



**TOGETHER**  
*for a sustainable future*

## OCCASION

This publication has been made available to the public on the occasion of the 50<sup>th</sup> anniversary of the United Nations Industrial Development Organisation.



**TOGETHER**  
*for a sustainable future*

## DISCLAIMER

This document has been produced without formal United Nations editing. The designations employed and the presentation of the material in this document do not imply the expression of any opinion whatsoever on the part of the Secretariat of the United Nations Industrial Development Organization (UNIDO) concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries, or its economic system or degree of development. Designations such as “developed”, “industrialized” and “developing” are intended for statistical convenience and do not necessarily express a judgment about the stage reached by a particular country or area in the development process. Mention of firm names or commercial products does not constitute an endorsement by UNIDO.

## FAIR USE POLICY

Any part of this publication may be quoted and referenced for educational and research purposes without additional permission from UNIDO. However, those who make use of quoting and referencing this publication are requested to follow the Fair Use Policy of giving due credit to UNIDO.

## CONTACT

Please contact [publications@unido.org](mailto:publications@unido.org) for further information concerning UNIDO publications.

For more information about UNIDO, please visit us at [www.unido.org](http://www.unido.org)

RESTRICTED

DP/ID/SER.A/813  
24 February 1987  
ENGLISH

16139

PILOT FURNITURE PLANT

DP/LAO/81/017

LAO PEOPLE'S DEMOCRATIC REPUBLIC

Technical report: Monitoring mission by Sinan Cinar,  
Agro-based Industries Branch\*

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

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

United Nations Industrial Development Organization  
Vienna

442

---

\*This document has been reproduced without formal editing.

TABLE OF CONTENTS

	<u>Page</u>
I. INTRODUCTION	1
II. INITIAL DISCUSSIONS WITH THE RESIDENT REPRESENTATIVE	2
III. DISCUSSIONS WITH THE VICE MINISTER	3
IV. SITUATION AT THE FACTORY	4
A. Organizational Structure	4
B. Management	4
C. Equipment and Facilities	4
V. WORK PLAN FOR VOLUNTEERS	6
VI. PLAN OF ACTION AND RECOMMENDATIONS	6
A. For the Factory	6
B. For UNIDO	7
VII. FINAL DISCUSSIONS WITH THE RESIDENT REPRESENTATIVE	8
ANNEX I (Itinerary)	9
ANNEX II (List of Persons met)	10
ANNEX III (Project Budget)	11
ANNEX IV (List of unutilized Machines)	12
ANNEX V (List of needed Spare Parts)	14
ANNEX VI (List of recommended Equipment)	18
ANNEX VII (Work Programme for UNV, Mr. L. Gronchi)	19

## I. INTRODUCTION

The woodworking industries of Laos have received technical assistance from UNDP/UNIDO for over 15 years, initially through an SIS project then through the "Integrated Woodworking Project" (DP/LAO/74/010) which started in 1974 and continued, in two phases, until 1980. The first phase covered the period from 1974 to 1976 and concentrated mainly on the training of manpower and trouble-shooting in the various existing woodworking plants. The second phase of the project covered the period from 1977 to 1980 when emphasis was placed on the conversion of the state-owned BML (Bois Manufacture Lao) furniture factory into a modern pilot furniture plant aimed at serving the country's secondary woodworking industries as a demonstration and training plant for industrial furniture and joinery manufacture using modern woodworking machinery and equipment.

When the project was financially completed in 1980, the machinery was temporarily installed, buildings were partially completed and the number of trained technicians/operators was insufficient. In view of the above, the Government of the Lao People's Democratic Republic requested UNDP to formulate a new project to complement the first project. This subsequent project, designated as "Pilot Furniture Plant" (DP/LAO/81/017) was approved by UNDP on 25 February 1983. The main objectives of the new project were:

- (a) To complete the establishment of the first modern equipped pilot furniture plant in the Lao PDR which was started under an earlier project (LAO/74/010).
- (b) To train technicians in effectively and efficiently operating and maintaining all the machinery, so as to manufacture furniture at an intermediate level of quality standard.
- (c) To train the management staff in overall management techniques of a furniture plant and to introduce them to marketing of furniture products.

The delivery of UNDP/UNIDO inputs started in April 1984 with the arrival of the first UNIDO expert acting as CTA and is continuing since then. However, according to the latest budget, the project will be operationally completed by the end of 1987. The most recent budget of the project is contained in Annex III.

