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ASSISTANCE IN THE DEVELOPMENT OF JIGS FOR FURNITURE PRODUCTION

SI/MEX/89/801

THE UNITED MEXICAN STATES

Technical report: Preliminary findings of the first phase*

Prepared for the Government of the United Mexican States
by the United Nations Industrial Development Organization,
acting as executing agency for the United Nations Development Programme

Based on the work of Pietro Borretti
Expert in jigs for furniture production

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

United Nations Industrial Development Programme
Vienna

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1 - MISSION DATA

Title and number of project:	Design and production of jigs for serial production of furniture SI/MEX/89/801/11-01
Period of mission:	4 August to 17 September 1989
Executing Agency:	United Nations Industrial Development Organization (UNIDO)
Backstopping officer:	Mr A. V. Bassili, Senior Industrial Development Officer
Counterpart Agency:	Consejo Coordinador de la Industria Mueblera, CANACINTRA, Mexico, D. F.
Main institutional contact:	- Ing. Antonio Mariscal Saenz, President, Consejo de la Industria Meublera
Counterparts:	- Lic. David Islas Martinez, Director, Consejo de la Industria Mueblera - Ing. Alejandro Elizalde Rubio Project Officer, Consejo de la Industria Mueblera
Objective of the mission:	To introduce appropriate jig making know-how as a means to: <ul style="list-style-type: none">- expedite wood-processing operations,- ensure accuracy of wood machining operations and attain interchangeability of component parts,- optimize quality of wood-machined surfaces, and- contribute to safety in wood-machining operations
Duties	The duties of the expert can be found in the attached job description (Annex I)

2 ACTIVITIES CARRIED OUT

Two-day course at CANACINTRA

A two-day course was conducted by the consultant at CANACINTRA on jig design, jig making and jig applications. The course was attended by some 45 persons, representing about 20 companies, and covered the following topics:

- (a) Definition of jigs
- (b) Purpose of jigs
- (c) Applicability of jigs to artisanal and industrial operations:
 - jigs for use in connection with hand-tool operations,
 - jigs for use in connection with power-tool operations,
 - jigs for use in wood-machining operations,
 - jigs for use in assembly operations.
- (d) Types of jigs for various wood-machining operations: routing operations; spindle-moulder operations; sawing operations; surface planing operations.
- (e) Assembly jigs operated by pneumatic cylinders,
- (g) Types of clamps for machining operations,
- (h) Types of clamps for assembly operations,
- (i) Proper working drawings as a pre-requisite for accurate jig work
- (j) Measuring instruments for controlling accuracy of jig work

Factory training sessions

Short training sessions were conducted by the consultant at selected factories and the Colegio Nacional to review again the main topics dealt with at the CANACINTRA two-day course, so as to extend the training benefit to a wider group of technicians. The following factories were included in the extension of the original programme: P.M. Steel, Fyli, Deca, Gamma, Industria Colombaires, D.M. National, Stylos and Cocinas Provel. The training sessions also covered trouble-shooting in other particular aspects of plant operation such as, for example, engineering of wood products for serial production and introduction of proper machine lubrication.

Ad hoc assistance to furniture factories

The consultant provided ad hoc assistance varying from two to four days to the following furniture factories; P.M. Steel, Muebla, Fyli, Deca, Stylos, Gamma, Cocinas Provel, Industria Colombaires, and D.M. National.

The assistance consisted of: initial factory visits to identify individual capabilities and requirements in jig making and select in each factory one or more jig making exercises to be undertaken as part of the project. Specifications of jig-related equipment were also provided - such as clamps, machine accessories and cutting tools - to be purchased to cover particular needs. Further factory visits followed to review progress made and recommend improvements and/or modifications of jigs as required.

Visits to training institutions

The main woodworking training institutions located in Mexico, D. F., were visited by the consultant in order to identify a school which could host demonstrations on jig making and applications to be carried out by the consultant in his return mission to Mexico in Phase II of the project. The following institutions were visited in this respect:

- (a) Colegio Nacional de Educación Profesional Técnica
(Conalep Ticoman)
- (b) Instituto Politecnico Nacional
- (c) Centro de Estudios Cientificos y Tecnologicos
- (d) Instituto de Capacitación de la Industria de la
Construcción

The Colegio Nacional was found to be the only institution in Mexico, F. D. equipped with machinery suitable for the purpose of carrying out the envisaged jig demonstration activities in Phase II of the project. In fact, the Colegio is the only technical school with a potential to carry out proper training for wood machinists. Furthermore, it is equipped with comprehensive metal working facilities and could therefore produce clamps and other jiggling accessories for the industry.

