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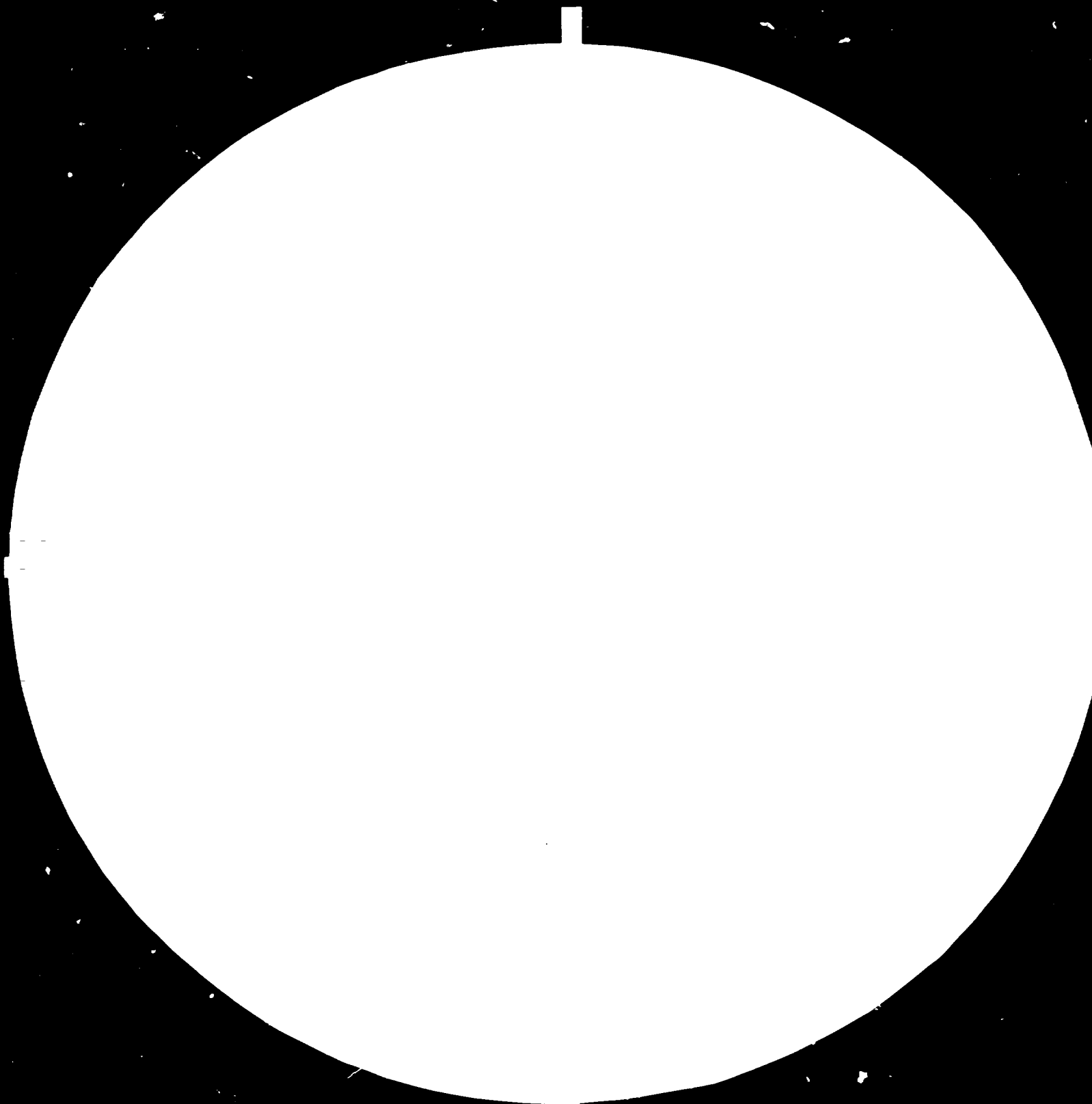