On 8 November 1986, UNDP/Vientiane requested in their telex Misc 2349 a monitoring visit of a UNIDO staff member to:

- Review the current situation at the Pilot Furniture Plant and the status of the training programme as well as the UN Volunteers' work programme.
- Provide guidance and technical advice on industrial production techniques.
- Determine future technical assistance needs of the plant.

UNIDO delegated Mr. Sinan Cinar, Associate Industrial Development Officer, of its Agro-based Industries Branch to undertake this mission which took place from 17 to 27 January 1987. His itinerary is given in Annex I.

The list of persons met is contained in Annex II.

## II. INITIAL DISCUSSIONS WITH THE RESIDENT REPRESENTATIVE

Following an initial visit to the factory and discussions with the factory management, the mission presented its preliminary findings and recommendations to the Resident Representative in a meeting held at the UNDP office on 21 January in which the Programme Officer also participated. The following are the main points which were raised by the mission:

- (a) In general, the situation of the factory was satisfactory when local conditions are considered.
- (b) Most of the basic woodworking machines supplied by the project were in use.
- (c) A number of machines were not fully installed and operational due to the unavailability of an adequate compressed air and/or dust exhaust system.
- (d) After installation of the compressed air system, a technician was needed for the initial maintenance, commissioning and testing of the wide-belt sanding machine purchased from the firm Costa.
- (e) A number of machines were not in use due to the lack of spare parts.
- (f) The maintenance of machines, equipment and tools was very poor, in some cases non-existent.
- (g) Some machines were not used because of the unsuitability of construction details - particularly joints - in the existing designs.
- (h) All the necessary equipment, materials and components for the compressed air system have been purchased by the project and delivered in the factory. The factory management promised to install the whole system and make the necessary connections with the machines by the end of March 1987.
- (i) The training programme for the training of secondary school leavers which was proposed by the ex-management adviser but not endorsed by UNIDO, was being implemented by the UNV Mr. Van de Gevel. Since such a training programme was not foreseen by the project it was felt that the available project staff at the factory should devote their time to the training of machine operators, foremen and the counterpart staff.
- (j) There was an adequate supply of average quality timber at the factory premises.

### III. DISCUSSIONS WITH THE VICE MINISTER

After the initial discussions outlined above, the Resident Representative, the Mission and the Programme Officer of the UNDP paid a visit to the Vice Minister for Industry, Forestry and Handicrafts at the request of the latter. Following his welcoming speech the Minister thanked UNIDO and made the following remarks:

- 1) The currently ongoing project DP/LAO/81/017 was a continuation of the previous project DP/LAO/74/010 and most of the modern machines were provided by UNIDO during the later project. It was hoped that UNIDO would put the uninstalled machines in operation soon.
- 2) It was hoped that UNIDO would continue/extend the existing project so that the secondary school leavers could be trained in furniture manufacturing and machine woodworking by the UNIDO experts.
- 3) Laos possessed considerable forest resources which contained several wood species of which at present only a few were exploited commercially and they wished to exploit other species as well.
- 4) The Government of Lao PDR wished to exploit the wood extractives contained in the Laotian wood species.
- 5) The Ministry would like to increase the rate of wood utilization by reducing waste in converted timber, utilizing thick branches and finding new uses for off-cuts, etc., and it was hoped that UNIDO would provide assistance in this area.

In response to the remarks made by the Vice Minister, the Resident Representative expressed his thanks for receiving the mission and pointed out that UNDP/UNIDO would insure the installation of all the remaining machines, provide short-term specialists and the most essential spare parts and would train their operators. The UNIDO mission made the following comments on the remarks of the Vice Minister:

- 1) The overall condition of the factory was satisfactory. Those machines which were delivered by the project and installed were being used by the operators without any difficulty.
- 2) The machines delivered by the project were adequate to produce export quality items and components. However, the items currently produced were not of a high quality.
- 3) Currently only simple items of furniture were produced. It was recommended that the factory should start producing sets of furniture such as bedroom, living room, dining room, office, hotel, kitchen, etc. Even if there is no market for these, prototype samples should be manufactured using the available modern machinery.
- 4) The wood species and plywood currently used for the manufacture of furniture were very heavy and less heavy wood species would have a better chance on the export markets.