Selection of equipment for purchasing under the project

The Colegio Nacional is equipped with a good set of basic woodworking equipment (see list in Annex III) some of which had never been utilized at the time of the consultant's visit for lack of proper accessories, cutting tools and adequate operating know-how. Furthermore, none of the supervising personnel had had any experience in jig making. Therefore, the consultant has prepared a listing with specifications of a number of cutting tools, jig-making items and machine accessories to be purchased with the funds available under the project. The selection has been with the following purpose:

- (a) To allow demonstration work to be conducted at the Colegio in Phase II of the project, on the use of jigs in woodworking operations,
- (b) To lay the basis for converting the Colegio Nacional into a pilot centre for institutional training of skilled wood-machinists for the furniture and joinery industry,
- (c) To provide samples of imported jig-making accessories to be reproduced for the industry in the metal working machine shop of the Colegio Nacional.
- (d) To provide samples of imported cutting tools of appropriate design (meant for spindle-moulding and routing operations) for possible reproduction locally by the UTEMEX company.

All the equipment to be purchased under the project is meant for use on two particular types of machines already installed at the Colegio Nacional:

- (a) The Swedish-made spindle moulder EJICA type F-4-M, and
- (b) the four brand-new Italian-made routers SAMCO.

Meeting at LANFI

The meeting at the Laboratorios Nacionales de Fomento Industrial (LANFI) was arranged by the UNIDO SIDFA Mr I.F. Contreras to discuss the possibility of establishing a furniture testing facility. The meeting was attended by LANFI'S Director General, Mr. J.A. Estera, Ms. Ana Stefanovich also of LANFI, Messrs. A. Mariscal and A. Ruiz Galindo of CANACINTRA and Mr J. Martinez IMAC'S Acting Director.

LANFI'S testing facilities of relevance to the furniture industry include equipment to test wood mechanical properties and surface resistance.

The main conclusion of the meeting was that the role of LANFI in setting up and operating a regular programme of furniture testing for the industry would be dependant upon the outcome of a mission to be undertaken by AIDIMA'S consultants already recruited under a UNDP-funded project.

Visit to Festo Pneumatic S.A.

The purpose of the visit was to investigate the possibility of introducing basic low-cost automation techniques in the furniture industry. It was found that the Festo company, besides distributing a wide range of pneumatic equipment for applications in the various industrial sectors, is also engaged in conducting practical-oriented courses on low-cost automation based on the utilization of pneumatics. During the consultant's debriefing at UNIDO, it was agreed with Mr Bassili that FESTO could possibly extend its training activities to the furniture industry by utilizing as a reference the UNIDO publication on low-cost Automation No ID/154, a copy of which had been left with Mr A. Mariscal of CANACINTRA by the consultant.

Visit to Utemex S.A.

The Utemex Company is one of Mexico's leading manufacturers of machine cutting tools for the furniture and joinery industry. It also operates a comprehensive tool-maintenance service. The discussions here centred on the possibility of introducing cutting tools with improved cutting characteristics - particularly those for use on spindle moulder. It was agreed in this respect that Utemex would have access to the sample cutting tools purchased under the project for use in demonstration work at the Colegio Nacional.

2 Visit to Leon Weil S.A.

The company distributes a range of toggle clamps of Mexican manufacture, part of which is suitable for use in the furniture industry. Samples of such clamps were purchased and their possible use in furniture production was illustrated by the consultant during the factory visits.

Proposal for the creation of a quality label for
Mexican furniture

On the occasion of the course conducted at CANACINTRA, the consultant had highlighted the importance of introducing a quality label for Mexican-made furniture as a means to certify product quality in the endeavour to promote furniture exports to the USA markets. The consultant's recommendation in this respect was to seek the assistance of the Swedish Furniture Research Institute that has developed the Mobel FACTA quality label programme widely adopted in the Scandinavian countries. During the consultant's debriefing at UNIDO, Mr. Bassili expressed the opinion that funds might be made available by UNIDO to provide such assistance, provided an official request to this effect be made by the Mexican government.

Preparation of a programme for technical services
to the furniture industry

In spite of various activities already undertaken and planned to be undertaken with respect to the provision of technical services to the furniture industry, no attempt had been made up to the time of the consultant's mission to elaborate a co-ordinated programme of technical services to cover all the critical requirements of the sector. Further to discussions on this subject with Messrs. A. Mariscal and A. Ruiz Galindo of CANACINTRA and J. Martinez of IMAC, the consultant produced reference tables (see Annex II) on the Development of Technical Services for the Furniture Industry covering the following areas:

- (a) Research and testing services
- (b) Quality certification services
- (c) Information services
- (d) Consultancy services
- (e) In-service training

Advice on furniture engineering

During the factory visits, the consultant found that one of the main problems experienced by the industry as a whole was the lack of furniture engineered for serial production and a rational use of raw material. Thus trouble shooting advice was provided by the consultant in this respect. In one particular instance, structural modifications resulted in a simplified process and a reduction of 40 kg in the material content in the manufacture of a standard desk.