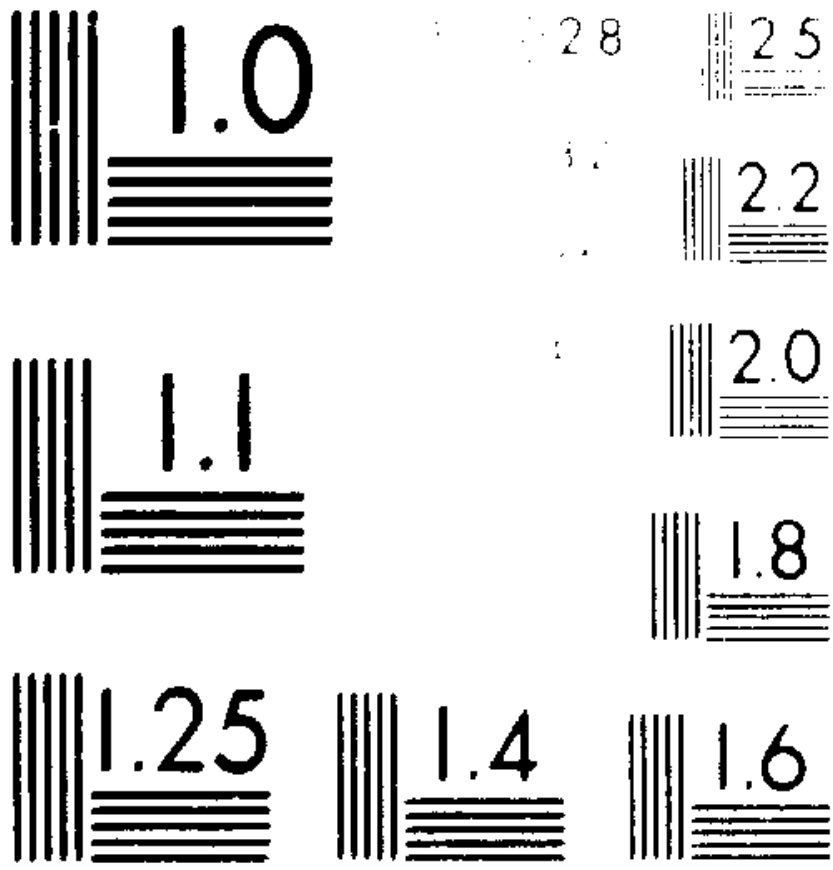
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28 August 1980
English

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DEVELOPMENT OF THE FURNITURE AND JOINERY INDUSTRIES AND CREATION OF A CENTRE

DP/YUG/73/006

YUGOSLAVIA

Terminal Report: Quality Control for Joinery Products *

Prepared for the Government of Yugoslavia
by the United Nations Industrial Development Organization,
executing agency for the United Nations Development Programme

Based on the work of R.W. Müller,
expert in quality control for joinery products

United Nations Industrial Development Organization
Vienna

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TABLE OF CONTENTS

1. Introduction

The author of this report, Mr. R.W. Müller, went to Sarajevo from 17 to 25 April 1980 to conduct the Seminar on Quality Control of Joinery Products under project number DP/YUG/73/006 (Annex I.) viz: windows and house doors (for interior and exterior use). The Seminar was conducted in German and based on the Seminar Brochure, (Annex II), which was translated prior to the Course into Serbo-Croate. This document, then, provides the basic information needed by factories and/or institutes to aid in the development and introduction of quality control standards, systems and procedures.

Among the participants were two experts (Messrs. Shorn and Lihovac) who were trained in a three-week course from 17 to 25 April at the Institut für Fenstertechnik e.V., Rosenheim, FRG. This intensive study (undertaken approximately one year ago) at foreign institutes enabled them to apply and perform inspections and tests on all types of windows and doors in the new established institute at Sarajevo.

2. Laboratories at SIPAD (IRC) Sarajevo 18 April 1980

2.1 Department for quality control of furniture, windows and doors

The above department is equipped as follows:

Control units for testing upholstery furniture with measurement facilities for depth penetration changes.	2
Control units for testing stools and chairs.	2
Control units for testing of:	3
- Furniture doors	
- Drawers	
- Case good furniture (car cases)	
Control unit for functional tests viz:	1
- Opening and closing features of doors on completely assembled case goods;	
- Durability testing on hinge and locking areas.	