- 5) Initially the factory would have a better chance on export markets if attempts were concentrated in the export of semi-finished furniture and joinery components.
- 6) Compressed air was needed for the commissioning and testing of certain machines. The factory management should take the necessary measure to install the already delivered compressor, pipes and control devices before making any arrangements for a specialist to come and commission the wide-belt sanding machine.
- 7) Wood waste in the form of off-cuts could be reduced considerably at the cross-cutting stage by taking into account the various lengths required for different components and models.

#### IV. SITUATION AT THE FACTORY

##### A. Organizational Structure

The structure is lax. Management has not allocated individual tasks and responsibilities to workers at the shop floor level.

##### B. Management

This area seemed one of the weakest points at the factory. Such important management functions as target setting, directing, co-ordinating and controlling were not used effectively to achieve the overall objectives of the project and the enterprise. Also noticed was the slow process in management decision making which, from the mission's point of view, was the prime cause for the loss of stimulation and initiative of the subordinates.

##### C. Equipment and Facilities

###### 1) Main production equipment

The mission noticed that those machines which had been installed by the project staff, were being used by the local operators without any difficulty. However, a number of machines which were delivered during either the previous or the later project were not operational due to one or more of the following reasons:

- Dust exhaust system not connected
- Compressed air system not connected
- Electricity not connected
- Spare parts not available to repair the machine
- Handicraft methods preferred to machine production methods
- Misconceptions about the type of materials needed (e.g. type of glue)

A list of unoperational machines and the reasons for their non-use are given in Annex IV.

Among these machines only the wide-belt sanding machine (Item 1) in Annex IV) needs the services of a technician from the manufacturing firm in Italy, to undertake the initial maintenance, commissioning and testing of the machine and training of its operators.

One important point that struck the mission was the total lack of appreciation of the importance of machine and tool maintenance. One feels quite certain that sooner or later all the machines will be abandoned as the wearing parts become worn out due to the non-existence of any preventive maintenance. The list of currently needed spare parts is contained in Annex V.

When the factory was looked upon from a positive point of view, it became apparent that some additional hand-operated mechanic, pneumatic and electric equipment was needed in the jig making, assembly and upholstery departments. A list containing the specifications and potential suppliers is contained in Annex VI.

2) Auxiliary equipment

- (a) Wood-drying kiln: At the time of the mission the wood-drying kiln was not in use. The moisture content of the wood in production was in the range of 13 to 15 per cent. When taking into account the relative humidity of the air in Vientiane, this moisture content range can be considered adequate for locally used furniture and joinery items.
- (b) Sharpening room: The machinery installed for the sharpening of cutters is considered adequate. However, there was no horizontal grinding machine to grind the butt-welded band saw blades. Overall housekeeping and the maintenance of the sharpening room machines were very poor.
- (c) Dust exhaust system: Modifications to the old piping system which was recommended by the former CTA, Mr. Malis, and the connection to some machines had not yet been completed. However, the factory management expected this task to be completed by end March 1987. The motors of the suction fans were not protected against rain and water. The factory management's attention was drawn to the need to protect these motors.
- (d) Compressed air system: All the necessary components of the redesigned compressed air system (by taking into account the current and likely future requirements) were purchased by UNIDO and delivered to the factory. During the mission the installation work was started and according to the information provided by the factory management, will be finished by the end of March 1987. The new system will provide the necessary moisture-free compressed air at 7 bar to the following machines:
  - Wide-belt sanding machine
  - Multiple boring machine
  - Single-sided edge lipping machine
- (e) Electricity: The newly installed distribution panels and wiring were considered satisfactory and adequate for the current and reasonable future requirements of the factory.
- (f) Production programme: The current production programme of the factory was based on speciality furniture and joinery items made to order. There was no manufacture of standardized items/sets so that all the project-supplied modern machinery could be utilized to its full advantage.



- (g) Designs: Designs of currently manufactured products were found to be acceptable on the local market. All were factory-assembled using either nails or screws. However, it was found that all the local designs could be manufactured as knocked-down items and nails be eliminated by using the project-supplied modern machinery and equipment.
- (h) Quality: The quality of the manufactured items was found to be substandard. It was noticed that the main reasons for this very low quality were the total lack of colour matching, poor sanding, staining and varnishing.

