



TOGETHER
for a sustainable future

OCCASION

This publication has been made available to the public on the occasion of the 50th 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 for further information concerning UNIDO publications.

For more information about UNIDO, please visit us at www.unido.org

DO 2349

ID/CONF.2/7

17 April 1967.

ENGLISH

ORIGINAL: DANISH

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

**INTER-REGIONAL SYMPOSIUM ON TECHNICAL
SERVICES AND FACILITIES FOR
SMALL-SCALE INDUSTRIES**

**Vedbaek, Denmark
26 June to 8 July 1967.**

TECHNOLOGICAL INSTITUTE'S WOOD DEPARTMENT.

An example of cooperation with a specific branch.

Presented by Morten Knudsen

We regret that some of the pages in the microfiche copy of this report may not be up to the proper legibility standards, even though the best possible copy was used for preparing the master fiche.

Distr.
RESTRICTED

ID/CONF.2/7/Add.1
17. April 1967.

ENGLISH
ORIGINAL: DANISH

UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

**INTER-REGIONAL SYMPOSIUM ON TECHNICAL
SERVICES AND FACILITIES FOR
SMALL-SCALE INDUSTRIES**

Vedbaek, Denmark
26 June to 8 July 1967.

QUALITY PROBLEMS IN SMALL INDUSTRY PRODUCTION.

An example of cooperation with a specific branch.

Summary.

Following a brief description of the Danish timber industry which is principally composed of a large number of small-scale firms and is in the early stages of rationalisation, a more detailed account is given of the Wood Department's activities and the structure and function of the Danish Furnituremakers Control.

The purpose of the Department is to promote the interests of those Danish industries that employ timber in their production.

One of the basic ideas behind the foundation of the Technological Institute is that interests of commerce are best promoted via an institution which by combining experiment, consultation and training supplemented by textbooks can keep abreast of developments in technology and science and the requirements of the respective branches of industry. In consequence, the knowledge that is assembled is converted to usable data and is distributed, is topical, related to practical requirements, and easy for firms to absorb.

Emphasis is placed in the Wood Department on linking the results of these forms of activity and establishing an interchange of information. For example, experimental work is related to needs which consultation has uncovered, and the results are passed on through further consultation, training and literature.

A considerable amount of activity is devoted to the interests of timber-preserving firms, sawmills, glue-lam factories, furniture manufacturers, joiners and other suppliers of timber industry.

Clients are in particular skilled personnel, works managers, foremen, self-employed master craftsmen, and to a certain extent consultant architects and engineers.

The Department devotes a lot of its research into subjects associated with timber materials, the moisture content of timber, glueing, surface treatment, wood processing, timber destruction, timber protection, product development and business management.

The staff of the Wood Department (at present numbering 30) consist of scientifically trained and craftsmen personnel, the latter with a certain degree of theoretic training.

The latest wood processing, pressing and testing equipment is available to assist in the Department's activities.

DANISH FURNITUREMAKERS CONTROL is an organisation set up by Danish furniture manufacturers in conjunction with the technological Institute with the aim of raising the quality of Danish furniture by means of quality controls, consultation and process development.

A special technical report has been drawn up, detailing the permanent requirements for materials, constructions and preliminary work. These requirements are reproduced in the introduction.

TABLE OF CONTENTS.

Page

I	PURPOSE.....	1
II	SIZE OF THE DANISH WOODWORKING INDUSTRY.....	2
III	CLIENTELE.....	2
	Branches of industry.....	2
	Clients' background.....	3
IV	SPHERES OF OPERATION.....	3
	Timber materials.....	3
	Timber and moisture.....	3
	Timber jointing.....	4
	Surface treatment.....	4
	Timber destruction and protection.....	4
	Mechanical woodworking.....	4
	Product development.....	4
	Company management.....	4
V	FORMS OF ACTIVITY.....	4
	Research.....	5
	Consultation.....	6
	Education.....	7
	Literature.....	7
VI	STAFF.....	8
	Staff breakdown.....	8
	Organization.....	9
VII	PREMISES.....	9
VIII	APPARATUS.....	10

APPENDIX: Danish Furnituremakers' Control

Table 1 (page 1 and 2)

Table 2 (page 1 and 2)

TECHNOLOGICAL INSTITUTE'S WOOD DEPARTMENT.

An example of cooperation with a specific branch.

Since the establishment of the Technological Institute in 1906 assistance has been given to the Danish woodworking industry, principally by way of a special department on wood and woodworking.

1. PURPOSE.

The purpose of the wood department is to promote developments in the industries which use wood.

To this end the department

conducts research mainly of a practical nature both in the public interest paid for by money put forward by the Wood Council, foundations, etc., and for individual firms on payment of a fee,

provides a consultative service in all aspects of timber technology for the wood-working industries, their suppliers and customers,

runs special courses on technical aspects of wood, holds short courses for management personnel in the timber industry, develops new courses and methods of training in the sphere of wood, and contributes to educate in woodtechnology at other institutions,

supplies the wood-working industry with information concerning major wood technological breakthroughs at home and abroad.

