot furniture plant.	Furniture expert	1.0	June 1992

Output 4.2

Improved factory management based on modern industrial production methods.

Activities for output 4.2

		Carried out by:	Duration in months:	Timing:
4.2.1	Train factory management staff in modern industrial production methods.	Furniture expert	0.5	October 1992
4.2.2	Train factory management on basic elements of cost accounting and economic indices.	Furniture expert	0.5	October 1992
4.2.3	Train factory management on basic management techniques and decision making procedures	Furniture expert	0.5	November 1992

Output 4.3

The factory management with a better knowledge of basic elements of marketing of furniture.

Activities for output 4.3

		Carried out by:	Duration in months:	Timing:
4.3.1	Make a survey and analyze the existing furniture distribution system	Furniture expert	0.5	October 1992
4.3.2	Train the factory management staff on basic elements of marketing of furniture with a view to export marketing.	Furniture expert	0.5	November 1992

E. INPUTS1. Additional Government inputs during extension period(a) Personnel (National Staff)

- (i) A technician from the selected factory as a full time counterpart and National Project Director.
- (ii) It is also expected that the Chief Engineer, and the heads of the Technical, Production, Planning, Sales and Financial Departments, as well as their staff members will cooperate to the fullest with the consultants, in order to achieve project outputs.
- (iii) One English/Korean typist to assist in typing reports, manuals and other relevant correspondence, to be made available by the General Bureau for Cooperation with international organizations.
- (iv) One English/Korean interpreter, conversant with technical vocabulary of woodworking, available for the entire duration of each expatriate expert engaged in the project.

(b) Training

- (i) Woodworking technicians and machine operators available for training according to the project outputs.
- (ii) Wages to the trainees during the time of training.
- (iii) Costs of participants from other furniture factories attending the one-week workshop.

(c) Office accommodations, facilities and supplies:

- (i) Office space for the consultants with necessary furniture and appropriate heating and cleaning facilities.
- (ii) Appropriate room for training with black-board of minimum size 2 x 1.2 m.
- (iii) Miscellaneous services including, but not limited to:
 - (1) Reconditioning of the old machines to be used in the Pilot Plant for manufacturing solid wood furniture.
 - (2) Transport of imported equipment from the harbour and import duties, if any.
 - (3) Local transportation for all project staff (national and international staff).
 - (4) Cost of installations and replacement of equipment.
 - (5) Production of new jigs, other fixtures and pallets.
 - (6) Raw materials and components for production.
 - (7) Any necessary addition to and modification of the existing facilities as required for the proper operation of the project.
 - (8) Supply of spare parts for equipment not eligible for purchase under the UNDP project.
 - (9) Other local services required to support the project and expenditures incurred by the Government in supporting the project.

2.	<u>Additional UNDP/UNIDO Inputs¹</u>		US\$ 400.000
I.	Personnel	11 m/m	US\$ 113.155
	1. Furniture production expert (CTA)	8 m/m	
	2. Furniture design specialist/ consultant	3 m/m	
II.	Training	7 m/m	US\$ 71.900
	1. Fellowships for group training abroad for three persons, 1 month	3 m/m	
	2. Study tour for four persons, 1 month	4 m/m	
	3. In-service training according to the training programme (see Annex III).		
III.	Equipment, as specified in Annex IV		US\$ 200.000
	Non-expendable equipment	US\$ 186.000	
	Expendable equipment	US\$ 14.000	

¹ These are additional inputs for the project extension.

2.	Total UNDP/UNIDO inputs during entire project period ²		US\$ 760.779
I.	Personnel	27.2 m/m	US\$ 249,307
	1. Furniture production expert (CTA)	18.5 m/m	
	2. Furniture design consultant	4.2 m/m	
	3. Tool maintenance expert	3.0 m/m	
	4. Furniture production expert	1.5 m/m	
II.	Training	12.5 m/m	US\$ 111,577
	1. Fellowships	7.0 m/m	
	2. Study tours	5.5 m/m	
	3. In-service training according to the training programme (See Annex III)		
III.	Equipment for the total project		US\$ 369,999
	1. Expendable equipment		US\$ 46,329
	2. Non-expendable equipment		US\$ 332,464
	3. Surrender of obligations		(US\$ 9,294)

F. PRIOR OBLIGATIONS AND PREREQUISITES

Prior obligations: None

Prerequisites: The government will:

1. Undertake necessary reconditioning of the existing machines to be used in the production of solid wood furniture.
2. Provide all alternations to the buildings as prerequisites for the installation of new machines.
3. Reconstruct and enlarge the dry kiln for drying wood.
4. Ensure the timely selection, preparation and release of the national staff for the project and trainees under fellowships provision of the project.
5. Ensure the provision of all information to the members of the international staff assigned to the project necessary for the implementation of the project.
6. Take the necessary action to assure regular provision of raw materials, auxiliary materials and components in adequate quality and sufficient quantity for the furniture pilot plant.

H. BUDGET

The budgets covering the Government contributions in kind and UNDP contribution will follow.

² These are UNDP total inputs to the project.

**PROJECT BUDGET COVERING UNDP CONTRIBUTION
(in US Dollars)**

COUNTRY: Democratic People's Republic of Korea
PROJECT NUMBER: DRK/86/011/H/01/37
PROJECT TITLE: Assistance in the Establishment of a Pilot Furniture Plant

