Practical Guide
Small to Medium Enterprises
Wood Furniture Industry

UTILIZING QUALITY WOOD IN AN EFFECTIVE MANNER

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ADDRESS BY THE CHAIRMAN, FPESD CENTRAL JAVA

The furniture industry is a business still being depended upon by Central Java province, along with its textile products. However, lately the furniture industry has experienced some deterioration as a result of several factors, among them the difficulty in obtaining quality raw materials, especially teakwood, and the increasingly stiff competition from international markets.

Linked to the problems experienced by Small to Medium Enterprises in Central Java within the furniture industry, The Forum for Economic and Natural Resource Development (FPESD), Central Java chapter, through dialogues among the Government and Private stakeholders, is developing various programmes in support of the efforts for the recovery of the furniture industry. In the future, the direction and development of the furniture sector will be focused on the production of furniture better oriented towards the interests of the broader society through the participation of Private and Community Stakeholders in conjunction with the Government, to draw up furniture sector developmental policies more attuned to the environmental sustainability aspect.

The Forum for Economic and Natural Resource Development (FPESD), Central Java chapter, expresses the hope that this volume can provide benefits to the furniture industry participants, the decision makers, and the teakwood user community in the endeavour to overcome the crisis in teakwood as a raw material. The cooperation among various parties, namely the Government, Private Sector, and the Community itself in the framework of disseminating information through this book is extremely significant, and hopefully this volume may truly be beneficial to all the competent parties involved.

THE FORUM FOR ECONOMIC & NATURAL RESOURCE DEVELOPMENT, CENTRAL JAVA
CHAIRMAN

PROF.DR. MIYASTO

International Labour Organization

F O R E W O R D

The International Labour Office (ILO) has produced this book to serve as a practical tool that will help small to medium enterprises working in the Indonesian Wood Furniture industry to cope with the difficulties they face in terms of obtaining good quality raw materials. The majority of small and medium scale businesses are unable to obtain sufficient information on procedures of using wood raw materials correctly and wisely. Given the high cost and increased scarcity of precious woods such as teak and mahogany, it is important that firms use these materials efficiently, in order to maintain competitiveness. This book gives these enterprises practical information to enhance the quality of work and their productivity.

This book, for small and medium scale entrepreneurs, provides useful advice on how to utilize raw wood materials correctly and wisely and how to develop positive work and business attitudes. Through this book, it is hoped that the reader will acquire ideas to improve each phase of the furniture production process and consequently the quality of their products.

Alan Boulton

Director
ILO Jakarta

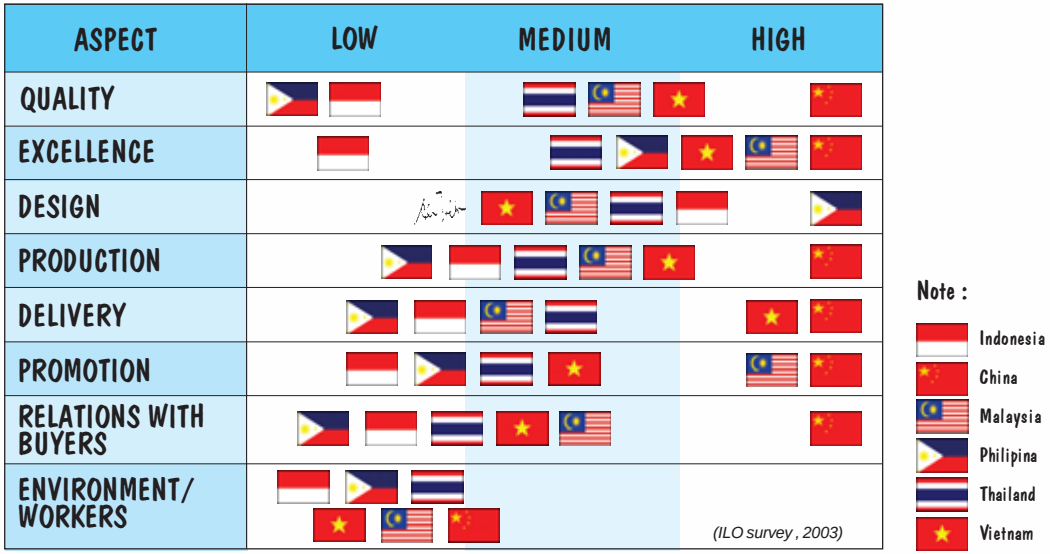
OUR FURNITURE INDUSTRY

Due to illegal logging and diminishing areas of teak forest, furniture industry players are finding it increasingly difficult to obtain high quality teakwood raw materials.

Indonesia's Furniture Industry is lagging behind those of China, Vietnam, Thailand, Malaysia and the Philippines in global industry competition. Low productivity and poor quality products are the main reason. At present, Indonesian furniture is able to survive by virtue of wood raw materials, superior design and cultural content.

The majority of small and medium scale business players are unable to obtain sufficient information on procedures of utilizing wood raw materials correctly and wisely.

These are some serious threats to the sustainability of our furniture industry.

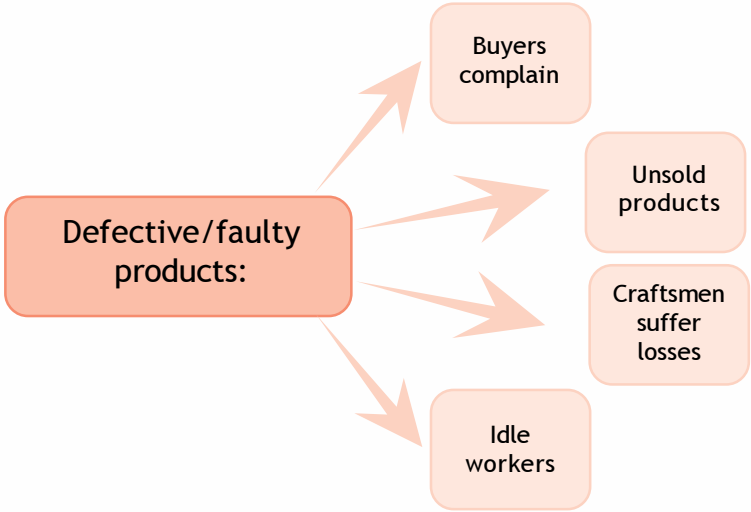


International buyer opinion on furniture among other countries

Furniture of Poor Quality

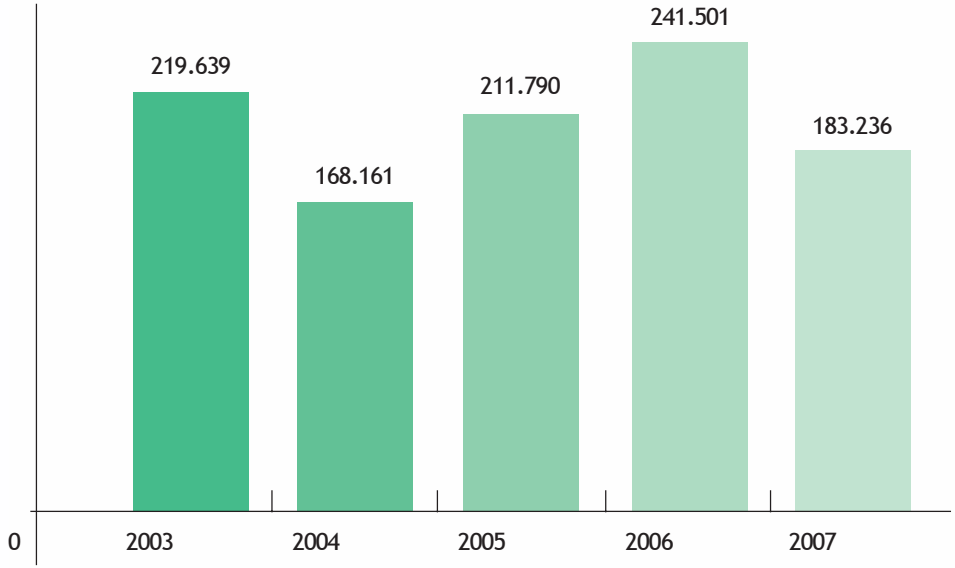
Cracked joints

Defective Furniture will be rejected by buyers



Result of producing poor quality furniture

TEAK WOOD PRODUCTION PLANE
Year 2003 to 2007
Perum Perhutani Unit I Central of Java



The teakwood supply will continue to decline, while the furniture industry -the source of livelihood for craftsmen and their families- must still go on. Furniture industry players must bear the responsibility of the preservation of forests, to ensure a supply of raw material for their businesses.