To obtain optimum exploitation of resources the department co-operates with other departments in the Institute who have special training applicable to the wood working industry (accounts consultation, construction department, paint testing station, etc.), with other institutions and organizations such as the State Building Research Institute, the Technical University, technical schools, trade unions, executives' organizations and employers' organizations, and in particular with the wood department of Denmark's other technical institute, which covers Jutland. The latter wood department

This paper has been prepared by Mr. Morten Knudsen, head of the Wood Department, Technological Institute, Copenhagen.

The opinions expressed in this paper are those of the author and do not necessarily reflect the views of the United Nations Industrial Development Organization. The paper cannot be reproduced without permission from the United Nations Industrial Development Organization.

engages in training and consultation, but does not carry out research work or publication of literature. Danish forest products research is concentrated in the Wood Department of the Technological Institute.

2. SIZE OF THE DANISH WOOD-WORKING INDUSTRY.

One of the characteristics of the Danish wood-working industry is that the great majority of its component firms are small (< 5 employees) and their production is based on craftsmanlike methods. As Tables 1 and 2 (which provides details of development in the Danish wood-working industry between 1948 and 1958 (indicate, major alterations took place in the various industrial groups in as much as many of the small firms were closed down.

The number of small shops (those with up to five employees) was reduced by about 33%. This resulted from the fact that industrialization did not really begin to affect this industry until 10 - 15 years ago. Similarly the group of large firms (> 100 employees) doubled in the same decade.

A number of parallels can be drawn between the development that Denmark has undergone in recent years and the development a number of countries are facing now. This is why a study of the related functions of the Wood Department of the Technological Institute can prove useful.

3. CLIENTELE.

3.1 Branches of industry.

- 3.11 The work of the department is vital for, and contact is maintained with, all:

IMPREGNATION FIRMS
GLUELAM FACTORIES

- 3.12 The work of the department is very important for, and contact is maintained with, a large number of:

SAWMILLS
FURNITURE MANUFACTURERS
JOINERY FIRMS
WOOD-PRESERVATION FIRMS
SUPPLIERS OF WOODWORKING MACHINERY, TOOLS, GLUE
AND VARNISH.

- 3.13 The work of the department is important for, and contact is maintained with, a number of:

VENEER MANUFACTURERS
CHIPBOARD MANUFACTURERS
HANDICRAFT FIRMS (Excl. furniture)
SPECIALIST JOINERY FIRMS
OTHER TIMBER TRADES

3.14 The work of the department is important for, but contact so far has been rather sporadic with:

CARPENTRY FIRMS
TIMBER BOAT-BUILDING YARDS
TIMBER STOCKISTS
FURNITURE RETAILERS
FORESTRY
CONSULTANT ARCHITECTS AND ENGINEERS

Future developments within the department will be aimed at an increased contact particularly with groups 3.12 and 3.14.

3.2 Clients' background.

Most Danish timber trades operate an apprentice system, training being conducted by the firms and technical colleges. The Wood Department's clients are in the main skilled craftsmen, journeymen, works managers, and master craftsmen, particularly from the joinery trade. In trades which do not operate an apprentice-training scheme (such as sawmills and impregnation firms) the clients are mainly foremen and works managers who have many years practical experience but a fairly limited theoretical background, often gathered in another sphere, e.g. forestry work.

Another important group of clients is the engineer category, men employed in the timber trade or among timber suppliers. On account of the industry's structure with so many small firms, only relatively few engineers and other highly trained technicians are however engaged in the Danish woodworking industry.

A number of clients with commercial backgrounds are engaged in the sale of timber and timber products.

4. SPHERES OF OPERATION.

The work of the department has in particular been influenced by - and has influenced - the tremendous rate of development in the Danish furniture-making industry.

4.1 Timber materials.

Quality of raw timber, cutting, storage of raw timber, separation into species, material's characteristics, structural strength, improvement of quality (stabilising, plastic impregnation).

4.2 Timber and moisture.

Timber drying, moisture content on location of use, steaming, moulding.

4.3 Timber jointing.

Glues for furniture-making and joinery work, glued timber, glueing processes and equipment, veneering and moulding, sheet materials, high frequency.

4.4 Surface treatment.

Materials, methods and machinery for polishing, staining and surfacetreating, particularly of furniture.

4.5 Timber destruction and protection.

Biological deterioration of wood, wood and fire, chemical preserving methods and substances.

4.6 Mechanical woodworking.

Maintenance of machinery, setting up machinery, machines for joineries and other woodworking firms, construction of special machines and aids, tolerances.

4.7 Product development.

In conjunction with manufacturers and/or architects various items of furniture and other wood products are developed with a view to improving function and technique of production.

4.8 Company management.

Fitting out of workshps, production planning, calculation and organization, technical/economic analysis, quality control, State-loan matters.

