

CERTIFICATE COURSE ON PLYWOOD
MANUFACTURING TECHNOLOGY

PROSPECTUS

IPIRTI

(An Autonomous body of the Ministry of Environment and Forest
Government of India)
Bangalore-560 022

Indian Plywood Industries Research and Training Institute

(An Autonomous body of the Ministry of Environment and Forests, Government of India)

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IPIRTI Field Station

Mohali

From the Director's Desk

Human resource development is concerned with the “people” dimension in management. Training, an important HRD tool is a learning process that seeks to prepare an individual to perform efficiently in the chosen profession.

Global concern for environment and bio-diversity conservation in recent years is shared by the nation and is reflected in various national policies. Complexity of values attached to environment, forests, bio-diversity often seems to conflict with the basic needs of human survival. The role of wood product research and training of personnel involved in the wood product manufacturing sector are even more critical now than ever before.

IPIRTI is especially mandated for research and development on all aspects of wood products/composites. It has established itself as the premier training institute to meet the HRD needs of the wood based industry in the country.

Certificate course on Plywood manufacturing Technology offered by the Institute, the only one of its type in the country, will be helpful to the technicians /supervisors working in the plywood industry and for those who have freshly joined the industry or likely to join the industry.

This brochure provides brief information about the certificate course on plywood manufacturing technology of 3 month duration offered by IPIRTI.

Bangalore
March 2010

Director

1. INTRODUCTION

From a modest beginning in 1962 as a cooperative research laboratory, IPIRTI is now an internationally recognized research and training institute in the field of wood and panels from wood and other lignocellulosic (renewable fibers) materials. Located in the Garden City and Technology City of India, Bangalore, the institute is an autonomous organization of the Ministry of Environment and Forests, Government of India.

2. MANDATE & VISION

Research on all aspects of production of sawn timber, manufacturing plywood and other allied engineered and reconstituted wood or lignocellulosic products, including improvement of materials, manufacturing processes, improvement of machines and appliances, conditions of work - time and motion studies - standardization of methods of work-conditioning of factories.

Inspection, certification and marking of all forest products viz. plywood, wood, timber, hardboard, particle board, chipboard, furniture, glue-lam, compregs, doors, panel doors, block board, flush doors, veneered panels, veneers, laminated panels, composite boards, and the products of allied trade and industry.

Training in connection with forest product utilization for plywood industry and trade, and allied industries.

Imparting technical education and/or training at undergraduate, postgraduate, and/or any other level in technology of forests products and chemicals and paper laminates, and/or synthetic finishing, manufacturing machinery.

Institute's **vision** is conservation of natural forests through development and adoption of efficient technologies for manufacturing wood alternates and panel products from renewable fibers, including plantation timbers & bamboo to meet the vital needs of our developing society.

3. RESEARCH AND DEVELOPMENT ACTIVITIES

The institute is specially mandated to undertake research on all aspects of wood and panel products made from wood and other renewable fibers.

Research

- | | | |
|----------------------------|---|---|
| Wood/Wood Based Composites | - | Plywood, Block Board, Flush Doors and LVL |
| | - | Saw milling. Finger Jointing, Glulam |
| Composites from non-wood | - | Agro/Forest/Wood residues. Bamboo |
| | | Lignocellulosic materials, etc. |

Treatment for Enhancing Service Life of Wood and wood based composites

- | | | |
|----------------------|---|-------------------------------------|
| Training & Education | - | HRD for industries. |
| | - | For Officers of regulating/resource |

Management departments, Forests Excise. Customs, Bureau of Indian Standards (BIS, the national standardization organization)

- Projects for Engineering students as partial fulfillment for completion of engineering degree in Chemical/ Mechanical engineering.
- To facilitate research leading to Ph.D. Degree from FRI University in the field of Wood Science & Technology.

Standardization and Testing

- Evolving/Revising national material/product standards,
- Testing for conformity to Indian Standard Specifications.