#### V. WORK PLAN FOR VOLUNTEERS

At the time of the mission there were two UN Volunteers with the project:

- Mr. J. Van de Gevel (14-01: Woodwork Machinist)
- Mr. L. Gronchi (14-02: Wood Machinist)

Upon consultation with the UNDP office in Vientiane, it was found that Mr. Van de Gevel's last working day was 2 February 1987. Therefore, it was decided by both the UNDP and the mission to let him finish, to the extent possible, his ongoing work programme until he leaves.

During the discussions with Mr. Gronchi, it became apparent that his last working day will be 1 October 1987 because he did not intend to use any of his accrued annual leave. In consideration of this, the mission had prepared a work programme for Mr. Gronchi, covering the period from 1 February to 1 October 1987. This work programme is given in Annex VII of this report.

#### VI. PLAN OF ACTION AND RECOMMENDATIONS

##### A. For the Factory

- (i) Improve the organizational structure and appoint well-qualified and permanent supervisors and foremen at the shop floor level as soon as possible.
- (ii) Adapt scientific management functions immediately to the local conditions and use them effectively to achieve the enterprise's and the Government's objectives.
- (iii) Develop a rapid decision-making process and take necessary steps to stimulate and initiate subordinates' contributions and involvement in production and management activities immediately.
- (iv) Set up immediately a plant maintenance team on a permanent basis consisting of an adequate number of electricians and mechanics and conduct routine preventive maintenance on all the machines and equipment.
- (v) Install, by end March 1987, the compressed air system and connect those machines that need purified compressed air at constant pressure. For this, the plan prepared by the last CTA (Mr. Malis) is to be used.

- (vi) Connect, by end March 1987, the dust extraction system to the machines not yet connected, according to the plan prepared by Mr. Malis.
- (vii) Obtain, as soon as possible, the necessary spare parts, cutting tools and auxiliary materials to ensure that the machinery and equipment supplied by the previous project is operational once again.
- (viii) Develop sets of products, such as dining room, bedroom, sitting room, which can be manufactured using local materials and available machinery at the factory.
- (ix) Produce above-mentioned sets as standard products besides custom-made items.
- (x) Concentrate on designs based on solid wood components and knocked-down construction methods.
- (xi) Use fully the project-supplied machinery and equipment in machining, gluing, varnishing and assembly instead of hand-working methods. For this, make full use of the project-supplied expertise.
- (xii) Improve quality conscience among management, supervisors and operators.
- (xiii) Co-operate fully with the international project staff to introduce better machine woodworking, production and work organization methods.

B. For UNIDO

- (i) Provide a specialist/technician for the initial servicing, commissioning and testing of the wide-belt sanding machine in May 1987.
- (ii) Implement, through the UNV, the practical training programme recommended (Annex VII) for the operators of the machines yet to be commissioned.
- (iii) Ensure the delivery of the still undelivered foam cutting machine.
- (iv) The Volunteer should now place more emphasis on the practical demonstration of various aspects of furniture manufacturing based on existing manuals rather than preparation of additional manuals.
- (v) Provide, without any precondition, the additional hand-operated machinery and equipment contained in Annex VI.
- (vi) Provide all the spare parts contained in Annex V, provided the factory sets up a plant maintenance team on a permanent basis and UNIDO is satisfied with the qualifications of the personnel in that team.
- (vii) Extend the contract of the local project staff, Mr. Bounvath Ketsouvanh, the senior technical clerk so that it expires at the same time as the contract of last UNV at the project.
- (viii) Field, in May 1987, a mission to monitor the progress of the project and the work programme for the UN Volunteer.

## VII. FINAL DISCUSSIONS WITH THE RESIDENT REPRESENTATIVE

The mission met with the Resident Representative in the afternoon of 23 January 1987 to brief him on its findings and final recommendations. The Deputy Resident Representative and the Programme Officer also participated in the meeting.

The mission brought up the following points regarding the situation of uninstalled/unutilized machines:

- The total number of uninstalled/unutilized machines was six, three of which needed compressed air for satisfactory operations.
- After the installation of the compressed air system five out of six machines could easily be commissioned by the existing project staff and their operators could be trained effectively.
- The wide-belt sanding machine was the only critical machine. A technician from the manufacturing firm was required to undertake the initial servicing, commissioning, testing and operator training.