It is also the Institute's future intension to devote some time to the following spheres:

UPHOLSTERY
NEW MATERIALS FOR THE WOODWORKING INDUSTRY
PRODUCT DEVELOPMENT AND STANDARDISATION IN THE CONSTRUCTION INDUSTRY
DATA PROCESSING FOR THE WOODWORKING INDUSTRY.

5. FORMS OF ACTIVITY.

One of the basic ideas behind the Technological Institute is that progress in business is best promoted via an institution which by a combination of research, consultation and training, supplemented by literature, can keep abreast of techno-scientific developments and the needs of the industry in order that the knowledge assembled can be processed and distributed, is up-to-date, related to practical operations, and is simple for firms to absorb.

The emphasis in the Wood Department is therefore on a combination of these forms of activity and on a positive exchange effect so that the research projects under way are linked with the major re-

quirements of clientele revealed by consultation, and the results are circulated by means of further consultation, training and literature.

5.1 Research.

In 1966 about 11.000 employee hours were spent on research work.

The primary object of the Institute's research work is to produce results which can be applied to practical, every-day projects within the industry. Consequently the work is not normally of a basically scientific nature, but concentrates on an effective solution of the problem on hand. The experimental problems are selected with a view to satisfying the needs of the widest possible range of woodworking industry clientele.

With the support of the Danish Wood Council, which is a coordinating body with representatives of the Woodworking industries organizations (employees and employers, higher colleges, the technological institutes and the Academy for Technical Science), experimental and research work is conducted into timber problems of a technical type, and experiments are also carried out for private firms on payment of a fee.

5.11 Current projects.

Development of systems for forced air-drying.

Mechanical stress-grading.

Combat of storage damage, particularly in beechwood.

Investigation into the strength qualities of Danish spruce.

Glueing furniture.

Injecting plastic into wood.

Examination of wood-preservatives.

Re-preservation of poles.

Further development in preservation methods.

Preservation of freshly cut sleepers.

Surface treatment of furniture.

Development of special machinery for the woodworking industry, including apparatus for testing furniture.

Product development in the furniture industry.

Development of tolerance system for woodworking.

5.12 Planned projects.

Glues for the building industry.

Development of methods for reliable use of sheeting materials in the building industry.

Study of moisture content in various building structures.

Moulding of furniture components.

Bending solid timber.

Study of the factors which affect maintenance of a desired quality, particularly in the furniture industry.

Impregnation of different species of *Abies* and *Picea*.

Use of wood waste for improvement of soil conditions.

5.2 Consultation.

In 1966 about 12.000 employee hours were spent on consultation work.

The advisory work of the Technological Institute aims at a speedy and effective assistance for the industry by solving specific problems. Consultants can be summoned by firms all over Denmark, and further study can be undertaken at the Institute by means of special equipment designed for the purpose.

Consultation is offered by the Wood Department to the whole sphere of the woodworking industry, partly by means of collective arrangements, partly for individual bodies or firms, particularly to joinery firms specialising in furniture-making, and also to sawmills and wood-preserving firms.

As a rule consultation is requested in cases of acute production difficulties or the expansion of production (including choice of new materials, methods and machinery).

Collective arrangements.

a) A subscriber system which covers about 100 firms which, on payment of 100 Danish kroner for half a day or 175 Danish kroner for a whole day, can receive a visit from one of the department's master joiners.

b) Quality marking of furniture. The department acts as consultant and secretariat for Danish Furnituremakers' Control, which is supported by about 100 manufacturers. Enclosure 1 provides a special account of Danish Furnituremakers' Control.

c) Supervision with regard to protection of timber.

Individual consultation.

Individual consultations amount to about 5.000 annually of which about 4.000 are conducted by telephone or personal contact. The remainder are connected with a written report, perhaps in association with a series of tests or other study in laboratory or workshop.

About 1500 working hours are spent annually on consultations free of charge.

It is reckoned that the department's consultative work will be expanded gradually, partly in connection with new collective

agreements on quality making and/or testing of woodworking machinery, glue, varnish, sheeting materials, and prefabricated timber elements for building.

5.3 Education.

In 1966 about 11.000 work hours were spent on training, of which approximately 1.500 were spent on Institute's evening school courses, the remainder for daytime education: about 7.500 hours at the Institute's courses in Copenhagen, about 1.000 hours at the Institute's provincial course, and about 1.000 hours at courses held by other institutions or organizations.

Training is provided for the whole of the trade with which the department is concerned. The individual courses range in length from 1 day to 1 year.

The following subjects, among others, are covered by courses of the length indicated:

Timber and timber materials	(50 hours)
Timber drying	(35 + 26 hours)
Glueing	(35 hours)
Surface-treating	(15-28 hours)
Costing	(25 + 25 hours)
Production planning	(48 hours)
Woodworking machinery	(21-126 hours)

A one-year course for timber technicians (managers) has been started, including timber technology, drawing and construction, mechanical training, operation techniques, physics, mathematics, costing, production planning, company structure, office routine, Danish, English and German.