4. Training Programmes

The training Centre with modern training facilities for mechanical wood industries was established in the Institute with the assistance of FAO/UNDP/GOI in the year 1989 to cater to HRD needs of the wood based industry in the country. The Institute offers one year Post Graduate Diploma Course (PGDC) in Mechanical Wood Industries Technology (MWIT). In addition, short term vocational courses are organized on different aspects related to MWIT and other allied subjects. Courses are also organized for forest officers for enhancing their appreciation about the role of technology in efficient utilization of wood and development of wood alternates from renewable fibers. The three months training course is a special training program for the technicians/supervisors working in plywood industry or those who are willing to join the plywood industry.

4.1 Duration of the course: 3 months

5.1 Eligibility and Admission Procedure

Technicians working in the plywood industry and have reading/ writing knowledge in English are eligible for the course. Also fresh candidate having passed PUC/ITI and reading/ writing knowledge can also join the course. Candidates are selected from all over the country. Preference in admission is given to candidates sponsored by industries or organizations. Quotas for SC/ST/OBC/physically handicapped persons are as per the Government of India rules.

5.2 Hostel accommodation

There is a Trainees' Hostel (only for gents) on the campus. Accommodation is provided on twin sharing basis and rent is Rs.300 per trainee per month (subject to revision). Trainees are required to bring their own bed linen, mosquito nets, blanket (woolen), pillow, towel etc No accommodation is provided for spouse and children of the trainees. (Trainees Hostel Rules - Annexure 3).

5.3 Boarding

Mess facilities in the hostel are provided through a contractor on cost sharing basis. The mess facilities are compulsory for all trainees staying in the hostel. Present charges are about Rs.2000/- per month.

5.4 Course fee

A non-refundable Course fee of Rs.10,000/- payable at the time of admission. In addition to the course fee, amount of Rs. 2000/- is to be paid as caution money and advance mess deposit of Rs. 2000. Caution deposit will be refunded at the time of the completion of the course. These amounts are to be deposited in the form of demand draft on any nationalized bank drawn in favour of 'Director, IPIRTI' payable at Bangalore within two weeks of issue of letter regarding selection or before the commencement of the course whichever is earlier.

5.5 Training Methods

Class room teaching

Class room lectures are designed to enhance the trainees' ability to comprehend the analytical methods, which help trainees to assimilate knowledge through interaction with the faculty members. In class room lectures, audio-visual aids are used very frequently.

In Plant Training

The aim of in plant training is effective absorption of essentials of technologies, processes and practices learnt during theory and lab practical through implementation in simulated factory floor conditions. Trainees deal with various production processes at the institute's in-house pilot plant facilities complete in all respects related to saw milling, plywood/block board manufacture, resin/adhesive manufacture, testing and evaluation.

Study tour

The study tour is aimed at broadening the perspective of the trainees from actual production systems view point. This also helps the trainees to

1. Learn about strategic approaches used in some organized factory and to identify critical areas for improvement.
2. Observe merits and demerits of various processing methods adopted by different factories and have discussions with the factory personnel regarding improvement in quality and productivity.

The journey and other arrangements for study tour out of Bangalore are made by Institute but the actual costs are to be borne by the trainees themselves. These programs are compulsory for all the trainees. It costs around Rs.1000/- for (2-3 days).

5.6 Evaluation and Grading

Evaluation system of trainees' performance is designed to encourage them for active participation in all the components of the training viz. class room lectures, laboratory/in plant practical classes, seminars, project work, excursions and tours, as also general conduct. Evaluation system helps each trainee to measure his achievement in various activities that are essential to make him a professional. (Examination rules at Annexure 2)

7. TEACHING FACULTY

The teaching faculty comprises of highly qualified and experienced scientists and technical staff in addition to guest faculty invited from recognized institutes and/or industry.

1. Dr. Sushil Kumar Nath. Ph.D.

Specialised in Adhesive and Plywood Manufacturing Technology
Diploma in Plywood & Wood Adhesive Technology from CSIRO, Australia,
Diploma in Technology Training from Australia.