3 RECOMMENDED ACTIVITIES BY THE UNIDO CONSULTANT IN PHASE II OF THE PROJECT.

Visits by the consultant to the nine factories that participated in Phase I of the project by undertaking jig-making exercises. The activity would involve the following:

- (a) Assessment of progress made in jig making,
- (b) Introduction of possible improvements in jig produced,
- (c) Selection of jigs produced by individual factories to be utilized for demonstration purposes at the Colegio Nacional.

Activities to be carried out by the consultant at the Colegio Nacional:

- (a) Preparation, jointly with the Colegio's counterparts, of sample demonstration jigs incorporating the use of jig-making equipment purchased by UNIDO in Phase I of the project,
- (b) Demonstration for participants from the industry and the College of sample jigs produced at the Colegio and of selected jigs produced by individual furniture factories in the course of Phases I and II of the project,
- (c) Selection from among jig-making equipment and machine accessories supplied under the project of items to be manufactured by the Colegio Nacional for the benefit of the furniture industry,

- (d) Selection from among the cutting tools supplied under the project of those items to be reproduced locally by the UTEMEX Tool Manufacturing Company, and
- (e) Show video cassettes on jig making and other subjects of plant operation purchased in Phase I of the project.

Provide assistance to individual factories in improving existing furniture designs so as to streamline production, minimize material content, and facilitate serial production.

Assist the FESTO company in preparing an in-service training programme on low-cost automation for the furniture industry based on the UNIDO publication ID/154.



UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

PROJECT OF THE GOVERNMENT OF MEXICO

ASSISTANCE IN THE DEVELOPMENT OF JIGS FOR FURNITURE PRODUCTION

JOB DESCRIPTION

SI|MEX|89|801|11-01(J-12209)

Post title	Expert in jigs for furniture production
Duration	Four months (split mission)
Date required	
Duty station	Mexico City with eventual travel in the country.
Purpose of project	To demonstrate the use of jigs for serial furniture production
Duties	<p>1. <u>Phase I: (6 weeks)</u></p> <p>(a) Prepare, jointly with the counterpart, the physical arrangements and demonstration workshop on jigs production and uses in the furniture industry.</p> <p>(b) To select participants from about 25 furniture companies.</p> <p>(c) To run a two-week course on use of jigs for serial furniture production.</p> <p>(d) To provide two-day technical assistance to five furniture companies.</p> <p>(e) To draw up detailed technical assistance specifications for the equipment to be provided by UNIDO (UNIDO HQ)</p> <p>2. <u>Phase II: (10 weeks)</u></p> <p>(a) To install and operate the demonstration equipment</p> <p>(b) To provide two-day technical assistance to the remaining twenty furniture companies.</p> <p>(c) To prepare a manual on the manufacture and use of jigs for serial furniture production, which could be used as a new teaching method by the counterpart, as well as the corresponding visual aids.</p>

Applications and communications regarding this Job Description should be sent to:

Project Personnel Recruitment Branch, Department of Industrial Operations
 UNIDO, Vienna International Centre, P.O. Box 300, A-1400, Vienna, Austria

- Qualifications** Engineer or wood technologist with long experience in plant management, experience in developing countries and in training desirable.
- Language** Spanish preferred, English acceptable.
- Background information** The Mexican furniture industry has been endeavouring to increase its limited exports mainly to the USA, which in 1987 imported about US\$ 2,500 million worth of wooden furniture. A major problem is the deficient use of jigs for serial furniture production, a critical factor to increase furniture productivity and product quality while reducing production costs. This problem and other related activities were discussed by a UNIDO staff member expert in wood processing with CANACINTRA on several occasions. Now, the new Mexican Government is endeavouring to modernize its production system through the support of the private sector as the main engine of economic growth. In view of the good export potential of Mexico's furniture industry, the Government has requested UNIDO's assistance in demonstrating how to develop and use jigs in serial furniture production.