New courses are also being developed for apprentices with a view to transferring to technical colleges. And staff from the department lecture on special subjects of timber technology at courses for engineering and architecture students, and at further-education classes for various professions.

A certain amount of training activity is also conducted by way of lectures at professional association meetings, on radio and television, and an annual conference is held for joiners and cabinet-makers.

5.4 Literature.

In 1966 about 3.000 hours were spent on compiling literature, etc.

The department's experimental results are normally published in the magazine "Træindustrien" ("The Timber Industry") in whose editorial preparation the department participates. In addition, instructions, short informative articles, trade handbooks and bro-

chures, and reports, as well as articles for other publications, are also compiled. A fairly extensive library on wood subjects and a filing system are also operated by the department.

Information regarding recent advances in timber technology and concerning the work of the department is dispensed by way of participation in exhibitions.

It is planned to intensify this work through the employment of a "Literary engineer", and it is intended that the department will back a special publication to be distributed among members of Danish Furnituremakers' Control.

6. STAFF.

In order to play its part as an efficient link between research and the practical problems of every business the department has a staff of people with theoretic backgrounds and a similar selection of a staff with practical craftsmanship at their fingertips. The presence of such collaboration with specialists in other spheres of other departments in the Institute presents the opportunity for a wider and therefore better solution of current problems in the woodworking industry.

It is essential for the success of the department that it has a staff familiar not only with the many aspects of a particular sphere, but also with the need for constantly deepening existing pools of knowledge, and presenting it in a readily acceptable manner for consumption by practical people.

The exchange effect of research, consultation and education and education help to increase the staff's flexibility of thought and its contact with advances in science and practical fields.

It is moreover necessary to have a steady further education via participation in courses, familiarity with trade periodicals, study trips visits to exhibitions, etc. About 10% of staff time is occupied by further education.

6.1 Staff breakdown.

	According to budget Estimate				
	<u>1966/67</u>	<u>1967/68</u>	<u>1968/69</u>	<u>1969/70</u>	<u>1980</u>
Engineers	3	3	4	5	9
Forestry graduates	5	6	6	7	8
Mycologist	1	1	1	1	1
Designers			1	2	5
Joiners	12	12	13	13	15
Intermediate techs.	2	2	4	5	10
Furn. upholsterers		1	1	1	2
Labourers	2	2	2	2	2
Office staff	3	4	4	5	7
Scholars		2	2	3	5
	28	33	38	44	64

In future recruitment of staff more emphasis than hitherto will be placed on craftsmen employees possessing a certain degree of theoretic education since it is of major importance that they should be able to read foreign language material, understand scientific publications, and appreciate theoretical solutions to involved problems.

6.2 Organization.

Staff are divided into groups, each with a sphere of operations as indicated in pt. 4. The leading staff member in each group is responsible both for the solution of current problems and for the renewal of activities. Job descriptions are at present being prepared for all staff positions.

To solve problems of a more complicated character special teams are often formed, cutting across the recognised "subject" groups. In the case of an experimental project, the team would always contain an employee with a knowledge of research.

This formation of employees into special groups, concentrating on particular subjects, means that the majority of the staff to varying degrees are engaged in research, consultation and training in that specific subject. Some form of specialisation is also required in this direction however, since the activities require different capabilities. For example, confusion is very apt to set in when consultation work perpetually interrupts research work, etc.

7. PREMISES.

At present the Wood Department occupies the undernoted areas in square meters, and an expansion is budgeted for 1970 which should cover the needs for the period 1970-80.

	Budgeted for	
	<u>1967</u>	<u>1970-80</u>
Offices	150 m ²	550 m ²
Laboratories	200 -	700 -
Auditoria	40 -	300 -
Workshops	550 -	1.300 -
Storage	160 -	250 -
Corridors, etc.	100 -	400 -
<u>Total:</u>	<u>1.200 m²</u>	<u>3.500 m²</u>

It should be noted that two staff members man a branch office in the provinces (Odense).

As will be seen from above, there is about 40 sq. meters per employee which - bearing in mind the amount of spacestealing machi-

nery and experimental equipment - must be regarded as somewhat under the optimum. The premises are heated and, where necessary, supplied with water, electricity, gas, compressed air and ventilation.

Special climatized rooms have been built for reproducing various degrees of humidity and moisture content in wood.

8. APPARATUS.

The Department has a well-equipped joinery and furnituremaking shop, modern hydraulic presses with special measuring equipment, a high frequency generator, spray shop, impregnating plant, various measuring equipment for registering the capacity of woodworking machines, laboratory equipment for chemical and mycological analysis (including laboratory scales and microscopes), testing equipment especially for furniture, and an atom-absorption-spectrofotometer. There are moreover electric calculating machinery and typewriters, as well as drawing materials, a wide selection of wood samples and products, and a colour slide collection for use in training.