2. Ms. D. Sujatha, B.E. (Chemical)

3. Shri. N. D. Uday, B.E. (Mechanical)

4. Shri. K. Thanigai, M.Tech.

5. Shri. Anand Nandanwar, M. Tech.(Building Engineering & Management).

6. Dr. Vipin Chawla, M.Sc., Ph.D (W.Sc. & T)

7. Shri. Jagadish Vengala, M.Tech. (Civil Engg. – Construction Technology)

8. Smt. Mamatha. B. S, M.Sc. (Chemistry)

9. Shri Narasimhamurty, M. Sc. (Botany)

10. Dr, Aparna Kalawate, M.Sc., Ph. D. (Entamology)

11. Shri. A. C. Ashok Kumar, B.E. (Mech. Engg.)

PLYWOOD MANUFACTURE COURSE**Theory 60 hrs.****Forestry and Timber Raw Material**

Forests in India	2 hours
Source of timber for plywood	
1 hour	
Wood anatomy	
2 hours	
Defects in wood	
1 hour	
Wood destroying organisms	
2 hours	
Protection of wood	
1 hour	
Measurement of volumes of logs	
1 hour	
Properties of wood (Physical)	2 hours
Properties of wood (Mechanical)	2 hours
Properties of wood (Chemical)	2 hours

Practical

10 hours

Laboratory testing of wood preservation against fungi - treatment of specimens, calculation of retention, media preparation for culturing fungi, inoculation, incubation, introduction of specimens, evaluation of results. Identification of wood destroying insects and termites through their method of attack. Detection of preservatives in treated timber and products through spot testing- and penetration.

Plywood Processing (Green End)

Storage of log – in log yard & water	
1 hour	
Log preparation and log centering	
1 hour	
Peeling lathe for rotary cutting of veneer	1
hour	
Lathe setting	
1 hour	
Knife grinding	
1 hour	
Veneer peeling	
2 hours	
Peeling defects & remedial measures	1
hour	
Clippers & clipping of veneer	
1 hour	

Veneer Slicer

1 hour

Slicing of veneer

2 hour

Matching of decorative veneer

1 hour

Veneer drying

2 hours

Veneer up gradation

2 hours

Veneer storage

1 hour

Practical

45 hours

Log storage - need for storage, dry storage, wet storage, precautions in storage. Steaming and boiling - heating schedules, effect of heating on properties of wood, advantages and disadvantages of heating. Preparation of logs for peeling - cross cutting, debarking and cleaning

Log centering - purpose and economic importance of centering, centering errors and their influence on veneer yield, methods of centering.

Veneer peeling lathe - machine parts, cutting action, undesirable movement of wood on lathe, play in lathe machine parts, spindle overhanging, dynamic equilibrium and slackness.

Peeling lathe settings- setting of knife, setting of pressure bar, and setting of the gap.

Rotary cutting of veneer - lathe settings and veneer quality, mechanism of veneer formation, type A and B veneer, effect of pressure bar compression and temperature on veneer yield.

Peeling defects, their cause and control - thickness variation, roughness, loose veneer corrugation, raised grain, torn grain, bump formation, wooliness, knife and pressure bar marks

Maintenance of peeling lathe - general procedures, lubricants and lubrication, storage of spare parts for replacement. Measurement of veneer recovery, Yield calculation, Quality evaluation.

Veneer Clipping - functions, types, clipping efficiency, clipping allowance, veneer yield, dry clipping, soning and slacking.

Preparation of flitches for slicing - sawing patterns, cutting plan, tangential cutting, radial cutting, box flitches, half sawn flitches, quarter sawn flitches. Veneer slicer - machine parts, cutting action, advantages of slicing, undesirable movement of wood on slicer, play in slicer machine parts. Slicer settings and veneer quality - setting of knife, setting of pressure bar, effect of knife and pressure bar settings on veneer quality.