The required time for the manufacturer's technician to carry out his tasks was estimated to be from 10 to 14 days. It may be necessary to envisage a split mission, starting with a two-day diagnostic mission, followed by 10 days once the parts have arrived. The estimated cost, excluding the spare parts, would be about \$US 10,000.

As to the work programme of the UN Volunteers, it was agreed between the UNDP and the mission, that, since the contract of Mr. Van de Gevel was expiring on 2 February 1987, there was no need for a new work programme. On the other hand, a recommended work programme for Mr. Gronchi was prepared by the mission and presented at the meeting. The Resident Representative agreed to this but requested UNIDO's formal endorsement. Annex VII contains this work programme. Additionally, the Resident Representative requested that UNIDO fields several missions, of which the first one should take place during May 1987, to monitor the progress of the project and the work programme of the UNV.

Finally, the mission drew the attention of the Resident Representative to the need for some additional hand-operated electro-pneumatical and mechanical equipment and devices which were needed in jig making, upholstery, quality improvement and furniture assembly. Annex VI contains a list of these items. Their estimated cost is \$US 2,225.

ANNEX I

Itinerary (17 - 28 January 1987)

- January 17 (Saturday) : Departure from Vienna for Bangkok
- January 18 (Sunday) : Arrival in Bangkok
- January 19 (Monday) : Visa collection from Lao Embassy (Bangkok)
- January 20 (Tuesday) - a.m. : Departure from Bangkok for Vientiane  
- p.m. : Meeting with UNDP Programme Officer
- January 21 (Wednesday) - a.m. : Visit to Pilot Furniture Plant  
- p.m. : Initial discussions with the Resident Representative;  
Visit to the Vice Minister for Industry, Forestry and Handicrafts.
- January 22 (Thursday) : Visit to Pilot Furniture Plant
- January 23 (Friday) - a.m. : Visit to Pilot Furniture Plant  
- p.m. : Visit to UNDP and meeting with Resident Representative, his Deputy and the Programme Officer.
- January 24 (Saturday) - a.m. : Visit to Pilot Furniture Plant  
- p.m. : Free
- January 25 (Sunday) : Report writing
- January 26 (Monday) - a.m. : Visit to Pilot Furniture Plant  
- p.m. : Visit to UNDP office and final meeting with the Resident Representative, his Deputy and the UNDP Programme Officer.
- January 27 (Tuesday) - a.m. : Departure from Vientiane for Bangkok  
- p.m. : Departure from Bangkok for Vienna
- January 28 (Wednesday) : Arrival in Vienna

ANNEX II

List of Persons met

Government of Lao PDR

Ministry of Industry, Forestry and Handicrafts:

Mr. Khan Ouane Boupha, Vice Minister

UNDP/UNIDO

Mr. Per Janvid, Resident Representative, UNDP

Ms. Carol Long, Deputy Resident Representative, UNDP

Ms. P. Nhouyvanisvony, Programme Officer, UNDP

Mr. J. Van de Gevel, UN Volunteer, Woodwork Machinist

Mr. L. Gronchi, UN Volunteer, Wood Machinist

State Furniture Factory No. 1

Mr. Bounthanh Bounlath, Director

Mr. Khamphay Rattanabounmy, Deputy Director

Mr. Bountieng, Deputy Director

Mr. T. Khamphoung Thongphataysak, Wood Technology Engineer

**PROJECT BUDGET**  
**(DP/LAO/81/017)**

PERSONNEL DU PROJET EXPERTS/DESIGNATION DU POSTE	TOTAL		PRIOR		1982		1983		1984	
	H/M	\$	H/M	\$	H/M	\$	H/M	\$	H/M	\$
11-01 FURNITURE PRODUCTION	24.0	163,062							8.4	52,145
11-04 MANAGEMENT ADVISER	19.8	129,989								
11-05 FURNITURE DESIGN										
11-50 CONSULTANTS COURT TERM	1.0	6,427			1.0	7,907		1,480-		
11-XX	44.8	299,478			1.0	7,907		1,480-	8.4	52,145
13-00 PERSONNEL D'APPUI ADMI		33,294						668		2,458
14-01 PRODUCTION ASSISTANCE										
14-02 WOOD MACHINIST		30,541								
14-03 WOODWORKING ASSISTANCE		31,270								
15-00 VOYAGES EXPERTS PROJEC		6,500								
18-00 AUTRES DEPENSES D.PERS		5,871								
1X-XX	44.8	406,954			1.0	7,907		812-	8.4	54,604
32-00 VOYAGES COLLECTIVE PNU		19,430								
41-00 MATERIEL CONSOMPTIBLE		51,710						11,506		16,617
42-00 MATERIEL NON CONSOMPTI		271,066						76,694		104,456
48-00 SURRENDER PY OBLIGS		5,024								2,428-
4X-XX		317,752						88,400		118,645
51-00 DEPENSES DIVERSES		23,175				50		1,977		2,280
<b>TOTAL</b>	<b>44.8</b>	<b>767,311</b>			<b>1.0</b>	<b>7,957</b>		<b>89,565</b>	<b>8.4</b>	<b>175,529</b>