Budget Line	Description	TOTAL		Prior to 1990		1990		1991		1992	
		m/m	US\$	m/m	US\$	m/m	US\$	m/m	US\$	m/m	US\$
10-00	Project Personnel										
11-01	Chief Technical Adviser	18.0	159,841	10.0	72,400						
11-02	Furniture Design Consultant	4.2	39,983	1.2	11,883	1.941		1.0	12,000	7.0	73,500
11-03	Tool maintenance expert	3.0	31,483	3.0	28,872					3.0	28,100
11-04	Furniture Expert	1.5	18,000			2,611		1.5	18,000		
11-99	Sub-Total	26.7	249,307	14.2	113,155	4,552		2.5	30,000	10.0	101,600
15-00	Project travel		3,790		3,790						
16-00	Other pers. costs		13,094		4,794						8,200
18-00	Surrender prior obl.		(2,745)			(2,745)					
19-00	COMPONENT TOTAL	26.7	268,446	14.2	121,839	1,807		2.5	30,000	10.0	109,800
30-00	TRAINING										
31-00	Fellowships	7.0	55,064	4.0	24,864					3.0	30,200
32-00	Study Tours	5.5	56,513	1.5	14,813					4.0	41,700
39-00	COMPONENT TOTAL	11.5	111,577	5.5	39,677					7.0	71,900
40-00	EQUIPMENT										
41-00	Expend. equipment		46,329		29,040		989				16,300
42-00	Non-expend. equipment		332,964		139,643		321				193,000
48-00	Surrender prior obl.		(9,294)		(8,859)		(435)				
49-00	COMPONENT TOTAL		369,999		159,824		875				209,300
50-00	MISCELLANEOUS										
51-00	Sundries		15,794		3,450		120		4,461		7,757
58-00	Surrender prior obl.		(31)		(31)						
59-00	COMPONENT TOTAL		15,763		3,419		120		4,461		7,757
99-99	PROJECT TOTAL	38.2	760,779	14.2	324,759	2,802		2.5	34,461	10.0	398,757

APPENDIX 1: Preliminary workplan

OUTPUTS/ACTIVITIES	RESPONSIBLE PARTIES	1991												1992				
		S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	
Approval of the project	VNDP																	
Recruitment of a furniture expert (CTA)	UNIDO																	
Recruitment of a desing expert	UNIDO																	
Engagement of the furniutre expert in DRK	UNIDO																	
Engagement of the design expert in DRK	UNIDO																	
OUTPUT 1.1 / ACTIVITIES																		
1.1.1 Define the production programme for the Pilot Furniture Plant	Counterpart, Design expert, CTA																	
1.1.2 Select the equipment to be purchased and for reconditioning	Counterpart, CTA																	
1.1.3 Design of a new technolgy	CTA, Counterpart																	
1.1.4 Reconditioning and testing of reconditioned equipment	Counterpart, CTA																	
1.1.5 Purchase new equipment	UNIDO																	
1.1.6 Install and commission equipment	Counterpart, CTA																	

OUTPUTS/ACTIVITIES	RESPONSIBLE PARTIES	1991												1992			
		S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
OUTPUT 2.1 / ACTIVITIES																	
2.1.1 Select a country for the study tour	UNIDO, Government		—														
2.1.2 Prepare the study tour programme	CTA, UNIDO		—														
2.1.3 Select four participants for the study tour	Counterpart, UNIDO			—	—	—											
2.1.4 Conduct the study tour	CTA, Participants									—							
2.1.5 Reporting on the study tour	CTA, Participants										—						
OUTPUT 2.2 / ACTIVITIES																	
2.2.1 Select a country for the group training abroad	UNIDO, Government		—														
2.2.2 Select three fellows for the group training abroad	Counterpart, UNIDO						—										
2.2.3 Prepare training programme	CTA, UNIDO			—	—	—											
2.2.4 Conduct the group training	CTA, Fellows													—			
2.2.5 Reporting on the group training	CTA, Fellows														—		
OUTPUT 2.3 / ACTIVITIES																	
2.3.1 Prepare the training programme for manufacturing solid wood furniture	CTA				—												

OUTPUTS/ACTIVITIES	RESPONSIBLE PARTIES	1991					1992												
		S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D		
2.3.2 Prepare training manuals	CTA				—	—						—	—					—	
2.3.3 Train 20 wood machinists, 10 assemblers and 4 team leaders	CTA				—	—						—	—					—	—
OUTPUT 2.4 / ACTIVITIES																			
2.4.1 Prepare training manual for design, construction and use of jigs	CTA											—							
2.4.2 Train 2 technicians to design and use jigs.	CTA											—							
OUTPUT 2.5 / ACTIVITIES																			
2.5.1 Make a survey of the existing standards of products and components	CTA				—														
2.5.2 Establish a new system of internal standards of products	CTA				—	—													
2.5.3 Implement the new standards	CTA, Counterpart					—													
2.5.4 Train two technicians in maintaining and developing standards	CTA					—													
OUTPUT 2.6 / ACTIVITIES																			
2.6.1 Make a survey of the existing quality control system	CTA																	—	
2.6.2 Design a new system for integral quality control	CTA																	—	

OUTPUTS/ACTIVITIES	RESPONSIBLE PARTIES	1991				1992												
		S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	
2.6.3 Develop a training manual for controllers	CTA																	
2.6.4 Train six controllers in the procedures and techniques of quality control	CTA																	
OUTPUT 2.7 / ACTIVITIES:																		
2.7.1 Conduct the workshop for technicians from other Korean furniture factories	CTA, Counterpart																	
OUTPUT 3.1 / ACTIVITIES:																		
3.1.1 Make a survey of the existing products in the factory and in Pyongyang	Design expert																	
3.1.2 Make a survey of materials available and technological possibilities	Design expert																	
3.1.3 Design two new products with standardized interchangeable parts	Design expert																	
3.1.4 Prepare production documentation and prototypes and start production	Counterpart, Design expert, CTA																	
3.1.5 Train two designers of the factory in product development	Design expert																	
OUTPUT 4.1 / ACTIVITIES:																		
4.1.1 Review and analyze the present production organization in the factory	CTA																	

OUTPUTS/ACTIVITIES	RESPONSIBLE PARTIES	1991												1992				
		S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	
4.1.2 Design new production organization, production planning and control	CTA																	
4.1.3 Design appropriate production documentation	CTA																	
4.1.4 Introduce new production organization into the Pilot Furniture Plant	CTA, Counterpart																	
OUTPUT 4.2 / ACTIVITIES:																		
4.2.1 Train the factory management on new production methods	CTA																	
4.2.2 Train the factory management in basic methods of cost accounting	CTA																	
4.2.3 Train factory management in management techniques and decision making process	CTA																	
OUTPUT 4.3 / ACTIVITIES:																		
4.3.1 Make a survey and analyze the existing furniture distribution system	CTA																	
4.3.2 Train the factory management in basic elements of furniture marketing	CTA																	
Project evaluation																		

APPENDIX 2

SCHEDULE OF PROJECT REVIEWS, REPORTING AND EVALUATION³

<u>DESCRIPTION</u>	<u>APPROXIMATE DATE</u>
1. Furniture Expert's Technical reports:	
- first mission	1 February 1992
- second mission	1 August 1992
- third mission	1 December 1992
2. Design consultant technical report:	1 April 1992
3. Study tour report	1 July 1992
4. PPER	1 August 1992
5. TPR	10 October 1992
6. Fellowships report	1 November 1992
7. Terminal report	15 November 1992
8. End of project evaluation	December 1992
9. Terminal TPR	15 December 1992

³ This schedule refers only to the project's extension.

