

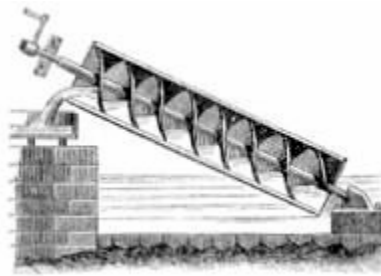
Mechanical Engineering: Rudiments, Rude Mechanicals and Some Personal Ramblings

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Mechanical engineering, as the name suggests, is the specific field of engineering that deals primarily with things mechanical; this, perhaps, then begs the question: what do we mean by things mechanical? Any standard English dictionary [e.g. 1] will at least offer us something like the following three definitions: (i) belonging to or concerning machines or mechanics; (ii) worked by, or performed with, machinery or a mechanism; or (iii) said of an action or movement, etc: done without or not requiring much thought. The first two definitions imply the involvement of machines or mechanisms, whilst the third definition represents the figurative usage of the word for some task or action that is soulless, repetitive or undemanding beyond the constraints of some fixed operation; in other words, “machine-like”. The word “mechanical” entered the English language in the 15th Century, and is derived from the Latin *mechanicus* and ultimately the Greek *mechane* [e.g. 2], both meaning a contrivance or a machine. Of course, the connection, and similarity, between the words *mechanical* and *machine* is no great revelation or surprise, but before we consider what is meant by a *machine* it is interesting to analyze the Thai word for mechanical engineering: [วิศวกรรมเครื่องกล](#) [e.g. 3]. (As any student of the Thai language knows, rendering Thai words in Roman script is usually unsatisfactory, and more often than not misleading, at least as far as pronunciation goes, and so will not be attempted here). The first component of the word is [วิศวกรรม](#), meaning engineering in general, but I would like to focus on the “mechanical” component of the word, namely: [เครื่องกล](#), which is composed of two parts. The first part being: [เครื่อง](#), meaning machine, apparatus or more generally a tool or means of doing or accomplishing something. Some examples: [เครื่องคิดเลข](#) is a calculator or literally a “think-number machine”, whilst [เครื่องหมาย](#) is a symbol, or literally a “means to convey meaning”. The last part of the Thai word for mechanical is: [กล](#), meaning magic or trick (in fact, the Thai word for conjuring is [เล่นกล](#), literally meaning to “play tricks”). So, according to the structure of the Thai word meaning “mechanical engineering”, we might be led to believe that mechanical engineering is that branch of engineering concerned with machines that do magic or play tricks. Of course, for people or a society with no hitherto exposure, or technical background, this is exactly what all but the most simple of machines often appear to be capable of. For those involved in the discipline of mechanical engineering, it could be indeed be said that it is “magical”, but in the emotional sense of the word.

Now, as promised earlier, let us now consider what we actually mean when we talk about a *machine*. In everyday parlance, a machine is a device that performs some (usually) useful task. The more technical amongst us might add that the operation of a

machine typically involves the transmission or modification of energy [4]. Simple machines, such as wheels, pulleys, ramps, levers and other devices were developed and used in antiquity. Possibly the greatest “mechanical engineer” of antiquity was Archimedes, who apart from being associated with a very famous bath-time “Eureka moment” leading to Archimedes’ principle (itself an important idea in mechanical engineering applications) was also attributed with the invention of an irrigation pump that would become known as Archimedes’ screw [5]; a machine (along with all the others listed earlier) that is still in use today in many developing countries.

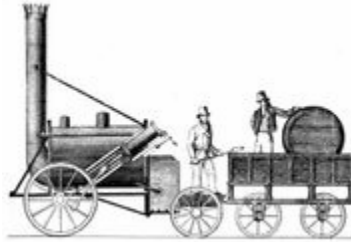


Archimedes’ Screw (public-domain image)

There are, needless to say, some rather significant jumps in technology from the aforementioned simple, but nevertheless useful, machines to the clockwork-mechanisms, compressors and heat engines of the Scientific and Industrial Revolutions onto the sophisticated mechanical engines and electrical machines of modern times. But from where did the special people who would be responsible for making these momentous steps in technology emerge?