PERSONNEL DU PROJET EXPERTS/DESIGNATION DU POSTE	1985		1986		1987		1988		SUBSEQ	
	H/M	\$	H/M	\$	H/M	\$	H/M	\$	H/M	\$
11-01	7.6	52,418	8.0	58,499						
11-04	7.8	48,389	12.0	81,600						
11-05										
11-50										
11-XX	15.4	100,807	20.0	140,099						
13-00		5,167		18,000		7,000				
14-01		2,605		2,605						
14-02		11,665		15,102		3,774				
14-03		1,303		15,634		14,333				
15-00		3,073		2,427		1,000				
16-00		2,405		3,466						
1X-XX	15.4	127,025	20.0	192,123		26,107				
32-00		16,910		3,520						
41-00		3,587		15,000		5,000				
42-00		35,730		49,986		4,000				
48-00		2,596								
4X-XX		36,721		64,906		9,000				
51-00		7,868		7,000		4,000				
<b>TOTAL</b>	<b>15.4</b>	<b>187,524</b>	<b>20.0</b>	<b>267,629</b>		<b>39,107</b>				

ANNEX IV

List of uninstalled/unutilized Machines delivered by UNIDO

A) New Equipment

<u>Machine Description</u>	<u>Comments</u>
1) Wide-belt sanding machine for panels, etc.  Make: COSTA Model: Alfa/CT/1350 Machine No.: 85/WA/1 Power: 36 KW	- Electricity connected - Needs compressed air and dust exhaust systemes - Dust exhaust pipes complete but not connected to the machine
2) Dowel cutting and champhering machine  Make: Löser Model: AA 20 0 Machine No. 3624	- Only electricity needs to be connected to the machine - Currently dowel joints not used
3) Multiple boring machine  Make: Schleicher Model: Unidrill/P/1985 Machine No.: 5094	- Electricity connected - Needs to be connected to the compressed air system
4) Frame and furniture gluing press  Make: Dornburg Model: DUP 250 Machine No.: 160/85	- Electricity connected - Compressed air not needed - Currently not used because nails are used to fix the frames and edgings instead of cold glue
5) Single-side edge lipping press  Make: Slegherr Model: KPP/1985 Working length: 2,600 mm	- Electricity connected - Compressed air needs connecting - Currently not used because nails are used to fix the edge lippings instead of cold glue
6) Case assembly press  Make: Höfer Model: Ideal-II	- Electricity connected - Compressed air not needed - Currently not used because of unsuitable designs and non-use of dowels - Can be used for current designs if construction details are changed to include dowel joints

B Old Equipment

1) Dowel milling machine

Make: Löser  
Model: DK 110  
Machine NO.: 3806/1978

- Not connected to electricity in its new location
- Has no cutterhead

2) Oscillating mortising machine

Make: Bacci  
Model: MOA/1977

- Not working because of missing spare parts

3) Tenoning machine

Make: Bacci  
Model: TSP/1977

- Not working because of missing spare parts and burnt motor



ANNEX V

List of urgently needed Spare Parts

<u>Pos. No.</u>	<u>Description</u>	<u>Quantity</u>	<u>Estimated total cost (\$US)</u>
1	Buss type fuses, 30A, 600 V	100	*
2	On-off switch for the circular sawing machine Rockwell, Model RT30 Catalogue numbers 234-11-27-0002 233-11-27-0001	1	*
3	Thrust bearing for the above machine Catalogue No. 194-03-00-0058	2	*
4	Table cover for the above machine Catalogue No. 83-5B 2KK 2-0	1	*
5	V-Belt for the above machine Type: F1-Ref 1200 Gates Catalogue No.: 157-1500-0035	3	*
6	V-Belt for the above machine Ref.: 1210 Gates Catalogue No. 158-1500-0036	3	*
7	V-Belt for the above machine Ref.: 1220 Gates Catalogue No. 159-15-00-0041	3	*
8	Ball-bearing for the above machine Type: SKF 6005-2 RS Catalogue No. 89-03-00-0067	3	*