Various furniture products that still highly depend on wood from the forest

Consequence of excessive forest exploitation

What should be done

The supply of teak wood increasingly declines, global competition is tighter, actual steps should be taken to overcome this pressure. Furniture industry players must be willing to change, carefully study each phase of the furniture production process. Beginning with using officially sanctioned good-quality raw materials, practicing correct methods of wood-processing, wisely utilizing quality materials, developing creativity and skills in producing side products, market knowledge and business development.

This book contains a brief guide for small and medium scale entrepreneurs on how to **utilize and manage raw wood materials correctly and wisely**. Through this book, it is hoped that the reader will acquire ideas to improve each phase of the furniture production process.

At the end of this book are the addresses and names of agencies related to the furniture industry. They may be utilized as a source of information, consultation as well as a network in efforts to improve our furniture industry.

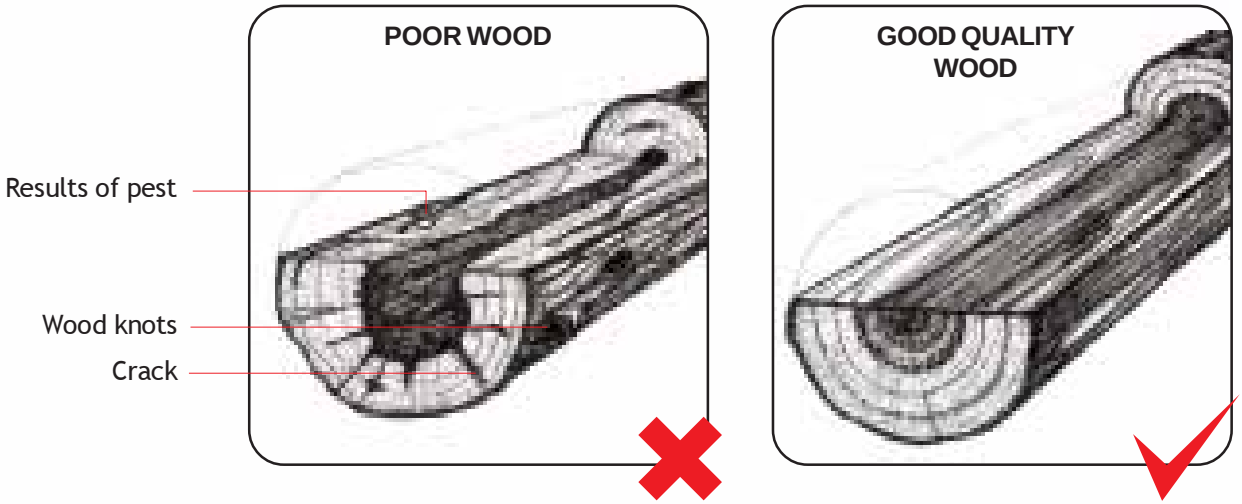
RAW MATERIALS

Selecting suitable wood

Raw material for furniture should possess these properties:

- Straightness
- Absence of /few knots
- Not hollow due to insects (termites, woodworms)
- Cylindrical
- No cracks /broken at the end

If possible, *Kayu teras* having many *galih* should be chosen



Purchasing Wood

Wood as raw material may be bought in the form of logs/lumber or boards, purchase may be done individually or by groups or cooperatives. Purchasing in groups is more profitable. Bargaining position at auctions is stronger, enabling good quality official wood to be bought at better prices compared with purchasing singly. In addition, when buying in groups, transport costs, cost of cutting wood and other processes may also be shared.

Buying either logs or boards have their advantages and disadvantages. Following are some comparisons:

Logs

- May be bought at Perhutani or people's forest
- Sawing can be arranged according to need
- Requires a process of sawing into boards
- Requires a band saw for cutting by oneself
- Requires skilled labor
- The price is ¼ times the price of boards per unit of volume

Boards

- May be bought in stores or in saw mills
- Material in form of boards can be directly processed into furniture
- Only boards available in the market can be bought
- Band saw not necessary
- Requires no skilled labor to saw
- The price may reach 4 times the price of logs per unit of volume

Whether in the form of logs or boards, furniture industry players should only buy official wood (legal), since buyers -particularly those in the international market- are greatly concerned about forest conservation.

Officially sanctioned wood may be bought at :

- ***Perhutani*, through large auctions and small auctions**
- **Official lumber traders and official lumber kiosks**

Following is a comparison of advantages and disadvantages of buying officially-sanctioned and illegal lumber

Advantage of buying officially-sanctioned wood

- Lumber derived from official source
  Guaranteed quality (wood is sufficiently aged and naturally dried)
- Lumber comes with SKSHH document and legal stamp(tok DK)
- Payment for board form completed with tax invoice
- Possesses transport document according to purchase
- Volume (cubic) stated on the SKSHH according to the attachment
- Will contribute to forest preservation and maintaining supply of raw materials for the furniture industry
- No legal risk
- No risk of being sued by buyer