Control unit for rain impact and sash joint tightness test on windows (control unit type "Ruschoff") including stream-line measuring device and recorder (according to European standards EN 42 and EN 86). 1/	1
Climate chamber for determining the K-values (coefficient of heat transmission) on windows.	1
Control unit for testing sash corner joint strength.	1
Control unit for testing the inflammability features of components test samples	1
Control unit for testing sound transmission loss in doors and windows.	1

In addition to this equipment orders were placed for control equipment and facilities for hydrothermal testing of flush doors as well as for fire protection tests.

2.2 Department for testing of wood derived products

Two laboratory presses and one tension testing machine besides other laboratory equipment is installed. Strength tests were performed according to existing quality standards for wood based panels. Laboratory supervisors stated that once a year panel manufacturers were visited and sample panels were taken for quality control purposes. These plants have their own control stations and they are inspected regularly. SIPAD acts on behalf of the State's Quality Control Organization, in fact. All particle board manufacturers must follow these quality specifications.

2.3 Department for wood drying and mechanical wood processing

There are one vacuum-drying unit, a hot-air drying unit, a bending machine, a steaming plant and 2 climate chambers for adjustment of different temperature range . With regard to kiln drying economical questions were considered to be most important.

1/ Methods of testing windows: air permeability test and water tightness test under static pressure.

2.4 Department for surface technology

Specialized laboratory equipment such as a curtain coater and a lacquer drying tunnel with infrared curing unit is installed.

2.5 Department for wood decay and detericration control (i.e. insects, fungi, etc.)

In this department extensive work is being done on pest control caused by insect and/or fungi attack. There were some climate chambers in operation for both causing and preventing biological defects by the insects.

3. Seminar on Quality Control of Joinery Products

3.1 Program of Seminar

The seminar participants received in addition to the complete brochure detailed papers for the individual lectures. All seminar presentations are included in the brochure: "Qualitätskontrolle Anforderungen-Prüfungen an Fenstern und Türen." This publication contains not only an introduction but adivse for implementation of quality control departments in all factories. Factory inspectors and laboratory test personnel will undoubtedly be stimulated and motivated by the contents of this brochure for their future tasks and responsibilities.

3.2 Conducting the Seminar

Monday, 21 April 1980

After the opening addresses of Mr. Stahivuković, Director of Laboratories IRC, the author (Mr. Müller) introduced himself through a brief view about his professional background. He also reviewed the activities of both the "Institut für Fenstertechnik e.V." and "the Deutsches Institut für Möbeltechnik". In connexion with a questionnaire the following topics were discussed and case studies explained:

- general introduction of quality control procedures
- production control activities within the manufacturing processes.

In evaluating the questionnaire it revealed that the seminar brochure basically and generally was in the interest of the seminar participants. Compilation of the evaluations of the questionnaire are as follows:

Question No. 1

What products are you dealing with?

- windows	7 participants
- doors	6 participants
- wondows and doors	5 participants
- institute	1 participant
- project planning and technology	2 participants

Question No. 2

What is your job related to?

- quality control	4 participants
- manufacturing	6 participants
- sales	0 participants
- quality control laboratory	1 participants
- project planning	2 participants

Question No. 3

What do you expect out of this seminar?

- additional knowledge for production control	4 participants
- additional knowledge of quality control and quality assurance as well as testing procedure in general	4 participants
- control procedures in production and institutional quality testing	1 participant

Question No. 4

What should be the main objectives of this seminar?

- on products like:	
(a) windows	7 participants
(b) doors	2 participants
(c) windows and doors	1 participant
- on control operations:	
(a) quality control	4 participants
(b) quality standards	1 participant
(c) tests and inspections	1 participant

Already on the first day participants indicated great interest in all of the topics presented.