DEVELOPMENT OF TECHNICAL SERVICES FOR THE FURNITURE INDUSTRY

TYPE OF SERVICE	FUNCTION OF SERVICE	INSTITUTIONAL RELATIONSHIP	EX
<p>1. RESEARCH AND TESTING</p>	<p>1.1 SELECTION AND/OR ADAPTATION OF STANDARD SPECIFICATION TO EVALUATE THE MOST IMPORTANT PERFORMANCE CHARACTERISTICS OF FINISHED FURNITURE AS WELL AS OF MATERIALS USED IN FURNITURE MANUFACTURING</p> <p>1.2 DEVELOPMENT OF AD-HOC STANDARDS AS REQUIRED</p> <p>1.3 TESTING OF FURNITURE PROTOTYPES AS A DESIGN TOOL TO ELIMINATE POTENTIAL DEFECTS</p> <p>1.4 TESTING OF STANDARD FURNITURE AS A BASIS TO GRANTING QUALITY LABELS ACCORDING TO THE FOLLOWING PERFORMANCE FACTORS: (a) STRENGTH (b) DURABILITY (c) SURFACE RESISTANCE AND QUALITY OF FINISH (d) FUNCTIONALITY (ERGONOMICS) (e) STABILITY (f) QUALITY OF MATERIAL AND PRECISION OF WORK</p> <p>1.5 TESTING OF FURNITURE MATERIALS (PANELBOARDS, LACQUERS, UPHOLSTERY MATERIALS, ADHESIVES, ETC) AS A BASIS TO GRANTING CERTIFICATION ON QUALITY OF MATERIALS</p>	<p>- LANFI - SECOFI - IMAC - CONSEJO IND. MUEBLERA - CANACINTRA NORMA</p>	<p>1 ASSISTA SPANIS INSTITU FUNDIN ORGANI TESTIN AND OP PROPOS AND TE</p> <p>2 1 1/2 LANFI PRIOR CONSUL FUNDIN</p> <p>3 SUPPLY EQUIPM TO BE</p> <p>4 PROVIS CONSUL ESTABL SERVIC ASSIST</p>
<p>2. QUALITY CERTIFICATION SERVICE</p>	<p>2.1 SELECTION AND/OR ADAPTATION OF A FURNITURE QUALITY ASSURANCE SCHEME</p> <p>2.2 ISSUING OF QUALITY LABELS TO FURNITURE TESTED BY THE TESTING SERVICE (REF 1.4)</p> <p>2.3 QUALITY CERTIFICATION OF FURNITURE MATERIALS</p>	<p>IMAC IN CO-OPERATION WITH SECOFI AND PROCUDARIA DEL CONSUMIDOR</p>	<p>1 ASSISTA SWEDISH INSTITU CONSULT QUALITY (POSSIB</p>

INSTITUTIONAL RELATIONSHIP	EXTERNAL INPUTS	LOCAL INPUTS
<p>LANFI OFI C BEJO IND. BLERA ACINTRA MA</p>	<p>1 ASSISTANCE ON THE PART OF THE SPANISH FURNITURE RESEARCH INSTITUTE AIDIMA (UNDP FUNDING) TO IDENTIFY ORGANIZATION STRUCTURES, TESTING FACILITY REQUIREMENTS AND OPERATING COST OF THE PROPOSED FURNITURE RESEARCH AND TESTING CENTRE.</p> <p>2 1 1/2 MONTH TRAINING OF A LANFI ENGINEER AT AIDIMA PRIOR TO THE FIELDING OF CONSULTANTS IN MEXICO (UNDP FUNDING)</p> <p>3 SUPPLY OF FURNITURE TESTING EQUIPMENT (SOURCE OF FUNDING TO BE IDENTIFIED)</p> <p>4 PROVISION OF SHORT-TERM CONSULTANTS TO ASSIST IN THE ESTABLISHMENT OF THE TESTING SERVICES (PHASE II OF SPANISH ASSISTANCE)</p>	<p>1 TWO COUNTERPART ENGINEERS WHO WILL BE RESPONSIBLE FOR THE OPERATION OF THE RESEARCH AND TESTING SERVICES ONCE THEY BECOME OPERATIONAL</p> <p>2 TESTING BUILDING FACILITIES</p> <p>3 EXISTING TESTING EQUIPMENT AT LANFI FOR TESTING WOOD MECHANICAL PROPERTIES AND FOR TESTING SURFACE RESISTANCE</p>

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1 ASSISTANCE OF THE PART OF THE SWEDISH FURNITURE RESEARCH INSTITUTE (2 MAN/MONTH CONSULTANCY) IN SETTING UP THE QUALITY CERTIFICATION SERVICE (POSSIBLE FUNDING BY UNIDO)