Matching of sliced decorative veneers - side matching or drawn across, book matching or tuned over or cathedral matching, quartered matching, half quartered matching. Slicing defects, their causes and control. Maintenance of slicer-general maintenance procedure, lubrication.

Veneer drying - purpose, drying variables, moisture movement in veneers during drying, special measures for controlling final moisture content, drying defects and their control, types of dryers, drying time, dryer productivity, dryer capacity.

Knife grinding machine and grinding wheels - knives, grinding machines, composition, abrasives, grain size, grade, structure, bond, wheel selection, grinding head, grinding bed, coolant, grinding procedures, maintenance. Jointing and splicing of veneers.

Resin and Adhesive

Adhesive made from material of natural origin.
hours

2

Raw materials used for synthetic resin

2 hours

Urea formaldehyde resin

2 hours

Phenol formaldehyde resin

2

hours

Other synthetic resin

2 hours

Substituted phenolic resin

2 hours

Additives used in plywood adhesives

1 hour

Preparation of glue mix	1 hour
Properties of resin and adhesive.	1 hour

Practical 50 hours

Estimation of the purity of phenol, formalin, paraformaldehyde, urea and melamine. Estimation of free formaldehyde in urea formaldehyde resins.

Preparation of conventional and modified PF resins, UF resin and UMF resin, Characterization of the resins prepared, UF resin adhesive formulation for MR grade plywood, PF resin adhesive formulation for BWR and BWP plywood, Adhesive application and board making.

Plywood manufacture Dry end

Preparation of veneer for assembly	1 hour
Construction of plywood	1 hour
Glue spreader and its operation	1 hour
Glue spreading and veneer assembly	1 hour
Cold press – construction and operation	1 hour
Cold press –and preparation	1 hour
Hot press – construction and operation	2 hours
Hot pressing of plywood	1 hour
Gluing faults and causes	2 hours
Gluing faults and remedial measures	2 hours
Trimming machine and operation	2 hours
Sanders and their operation	1 hour
Finishing of plywood	1 hour
Storage of plywood	1 hour
Wood destroying agents and affect on plywood	1 hour
Preservative treatment of plywood	1 hour

Practical 60 hours

Glue spreaders - components of the machine.
 Operation and maintenance. Hydraulic presses - cold and hot. Hydraulic system, Pascal's law, advantages and disadvantages over mechanical system. Pneumatic system. Material handling - why and how of handling, indirect and direct handling, handling equipments and devices.
 Trimming - machines and operation.
 Drum and belt sanders - machines and operation.

Other Panel Products

Compreg – Manufacture	2 hours
Overlaying of Panel Products	1 hour
Block Board & Flush Doors – Core Preparation	1 hour
Manufacture of Block Board	1 hour

Manufacture of Flush Door

1 hour

Practical

10 hours

Sawmill operation, sawing of small girth logs, machinery, operation, cross cutting of sawn timber, stacking of sawn timber for air drying, mill maintenance, seasoning kilns, batten preparation and core composing for flush door and block board.

Compregs - process of making compregs, adhesives, and uses.

Block boards and flush doors - core preparation, veneers, adhesives, construction, hot press schedules.

Particle Board

Machinery required for particle board manufacture

1 hour

Raw material for particle board wood

1 hour

Resin & process of manufacture of particle board

2 hours

Process faults & remedial measures

1 hour

Practical

hours

6

Manufacture of Particle Board in pilot plant.

Testing and Evaluation

BIS specification for plywood

4 hours

Method of testing of plywood

2 hours

Testing of plywood

2 hours

Testing of Block Board & Flush doors

2 hours

Testing of Particle Board

2 hours

Practical

30 hours

Determination of density and moisture content of woods, swelling and shrinkage characteristics of wood, compression strength of wood, bending strength of wood. nail and screw holding power of wood.

Test methods for different panel materials/products from wood and other lignocellulosic materials.