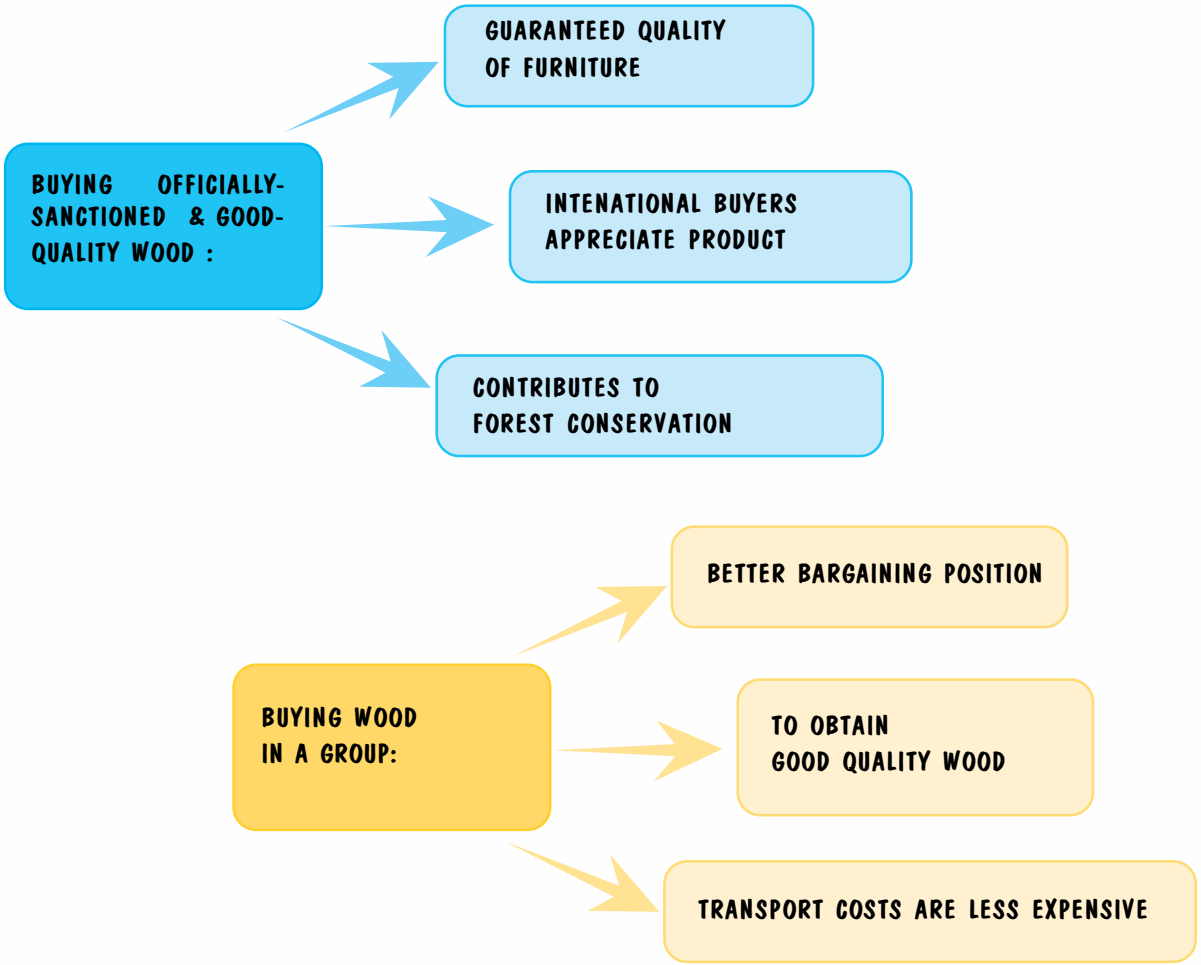
Disadvantage of buying illegal wood

- Inexpensive, quality not guaranteed
- Produces poor quality product
- Buyer disadvantaged
- Take part in forest destruction
- Risk violating the law
- Product poor quality, buyer disadvantaged

Legality of wood is proven by SKSHH document, for boards transported from the lumber shop to user in the same district, an invoice is sufficient.

Illustration: SKSHH
example of Surat Keterangan Sahnya Hasil Hutan and supplementary documents

Purchasing Wood



CREATING WITH WOOD

Teakwood Material

From the aspect of grain and strength, teakwood is the best quality wood. With this in mind, furniture industry players often confine themselves to employing teakwood in the production of all types of furniture. It has become more difficult to find good-quality teakwood, and, when found they are very expensive. In the future, teakwood will become even more scarce.

It would be an advantage for furniture industry players to be more calculating when using teakwood. Among others by limiting teakwood use to the following :

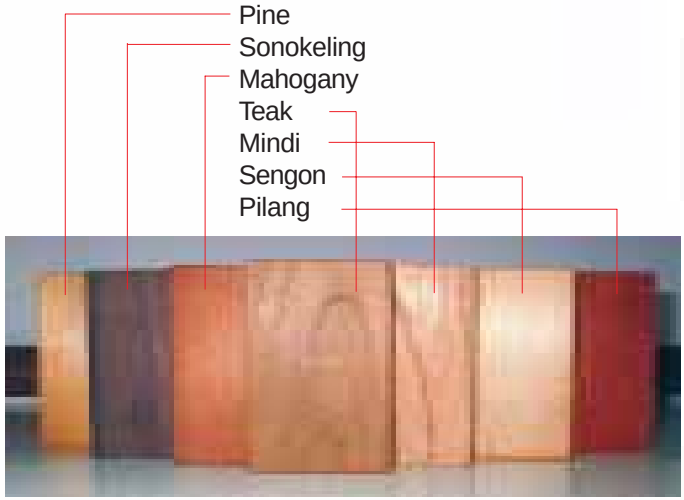
- Manufacturing exclusive and high-quality furniture products
- Making wood carvings by highly skilled craftsmen
- Developing creations taking in account the aspect of cultural content
- Avoiding wastefulness by planning products carefully and with calculation
- Re-using teakwood left over from the furniture industry to be made into side products of high artistic value and high selling price (handicrafts, furniture accessories, etc)

Other Wood Material Besides Teak

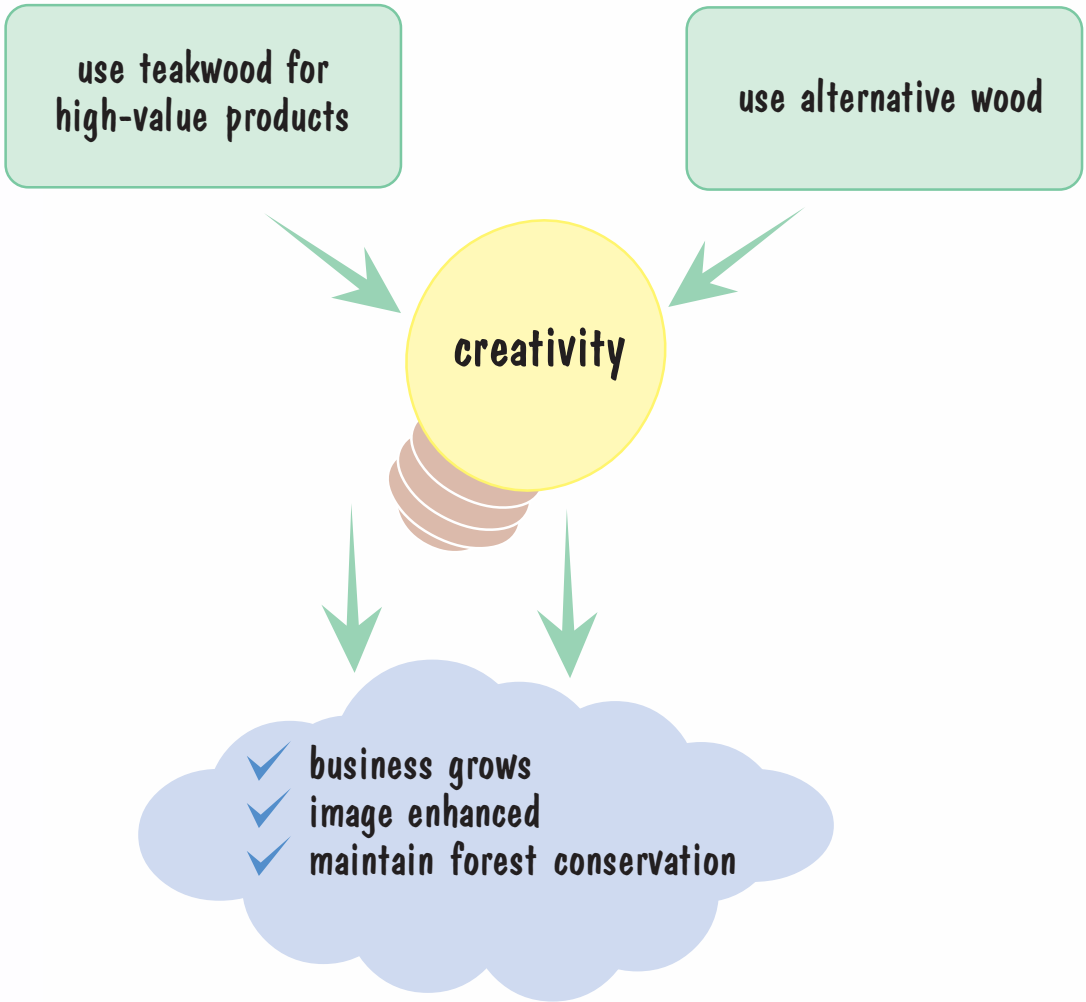
Many other types of wood can be used as substitutes for Teak in the furniture industry. Particularly for middle-class furniture for house interiors. Preserving technology has developed to the point of increasing resistance of wood against destructive pests and fungi.

Know the types of wood and their characteristics, and the correct processing methods that can produce quality products from other woods than teak. Buyers also need to know that quality furniture don't have to be made of teak.