To the current author, it seems reasonable to assert that the idea of a “mechanical engineer” gradually began to develop in the western world from a merging of the traditional artisans of the Middle Ages (e.g. blacksmiths, tanners, joiners, bellows-makers, and so on) with people willing to apply the new rationalism of the scientific revolution, pioneered by scientists like Galileo who applied a “mechanical-mathematical mode of analysis” [6] to a range of mechanical engineering problems, including structural analysis. Shakespeare has a group of comical characters dubbed the “rude mechanicals” (in other words, unpolished artisans) in his play “A Midsummer Night’s Dream” [7]. That the “rude mechanicals” were fair game for ridicule is as a result of their perceived lesser status as “mechanical” tradesmen [8]. But by the time of the First Industrial Revolution, when many machines began to be driven by steam power rather than by muscle, the social status of the mechanical engineer, and indeed engineers in general, had increased considerably with the emergence of mechanical engineering superstars such as James Watt [9], pioneer of the modern steam engine, who, interestingly enough, is referred to as a craftsman (in other words, an artisan) rather than a mechanical engineer in one of the texts I came across when doing research for this article [10]). Another extremely important mechanical engineer was George Stephenson, often referred to as the “father of the railways” [11]. Now at this point, I must admit to feeling some pride that George Stephenson, inventor of the famous locomotive “the Rocket” [12], also hails from the same part of the world as myself, namely Newcastle-upon-Tyne in the north-

east of England. In fact, as a child I used to live within walking-distance of Dial Cottage in West Moor, Tyne and Wear, [13] the place where Stephenson lived when developing another of his famous locomotives: “the Blücher”.



Stephenson’s Rocket (public-domain image)

And if I will be permitted to indulge my petty chauvinism just a little further, I would like to add that there is even one school of thought which believes that the term “Geordie” (used to refer to a denizen of the city of Newcastle-upon-Tyne) actually originated from the great engineer’s nickname: “Geordie Stephenson” [14]; though this is not yet a universally accepted, or proven, theory despite its pat plausibility! But, alas, it seems that all this talk of Stephenson and his locomotives has taken us down a very different track to the one on which we originally started, so let us finally head off, full-steam, in the direction of the (no-doubt bright) future of mechanical engineering. We cannot be completely sure where this journey will take us, but wherever it does it will surely involve new and exciting areas such as mechatronics (a term so new, my word-processing dictionary doesn’t even recognize it!), robotics, nanotechnology and possibly eventually biological machines. Who knows? But that is another story; do you want to be part of it?

References:

- [1] <http://www.m-w.com/dictionary/mechanical>
- [2] <http://www.allwords.com/word-mechanical.html>
- [3] <http://www.thai-language.com/dict/>
- [4] <http://en.wikipedia.org/wiki/Machine>
- [5] <http://en.wikipedia.org/wiki/Archimedes>
- [6] Richard Tarnas. “The Passion of the Western Mind”, page 263, Pimlico, Random House, 1991.
- [7] http://en.wikipedia.org/wiki/A_Midsummer_Night's_Dream
- [8] <http://allshakespeare.com/midsummer/413>
- [9] http://en.wikipedia.org/wiki/James_Watt
- [10] James E. McClellan III and Harold Dorn. “Science and Technology in World History: An Introduction”, page 281, The Johns Hopkins University Press, 1999.
- [11] http://en.wikipedia.org/wiki/George_Stephenson
- [12] http://en.wikipedia.org/wiki/Stephenson's_Rocket
- [13] http://en.wikipedia.org/wiki/West_Moor
- [14] <http://www.northeastengland.talktalk.net/GeordieOrigins.htm>