APPENDIX 3

TRAINING PROGRAMME

1. In-service training

<u>TOPICS</u>	<u>LEVEL OF COMPETENCE TO BE REACHED:</u>
<p>1. Wood, affiliated products and other materials used in the production of solid wood furniture.</p> <ul style="list-style-type: none"> - Physical and mechanical characteristics. - Moisture content and wood drying. - Plywood and blockboard - Glues and glue additives. - Finishing materials. - Metal components - Plastic components 	<p>Better knowledge of properties of wood as a raw material, ability to dry wood properly and to select required quality.</p> <p>Better knowledge and utilization of all other materials used in the production of solid wood furniture.</p>
<p>2. Solid wood furniture products, design, construction and standards.</p> <ul style="list-style-type: none"> - Classification of products. - Design of products. - Construction of products. - Standardization of products and component parts. - Product development techniques and procedures. 	<p>Better knowledge of characteristics of solid wood furniture, its use and classification.</p> <p>Understanding the product development process from an idea to a finished prototype.</p> <p>Understanding the necessity of the permanent work on innovation and development of products.</p>
<p>3. Machining operations in manufacturing solid wood furniture.</p> <ul style="list-style-type: none"> - Crosscutting and trimming, - Planing and thicknessing, - Turning moulding, routing and drilling. - Sanding 	<p>Better knowledge of woodworking machines and tools.</p> <p>Ability to select and set woodworking tools.</p> <p>Ability to operate woodworking machines and to perform machinery operations in a proper and safe way.</p> <p>Ability to use measuring instruments for controlling accuracy of machining.</p>

TOPICSLEVEL OF COMPETENCE TO BE REACHED:

4. Preassembling and assembling of solid wood furniture.

- Constructive joints and fittings used for preassembling of solid wood furniture.
- Preassembling and assembling presses and tools,
- Selection of glues,
- Preassembling and assembling operations,
- Production of knock-down furniture.

Better knowledge of constructive elements of solid wood furniture and ability to use assembling equipment in a proper way. Ability to perform preassembling operations and to make products having required accuracy, strength, stability, functionality and durability.

5. Finishing of solid wood furniture:

- Finishing materials,
- Finishing facilities,
- Finishing operations,
- Fire-fighting measures.

Knowledge of finishing materials and their appropriate use. Ability to prepare and use finishing equipment and to perform finishing operations. Knowledge of risks of fire and ability to use the available fire fighting devices.

6. Tools, jigs and measuring instruments used in the production of solid wood furniture.

- Wood cutting tools,
- Sanding papers
- Grinding wheels
- Measuring instruments.

Knowledge of major characteristics of various woodworking tools. Ability to use woodworking tools and to control if they are correctly selected and maintained. Ability to use various measuring instruments and gauges to control accuracy of processing.

7. Quality control in the production of solid wood furniture.

- Purpose and importance of quality control.
- Quality standards for furniture.
- Quality control by operators.
- Quality controllers and their duties.
- How to avoid defective work and improve quality.

Understanding importance of quality. Ability to apply quality standards for furniture. Ability to perform in process control. Ability to perform end control. Knowledge of quality control procedures. Knowledge of methods for reducing defects. Understanding relations between quality and productivity.

TOPICSLEVEL OF COMPETENCE TO BE REACHED:

8. Production organization, production planning and control in the production of solid wood furniture.
- Factory organization structure.
 - Production planning procedures and methods.
 - Cost accounting.
 - Production process control

Better understanding of industrial production organization. Knowledge of production planning, costing, pricing and production control methods and procedures. Ability to do production planning and control of manufacturing process.

9. Management based on the modern industrial production methods.
- Basic characteristics of an industrial organization.
 - Role of a management.
 - Information system.
 - Decision making procedures and methods.
 - Some other management techniques.
 - Motivation as a goal achieving factor.

Ability to understand and to use more efficient management methods and techniques in the managing of the pilot furniture plant.

10. Basic elements of marketing:
- Marketing concept and tasks,
 - Market research,
 - Promotion of products and entering a market,
 - Marketing and international trade of furniture.

Understanding the essentials of marketing and the role of marketing in the international trade of furniture.

2. Study Tour Programme

Duration: 4 weeks

Countries foreseen: Yugoslavia and Italy.

Time estimated: May 1992

Participants: Managing Director
Chief Engineer
Chief of the Technical Department
Economist

Programme

1. Visiting six furniture factories within SIPAD. Yugoslavia, producing solid wood furniture in order to study:
 - Development of products;
 - Production technology;
 - Woodworking machines;
 - Organization, planning and control of production;

- Materials and components used in the production of furniture;
- Maintenance and costs of tools;
- Quality control;
- Cost accounting and pricing;
- Marketing of furniture;
- Management practice.

2. One week visit to the fair of woodworking machines in Milan, Italy in order to get acquainted with new developments in the woodworking machinery.

The study tour will be accompanied and assisted by a UNIDO furniture production expert.

3. Group training abroad

Duration: 4 weeks

Country foreseen: Yugoslavia or Romania

Time estimated: September 1992

Participants: Three team leaders (foremen) working in the production of solid wood furniture of the Pyongyang Wood Complex.

Programme: The training will take place in two selected factories, two weeks in each. Short visits to some other nearby furniture factories will be arranged. The participants will learn proper and efficient performance in the following operations:

- One participant will be specialized in machining of solid wood parts (settling machine and tools, use of jigs, operation and control of precision).
- One participant will specialize in the assembly of solid wood furniture.
- One participant will specialize in the finishing of solid wood furniture.

The participants will be accompanied, assisted and trained by a UNIDO furniture production expert.