Several types of alternative wood found in Java :



Creating with Wood



Storing Wood

Why must lumber be stored properly ?

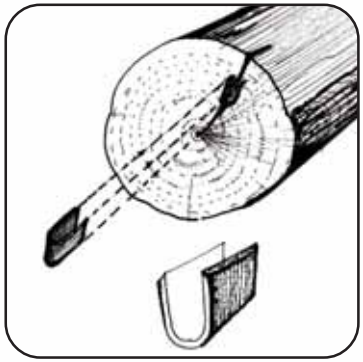
Logs

- So that cracks or broken ends won't become wider and longer
- To keep them safe from wood-destroying insects

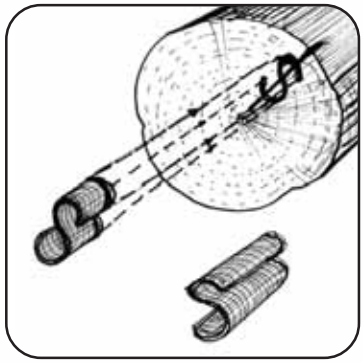
Boards

- So that dry material will stay dry
- To prevent change in form, warping (baling), deflection
- To protect them against wood- destroying insects
- For easier control of their numbers

Proper methods of storing :



" U " nails



" S " nails

Logs

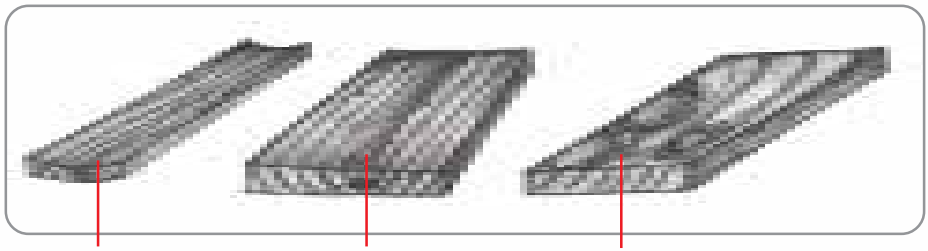
- Should be sheltered by roof or trees
- Provided with S or U nails for cracks

Proper boards storage

Boards

- Should be stored indoors
- Good air circulation
- Floor is not damp
- Piled and individually supported
- Protected against insects

Careless storage of wood will result in cracking , curving (*baling*), pores caused by insects and fungi



WOOD PROCESSING

Making Boards

Boards commonly found in the market are produced by splitting in large saw mills, using a method known as *jeblosan* splitting. This method produces tangential boards.

Tangensial boards from jeblosan splitting

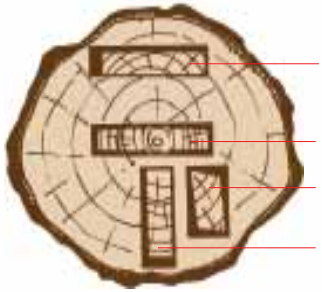
Boards Processing

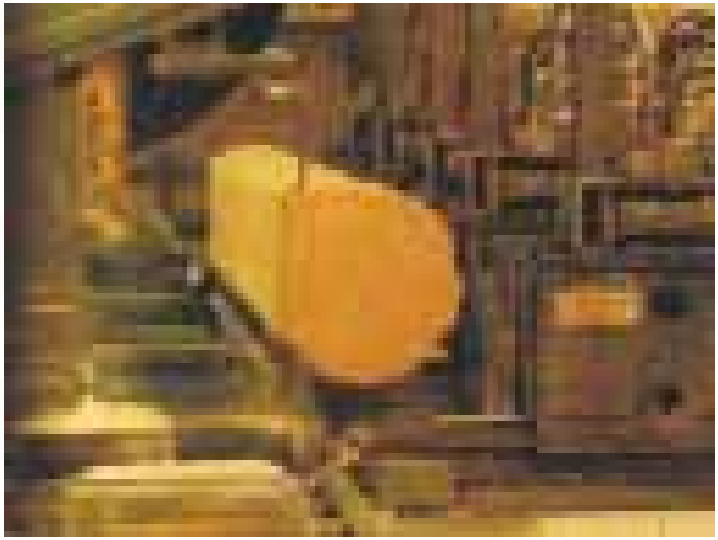
Three types of boards are produced by splitting logs, namely:

- Tangential Boards
- Radial Boards
- Semi Radial Boards

Each type has its own different properties.

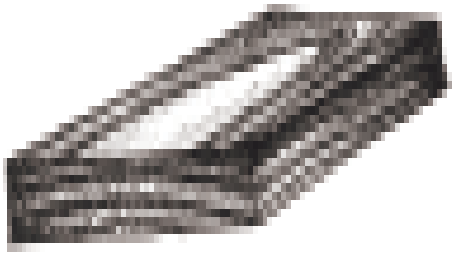
We can bring logs to saw mills ourselves, and ask for the wood to be split according to need, or to obtain other boards than tangential boards.





Location of log-splitting at saw mill industry

Tangential Boards



Cross section of tangensial board

Section and Grain of tangensial board

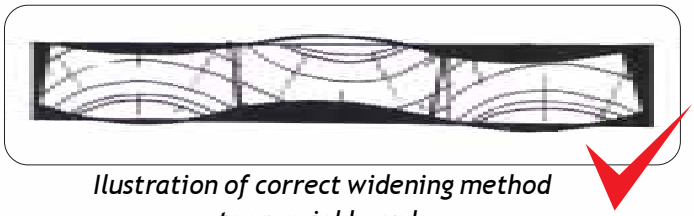
Change in form of tangensial board after drying

Characteristics

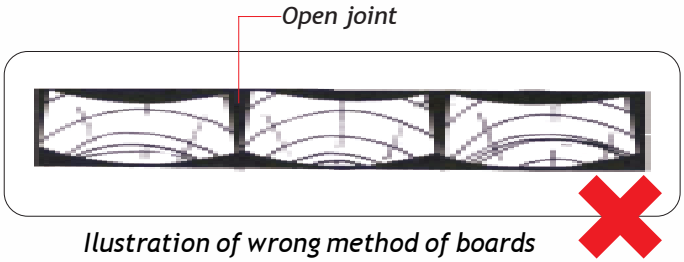
- Attractive wood grain design
- The most unstable
- Defective shape : deflect, curved
- Most often produced in splitting of logs

Technique for widening tangential boards

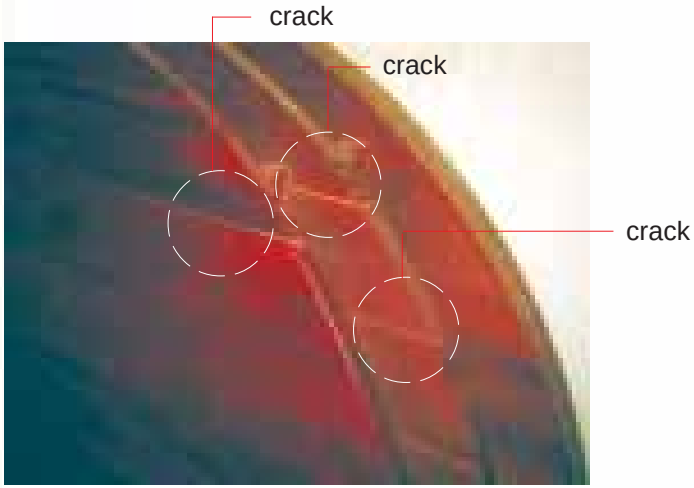
When drying, tangential boards will shrink at its sides, so that the board will appear to curve in the outer direction. The technique for making larger tangential boards must take into account the direction of shrinkage. When correctly joined, as the board shrinks, the width of the board will be wavy. If incorrectly joined, the joints will open/ loosen (crack), particularly when the drying process is imperfectly done.



