Machine Elements

> **Learning Outcome:** Identify various machine elements, describe their function, and include them in the construction of simple and complex machines.

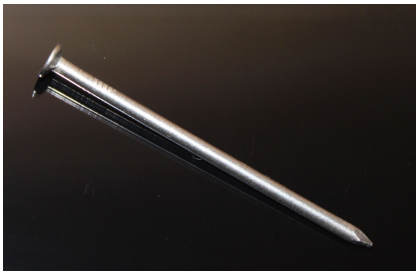
Fasteners

A **fastener** is a machine element that joins or affixes two or more objects together. Some fasteners do this using chemical properties (like glue), or heat (like soldering), but this page will focus specifically on **mechanical fasteners.**

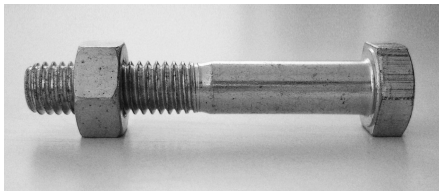
> A **mechanical fastener** holds two (or more) pieces together using the mechanical advantage of a simple machine. In order to separate the pieces, the simple machine must be overcome or undone.

Nails

A **nail** is a (typically) metal device that is driven through two (or more) pieces, acting as a wedge and using friction to keep them fastened together.



Name	Description	Example
Nail	Nails work by passing through one piece and becoming lodged in another. Nails work by passing through one piece and becoming lodged in another.	

Name	Description	Example
Screw		
Bolt		

Bolts vs. Screws

You may have noticed that

> **Screws** fasten objects together **on their own**.

> **Bolts** fasten objects together with the **help of a nut on the other side**.

The *Machinery's Handbook* describes the distinction between bolts and screws in more detail:

> A bolt is an externally threaded fastener designed for insertion through holes in assembled parts, and is normally intended to be tightened or released by torquing a nut. A screw is an externally threaded fastener capable of being inserted into holes in assembled parts, of mating with a preformed internal thread or forming its own thread, and of being tightened or released by torquing the head. An externally threaded fastener which is prevented from being turned during assembly and which can be tightened or released only by torquing a nut is a bolt. (Example: round head bolts, track bolts, plow bolts.) An externally threaded fastener that has thread form which prohibits assembly with a nut having a straight thread of multiple pitch length is a screw. (Example: wood screws, tapping screws.)[60]

Screws

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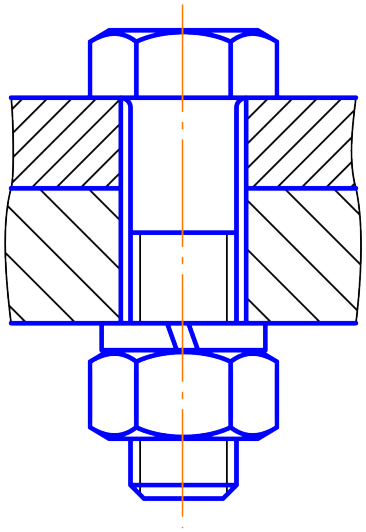
> **NOTE**: We are talking here about **screws** as a **physical machine element**, rather than a theoretical simple machine screw.

Contrary to Nails which rely solely on friction to fasten two pieces together, **screws** use the mechanical advantage provided by their threading.

They come in a wide variety types and sizes. Which you choose varies drastically depending

Bolts



Nuts

When combined with a Bolt,

Shafts

Bearings

A **bearing** is a machine element

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