APPENDIX 4

EQUIPMENT REQUIREMENTS

1. Manufacturer/model (types) are furnished as examples of the type required. Equipment equal in the type and quality may be produced.
2. Costs given are CIF Nampo harbour, DPR of Korea.
3. The equipment is listed in order of priority.

ITEM	MANUFACTURER/MODEL	QUAN- TITY	UNIT COST US\$	TOTAL COST US\$
High-speed router, 10000/20000 rpm with mechanical pedal	SCM, Italy, Model R8	1	16,000	16,000
Four side planer-moulder, 5 spindles	Sung Kuang Machinery, Taiwan Model KP5-220	1	20,000	20,000
Wood Turning lathe with template, turning length up to 900 mm	HAPFO Wood-Turning Lathes, Model AP 5000M	1	20,000	20,000
Single-side tenoner for oval tenons	Ind. Machine Speciali, Italy Model TSH	1	7,500	7,500
Dovetailing machine for making concealed dove tail corner group joints	Excellent Woodworking Machines (Taiwan, Baeurle, Knoevenagel, Grecon (Germany))	1	8,000	8,000
Horizontal log sawing bandsaw with electric motor, static type	Forestor (England), Static "Tom Sawyer" Bandmill with electric power	1	60,000	60,000

ITEM	MANUFACTURER/MODEL	QUAN- TITY	UNIT COST US\$	TOTAL COST US\$
Universal grinding machine for bandsaw and circular saw blades	Vollmerwerke, Germany, Cana E	1	15,000	15,000
Bandsaw blade rolling and levelling machine	Vollmerwerke Germany Model VRB	1	5,000	5,000
Bandsaw and circular saw teeth setting machine	Vollmerwerke, Germany Model Adn V	1	4,500	4,500
Brush backed sanding machine for sanding profiled furniture parts	FROMMIA (Germany), Chun Weii, Union-One Machinery, Wen Sheng Mach. (Taiwan)	1	3,500	3,500
Airless spray gun with pump	Wagner, Wiwa, Kopperschmidt-Mueller (Germany)	1	4,000	4,000
Long neck stitching machine for heavy upholstery fabrics and foam. For figurative stitching	Adler or Pfaff (Germany)	1	6,000	6,000
Multi-spindle drilling machine with six adjustable drilling heads.	J i n S e n Woodworking machinery (Taiwan) Model RS308	1	5,000	5,000
Universal vertical edge sanding machine, oscillating type	Hamond-Liu Ind. Co., Ltd. Taiwan Model AK-108	1	5,500	5,500

ITEM	MANUFACTURER/MODEL	QUAN- TITY	UNIT COST US\$	TOTAL COST US\$
V a r i o u s pneumatically powered hand t o o l s (2 nailguns, 2 staplers, 2 drillers, 2 screwdrivers)	Festo, Haffner, Metabo (Germany)	8	150	1,200
Spare parts for machines to be purchased under the project	Suppliers of the machines			5,000
Tools: drilling bits and cutters, moulding cutters, bandsaw blades, circular saw blades, sanding papers	Leitz, Stehle Germany			9,300*
Power feeder for planer and spindle moulder	Comatic Machinery or Feng An Iron Works (Taiwan) Models FA-300 and FA-202	2	400	800
TOTAL	E x p e n d a b l e equipment			16,300
	Non-expendable equipment			193,000
	TOTAL EQUIPMENT			209,300

* This amount is not sufficient for provision of all necessary tools for the equipment supplied by UNDP but the Government will provide tools through its contribution valued at about US\$ 10,000.

More detailed technical specifications and references are prepared for the purpose of purchase of equipment.

APPENDIX 5

JUSTIFICATION FOR THE USE OF UNDP RESOURCES FOR SIGNIFICANT
EQUIPMENT PURCHASES
SPECIAL DOCUMENTATION REQUIRED

Project: Assistance in the Establishment of a
Pilot Furniture Plant (DP/DRK/86/011)

- (a) This equipment meets UNDP's policy with respect to the provision of equipment to pilot plants since the factory in Pyongyang receiving the technical assistance will be the first that will be producing furniture, both solid wood and panel, on an industrial (as against craft) basis. New equipment, hitherto unknown in the country, will be provided and personnel trained in its utilization. The project also foresees the transfer of technology in the design of furniture components for industrial (as against craft) production compatible with the equipment being provided. The project will also be a testing ground to introduce modern management methods, production planning and control, industrial costing, quality control, etc. in the plant. This cannot be done on the existing equipment.
- (b) The equipment is necessary because, as indicated above, the serial production of furniture with standardized tolerances of sized cannot be carried out using the machines and technology existing in the country's furniture industries. The cost effectiveness of the equipment will be reflected in increased productivity, better utilization of materials and higher quality of products.
- (c) In this particular case, UNDP assistance is the most appropriate source for these additional inputs, because it is an expansion of an on-going project. It would be very difficult to find multi-lateral or bi-lateral sources that would be willing to join UNDP and UNIDO in this ongoing project and, even if this were the case, delays in obtaining such a partner would delay the final implementation of the rest of the project.
- (d) The project is a pilot plant, but not of the conventional (small scale) operation. It can be considered a pilot plant in so far as it is a full sized plant where new technologies will be introduced. Preinvestment study in the sense of investments for a full sized plant, is not applicable in this case. The benefits of the new technology will appear when the pilot plant will be producing on a continuous basis products of improved quality, at a lower price and with less waste of raw material. The main task of the pilot plant is to gain and spread out new experience in applying modern production methods.
- (e) The equipment that will be selected by a furniture production expert, and professionals of the executing and implementing agencies, will be the most appropriate level of technology, quality and reliability for the conditions in which it will be used. It will be recalled that the ongoing project is a follow-up to the SIS one, whereby the same furniture expert, the current CTA, Mr. R. Malis, was

assigned. We were thus able to select equipment that is appropriate to the level of development of the factory (in particular) and the country at large. We have already provided some equipment to this project which has been installed and found appropriate. The equipment we will be providing consists of standard, modern, special purpose woodworking machines. The firms selected are all reliable and world known and equipment will be purchased on competitive bidding.