Ilustration of correct widening method tangensial boards



Ilustration of wrong method of boards widening



Crack in joint due to incorrect widening

Because of their highly unstable nature, Tangential boards must be dry before being used.

Radial Boards

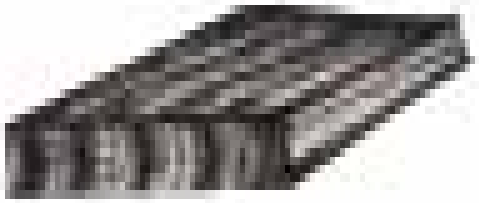
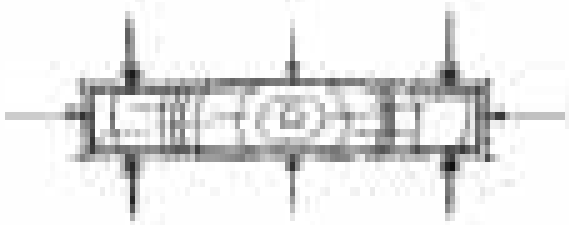


Illustration of radial board, radial cross section

Section and Grain of radial board



Shrinkage direction of radial board

Characteristics

- Decorative design of wood grain less attractive than tangential boards
- Having the most stable properties
- Not easy to obtain radial cuts

Widening technique for radial boards

Radial boards produce the best result when joined. However, the direction of shrinkage must be considered to prevent the joints from becoming loose (cracks).

Radial boards will shrink on one side, the outermost side from the center of the log will shrink slightly more than the center. With correct joining technique, if shrinkage occurs, wide boards will be slightly wavy.

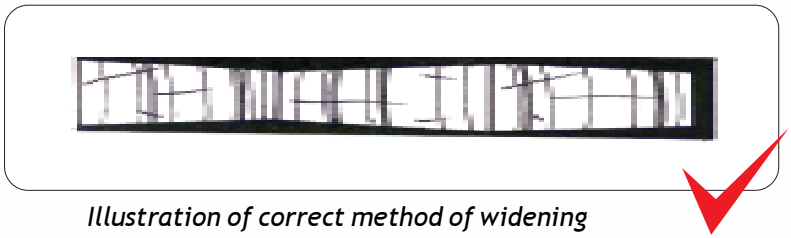


Illustration of correct method of widening radial board

Illustration of incorrect method of widening radial board

Semi Radial Boards

Characteristics

- Not too attractive wood grain design
- By nature more stable than Tangential boards
- Result of board widening better than that of Tangential boards

Cross section of semi radial board

Section and Grain of semi radial board

Direction of shrinkage diamonding

Widening technique of semi radial boards

Semi Radial boards are frequently produced in log-splitting - besides Tangential boards—. By noting the direction of wood grain, the width can be extended satisfactorily, in the event of shrinkage, there will be less damage than that of Tangential boards.

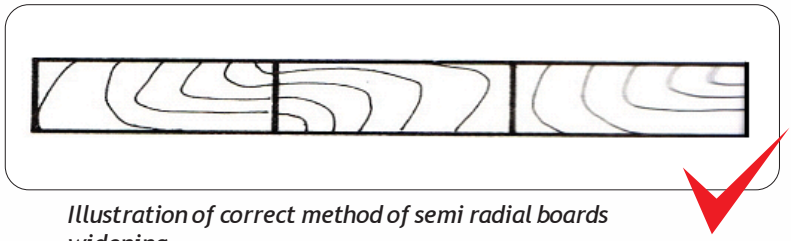


Illustration of correct method of semi radial boards widening

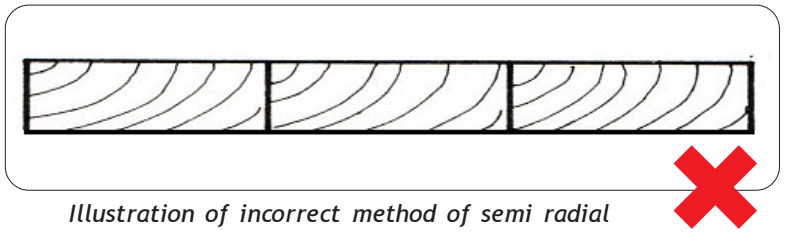
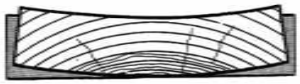
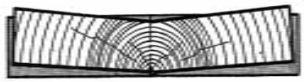


Illustration of incorrect method of semi radial boards widening

CUTTING LOGS

There are several choices in cutting logs

Cutting logs according to need

Tangential boards	Radial boards	Semi radial boards
		
• Attractive design of wood grain • Least stable by nature • Defective shape: deflecting, curving • Most often produced in splitting round logs	• Wood grain design less attractive than that of tangential boards • Most stable by nature • Not easy to obtain radial cuts	• Decorative design of wood grain not so attractive • More stable by nature than tangential boards • Diagonal defect (diamonding)

Preserving Wood

The purpose of preserving wood :

- To increase its lifetime
- To increase resistance against destructive pests
- To enable the use of alternative wood known to be less enduring

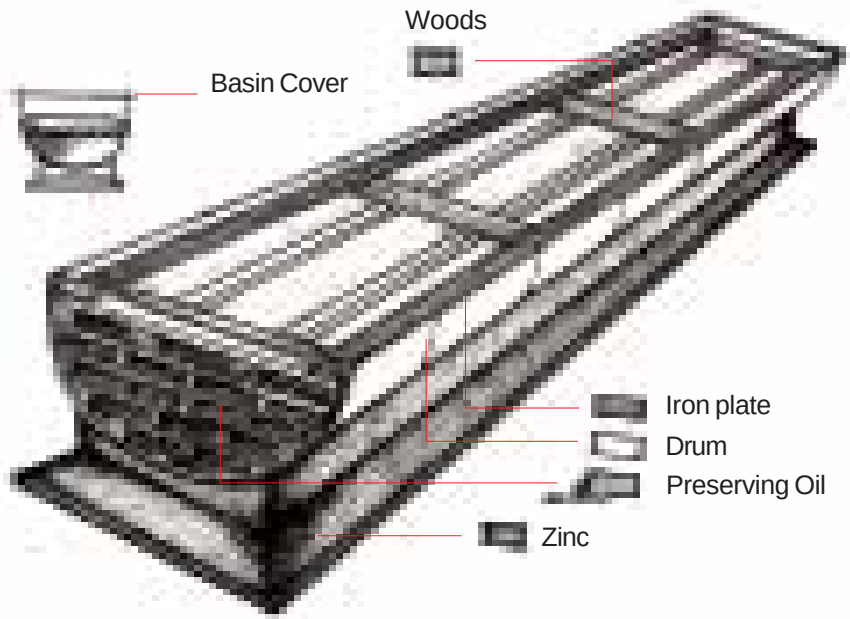
Some methods of preserving wood:

- Preserving by coating (using brush)
  Used on boards or furniture before finishing, this method will give the poorest result since the chemical will only coat the wood surface.

