Glossary

Composite Wood Products

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Glossary of items

This report is intended as a glossary of commonly used terms in the forest products and isocyanate (wood related) industry – the terms listed include both wood specific and glue specific terms. The terms are listed alphabetically. The original source of definitions is indicated.



Acid	A substance which liberates hydrogen ions in solution; substance which contains hydrogen which may be replaced by a metal to form a salt; substance having a tendency to lose protons. Many acids are corrosive, have a sour taste, and turn litmus red. ¹
Acid value	A measure of the residual acidity of a substance, e.g. a polyester. Measured in mgKOH/g needed to neutralize the acidity. ²
Acoustical board	A low-density, sound absorbing structural insulating board having a factory-applied finish and a fissured, felted-fibre, slotted or perforated surface pattern provided to reduce sound reflection. Usually supplied for use in the form of tiles. ³
Addition reaction	A chemical reaction in which molecules are brought together such that only one product is produced. Typically related to the reaction between an unsaturated organic material in which the double bond is converted to a single bond. Also related to the reaction of isocyanates with alcohols to form urethane bonds.
Adhere	To cause two surfaces to be held together by adhesion. ³
Adherend	A body which is held to another body by an adhesive. ³
Adhesion	The state in which two surfaces are held together by interfacial forces which may consist of valence forces or interlocking action or both. ³
Adhesion, mechanical	Adhesion between surfaces in which the adhesive holds the parts together by interlocking action. ³
Adhesion, specific	Adhesion between surfaces, which are, held together by valence forces of the same type as those which give rise to cohesion. ³
Adhesive	Substance used for sticking surfaces together. ¹
Adhesive, assembly	An adhesive which can be used for bonding parts together, such as in the manufacture of a boat, aeroplane, furniture, and the like. Note: The term "assembly adhesive" is commonly used in the wood industry to distinguish such adhesives (formerly called "joint glues") from those used in making plywood (sometimes called "veneer glues"). It is applied to adhesives used in fabricating finished structures or goods, or subassemblies thereof, as differentiated from adhesives used in the production of sheet materials for sale as such, for example, plywood or laminates. ³
Adhesive, cold-setting	An adhesive which sets at temperatures below 20°C. ³
Adhesive, contact	An adhesive which is apparently dry to the touch and which will adhere to itself instantaneously upon contact; also called contact bond adhesive or dry bond adhesive. ³

Adhesive, gap-filling	Adhesive suitable for use where the surfaces to be joined may not be in close or continuous contact owing either to the impossibility of applying adequate pressure or to slight inaccuracies in matching mating surfaces. ³
Adhesive, heat-activated	A dry adhesive film which is rendered tacky or fluid by application of heat or heat and pressure to the assembly. ³
Adhesive, hot-melt	An adhesive that is applied in a molten state and forms a bond on cooling to a solid state. ³
Adhesive, hot-setting	An adhesive which requires a temperature at or above 100°C to set it. ³
Adhesive, room-temperature-setting	An adhesive which sets in the temperature range of 20°C to 30°C, in accordance with the limits for Standard Room Temperature specified in the Standard Methods of Conditioning Plastics and Electrical Insulating Materials for Testing (ASTM Designation: D618). ³
Adhesive, separate application	A term used to describe an adhesive consisting of two parts; one part being separate application applied to one adherent and the other part to the other adherent and the two brought together to form a joint. ³
Adhesive, solvent	An adhesive having a volatile organic liquid as a vehicle. Note: this term excludes water-based adhesives. ³
Adhesive, solvent-activated	A dry adhesive film which is rendered tacky just prior to use by application of a solvent. ³
Air drying	The process of drying green lumber or other wood products by exposure to prevailing atmospheric conditions outdoors or in an unheated shed. Also called air seasoning. ⁴
Albumin	A group of soluble proteins occurring in many animal tissues and fluids e.g. eggwhite, milk and blood. ¹
Alcohol	A class of organic compounds derived from the hydrocarbons, one or more hydrogen atoms in molecules of the latter being replaced by hydroxyl groups – OH. e.g. ethanol (ordinary alcohol) is C_2H_5OH theoretically derived from ethane, C_2H_6 . alcohols which contain more than one hydroxyl group are called polyhydric alcohols. [or in urethane chemistry polyols]. ¹



Alcohol | Examples of alcoholic materials, the upper being a a,w di-hydroxy hydrocarbon, the middle being an example of a mono-hydroxy functionalised product with a primary hydroxyl group and the last being the secondary alcohol analogue.

Aliphatic

Alkaline

Allophanate

An organic substance containing straight - or branched - chain arrangements of carbon atoms.²

Having the properties of an alkali, the opposite of acidic.¹

Generic name for materials containing the allophanate group which is derived from the reaction of isocyanates with carbamates. Reaction usually occurs only at elevated temperatures in the presence of catalysts.



Allophanate | Allophanates are prepared by the reaction of isocyanates with urethanes. They are characterized by the heteroatom -NH-CO-NR-CO-O- chain.

Amide

Generic name for materials containing the -CO-NR, functionality.



Amide | Generic structure of an amide. In this particular example the structure represents a primary amide.

Compounds formed by replacing hydrogen atoms of ammonia, NH_3 , by organic radicals. Classified into primary amines of the type NH_2R ; secondary, NHR_2 ; and tertiary, NR_3 .¹

	H_3C H_3C H_3C H_3C H_3C H_3C CH_3 H_3C CH_3	Amine Examples of amines – primary (with two protons attached to the amino nitrogen), secondary (with only one proton attached to the amino nitrogen) and tertiary (no protons attached to the nitrogen).
Aminoplastic resins	H_3 C — \sim Synthetic resins derived from the reaction	n of urea, melamine, or allied amino compounds with aldehydes,
	usually formaldenyde. They form the basis	s of thermosetting moulding materials."
Angiosperm	See Hardwoods.	
Anisotropic	Exhibiting different properties when mea wood are anisotropic. ⁵	sured along different axes. In general, fiberous materials such as
Annealing	The process by which stresses are relieve causes the material to have more micro-r lower energy structure, which is usually a defects. ⁶	ed in a structure through the addition of heat. The added heat nobility and allows the rearrangement on a segmental basis to a more ordered array. For a crystal, this means a reduction in crystal
Annual plant	Plant that completes it life-cycles, from se single season. ⁷	eed germination to seed production, followed by death, within a
Annual ring	The growth layer put on a tree in a single	growth year, including earlywood and latewood. ⁴
Antioxidants	Additives that inhibit a polymer from che in chain scission and, therefore, possible c Oxygen reactions can also produce volatil Antioxidants are particularly useful both oxygen-polymer reaction proceeds at an	mically reacting with oxygen. An oxygen reaction usually results ross-linking. e products that contribute to further combustion of the polymer. at combustion control and at elevated temperatures where the accelerated rate. ⁶
Application rate	Resin loading using in a bonded assen resin), gram/m ² (amount of resin per unit weight of wood).	nbly. This may be quoted as grams/second (flow rate of the t surface area of adherent), gram/gram (weight of resin per unit
Architectural plywood	Plywood having aesthetic appeal, attractiv	ve grain pattern. ⁴
Aromatic	An organic substance usually containing "aromatic" chemical properties are also co	one or more benzene ring structures. In some substance, typical nferred by other ring structures. ²
Aspect ratio	Ratio of the length to the width of a body	
Assembly	A group of materials or parts, including a has been bonded together. ⁸	dhesive, which has been placed together for bonding or which
Assembly joints	Joints for bonding variously shaped parts laminates that are all quite similar). ⁴	such as in wood furniture (as opposed to joints in plywood and
ASTM	American Society for Testing and Material	S.
Atatic	The side groups attached to a polymer ch	ain backbone have no regular pattern. ⁶



Backbone	The series of atoms chemically bonded in a linear array that characterizes the structure of a polymer. Most polymers are classified by their composition of backbone atoms. ⁶
Bark	This is the outer protective layer of trees. Is usually of low density and has high extractives contents. This portion of the tree is usually removed before any wood processing.
Bark pocket	An opening between annual growth rings that contains bark. Bark pockets appear as dark streaks on radial surfaces and as rounded areas on tangential surfaces. ⁵
Baseboard	A board placed against the wall around a room next to the floor to finish properly between floor and plaster or gypsum board. ⁴
Bastard sawn	Lumber or veneer, usually hardwood, in which the annual growth rings make angles of 30° to 60° with the surface of the piece. ⁹
Beam	A structural member transversely supporting a load. ¹⁰
Binder	A component of an adhesive composition that is primarily responsible for the adhesive forces, which hold two, bodies together. ⁸
Bird's eye	Small localized areas in wood with the fibres indented and otherwise contorted to form small circular or, elliptical figures remotely resembling bird's eyes on the tangential surface. Sometimes found in sugar maple and used for decorative purposes; rare in other hardwood species. ⁵
Biuret	Generic name for product containing the biuret functionality as shown in the figure below. Biurets are derived from the reaction of isocyanates with ureas. Reaction usually occurs only at elevated temperatures.
	Biuret Biurets are the reaction products of ureas with isocyanates and are characterized by the heteroatom chain –NH-CO-NR-CO-NH
Blade-coating	Application of a film of a liquid material (liquid resin) on a panel surface by scraping the straight edge of a steel blade, or other material, over the panel. ⁴
Blending	The process of mixing components. Related to wood composite manufacture this usually refers to the mixing and distributing of resin and other additives such as waxes on wood.
Blister	(gluing error) – a spot or area where the veneer does not adhere and bulges like a blister. It may be caused by lack of glue or adhesive or inadequate pressure. In hot pressing it may be caused by a pocket of steam, which often ruptures the veneer. ⁹
Blistering	Formation of vapour pocket in a plywood (or other) panel because of too wet veneer (other base wood component), too much solvent in adhesive, too high adhesive spread, or too high cure temperature for the adhesive used. ⁴
Block co-polymer	A polymer that contains linear polymer sequences of two or more different polymer molecules in one polymer chain. The polymer blocks are sometimes called segments, particularly when they are small in size. ²
Block shear test	See Shear block test.
Blood albumin	Complex protinaceous material obtained from blood. ⁴

Blow	In plywood and particleboard especially, the development of steam pockets during hot pressing of the panel, resulting in an internal separation or rupture when pressure is released, sometimes with an audible report. ⁵
Blowline	In MDF production, the fibres generated in the defibrator are released into the blowline. This is a length of pipe of defined diameter which conveys the hot, wet fibres to the dryers. It is common that the resins are blended with the wood fibre in the blowline. Blowlines are usually under high pressure and temperature and the fibres are conveyed at very high (supersonic) speeds. The flow of fibres is very turbulent with large numbers of inter-fibre collisions. The turbulent flow and collision rate are usually considered necessary to achieve good resin distribution.
Bolt	(i) A short section of a tree trunk. (ii) In veneer production, a short log of a length suitable for peeling in a lathe.⁵
Bond (noun)	The union of materials by adhesives. ⁵
Bond (verb)	To unite materials by means of adhesive. ³
Bond failure	Rupture of adhesive bond. ⁴
Bond strength	The unit load applied in tension, compression, flexure, peel, impact, cleavage, or shear, required to break an adhesive assembly with failure occurring in or near the plane of the bond. ³
Bondability	Indication of the ease of difficulty to bond a material with an adhesive.
Bondline	The layer of adhesive which attaches two adherents. ¹¹
Bowing	Distortion whereby the faces of a wood product become concave or convex along the grain. ⁴
Branch	The off shot of a plant or a tree. The wood structure in a tree branch can be different from the main stem in that is may contain reaction wood. Branches are usually removed from trees at the point of harvest and are not used in composite wood production.
Branching	Lateral extension points in a polymer chain. ²
BSi	British Standards.
Burl	Burls come from a warty growth generally caused by some injury to the growing layer just under the bark. This injury, perhaps due to insects or bacteria, causes the growing cells to divide abnormally, creating excess wood that finds room for itself in may little humps. Succeeding growth follows these contours. Cutting across these humps by the half-found method brings them out as little swirl knots or eyes. ⁴
Burnished	A glazed surface with which it may be difficult to obtain a satisfactory bond. ⁴
Butt joint	An end joint formed by abutting the squared ends of two pieces.



Calking gun	Device for dispensing a bead of calking material, mastic glue, etc. ⁴
Cambium	Layer of actively dividing cells lying between xylem and phloem. ⁷
Carbamate	Correct nomenclature for a urethane link or functionality: R-NH-CO-O-R'.