Quality Control in Plywood Manufacture

Concept of quality

1 hour

Total Quality management in plywood manufacture

2 hours

Time & Cost Management

2 hours

Production planning

1 hour

IPIRTI, Bangalore
3 Months Training in Plywood Manufacture
Rules and Regulations for Examinations

1. General

The Plywood Manufacturing Training Course is an exciting opportunity for the technical personal working in the plywood industry as well as fresh candidates willing to work in panel industry. It involves both theoretical and practical training in the science and art of manufacturing panel materials from wood and other renewable natural fibers for various end use applications.

Academic year is generally from July to September of the calendar year. The three-month course includes theory and practical classes, demonstrations, study tour etc. The performance of the trainees is assessed through snap tests during the course and practical examinations at the end of the course.

2. Scheme of Examination

Examinations are conducted during the course and practical examinations at the end of the training as mentioned below:

Theory: 200

Practical: 450

Pass Mark: 40%, Second Class: 50%, First Class: 60%, Distinction: $\geq 70\%$

SI No	Paper	Max. Marks
1	Forestry and Wood Science	
	Theory Practical	20 50
2	Other Panel Products	
	Theory Practical	20 50
3	Plywood Manufacturing Technology – I (Green End)	
	Theory Practical	40 100
4	Plywood Manufacturing Technology – II (Dry End)	
	Theory Practical	40 100
5	Resin & Adhesive	
	Theory Practical	20 50
6	Testing of Panel Products	
	Theory Practical	20 50
7	Quality Control	
	Theory	20
8	Particle Board	
	Theory Practical	20 50

3. Attendance

80 % attendance in theory and practical classes is compulsory for a trainee to be eligible for taking the examination. Absence in even a single theory/practical class on any day will be computed as absence for half a day absence, and one theory and one practical class on the same day will be computed as absence for one day, unless permitted by the concerned teacher and agreed to by the officer-in-charge training for reasons to be recorded in writing. Trainees whose attendance falls short of 80% in a particular semester will not be allowed to appear at the examination.

5. Award of Training Certificate: A certificate will be awarded to trainees on successful completion of the training. Mention will be made of the grade secured by the trainee in the examination. Those who would failed to secure minimum pass mark will be issued a general certificate stating his/her participation in the training course.

IPIRTI, Bangalore
Rules and Regulations of the Trainees Hostel

The following are the Rules and Regulations of the IPIRTI Trainees Hostel

A. General

1. All trainees are required to behave and conduct themselves in a disciplined way.
2. Each room of the hostel has been provided with the items as per list pasted on the backside of the door in each room. Occupancy of each room is restricted to only two trainees. Hostel inmates are expected to maintain all the items provided to them including furniture and fixtures in a good condition. Any breakages or malfunctioning of the articles should be reported immediately to the Officer-in-charge, Hostel.
3. Defacing of walls, furniture are strictly prohibited. Good hygiene has to be maintained in all the living rooms, common room and surrounding areas.
4. Economy in use of water and electricity must be observed at all times. All the light switches, geysers, water taps, etc. should be switched-off or closed when not in use.
5. Furniture provided in the common room should not be disturbed and good usage of such items is necessary. The common room has been provided with a TV placed in the TV cabinet which should be handled carefully. Any damage caused to the furniture and fixtures provided will be dealt seriously and calls for reimbursement from the trainees depending upon the seriousness of damages. Food and tea carry to common room is strictly prohibited.
6. The common room will be closed at 10 p.m. by group leader of the trainees/security men. It will be opened only in the morning at 7 a.m.
7. Trainees will work as group leaders by rotation for liaison between Officer-in-Charge, Hostel and trainees.
8. Good hygiene should be maintained in all the public places especially in bath-rooms, toilets, common-room, etc. Throwing of all paper bills, plastics, cigarettes, shampoo cover, thrash, etc. should be avoided and have to be deposited in dustbins provided. Smoking is strictly prohibited in public places.
9. The trainees who want to have their rooms moped must tell the sweeper to mop in their presence only once a week.
10. Trainees in their own interest have to secure their valuables, cash, in their safe custody. Institute is not at all responsible for any theft, damage or loss, etc.
11. The hostel is meant only for trainees. No outsiders are allowed to stay in the hostel.
12. The trainees are requested to bring pillows, mosquito nets, linen (blankets).