- Preserving by soaking/dipping
  For boards before the drying stage, will give better results since the chemical can penetrate deeper into the wood

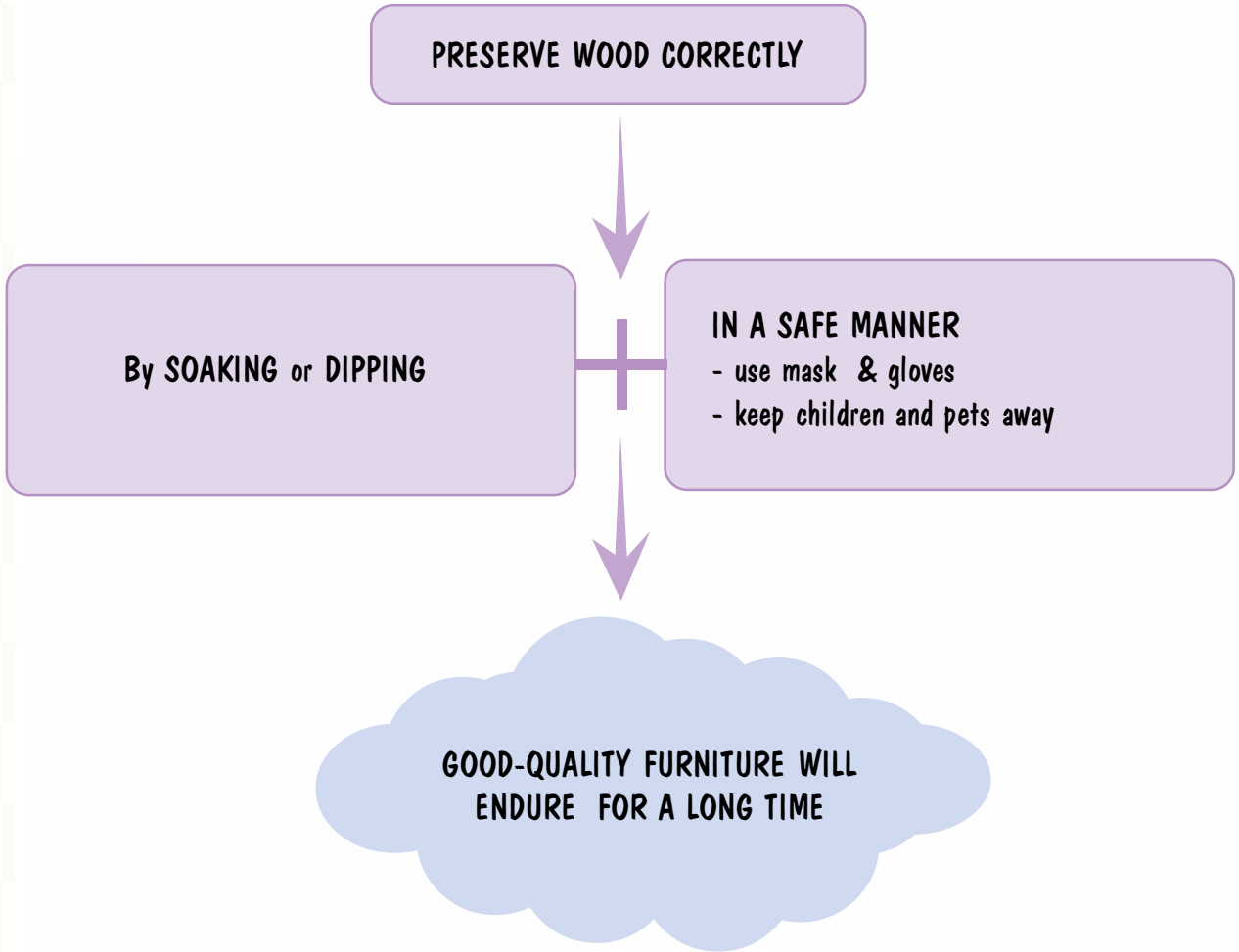
Preserving wood by soaking/dipping will give the best result as a larger amount of chemicals can penetrate and will enter more deeply in wood.

Illustration of preserving by soaking in section of drum



Chemicals used in preserving wood are easily found in the market.

PRESERVING WOOD

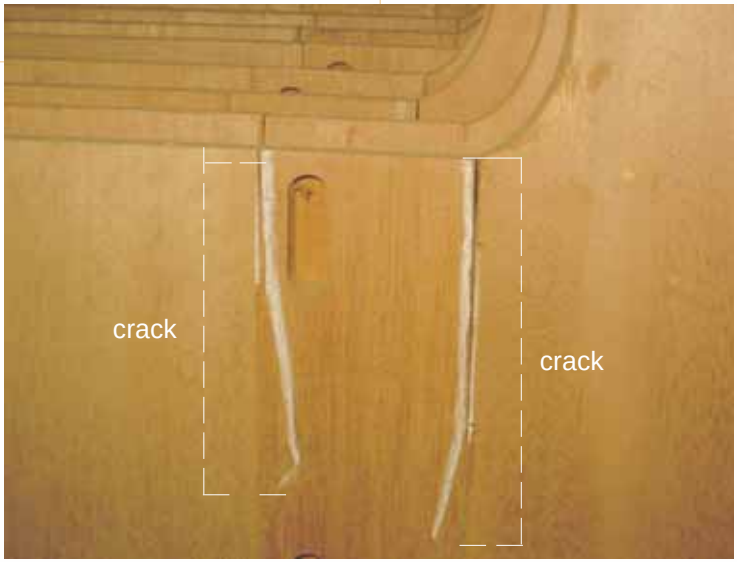


Wood drying

Wood drying is an important requirement in manufacturing furniture of good quality.

The use of damp timber in furniture-making will result in :

- Breaking of wood furniture components
- Change in furniture shape
- Damage to furniture finish
- Loose construction (joints) of furniture
- Loose joints in extending width of boards
- Knock down furniture unable to be assembled
- Growth of fungi



One consequence of imperfect wood drying

Methods of wood-drying :

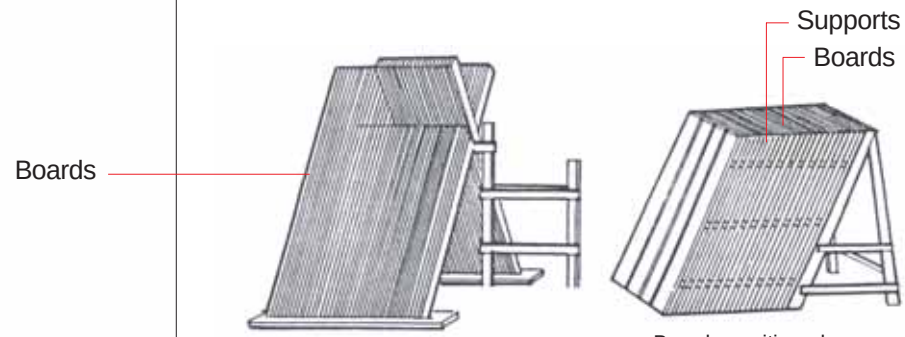
Natural Drying

- Dependent on the sun (weather)
- Carried out in open air
- Unable to regulate the required temperature or humidity
- Requires long period of time
- Unable to keep up with production speed
- Final water content achieved maximum 13-20% (for Indonesia)
- Inexpensive, no investment in drying equipment
- Simple, no special knowledge or skill required

Artificial Drying

- Using machinery
- In closed space
- Temperature and humidity regulated
- Speedier process
- Able to keep up with production speed
- Water content may be less than 13%
- Requires investment of drying machine
- Special knowledge and skill required