Number of firms classified in sizes. (Stat. Dept. of Industrial Census 1948 to 1958).

	<5 employees			5 - 19 employees				
	1948		1958		1948		1958	
	total	%	total	%	total	%	total	%
Sawmills	556	72.5	245	49.2	165	21.5	174	34.9
Packing case factories	71	58.2	82	54.3	35	28.7	47	31.1
Impregnation plants	5	29.4	2	14.3	10	58.8	10	71.4
Cork goods manufacturers	16	61.6	13	56.5	5	19.2	3	13.0
Cooperages	369	97.1	182	93.8	10	2.6	10	5.2
Woodturners	184	96.3	107	89.9	7	3.7	12	10.1
Basketmakers	172	91.0	99	86.8	16	8.5	15	13.2
Moulding and frame factories	78	84.8	39	69.6	14	15.2	16	28.6
Picture-making works	229	98.7	84	94.4	3	1.3	5	5.6
Clog factories	575	96.8	233	90.7	14	2.4	21	8.1
Timber boat-builders	149	63.1	80	45.4	59	25.0	74	42.1
Carpenters	3,945	89.0	3,309	77.1	430	9.6	894	20.9
Joiners	4,125	84.8	2,415	71.4	626	12.9	787	23.3
Other timber industries	384	78.0	311	69.7	78	15.9	110	24.7
TOTAL	10,858	85.9	7,201	73.7	1,472	11.6	2,178	22.2

1) Joiners:

1948: Woodworking factories, Cabinet-makers, Cabinet-makers, Other building Joiners, Coffin-makers, Joinery workshops, etc.

1958: Woodworking factories, Cabinet-makers, Building Joiners.

2) Other timber industries:

1948: Timber product retailers, Other industries.

1958: Other industries.

Table 1. (Page 2)

	20-49 employees		50-99 employees		100 employees		total							
	1948		1958		1948			total						
	to- tal	%	to- tal	%	to- tal	%								
Sawmills	37	4.8	48	9.7	4	0.5	22	4.4	5	0.7	9	1.8	767	498
Packing case factories	12	9.8	17	11.3	4	3.3	4	2.6	-	-	1	0.7	122	151
Impregnation plants	2	11.8	-	-	-	-	2	14.3	-	-	-	-	17	14
Cork goods manufacturers	2	7.7	3	13.1	3	11.5	2	8.7	-	-	2	3.7	26	22
Cooperages	-	-	2	1.0	1	0.3	-	-	-	-	-	-	380	194
Woodturners	-	-	-	-	-	-	-	-	-	-	-	-	191	119
Basketmakers	-	-	-	-	1	0.5	-	-	-	-	-	-	189	114
Moulding and frame factories	-	-	1	1.8	-	-	-	-	-	-	-	-	92	56
Picture-making works	-	-	-	-	-	-	-	-	-	-	-	-	232	89
Clog factories	4	0.7	2	0.8	1	0.1	1	0.4	-	-	-	-	524	257
Timber boat-builders	23	9.8	17	9.7	4	1.7	5	2.8	1	0.4	-	-	236	175
Carpenters	53	1.2	73	1.7	4	0.1	7	0.2	3	0.1	5	0.1	4,435	4,208
Joiners	88	1.6	130	3.8	21	0.4	35	1.0	6	0.1	16	0.5	4,266	3,383
Other timber industries	27	5.5	20	4.5	2	0.4	4	0.9	1	0.2	1	0.2	492	446
TOTAL	248	2.0	313	3.2	45	0.4	82	0.8	16	0.1	34	0.4	12,639	9,800

Reduction in the number of firms from 1948 to 1958: 2.831 or approx. 22%
 - - - - employees - - - : 6.442 - - 11%

Total no. of employees engaged in timber industry, and division into company sizes and industry's absolute and relative turnovers (Stat. Dept. of Industrial Census 1948 to 1958).

	5 employees				5-19 employees				20-49 employees				1958
	1948		1958		1948		1958		1948		1958		
	total	%	total	%	total	%	total	%	total	%	total	%	
Sawmills	1,706	24.4	555	7.7	2,485	35.6	1,558	21.5	1,386	19.8	1,365	19.3	
Packing case factories	223	15.8	200	13.7	427	30.2	382	26.2	384	27.2	503	34.8	
Impregnation plants	21	9.1	8	3.7	122	52.8	80	37.4	88	38.1	-	-	
Cork goods manufacturers	71	14.1	27	5.1	71	14.1	29	5.4	88	17.7	79	14.8	
Cooperages	574	76.1	264	70.0	113	15.0	59	15.7	-	-	54	14.3	
Woodturners	328	76.8	194	64.7	99	23.2	106	35.3	-	-	-	-	
Basketmakers	311	49.1	153	60.2	222	35.0	101	39.8	-	-	-	-	
Moulding and frame factories	204	47.0	72	29.0	230	53.0	152	61.3	-	-	24	9.7	
Picture-making works	348	89.9	101	74.3	39	10.1	35	25.7	-	-	-	-	
Clog factories	881	67.0	340	55.7	170	12.9	171	28.0	158	12.0	49	8.6	
Timber boat-builders	431	17.0	180	10.1	716	28.2	746	41.9	814	32.1	537	30.2	
Carpenters	9,157	56.6	6,871	40.6	4,611	28.5	6,948	41.0	1,743	10.8	2,102	12.4	
Joiners	10,443	42.7	4,558	22.3	7,820	31.9	6,794	33.2	3,361	13.7	3,883	19.0	
Other timber industries 1)	1,056	31.3	645	23.9	994	29.5	1,042	38.5	1,016	30.2	630	23.2	
Total	25,754	43.2	14,168	26.6	18,119	30.4	18,203	34.2	9,038	15.1	9,226	17.4	