- (f) As soon as the necessary funds are obtained the Executing Agency will proceed with the purchase of equipment. The return mission of the CTA will be linked to the delivery dates of the equipment so that he can supervise the installations, running-in and train the personnel on its utilization. The delivery time foreseen in the project work plan (Annex I) has already been proven earlier as sufficient.
- (g) The necessary infrastructure to accommodate this equipment exists in the factory. The pilot furniture factory is a part of the Pyongyang Wood Complex employing more than a thousand persons. All the necessary infrastructure; electric power, steam, compressed air, premises and maintenance facilities exist in the complex and the new equipment is only a small addition to the total horsepower already installed.
- (h) The satisfactory maintenance and servicing facilities exist and, as indicated in project revision H, the Government will bear the costs of standard parts such as belting, bearings, etc. while all new machines will be provided with spare parts for a two year period. Labour for maintenance will not be a problem because of the magnitude of the existing installations. No totally new skills (eg. electronics or computer skills) will be needed to operate and maintain the machines to be provided.
- (i) Recurrent costs will not occur after the end of the project. The machines to be provided will be incorporated in the existing overall complex and there should be no problem for the Government to provide the small amounts of foreign currency needed for special spare parts that the cannot produce themselves. The ongoing operation of the complex will generate the necessary cash to pay not only for the spare parts, etc. but also for the eventual replacement of the machines after the project is terminated. Supply of consumable is, as indicated in the project revision H assured as the Government contribution.
- (j) Bearing in mind the human resources available in the country and their level of education, there are no problems in finding competent counterparts to run the factory and the equipment provided. What the project will do will be train them in the specifics of serial production of furniture. This will be done during the project execution through on-the-job training and through a study tour and group training abroad. Both study tour and fellowships for training abroad are included in this revision.
- (k) The furniture production expert (CTA) has selected the equipment according to the range of products that will be designed and produced, and the utilization of all equipment will be at or near the capacity for which it is foreseen. Because of the need for good quality furniture at reasonable prices, the marketing of the production will cause no problem. The raw materials that will be used are not new to

the country nor to the industry. No problems are foreseen in increasing deliveries of raw materials (sawnwood and wood based panels) to cover the requirements of the additional machines. It is not foreseen that equipment will be shared by other users. In the light of the above, it is hoped that additional funds will be made available to enable the project to attain its initial objectives.

APPENDIX 6

JOB DESCRIPTION

Post title: Furniture production expert, Chief Technical Adviser

Duration: 8 months out of which: 6 months split in three missions, 2 months each, and 2 months to accompany a study tour and a group training abroad, one month each.

Date required: December 1991, June 1992, October 1992

Duty station: Pyongyang, DPR of Korea.

Qualifications: Wood technologist or engineer.

Experience: Considerable experience in furniture production and in the management of a medium-sized furniture plant.

Language: English or Russian.

Responsibility: Co-ordination of the work of the internationally recruited staff and reporting on the project activities.

Duties:

- To assist in designing a new technology for the Pilot Furniture Plant.
- To assist in the selection, installation and commissioning of the equipment purchased by the project.
- To train team leaders, wood technicians and machinists in the full and efficient use of production equipment available under actual production conditions, and training assemblers and finishing operators.
- To develop and introduce standards of products for the Pilot Furniture Plant.
- To develop the required production fixtures.
- To conduct a study tour and a group training abroad.
- To introduce machining methods suitable for serial production with interchangeable parts.
- To introduce basic quality control procedures for work in process and end control.
- To design and introduce improved production organization, production planning and cost accounting methods, to train the management in improved organization methods and basic export marketing techniques.
- To prepare technical reports, project performance evaluation reports and the project's terminal report.
- To cooperate with the National Project Director.

JOB DESCRIPTION

Post title: Furniture Design consultant.

Duration: 3 months

Date required: January 1992

Duty Station: Pyongyang, DPR of Korea

Qualifications: An industrial designer or architect specialized in designing of furniture products.

Experience: Considerable experience and a proof of successful performance.

Language: English or Russian.

Duties:

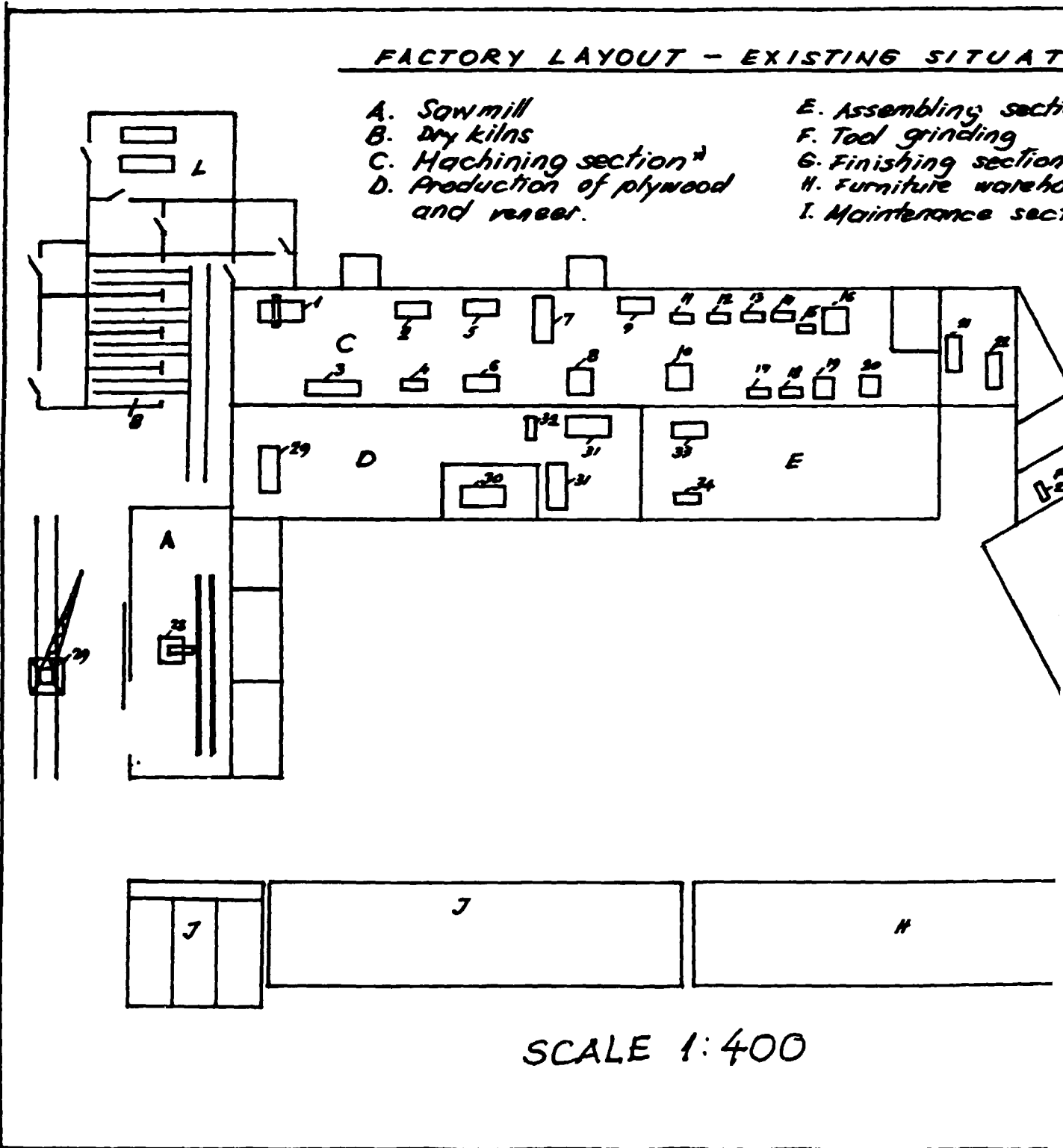
- To analyze the present products, available materials and technological possibilities of the pilot furniture plant.
- To design two furniture products using standardized interchangeable components.
- To improve construction details of solid wood furniture products and prepare basic construction documentation with technical descriptions, identification of materials and determination of quality criteria.
- To train two factory designers in the procedures and techniques concerning development of the furniture products.
- To prepare technical reports, as necessary..
- To participate in the programme set by the Chief Technical Adviser concerning introduction of the new designed products into production.