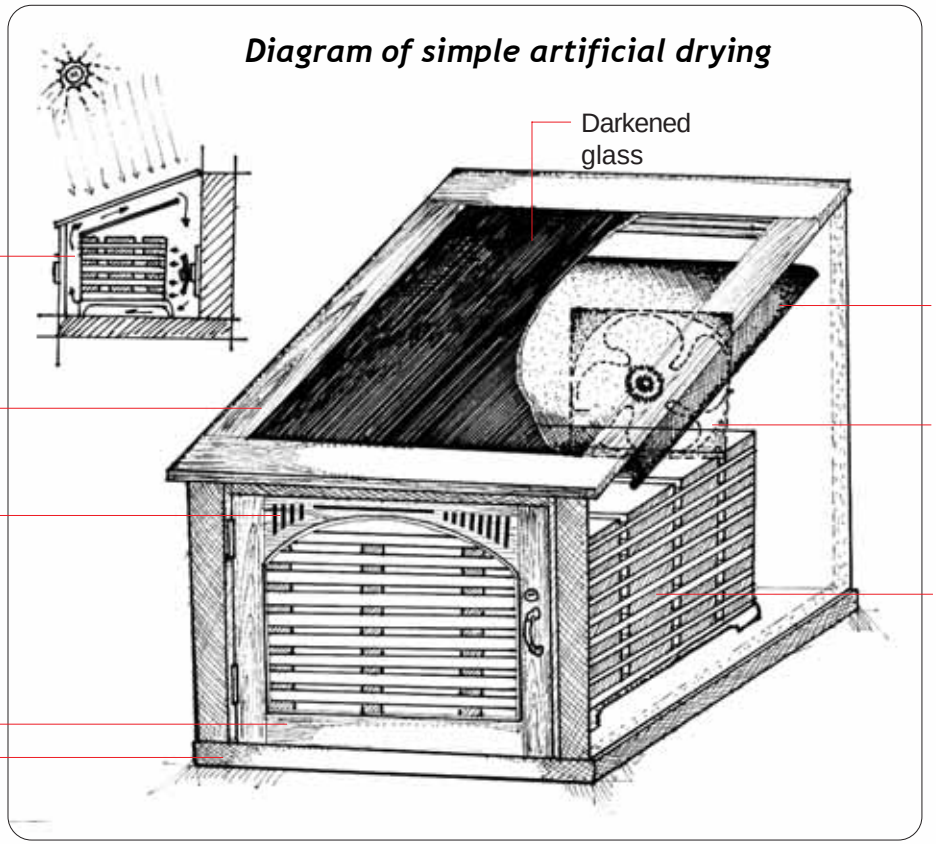
Diagram of natural drying



Simple Artificial Drying

This method is a combination of sun-drying and constructing a covered space in which a fan provides air circulation. Produces a better and quicker result than natural drying and less expensive.

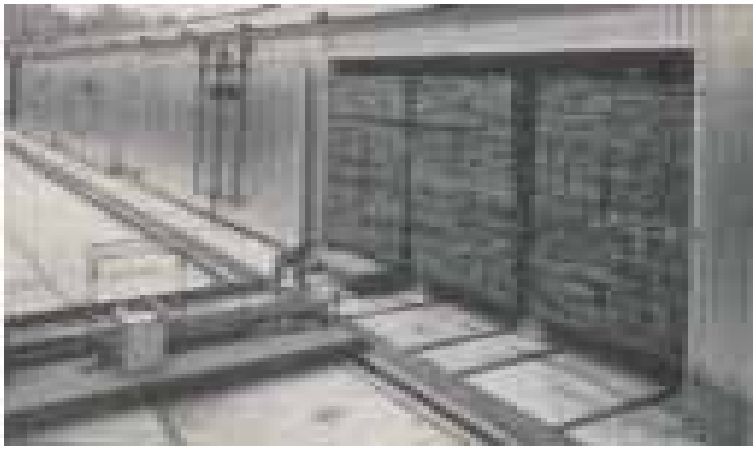
Diagram of simple artificial drying



Modern artificial drying

Artificial drying using modern machinery will produce the best result. The machine operates under the principle of regulating temperature and humidity in the drying room. The temperature is regulated gradually from warm to hot, while humidity is regulated from very damp to dry, also gradually.

Temperatures will differ according to type of wood. Heavy woods (of High density) must be dried more carefully than light woods. Thick wood must be treated with more care than thin wood.



Modern drying machine

Although artificial drying is to be carried out, natural drying will be necessary during the initial stage.

Drying Based On Category Of Wood

Difficult wood

- Ebony, *Kruing*, *Merbau*, Teak
- Initial temperature 45°-50°C
- Final temperature 60°-65°C

Medium wood

- Mahogany, Red *Meranti*
- Initial temperature 50°-55°C
- Final temperature 65°-70°C

Length of drying time required for each type of wood

Initial water content: 50% - 60%
Final water content: 10%

Type of wood	Days Wood thickness 26 mm	Days Wood thickness 52 mm
Agathis	5	14
Sengon	4	8
Jati	5	16
Kamper	6	20
Kruing	6	21
Mahoni	5	14
Meranti merah	5	14
Meranti kuning	6	16
Meranti putih	6	17
Mersawa	8	21
Merbau	15	23

After the wood is dry and awaiting the furniture making process, it must be stored :
- Under a roof
- In a dry room and supported

Measuring water content of wood

Some methods of measuring water content of wood:

- Method of nails to measure water content in boards
- Attaching a device on wood surface, for finished furniture

Water content measuring device nail method

Measuring water content using attachable meter

Some furniture makers measure water content of boards/furniture using the needle method. This method is unsuitable since it is actually designed to measure water content of plywood veneer 3-5 mm thick. Using this method, the water content of the board/furniture seems to be low, although actually still high.

Water content of furniture

Foreign buyers complain of Indonesian furniture products being faulty not long after being used. The imperfections consist of cracks, loose construction and damaged finishing. All these damages are the result of high water content.

Location	wood equilibrium water content
Central Java	13%
Boston (AS)	10%

These furniture are considered sufficiently dry since the water content is far below that of Central Java which is 27% but is not enough. The reason is that these products are to be exported to Boston, U.S.A. (a country with 4 seasons) where the wood equilibrium water content is 10%

Furniture should be dried until its water content is suitable for the destination country. Otherwise, the furniture will likely crack.

The length of drying time should take the following into account :

- To achieve water content below 10% , a longer period is needed. Each 1% decrease requires 1-3 days' time.
- During drying, when more than one type of wood is involved, the difficult wood type becomes the standard of drying period
- For varying thickness of wood, the thickest wood becomes the standard.

Delivery

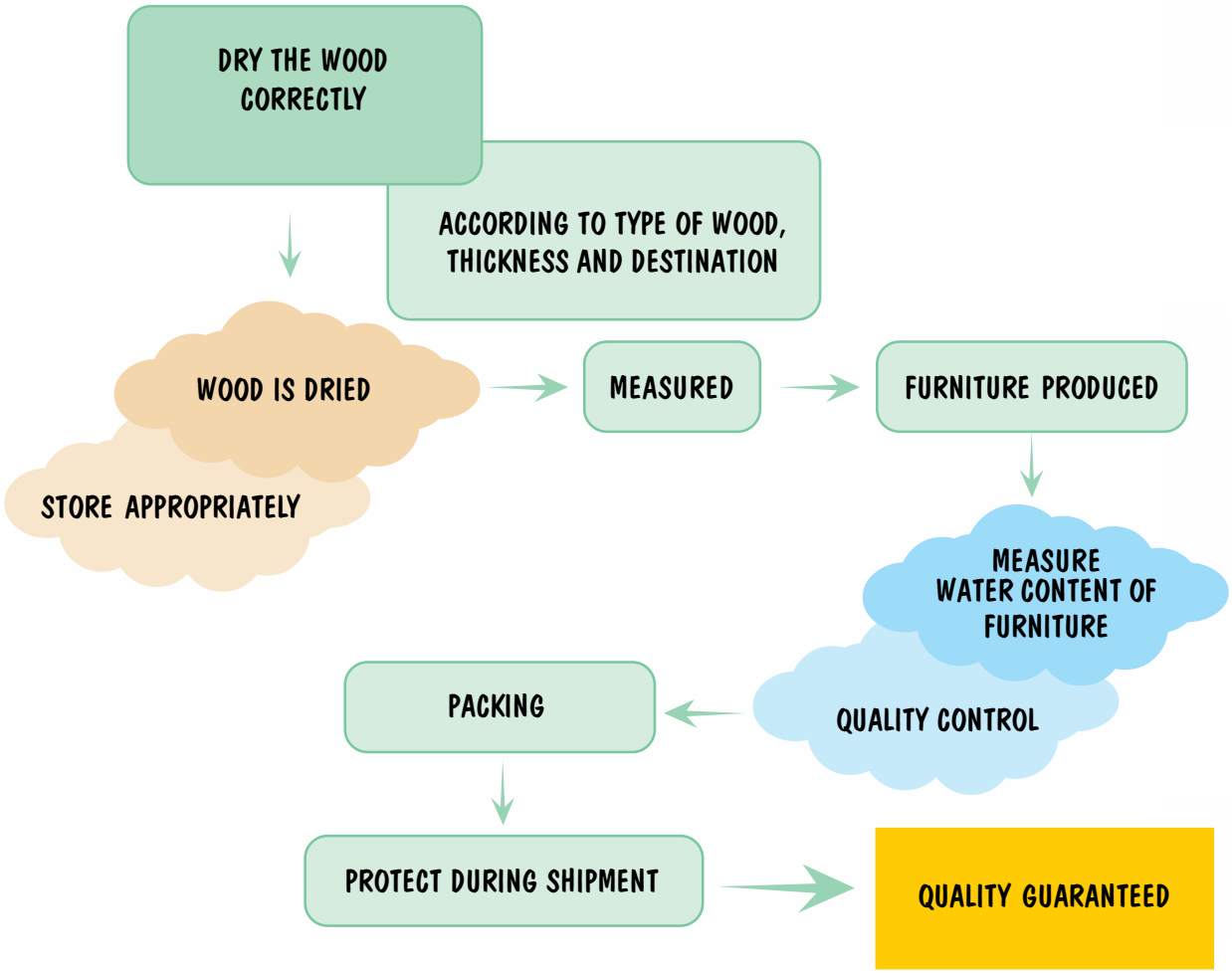
After the furniture making process is completed, the product is ready to be delivered to the buyer, products must be protected from possible humid/moist air during delivery.