Potential supplier for items 2 to 8:

Rockwell do Brasil  
Divisao Invicta  
Au Major Jose Levy  
Sobrinho 2500  
Brazil

ANNEX V (2)

<u>Pos. No.</u>	<u>Description</u>	<u>Quantity</u>	<u>Estimated total cost (\$US)</u>
9	Grinding wheels 125x20x20 mm Diamond grit: D 91, Pos 1 Concentration hardness: 30/50	4	*
10	Grinding wheels 150x20x20 mm Diamond grit: D 76, Pos. 1A Concentration hardness: 50	4	*
11	Grinding wheels 50x55x10 Diamond grit: D 76, Pos. 4 Concentration hardness: 50	4	*
Potential supplier for items 9 to 11:			
Sigrist and Müller Werkzeug- und Maschinenfabrik CH-8197 Rafz Switzerland			
12	Spindle sleeves for the front groove bearing, no. 6209, for the six-spindle moulding machine Gubisch, type 172-S/7	6	*
13	Spindle sleeves for the rear groove bearing, no. 6208, for the above machine	6	*
Potential supplier for items 12 and 13:			
Maschinenfabrik Gubisch K.G. Liebig Strasse 5 Postfach 544 D-2390 Flensburg (FRG) Telex 22804			
14	Drum for photocopy machine Ricoh Model: FT 3050	1	*
15	Hot roll for the above machine	1	*
16	Pressure roll for the above	1	*

(Items 14 to 16 can be purchased locally in Bangkok)

ANNEX V (3)

<u>Pos. No.</u>	<u>Description</u>	<u>Quantity</u>	<u>Estimated total cost (\$US)</u>
17	Set of rotational speed control light bulbs for Schneider spindle moulder machine, model: SK 2/4-II	2	*
18	Set of fine fuses (4A) for the above machine	4	*
19	Set of "machine ready" control light bulbs for the above machine	2	*
20	Set of "break down" control light bulbs for the above machine	2	*
	Potential supplier for items 17 to 20:		
	Schneider GmbH Skagerrakstr. 21 - 23 D-3540 Korbach (FRG)		
21	Set of rubber feeding rollers for HolzHer feeder, type ET-117	2	*
	Potential supplier for item 21:		
	HolzHer, Karl M. Reich Maschinenfabrik GmbH Postfach 1740 D-7440 Nürtingen (FRG)		
22	Set of rubber feeding rollers for Univer feeder, model: 904V	2	*
	Potential Supplier for item 22:		
	Pertici S.p.A. Viale della Repubblica, 50 50050 Gambassi Terme (Firenze) Italy		
23	Cutters for rounding-off tenoning machine Paolino Bacci, model: TSP part no. 120/025	10	150
24	Circular saw blade for the above machine, part no. 185/015	3	60

ANNEX V (4)

<u>Pos. No.</u>	<u>Description</u>	<u>Quantity</u>	<u>Estimated total cost (\$US)</u>
25	Scriber cutter R.H. for the above machine, part no. 60/0252	10	150
26	Chamfer cutter R.H. for the above machine, part no. 64/0200	10	100
27	Set of bolts and nuts for mounting the cutters and saw blade described above under items 23 to 26	5	50
28	Set of cutters, 75 mm, for horizontal copying lathe, Paolino Bacci model T3M-0	2	*
29	Set of spurs for cutters for the above machine, catalogue no. 40/0440	4	*
Potential supplier for items 23 to 29:			
Paolino Bacci Via Toscoromagnola 230 56021 Cascina (Pisa) Italy			
30	Reversing switch for semi-automatic lathe Locatelli, model Super Volcano 1200-DL.667.	1	*
31	Sheet material for making templates for the above machine	2	*
Potential supplier for items 30 and 31:			
Locatelli Macchine Viale Italia, 84 24011 Almè (Bergamo) Italy			
<u>TOTAL:</u>		<u>(up to the value of):</u>	<u>\$US 7,000</u>

\* Price estimations were not available at the time of report writing.