ANNEX III

FACTORY LAYOUT - EXISTING SITUATION

- A. Sawmill
- B. Dry kilns
- C. Machining section
- D. Production of plywood and veneer.

- E. Assembling section
- F. Tool grinding
- G. Finishing section
- H. Furniture warehouse
- I. Maintenance section



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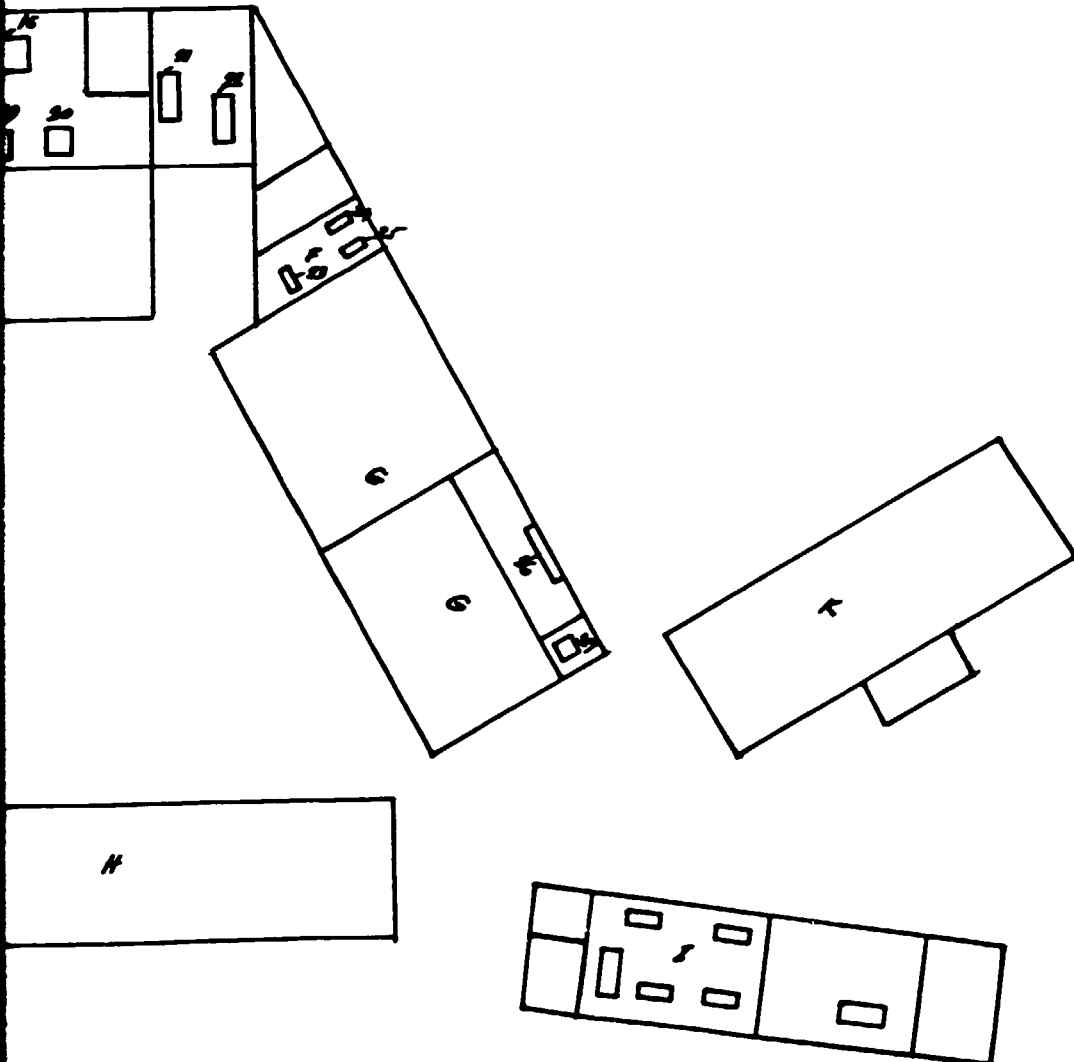
SECTION 1

PLACING SITUATION

ANNEX III-1

Assembling section
 Tool grinding
 Finishing section
 Furniture warehouse
 Maintenance section