- 1) Joiners: 1948: Woodworking factories, Cabinet-makers, Other building Joiners, Coffin-makers, Joinery workshops, etc.
1958: Woodworking factories, Cabinet-makers, Building joiners.
- 2) Other timber industries: 1948: Timber product retailers, Other industries.
1958: Other industries.

	50-99 employees		≥ 100 employees		total (100%)		total turnover in 1000 kr.	Rel. turn			
	1948		1958		1948				1958		
	total	%	total	%	total	%			1948	1958	
Sawmills	303	4.3	1.477	20.4	1.109	15.9	2.290	31.6	151.810	280.995	130
Packing case factories	377	26.8	253	17.3	-	-	120	8.2	32.016	55.160	120
Impregnation plants	-	-	126	58.9	-	-	-	-	9.356	13.779	103
Cork goods manufact.	273	54.1	159	29.8	-	-	239	44.9	17.102	27.426	160
Cooperages	67	8.9	-	-	-	-	-	-	11.104	10.981	69
Woodturners	-	-	-	-	-	-	-	-	4.206	5.170	36
Basketmakers	101	15.9	-	-	-	-	-	-	5.625	4.118	51
Mould. and frame fact.	-	-	-	-	-	-	-	-	7.544	6.312	59
Picture-making works	-	-	-	-	-	-	-	-	2.744	1.505	30
Clog factories	106	8.1	51	8.3	-	-	-	-	17.787	15.373	61
Timber boat-builders	323	12.8	316	17.8	-	-	-	-	31.347	42.720	95
Carpenters	279	1.7	447	2.6	251	9.9	571	3.4	211.784	474.337	156
Joiners	1.774	7.2	2.448	12.0	1.107	4.5	2.747	13.5	284.741	560.903	130
Other timber ind.	169	5.0	278	10.3	136	4.0	108	4.0	46.452	68.782	108
Total	3.772	6.3	5.555	10.4	2.986	5.0	6.075	11.4	909.069	1.567.561	147

3) Relative turnover = $\frac{\text{turnover 1958} \cdot \text{wholesale price index 1948}}{\text{turnover 1948} \cdot \text{wholesale price index 1958}}$

DANISH FURNITUREMAKERS' CONTROL

Danish Furnituremakers' Control Association has been founded by Danish furniture producers who in collaboration with the Technological Institute in Copenhagen have formulated the demands to be made on correct craftsmanship of high quality. The Association is open to all Danish furniture manufacturers who in their production comply with the extensive technical demands and who subject themselves to the extensive control measures of the Association. The approval entails the right to use the quality mark, which thus expresses to the buyer a guarantee for the technical quality of the furniture in question.

The Wood Department of the Technological Institute acts as technical secretariat and laboratory, and before being admitted to the Association a factory is subjected to an expert inspection for six months. In this way it is ensured that the factory in its production complies with the stipulated technical regulations. During the period of inspection random samples are taken of the production, and subjected to exacting tests and the manufacturer must face the fact that these tests mean complete or partial destruction of the furniture in question.

Also after the trial period the production of the factory is watched through unannounced visits and the factory loses immediately the right to use the quality mark if the fixed rules are not strictly adhered to. A member factory is moreover obliged to give full compensation if complaints are due to the technical demands not being complied with.

In the technical journal rules - compare below - are given for wood quality, constructions, glueing and surface treatment. Among the regulations is also a clause that the types of wood are to be described by their correct names. For the control work the Technological Institute has a number of testing devices in which the furniture is exposed to a hard treatment. Chairs are tested in a rocking device, in which they are placed loaded with 70 kilos on the seat and set in a rocking movement. A good chair should stand at least 10.000 rockings, but the best Danish chairs have undergone 250.000 rockings without breaking. In other devices the Laboratory tests the strength of glueing, the durability of the constructions and the resistance of the finish. Through the tests of the Laboratory a good deal of valuable experience has already been gained, which contributes to extending the basis of high quality craftsmanship for furniture making by thoroughly tested modern methods.

TECHNICAL PROTOCOL.

as on April 19, 1963.

TECHNICAL PROTOCOL

as on April 19, 1963.