SECTION 2

DEVELOPMENT OF TECHNICAL SERVICES FOR THE FURNITURE INDUSTRY

TYPE OF SERVICE	FUNCTION OF SERVICE	INSTITUTIONAL RELATIONSHIP	TEXT
<p>3. INFORMATION SERVICE</p>	<p>3.1 TECHNICAL INQUIRY SERVICE DEALING WITH SPECIFIC MANUFACTURING TOPICS AND/OR PROBLEMS. SERVICE TO BE INITIALLY PROVIDED ON A CROSS-LINK ARRANGEMENT WITH LEADING OVERSEAS INSTITUTIONS DEALING WITH FURNITURE INDUSTRY DEVELOPMENT</p> <p>3.2 PERIODIC NEWSLETTER WITH ABSTRACTS ON TECHNOLOGICAL DEVELOPMENTS; REVIEWS OF NEW TYPES OF EQUIPMENT; REVIEW OF NEW DESIGNS, ETC.</p> <p>3.3 LIBRARY OF OVERSEAS LITERATURE RELATING TO THE FURNITURE INDUSTRY, WITH PARTICULAR EMPHASIS ON STUDIES AND PUBLICATIONS ISSUED BY OVERSEAS FURNITURE DEVELOPMENT INSTITUTIONS.</p> <p>3.4 LIBRARY OF LEADING FURNITURE INDUSTRY PERIODICALS</p> <p>3.5 CLEARING HOUSE FOR JOINT VENTURE OPPORTUNITIES WITH FOREIGN PARTNERS.</p> <p>3.6 ORGANIZATION OF OVERSEAS STUDY TOURS TO KEEP ABREAST OF TECHNOLOGICAL AND DESIGN DEVELOPMENT IN OTHER COUNTRIES</p>	<p>IMAC</p> <p>INFOTEC</p>	<p>1 ASSISTANCE SPANISH FURNITURE INSTITUTE CONSULTANCY INFORMATION SPANISH GOVERNMENT</p> <p>2 TWO-MONTH TECHNICAL ASSISTANCE (FUNDING)</p> <p>3 UNIDO ASSISTANCE</p>
<p>4 CONSULTANCY SERVICES</p>	<p>4.1 PROVISION OF ADVISORY SERVICES COVERING CRITICAL MANUFACTURING ASPECTS <u>RELEVANT TO THE FURNITURE INDUSTRY AS A WHOLE</u></p> <p>SUBJECTS REQUIRING PRIORITY:</p> <p>(a) JIG DESIGN AND APPLICATIONS AS A MEANS OF IMPROVING PRODUCTIVITY AND QUALITY 1/</p> <p>(b) DEVELOPMENT OF FURNITURE DESIGN STRUCTURES SUITABLE FOR SERIAL PRODUCTION</p>	<p>CANACINTRA AND IMAC</p>	<p>1 UNIDO COOPERATION</p> <p>2 SUPPLIES</p>

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FUNCTIONAL RELATIONSHIP	EXTERNAL INPUTS	LOCAL INPUTS
<p>IMAC INTEC</p>	<p>1 ASSISTANCE ON THE PART OF THE SPANISH FURNITURE RESEARCH INSTITUTE (2 MAN/MONTH CONSULTANCY) IN SETTING UP THE INFORMATION SERVICE (GRANT OF SPANISH GOVERNMENT)</p> <p>2 TWO-MONTH TRAINING AT AIDIMA OF IMAC'S TECHNICAL MANAGER (FUNDING AS ABOVE)</p> <p>3 UNIDO ASSISTANCE TO BE SOUGHT</p>	<p>1 COUNTERPART PERSONNEL</p> <p>2 LIBRARY FACILITIES</p> <p>NOTES</p> <p>A FULL-TIME TECHNICAL MANAGER SHOULD BE APPOINTED TO OVERSEE ALL IMAC SERVICE ACTIVITIES. HE SHOULD HAVE EITHER WOODWORKING OR FORESTRY BACKGROUND.</p>
<p>IMACINTRA IMAC</p>	<p>1 UNIDO CONSULTANTS 1/</p> <p>2 SUPPLIES 1/</p>	<p>1 COUNTERPART PERSONNEL</p> <p>SECTION 2</p>

DEVELOPMENT OF TECHNICAL SERVICES FOR THE FURNITURE INDUSTRY

17/18

TYPE OF SERVICE	FUNCTION OF SERVICE	INSTITUTIONAL RELATIONSHIP	EXTERNAL
	<ul style="list-style-type: none"> (c) QUALITY CONTROL MANAGEMENT (d) WOOD FINISHING (e) PLANT ORGANIZATION (f) PRODUCT AND PROCESS ENGINEERING (h) LOW-COST AUTOMATION AND INSTALLATION AND MAINTENANCE OF PNEUMATIC SYSTEMS (i) MERIT RATING AND WAGE INCENTIVES AS A MEANS TO IMPROVE LABOUR PERFORMANCE 		<ul style="list-style-type: none"> 1 USA CONSULT 2 AIDIMA CONS 3 FESTO TECHN
<p>5 IN-SERVICE TRAINING</p>	<p>5.1 SHORT-TERM, PART-TIME INSTITUTIONAL TRAINING ON CRITICAL WOOD MACHINING TECHNIQUES FOR SKILLED LABOUR ALREADY EMPLOYED IN THE INDUSTRY. TRAINING TO COVER, AMONG OTHERS, THE FOLLOWING SUBJECTS:</p> <ul style="list-style-type: none"> (a) EFFICIENT USE OF BASIC WOODWORKING MACHINES (b) APPROPRIATE UTILIZATION OF MACHINE ACCESSORIES, (c) APPROPRIATE SELECTION AND UTILIZATION OF CUTTING TOOLS FOR MACHINING OPERATIONS (d) JIG DESIGN AND APPLICATIONS <p>5.2 USE OF LOW-COST AUTOMATION IN WOOD-MACHINING AND ASSEMBLY OPERATIONS <u>2/</u></p>	<p>COLEGIO NACIONAL DE EDUCACION PROFESIONAL TECNICA</p> <p>FESTO CO.</p>	<ul style="list-style-type: none"> 1 OVERSEAS TR WOODWORKING 2 ADDITIONAL EQUIPMENT F DEMONSTRATI

NOTES

1/ ON GOING UNIDO PROJECT SI/MEX/89/801 (PHASES I AND II).
DEMONSTRATION WORK TO BE CONDUCTED IN PHASE II WITH THE AID OF THE JIG-MAKING EQUIPMENT PURCHASED BY UNIDO UNDER THE PROJECT

2/ SHORT-TERM IN-SERVICE TRAINING ON LOW-COST AUTOMATION TO BE CONDUCTED BY FESTO ON THE BASIS OF UNIDO PUBLICATION ID/18 THE SUBJECT

INSTITUTIONAL RELATIONSHIP	EXTERNAL INPUTS	LOCAL INPUTS
<p>→</p> <p>→</p> <p>→</p>	<p>1 USA CONSULTANT (BILATERAL AID)</p> <p>2 AIDIMA CONSULTANT</p> <p>3 FESTO TECHNICIANS</p>	<p>1 COUNTERPART PERSONNEL</p> <p>2 LOCAL EXPERTISE TO COVER SUBJECTS (c) (e) AND (i)</p>
<p>COLEGIO NACIONAL DE EDUCACION PROFESIONAL TECNICA</p> <p>FESTO CO.</p>	<p>1 OVERSEAS TRAINING OF A WOODWORKING INSTRUCTOR <u>3/</u></p> <p>2 ADDITIONAL BASIC WOODWORKING EQUIPMENT FOR TRAINING AND DEMONSTRATION PURPOSES <u>3/</u></p>	<p>1 TRAINING PERSONNEL</p> <p>2 TRAINING FACILITIES</p>

NOTES

2/ SHORT-TERM IN-SERVICE TRAINING ON LOW-COST AUTOMATION TO BE CONDUCTED BY FESTO ON THE BASIS OF THE UNIDO PUBLICATION ID/154 ON THE SUBJECT

3/ SOURCE OF FUNDING TO BE IDENTIFIED

LIST OF PERSONNEL AND FACTORIES/INSTITUTIONS VISITED

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| 3 | Mr Armando Ruiz Galindo
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| 4 | Mr David Islas Martinez
Director | Consejo Coordinator de la
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| 5 | Mr Alejandro Elizalde R.
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| 6 | Mr I. Contreras
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Production Manager | Muebles Fyli |
| 10 | Mr Oscar Sobrino C.
Managerial Staff | Meubles Fyli |
| 11 | Mr Abel Sanchez G.
Technical Director | Acabados en Madera Deca S.A. |
| 12 | Mr Jesus Andrade A.
Production Control Head | " |
| 13 | Mr Nestor L. Castillo F.
Designer | " |
| 14 | Mr D.I. Mauricio S.
Designer | " |

- | | | |
|----|---|--|
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| 17 | Mr Vicente Teodoro
Figuera N. | " |
| 18 | Mr Alfonso Rosas A.
General Manager | MUEBLA. S.A. de C.V. |
| 19 | Mr Carlos Rivera M.
Production Manager | " |
| 20 | Mr Jame Martinez N.
Director General | STYLOS
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Lerma, Edo de Mexico
Lada 91-728-50600 |
| 21 | Mr Ricardo Madrid M
Factory Manager | " |
| 22 | Mr Genaro Ponce G.
Designer | " |
| 23 | Mr Humberto Cruz M.
Sales Manager | Industria Colombaire S.A.
Prol. La Viga 175
Mexico 04230, D. F.
Tel. 581-48-77 |
| 24 | Mr Arturo Godinez
Production Manager | " |
| 25 | Mr Jorge Mariscal
General Manager | GAMMA, Banos y Cocinas S.A.
Prol. Manuel Acuna 142
02730 Mexico, D.F.
Tel. 56 01 64 |
| 26 | Mr F. Fernando Ricalde A.
Production Manager | " |
| 27 | Mr J. Ignacio Barrera L.
Architect | " |
| 28 | Ms Dolores Godoy
Designer | " |
| 29 | Mr Amando Santiago
Production Supervisor | " |
| 30 | Mr Alfredo Medina F.
General Manager | Tre Picos S. A.
Insurgentes Centro 14
Entre Edison y Puente
de Alvarado, Mexico 4, D.F.
Tel. 546-17-13 |