Tuesday, 22 April 1980

During the course of this day the following topics were discussed:

- Product requirements and standards for doors (interior and exterior) and windows.

- Quality assurance for windows
  (a) proof of suitability (prototype test)
  (b) internal quality control
  (c) quality control under contract

Having presented details for these two subjects an institute visit followed to demonstrate quality control procedures for windows and doors. At the same time the sash/frame joint tightness of two casement windows and their rain impact tightness was tested. This test also drew the attention of participants to the fundamentals concerning quality assurance for windows with regard to suitability when testing under internal directions or under contract.

While discussing this subject it was revealed that there are no specified decails for doors but standard specifications for windows are available. Tests are performed according to Yugoslavian specifications with different grades. These specifications are generally lower compared to German standards (DIN 18 055 - quality grades for windows) however, testing procedures and performances are alike.

In summarizing the second day it could be stated that there is less knowledge on standarized (Yugoslavian) test and inspection specifications.

Wednesday, 23 April 1980

Topics discussed:

- Quality assurance for doors

  (a) proof of suitability (prototype test)
  (b) internal quality control
  (c) quality control under contract

- Laboratory control equipment for testing the suitability as well as specified quality control for windows and doors.

- Introduction to quality control procedures, facilities and equipment required for suitability tests.

After supplementary explanations of the operational testing equipment for doors a second measurement was taken on a single side hung sash window. Based on this type of window and primarily from the test results and findings for both windows the basic ideas of quality control could be very well explained.

Attention was drawn to weak points within the production process. These weak operation spots no doubt revealed the need for permanent production control procedures.

Thursday, 24 April 1980

Before continuation of the seminar the window manufacturing company "BJELASNICA HADZICI", member of SIPAD, was visited. Prior

to the plant tour the technical director explained their own quality control specifications. The window plant has about 160 employees and has set a production goal of 80 000 window units for 1980. The company was founded in 1978. Testing standards as developed and designed by the company include specifications for semifinished and finished products.

Basic parts as well as components are checked. Visual control on: material, production facilities, production performance and assembly. Also, "Receiving Inspection" is performed. Wooden stock is being tested in accordance with existing Yugoslavian specifications and standards. Throughout the plant there are 15 inspection stations to guarantee quality in production control.

Production operations and material handling

- Mechanization of the plant is applied in the machine shop only which means that certain assembly operations and internal transportation require considerable improvements.

- Individual inspection stations are not properly integrated.

- Inspection personnel could not be identified. No test reports and records are kept at inspection stations.

- Final inspection of sash/frame assembly is not performed properly as to: defective wood quality, joint tightness, hinge and locking operations, and surface finish damages.

Friday, 25 April 1980

Discussion concerning the visited plant:

- Where should inspection stations be established

- How often should inspection be performed at these stations

- In what form should inspection records be kept

- How should inspection records be analysed and results evaluated and action taken.

What advantages can one expect from quality control regarding:

- Production and plant facilities
- The final product
- The customer.

Following the individual sequence operations from wood drying to foil-packaging a discussion took place on all subjects concerned. It revealed that in this window factory all production and inspection standards as issued by RAL (society for delivery conditions and quality assurance) could be applied. Production control procedures are applied in respect to inspection standards and grades:

The 5-step quality control model explained in the seminar brochure in detail is applicable for the visited plant:

First step:
- Determination of present status
- Discovering of weak spots
- Recording of reject rates

Second step:
- Development and introduction of test specifications, test schedules and inspection procedures.
- Introduction of statistics

Third step:
- Introduction of "Purchase Inspection" standards
- Superivsion and purchase contracting for ancillary material
- Recording reject products
- Complaint meetings
- Development of a reject catalogue resulting in a failure analysis
- Introduction of inspection sampling procedures
- Application of inspection sampling procedures

Fourth step:
- Introduction of inspection card and inspection records

- Preparation of self controlled inspection operations
- Introduction of incentive systems

Fifth step:

- Evaluation of inspection reports and performance testing
- Introduction of self controlled inspection responsibility
- Supervision of product quality, recording and registration aids, data processing introduction to quality control.