During delivery in containers, the space will be very hot and humid, this will endanger the product. Therefore, equipment able to reduce humidity is required, these devices are available in several brands.

Correct packing will protect product during shipment

This device will maintain air humidity

WATER CONTENT OF WOOD DETERMINES QUALITY



SAFE AND EFFICIENT MACHINE PROCESSES

Furniture production processes are inseparable from the aid of machines.

Safe and efficient machines

- Machines are well-maintained
- Machines run according to function
- Machines are placed according to production sequence

Characteristics of well-maintained and functioning machines:

- Sharp knife
- Conductor functions well
- Equipped with safety cover, also helps to press work object to knife

spindle machine with conductor and safety cover

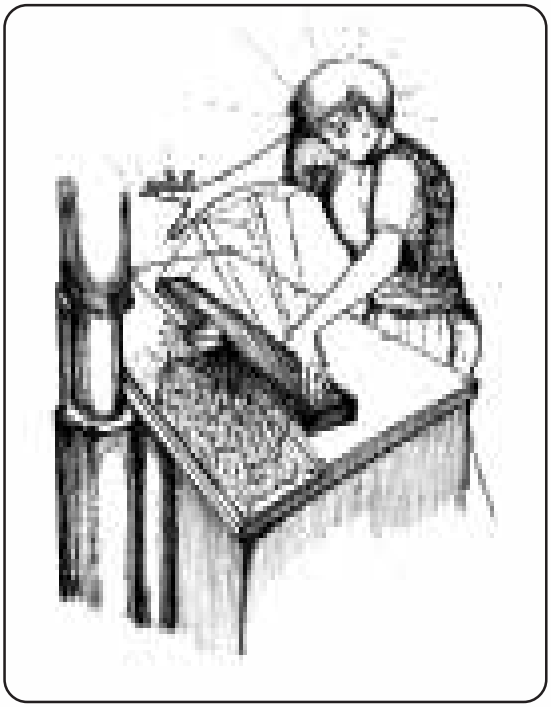


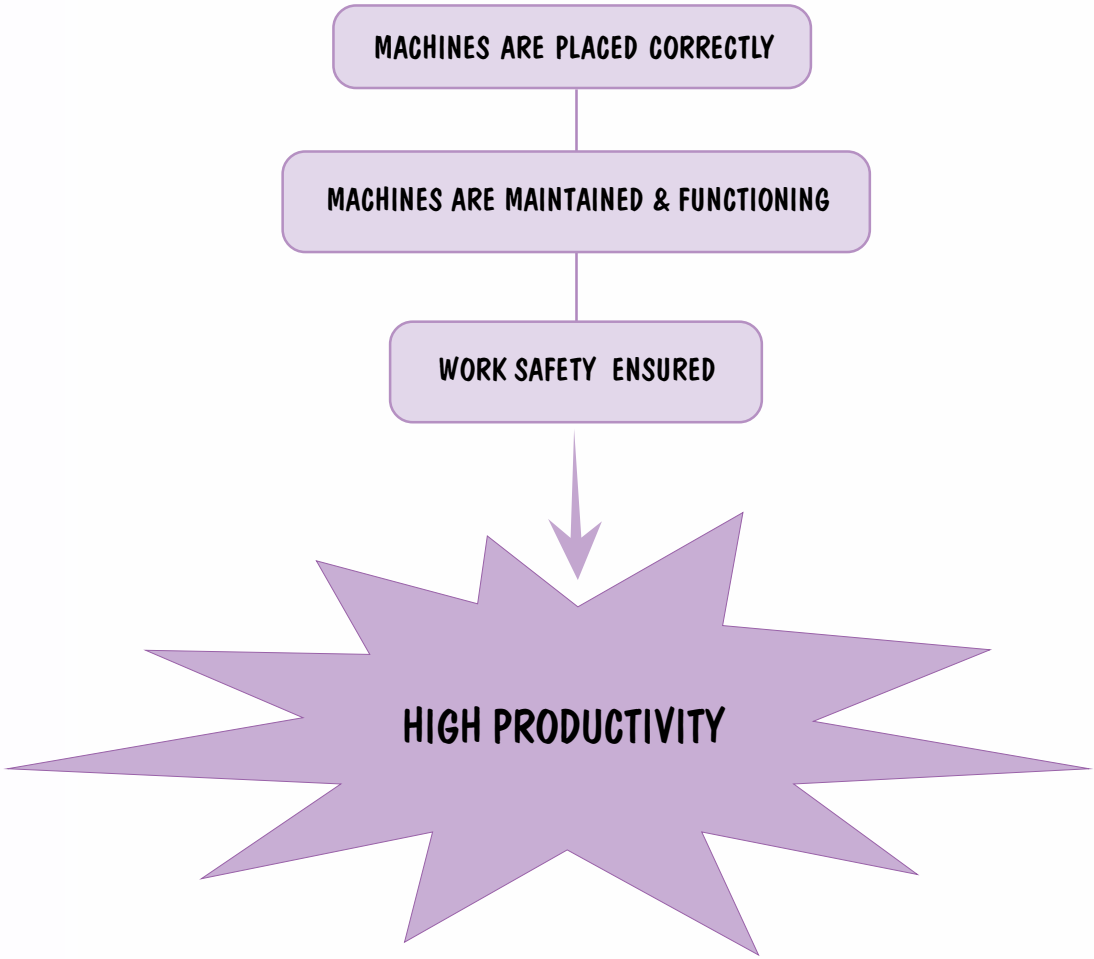
illustration of work accident as a result of machine without safety cover

illustration machinery

Machines that function well and safely, and good templates can guarantee that the quality of furniture produced will be maintained.

Machines need scheduled maintenance to prevent their being easily damaged and ensure that they can still run well.

Safe and Efficient Machine Process



Utilizing residue wood

The furniture making process frequently leaves many pieces of wood. Some craftsmen consider wood residues as waste that are no longer able to be utilized, other than for burning.

Wood pieces left over from furniture making can be made into side products of high artistic value. With additional creativity, wood residue can be converted to handicrafts with sales value that will mean additional income.

Left-over wood from furniture production made into handicraft

SELECTING AND UTILIZING WOOD W

VISELY

(QC) RIGHT QUALITY CONTROL

SUPERIOR PRODUCT

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Jl. Ki Ageng Bribig No. 28 Klaten

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