1.

Woods.

All materials shall be of good quality.

Softwoods.

All softwoods used shall be sound, free from fungi- or insect infections. Softwoods shall be without barky edges, resin galls, checks, shakes or "dead", i.e. black or loose knots.

Occasional sound knots may be tolerated, provided that they will not tend to weaken the total stability of furniture or parts thereof - as in special constructive joints of furniture. Sound knots, however, shall not be more than $\frac{1}{4}$ of the width of the material, and never of diameter more than 20 mm.

Hardwoods.

All hardwoods used shall be sound, free from defects from fungi- or insect infections. There shall be no checks, shakes or other defects, just as knots will generally not be tolerated.

In hardwoods with specific formation of heartwood, such as oak, teak, mahogany, rosewood, etc. there shall be no sapwood. In the case of French, Italian or other European walnut sapwood may be used.

For furniture, including especially tables and chairs etc., the designing and construction of which make special claims on the strength of the wood, annular-pitted woods such as ash, oak and teak must not be too "mild", i.e. too slowly grown. If such furniture is made of annular-pitted woods, the width of annular rings, i.e. the growth-zones of the wood should usually not be less than $2\frac{1}{2}$ - 3 mm.

Veneers.

All veneers, base-veneers as well as visible facing-veneers, shall be evenly and neatly cut and without serious checks. Facing-veneers shall be without defects such as discolorations, coarse splintering, shakes or serious checks.

Plywood.

All visible plywood shall be:

for birch (Finnish) quality A/BB.

for beech (Danish) quality B/BB.

for pine (Swedish) quality B/X.

Minimum of re-veneered plywoods is fixed as follows:

for birch (Finnish) quality S/BB.

for beech (Danish) quality BB.

for pine (Swedish) quality B/X.

In the case of other descriptions of quality, plywoods used shall be of a quality similar to what is covered by the above descriptions.

In less prominent places - e.g. upholstered chair-seats, etc. - less "perfect" qualities than the above may be used. For such purposes glueing of plywoods must be solid and without defects. This applies to all other qualities.

Laminated Board.

Laminated board shall be made of well-suited, sound materials. Core-wood shall be without holes, loose or big knots.

Shavings-
Board.

If shavings-board is used it shall be a sound and sturdy make, which under exposure to humidity must not expand more than 5 per cent in thickness.

Shaving-board shall in all cases be provided with edge-strips. On doors, flaps, etc. edge-strips shall be so thick that hinge-screws may be securely fastened.

Flaxboard must not normally be used.

2.

Seasoning.

All woods used - not only solid wood, but also laminated board, plywood, shavings-board and veneers - shall be seasoned to a uniform moisture content.

Moisture content in finished furniture must not be more than 9 - 10 per cent in proportion to the dry weight of the wood.

Woods which in the seasoning-process have become distorted-contracted shakes, cracks or checks, etc. - must not be used.

3.

Veneering.

Irrespective of process used in veneering, glueing between base-wood and veneers must be perfect - i.e. without blisters or other defects. In veneering - processes where woods are subjected to heavy moisture, veneered items shall be carefully dried before sanding and finishing.

Serious penetrations of artificial resin-glues will not be tolerated.

4.

Constructions
and Joints.

Constructions and joints must be carefully designed and performed in a professionally acceptable manner.

Constructions and joints shall always be capable of standing up to the load to which furniture of the type in question - excepting maltreatment - will be exposed in everyday use.

5.

Machining.

The machining of woods shall be precise and without defects. Special attention shall be devoted to precise and careful execution of constructions and joints.

6.

Gluing.

All gluing shall be made carefully with suitable glues with good adhesive qualities.

Special care shall be taken to obtain careful glueing of constructions and joints - especially joints of tables and chairs etc.

All edge - joints and other joints shall be "close" and without defects.

Visible splittings, cracks or other defects as a result of jointing will not be tolerated.

7.

Sanding.

All sanding shall be carefully and professionally executed - not least where "lean" finishings, such as wax - and oil finishes are used.

Direct saw marks or rough wood will not be tolerated, not even in places that are not normally visible. In invisible places neat machine-planing without chipping is acceptable.

8.

Finishing.

Finishes - irrespective of method used - shall be carefully and professionally performed, and materials herefor used shall be of good quality.

Where a full cellulose finish is used this shall be without blisters, checks, bare patches, etc.

Special Conditions I.Special re-
marks as to
Woods.

Wood used in furniture shall be indicated by its real name. Thus wood on which imitation has been carried out must not be described as the wood that has been imitated.

Likewise Afrormosia (Dua-teak), Iroko (Kambela) for instance, must not be described as being real teak irrespective of whether such woods appear in furniture as naturally-finished solid wood or as veneer.

Sundries.

For any other materials or methods used in furniture intended for export and not mentioned in the above, the same requirements shall apply in respect of quality of materials and workmanship as in the case of what is described in the above.

Packing and
Shipment.