Carbamic acid	Reaction product of isocyanate groups with water to form R-NH-CO-OH. This product is unstable and rapidly decomposes to the amine and carbon dioxide. The amine is very reactive in the presence of further isocyanate groups which are rapidly converted to substituted ureas. This reaction is often employed to generate polyurethane foams which are blown by virtue of the carbon dioxide generated.
Carbodiimide	Isocyanates can auto react at elevated temperatures by a mechanism which is not well understood to form carbodiimides $R-N=C=N-R'$ and carbon dioxide. The carbodiimide is not very stable and reacts reversibly with a further isocyanate to the uretonimine. ¹²
Carbon 13	Isotope of carbon, the atoms of which are detectable by NMR. Commonly written as 13 C.
Casehardening	 (i) A condition of stress and set in dry lumber characterized by compressive stress in the outer layers and tensile stress in the centre or core.¹³ (ii) Surface condition of a substrate that renders it difficult to wet with adhesives.¹¹
Casein	The main protein of milk. A pale yellow solid obtained from milk by the addition of acid. Used in paper coating, paints, adhesives, plastics etc. ¹
Cassava	A term customarily applied to the older conventional cold-setting plywood adhesives e.g. blood based, animal based, casein based etc. ⁹
Cat eyes	Term used to describe small pin knots less than 0.25 inch in diameter.9
Catalysis	The alteration of the rate at which a chemical reaction proceeds, by the introduction of a substance (catalyst) which remains unchanged at the end of the reaction. Small quantities of the catalyst are usually sufficient to bring the action about or to produce a vast increase in its speed. ¹
Catalyst	A substance that markedly speeds up the cure of an adhesive when added in minor quantity as compared to the amounts of the primary reactants. ³
Caul	A sheet of material employed singly or in pairs in hot or cold pressing of assemblies being bonded. Cauls are employed usually to protect either the faces or the press platen or both against marring and staining, to prevent sticking, and to facilitate press loading. Note: Cauls may be made of aluminium, stainless steel, hardboard, or fibreboard with the length and width generally equal to the platen size of the press in which they are employed. ³
Cell lumen	Central cavity within wood cells through which nutrients and moisture can be moved or stored.
Cell wall	Enclosing membrane for the minute units of wood structure. ⁴
Cell wall (alt.)	The membrane around a wood cell. It is composed of the primary and three secondary layers. Each layer is characterized by the orientation of the microfibrils, which are particular arrangements of crystalline cellulose, semi-crystalline hemicellulose and lignin.

Cellulose

A white solid carbohydrate, $(C_6H_{10}O_5)_{n'}$ found in all plants as the main constituent of the cell wall. Cellulose can be hydrolyzed to glucose by acids. The usual source is wood pulp. [In woody plants the numbers of glucopyranose rings in a cellulose molecule are tens of thousands. The glucopyranose rings are arranged in linearly via 1-> 4 glucoside bonds with the rings arranged with the heterocyclic oxygen opposite sides in adjacent monomers. This gives rise to the ability of cellulose to pack together in (several) crystalline forms].¹⁴

📕 cellulose

lignin
hemicellulos



Cellulose | Structure of cellulose showing the 1-> 4 glucoside bond joining adjacent glucopyranose rings. Due to the alternating ring reversal, the -O- is alternatively on opposite sides of the chain resulting in a linear and crysllalizable macromolecule. The momomeric unit of cellulose is the di-saccharide cellobiose. In this schematic, two cellobiose molecules are joined.

Cell wall | Cross section of a microfibril¹⁸

(All measurements are in nanometers).

C

Cement	A term sometimes used for liquid glue. ⁹
CEN	European committee for standardization.
Cereal flour	Flour from grain used as food. ⁴
Chain segment	The section of polymer backbone that moves together as a unit. The number of atoms which comprise a chain segment is both a function of the structure of the polymer and the temperature. The motion of chain segments allows for polymer rearrangement and stress reduction. ⁶
Check	In the case of wood, a separation along the grain, the greater part of which occurs across the rings of annual growth. ³
Chip board	A paperboard used for many purposes that may or may not have specifications for strength, colour, or other characteristics. It is normally made from paper stock with a relatively low density. ⁵
Chord	Either of the two outside members of a truss connected and braced by the web members. ¹¹
Clamping pressure	Pressure developed by clamps of various designs to bring joint surfaces into close contact for glue bond formation. ⁴
Cleavage	Splitting or dividing along the grain. ⁴
Closed assembly	See Assembly time (Time, assembly).
Closed assembly time	The time interval between completion of assembly of the parts for bonding and the application of pressure or heat, or both, to the assembly.
Closed knot	See knot, closed.
Closed side	Side of veneer not touching knife as it is peeled from log (also called tight side of veneer). ⁴
Cobwebbing	A phenomenon observed during the spray application of an adhesive characterized by the formation of weblike threads along with the usual droplets as the adhesive leaves the nozzle of a spray gun. ¹¹
Cohesion	The state in which the particles of a single substance are held together by primary or secondary valence forces. As used in the adhesive field, the state in which the particles of the adhesive (or the adherent) are held together. ³
Cohesion Cold pressing	The state in which the particles of a single substance are held together by primary or secondary valence forces. As used in the adhesive field, the state in which the particles of the adhesive (or the adherent) are held together. ³ A bonding operation in which an assembly is subjected to pressure without the application of heat. ³
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Cohesion Cold pressing Colophony Composite strand lumber	The state in which the particles of a single substance are held together by primary or secondary valence forces. As used in the adhesive field, the state in which the particles of the adhesive (or the adherent) are held together. ³ A bonding operation in which an assembly is subjected to pressure without the application of heat. ³ See Rosin. Type of structural lumber prepared by adhesively bonding long OSB-like strands of wood in thick layers which are useful in load bearing applications.
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Cohesion Cold pressing Colophony Composite strand lumber Compregnated wood Compression wood	The state in which the particles of a single substance are held together by primary or secondary valence forces. As used in the adhesive field, the state in which the particles of the adhesive (or the adherent) are held together. ³ A bonding operation in which an assembly is subjected to pressure without the application of heat. ³ See Rosin. Type of structural lumber prepared by adhesively bonding long OSB-like strands of wood in thick layers which are useful in load bearing applications. A structural element consisting of wood and combination of other materials in which all pieces are attached together to act as a single unit. ¹⁵ (compreg.)(pregwood) A consolidation of the terms, compressed-impregnated wood, referring usually to an assembly of layers of veneer impregnated with a liquid resin and bonded under very high pressures. More commonly, but not always, the veneer layers have parallel grain. ⁹
Cohesion Cold pressing Colophony Composite strand lumber Compregnated wood Compression wood Condensation reaction	The state in which the particles of a single substance are held together by primary or secondary valence held together. ³ A bonding operation in which an assembly is subjected to pressure without the application of heat. ³ See Rosin. Type of structural lumber prepared by adhesively bonding long OSB-like strands of wood in thick layers which are useful in load bearing applications. A structural element consisting of wood and combination of other materials in which all pieces are attached together to act as a single unit. ¹⁵ (compreg.)(pregwood) A consolidation of the terms, compressed-impregnated wood, referring usually to an assembly of layers of veneer impregnated with a liquid resin and bonded under very high pressures. More commonly, but not always, the veneer layers have parallel grain. ⁹ Abnormal wood formed on the lower side of branches and inclined trunks of softwood trees. Compression wood is identified by its relatively wide annual rings, usually eccentric; its relatively large amount of summerwood, sometimes more than 50% of the width of annual rings in which it occurs; and a lack of demarcation between springwood and summerwood. ³ A reaction in which usually two (or more) materials react such that small molecules are eliminated. e.g. esterification by the reaction of an acid with an alcohol results in the formation of an ester and a water molecule. In urethane chemistry examples of condensation reactions include: polyesterification to product polyester polyols.
CohesionCold pressingColophonyComposite strand lumberCompositeCompregnated woodCompression woodCondensation reactionConditioning (pre or post)	The state in which the particles of a single substance are held together by primary or secondary valence forces. As used in the adhesive field, the state in which the particles of the adhesive (or the adherent) are held together. ³ A bonding operation in which an assembly is subjected to pressure without the application of heat. ³ See Rosin. Type of structural lumber prepared by adhesively bonding long OSB-like strands of wood in thick layers which are useful in load bearing applications. A structural element consisting of wood and combination of other materials in which all pieces are attached together to act as a single unit. ¹⁵ (compreg.)(pregwood) A consolidation of the terms, compressed-impregnated wood, referring usually to an assembly of layers of veneer impregnated with a liquid resin and bonded under very high pressures. More commonly, but not always, the veneer layers have parallel grain. ⁹ Abnormal wood formed on the lower side of branches and inclined trunks of softwood trees. Compression wood is identified by its relatively wide annual rings, usually eccentric; its relatively large amount of summerwood, sometimes more than 50% of the width of annual rings in which it occurs; and a lack of demarcation between springwood and summerwood in the same annual ring. Compression wood shrinks excessively lengthwise as compared with normal wood. ³ A reaction in which usually two (or more) materials react such that small molecules are eliminated. e.g. esterification by the reaction of an acid with an alcohol results in the formation of an ester and a water molecule. In urethane chemistry examples of condensation reactions include: polyesterification to product polyester polyols.

Construction adhesive

Contact adhesive

Contact angle

Contact cement

Continuous feed press

Press in which panels are moving ahead (under pressure) while glue is setting.⁴

= IS most commonly applied to elastomer mastic-type adhesives.¹¹

contact; also called contact bond adhesive or dry bond adhesive.⁵

Any adhesive used to assemble primary building materials into components during building construction

An adhesive that is apparently dry to the touch and, which will adhere to itself instantaneously upon

The angle a drop of liquid makes with the surface of a contacted solid. This is a thermodynamic property,

which describes the ease with which that solid is wetted by that liquid. Measured in degrees.



See Adhesive, contact.

Continuous feed press | Continuous press (feeder end).

Copolymer	Substance obtained when two or more types of monomers polymerize. ⁵
Core	A generally centrally located layer or composite component of a sandwich construction, usually low density, which separates and stabilizes the facings and transmits shear between them and provides most of the shear rigidity of the construction. ³
Coupling agent	A molecule with different or like functional groups that is capable of reacting with surface molecules of two different substances, thereby chemically bridging the substances. ⁵
Covalent bond	A chemical bond that results when electrons are shared by two atomic nuclei. ⁵
Crazing	Fine cracks, which may extend in a network on or under the surface of or through a layer of adhesive. ³
Creep	The dimensional change with time of a material under load, following the initial instantaneous elastic or rapid deformation, Creep at room temperature is sometimes called cold flow. ³
Cross grain	A pattern in which the fibres and other longitudinal elements deviate from a line parallel to the sides of the piece. Applies to either diagonal or spiral grain or a combination of the two. ³
Cross link	Bridge structure between different polymer chains. ²
Crossband	To place the grain of layers of wood at right angles in order to minimize shrinking and swelling; also, in plywood of three or more plies, a layer of veneer whose grain direction is at right angles to that of the face plies. ¹³
Crotch veneer	Veneer cut from fork of tree to provide pleasing grain, figure, and contrast.4
CSL	See composite strand lumber.
Сир	A distortion of a board in which there is a deviation flatwise from a straight line across the width of the board. ¹³
Cure	To change the properties of an adhesive by chemical reaction (which may be condensation, polymerizations or vulcanizations) and thereby develop maximum strength. Generally accomplished by the action of heat or a catalyst, with or without pressure. ⁵
Cure rate	The speed at which a resin or adhesives cures.
Curtain coating	Applying adhesive to wood by passing the wood under a thin falling curtain of liquid.⁴

Dado	A rectangular groove across the width of a board or plank. ⁴
DADPM	Diamino diphenylmethane, also known as MDA (methylene diphenyl diamine). This is the amine analogue of MDI.
	H ₂ N NH ₂ DADPM Diamino diphenyl methane the aromatic amine analogue of MDI.
Dead knot	See knot, open.
Debark	A process for removing the bark layer from a tree.
Decay	The decomposition of wood substance by fungal activity. Common types of decay include brown rot (fungal attack on the cellulose and carbohydrates), white rot (fungal attack on the lignin), dry rot resulting in a soft powdery material.
Deciduous	Also known as broad-leafed trees. See Hardwood.
Decorative laminate	A multilayered panel made by compressing sheets of resin-impregnated paper together into a coherent solid mass. ¹³
Defect	In the case of wood, any irregularity occurring in or on the wood that may lower its strength. ³
Defibrator	An apparatus used to reduce wood to wood fibres usually by a process of thermal and hydrolytic softening and mechanical grinding and explosive decompression.
Delamination	The separation of layers in a laminate because of failure of the adhesive, either in the adhesive itself or at the interface between the adhesive and the adherent, or because of cohesive failure of the adherent. 3
Density	The measure of the mass of unit volume of a material. Units g/cm^3 (or similar).
Density Profile	Composite wood panels are prepared such that the density at different depths of the panel is controlled. The density as a function of the thickness is described as the density profile. The desired density profile is usually such that there is a high density on the faces, which declines rapidly to a thick layer in the core of low density. In other circumstances a uniform density throughout the thickness is required. Density profiles can be adjusted by controlling the moisture content of the mat, the closing speed of the press, the holding time and temperature of the press, the amount of resin employed.
Diagonal grain wood	A form of cross grain where the longitudinal elements run obliquely but parallel to the surface; i.e. the growth layers are not parallel to the edge of the piece as viewed on a quartersawn surface. ⁴
Differential mechanical (thermal) analysis	The measure of the mechanical response of a material subjected to either as stressing or straining force at different temperatures. The technique reveals information about changes of state and changes of phase of a polymer including softening points, glass transition temperatures, melting points, decomposition points, crystallization effects, side chain mobility and so on.
Differential scanning calorimetry	This measures the amount of heat needed to increase the temperature of a material by a fixed amount relative to the amount of heat needed to increase the temperature of a reference (thermally inert material). The technique reveals changes of state, phase changes, crystallization and melting effects. It can also be used to study the kinetics of reactions which under go thermal changes (exothermic or endothermic).
Diffuse porous wood	Certain hardwoods in which the pores tend to be uniform in size and distribution throughout each annual ring or to decrease in size slightly and gradually toward the outer border of the ring $\frac{5}{2}$

Diffusion	The speed at which atoms, segments of backbone, or molecules move through one another. The diffusion rate is dependent on the vibrational energy of the type involved. It increases with increasing temperature and decreases with increasing pressure. Polymers are dependent on segment motion for mobility within the material, thus, the vibrational energy and the size of the mobile segment affect the diffusion rate. ⁶
Diffusion interphase	(i) In wood bonding, a region of finite thickness as a gradient between the bulk adhered and bulk adhesive in which the adhesive penetrates and alters the adherent's properties and in which the presence of the adherent influences the chemical and/or physical properties of the adhesive. ⁵ [(ii) Mutual inter-diffusion occurs across an interface resulting in an indistinct boundary of gradually changing composition from one bulk material to the other bulk material.]
Diluent	An ingredient usually added to an adhesive to reduce the concentration of bonding materials. ³
Dimensional stability	Ability of a material to resist changes in dimensions due to changing environments that affect their size or volumes, i.e., metals in changing temperatures, wood in changing moisture conditions. ¹¹
Dimer	See uretidione/uretidinedine.
DIN	Deutsches Institut für Normung = German institute for norms.
Di-phenylene di-isocyanate methane	MDI, see methylene diphenyl di-isocyanate.
Dipole-dipole forces	Intermolecular attraction forces between polar molecules that result when positive and negative poles of molecules are attracted to one another. ⁵
DMTA/DMA	See differential mechanical (thermal) analysis.
Doctor bar or blade	A scraper mechanism that regulates the amount of adhesive on the spreader rolls or on the surface is coated. $^{\scriptscriptstyle 3}$
Doctor roll	A roller mechanism that is revolving at a different surface speed, or in an opposite direction, resulting in a wiping action for regulating the adhesive supplied to the spreader roll. ³
Door skins	Thin plywood, usually three-ply, used for faces of flush doors. ⁴
Double lap joint	A tensile lap joint which is constructed so as to have two gluelines which are tested simultaneously. See figure.