It is recommended to place throughout the plant instructive placards referring to inspection stations and informing onlookers about inspection and quality control in general. Also, inspection procedures (basic production failures causing rejects) should be included for education on instructive wall placards. Most important is the intensive training of all employees concerned towards the absolute need for quality control. It is evidently a question of developing control standards and grades which cannot be taken for granted from the seminar brochure because they are based on national standards.

Again it was once more emphasized that quality control is most valuable for all plant operations, for the final product and primarily for the customer. Plant supervision undoubtedly realizes weak spots during the operational process and consequently can improve quality and minimize customer complaints, since, the finished product or final prefab unit will have a higher quality and will therefore increase its economic value for the customer.

Questionnaire No. 2 was prepared to compile the pros and cons of this seminar. Through its anonymity all participants and the opportunity to express openly their opinions in answering the following questions listed on the next page.

Question No. 1: "On the last day of the seminar, it was asked whether this course has motivated well and convinced participants of the need for introducing quality control in modern factories"? Naturally, everyone agreed by answering "yes" to this question.

Question No. 2: "If answered yes, how should one start with this task"? Emphasized here were comments from the participants concerning development of quality control standards and grades and analysis of rejects reports. The seminar consultant could very well recognize whether topics presented were positively received and digested by the individual participants. Almost all of the participants wanted to start working by determining the present status of their individual products and their production. The second step would be the development of quality standards and specifications and the third step was the introduction and implementation of a quality control system.

Question No. 3: "Has this seminar improved your future work"? Again, of course, all participants answered "yes" to this question.

Question No. 4: "Which topics were not appropriately handled"? To this question, 80 per cent of the participants answered that all of the subjects had been discussed well enough. The remaining 20 per cent expressed the opinion that with regard to their own plants, quality control functions have not yet been introduced in detail. Two participants were of the opinion that the design requirement aspect on windows and doors should have been given more importance. In this regard the time was limited and especially the diversity of participants, design and construction samples as well as theoretical considerations and problem areas could not be discussed.

Specific quality control procedures viz: the performance of inspection procedures in individual companies can only be explained in detail, if a quality control system has been developed directly with companies concerned or with selected pilot plants. The transfer of quality control systems applied in Germany to Yugoslavian conditions is possible in principal.

Question No. 5: "Miscellaneous - suggestions, proposals and improvements"? This was generally answered by all participants that such type of a seminar should be held at least once a year.

4. Findings

- Seminars or workshops on quality control are necessary for co-ordinated operations.

- Implementation of quality control stations could be based on the comprehensive seminar brochure (at this place appreciation is expressed to the translater who fully, on a word-by-word basis, translated the entire brochure into Serbo Croate).

- Laboratory facilities at SIPAD render possible the immediate development of quality control standards for windows and doors - available test units are appropriate to provide the necessary guidance for SIPAD's other companies.

- The laboratory director is in a position to motivate all companies for applied quality control procedures through a positive co-ordination.

5. Recommendations

- Seminars and workshops on quality control should be organized regularly.

- Seminar participants should be grouped according to their responsibilities on production control.

- Industry control specialists should exchange experience with laboratory control experts in co-ordination with engineers from the project planning department.

- Engineers of the research and development department have to introduce new manufacturing technologies and assembly accessories.

- The institute should also be responsible for neutral surveys, prototype testing, development testing following the trends in European countries.

If the institute cannot operate in this way the concept of quality control will remain paper work only, the laboratory facilities will represent a "modern museum".

SIPAD, IRC, Sarajevo, no doubt, is in the position to provide all necessary inputs and should start without further delay.

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JOB DESCRIPTION

DP/YUG/73/006/11-03/Z/31.7.A

Post title : Expert in Quality Control for joinery products

Duration : 10 days

Date required : 18-27 April 1980

Duty station : Sarajevo

Purpose of project : 5 day Seminar on Quality Control of joinery products

Duties : The Expert will be assigned to the Centre for the Development of the Furniture and Joinery Industries which is being created with UNDP/UNIDO assistance. He will be responsible to the Centre's Director and will, in collaboration with the Centre's Yugoslav staff, conduct a one-week seminar on quality control of joinery products.

