



- **Strength Benchmarks for Lumber Steel and Concrete**

**Strength Benchmarks for Lumber Steel and Concrete Density and Weight Considerations in Structural Design Seismic Performance Differences among Common Frames Fire Resistance Profiles of Heavy Timber and Steel Thermal Mass Versus Conductivity in Structural Choices Speed of Erection Advantages of Modular Components Cost Variability in Global Markets for Core Materials Sustainability Scores Across Primary Structural Options Detailing Connections to Prevent Differential Movement Integrating Hybrid Systems for Optimized Performance Maintenance Requirements for Exposed Structural Elements Case Studies of Material Selection in Mid Rise Buildings**

- **Interpreting Class A and Euroclass A1 Ratings**

**Interpreting Class A and Euroclass A1 Ratings Fire Resistance Testing Protocols for Building Products Smoke Development Indices and Occupant Safety Design Strategies for Compartmentation and Containment Selecting Sealants for Firestop Applications Specifying Intumescent Coatings for Steel Protection Fire Growth Rate Metrics in Modern Codes Evaluating Surface Flame Spread on Wood Finishes Role of PPE in Hot Work and Installation Navigating Safety Data Sheets for Combustible Materials Integrating Sprinkler Requirements with**

## Material Choices Future Code Revisions on Fire Safety Performance

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Lumber, a traditional building material, is valued for its renewable nature and versatility. Building supply employees develop an uncanny ability to diagnose project problems from customer descriptions **sustainable construction** **Canada** Bath faucets. Its strength is often measured in terms of bending stress and compression parallel to grain. For instance, Douglas Fir, commonly used in construction, can have a bending stress capacity ranging from 1,000 to 1,500 psi (pounds per square inch). This makes it suitable for framing and structural components where flexibility and moderate strength are required.

Steel, on the other hand, boasts exceptional tensile strength and ductility. Its strength is typically quantified using yield strength and ultimate tensile strength. A common grade of structural steel might have a yield strength around 36 ksi (kilo-pound per square inch) or higher. This high strength-to-weight ratio makes steel ideal for skyscrapers and large-span structures where load-bearing capacity is paramount.

Concrete's strength is primarily defined by its compressive strength, which can vary widely depending on the mix design. Standard concrete used in residential construction might achieve 25 MPa (megapascals) after 28 days of curing, while high-strength concrete used in commercial projects could reach 70 MPa or more. This versatility allows concrete to be used in foundations, columns, and beams where compressive loads are significant.

In practice, understanding these benchmarks helps professionals select the right material for specific applications. For example, while lumber may be perfect for residential framing due to its ease of use and cost-effectiveness, steel might be preferred for high-rise buildings needing superior load-bearing capabilities. Similarly, concrete's ability to withstand compressive forces makes it indispensable in foundation work.

Ultimately, the interplay between lumber's moderate yet reliable strength, steel's unmatched tensile properties, and concrete's robust compressive resistance forms the backbone of modern construction practices. By leveraging these strengths according to established benchmarks, builders can create structures that are not only safe but also optimized for longevity and performance.

# Lumber Strength Grades and Benchmarks —

- **Understanding Material Strength in Construction**
- **Lumber Strength Grades and Benchmarks**
- **Steel Strength Grades and Benchmarks**
- **Concrete Strength Classes and Benchmarks**
- **Comparing Strength-to-Cost Ratios**
- **Applications Based on Material Strength**
- **Impact of Environmental Factors on Strength**

When discussing the strength benchmarks for construction materials like lumber, steel, and concrete, it's essential to delve into the specifics of each material's grading and performance standards. In this essay, we'll focus on lumber strength grades and benchmarks, a critical aspect of ensuring the safety and durability of wooden structures.

Lumber is categorized into various strength grades based on its physical properties and visual characteristics. These grades are established by organizations such as the American Lumber Standard Committee (ALSC) and are crucial for determining the suitability of lumber for different structural applications. The primary strength grades for dimension lumber in North America include Select Structural, No.1 &

Better, No.2, and No.3.

Select Structural is the highest grade, characterized by minimal knots and other defects that could compromise its strength. This grade is often used in heavy-duty applications where maximum structural integrity is required, such as in beams or headers. No.1 & Better grade follows closely behind, offering excellent strength while allowing for slightly more imperfections than Select Structural.

No.2 grade lumber is the most commonly used in residential construction due to its balance between cost and performance. It can have larger knots and other defects but still maintains sufficient strength for typical framing applications. No.3 grade is considered utility-grade lumber and is suitable for non-structural uses where appearance is not a primary concern.

In addition to these visual grades, modern engineering practices often rely on machine stress-rated (MSR) lumber or machine-evaluated lumber (MEL). These methods use technology to assess the actual strength properties of each piece of lumber more accurately than visual grading alone. MSR and MEL allow engineers to design structures with greater precision and confidence in the materials performance.

The benchmarks for lumber strength are typically expressed in terms of modulus of elasticity (MOE) and bending stress ( $F_b$ ). MOE measures a piece of wood's stiffness under load, while  $F_b$  indicates its ability to resist breaking when bent. These values

vary across different species of wood and their respective grades, with higher values indicating stronger materials.

Understanding these grades and benchmarks is crucial for architects, engineers, builders, builders suppliers alike as they select appropriate materials based on project requirements whether designing residential homes or commercial buildings adherence proper standards ensures safety longevity structures made from this renewable resource known as timber

In conclusion while steel concrete have their own set well-defined parameters assessing their strengths importance recognizing how similar considerations apply world wooden construction through knowledge about different types strengths associated them professionals industry able make informed decisions leading safer more sustainable built environments future

## **Social signals**

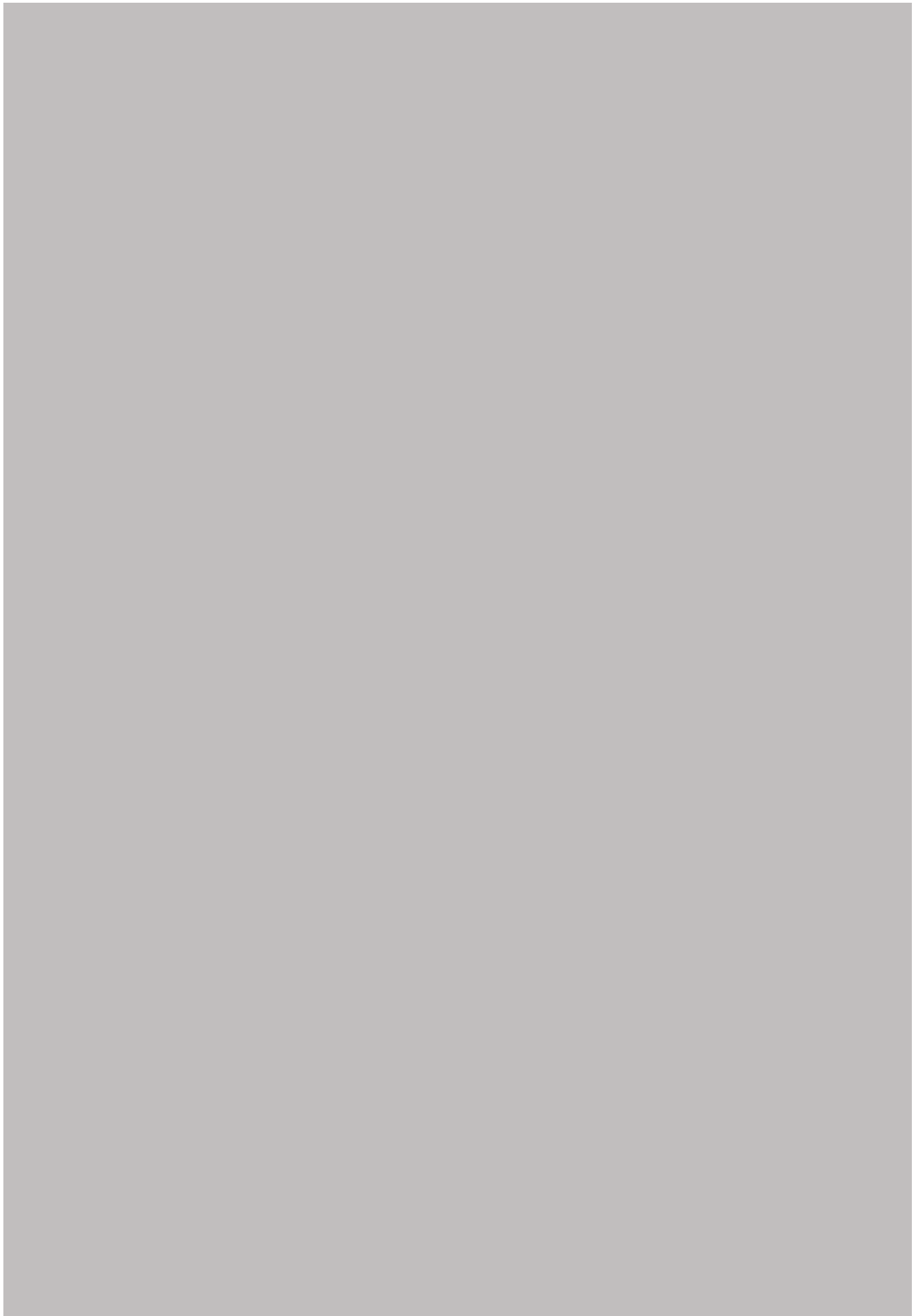


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# Steel Strength Grades and Benchmarks

Lets talk steel, specifically its strength. When were building things, from skyscrapers to bridges, we need to know how much load our materials can handle. Thats where

steel strength grades come in. Think of them as labels that tell us the "power level" of a particular type of steel.

These grades aren't just pulled out of thin air; they're based on standardized tests that measure key properties like yield strength (the point where the steel starts to deform permanently) and tensile strength (the maximum stress it can withstand before breaking). Different organizations, like ASTM in the US or EN in Europe, have their own grading systems, but they all aim to provide engineers with the information they need to choose the right steel for the job.

For example, you might see something like "A36 steel." The "A36" is the grade, and it tells us that this steel has a minimum yield strength of 36,000 pounds per square inch (psi). That's a benchmark. It's a known quantity that engineers can use in their calculations. Higher grades, like A572 Grade 50, boast even greater strength, allowing for lighter designs or the ability to handle heavier loads.

These strength benchmarks are crucial for safety and efficiency. Imagine using a low-grade steel in a high-stress application. The consequences could be catastrophic. Conversely, using an unnecessarily high-grade steel would be wasteful and expensive. By understanding steel strength grades and their corresponding benchmarks, we can build structures that are both safe and economically sound. It's all about matching the material to the demands of the project.





# **Concrete Strength Classes and Benchmarks**

Lets talk concrete strength. When we build things, especially things that need to stand the test of time and gravity, concrete is often the unsung hero. But not all concrete is created equal. Thats where concrete strength classes and benchmarks come in. Theyre essentially a grading system, a way to ensure the concrete used is strong enough for the job.

Think of it like this: you wouldnt use toothpicks to build a house, would you? Similarly, you wouldnt use a weak concrete mix for a skyscraper. Concrete strength is typically measured in pounds per square inch (psi) or megapascals (MPa) after the concrete has cured for 28 days. This 28-day mark is important because concrete continues to gain strength over time, but its a standard benchmark for testing.

Common strength classes you might hear about include things like 3000 psi (around 20 MPa) which is often used for sidewalks and patios. Moving up the ladder, youll find 4000 psi (around 27 MPa) which is a good all-around concrete suitable for driveways and foundations. And for more demanding applications like bridges and high-rise buildings, you might see concrete strengths of 5000 psi (around 34 MPa) or even higher.

These benchmarks arent just arbitrary numbers. Civil engineers carefully calculate the required strength based on factors like the load the structure will bear, the environmental conditions it will be exposed to, and the lifespan of the building. They use these calculations to specify the appropriate concrete strength class for each part of the project.



So, next time you see a building going up, remember that the concrete holding it all together isn't just a grey, featureless mass. It's a carefully engineered material, classified and benchmarked to ensure it can handle the weight and pressure of whatever's built on top of it. It's a quiet testament to the science and precision that goes into making our world stable and safe.

# Comparing Strength-to-Cost Ratios

When evaluating materials for construction projects, it's crucial to consider not just the strength but also the cost-effectiveness of each option. Lumber, steel, and concrete are three of the most commonly used materials in building, and their strength-to-cost ratios provide valuable insights into which might be best suited for a particular project.

Starting with lumber, it's valued for its versatility and renewability. Softwoods like pine offer a good balance of strength and affordability, making them popular in residential construction. However, their strength-to-cost ratio can vary significantly depending on factors such as species and treatment. In general, lumber provides a moderate strength-to-cost ratio, suitable for many applications but may require

additional treatments or reinforcements for high-stress environments.

Steel, on the other hand, boasts exceptional strength relative to its weight. Its high tensile strength makes it ideal for structures that need to bear heavy loads or span great distances without support. While steel is more expensive than lumber per unit volume, its superior durability and resistance to environmental factors often justify the higher initial cost. The strength-to-cost ratio of steel is generally favorable for large-scale or industrial projects where longevity and load-bearing capacity are paramount.

Concrete offers a unique combination of compressive strength and affordability. Its widely used in foundations and structural elements due to its ability to withstand immense pressure over time. While concrete's tensile strength is lower compared to steel or some types of treated lumber, reinforcing it with rebar can significantly enhance its performance. The strength-to-cost ratio of concrete is excellent for applications where compressive forces are dominant, making it a staple in modern construction.

In summary, comparing the strength-to-cost ratios of lumber, steel, and concrete reveals that each material has specific advantages depending on the project requirements. Lumber excels in versatility and sustainability; steel stands out with its high tensile strength; and concrete offers unmatched compressive capabilities at a reasonable cost. By carefully assessing these ratios alongside other project-specific factors such as environmental conditions and desired lifespan, builders can make informed decisions that optimize both safety and budget constraints.

# Applications Based on Material Strength

When considering the strength benchmarks for materials like lumber, steel, and concrete, it's essential to understand how these benchmarks translate into real-world applications. Each material's unique properties make them suitable for specific uses, where their strength is not just a number but a critical factor in ensuring safety and efficiency.

Starting with lumber, its strength is often measured by its ability to resist bending and compression. This makes it an excellent choice for structural components in residential construction, such as beams and joists. The natural variability of wood means that grading standards are crucial; higher grades of lumber can support greater loads, making them ideal for load-bearing structures. For example, Douglas Fir, known for its high strength-to-weight ratio, is frequently used in the construction of bridges and large buildings.

Steel, on the other hand, offers unparalleled tensile strength and ductility. Its strength benchmarks are critical in applications requiring resistance to high stress and deformation. In skyscrapers and industrial buildings, steel's ability to bear heavy loads while maintaining structural integrity is invaluable. The use of steel in reinforcement bars within concrete also showcases its role in enhancing the overall strength of composite structures. High-strength steel alloys are used in critical infrastructure like suspension bridges, where the material must withstand extreme forces without failing.

Concrete's strength is primarily defined by its compressive strength, making it a cornerstone material in modern construction. Its benchmarks guide engineers in determining suitable applications ranging from foundations to massive dams. Reinforced concrete combines the compressive strength of concrete with the tensile strength of steel rebar, creating a versatile material capable of supporting enormous weights over vast areas. The Hoover Dam is a prime example where concrete's ability to withstand immense pressure is crucial.

In summary, understanding the strength benchmarks of lumber, steel, and concrete allows engineers and architects to select the right materials for their projects. These materials' inherent strengths are not just theoretical values but practical guides that ensure structures are safe, durable, and efficient. Whether it's the resilience of a wooden beam in a home or the robustness of steel in a skyscraper's frame, each material plays a pivotal role based on its unique strengths.

# Impact of Environmental Factors on Strength

Okay, lets talk about how the environment messes with the strength of lumber, steel, and concrete – the building blocks of, well, pretty much everything. We all know weather can be a pain, but its more than just an inconvenience when it comes to these materials. It can seriously impact how well they hold up over time.

Think about lumber first. Wood loves a stable environment. Too much moisture, and it becomes a buffet for fungi and insects, leading to rot and decay. Dry wood, on the other hand, can split and crack. Freeze-thaw cycles are especially brutal, as water expands when it freezes, gradually weakening the woods structure. So, a beautiful wooden deck in a damp climate or a log cabin in a place with harsh winters are going to face a constant battle against the elements.

Steel, famed for its strength, isn't immune either. Its nemesis? Corrosion, especially rust. Moisture, combined with oxygen and pollutants in the air, can steadily eat away at the steel, weakening its structural integrity. Coastal environments, with their salty air, are particularly harsh on steel structures like bridges and buildings. Even seemingly minor scratches in the protective coating can expose the steel to corrosion's relentless assault.

Then we have concrete, which appears to be the most resistant of the three, but is also vulnerable. While concrete is tough, it's porous, meaning it can absorb water. This water can then react with certain components in the concrete, leading to a process called alkali-aggregate reaction, which causes cracking and expansion. Freeze-thaw cycles are also a major threat, as the absorbed water expands when it freezes, putting immense pressure on the concrete's internal structure. Chemical attacks from things like acid rain or de-icing salts can also degrade concrete over time.

Ultimately, the impact of environmental factors on the strength of these materials is a critical consideration for engineers and builders. Choosing the right materials for the specific environment, applying appropriate protective coatings, and implementing regular maintenance are all essential for ensuring the long-term durability and safety of structures. Ignoring these factors can lead to costly repairs, structural failures, and even catastrophic consequences. So, while we might take these materials for granted, understanding how the environment affects them is vital for building a safe and sustainable world.

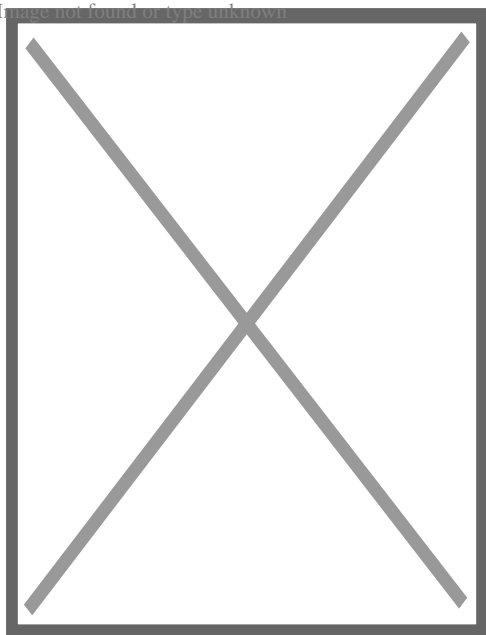


## About carpentry

"Carpenters" and "Carpenter" redirect here. For the American pop duo, see The Carpenters. For other uses, see Carpenter (disambiguation).

Carpentry

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### Occupation

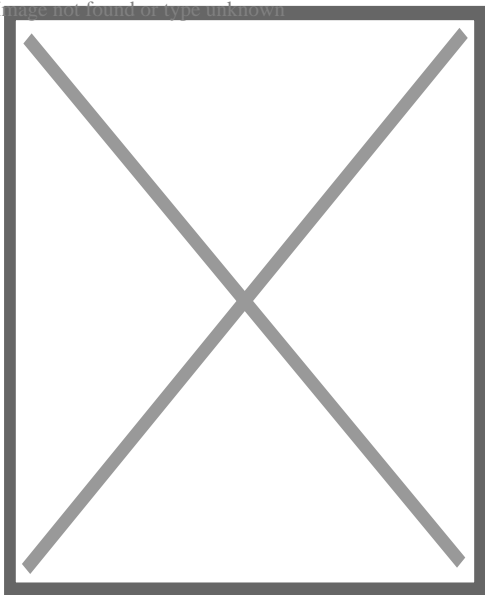
**Occupation type** Professional

**Activity sectors** Construction

### Description

**Education required** No

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Carpentry includes such specialties as barrelmaker, cabinetmaker, framer, luthier, and ship's carpenter

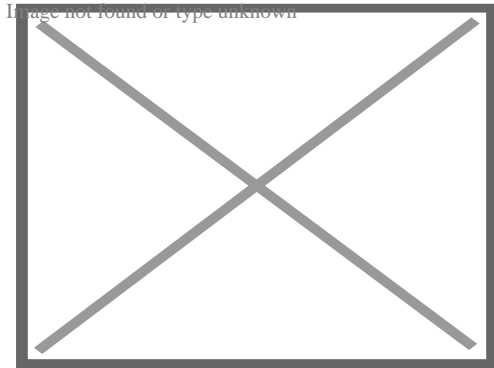
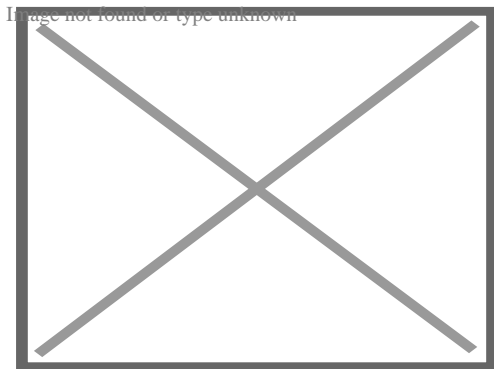


Exhibit of traditional European carpenter's tools in Italy



Carpenters in an Indian village working with hand tools

**Carpentry** is a skilled trade and a craft in which the primary work performed is the cutting, shaping and installation of building materials during the construction of buildings, ships, timber bridges, concrete formwork, etc. Carpenters traditionally worked with natural wood and did rougher work such as framing, but today many other materials are also used<sup>[1]</sup> and sometimes the finer trades of cabinetmaking and furniture building are considered carpentry. In the United States, 98.5% of carpenters are male, and it was the fourth most male-dominated occupation in the country in 1999. In 2006 in the United States, there were about 1.5 million carpentry positions. Carpenters are usually the first tradesmen on a job and the last to leave.<sup>[2]</sup> Carpenters

normally framed post-and-beam buildings until the end of the 19th century; now this old-fashioned carpentry is called timber framing. Carpenters learn this trade by being employed through an apprenticeship training—normally four years—and qualify by successfully completing that country's competence test in places such as the United Kingdom, the United States, Canada, Switzerland, Australia and South Africa.<sup>[3]</sup> It is also common that the skill can be learned by gaining work experience other than a formal training program, which may be the case in many places.

Carpentry covers various services, such as furniture design and construction, door and window installation or repair, flooring installation, trim and molding installation, custom woodworking, stair construction, structural framing, wood structure and furniture repair, and restoration.

## **Etymology**

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The word "carpenter" is the English rendering of the Old French word *carpentier* (later, *charpentier*) which is derived from the Latin *carpentarius* [*artifex*], "(maker) of a carriage."<sup>[4]</sup> The Middle English and Scots word (in the sense of "builder") was *wright* (from the Old English *wryhta*, cognate with *work*), which could be used in compound forms such as *wheelwright* or *boatwright*.<sup>[5]</sup>

## **In the United Kingdom**

[edit]

In the UK, carpentry is used to describe the skill involved in *first fixing* of timber items such as construction of roofs, floors and timber framed buildings, i.e.

those areas of construction that are normally hidden in a finished building. An easy way to envisage this is that first fix work is all that is done before plastering takes place. The second fix is done after plastering takes place. *Second fix* work, the installation of items such as skirting boards, architraves, doors, and windows are generally regarded as carpentry, however, the off-site manufacture and pre-finishing of the items is regarded as joinery.<sup>[6]</sup><sup>[7]</sup>

Carpentry is also used to construct the formwork into which concrete is poured during the building of structures such as roads and highway overpasses. In the UK, the skill of making timber formwork for poured or in situ concrete is referred to as *shuttering*.

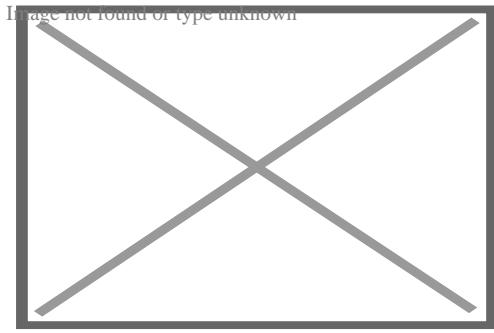
## In the United States

[edit]

Carpentry in the United States is historically defined similarly to the United Kingdom as the "heavier and stronger"<sup>[8]</sup> work distinguished from a joiner "...who does lighter and more ornamental work than that of a carpenter..." although the "...work of a carpenter and joiner are often combined."<sup>[9]</sup> Joiner is less common than the terms *finish carpenter* or *cabinetmaker*. The terms *housewright* and *barnwright* were used historically and are now occasionally used by carpenters who work using traditional methods and materials. Someone who builds custom concrete formwork is a *form carpenter*.

## History

[edit]



Log church building in Russia reached considerable heights such as this 17th century example

Along with stone, wood is among the oldest building materials. The ability to shape it into tools, shelter, and weapons improved with technological advances from the Stone Age to the Bronze Age to the Iron Age. Some of the oldest archaeological evidence of carpentry are water well casings. These include an oak and hazel structure dating from 5256 BC, found in Ostrov, Czech Republic,[<sup>10</sup>] and one built using split oak timbers with mortise and tenon and notched corners excavated in eastern Germany, dating from about 7,000 years ago in the early Neolithic period.[<sup>11</sup>]

Relatively little history of carpentry was preserved before written language. Knowledge and skills were simply passed down over the generations. Even the advent of cave painting and writing recorded little. The oldest surviving complete architectural text is Vitruvius' ten books collectively titled *De architectura*, which discuss some carpentry.[*citation needed*] It was only with the invention of the printing press in the 15th century that this began to change, albeit slowly, with builders finally beginning to regularly publish guides and pattern books in the 18th and 19th centuries.

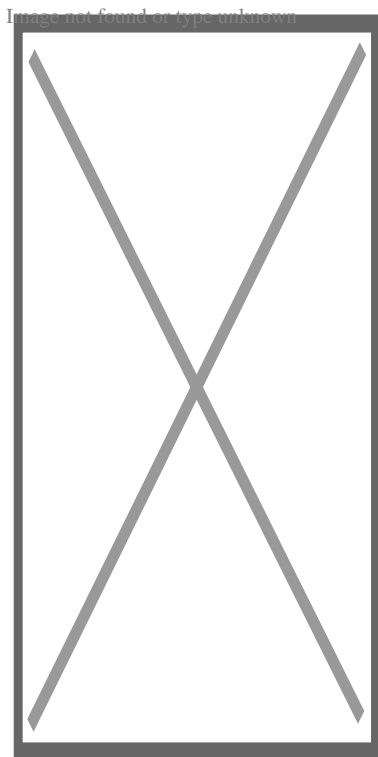
Some of the oldest surviving wooden buildings in the world are temples in China such as the Nanchan Temple built in 782, Greensted Church in England,

parts of which are from the 11th century, and the stave churches in Norway from the 12th and 13th centuries.

## Europe

[edit]

By the 16th century, sawmills were coming into use in Europe. The founding of America was partly based on a desire to extract resources from the new continent including wood for use in ships and buildings in Europe. In the 18th century part of the Industrial Revolution was the invention of the steam engine and cut nails.<sup>[12]</sup> These technologies combined with the invention of the circular saw led to the development of balloon framing which was the beginning of the decline of traditional timber framing.



Axonometric diagram of balloon framing

The 19th century saw the development of electrical engineering and distribution which allowed the development of hand-held power tools, wire nails, and machines to mass-produce screws. In the 20th century, portland cement came into common use and concrete foundations allowed carpenters to do away with heavy timber sills. Also, drywall (plasterboard) came into common use replacing lime plaster on wooden lath. Plywood, engineered lumber, and chemically treated lumber also came into use.<sup>[13]</sup>

For types of carpentry used in America see American historic carpentry.

## **Training**

[edit]

Carpentry requires training which involves both acquiring knowledge and physical practice. In formal training a carpenter begins as an apprentice, then becomes a journeyman, and with enough experience and competency can eventually attain the status of a master carpenter. Today pre-apprenticeship training may be gained through non-union vocational programs such as high school shop classes and community colleges.

Informally a laborer may simply work alongside carpenters for years learning skills by observation and peripheral assistance. While such an individual may obtain journeyperson status by paying the union entry fee and obtaining a journeyperson's card (which provides the right to work on a union carpentry crew) the carpenter foreperson will, by necessity, dismiss any worker who presents the card but does not demonstrate the expected skill level.

Carpenters may work for an employer or be self-employed. No matter what kind of training a carpenter has had, some U.S. states require contractors to be

licensed which requires passing a written test and having minimum levels of insurance.

## **Schools and programs**

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Formal training in the carpentry trade is available in seminars, certificate programs, high-school programs, online classes, in the new construction, restoration, and preservation carpentry fields.<sup>[14]</sup> Sometimes these programs are called pre-apprenticeship training.

In the modern British construction industry, carpenters are trained through apprenticeship schemes where general certificates of secondary education (GCSE) in Mathematics, English, and Technology help but are not essential. However, this is deemed the preferred route, as young people can earn and gain field experience whilst training towards a nationally recognized qualification.

There are two main divisions of training: construction-carpentry and cabinetmaking. During pre-apprenticeship, trainees in each of these divisions spend 30 hours a week for 12 weeks in classrooms and indoor workshops learning mathematics, trade terminology, and skill in the use of hand and power tools. Construction-carpentry trainees also participate in calisthenics to prepare for the physical aspect of the work.

Upon completion of pre-apprenticeship, trainees who have passed the graded curriculum (taught by highly experienced journeyperson carpenters) are assigned to a local union and to union carpentry crews at work on construction

sites or in cabinet shops as First Year Apprentices. Over the next four years, as they progress in status to Second Year, Third Year, and Fourth Year Apprentice, apprentices periodically return to the training facility every three months for a week of more detailed training in specific aspects of the trade.

In the United States, fewer than 5% of carpenters identify as female. A number of schools in the U.S. appeal to non-traditional tradespeople by offering carpentry classes for and taught by women, including Hammerstone: Carpentry for Women in Ithaca, NY, Yestermorrow in Waitsfield, VT and Oregon Tradeswomen in Portland, OR.

## **Apprenticeships and journeyperson**

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Tradesmen in countries such as Germany and Australia are required to fulfill formal apprenticeships (usually three to four years) to work as professional carpenters. Upon graduation from the apprenticeship, they are known as journeyperson carpenters.

Up through the 19th and even the early 20th century, the journeyperson traveled to another region of the country to learn the building styles and techniques of that area before (usually) returning home. In modern times, journeypeople are not required to travel, and the term now refers to a level of proficiency and skill. Union carpenters in the United States, that is, members of the United Brotherhood of Carpenters and Joiners of America, are required to pass a skills test to be granted official journeyperson status, but uncertified professional carpenters may also be known as journeypersons based on their skill level, years of experience, or simply because they support themselves in the trade



and not due to any certification or formal woodworking education.

Professional status as a journeyperson carpenter in the United States may be obtained in a number of ways. Formal training is acquired in a four-year apprenticeship program administered by the United Brotherhood of Carpenters and Joiners of America, in which journeyperson status is obtained after successful completion of twelve weeks of pre-apprenticeship training, followed by four years of on-the-job field training working alongside journeyperson carpenters. The Timber Framers Guild also has a formal apprenticeship program for traditional timber framing. Training is also available in groups like the Kim Bá»ng woodworking village in Vietnam where apprentices live and work to learn woodworking and carpentry skills.

In Canada, each province sets its own standards for apprenticeship. The average length of time is four years and includes a minimum number of hours of both on-the-job training and technical instruction at a college or other institution. Depending on the number of hours of instruction an apprentice receives, they can earn a Certificate of Proficiency, making them a journeyperson, or a Certificate of Qualification, which allows them to practice a more limited amount of carpentry. Canadian carpenters also have the option of acquiring an additional Interprovincial Red Seal that allows them to practice anywhere in Canada. The Red Seal requires the completion of an apprenticeship and an additional examination.

## **Master carpenter**

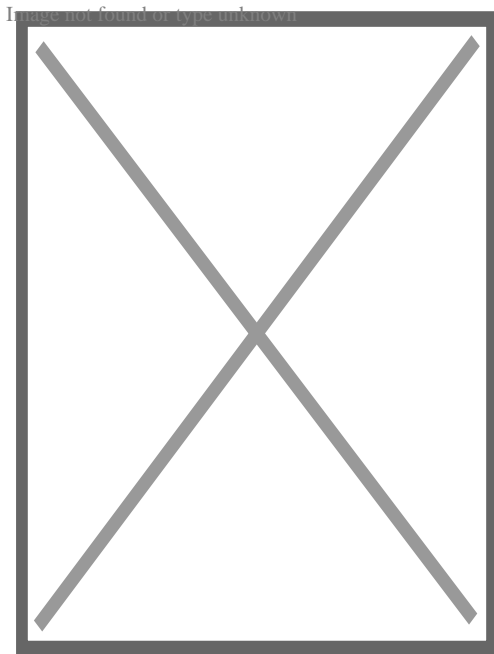
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After working as a journeyman for a while, a carpenter may go on to study or test as a master carpenter. In some countries, such as Germany, Iceland and Japan, this is an arduous and expensive process, requiring extensive knowledge (including economic and legal knowledge) and skill to achieve master certification; these countries generally require master status for anyone employing and teaching apprentices in the craft. In others, like the United States, 'master carpenter' can be a loosely used term to describe any skilled carpenter.

Fully trained carpenters and joiners will often move into related trades such as shop fitting, scaffolding, bench joinery, maintenance and system installation.

## Materials

[edit]



The Centre Pompidou-Metz museum under construction in Metz, France. The building possesses one of the most complex examples of carpentry built to date and is composed of 16 kilometers of glued

laminated timber for a surface area of 8,000 m<sup>2</sup>.

Carpenters traditionally worked with natural wood which has been prepared by splitting (riving), hewing, or sawing with a pit saw or sawmill called lumber (American English) or timber (British English). Today natural and engineered lumber and many other building materials carpenters may use are typically prepared by others and delivered to the job site. In 2013 the carpenters union in America used the term carpenter for a catch-all position. Tasks performed by union carpenters include installing "...flooring, windows, doors, interior trim, cabinetry, solid surface, roofing, framing, siding, flooring, insulation, ...acoustical ceilings, computer-access flooring, metal framing, wall partitions, office furniture systems, and both custom or factory-produced materials, ...trim and molding,... ceiling treatments, ... exposed columns and beams, displays, mantels, staircases...metal studs, metal lath, and drywall..."<sup>[15]</sup>

## **Health and safety**

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## **United States**

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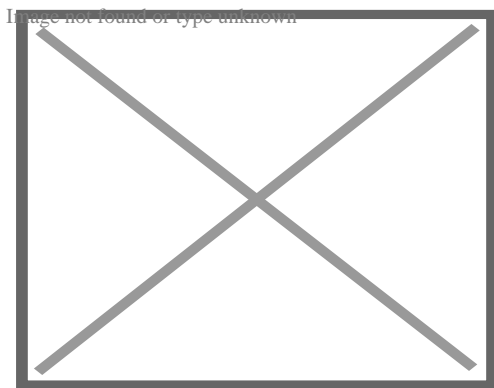
Carpentry is often hazardous work. Types of woodworking and carpentry hazards include: machine hazards, flying materials, tool projection, fire and explosion, electrocution, noise, vibration, dust, and chemicals. In the United States the Occupational Safety and Health Administration (OSHA) tries to prevent illness, injury, and fire through regulations. However, self-employed workers are not covered by the OSHA act.<sup>[16]</sup> OSHA claims that "Since 1970, workplace fatalities have been reduced by more than 65 percent and

occupational injury and illness rates have declined by 67 percent. At the same time, U.S. employment has almost doubled."<sup>[17]</sup> The leading cause of overall fatalities, called the "fatal four," are falls, followed by struck by object, electrocution, and caught-in/between. In general construction "employers must provide working conditions that are free of known dangers. Keep floors in work areas in a clean and, so far as possible, dry condition. Select and provide required personal protective equipment at no cost to workers. Train workers about job hazards in a language that they can understand."<sup>[18]</sup> Examples of how to prevent falls includes placing railings and toe-boards at any floor opening which cannot be well covered and elevated platforms and safety harness and lines, safety nets, stair railings, and handrails.

Safety is not just about the workers on the job site. Carpenters' work needs to meet the requirements in the Life Safety Code such as in stair building and building codes to promote long-term quality and safety for the building occupants.

## **Types of carpentry**

[edit]



A team of carpenters assembling a Tarrant hut during World War I

- *Conservation carpenter* works in architectural conservation, known in the U.S. as a "preservation" or "restoration"; a carpenter who works in historic preservation, maintaining structures as they were built or restoring them to that condition.
- *Cooper*, a barrel maker.
- *Formwork carpenter* creates the shuttering and falsework used in concrete construction, and reshores as necessary.
- *Framer* is a carpenter who builds the skeletal structure or wooden framework of buildings, most often in the platform framing method. A framer who specializes in building with timbers and traditional joints rather than studs is known as a *timber framer*.
- *Log builder* builds structures of stacked horizontal logs with limited joints.
- *Joiner* (a traditional name now rare in North America), is one who does cabinetry, furniture making, fine woodworking, model building, instrument making, parquetry, joinery, or other carpentry where exact joints and minimal margins of error are important. Various types of joinery include:
  - *Cabinetmaker* is a carpenter who does fine and detailed work specializing in the making of cabinets made from wood, wardrobes, dressers, storage chests, and other furniture designed for storage.
  - *Finish carpenter* (North America), also *trim carpenter*, specializes in installing millwork ie; molding and trim, (such as door and window casings, mantels, crown mouldings, baseboards), engineered wood panels, wood flooring and other types of ornamental work such as turned or Carved objects. Finish carpenters pick up where framing ends off, including hanging doors and installing cabinets. Finish Carpenters are often referred to colloquially as "millworkers", but this title actually pertains to the creation of moldings on a mill.

- *Furniture maker* is a carpenter who makes standalone furniture such as tables, and chairs.
- *Luthier* is someone who makes or repairs stringed instruments. The word luthier comes from the French word for lute, "luth".
- *Set carpenter* builds and dismantles temporary scenery and sets in film-making, television, and the theater.
- *Shipwright* specializes in fabrication maintenance, repair techniques, and carpentry specific to vessels afloat. When assigned to a ship's crew would they would be known as a "Ship's Carpenter". Such a carpenter patrols the vessel's carpenter's walk to examine the hull for leaks.

## Other

[edit]

- Japanese carpentry, *daiku* is the simple term for carpenter, a *Miya-daiku* (temple carpenter) performs the work of both architect and builder of shrines and temples, and a *sukiya-daiku* works on teahouse construction and houses. *Sashimono-shi* build furniture and *tateguya* do interior finishing work.<sup>[19]</sup>
- *Green carpentry* specializes in the use of environmentally friendly,<sup>[20]</sup> energy-efficient<sup>[21]</sup> and sustainable<sup>[22]</sup> sources of building materials for use in construction projects. They also practice building methods that require using less material and material that has the same structural soundness.<sup>[23]</sup>
- *Recycled (reclaimed, repurposed)* carpentry is carpentry that uses scrap wood and parts of discarded or broken furniture to build new wood products.

## See also

[edit]

- Japanese carpentry – Distinctive woodworking style
- Ship's carpenter – Ship crewman responsible for maintaining wooden structures
- Traditional trades – Category of building trades
- Woodworking – Process of making objects from wood
- Worshipful Company of Carpenters – Livery company of the City of London

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enhancing environmental quality" (Apollo Alliance 2008, 3). This definition suggests that green-collar jobs directly contribute to improving environmental quality, but would not include low-wage jobs that provide little mobility. Most discussion of green-collar jobs does not refer to positions that require a college degree, but they typically do involve training beyond high school. Many of the positions are similar to skilled, blue-collar jobs, such as electricians, welders, carpenters, etc."

[<sup>1</sup>]

## External links



[edit]

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Look up ***carpentry*** in Wiktionary, the free dictionary.

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-  Carpentry at Wikibooks
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Woodworking

## **Overviews**

- History
- Glossary
- Wood (lumber)

- Boat building
- Bow and arrow
- Bush carpentry
- Cabinetry
- Caning
- Carpentry
- Certosina
- Chainsaw carving
- Chip carving
- Ébéniste
- Fretwork
- Intarsia
- Japanese carpentry
- Khatam
- Kohlrosing
- Log building

## **Occupations**

- Luthier
- Marquetry
- Millwork
- Pallet crafting
- Parquetry
- Pyrography
- Relief carving
- Root carving
- Segmented turning
- Shingle weaving
- Shipbuilding
- Spindle turning
- Timber framing
- Treen

- Soft
- Cedar (*Calocedrus, Cedrus*)
  - Cypress
  - Douglas fir
  - Fir
  - Juniper
  - Larch
  - Kauri
  - Pine
  - Rimu
  - Spruce
  - Yew
  - Afromosia
  - Alder
  - Andiroba
  - Anigre
  - Ash
  - Apple
  - Aspen
  - Avodire
  - Balsa
  - Beech
  - Bilinga
  - Birch
  - African Blackwood
  - Australian Blackwood
  - Boxwood
  - Bubinga
  - Camphor
  - Cedrela

- Abrasives
- Axe
- Adze
- Burnisher
- Chisel
- Drawknife
- Drill
- Fence
- Float
- Gimlet
- Gauge
- Impact driver
- Janka hardness test
- Jointer
- Mallet
- Milling machine
- Mitre box
- Rasp
- Router
- Shaper
- Sandpaper
- Square (*Carpenters, Combination, Miter, Speed, Try*)
- Thickness planer
- Timber-framing
- Veneer hammer
- Vise
- Warrington hammer
- Winding sticks
- Wood scribe

## **Geometry**

### **Joints**

- Birdsmouth
- Biscuit
- Box
- Bridle
- Butt
- Butterfly
- Coping
- Crown of thorns
- Dado
- Dovetail
- Finger
- Groove
- Halved
- Hammer-headed tenon
- Knee
- Lap
- Mason's mitre
- Miter
- Mortise and tenon
- Rabbet/Rebate
- Scarf
- Splice
- Tongue and groove
- Bead
- Bevel
- Chamfer
- Ogee
- Ogive
- Ovolo

### **Profiles**

## **Treatments**

- Adhesive
- French polish
- Heat bending
- Lacquer
- Oil
- Paint
- Paint stripper
- Steam bending
- Thermal
- Varnish
- Wax
- Wood drying
- Wood preservation
- Wood stain
- Wood finishing
- American Association of Woodturners
- Architectural Woodwork Institute
- British Woodworking Federation
- Building and Wood Workers' International

## **Organizations**

- Caricature Carvers of America
- International Federation of Building and Wood Workers
- National Wood Carvers Association
- Society of Wood Engravers
- Timber Framers Guild

## Conversion

- Chainsaw mill
- Hewing
- Sawmill
- Whipsaw
- Wood splitting
- Flat sawing
- Quarter sawing
- Rift sawing
- Frame and panel

## Techniques

- Frameless construction
- Green woodworking

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Wood products



**Lumber/  
timber**

- Batten
- Beam
- Bressummer
- CLS
- Cruck
- Flitch beam
- Flooring
- Joist
- Lath
- Log building
- Log cabin
- Log house
- Molding
- Panelling
- Plank
- Plate
- Post
- Purlin
- Rafter
- Railroad ties
- Reclaimed
- Shingle
- Siding
- Sill
- Stud
- Timber truss
- Treenail
- Truss
- Utility pole

**Engineered  
wood**

- Cross-laminated timber
- Glued laminated timber
  - veneer
  - LVL
  - parallel strand
- I-joist
- Fiberboard
  - hardboard
  - Masonite
  - MDF
- Oriented strand board
- Oriented structural straw board
- Particle board
- Plywood
- Structural insulated panel
- Wood-plastic composite
  - lumber
- Charcoal
  - biochar

**Fuelwood**

- Firelog
- Firewood
- Pellet fuel
- Wood fuel

## **Fibers**

- Cardboard
- Corrugated fiberboard
- Paper
- Paperboard
- Pulp
- Pulpwood
- Rayon
- Birch-tar
- Cellulose
  - nano
- Hemicellulose
- Cellulosic ethanol

## **Derivatives**

- Dyes
- Lignin
- Liquid smoke
- Lye
- Methanol
- Pyroligneous acid
- Pine tar
- Pitch
- Sandalwood oil
- Tannin
- Wood gas

## **By-products**

- Barkdust
- Black liquor
- Ramial chipped wood
- Sawdust
- Tall oil
- Wood flour
- Wood wool
- Woodchips
- Axe ties
- Bavin (wood)
- Billet (wood)
- Clapboard
- Dugout canoe

## **Historical**

- Potash
- Sawdust brandy
- Split-rail fence
- Tanbark
- Timber framing
- Wooden masts

- Biomass
- Certified wood
- Destructive distillation
- Dry distillation
- Engineered bamboo
- Forestry
- Green building and wood
- List of woods
- Mulch

## See also

- Non-timber forest products
- Natural building
- Papermaking
- Reclaimed lumber
- Timber recycling
- Wood drying
- Wood preservation
- Wood processing
- Woodworking
- *Yakisugi*

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Construction

## **Types**

- Home construction
- Offshore construction
- Underground construction
  - Tunnel construction
- Architecture
- Construction

## **History**

- Structural engineering
- Timeline of architecture
- Water supply and sanitation
- Architect
- Building engineer
- Building estimator
- Building officials
- Chartered Building Surveyor
- Civil engineer

## **Professions**

- Civil estimator
- Clerk of works
- Project manager
- Quantity surveyor
- Site manager
- Structural engineer
- Superintendent

**Trades  
workers  
(List)**

- Banksman
- Boilermaker
- Bricklayer
- Carpenter
- Concrete finisher
- Construction foreman
- Construction worker
- Electrician
- Glazier
- Ironworker
- Millwright
- Plasterer
- Plumber
- Roofer
- Steel fixer
- Welder

## **Organizations**

- American Institute of Constructors (AIC)
- American Society of Civil Engineers (ASCE)
- Asbestos Testing and Consultancy Association (ATAC)
- Associated General Contractors of America (AGC)
- Association of Plumbing and Heating Contractors (APHC)
- Build UK
- Construction History Society
- Chartered Institution of Civil Engineering Surveyors (CICES)
- Chartered Institute of Plumbing and Heating Engineering (CIPHE)
- Civil Engineering Contractors Association (CECA)
- The Concrete Society
- Construction Management Association of America (CMAA)
- Construction Specifications Institute (CSI)
- FIDIC
- Home Builders Federation (HBF)
- Lighting Association
- National Association of Home Builders (NAHB)
- National Association of Women in Construction (NAWIC)
- National Fire Protection Association (NFPA)
- National Kitchen & Bath Association (NKBA)
- National Railroad Construction and Maintenance Association (NRC)
- National Tile Contractors Association (NTCA)
- Railway Tie Association (RTA)
- Royal Institution of Chartered Surveyors (RICS)
- Scottish Building Federation (SBF)
- Society of Construction Arbitrators



## **By country**

- India
- Iran
- Japan
- Romania
- Turkey
- United Kingdom
- United States
- Building code

## **Regulation**

- Construction law
- Site safety
- Zoning
- Style
  - List

## **Architecture**

- Industrial architecture
  - British
- Indigenous architecture
- Interior architecture
- Landscape architecture
- Vernacular architecture

## **Engineering**

- Architectural engineering
- Building services engineering
- Civil engineering
  - Coastal engineering
  - Construction engineering
  - Structural engineering
- Earthquake engineering
- Environmental engineering
- Geotechnical engineering
- List
- Earthbag construction

## **Methods**

- Modern methods of construction
- Monocrete construction
- Slip forming

## **Other topics**

- Building material
  - List of building materials
  - Millwork
- Construction bidding
- Construction delay
- Construction equipment theft
- Construction loan
- Construction management
- Construction waste
- Demolition
- Design–build
- Design–bid–build
- DfMA
- Heavy equipment
- Interior design
- Lists of buildings and structures
- Megaproject
- Megastructure
- Plasterwork
  - Damp
    - Proofing
  - Parge coat
  - Roughcast
    - Harling
- Real estate development
- Stonemasonry
- Sustainability in construction
- Unfinished building
- Urban design
- Urban planning

 Outline  Category

◦ United States

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## 1. What Is Carpentry

### About Sink

A sink (also referred to as container in the UK) is a bowl-shaped plumbing fixture for cleaning hands, dishwashing, and other objectives. Sinks have a faucet (faucet) that supplies hot and cold water and might include a spray function to be made use of for faster rinsing. They also include a drain to get rid of previously owned water; this drain might itself include a strainer and/or shut-off tool and an overflow-prevention tool. Sinks may likewise have an incorporated soap dispenser. Numerous sinks, especially in kitchens, are mounted beside or inside a counter. When a sink comes to be clogged up, an individual will often consider using a chemical drainpipe cleaner or a bettor, though the majority of expert plumbings will remove the blockage with a drainpipe auger (frequently called a "plumbing professional's serpent").

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### About CREATIVE BUILDING SUPPLIES LTD

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## **Frequently Asked Questions**

**Where can I find the specific strength requirements for these materials according to local building codes?**

Your local building department or permit office is the best source for specific strength requirements dictated by the building codes in your area. They can direct you to the relevant sections of the code and any amendments or local requirements that apply.

Strength Benchmarks for Lumber Steel and Concrete

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