Double lap joint | A double lap joint – in tensile shear the applied forces are parallel to the two gluelines in the assembly reducing or even eliminating any peel forces which would contribute in a complex way to the failure of the assembly. D)

Double spreading	Application of adhesive to both adherents of a joint. ³
Dovetail	Joint shaped like a dove's tail. ⁴
Dowel	Wood peg fitted into corresponding holes in two pieces to fasten them together. ⁴
Dressed size	The dimensions of lumber after being surfaced with a planning machine. The dressed size is usually 0.5 to 0.75 inch less than the nominal or rough size. A 2 by 4 inch stud, for example, actually measures about 1.5 by 3.5 inches. ¹³
Dry kiln	A chamber having controlled airflow, temperature, and relative humidity for drying lumber, veneer, and other wood products. ¹³
DSC	See differential scanning calorimetry.
Durability	As applied to gluelines, the life expectancy of the structural qualities of the adhesive under the anticipated service conditions of the structure. ¹⁵



Earlywood	The portion of the annual growth ring that is formed during the early part of the growing season. It is usually less dense and weaker mechanically than latewood. ¹³
EDAX	Energy dispersive analysis by x-ray – this is a technique by which x-rays are generated by the action of an electron beam on a sample. The energies of the xrays which are collected provide information about the elemental composition of the sample.
Edge gluing	Bonding veneers or boards edge to edge with glue. ⁴
Edge joint	The place where two pieces of wood are joined together edge to edge, commonly by gluing. The joints may be made by gluing two squared edges as in a plain edge joint or by using machined joints of various kinds, such as tongued-and-grooved joints.
Edge swell	When wooden composite panels are exposed to moisture, the water accesses the panel more rapidly in the sides and therefore induces swelling at the sides and edges more rapidly than in the centre of the panel. This phenomenon is called edge swell. It results in unevenness in the panel and can be aesthetically displeasing in applications such as flooring. To avoid the effect, the edges of panels are often treated with hydrophobic materials.
Edgebanding	A thin, flat strip of material bonded to edges of panels as a decorative and protective finish. ¹¹
Elasticity	Tensile flow behaviour in which the strain is linearly related to the stress. ⁶
Electron spectroscopy for chemical analysis	This is a surface sensitive technique. Electrons of a defined energy are directed at the surface of the material of interest. This impact of electronic energy causes excitations in the core electrons of atoms on the sample surface. When the core electrons return to their zero state, the energy released is sufficient to ionize outer electrons from those atoms. Analysis of these emitted electrons gives chemical information about the composition of the surface of the material of interest.
Electrostatic forces	The attractive or repulsive forces experienced between charged bodies. Electrostatic force is one of the possible causes of adhesion between bodies (secondary bond).
eMDI	Emulsifiable MDI. MDI is a hydrophobic material (even though it does react with water) and to emulsify MDI, the material is rendered slightly more hydrophilic with reactive components. The extent of increase of hydrophilicity is controlled so that a physically stable emulsion is readily prepared but which is also chemically stable. The main eMDI grade from Huntsman is Suprasec 1041.
Emulsion	A colloidal dispersion of one liquid in another. Oil in water form emulsions, the system may be small globules of oil in a continuous water phase (an oil-in-water emulsion) or small drops of water in oil (a water-in-oil emulsion). Emulsions can be produced by agitating the components together. Soaps, detergents and other emulsifiers are often added to promote the formation of emulsions and to stabilize them. ¹⁴
End grain	The grain of a cross section of a tree, or the surface of such a section. ⁴
End joint	The place where two pieces of wood are joined together end to end, commonly by scarf or finger jointing. $^{\rm 13}$
Energy dispersive analysis by x-ray	See EDAX.
Equilibrium moisture content	The moisture content at which wood neither gains nor loses moisture when surrounded by air at a given relative humidity and temperature. ¹³
ESCA	See electron spectroscopy for chemical analysis.

Extender	A substance, generally having some adhesive action, added to an adhesive to reduce the amount of the primary binder required per unit area. ³
Extent of reaction	A chemical reaction kinetic term. Chemical reactions do not occur instantaneously. The amount by which reactants are converted as a function of time is termed the extent of reaction. Alternatively the amount of product compared to the final amount possible can also be defined as the extent of reaction.
Extractives	Substances in wood, not an integral part of the cellular structure, that can be removed by solution in hot or cold water, ether, benzene, or other solvents that do not react chemically with wood components. ¹³
Extrusion spreading	Adhesive forced through small openings in spreader head (see also Ribbon spreading). ⁴



Face joint	A face joint is achieved with the faces of two parts are glued together in a complex assembly. An example of this is Glulam.
Face layer	The veneer or upper layer of strands or fibres on the exposed surface of a composite panel is termed the face layer – there are of course two such layers. ⁹
Face	The better side of a panel in any grade of plywood calling for a face and back; also either side of a panel where the grading rules draw no distinction between faces. ³
Facing	The outer most layer or composite component of a sandwich construction, generally thin and of high density, which resists most of the edgewise loads and flatwise bending moments; synonymous with face and skin. ³
Failure, adhesive	Rupture of an adhesive bond, such that the plane of separation appears to be at the adhesive-adherent interface. ³
Fibre (wood)	A wood cell comparatively long (40 – 300 μm), narrow, tapering and closed at both ends. $^{\scriptscriptstyle 5}$
Fibre bundle	In MDF, wood is refined into preferably, single discrete non-truncated fibres. If too much energy is employed in the process, the fibres become damaged and break resulting in truncated fibres with do not have gradually tapered ends and which as a result of the truncation have exposed lumen. If insufficient energy is used, then the fibres are not adequately separated from each other and fibre bundles result.
	MDF fibres

Fibre saturation pointThe stage in the drying or wetting of wood at which the cell walls are saturated and the cell cavities free
from water. It applies to an individual cell or group of cells, not to whole boards. It is usually taken as
approximately 30% moisture content, based on ovendry wood.13FibreboardA broad generic term inclusive of sheet materials of widely varying densities manufactured of refined or

A broad generic term inclusive of sheet materials of widely varying densities manufactured of refined or partially refined wood (or other vegetable) fibres. Bonding agents and other materials may be added to increase strength, resistance to moisture, fire, or decay, or to improve some other property.¹³

Fibril	A threadlike component of cell walls, invisible under a light microscope. Fibrils are composed of the basic components of wood (cellulose light) and bemicellulose) in particular arrangements with the crystalline
	cellulose embedding in a sheath of semi-crystalline hemicellulose which is encased in a sheath of lignin.
Figure	Is the pattern formed by peculiar or abnormal arrangement of the elements within the tree, as well as by reflected light. This reflection is caused by the unusual alignment of the wood fibres, and by the exposure of the medullary rays. The various kinds of figure are known by many different terms such as bird's eye, burl, crotch, blister etc. ⁹
Figured veneer	General term for decorative veneer such as from crotches, burls, and stumps. ⁴
Filler	A relatively non-adhesive substance added to an adhesive to improve its working properties, permanence, strength, or other qualities. ³
Fillet	That portion of an adhesive, which fills the corner or angle, formed where two adherents are joined. ³
Film adhesive	Describes a class of adhesives furnished in dry film form with or without reinforcing tissue-like paper of fabric. ⁴
Finger joint	An end joint made up of several meshing wedges or fingers of wood bonded together with an adhesive. Fingers are sloped and may be cut parallel to either the wide or edge faces of the piece. ¹³
Fire endurance	A measure of the time during which a material or assembly continues to exhibit fire resistance under specified conditions of test and performance. ¹³
Flakeboard	A particleboard composed of flakes. ¹³
Flange, spar	Upper and lower member of a spar made in the form of an I-beam. ⁴
Flat sawn	Lumber that has been sawn parallel to the pith and approximately tangent to the growth rings. Lumber is considered flat grained when the annual growth rings make an angle of less than 45° with the surface of the piece. ⁵
Flat-grained lumber	Lumber that has been sawed in a plane approximately perpendicular to a radius of the log. Lumber is considered flat grained when the annual growth rings make an angle of less than 45° with the surface of the piece. ⁴
Flitch	The sawn segment from the log from which veneers are cut. The term is also applied to the resulting sheets of veneer, which are kept together, arranged in the sequence of cutting, so that adjacent sheets will have almost identical figure for matching. ⁹
Flow	Movement of an adhesive during the bonding process, before the adhesive is set. ³
Fluorescent microscopy	Fluorescent microscopy is the observation of the fluorescence from a material using optical microscopic techniques. ⁶
Formaldehyde	Formaldehyde is a material useful in the production of many wood adhesives including urea formaldehyde, phenol formaldehyde and MDI. Chemically it is HCHO, the lowest aldehyde homologue. In UF adhesives the polymer is easily hydrolysable back to urea and formaldehyde whilst in PFs and MDI hydrolysis of this sort is not possible. Much attention is currently being paid to formaldehyde emissions from glued wood products (both from the resin and from the wood itself) for use in indoor applications.
Fourier transform infra-red	A photospectroscopic technique useful in determining functional groups within a sample.
Free volume	The difference in volume between that of the material at a particular temperature and that which it would occupy at absolute zero. This parameter is used to characterize different states for polymers. It is also used in many mobility considerations. ⁶
FTIR	See Fourier transform infra-red.
Functionality	This refers to the numbers (and/or types) of functional groups on a polymer chain.
Furnish	Refers to the reduced dimension wood particles used in composite panel production. Hence the fibre for fibreboard, the strands for OSB etc.
Furring	Strips of wood or metal applied to a wall or other surface to even it and normally to serve as a fastening base for finish material. ¹⁰



Gap-filling adhesive	See Adhesive, gap-filling.
Gel	A semisolid system consisting of a network of solid aggregates in which liquid is held. ³
Glass transition temperature, Tg	 (i) The temperature at which a glass transforms into a rubber for the amorphous part of the polymer. The value of the glass transition temperature for a particular polymer is sensitive to molecular weight, branching, crystallinity, and traces of solvents from processing.⁶ (ii) The glass transition temperature occurs when adequate free volume is present to allow segmental motion of the polymer backbone. This occurs in amorphous polymers of a narrow temperature range and is manifested as a phase change in the material from a glass to a rubber.
Gluability	Term indicating ease or difficulty in bonding a material with adhesive.
Glue	Originally, a hard gelatine obtained from hides, tendons, cartilage, bones, etc., of animals. Also, an adhesive prepared from this substance by heating with water. Through general use the term is now synonymous with the term "Adhesive". ³
Glueline starvation	This is a term applied to situations where either insufficient glue or adhesive has been applied to the surfaces of the adherend(s) or due to some physical or chemical process, the adhesive which has been applied is wholly or partially removed e.g. by penetration or diffusion into the bulk of the adherend, again resulting in an insufficient amount of glue on the surface. The result is that the bond strength or durability of the bond is compromised and the assembly does not perform as expected.
Glueline	The layer of adhesive affecting union (bond) between any two adjoining wood pieces or layers in an $assembly$. ⁴
Glulam	A term used in North America for parallel-laminated wood structural members bonded with adhesives into large sections and slopes. See Wood, glued laminated. ¹¹
	I-beam and Glulam
Graft polymer	A type of copolymerization where polymeric chains made up of monomers differing from all or most of the monomers comprising the backbone of the main polymer are attached as side chains. The backbone may itself be a copolymer. ⁶
Graft polymer Grain	Image: Severe display="block">A rather general term applied to the vertical elements of wood as it occurs in the living tree. Grain is, perhaps, most easily distinguished in certain woods by the presence of annual layers of more densely aggregated cells or by groups of prominent vessels which form the well-known growth rings. When these are severed they may become quite conspicuous, and the effect produced is referred to as grain.
Graft polymer Grain Grain angle	Image: See Grain direction.Image: See Grain direction.
Graft polymer Grain Grain angle Grain direction	Image: A type of copolymerization where polymeric chains made up of monomers differing from all or most of the monomers comprising the backbone of the main polymer are attached as side chains. The backbone may itself be a copolymer. ⁶ A rather general term applied to the vertical elements of wood as it occurs in the living tree. Grain is, perhaps, most easily distinguished in certain woods by the presence of annual layers of more densely aggregated cells or by groups of prominent vessels which form the well-known growth rings. When these are severed they may become quite conspicuous, and the effect produced is referred to as grain. ⁹ See Grain direction. Fibre direction (essentially parallel to pith of tree). [More commonly called grain angle]. ⁴
Graft polymer Grain Grain angle Grain direction Green	Image: Second

Growth rings, annual

The layer of wood growth put on a tree during a single growing season. In the Temperate Zone the annual growth rings of many species (e.g., oaks and pines) are readily distinguished because of differences in the cells formed during the early and late parts of the season. In some Temperate Zone species (black gum and sweet gum) and many tropical species, annual growth rings are not easily recognized.¹³



Growth rings, annual | Transverse section of a tree showing annual growth rings.