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| 31 | Mr Juan Antonio Vega
General Manager | Cocinas Provel, S.A. de C.V.
P.O. Box 60484
Mexico 18, D.F.
Tel. 516-08-63 |
| 32 | Mr Jaime Velaquez del C.
Director General | " |
| 33 | Mr Ignacio Galicia
Production Supervisor | " |
| 34 | Mr Diego Fuentes
Machining Foreman | " |
| 35 | Mr Jesus Fonseca J.
Plant Manager | D.M. National S.A. de C.V.
Calz. San Juan de Aragon 439
577-21-22 Mexico 14, D.F.
Tel. 577-38-57 |
| 36 | Mr Arturo Carbajal B.
Design Manager | " |
| 37 | Mr Jesus Fuentes M.
Jig maker | " |
| 38 | Mr Pablo Rojas S.
Tool Maker | " |
| 39 | Mr Alfredo Medina F.
Director | Tre Picos S.A.
Insurgentes Centri 14
Entre Edison y Fuente
de Alvarado, Mexico 4, D.F.
Tel. 546-17-13 |
| 40 | Mr Dario Solis
Production Manager | Carpenteria y Ebanisteria
Canela No 460
Mexico 8, D.F.
Tel. 657-14-58 |
| 41 | Mr Jose Luis Fonseca
Director | Instituto Politecnico Nacional
Constituyentes B13
Col. Belen de las Flores
Tel. 5-15-23-13 |
| 42 | Mr David Aranda A.
Co-ordinator External
Services | Centro de Estudios Cientifico
"WILFRED MASSIEU"
Av. de los Maestros 217
Cosco de Santo Tomas
Cod. Postal 11340, Mexico, D.F.
Tel. 547-71-08 |
| 43 | Mr Roberto Axotla M.
Director | Colegio Nacional de Educacion
Tecnica (Cobaleo Ticoman)
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Acueducto, Unidad Residencial
Acueducto de Guadalupe,
Mexico, D.F.
Tel. 392-76-65 |

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| 44 | Mr Jose M. Yanez M.
Department Head,
Technology Activities | " |
| 45 | Mr Jaime Nieto H.
Woodworking Instructor | " |
| 46 | Mr Mario Avila C.
Woodworking Instructor | " |
| 47 | Mr Ramon Gonzalez C.
Woodworking Instructor | " |
| 48 | Mr Francisco Cruz C.
Woodworking Instructor | " |
| 49 | Mr Alfonso Cedillo V.
Training Head | Instituto de Capacitation de
la Industria de la Construction
P.O. Box 01780, Mexico D.F.
Tel. 683-61-37
telex 1764138 |
| 50 | Mr Jose Antonio
Esteva M.
General Director | Laboratorios Nacionales
de Fomento Industrial
(LANFI)
P.O. Box 41-537, Mexico, D.F.
Tel. 589-01-99 |
| 51 | Ms. Ana Stefanovich H.
Director of Industrial
Promotion | " |
| 52 | Mr Gerardo Valdes D.
Training Manager | FESTO Pneumatic, S.A.
Av. Ceylan No 3
Col. Tequesquinahuac
54020 Tlalnepantla, Edo. de Mex.
Tel. 3-90-71-00
Telex 17-2365 FESTME
fax 390-71-00 |



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CEDULA DE CONTROL

PLÁNTEL TICOMAN

AREA MODELOS INDUSTRIALES

No. MARBETE	CLAVE CONT.	No. DE INVENTARIO	CANT.	DESCRIPCION
1004281	40	002 BM 29410130129585001	1	TORNO PARA MADERA MCA. SICAR MOD. MUM-1200
1004282	40	002 BM 29410130129585001	1	TORNO PARA MADERA MCA. SICAR MOD. MUM-1200
1004283	40	002 BM 29410130129585001	1	TORNO PARA MADERA MCA. SICAR MOD. MUM-1200
1004284	40	002 BM 29410130129585001	1	TORNO PARA MADERA MCA. SICAR MOD. MUM-1200
1004285	40	002 BM 29410130129585001	1	TORNO PARAMADERA MCA. SICAR MOD. MUM-1200
1004286	40	002 BM 29411030129587001	1	PULIDORA DE BANCO PARA DICO MCA. KA LA MAZZO, D-512
1004287	40	002 BM 29411030129587001	1	PULIDORA DE BANCO PARA DISCO MCA. KA LA MAZZO, D-512.
1004288	40	002 BM 29411030129587001	1	PULIDORA DE BANCO PARA DICO MCA. KA LA MAZZO, D-512.
1004289	40	002 BM 29411030129587001	1	PULIDORA DE BANCO PARA DICO MCA. KA LA MAZZO, D-512.
1004290	40	002 BM 29421600129587001	1	TROMPO PARA MADERA MCA. ROCKWELL MOD. 8718 SERIE 3436
1004291	40	002 BM 29421600129587001	1	TROMPO PARA MADERA MCA. ROCKWELL MOD. 8713 SERIE 3018
1004292	40	002 BM 29411630129585001	1	SIERRA CIRCULAR MCA. SICAR SC1000
1004293	40	002 BM 29410712129585001	1	TALADRO DE COLUMNA MCA. TURMOSA MOD. 2508 GL SERIE 1316
1004294	40	002 BM 29410540129585001	1	CANTEADORA MCA. EJTA
1004295	40	002 BM 29410540129585001	1	CANTEADORA MCA. EJTA
1004296	40	002 BM 29410540129585001	1	CANTEADORA MCA. EJTA
1004297	40	002 BM 29410540129585001	1	CANTEADORA MCA. EJTA
1004298	40	002 BM 29410540129587001	1	CANTEADORA MCA. DELTA MOD. 6 DE LUXE SERIE 38394286
1004299	40	002 BM 29421701129585001	1	ASPIRADORA PARA POLVO MOD. MCZ MOBEL NICE., SERIE 3022098
1004300	40	002 BM 29421701129585001	1	ASPIRADORA PARA POLVO MOD. MCZ MOBEL NICE SERIE 3022099
1004301	40	002 BM 29422105129587001	1	ESMERIL DE PEDESTAL MCA. FONDAY SEW
1004302	40	002 00 29411630129500001	1	PULIDORA DE BANDA PARA BANCO MCA. - SEARS REEBUCK MOD. 14922641
1004303	40	002 BM 29411633129587001	1	SIERRA RADIAL MCA. OMOGA SERIE 173715
1004304	40	002 BM 29411633129587001	1	SIERRA RADIAL MCA. OMOGA SERIE 173747
1004305	40	002 BM 29411030129588001	1	PULIDORA DE DISCO Y BANDA MCA. SICAR MOD. 9054-2
1004306	40	002 BM 29411030129588001	1	PULIDORA DE DISCO Y BANDA MCA. SICAR MOD. 9054-2
1004307	40	002 BM 29411030129588001	1	PULIDORA DE DISCO Y BANDA MCA. SICAR MOD. 9054-2
1004308	40	002 BM 29411030129588001	1	PULIDORA DE DICO Y BANDA MCA. SICAR MOD. 9054-2



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CEDULA DE CONTROL

PLANTEL TICOMAN

AREA MODELOS INDUSTRIAL

No. MARBETE	CLAVE CONT.	No. DE INVENTARIO	CANT.	DESCRIPCION	MANUAL
1004309	40	002 EX: 2941103012958801	1	PULIDORA DE DISCO Y BANDA MCA. SICAR MOD. 9054-2	
1004310	40	002 EX: 2941103012958801	1	PULIDORA DE DISCO Y BANDA MCA. SICAR MOD. 9054-2	
1004311	40	002 EX: 29422105129567001	1	ESMERIL DE PEDESTAL	
1004312	40	002 EX: 29411120129587001	1	AFILADORA Y RECTIFICADORA DE HTAS. MCA. ELITE MOD. 70 SERIE 922	
1004313	40	002 EX: 296070101295001	1	RAUTER MOD. 004 A-SCN (NUEVO)	
1004314	40	002 EX: 296070101295001	1	RAUTER MOD. 004 A-SCN (NUEVO)	
1004315	40	002 EX: 296070101295001	1	RAUTER MOD. 004 A-SCN (NUEVO)	
1004316	40	002 EX: 296070101295001	1	RAUTER MOD. 004 A-SCN (NUEVO)	
1004317	40	002 EX: 26104221129587017	17	BANCOS DE TRABAJO DE ANGULO 1 1/2 X 3/16 C/CUBIERTA DE MADERA	
1004318	40	002 CANCELADO 034	34	TORNILLOS DE BANCO MCA. VIMBERT No. 100	
1004319	40	002 00 26104221129500002	2	BANCOS DE ESTRUCTURA METALICA Y CUBIERTA DE ANGULO Y MADERA	
1004320	40	002 00 26104221129500001	1	BANCO DE TRABAJO DE ESTRUCTURA DE ANGULO Y MADERA	
1004321	40	002 EX: 29510800129583001	3	EXTINGUIDORES MCA. PHILADELPHIA MOD. 9 KGS. ASC	
1004322	40	002 EX: 26619170129500004	4	LAVABOS	

ANNEX V

COMMENTS OF SUBSTANTIVE OFFICER

This project foresaw a split mission by an expert in jigs for furniture production. This report was prepared by the expert who undertook the first phase of the split mission. When it became apparent he would not be able to undertake the second mission for health reasons, this report was prepared to reflect what he did and to serve as background material for the expert who was to complete the task. It should be read with this in mind.

Although certain aspects of this report have been incorporated in the project's terminal report, it was decided to reproduce it and submit it to the Government since it complements the terminal report and narrates in more detail the work done.

We fully concur with the expert's findings and recommendations.