J. Administrative section
 K. Institute for political education.

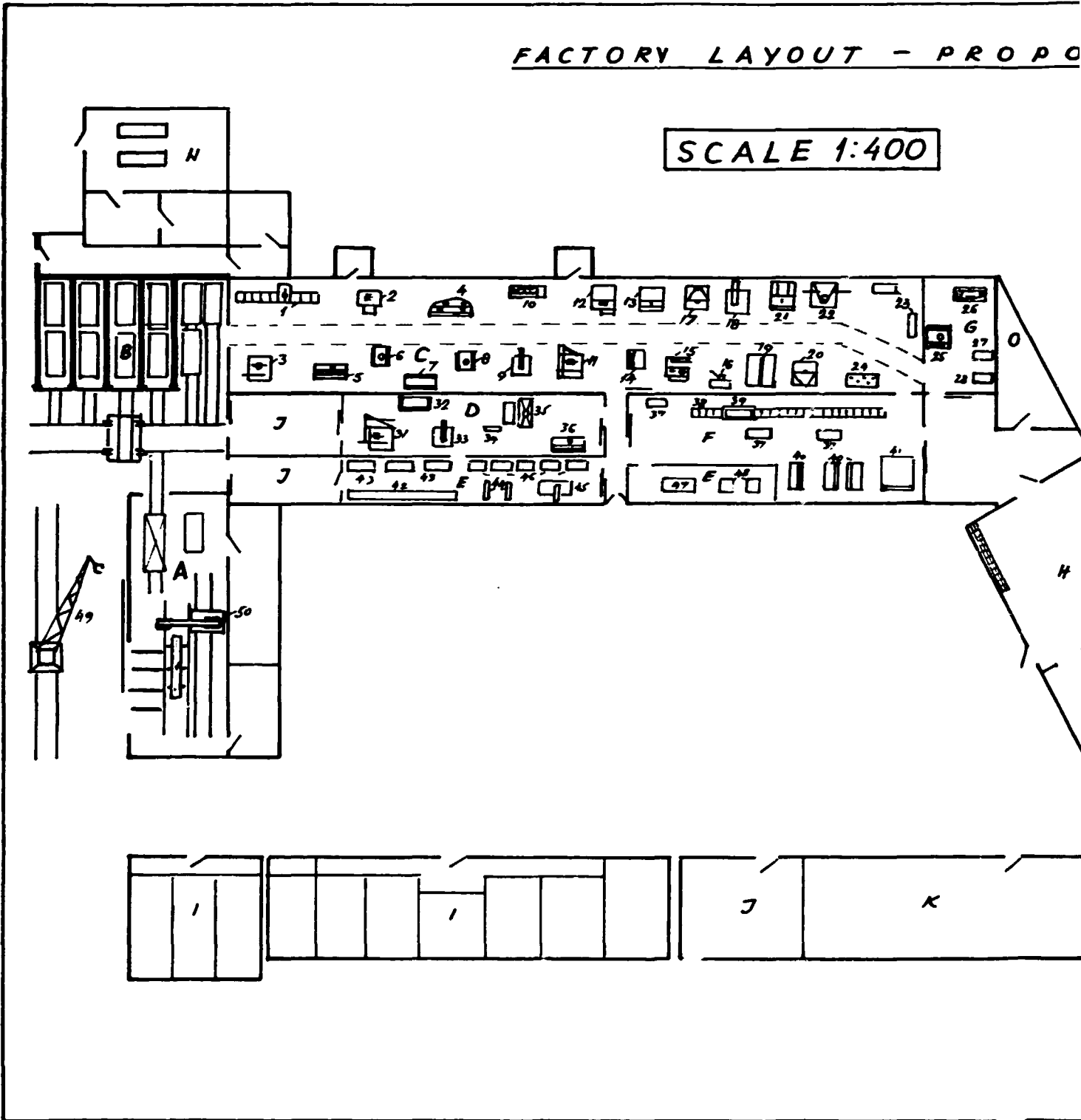


LIST OF MACHINES

1. Cross-cut saw
2. Multi-blade circular saw
3. Planer
4. Thicknesser
5. Thicknesser
6. Circular saw with sliding table
7. Wide belt sanding machine
8. Panel sizing circular saw
9. Spindle moulder
10. Circular saw with sliding table
11. Spindle moulder
12. Narrow bandsaw ϕ 400 mm
13. Single spindle vertical drilling machine
14. Single spindle horizontal drilling machine
15. Narrow bandsaw
16. Tenoning machine for oval tenons
17. Wood turning lathe
18. Wood turning lathe
19. Chain mortiser
20. Disc sanding machine
21. Planer
22. Circular saw
23. Bandsaw blade grinder
24. Two-wheel bench grinder
25. Circular sawblade grinder
26. Spray booth
27. Compressor
28. Log sawing bandsaw
29. Veneer rotary peeling machine
30. Veneer slicing machine
31. Hot hydraulic press
32. Glue spreading machine
33. Planer
34. Knife grinder

FACTORY LAYOUT - PROPOSED

SCALE 1:400



SECTION 1

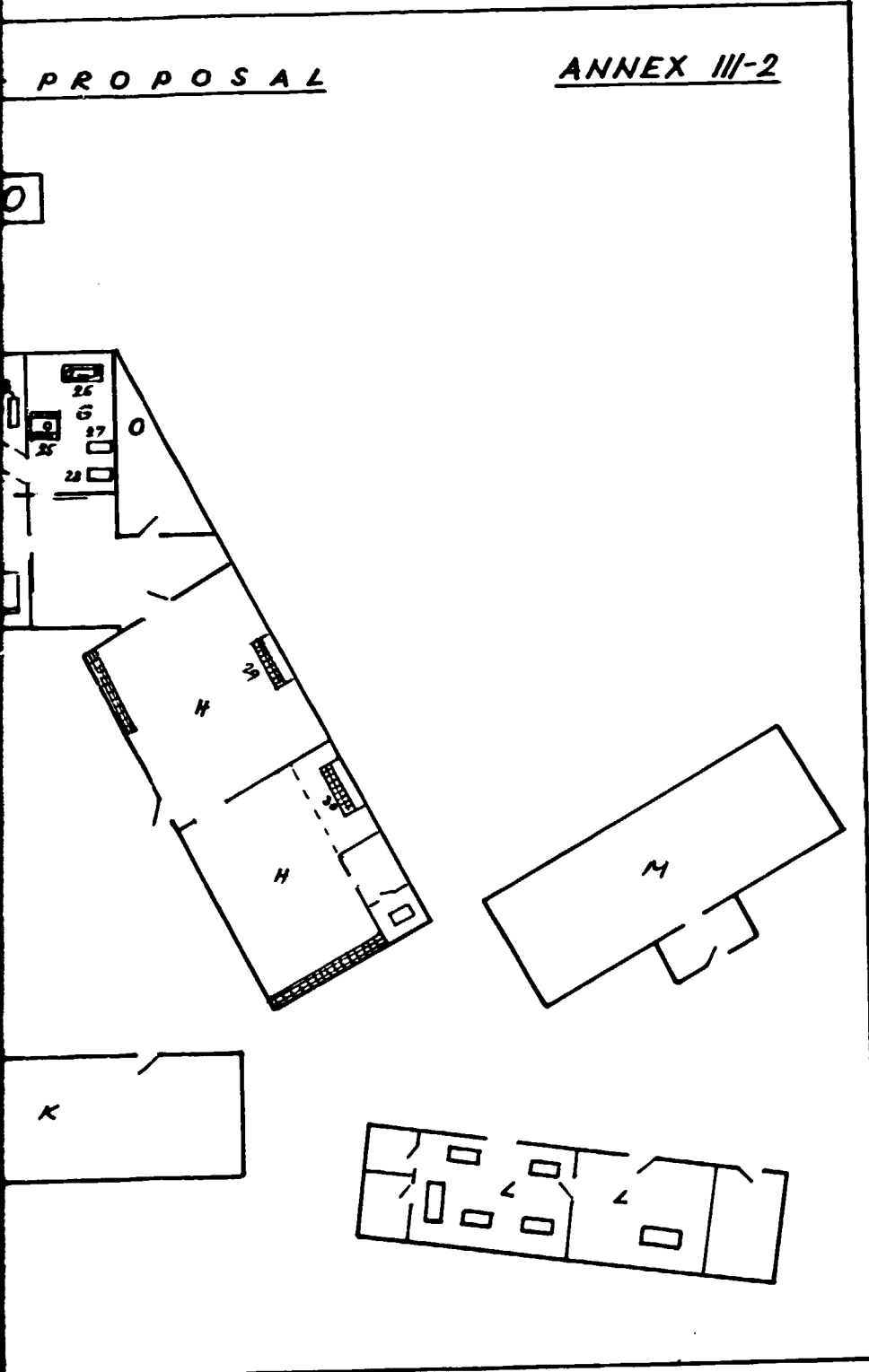
PROPOSAL

ANNEX III-2

LEGEND OF THE FACTORY LAYOUT

- I. Factory sections.
- A. Saw mill
- B. Dry kilns
- C. Machining solid wood parts
- D. Processing panel parts
- E. Upholstering section
- F. Assembling section
- G. Sanding section
- H. Finishing section
- I. Administrative offices
- J. Material storage
- K. Furniture storage
- L. Maintenance room
- M. Institute for political education.

- II. Woodworking machines:
- 1. Cross-cut saw
- 2. Multi-blade circular saw
- 3. Ripping single-blade circular saw
- 4. Four-side planer-moulder
- 5. Planer
- 6. Thicknesser
- 7. Mechanical press for gluing wood
- 8. Thicknesser
- 9. Narrow bandsaw
- 10. Turning lathe
- 11. Circular saw with sliding table
- 12. Tenoning machine for square tenons
- 16. Chain mortiser
- 17. Spindle moulder
- 18. High-speed router
- 19. Preassembling bench
- 20. Spindle moulder
- 21. Horizontal drilling machine
- 22. Vertical drilling machine
- 23. Controlling and repairing tables
- 24. Multi-spindle (6) drilling machine
- 25. Wide-belt sanding machine
- 26. Universal oscillating belt sander
- 27. Brush backed sanding machine
- 28. Disc sanding machine
- 29. Spray booth
- 30. Spray booth
- 31. Panel sizing circular saw
- 32. Bench for assembling frames
- 33. Narrow bandsaw
- 34. Glue spreading machine
- 35. Six-daylight hydraulic hot press
- 36. Planer
- 37. Preassembling bench
- 38. Dead roller conveyor
- 39. Assembling press
- 40. Assembling benches
- 41. Beds assembling place
- 42. Table for cutting fabrics
- 43. Table for gluing foam
- 44. Sewing machines (two pieces)
- 45. Stitching machine with long neck
- 46. Upholstering benches
- 47. Bench for assembling sofas
- 48. Benches for assembling upholstered chairs and armchairs



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ANNEX IV

LIST OF COUNTERPARTS

- Choi In Gon, Deputy Director General, Bureau for Cooperation with International Organization (GBCIO).
- Son Dok Ryum, Officer in the General Bureau for Building Materials in Pyongyang (GBBM).
- Ko Ju Chol, Officer in the GBCIO.
- Kim Ha Chun, Managing Director of the factory.
- Kim Li Yong, Chief Engineer of the Factory.
- Hyong Sung Chol, Chief, Technical Department of the Factory.
- Kim Chol Man, Interpreter.
- Li Myong Sik, Driver.

ANNEX V

Comments of Substantive Officer

The expert, who is very familiar with local conditions, having first served in an SIS project and then as CTA of the ongoing project, did a very thorough job. He has analyzed the current (artisanal) production and the equipment installed, as well as the qualifications and attitude of the management - which he found to be very positive. This is particularly important because although this mission was basically to draft Revision "H" of the project document, the Korean authorities have decided that the counterparts' production facility receiving the assistance will be a totally different one.

The technological process recommended, and the layout proposed fully meet our approval. Although the expert has recommended specific pieces of equipment, at the time of purchase we shall also invite other suppliers to bid, and purchase the most appropriate one, bearing in mind cost and other parameters. The specifications are detailed enough to permit in-depth comparisons of the bids to be made.

We fully endorse the recommendations made, and wish to stress the need for the expert to accompany the participants of the study tour and group training.