The theoretical introduction to quality control will be supplemented by advice on practical testing procedures in the institute.

The Expert will also be expected to prepare a report setting out the present possibilities of testing joinery products in relation to production control of SIPAD-Industries. Specifically, the Expert will be expected to:

1. Determine the needs of the industry with respect to quality control.

2. Introduce quality control in the joinery industry.

..../..

3. Introduce the methodology of testing joinery products with windows and, exterior and interior house doors.

4. Introduce the set-up and operation of joinery product testing machines and equipment.

5. Introduce test forms and discuss test results for programming production control.

6. Review quality control regulations, National and International standards for joinery products.

7. Advice on production control to perform quality mark specification.

8. Prepare assignment work for seminar participants.

9. Recommend a coordinating programme of SIPAD-Industries and the quality control section of the Furniture and Joinery Centre.

10. Recommend additional equipment for testing joinery product components or materials in view of present or future demands.

Qualifications: Specialist in Quality Control of Joinery Products. Experience in Production Control, testing of joinery products and establishing of quality specifications.

Language: English or German

Background information: The furniture and joinery industries of Bosnia and Herzegovina contribute about 8 per cent to the Republic's gross national product, and represent over 4 per cent of its exports. An ambitous 5-year development plan is being implemented to double the production of furniture which attained about Din 1,500 million in 1976, the work force was 7,400 persons in 1976. This plan calls for an investment of Din 800 million. Joinery production represented in 1976 some Din 500 million: over 3,000 persons being employed in this sector. The work force will attain 4,500 persons. Investment of Din 950 million are foreseen for joinery plants (US$ 1 = Din 18.3)

SIPAD, a co-operative integrated Forest Industry Organization consisting of 126 factories and employing over 55,000 persons, accounts for 77 per cent of the wood industries of Bosnia and Harzegovina. SIPAD

exported about one third of its production of furniture and joinery. Some 80 per cent of this went to market economies and 20 per cent to countries with centrally planned economies. The Government of Bosnia and Herzegovina and the SIPAD Organization have decided to create a "Centre for the Development of the Furniture and Joinery Industry" to cater to the 41 existing furniture and joinery plants within the organization, and have requested UNDP/UNIDO assistance in the development of this industrial sector and the establishment of this Centre. It is to have the following departments: quality control and documentation; design, marketing and engineering; and organization services.

ANNEX II

Contents of the Seminar Brochure on Quality Control - Requirements - Testing of Windows and Doors, presented by Mr. R.W. Müller, representing the Institute for Window Technology, Arnulfstrasse 13, 8200 Rosenheim-Aisingerwies.

Introduction to Quality Control, the Requirements and the Testing of Windows, Sashes, Doors (both interior and exterior)

Part I

(1) General introduction into Quality Control
(2) Comments on the Process of Production Control in Industry

Part II

(1) Requirements for: Doors (interior and exterior) and Windows
(2) Quality Assurance for Windows
- Prototype Product Test
- Industry Test
- Laboratory Test

Part III

(1) Quality Assurance for Doors
- Prototype Product Test
- Industry Test
- Laboratory Test

(2) Appropriate Testing Equipment for a Quality Control Laboratory for Prototype Tests and Laboratory Tests for Windows and Doors.

(3) Introduction to Test Procedures and Explanations of the Installed Testing Equipment.

Part IV

(1) Visit of a Joinery Factory

(2) Discussions on the Production Control
- Where should Production Control Stations be installed;
- How often are control checks necessary at the individual inspection stations;
- How to prepare a test record;
- How to evaluate the records with regard to statistics and how will results make for improved production.

Part V

(1) What advantages can one expect from Quality Control in relation to
- The production and plant facilities;
- The final products;
- The customer.

(2) "Capacity Efficiency" through group work on trained subject by operating the test units
- Scope of tests,
- Test recording,
- Test runs,
- Test results.

(3) Final Discussions