

Genesis and Metamorphosis of Screws

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Genesis Alias A Look Into the Past

When asked a question of old man in Fig. 1, few people would not mention one of the pioneers of screw connections, or someone from Fig. 2. However, some would go even further into the past and mention the Archimedes helix for transporting water. He was right, however?

In order to be able to answer this question, some terms must be clarified. First of all, a distinction must be made between a screw (Fig. 3) as a thread carrier and a spiral (Fig. 4) as a geometric element.



Fig. 1

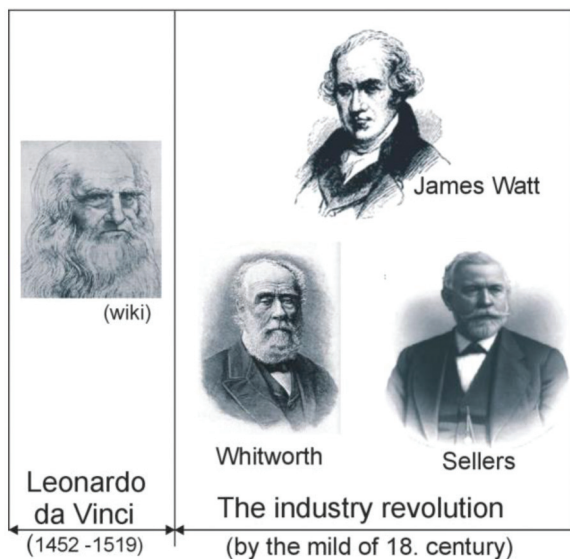


Fig. 2



How Did it All Start?

It should be emphasized that the characteristic element of the screw - thread (spiral) is an autochthonous geometric element; this means that it was not invented, but like the circle, for example, it exists ab origine, that is, from time immemorial; he was therefore observed by nature. One had enough opportunities for this, it was enough to keep one's eyes open and look (Fig. 5 and Fig. 6). Such spirals are known, from human DNA to various galaxies, from simple to complex substances. It is therefore not surprising that people noticed them and began to use them to their advantage. **Archimedes** (287 - 212 BC), who was the first to understand the principle of the helix and used it in the construction of a water transport device (Fig. 7), the aforementioned **Leonardo da Vinci** (1452 - 1519), later **Henry Maudslay** (1771-1831, UK), **Joseph Whitworth** (1803 -1887, UK), **William Sellers** (1827 - 1905, USA) and many, many other nameless pioneers contributed to the practical use of the screw as the most used structural element today.

Without screws and without friction, all machines and devices would fall apart into individual parts!

If we don't count Archimedes' transport screw (Fig. 7), **Johann Gutenberg** was the first to use screws industrially to assemble his printing machines, and later the spiral principle was also used in architecture (Fig. 8).

However, the biggest boom occurred at the end of the 18th century, during the industrial revolution, when screws greatly influenced this revolution. It would not be possible without them. Thanks to **James Watt**, the Industrial revolution began in the United Kingdom. His improved steam engine enabled the unprecedented development of other machines and devices (Fig. 9). Fig.10



Fig. 3



Fig. 4



Fig. 5



Fig. 6

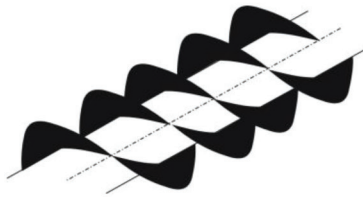


Fig. 7

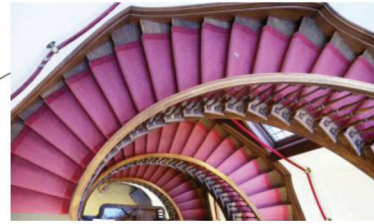


Fig. 8



Fig. 9

also proves that screws have a versatile use.

Screws enabled the rapid development of rail and road transport. None of this was done without screw connections. And there are other useful things and devices without which we cannot imagine life today and whose production would not be possible without screws. An interesting overview of this is provided by **Museum Würth, Schrauben und Gewinde**. We learn from him e.g. about the application of screws in medicine, military

industry, architecture, fine mechanics and optics, etc.

Metamorphosis of Screws

Hand in hand with the advances of the industrial revolution, the development of screws continued. A simple square head (Fig. 11) and a wooden thread (Fig. 3) were no longer sufficient for the needs. Various types of heads and tightening grooves (Fig. 12 - 14), thread shapes were developed, and development did not lag behind in the field of materials either.

Today, screws with a strength of 800 to 1200 N/mm² are commonly produced, further made of stainless steel with high resistance to corrosion and at the same time high mechanical properties. A typical representative is self-drilling screws made of martensitic stainless steel (Fig. 13). And we could continue with thread - forming screws with a triangular thread cross-section (Fig. 14) and so on. No wonder that these twisting metamor-

phoses also fascinated the English laureate of the Nobel Prize for literature, **Rudyard Kipling**. In one of his short stories, he writes about a small screw on a ship that felt a little tight after a while and decided to loosen it. When the beams and ribs of the ship's frame found out, they began to beg her to stay because the ship would sink. The little screw, honored by so much attention, finally decided to stay. The ship was saved.

Unfortunately, not all screws behave responsibly and after a certain time they arbitrarily decide to go "their own way;" in other words, they leave the construction to its fate. In fact, every bolted joint presents a latent danger of disintegration. If it was not assembled correctly, per hand for example, it will happen during operation. Let the many cases of accidents, often with fatal consequences, serve as a reminder for the future. This was also the inspiration for the development of various external safety fasteners, which today form an indivisible part of the screwdriver portfolio.

Summary

As you can see, screws play an important role in a person's life. In this regard, nothing has changed even in the current modern over-technological, automatization and computer era. At first glance, a very simple component, in fact a complexly stressed structural element with its own colorful life (see the Screw-driver theorem below), without which there would be no technical life. Therefore, they deserve adequate attention and a fully legitimately entry into the UNESCO list.



Fig. 10

Continued...



Fig. 11

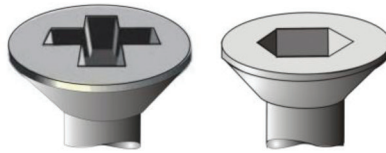


Fig. 12

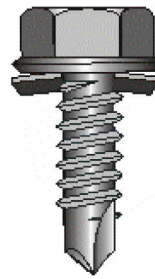


Fig. 13



Fig. 14

Ferodom's Screw-Driver Theorem:

"The screw connection is not a soulless monster, but a living organism with its own life. Only those who know and respect this life can count on a reward in the form of reliability and safety. Otherwise, he can cruelly avenge."

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Company Profile: FERODOM Ltd., Zilina, Slovakia, was established at the end of the year 2000 as a family enterprise to take advantage of many years of theoretical and practical experiences in the field of mechanical joining of parts.

Ferodom is not only a typical logistic supplier, but also an investigative partner for the optimization and development of joinings elements. An example can be the high valuation of Ist Lock Nuts, named as an "Innovative Product of the Year" at *Fastener Fair Stuttgart 2009* in Germany, and one year later as a "Top Product of the Year" in *Fastener Technology International (FTI)* magazine in the USA. www.ferodom.sk.