Gusset

A flat wood, plywood, or similar type member used to provide a connection at intersection of wood members. Most commonly used at joints of wood trusses. They are fastened by nails, screws, bolts, or adhesives.¹⁰

Gymnosperm

See Softwoods.



Half round	A manner of cutting veneer to bring out a certain beauty of figure. It is accomplished in the same manner as rotary cutting, except that the flitch is secured on a stray log, a device that permits the cutting of the wood on a wider sweep than when mounted on the lathe centre. ⁹
Hammermill	Consists of horizontal or vertical shaft rotating at high speed on which crushing elements, hammers, bars, or rings are mounted. ⁴
Hard block	Many polyurethane systems have phase separated morphologies. This is because the aromatic isocyanate bearing group is usually in compatible with each other and so as the molecular weight builds up during cure, similar parts of the chemically linked polymer separate, agglomerate and drop out of solution. The MDI, along with low molecular weight isocyanate reactive materials form the so called hard segments which phase separate into crystalline domains – these domains are called hard blocks.
Hard block content	The hardblock content of a polyurethane system is defined as the ratio of the sum of the weight of the isocyanate bearing group and the low molecular weight isocyanate reactive components to the total weight of the components which form the polymer in a given system. the inclusion of water in a system complicates the calculation since the water contributes mass to the hardblock, but also causes a mass loss due to the formation of carbon dioxide.
Hard segment	Hard segments in a polyurethane system are those parts of the polyurethane polymer which will, if possible, phase separate into the hard blocks. Hence the hard segment is the MDI/low molecular weigh isocyanate reactive) segment of the polymer. These fractions of the polyurethane change may be monodispersed lengths or polydispersed.
Hardboard	A generic term for a panel manufactured primarily from interfelted ligno-cellulosic fibres (usually wood), consolidated under heat and pressure in a hot press to a density of 31 pounds per cubic foot or greater, and to which other materials may have been added during manufacture to improve certain properties. ¹³
Hardener	A substance or mixture of substances added to an adhesive to promote or control the curing reaction by taking part in it. The term is also used to designate a substance added to control the degree of hardness of the cured film. ³

A conventional term for the timber of broad-leaved trees, and the trees themselves, belonging to the botanical group Angiospermae.⁴

Heartwood

The wood extending from the pith to the sapwood, the cells of which no longer participate in the life processes of the tree. Heartwood may contain phenolic compounds, gums, resins, and other materials that usually make it darker and more decay resistant than sapwood.¹³



Heartwood | Cross section of wood showing heart and sap wood.

Hemicellulose	Heterogeneous group of long chain polysaccharides distinct from cellulose (basic units are arabinose, xylose, mannose or galactose) forming part of the cell wall of plants, especially lignified tissue. [Chain lengths of hemicellulose are of the order of several hundred sugar monomers]. ⁷
Holocellulose	General term for all the cellulosic type materials (i.e., the cellulose and hemicellulose content of cell walls).
Honey moon adhesive	This term is used to describe two component adhesive systems which are not required to be mixed prior to application to the surface(s) of the to be bonded adherends. Specifically, each of the components in the honey moon system is applied to a separate surface of the adherends and the surfaces are then married to bring the separate components of the adhesive system together so that cure can be affected.
Horizontally laminated wood	Laminated wood in which the laminations are so arranged that the wider dimension of each lamination is approximately perpendicular to the direction of load.
Hot melt adhesive	Adhesives which are solid at room temperature but which when heated flow and can wet substrates and bind to them to affect adhesion. The adherents need to be married together whilst the adhesive is in the molten state. On cooling the adhesive again becomes solid.
Hot press	A press in which the platens are heated to a prescribed temperature by steam, electricity, hot water, or oil. ⁴
Humidify	To increase, by any process, the quantity of water vapour within a given space. ³
Humidity (relative)	This term is used correctly to express the relative amount of moisture in air, compared with dry air. It should not be confused with moisture content of wood. ⁹
Hydrogen bond	Points of attraction between molecules, caused by polarized links involving hydrogen atoms. ²
Hydrolysis	Hydrolysis is the term used to describe reactions of material with water which lead to a break down of the material. e.g. in the case of polyesters, the action of water will cleave the ester bond (-CO-O-) resulting in an acid and an alcohol; in the case of isocyanates, reaction with water will break down the -NCO functional group to the amine, -NH ₂ , and carbon dioxide.
Hydrophilic	Having a strong tendency to bind or absorb water. ⁵
Hydrophobic	Having a strong tendency to repel water. ⁵
Hydroxyl	Alcohol functionality –OH.



IB

I-beams

A construction assembly which in profile forms an I shape, due to the bonding of flange lumber to a central panel web.

The strength of composite wood panels which fail under a load normal to the plane of the faces is referred

to as the internal bond strength. In practice, yokes must be glued to the faces of the panel with a strong glue. By gripping the yokes the panel can then be pulled apart causing failure in the core of the panel. The



load to cause failure is the internal bond strength.

I-beam

I-BOND [®]	Tradename for Isocyante based products from Huntsman
I-RELEASE®	Tradename for release agent products for Huntsman
l-joist	See I-beams.
Index	Index is a parameter indicating the stocheometry of an isocyanate reaction. It indicates the ratio of the numbers of moles of isocyanate groups to the number of moles of the isocyanate reactive groups. A mixture of reactive components which has a 1:1 ratio of the reactive groups would be defined as having an index of 100.
Inhibitor	A substance that slows down chemical reaction. Inhibitors are sometimes used in certain types of adhesives to prolong storage or working life. ⁸
Insulation board, rigid	A structural building board made of coarse wood or cane fibre in 1/2- and 25/32-inch thicknesses. It can be obtained in various size sheets, in various densities, and with several treatments. ¹⁰
Interface	The surface which separates two chemical phases. [The boundary layer joining two distinct layers of material]. ¹
Internal bond	See IB
Interphase	In wood bonding, a region of finite thickness as a gradient between the bulk adhered and bulk adhesive in which the adhesive penetrates and alters the adherend's properties and in which the presence of the adherend influences the chemical and/or physical properties of the adhesive. [Also see diffusion interphase]. ⁵
lonic bond	The chemical bonding of two or more atoms such that the valence electrons are predominately associated with one type of elemental atom. This is not a common form of primary bonding in polymers. ⁶
IPN	See interpenetrating network.

ISO

International standards organization.

Isocyanate value Isocyanate

Isocyanurate

See NCO value. A substance containing an isocyanate (-N=C=O) group. A polyisocyanate contains more than one isocyanate group.

A trimeric reaction product of an isocyanate having the ring structure shown below.²



Isocyanurate | A trimer of isocyanate functionality – the heterocycle thus formed has unique thermal stability properties and, in the case of urethane chemistry is often utilized to increase branching and cross link density.

Isomer

Molecules of the same atomic composition and molecular weight but of different geometric configuration.^2 $\,$

Isotactic

The stereoregularity of a polymer can affect its properties, notably its ability to crystallize. If the side atoms of pendant groups of a polymer are only located on one side relative to the backbone then it is said to be isotactic. Since this is a regular structure, it is often favourable for crystallization.⁶



Jig	A device for holding an assembly in place during gluing or machining operations. ⁴
SIC	Japanese standards association.
Joint geometry	Shape or design of joint (for example, a finger joint). ⁴
Joint, starved	A glue joint that is poorly bonded because an insufficient quantity of glue remained in the joint. ¹³
Joint	The junction of two pieces of wood or veneer.
Joist	One of a series of parallel beams used to support floor and ceiling loads and supported in turn by larger beams, girders, or bearing walls. ¹³
Juvenile wood	The wood formed during the early stages of development of a tree. This wood usually has shorter than average fibres, is comparatively of low density and is mechanically weak, yet very flexible wood.



Keel	The chief timber or steel member extending along the entire length of the bottom of a boat or ship to which the frames are attached. ⁴
Kiln	Heating apparatus intended for drying. Sometimes applied to a drier or redrier, used to remove moisture from veneer, lumber or plywood. ⁹
Kiln drying	The process of drying wood products in a closed chamber in which the temperature and relative humidity of the circulated air can be controlled. ⁴
Knots	These are 'defects' in wood, which indicate anchor points of branches in the original tree. There are two kinds of knots, namely 'living' and 'dead'. Living knots are knots which are still intimately associated with the wood surrounding it, whilst dead knots have the inner portion of the structure dissociated or loose from the surrounding wood. The presence of knots distorts the grain in the vicinity considerably.
	Knots A living knot.
Knot, closed	Where a knot is intact.
Knot, dead	See knot, open.
Knot, living	See knot, closed.
Knot, open	Where a portion of the wood substance of the knot has dropped out, or where cross checks have occurred to present an opening. ⁹



Laminate (noun) Laminate (verb) A product made by bonding together two or more layers of material or materials. $^{\scriptscriptstyle 3}$

To unite layers of material with adhesive.³

Laminated member	A wood member glued up from smaller pieces of wood, either in straight or curved form, with the grain of all pieces essentially parallel to the length of the member. ⁴
Laminated timber	Synonymous to laminated member, but usually implies structural member. ⁴
Laminated Veneer Lumber (LVL)	A plywood type construction is which veneers are laid with parallel grain direction (instead of the typically cross grain arrangement used for plywood). LVL is often of more layers than plywood and whilst manufactured as panels, is cut into strips for use as solid wood lumber replacement.
Laminated wood	An assembly made by bonding layers of veneer or lumber with an adhesive so that the grain of all laminations is essentially parallel.
Laminated, cross	A laminate in which some of the layers of material are orientated at right angles to the remaining layers with respect to the grain or strongest direction in tension. Note: Balanced construction of the laminations about the centreline of the thickness of the laminate is normally assumed. ³
Laminated, parallel	A laminate in which all the layers of material are oriented approximately parallel with respect to the grain or strongest direction in tension. ³
Lamination	The process of preparing a laminate. Also, any layer in a laminate. ³
Lap joint	A joint made by placing one member partly over another and bonding the overlapped portions. ¹³
Lap shear strength	The strength (measured as the applied load to cause failure) of lap joints. Loads are applied parallel and in plane to the adhesive layer.
Laser ionization mass analysis	A surface analysis technique in which light energy is directed to a small region of a surface which generates a plasma of atomic and molecular fragmentation of said surface. These fragments may or may not be charged. The mass of the charged fragments can be detected using mass spectroscopic techniques.
Latewood	The portion of the annual growth ring that is formed after the earlywood formation has ceased. It is usually denser and stronger mechanically than earlywood. ¹³
Lathe	The machine on which rotary and half-round veneer is cut. ⁹
Lay up	The operation of assembling the various layers of veneer or lumber cores, after the glue or adhesive has been applied or inserted, and before pressing. ⁹
Lignin	The second most abundant constituent of wood, located principally in the secondary wall and middle lamella, which is the thin cementing layer between wood cells. Chemically it is an irregular polymer of substituted propylphenol groups, and thus no simple chemical formula can be written for it. ¹³
Lignocellulosic	Generic term related to wood and wood-like matter which is composed principally of lignin and cellulose.
LIMA	See laser ionization mass analysis.
Line Star	Trade name for isocyanate based products useful in structural applications such as I-beams and Glulam, from Huntsman International.
Linear expansion	Wood movement (the changes in dimensions of wood due to water ingress or drying) is most apparent in the radial and tangential directions with swelling being typically of the order of 5 – 10% from dry to saturated. In the longitudinal direction the swell is less significant at typically only around 0.1%. In composite wood panels, the resins and waxes which are employed help to reduce the swelling that would occur. Swell perpendicular to the plane of the panel is termed thickness swell and swell in the plane of the panel is called linear expansion. Linear expansion is generally small compared to thickness swell.
Linear polymer	A polymer without branching or crosslinking. ⁶
Living knot	See knot, closed.
Log pond	The reservoir of water, where the reserve supply of logs and blocks is stored, usually adjacent to the mill. ⁹
London dispersion forces	Intermolecular attraction forces between non-polar molecules that result when instantaneous (non- permanent) dipoles induce matching dipoles in neighbouring molecules. ⁵
Longitudinal	Generally, parallel to the direction of the wood fibres. ¹³
Loose side	See definition under tight side. ⁹

Lumber, stress-gradedLumber separated by non-destructive testing into categories or grades for which allowable design
properties are assigned.¹¹LumberThe product of the saw and planing mill not further manufactured than sawing, resawing, passing
lengthwise through a standard planing machine, crosscutting to length, and matching.¹³LumenIn wood anatomy – the cell cavity.⁵LVLSee laminated veneer lumber.



Machinability	This term describes the ability of a composite wood panel to be machined – sawn, planed, sanded, profiled etc. The smoother the resultant surface (avoidance of furring and macroscopic damage) the better the machinability is said to be.
Macromolecule	An alternative name for a polymer, usually of the structural type; giant molecule. ⁶
Marine plywood	Plywood made of veneers of grades specified for marine use and bonded with waterproof adhesive (usually phenolic type). ⁴
Mastic	A material with adhesive properties usually used in relatively thick sections that can be readily formed by application with trowel or spatula. ^{3}
Mat-formed particleboard	A particleboard in which the coated particles are formed first into a mat having substantially the same length and width as the finished board before being flatplaten pressed. ³
MDA	See DADPM.
MDF	See fibreboard.



MDF panel

MDI

See Methylene diphenyl di-isocyanate.

Mechanical adhesion

Adhesion effected by the interlocking action of an adhesive that solidifies within the cavities of the adherent.⁴

Mechanical fastener

Nails, screws, bolts, and similar items.⁴

See fibreboard.

Mechanical interlock

Also called mechanical adhesion. Adhesion between surfaces in which the adhesive holds the parts together by interlocking action.⁵

Medium density fibreboard (MDF) Melamine

Triaminotriazine, $C_{a}H_{c}N_{c}$. A white crystalline substance, which forms a thermosetting resin with formal dehyde.¹



Melamine formaldehyde

Melamine urea formaldehyde

Mesh sieve

Methanol

Methylene bridge

Methylene diphenyl di-isocyanate A polycondensate thermosetting resin made by the polycondensation of melamine and formaldehyde. This resin is used often for the construction of semi-exterior and exterior grade wood composites.

A polycondensate thermosetting resin made by the polycondensation of melamine, urea and formaldehyde. Alternatively, MF is made and solid urea added as a formaldehyde scavenger. This resin is used often for the construction of semiexterior grade wood composites.

The size of openings in a sieve as designated by the number of meshes openings per linear inch.⁴

The lowest alcohol homologue, namely methyl alcohol or CH₂OH.

This is the shortest (and lowest molecular weight) connection between two organic materials other than if directly connected. The methylene group is a single carbon atom long, hence, -CH₂-.

The basic (monomer) di-functional isocyanate used in binders compositions and supplied by Huntsman. The material has a structure: In the di-functional form, the product can be in the 4,4'- form (shown), the 2,4'-form or the 2,2'-form. In this form, the functionality is 2, and the material is a white solid at room temperature. It has an NCOv of 33.5%.



Methylene diphenyl di-isocyanate | Structure of di-isocyanato diphenyl methane. This is the basic unit in much industrial based polyurethane chemistry.

MF	See Melamine formaldehyde.
Microfibrils	See fibrils.
Middle lamella	Intercellular material that cements together adjacent cells. [The layer is rich in pectic matter and lignin]. ⁷
Mitered joint	Joint cut at a 45° angle with fibre direction. ⁴
Mixed grain	Mixture of flat-sawn and quartersawn pieces. ⁴
Modifier	Any chemically inert ingredient added to an adhesive formulation that changes its properties. ³
Modulus of elasticity	The ratio of stress to strain in tension at strains that are sufficiently small that the material will return to its original length when the stress is removed. For cross-linked and rigid polymers this value has useful meaning but for a large number of polymers it is mainly a traditional measurement. ⁶
Modulus of rupture in bending	The Value of maximum tensile or compressive stress (whichever causes failure) in the extreme fibre of a beam loaded to failure in bending computed from the flexure equation:
	Sb = Mc/I where M is maximum bending moment, computed from the maximum load and the original

Sb = **Mc/I** where M is maximum bending moment, computed from the maximum load and the original moment arm, c is initial distance from the neutral axis to the extreme fibre where failure occurs, and I is initial moment of inertia of the cross section about the neutral axis.³

Μ

MOF/MOR	See modulus of elasticity and modulus of runture
Moisture content	The amount of water contained in the wood, usually expressed as a percentage of the weight of the ovendry wood. ¹³
Moisture cure	Curing of resins and adhesives by virtue of reaction with water. The water is commonly, but not necessarily atmospheric water. Such curable materials need to be dried for storage and precautions taken to avoid atmospheric moisture ingress. Such materials are useful in that they are essentially two component systems where the second component is the environment, but consequently reaction profiles will depend greatly on prevailing relative humidity.
Molar	 (i) Indicating that a specified physical quantity is measured for unit amount of substance. For example, the molar heat capacity (Cm) is the heat capacity of unit amount of substance and is measured in joules per Kelvin per mole. Molar quantities are properties of the substance or material rather than properties of objects or systems. (ii) Denoting a solution that contains one mole of a specified substance per cubic decimetre of solution. A solution containing x moles per cubic decimetre is said to be x molar – written xM.¹⁴
Mole	The basic SI unit of amount of substance equal to the amount of substance that contains the same number of entities as there are atoms in 0.012 kilograms of carbon 12. The entities may be atoms, molecules, ions, electrons, or similar elementary units. One mole of any substance contains N entities, where N is Avogadro's number (6.02252 x 10 ²³). One mole of a compound is equivalent to M grams where M is the molecular weight. ¹⁴
Molecular weight, average	The weight average of a polymer derived by adding up the total molecular weights of all the polymeric molecules and dividing by the total number of molecules. This does not give any indication of the range of molecular weights present in the polymer and thus has limited usefulness by itself.
Molecular weight	ls the total weight of a polymeric chain. Usually it is given for individual molecules, which have weights that are quite small. ⁶
Molecule	A group of atoms that are bound together by either ionic or covalent bonding. It is the basic unit of the polymer since each chain is a molecule. ⁶
Monomer	A substance which is capable of conversion into a polymer. ²
Mortise	A slot cut in a board, plank, or timber, usually edgewise, to receive tenon of another board, plank, or timber to form a joint. ⁴
Mucilage	An adhesive prepared from gum and water. Also in a more general sense, a liquid adhesive which has a low order of bonding strength. ⁸
MUF	See Melamine urea formaldehyde.
Multiday-light press	See Multiopening press.
Multiopening press	Press having a number of platens between which panels can be pressed. (Also called multiday-light press). ⁴



Nail bonding Nail holding Obtaining bonding pressure by nailing together the pieces spread with adhesive.¹¹

The ability of a substance to withstand the removal of a hammered in nail. Usually measured as the load to remove a standard nail driven in to a standard depth.

Nail popping	Protrusion of nailheads because of shrinking and swelling of wood. ¹¹
Natural adhesive	Adhesive produced from naturally occurring products such as blood, bone and casein. ⁴
ΝΟ	The isocyanate functional group.
NCO value	See NCO _v .
ΝΟν	The NCO-value, this is a measure of the weight percent of the -NCO moiety in a compound or mixture.
Neutral plane	Of a beam, the longitudinal section, perpendicular to the plane of loading, in which no strain develops. ¹⁶
NMR	See nuclear magnetic resonance.
Nominal lumber	The rough-sawed commercial size by which lumber is known and sold in the market; for example, a 2 by 4.4
Novolac	A phenolic-aldehydic resin that, unless a source of methylene groups is added, remains permanently thermoplastic. ⁸
Nuclear magnetic resonance	A method of investigating the spins of atomic nuclei. In the presence of a strong magnetic field the magnetic moment of a nucleus precesses around the field direction. Only certain orientations are possible, leading to the existence of a number of discrete energy states for the nucleus. Radiofrequency radiations is supplied to the sample by passing a high-frequency current through a coil and the radiation is detected by a second coil. If the magnetic field is changed slowly, thus changing the difference in energy between levels, radiation is absorbed at certain values of the field when the frequency of the radiation corresponds to the difference between two energy levels. A graph of detector response against magnetic field is an NMR spectrum of the sample. The technique is extensively used in chemistry for studying molecules – the energy levels of the nucleus are affected by the electrons surrounding the nucleus and the frequency at which the nucleus absorbs radiation depends on its position in the molecule. ¹⁴



ОНѵ	The OH-value. This is a measure of the hydroxyl content of a material. It is measured as an equivalent of the hydroxyl content of KOH, in milligrams of KOH required to have the same number of OH groups as in one gram of the material (mgKOH/g).
Oil-borne preservative	Preservative dispensed or dissolved in oil carrier or vehicle. ⁴
Onsite bonding	Bonding of assemblies, often under outdoor conditions, at the building construction site. ¹¹
Open assembly time	The time interval between the spreading of the adhesive on the adherent and the completion of assembly of the parts for bonding.
Open assembly	See Assembly time.
Open knot (knot, open)	Where a portion of the wood substance of the knot has dropped out, or where cross checks have occurred to present an opening. ⁹
Open piling	Stacking of wood products layer by layer separated by strips of wood inserted between layers to permit air circulation. ⁴
Open side	Side of veneer next to knife as it comes off the log (also called loose side). ⁴

Orientated strand board (OSB) Wooden panel composites, in which thin wooden strands, approximately- $10 - 15 \times 2 - 4$ cm, are bonded together. The planes of the strands are parallel to the plane of the panel.



OSB panel

OSBSee oriented strand board.Ovendry woodWood dried to a relatively constant weight in a ventilated oven at 101°Cto 105°C.13OverlayA thin layer of paper, plastic film, metal foil, or other material bonded to one or bothfaces of panel products or to lumber so as to provide a protective or decorative face or a base for painting.13



Panel	Referring to a sheet or piece of plywood [or other composite wood board].9
Paper laminates	See Decorative laminate.
Paper, building	A general term for papers, felts, and similar sheet materials used in buildings without reference to their properties or uses. ¹⁰
Paraffin wax	White waxy low melting hydrocarbon solids which are insoluble in water. These are useful as additives in composite wood production to improve the hydrophobicity of the wood and limiting thickness swell.
Parenchyma	Tissue consisting of living, thin-walled cells, often almost as broad as long, and permeated with a system of intercellular spaces containing air. ⁷
Partial prepolymers	See pre-polymer
Particleboard	A generic term for a panel manufactured from lignocellulosic materials (commonly wood) essentially in the form of particles (As distinct from fibres). The boards are bonded together with synthetic resin – or other suitable binder, under heat and pressure, by a process wherein the interparticle bonds are created wholly by the added binder. ¹³
Patches	Insertions of sound wood, placed and glued into veneer or plywood panels, from which defective portions have been removed. ⁹
Pearl glue	Animal glue dried in the form of round pearls. ⁴
Peeler	The trade name of a log, selected and suitable for cutting into rotary veneer. Applies particularly to softwoods, especially Douglas fir. ⁹
Pendant group	A cluster of atoms chemically bonded to the backbone of a polymer. Usually this cluster is large and may contain unoccupied space, such a carbon ring. ⁶
Penetration	The entering of an adhesive into an adherent. Note: this property of a system is measured by the depth of penetration of the adhesive into the adherent. ³
Permanence	See durability.

Permeability	The amount of a second material, usually a fluid, that can be moved through a unit area of a host material in a given time. The value of this property is very dependent on the pressure of the fluid moving through the polymeric host. The greater the pressure of the fluid, the greater the driving force through the polymer will be. thus, flow through the polymer will proceed more quickly. also, increasing the temperature of the fluid since the polymeric free space increases with increasing temperature. ⁶
Perennial plant PF	Plant that continues its growth from year to year. In herbaceous perennials aerial parts die away in autumn, replaced by new shoots in following year from underground structures e.g. rhubarb, delphinium; in woody perennials, permanent woody stems above ground form starting point for each new year's growth, a characteristic that enables some of them to reach a large size, e.g. shrubs and trees. ⁷ See Phenol formaldehyde.
рН	A measure of the acidity or alkalinity of a solution, equal to the logarithm to base 10 of the reciprocal of the concentration of hydrogen ions; i.e. $pH = log_{10}(1/[H+])$. Neutral solutions have a pH or 7, acid solutions a pH less than 7 and alkaline solutions a pH greater than 7. ¹⁴
Phase separation	In polyurethanes phase separation is usually associated with TPUs, elastomeric systems and flexible systems. It is the geometric separation of components in the final solid material such that specific component rich domains are separated from the rest of the matrix. In urethane chemistry the hard blocks phase separate from the soft blocks with the soft block usually being the continuous phase. The size, distribution and quality (crystallinity) of the separated domains depends on relative compatibilities, the speed of reaction, the types of chain extenders and blowing agents and so on.
Phenol	A white hygroscopic crystalline solid, C ₆ H ₅ OH, which turns pink if impure or in light. An important aromatic hydroxy compound, it is manufactured by preparing sodium benzene sulphonate and treating with acid. Phenol is used to make resins, polymers, weed-killers and pharmaceuticals. ¹⁴
	Phenol Structure of phenol.
Phenol formaldehyde	A polycondensate thermosetting resin made by the polycondensation of phenol and formaldehyde. This resin is used often for the construction of semi-exterior and exterior grade wood composites.
Phenol formaldehyde Phenol resorcinol formaldehyde	A polycondensate thermosetting resin made by the polycondensation of phenol and formaldehyde. This resin is used often for the construction of semi-exterior and exterior grade wood composites. A polycondensate thermosetting resin made by the polycondensation of phenol, resorcinol and formaldehyde. This resin is used often for the construction of semiexterior and exterior grade wood composites.
Phenol formaldehyde Phenol resorcinol formaldehyde Phenolic resin	A polycondensate thermosetting resin made by the polycondensation of phenol and formaldehyde. This resin is used often for the construction of semi-exterior and exterior grade wood composites. A polycondensate thermosetting resin made by the polycondensation of phenol, resorcinol and formaldehyde. This resin is used often for the construction of semiexterior and exterior grade wood composites. Adhesives made from phenol and formaldehyde. Depending on the ratio of components a novolac or resole type resin will be produced. Resoles have a higher F:P ratio and only require heat to harden. Novolacs are rich in phenol and require the addition of formaldehyde (often in the form of paraformaldehyde) to cure. Phenolic resins are very durable and can be used in structural and exterior applications, especially if modified with resorcinol.
Phenol formaldehyde Phenol resorcinol formaldehyde Phenolic resin Phenolplast	A polycondensate thermosetting resin made by the polycondensation of phenol and formaldehyde. This resin is used often for the construction of semi-exterior and exterior grade wood composites. A polycondensate thermosetting resin made by the polycondensation of phenol, resorcinol and formaldehyde. This resin is used often for the construction of semiexterior and exterior grade wood composites. Adhesives made from phenol and formaldehyde. Depending on the ratio of components a novolac or resole type resin will be produced. Resoles have a higher F:P ratio and only require heat to harden. Novolacs are rich in phenol and require the addition of formaldehyde (often in the form of paraformaldehyde) to cure. Phenolic resins are very durable and can be used in structural and exterior applications, especially if modified with resorcinol. Synthetic resins derived from the reaction of phenol, resorcinol or allied phenolic compounds with aldehydes, usually formaldehyde. They form the basis of hydrolytically stable thermosetting moulding materials.
Phenol formaldehyde Phenol resorcinol formaldehyde Phenolic resin Phenolplast	A polycondensate thermosetting resin made by the polycondensation of phenol and formaldehyde. This resin is used often for the construction of semi-exterior and exterior grade wood composites. A polycondensate thermosetting resin made by the polycondensation of phenol, resorcinol and formaldehyde. This resin is used often for the construction of semiexterior and exterior grade wood composites. Adhesives made from phenol and formaldehyde. Depending on the ratio of components a novolac or resole type resin will be produced. Resoles have a higher F:P ratio and only require heat to harden. Novolacs are rich in phenol and require the addition of formaldehyde (often in the form of paraformaldehyde) to cure. Phenolic resins are very durable and can be used in structural and exterior applications, especially if modified with resorcinol. Synthetic resins derived from the reaction of phenol, resorcinol or allied phenolic compounds with aldehydes, usually formaldehyde. They form the basis of hydrolytically stable thermosetting moulding materials.
Phenol formaldehyde Phenol resorcinol formaldehyde Phenolic resin Phenolplast Phioem Pin knots	A polycondensate thermosetting resin made by the polycondensation of phenol and formaldehyde. This resin is used often for the construction of semi-exterior and exterior grade wood composites. A polycondensate thermosetting resin made by the polycondensation of phenol, resorcinol and formaldehyde. This resin is used often for the construction of semiexterior and exterior grade wood composites. Adhesives made from phenol and formaldehyde. Depending on the ratio of components a novolac or resole type resin will be produced. Resoles have a higher F:P ratio and only require heat to harden. Novolacs are rich in phenol and require the addition of formaldehyde (often in the form of paraformaldehyde) to cure. Phenolic resins are very durable and can be used in structural and exterior applications, especially if modified with resorcinol. Synthetic resins derived from the reaction of phenol, resorcinol or allied phenolic compounds with aldehydes, usually formaldehyde. They form the basis of hydrolytically stable thermosetting moulding materials. The tissues of the inner bark, characterized by the presence of sieve tubes and serving for the transport of elaborate foodstuffs. ⁵ See knots, pin.
Phenol formaldehyde Phenol resorcinol formaldehyde Phenolic resin Phenolplast Phloem Pin knots Pitch pocket	A polycondensate thermosetting resin made by the polycondensation of phenol and formaldehyde. This resin is used often for the construction of semi-exterior and exterior grade wood composites. A polycondensate thermosetting resin made by the polycondensation of phenol, resorcinol and formaldehyde. This resin is used often for the construction of semiexterior and exterior grade wood composites. Adhesives made from phenol and formaldehyde. Depending on the ratio of components a novolac or resole type resin will be produced. Resoles have a higher F:P ratio and only require heat to harden. Novolacs are rich in phenol and require the addition of formaldehyde (often in the form of paraformaldehyde) to cure. Phenolic resins are very durable and can be used in structural and exterior applications, especially if modified with resorcinol. Synthetic resins derived from the reaction of phenol, resorcinol or allied phenolic compounds with aldehydes, usually formaldehyde. They form the basis of hydrolytically stable thermosetting moulding materials. The tissues of the inner bark, characterized by the presence of sieve tubes and serving for the transport of elaborate foodstuffs. ³ See knots, pin. A defect in the tree, caused by an opening between the annual rings, which may contain an accumulation of pitch. ⁹
Phenol formaldehyde Phenol resorcinol formaldehyde Phenolic resin Phenolplast Phioem Pin knots Pitch pocket	A polycondensate thermosetting resin made by the polycondensation of phenol and formaldehyde. This resin is used often for the construction of semi-exterior and exterior grade wood composites. A polycondensate thermosetting resin made by the polycondensation of phenol, resorcinol and formaldehyde. This resin is used often for the construction of semiexterior and exterior grade wood composites. Adhesives made from phenol and formaldehyde. Depending on the ratio of components a novolac or resole type resin will be produced. Resoles have a higher F:P ratio and only require heat to harden. Novolacs are rich in phenol and require the addition of formaldehyde (often in the form of paraformaldehyde) to cure. Phenolic resins are very durable and can be used in structural and exterior applications, especially if modified with resorcinol. Synthetic resins derived from the reaction of phenol, resorcinol or allied phenolic compounds with aldehydes, usually formaldehyde. They form the basis of hydrolytically stable thermosetting moulding materials. The tissues of the inner bark, characterized by the presence of sieve tubes and serving for the transport of elaborate foodstuffs. ⁹ See knots, pin. A defect in the tree, caused by an opening between the annual rings, which may contain an accumulation of pitch. ⁹

Ρ

Pits

Connections between wood cells. Effectively these are holes, which are bordered by primary cell walls. There are three principal types of pits, namely bordered, semibordered and simple pits. Bordered pits are covered by a torus and margo – a sheath or membrane.



Pits | Bordered pit showing the margo and torus.

Plank	A broad board, usually more than 1 inch thick, laid with its wide dimension horizontal and used as a bearing surface. ¹³
Plant bonding	Bonding of assemblies indoors at a central location, form which they are transported to the building construction site. 11
Plastic laminate	See decorative laminate.
Plasticizer	A material incorporated in an adhesive to increase its flexibility, or distensibility. The addition of the plasticizer may cause a reduction in melt viscosity, lower the temperature of the second-order transition, or lower the elastic modulus of the solidified adhesive. ³
Platen	A plate of metal, especially one that exerts or receives pressure, as in a press used for gluing plywood. ³
Plywood	A panel composed of an assembly of layers or plies of veneer (or veneers in combination with lumber core, particleboard core, hardboard core, or of special core material) joined with an adhesive. Except for special constructions, the grain of alternate plies is always approximately at right angles. ¹¹
pMDI	Polymeric form of MDI, see Methylene diphenyl di-isocyanate. The material has a number average functionality of 2.7, is a low viscosity dark brown liquid. It has an NCO _v of approximately 30.5%.
Polydispersivity	In general, the width of a molecular weight distribution, given quantitatively by any of several molecular weight distribution indices, including the polydispersity index (Mw/Mn). ¹⁷
Polymer	A compound formed by the reaction of simple molecules having functional groups that permit their combination to proceed to height molecular weights under suitable conditions. Polymers may be formed by polymerization. ⁵
Polymeric MDI	See pMDI.
Polymerization	A chemical reaction in which the molecules of a monomer are linked together to form large molecules whose molecular weight is a multiple of that of the original substance. ⁵
Polysaccharide	Carbohydrate produced by combination of many molecules of monosaccharide; e.g. starch, cellulose. Some kinds e.g. chitin, have other constituents besides such simple sugars. Large, often fibrous, molecules. Important structural and reserve energy-rich material in organisms. ⁷
Polyurethane	Polymeric substance containing many urethane (-NH-CO-O-) linkages, abbreviated as PU. ²
Porosity	The ratio of the volume of a material's pores to that of its solid content. ⁴
Post cure	A treatment applied to an adhesive assembly following the initial cure, to complete cure, or to modify specific properties. ⁵
Post	A length of timber generally round or square-cut used as a pillar or other upright support in building, fencing, etc. ¹⁶
Pot life	Usable life of adhesive after mixing. ⁴
Precure	Condition of too much cure or set of the glue before pressure is applied, resulting in inadequate flow and glue bond. ³
Prepolymer	The reaction product of an isocyanate with an isocyanate reactive material, in which insufficient isocyanate reactive material is added to leave residual, unreacted isocyanate groups, which may or may not be connected to free MDI. Commonly this is the reaction product of di- or polymeric MDI with a high molecular weight polyether or polyester. Prepolymers are also known as quasi-prepolymers, semiprepolymers and partial prepolymers.

Prepreg	See compregnated wood. ⁹
Pre-press	A cold press used to reduce the height of plywood veneer stacks and particle board mats prior to the hot (curing) press. The pre-press actually serves several requirements in addition to reducing matt height to allow entry of the matt into the usually smaller opening of the hot press: holds uncured resinated wood in place to avoid veneer slippage or crumbling of the shape and prevents excessive moisture loss from the matt before curing.
Preproduction test	A test or series of tests conducted by (1) an adhesive manufacturer to determine conformity of an adhesive batch to established production standards, (2) a fabricator to determine the quality of an adhesive before parts are produced, or (3) an adhesive specification custodian to determine conformance of an adhesive to the requirements of a specification not requiring qualification tests. ³
Preservative	Any substance that, for a reasonable length of time, is effective in preventing the development and action of wood-rotting fungi, corers of various kinds, and harmful insects that deteriorate wood. ¹³
r M	See Thenorresolehonormaldenyde.
Primary bond	Collective term for covalent and ionic bonds.
Primary cell wall	Cell walls in wood are composed of several layers of variously aligned and orientated microfibrils. The first cell wall layer that forms, the primary cell wall is thin and composed of randomly orientated microfibrils. Secondary cell wall layers and laydown inside the cavity formed by the primary cell wall. In the vicinity of the pits, the cell wall is limited to primary cell wall only.
Psychrometer	An instrument for measuring the amount of water vapour in the atmosphere. It has both a dry-bulb and wet-bulb thermometer. The bulb of the wet-bulb thermometer is kept moistened and is, therefore, cooled by evaporation to a temperature lower than that shown by the dry-bulb thermometer. Because evaporation is greater in dry air, the difference between the two thermometer readings will be greater when the air is dry than when it is moist. ¹³
PU	See polyurethane.
Pulp	The paper industry is responsible for the largest consumption of wood. Wood is delignified by various processes and the resultant material is effectively cellulose which is used in paper manufacturing. The delignified wood is referred to as pulp.
Pyrometer	An instrument for measuring temperatures. ³



Quartered	A method of producing veneer by slicing or sawing, to bring out a certain figure developed by the medullary or pith rays, which is especially conspicuous in oak. The log may be flitched in several different ways to allow the cutting of the veneer in a radial direction. ⁹
Quartersawn	Sawn so the annual rings are essentially perpendicular to the wide face of the board. Lumber is considered quartersawn when the annual growth rings form an angle of 45° to 90° with the wide surface of the piece. ⁴
Quasi-prepolymers	See pre-polymer.



Rabbet	A type of joint for fitting one wood member to another (for example, planking to keel and stem of a boat). ⁴
Racking	Application of pressure to the end of a wall anchored at the base but free to move at top. ⁴
Radial	Strictly, coincident with a radius of a tree or log. In practice, however, it often means roughly radial to a growth ring. A radial section is a longitudinal section through a tree or limb perpendicular to a tangent. Quartersawn lumber is sawed radially.
Radiofrequency (RF) curing	Curing of bondlines by the application of radiofrequency energy. ¹¹
Rafter	One of a series of structural members of a roof designed to support roof loads. The rafters of a flat roof are sometimes called roof joints. ¹⁰
Raised grain	A roughened condition of the surface of dressed lumber in which the hard latewood is raised above the softer earlywood but not torn loose from it. 5
Ray (cells)	Wood cells running in a radial direction (bark to pith). These cells constitute less than 10% of the total cells in a tree.
Reaction injection moulding	Process which involves the rapid metering, and mixing of polyurethane reaction ingredients, followed by their injection into a mould. ²
Reaction wood	Common term for tension wood in hardwoods and compression wood in softwoods. ⁴
	Reaction wood Compression wood.
Relative humidity	Ratio of the amount of water vapour present in the air to that which the air would hold at saturation at the same temperature. It is usually considered on the basis of the weight of the vapour but, for accuracy, should be considered on the basis of vapour pressures. ¹³
Release	The ability of a pressed or moulded material to be removed without damage either to itself or the mould or press platens from the mould or press. This is particularly relevant to isocyanate based adhesive system. Isocyanates tend to stick to press platens and so special technologies and/or resins are required to promote adhesion within the wood whilst avoiding adhesion to the metal press.
Release paper	A sheet, serving as a protectant and/or carrier for an adhesive film or mass, which is easily removed from the film or mass prior to use. ⁸
Resin canal	See resin ducts.
Resin ducts	Intercellular passages that contain and transmit resinous materials. On a cut surface, they are usually inconspicuous. They may extend vertically parallel to the axis of the tree or a right angles to the axis and parallel to the rays. ⁵
Resin	A solid, semisolid, or pseudo solid organic material which has an indefinite and often high molecular weight, exhibits a tendency to flow when subjected to stress, usually has a softening or melting range, and usually fractures cohesively. Liquid resin – an organic polymeric liquid which when converted to its final state for use becomes a resin. ³

Resinoid

Resole

Resorcinol

Any of the class of thermosetting synthetic resins, either in their initial temporarily fusible state or in their final infusible state.⁸

An early stage in the reaction of certain thermosetting resins in which the material is fusible and still soluble in certain liquids.⁸

1,3-di-hydroxy benzene (or 3-hydroxy phenol) used as a replacement of phenol in phenolplasts for improved durability, thermal stability and moisture resistance and for structural elements. A common modification for PF resins for marine grade plywood.



Retarder

See Inhibitor.

Ribbon coating

A method of applying resin on wood (usually veneers) in which thin beads of resin are extruded onto the wood surface. The thus applied resin is not uniformly distributed on the wood and often a brush system is employed to spread the resin once applied.



Ribbon coating | Ribbon coating system (laboratory scale).

Ribbon spreading	Spreading a glue in parallel ribbons instead of a uniform film. ³
RIM	See reaction injection moulding.
Roll coating	A method of applying resin on wood. Resin is applied on a rotating drum or cylinder and this is rolled over the surface of the material to be bonded. The resin is transferred to the material by contact.
Roll spreading	Application of a film of a liquid material (liquid resin) which on a surface with rolls. ⁴
Rosin	A resin obtained as a residue in the distillation of crude turpentine from the sap of the pine tree (gum rosin) or from an extract of the stumps and other parts of the tree (wood rosin). ⁸
Rotary cut	Veneers cut on a lathe, which rotates a log or bolt, chucked in the centre, against a fixed knife. ⁴
Rotary-cut veneer	Veneer cut in a lathe which rotates a log or bolt, chucked in the centre, against a knife.
Rubinate	Trade name for isocyanate based products from Huntsman International. (In Europe and Asia trade name is Suprasec).



Sandwich panels	See Structural sandwich construction.
Sapwood	The wood of pale colour near the outside of the log. Under most conditions the sapwood is more susceptible to decay than heartwood. ¹³
Saturated salt solution	Saturated salt solutions are solutions of a salt in water such that the salt is in equilibrium between the dissolved phase and the precipitated phase. Such solutions (of different salts) are useful in providing controlled relative humidity environments (closed systems) for the conditioning of wood and wood composites.
Sawed veneer	Veneer produced by sawing.
Scarf joint	An end joint formed by joining with glue the ends of two pieces that have been tapered or beveled to form sloping plane surfaces, usually to a feather edge, and with the same slope of the plane with respect to the length in both pieces. In some cases, a step or hook may be machined into the scarf to facilitate alignment of the two ends, in which case the plane is discontinuous and the joint is known as a stepped or hooked scarf joint. ¹³
Screw holding	The ability of a substance to withstand the removal of a screw which has been screwed in. Usually measured as the load to remove a standard screw driven in to a standard depth.
Seasoning	Removing moisture from green wood to improve its serviceability. ⁵
Secondary bond	Collective term for London dispersion forces, dipole-dipole forces, hydrogen bonds etc. Such bonds are individually relatively weak and do not usually involve the transfer or sharing of electrons on a permanent basis.
Secondary cell wall	Plant cells are encased in a cell wall which is composed of various layers of alternatively aligned microfibrils. There are two principle cell wall layers the primary cell wall on the outer most part (next to the middle lamella) and the secondary cell wall. The secondary cell wall is composed of three main sub layers, the S1, S2 and S3 layers, characterized by the orientation of the microfibrils. The S1 layer is adjacent to the primary cell wall layer is responsible for most of the thickness swell that wood experiences during moisture uptake. Other than the microfibril orientation, the relative abundance of cellulose, hemicellulose and lignin are different in the different layers with increasing concentrations of cellulose from the S1 to S2 to S3 layers and conversely



decreasing concentrations of lignin.

Secondary cell wall Distribution of cellulose, lignin and hemicellulose in cell walls¹⁹.

Secondary ion mass spectroscopy

(SIMS) – this is a surface analytical technique which helps determine the surface composition of materials. A primary ion beam is directed onto the surface of the test material in a ultra high vacuum. The impact of the heavy ions causes structural damage to the sample surface resulting in the expulsion of fragmented ions and uncharged particles. The charged particles can be accelerated in a mass spectrometer and fragmentation patterns observed. There are two types of SIMS experiments – high energy or dynamic SIMS which is useful in depth profiling of hard materials and low energy or static SIMS useful for mapping the surface soft organic materials.

Semi-prepolymers	See prepolymer.
Set	To convert an adhesive into a fixed or hardened state by chemical or physical action, such as condensation, polymerization, oxidation, vulcanization, gelation, hydration, or evaporation of volatile constituents. ³
Setting	The hardening of a cold-pressed glue. It is brought about, largely, by the evaporation of the glue solvent, either with or without heat. ⁹
Shear block test	A means of testing a bond joint in shear. ³
Shear	A condition of stress or strain where parallel planes slide relative to one another. ¹³
Sheathing	The structural covering, usually of boards, building fibreboards, or plywood, placed over exterior studding or rafters of a structure. ¹³
Shelf life	This indicates the usable time of a product from the time of manufacture.
Shim	A long narrow patch, glued into the panel, or into the lumber core. [Or a defined thickness spacer to generate controlled glueline thickness or panel thickness]. ⁹
Short grain	Term used for cross grain as when end grain is exposed on face of veneer. ⁴
Show through	Term used when effects of defects within a panel can be seen on the face. ⁴
Siding	The finish covering of the outside wall of a frame building, whether made of horizontal weatherboards, vertical boards with battens, shingles, or other material. ¹³
SIMS	See secondary ion mass spectroscopy.
Single day light press	A discontinuous or static press with a single opening for one pressing at a time.



Single day light press | Single daylight press (lab scale).

Single lap joint

A tensile lap joint which is constructed so as to have a single glueline which is strained to determine the failure load and hence quality of resin. See figure.



Single lap joint | Single lap joints have only one glueline (compared to double lap joints) and therefore when used for tensile strength testing, care must be taken to avoid peel forces acting on the glueline. Spacers are usually employed to allign the glueline with the pull plane to avoid this problem.

Single spread	Refers to application of adhesive to only one adherent of a joint.
Sizing	The process of applying diluted animal glue or similar material to the face or faces of a panel to reinforce fuzzy fibres and facilitate sanding. ⁴
Sliced veneer	Veneer that is sliced off a log, bolt, or flitch with a knife. ¹³
Soft block	Also see hard block. The soft block of a phase separated polyurethane is the region or domain rich in the high molecular weight isocyanate reactive competent – usually the polyether or polyester phase.

Soft segment	Also see hard segment and soft block – the soft segments in a polyurethane material is simply that part of the polyurethane chain which is free of MDI groups. Essentially the soft segments are the fractions of the polyurethane polymer chains which are derived from usually polyethers or polyesters.
Softwoods	Generally, one of the botanical groups of trees that in most cases have needlelike or scalelike leaves; the conifers, also the wood produced by such trees. The term has no reference to the actual hardness of the wood. ¹³
Solids content	The percentage by weight of the nonvolatile matter in an adhesive. Note: The actual percentage of the nonvolatile matter in an adhesive will vary considerably according to the analytical procedure that is used. A standard test method must be used to obtain consistent results. ³
Spar	Upper and lower member of a spar made in the form of an I-beam. Note also known as a flange.⁴
Specific gravity	As applied to wood, the ratio of the ovendry weight of a sample to the weight of a volume of water equal to the volume of the sample at a specified moisture content (e.g., green, air dry, or ovendry). ¹³
Spinning disc	A means of distributing resin on wood strands. Resin is meterred onto a spinning metallic fringe in a continuous stream. At the edge of the fringe, the liquid resin is atomized, due to centrifugal forces, into a fine mist though which the wooden strands are passed. This method of resin application provides a good distribution of low amounts of resin.
Spiral grain	This is produced when the fibres follow a spiral course in the living tree. Whilst this may give rise to interesting figure, it usually reduces the strength of timber. The reasons for spiral grain to develop are not well understood.
Spline	Thin piece of wood or plywood often used to reinforce a joint between two pieces of wood. ⁴
Spray blending	The most common form of blending resins, including isocyanate based resins on small geometry wood for composite panel preparation. The resin is pumped to a nozzle where it is atomized and the wood particles are passed across the spray. There are several common types of spray heads but commonly air assisted spray nozzles are used or spinning disc heads (especially in OSB production). Care is needed to avoid large drips of resin falling from the spray unit and to avoid wood fibres and dust from collecting around the heads.



Spray blending | Row of spinning disc heads in an industrial OSB blender.

Spread	The quantity of adhesive per unit joint area applied to an adherent, usually expressed in pounds of adhesive per thousand square feet of joint area.
Springwood	See earlywood.
Squeeze out	Bead of glue squeezed out of a joint when gluing pressure is applied. ⁴
Stain	Any discolouration of the wood substance. Common veneer stains are often produced by the chemical action of the iron of the cutting knife with the tannic acid in the wood, as well as by the chemical action of the glue. ⁹
Starch	The principal reserve deposit polysaccharide in plants. A mixture of two glucans: (1) amylopectin (usually comprising 70 -85% of the starch) which swells in hot water, but is insoluble; (2) amylose which is soluble in hot water. Starch occurs in plant cells as granules of 0.01 – 1 m min size. ¹⁷
Starved joint	An expression used to indicate an inadequate amount of glue or adhesive, either because of insufficient spread, too rapid absorption into the wood substance, or in some cases, with dense woods, of too much pressure. ⁹
Static bending	Bending under a constant or slowly applied load; flexure. ¹³

Static press	A discontinuous press. In wood composite manufacture these are common presses. The resinated wood matt is conveyed into the press between the platens and the mat is pressed and heated. The conveying system both before and after the press is timed to allow for the discontinuity in the process.
Stickering	The use of wooden strips (stickers) between courses or boards in a lumber pile; stickers are placed at a right angle to the long axis of the lumber. Stickering permits air circulation and facilitates rapid and even drying of lumber. ¹¹
Storage life	The period of time during which a packaged adhesive can be stored under specific temperature conditions and remain suitable for use. Sometimes called shelf life. ³
Straight grained wood	Wood in which the fibres run parallel to the axis of the pieces. ⁴
Strain hardening	An increase in strength accompanying strain. This term may be said to apply to the last segment of a tensile test graph when a polymer shows an increase in sustained stress before failure. This is usually a result of a hardening mechanism, such as chain alignment, in the direction of the applied force. ⁶
Strength, wet	The strength of an adhesive joint determined immediately after removal from a liquid in which it has been immersed under specified conditions of time, temperature, and pressure. Note: the term is commonly used alone to designate strength after immersion in water. In the latex adhesives the term is also used to describe the joint strength when the adherents are brought together with the adhesive still in the wet state. ³
Stressed-skin construction	A construction in which panels are separated from one another by a central partition of spaced strips with the whole assembly bonded so that when loaded it acts as a unit. ¹³
Stringer	A timber or other support for crossmembers in floors or ceilings. In stairs, the support on which the stair treads rest. ¹³
Structural adhesive	A bonding agent used for transferring required loads between adherents exposed to service environments typical for the structure involved. ³
Structural sandwich construction	A layered construction comprising a combination of relatively high strength facing materials intimately bonded to and acting integrally with a low density core material. ¹³
Structural timber	Pieces of wood of relatively large size, the strength of which is the controlling element in their selection and use. Trestle timbers (stringers, caps, posts, sills, bracing, bridge ties, guard rails); car timbers (car framing, including upper framing, car sills); framing for buildings (posts, sills, girders); ship timbers (ship timbers, decking); and cross arms for poles are examples of structural timbers. ¹³
Stud	One of a series of slender wood structural members used as supporting elements in walls and partitions. ¹³
Stump veneer	Veneers cut from the sound roots of a tree, such as walnut, and having a rich, curly figure, resulting from the intertwinning of the root fibres. ⁹
Subfloors	Boards or plywood laid on joists over which a finished floor is to be laid. ¹⁰
Substituted urea	Urea is an organic substance, with chemical formula H_2N -CO- NH_2 . The protons are replaceable by organic materials, hence R_2N -CO- NR_2 , where R is H, or a carbon based material (although the tetrasubstituted form is rare) constitutes substituted ureas. In the case of polyurethane chemistry, when isocyanates react with amines, it is said that polyurea is formed. These urea groups are substituted ureas: R-NHCO- NH-R'.
Substrate	A material upon the surface of which an adhesive-containing substance is spread for any purpose, such as bonding or coating. A broader term than adherent. (See also Adherent). ³
Summerwood	See Latewood.
Suprasec	Trade name for isocyanate based products from Huntsman International. (In US trade name is Rubinate).
Surface	The exterior part of anything that has length and breadth. The surface of a material is the outer most part which constitutes the boundary between the material itself and the outside environment.
Surface deactivation	Or surface inactivation. In adhesive bonding to wood, physical and chemical modifications of the wood surface that result in reduced ability of an adhesive to properly wet, flow, penetrate and cure. [Deactivation can be derived from oxidative processes, contamination, migration of extractives and so on.] ⁵
Surface lumber	Lumber that is dressed by running it through a planer. ¹³
Surface roughness	General term to describe the irregularities of a surface of a material. Roughness of surfaces is a complex parameter which contributes directly to the ability of a material to be adhesively bonded.
Surface tension	The property of liquids that makes them act as if they had an elastic skin at their surface. ¹⁴