ANNEX VI

List of recommended additional equipment

<u>Pos. No.</u>	<u>Description</u>	<u>Quantity</u>	<u>Estimated total cost (\$US)</u>
1	Mechanical hold-down toggle clamps for use in jigs (10 medium + 10 large)	20	200
2	Pneumatic screw driver for use in the assembly of furniture components (complete with set of bits for small, medium and large screw heads)	2	600
3	Electrical or pneumatic portable hand sander for doing patching and repair work on semi-finished components for improving quality; similar to model: Makita 9035 SB or Bosch PSS 230	2	400
4	Sanding paper for above machines (100 pcs. 120 grit + 100 pcs. 220 grit)	200	50
5	Combination cloth punching and button covering press (hand-operated) complete with set of small, medium and large size blades and heads	1	250
6	Assortment of buttons and cover caps (500 each of 3 different sizes)	1500	50
7	Mechanical stapling machine for upholstery work (staple size: 6 mm)	2	100
8	Metal staples for item 7 (above)	5000	25
9	Horizontal grinding machine for grinding the butt-welded area of band saw blades, complete with 3 pcs. of grinding wheels; similar to IDEAL, model SM60	1	350
Total ex works:			2,025
Estimated charges for packing, shipping and insurance			200
<u>Grand total:</u>			<u>\$US 2,225</u>

Potential supplier and consolidated shipper for all items:

Coimal Italiana S.p.a.  
 Strada Campanara s.n.  
 61100 Pesaro (Italy), telex: 5670012 Coimal I

ANNEX VII

Recommended Work Programme for UNV (Mr. L. Gronchi)  
(covering the period from 21 January to 1 October 1987)

- 1) Complete the currently ongoing training programme for non-factory trainees which has already been started. To the extent possible, demonstrate to trainees various operations and tools practically in the factory.
- 2) Select, in co-operation with the counterpart, a range of furniture items for prototype making (provided full co-operation is given by the counterpart).
- 3) Prepare the technical production drawings of the furniture items selected for prototype production.
- 4) Prepare the technical production drawings of the jigs that will be used during the production of prototypes.
- 5) Produce the necessary jigs for each prototype furniture item.
- 6) Assist the counterparts in installing the compressed air system and in connecting of machines to the system.
- 7) Commission and test, in co-operation with the counterparts, the remaining uninstalled machines supplied by the project.
- 8) Prepare operational instructions specifically for those machines that were installed in the factory by the project.
- 9) Train the machine operators and the available counterpart staff in the operation and maintenance of the newly installed equipment.
- 10) Produce, in co-operation with the counterparts, the mutually agreed on furniture prototypes by using the project-supplied modern equipment.
- 11) Demonstrate, during the production of prototypes, the basic quality control procedures.
- 12) Demonstrate, during the production of prototypes, the necessary safety measures in the operation and use of woodworking machines.
- 13) Prepare and reproduce the manuals still outstanding which were assigned to him, namely:
  - Manual on routing and moulding
  - Manual on tenoning and mortising
- 14) Provide, to the extent possible, ad hoc assistance and advice to the counterparts and machine operators in areas in which he is competent (e.g. work preparation, technical drawing, production control, quality control, record keeping, etc.).

W O R K   P R O G R A M M E

(for Mr. L. Gronchi, UNV, from 1 February to 1 October 1987)

Task No.	Description of Tasks	1987								
		Feb.	March	April	May	June	July	August	Sept.	
1	Completion of ongoing training course	----								
2	Selection of prototype models	----								
3	Preparation of technical drawings of prototypes		-----							
4	Preparation of technical drawings of jigs		-----							
5	Production of jigs			----						
6	Assisting at the installation of compressed air system	-----								
7	Commissioning and testing of machinery			----						
8	Preparation of operational instructions for	-----								
9	Training of machine operators			-----	-----	-----	-----	-----	-----	-----
10	Production of prototypes				-----	-----	-----	-----	-----	-----
11	Demonstration of quality control procedures				-----	-----	-----	-----	-----	-----
12	Demonstration of machine woodworking safety				-----	-----	-----	-----	-----	-----
13	Preparation of outstanding manuals	-----	-----	-----	-----	-----	-----	-----	-----	-----
14	Provision of <u>ad hoc</u> advice	-----	-----	-----	-----	-----	-----	-----	-----	-----