It rests with the exporting furniture manufacturer in each individual case to see that furniture is carefully and securely packed so as to protect any furniture in the best way possible against consequences resulting out of shipment of furniture.

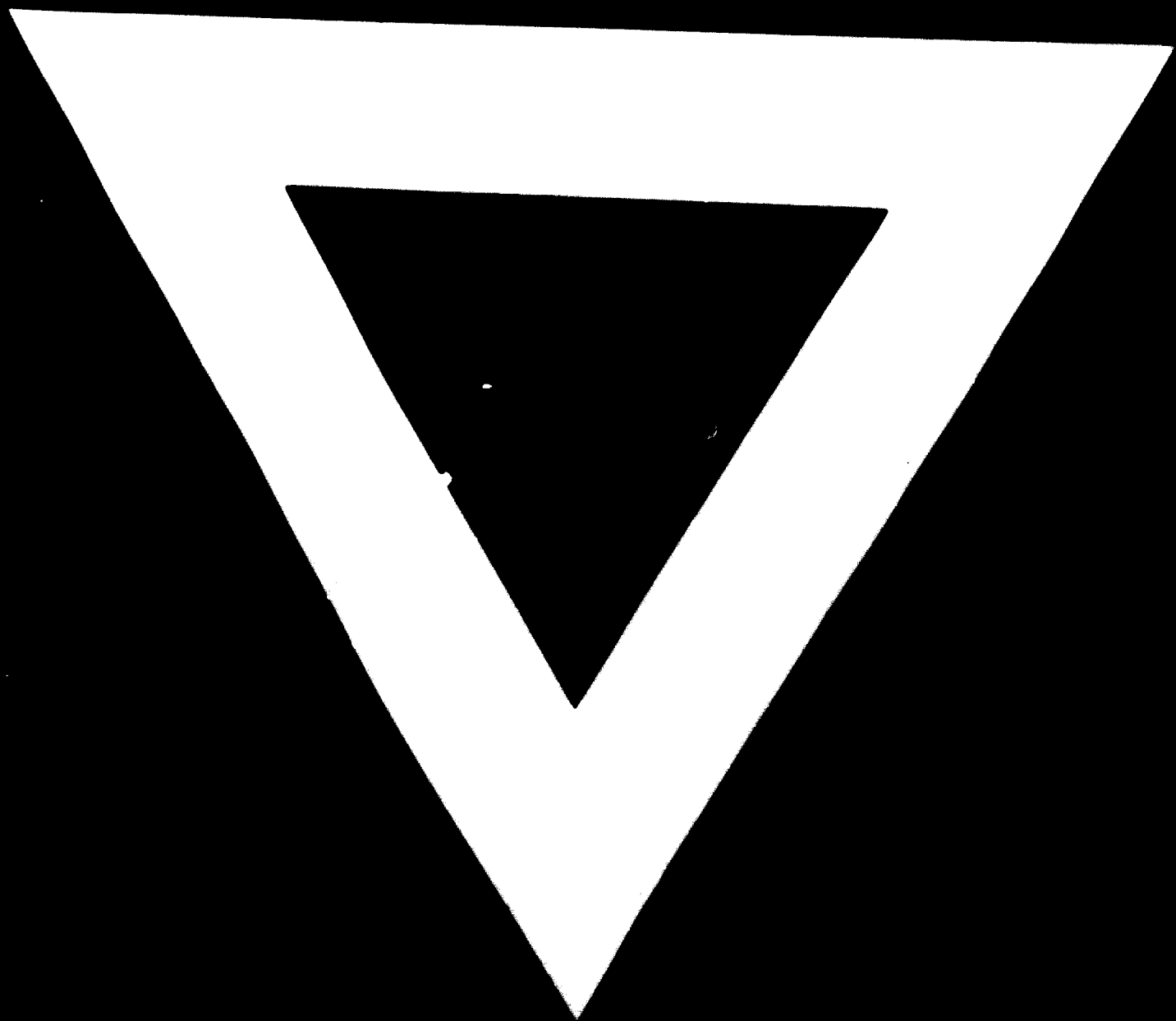
Special Conditions II.

1. Furniture manufacturers joining the Association shall not obtain the right to use the Common Seal till they have been open to inspection from the Association for at least 6 months - and within the said period having complied with the standards fixed.

 2. The inspectors have the right to take random specimen-samples out of the various finished types of furniture produced at a factory with a view to export and, therefore, subject to inspection, and further have the right to expose such random samples to special tests, even if this may result in partial or complete destruction of the furniture-specimen in question.

 3. It is the privilege and the duty of the inspectors to see, in making unannounced calls at business premises belonging to members of the Association and to any sub-contractors, that the standards fixed are being observed.

 4. Agreement has been entered into between the Association and The Institute of Technology to the effect that, until agreement to the contrary be made, the Institute undertakes to make any number of calls, at the descretion of the Institute, at the premises of associated factories.
-



14 . 1 . 72