Surface treatment	Surfaces may be treated physically or chemically in order to improve the bondability of a material. In wood, freshly exposed surfaces bond more easily than aged surfaces and so prior to bonding, the surface of wood may need to be sanded. Alternatively surfaces may be wiped free from contamination or de-greased. Primering is a common surface treatment which essentially means that a layer of highly bondable material is deposited on the surface of the substrate. Other treatments include flame ionization, plasma etching, halogenation. All treatment increase the surface energy of the substrate to be bonded.
Surfactant	A substance used to increase the spreading or wetting properties of a liquid. ¹⁴
Swelling	The dissolving of a solvent into a crosslinked polymer. The cross-linked polymer will elastically stretch to accommodate the solvent, thereby producing a gel in the case of extreme solubility. Swelling is a common problem when rubbers are used in conjunction with greases. ⁶
Syntactic	An arrangement in which the side atoms or groups alternate. ⁶



Tack	The property of an adhesive that enables it to form a bond of measurable strength after adhesive and adherend are brought into contact under low pressure. ⁵
Tack, dry	The property of certain adhesives, particularly non-vulcanizing rubber adhesives, to adhere on contact to themselves at a stage in the evaporation of volatile constituents, even thought they seem dry to the touch. Sometimes called "aggressive tack". ³
Tangential	Strictly, coincident with a tangent at the circumference of a tree or log, or parallel to such a tangent. In practice, however, it often means roughly coincident with a growth ring. A tangential section is a longitudinal section through a tree or limb perpendicular to a radius. Flat-grained lumber is sawed tangentially. ¹³
Telegraphing	A condition in a laminate or other type of composite construction in which irregularities, imperfections, or patterns of an inner layer are visibly transmitted to the surface. Note: Telegraphing is occasionally referred to as photographing. See show through. ³
Temperature, curing	The temperature to which an adhesive or an assembly is subjected to cure the adhesive. ³
Temperature, dry-bulb	The temperature of the air as indicated by an accurate thermometer corrected for radiation if significant. ³
Temperature, drying	The temperature to which an adhesive on an adherent or in an assembly or the assembly itself is subjected to dry the adhesive. Note: The temperature attained by the adhesive in the process of drying it (adhesive drying temperature) may differ from the temperature of the atmosphere surrounding the assembly (assembly curing temperature). ³
Temperature, maturing	The temperature, as a function of time and bonding conditions, which produces desired characteristics in bonded components. Note: The term is specific for ceramic adhesives. ³
Temperature, setting	The temperature to which an adhesive or an assembly is subjected to set the adhesive. Note: The temperature attained by the adhesive in the process of setting it (adhesive setting temperature) may differ from the temperature of the atmosphere surrounding the assembly (assembly setting temperature). ³
Temperature, wet-bulb	Wet-bulb temperature (without qualification) is the temperature indicated by a wetbulb psychrometer constructed and used according to specifications. ³
Tempered hardboard	A hardboard subjected to tempering as previously defined or specially manufactured with other variation in usual process so that the resulting product has special properties of stiffness, strength, and water resistance associated with boards meeting specifications for that quality product. ³

Tenon	A projecting part cut on the end of a piece of wood for insertion into a corresponding hole in another piece to make a joint. ⁴
Tensile strength	The maximum load that a polymer can withstand prior to failure divided by the original cross-sectional area supporting the load. Since many polymers neck to a large extent, this value may be less than would be expected. ⁶
Tension wood	A form of wood found in leaning trees of some hardwood species and characterized by the presence of gelatinous fibres and excessive longitudinal shrinkage. Tension wood fibres hold together tenaciously, so that sawed surfaces usually have projecting fibres and planed surfaces often are torn or have raised grain. Tension wood may cause warping. ¹³
Tension, parallel to grain	Stress on a material (wood) in the long direction of its fibres. ⁴
Texture	The arrangement of the particles or constituent parts of material, such as wood, metal, etc. (Uniformly textured wood – not a great difference between earlywood and latewood). ⁴
TGA	See thermal gravimetric analysis.
Thermal analysis	A general term describing a collection of analytical tests used to characterize polymers and other materials. Different material properties can be measured whilst heating the material in a controlled manner. The properties which are measured can be dynamic modulus (by Dynamic Mechanical Thermal Analysis – DMTA), mass changes (by Thermogravimetric Analysis – TGA), calorimetric changes (by Differential Scanning Calorimetry – DSC), dimensional changes (by Thermomechanical Analysis – TMA).
Thermogravimetric analysis	A thermal analytical technique in which materials are heated up at a defined heating rate or a specific temperature for a defined time in a controlled atmosphere and the mass changes are monitored. In this way e.g. thermal decomposition, condensation reactions, water loss, reaction with oxygen etc. can be observed.
Thermoplastic	A polymeric material which may be formed and reformed by the application of heat and pressure. ²
Thermoplastic urethane	This is a class of polyurethane chemistry/technology in which all the NCO groups are pre-consumed by defined reactions such that an essentially linear polyurethane material results. This linear, uncross-linked polyurethane is thermoprocessible and is useful in the preparation of moulded parts.
Thermoset	A polymer that does not display a softening point. This type of polymer is produced by starting with a monomer that will form a highly cross-linked matrix unable to respond to elevated temperatures in any way except sublimation or char. ⁶
Thickness swell	See linear expansion.
Thinner	A volatile liquid added to an adhesive to modify the consistency or other properties. ³
Thixotropy	A property of adhesive systems to thin upon isothermal agitation and to thicken upon subsequent rest. ³
Tight side	This term, and its opposite, loose side, are used to refer to veneer cut with a knife. A wedge-shaped or beveled knife is used, and the veneer comes out curved away from the knife, thus producing small ruptures on the concave side, known as the loose side. The opposite surface, slightly in compression, but free from any ruptures, is known as the tight side. ⁹
Timbers	Wood forms suitable for heavy construction, e.g., lumber 5 or more inches width and thickness. ¹⁶
Time, assembly	The time interval between the spreading of the adhesive on the adherent and the application of pressure or heat, or both, to the assembly. Note: For assemblies involving multiple layers or parts, the assembly time begins with the spreading of the adhesive on the first adherent. ³
Time, curing	The period of time during which an assembly is subjected to heat or pressure, or both, to cure the adhesive. Note: Further cure may take place after removal of the assembly from the conditions of heat or pressure, or both. ³
Time, drying	The period of time during which an adhesive on an adherent or an assembly is allowed to dry with or without the application of heat or pressure, or both. ³
Time, setting	The period of time during which an assembly is subjected to heat or pressure, or both, to set the adhesive. $\!\!^3$
ТМА	Themomechanical analysis – a mechanical arm is positioned such to touch the material under investigation under a certain load. The system is then heated up and the movement of the arm is monitored as a function of the temperature.

Tongue and groove	A kind of joint in which a tongue or rib on one board fits into a groove on another. ⁴
TPU	See thermoplastic urethanes.
Tracheid	Non-living element of xylem formed from a single cell. Elongated, with tapering ends and with thick, lignified and pitted walls. It is a long, empty, firm-walled tube, running parallel with long axis of the organ in which it lies, overlapping and in communication with adjacent tracheids by means of pits. Functioning in water conduction and in mechanical support. ⁷
Transverse section	Wood cut in a direction perpendicular to the grain, producing an end-grain surface. ⁴
Trunk	The main body of a tree which rises from the root system and supports the leafy canapé. The trunk provides the useful woody matter for the forest products industry, the grain being more uniform, the diameter being large and the usual absence of reaction wood.
Truss	An assembly of members, such as beams, bars, rods, and the like, so combined as to form a rigid framework. All members are interconnected to form triangles. ¹³
Twist	A distortion caused by the turning or winding of the edges of a board so that the four corners of any face are no longer in the same plane. ¹³
Two component	With reference to adhesives, two component systems are those adhesives which are supplied in two parts and which need to be mixed prior to the application on the substrates to be bonded. Usually one of the components is the polymeric system and the other the hardening or curant system.



UF	See Urea formaldehyde.
Underlayment	A material placed under finish coverings, such as flooring, or shingles, to provide a smooth, even surface for applying the finish. ¹⁰
Urea	The basis of urea formal dehyde resin. The chemical formula of urea is H_2N -CO-N H_2 .
Urea formaldehyde	A polycondensate thermosetting resin made by the polycondensation of urea and formaldehyde. This resin is used often for the construction of semi-exterior and exterior grade wood composites.
Urethane	The chemical group -NH-CO-O Also used as a corruption of polyurethane. ²
Uretidione	The union of two NCO bearing compounds in such a way as to form a highly strained 4 membered heterocyclic ring. Also known as a dimer.
	R N R Uretidione Structure of an isocyanate dimer.

lsocyanates react at high temperatures to form carbodiimides with the loss of carbon dioxide. Carbodiimides can then further react with another isocyanate in a [2+2] cyclo-addition reaction across the C=N bonds forming uretonimine.¹³





Vacuum impregnation	A technique employed to treat wood, usually of large dimensions. Wood is immersed in a bath containing the medium to be impregnated and vacuum is applied. The depth of treatment and speed of treatment is high. This method is often used to treat wood with fire retardants or fungicides.
van der Waal forces	Physical forces of attraction between molecules, which include permanent dipole, induced dipole, hydrogen bond and London dispersion forces. ⁵
Vehicle	The liquid portion of an adhesive or a finishing material; it consists of the binder (non-volatile) and volatile thinners. ¹¹
Veneer	A thin layer or sheet of wood. ⁵
Vertically laminated wood	Laminated wood in which the laminations are so arranged that the wider dimension of each lamination is approximately parallel to the direction of load. ¹³
Vessels (cells)	Non-living element of xylem, consisting of a tube-like series of cells arranged end to end, running parallel with long axis of the organ in which it lies and in communication with adjacent elements by means of numerous pits in sidewalls. Functioning in conduction of water and mineral salts, and for mechanical support. ⁷
Viscosity	The property of liquids and gases of resisting flow. ¹⁴
Volatile solvent	Any non-aqueous liquid that has the distinctive property of evaporating readily at room temperature and atmospheric pressure. ³



Wane (or wany)	The tapering or angling edge of a board or sheet or veneer, due to the round shape of the log, that was not properly trimmed off. ⁹
Warp	A significant variation from the original, or plane surface. ³
Water repellent preservative	A liquid designed to penetrate into wood and impart water repellency and a moderate preservative protection. It is used for millwork, such as sash and frames, and is usually applied by dipping. ¹⁰
Water uptake	This relates to the amount of water that a material absorbs under different specific conditions (temperature, vapour pressure, full water immersion etc.). Water uptake is usually measured as a percent of dry weight of the test material. At any given condition, an equilibrium water uptake will be reached for most materials.
Waterproof	As applied to plywood, the term is synonymous with exterior; that is, plywood, bonded with highly resistant adhesives, which is capable of withstanding prolonged exposure to severe service conditions without failure in the glue bonds. ³
Water-resistant	A term frequently applied to plywood, bonded with moderately resistant adhesives, which is capable of withstanding limited exposure to water or to severe conditions without failure in the glue bonds. ³
Weak boundary layer	A weak boundary layer is often manifested in adhesive systems by lower than expected loads to cause failure of the assembly. Weak boundary layers can result from many effects, but is usually due to contamination of the adherend surface by some extraneous matter such as oil or grease. The contamination can either prevent good wetting of the substrate by the adhesive or can prevent the formation of bonds. Alternatively, weak boundary layers can result due to e.g.: (a) poorly formed oxide layers on metal surfaces (b) fractured surfaces resulting from the surface preparation method (c) the formation of strong adhesive bonds between the adhesive and the surface of the substrate – these bonds may cause stress in the substrate subsurface resulting in a weakly held adhesion layer.
Weatherability	The measure of a material to resist aging effects induced by weather (sunlight, precipitation, temperature, freezing conditions, airborne contaminants, and so on.).
Weathering	The mechanical or chemical disintegration of the surface of wood that is caused by exposure to light, the action of dust and sand carried by winds, and the alternate shrinking and swelling of the surface fibres with continual variation in moisture content brought by changes in the weather. Weathering does not include decay. ⁴
Web or Webbing	Filaments or threads that may form when adhesive transfer surfaces are separated. Note: Transfer surfaces may be rolls, picker plates, stencils, etc. ³
Webstock	Planks or panels (of usually OSB or plywood) used for the central portion of Ibeams, glued between two flange beams for structural applications.
Wettability	A condition of a surface that determines how fast a liquid will wet and spread on the surface or if it will be repelled and not spread on the surface. ¹¹
Wood failure	The rupturing of wood fibres in strength tests on bonded specimens usually expressed as a percentage of the total area involved which shows such failure. ¹³

Wood fibre insulation panel

Relatively thick low density wood fibre panels used in thermal insulation applications such as under roof insulation.



Wood fibre insulation panel | WFIP (Wood Fibre Insulation Panel).

Wood flour	Wood reduced to finely divided particles approximately those of cereal flours in size, appearance, and texture, and passing a 40 to 100 mesh screen. ¹³
Wood substance	The solid material of which wood is composed. It usually refers to the extractivefree substance of which the cell walls are composed, but this is not always true. There is no wide variation in chemical composition or specific gravity between the wood substance of various species, the characteristic differences of species being largely due to differences in extractives and variations in relative amounts of cell walls and cell cavities. ¹³
Wood, glue-laminated	An assembly made by bonding layers of veneer or lumber with an adhesive so that the plain of all laminations is essentially parallel. (See LVL). ³



XPS

See electron spectroscopy for chemical analysis.

X-ray photoelectron spectroscopy

See electron spectroscopy for chemical analysis.

W

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 - **Note** [] bracketed definitions are extensions of the quoted definitions

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