B. Mess

13. Boarding is mandatory for all hostel inmates (trainees). The Mess charges are calculated as a package on monthly basis. On the day of official tour outside Bangalore/Vacation rebates will be allowed, as decided by the authorities.
14. A trainee has to avail leave with prior permission from OIC, HOD/Jt. Director and also inform the OIC, Hostel and in writing the Canteen Contractor about his leaving the Hostel. For a period of leave of more than 4 days, rebate will be decided from time to time. No rebate will be allowed for the extended leave period unless the same is intimated in advance and duly approved by the authorities.
15. A trainee shall get a 50% rebate provided he goes on leave for more than 4 days.
16. If the trainee returns to Hostel later than the date mentioned in his leave application, he shall get rebate only till the date mentioned in his application.

17. The trainees shall pay the Mess charges on or before 10th of each month failing to pay a fine of Rs.2/- per day will be charged. Only vegetarian food will be served in the hostel at the rates approved by the Food Committee. One trainee on the Food Committee will be nominated by J.D. as a food committee member.

18. The following timings will be observed in the hostel canteen for catering.

Morning bed coffee/Tea	..	5.30 a.m. to 6.30 a.m
Break fast	..	7.30 a.m. to 8.45 a.m
Lunch	..	1.00 p.m. to 2.00 p.m
Refreshments	..	5.15 p.m. to 6.00 p.m
Dinner	..	7.30 p..m to 9 00 p.m

Food will not be served in the rooms or in the common room. Trainees must not take food/tea to their rooms or to the common room.

C. Games and Sports

18. Trainees can play games badminton/T.T. between 5.30 - 6.30 p.m. at the venue meant for these games. Trainees are required to dress appropriately for games.

Playing games inside hostel quadrangle is strictly prohibited.

INDIAN PLYWOOD INDUSTRIES RESEARCH AND TRAINING INSTITUTE (IPIRTI)

(An Autonomous body of the Government of India, Ministry of Environment and Forests)

P.B.No.2273, Tumkur Road, Bangalore-560 022, INDIA

Phone: 91-80-28394231-32-33 (Gen.); Fax: 91-80-28396361

Application form for admission to Three Month Training Course in Plywood Manufacture

Application form No.....

D.D. No.....dated.....

issued at

**Affix Passport
size photograph**

APPLICATION FORM

I. GENERAL

(17)

1	Name of the candidate (in BLOCK CAPITAL LETTERS)		
2	i) Age, as on 01.05.2010	Years	
	ii) Date of birth as recorded in SSLC/Matriculation Certificate	Day	Month Year
	Name of your Father/Guardian Occupation and Annual Income		
4	Full postal address for communication with telephone nos., if any (in Block capitals) State to which you belong to		
5	Do you belong to Reservation Category? Say Yes/No If Yes, please furnish the category you belong (enclose certificate)	Yes No	
6	Are You sponsored by any Wood based Industry	Yes No	
7	Whether you need Hostel Accomandation	Yes No	

II. for Sponsored Candidates

(If your answer is 'Yes' for item No.6 under I, please forward this application through your Sponsoring authority):

I hereby sponsor Shri..... Graduated from..... University for undergoing One Year Post Graduate Diploma Course in Mechanical Wood Industries Technology at IPIRTI, Bangalore.

Date:

Signature of the Sponsoring Authority with their company seal

Place:

Declaration

III I hereby declare that the particulars furnished in this form are true to the best of my knowledge and belief. If any information is found to be untrue/false, I am liable to be disqualified from Course.

Date:

Signature of the Candidate

Place: