**Machining properties**
- **Ease of Cutting**: Wood > Plastic = Metal
- **Ease of Adhering**: Wood > Plastic = Metal
- **Ease of Welding**: Plastic = Wood > Metal
- **Non-splitting**: Wood = Plastic > Metal
- **Food-safe**: Plastic > Metal = Wood
- **Anti-corrosive**: Plastic = Wood > Metal
- **Scratch-resistant**: Plastic > Wood > Metal
- **UV-resistant**: Plastic > Wood = Metal
- **Water-resistant**: Plastic > Wood > Metal

**Practical properties**
- **Strength**: Wood = Metal > Plastic
- **Stiffness**: Plastic = Wood > Metal
- **Thermally conducive**: Plastic = Wood > Metal
- **Modulus of elasticity**: Plastic = Wood > Metal
- **Modulus of rupture**: Plastic = Wood > Metal
- **Hardness**: Wood = Metal > Plastic
- **Brittleness**: Plastic = Wood = Metal

**Mechanical properties**
- **Strength (Yield point)**: Describes the stress a material can handle before it starts to permanently deform.
- **Stiffness/Rigidity (Elastic modulus, \(E\))**: Describes how much a material can handle before it is bent.
- **Thermal conductivity (\(k\) or U-value)**: Describes how easily heat travels through the material.

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**Wood**
- **Common applications**: House frames, simple furniture, expensive furniture, fences, foundation for flooring, outdoor furniture, temporary bridges, shakes, harbor/boat docks, etc.
- **Typical geometry**: As boards and planks, 3/4" thick, 2" x 4" board, 2" x 6" board, 2" x 8" board, 3/4" x 6" x 12" plank.
- **Standard types**: Pine, Cedar, Spruce, Fir, Ash, Mahogany, Maple, Oak, Hemlock, Bamboo, African Jute, Rope.
- **Other plant-based materials**: The cheapest industrial lumber is from poplar, mahogany, pine, and redwood.
- **Machining properties**: Easily worked with saws, cutters, and drills in all directions. Wood is softer and very light compared to metals.
- **Practical properties**: Easy to work with, and splits easily into strips. Stiff, hard, and strong. Available everywhere. Very resistant to weather and use.
- **Mechanical properties**: Soft and very light. Water resistant. Resistant to acids. About 7.2% carbon, 0.2% to 0.3% silicon, other.

**Metal**
- **Casting properties**: Cast iron is 2% carbon, stainless steel is 10% chromium, other metals.
- **General notation**: A36 – hot roll angle 0.5" x 0.5" x 0.125".
- **Mechanical properties**: Stiff, hard, but brittle. Usually used for tools, equipment, or machinery.

**Plastic**
- **Common applications**: Bags, bottles, food containers.
- **Typical geometry**: Sign cutters, templates, and dimensions.
- **Standard types**: HDPE, PP, PS, PVC, PET.
- **Practical properties**: Thermoplastics (PET, HDPE/LDPE, PVC, PP) can be remolded or melted, but should not be mixed together.
- **Mechanical properties**: Thermoplastic polyurethane (TPU) cannot be remolded with heat.

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**What other materials should I consider?**
- **Concrete / brick**: Available everywhere. Resident to weather and use.
- **Plaster**: Most available. Can be very smooth, so it is used for moldable.
- **Ceramic**: Widely available. Can be used very smooth, tough, and heat-resistant.
- **Paper / cardboard**: Does not require special tools to handle. Very pliable. Adhered very well.
- **Glass / fiberglass**: Transparent. Anti-corrosive. Very resistant to weather and use.
- **Canvas / leather**: Strong, flexible. Somewhat resistant.
- **Rubber**: High friction. Anti-corrosive. Well resistant to weather and use.

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**What should I consider when choosing a material?**
- Use materials that are lightweight, easy to transport, and cost-effective.
- Consider the environmental impact of the materials used.
- Ensure that the materials are durable and can withstand the conditions they will be exposed to.
- Consider the scalability of the materials, ensuring they can be scaled up or down as needed.
- Ensure that the materials are maintainable and repairable. 

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**Learn-IT: Material selection**

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**Protip**
- **Learn-IT**: Material selection
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- **Contact**: Material selection (http://web.mit.edu/materialselection/)