The history of the screw

From early historical times up to the 20th century

Screws and nuts have become common objects used throughout the world and they are often used lavishly. Modern screws are real high-tech products and the path to them becoming mass-produced articles has a long history behind it. By the way: We always say that the nut is female and not male and this expression was actually used in the Krüütz encyclopaedia published in 1800.

Technical differences exist between rotating and securing threads and they result from the flank shape and the angle, as contrary requirements exist for rotating or securing tasks.

Today the following description for a screw is listed by Brockhaus as follows: “Screw; a fixture made from steel, copper, brass or light metal used to produce a removable connection; it consists of a cylindrical head, has a threaded shaft and the nut used with it has an internal thread and this nut must be tightened up or undone using a wrench.”

The word “screw” now has a permanent place in the language that we use every day: “Eine Schraube locker haben” and “Erwartungen zurückgeschrauben” and “geschraubte Rede” (used during the 18th century) are terms used in German, which loosely mean “to have a screw loose”, “expectations have been retracted, i.e. unscrewed” and “stilted or convoluted speech” in English. The word “screw” is also used whenever something has to be tightened up, undone, unscrewed or screwed in.

Early historical times

Helixes or spiral structures are often found in nature in their natural forms. Their first technical deployment was during the Bronze Age (approx. 2,500 BC), where they were used in equipment and weapons as well as being simple adornments in jewellery.

The spiral was a favourite decoration used on columns in ancient world architecture. The screw connection first appeared during the Late Antiquity period.

The actual origin of the screw remains unknown. It can probably be attributed to the Near East area. Water screws appeared in the southern Mediterranean area around 300 BC.

The first scientific use of a screw is attributed to Archimedes, the Greek mathematician (about 285 - 212 BC).

Middle Ages

It is known from written records as well as archaeological excavations that the Romans used the screw-thread principal in many different ways. Good examples are water screws, odometers, medicinal equipment as well as oil and wine presses.
This technology faded into obscurity after the fall of the Roman Empire. The water screw first made a renaissance in the 15th century thanks to Italian scholars and the distribution of their writings. Intensive further development did not take place during the Middle Ages despite many examples of different applications.

18th century
As the centuries changed over from the 18th to the 19th, it became apparent that a screw could be used to provide the mechanical propulsion for ships. As with many other discoveries, the principle already existed and it was “only” modified or used conversely to its conventional operation. Production of screws as they are known today began at the end of the 19th century. The screw gained enormous importance as a connecting device with the onset of the industrial revolution.

19th century
No standards existed at the start of the century, which meant that every engineering company produced different sized screws in accordance with their own in-house standards. This resulted in huge problems during assembly if external parts had to be used and with the supply of replacement parts later on.
The huge demand for uniform screws for tracks and railway construction resulted in the adoption of nationwide standards and the standardisation of screws and nuts became a necessity.

Companies with special machines and toolpieces for producing threads were established and the screw became a cheap, mass-produced article. Joseph Whitworth (1803-1897) introduced core and external diameters from a practical standpoint using British inch (imperial) sizes. The system proved to be so good that it remains virtually unchanged and is still used up to this day.

20th century
End of story? Certainly not! Special technical demands arising from the aviation industry or lightweight constructions have to use suitable screws.
Automated assembly requirements have resulted in the further development of screws and nuts. Today’s design engineer has a variety of construction techniques available to him and these can be selected for use.
from either economical or technical standpoints. New construction methods are continually being conceived. There is no end in sight even after more than 2,300 years of the history of this technology.

Process
Screws have been cut, filed or sawn and sometimes they have even been cast since the age of the ancient world. The precision depended on the craftsman involved and any faults found in the raw material.

Three methods existed in 1880 for the production of a helical track:

- **Jigging**: Jigs were used to work the blank piece
- **Turning**: A manually operated turning lathe was used to turn the helical track
- **Cutting**: Cuts were pressed into the blank piece at an angle and this allowed the piece to be turned afterwards

The following processes are used in this day and age:
Cut screws are manufactured using lathes or thread-cutting dies. This type of screw has the benefit of being made precisely, but the disadvantage is that the cutting tool cuts through the crystalline metal structure. The screw’s precision comes at the expense of a loss of strength.

Rolled screws, which can be manufactured using either cold or hot processes, have the advantage of being much stronger and more economical to produce. The precision of the rolled screws depends on the tolerances required, but the actual precision is not as good as that of a cut screw. Screws can also be produced using presses with two or even multiple dies. This process has been generally accepted for use in the production of plastic screws.