

# Mechanical Engineering-The King of Engineering

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## ABSTRACT

Mechanical engineering is the discipline that applies engineering physics, engineering mathematics, and materials science principles to design, analyze, manufacture, and maintain mechanical systems. It is one of the oldest and broadest of the engineering disciplines. The mechanical engineering field requires an understanding of core areas including mechanics, dynamics, thermodynamics, materials science, structural analysis, and electricity. In addition to these core principles, mechanical engineers use tools such as computer-aided design (CAD), computer-aided manufacturing (CAM), and product life cycle management to design and analyze manufacturing plants, industrial equipment and machinery, heating and cooling systems, transport systems, aircraft, watercraft, robotics, medical devices, weapons, and others. It is the branch of engineering that involves the design, production, and operation of machinery.

**KEYWORDS:** Design, Engineering, Mechatronics, Manufacturing, Mechanical Systems

## INTRODUCTION

Mechanical engineering emerged as a field during the Industrial Revolution in Europe in the 18th century; however, its development can be traced back several thousand years around the world. In the 19th century, developments in physics led to the development of mechanical engineering science. The field has continually evolved to incorporate advancements; today mechanical engineers are pursuing developments in such areas as composites, mechatronics, and nanotechnology. It also overlaps with aerospace engineering, metallurgical engineering, civil engineering, electrical engineering, manufacturing engineering, chemical engineering, industrial engineering, and other engineering disciplines to varying amounts. Mechanical engineers may also work in the field of biomedical engineering, specifically with biomechanics, transport phenomena, biomechanics, bionanotechnology, and modelling of biological systems.

The earliest practical water-powered machines, the water wheel and watermill, first appeared in the Persian Empire, in what are now Iraq and Iran, by the early 4th century BC.[9] In ancient Greece, the works of Archimedes (287–212 BC) influenced mechanics in the Western tradition. In Roman Egypt, Heron of Alexandria (c. 10–70 AD) created the first steam-powered device (Aeolipile).[10] In China, Zhang Heng (78–139 AD) improved a water clock and invented a seismometer, and Ma Jun (200–265 AD) invented a chariot with differential gears. The medieval Chinese horologist and engineer Su Song (1020–1101 AD) incorporated an escapement mechanism into his astronomical clock tower two centuries before escapement devices were found in medieval European clocks. He also invented the world's first known endless power-transmitting chain drive.[11]

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During the Islamic Golden Age (7th to 15th century), Muslim inventors made remarkable contributions in the field of mechanical technology. Al-Jazari, who was one of them, wrote his famous Book of Knowledge of Ingenious Mechanical Devices in 1206 and presented many mechanical designs. Al-Jazari is also the first known person to create devices such as the crankshaft and camshaft, which now form the basics of many mechanisms.[12]

During the 17th century, important breakthroughs in the foundations of mechanical engineering occurred in England. Sir Isaac Newton formulated Newton's Laws of Motion and developed Calculus, the mathematical basis of physics. Newton was reluctant to publish his works for years, but he was finally persuaded to do so by his colleagues, such as Sir Edmond Halley, much to the benefit of all mankind. Gottfried Wilhelm Leibniz is also credited with creating Calculus during this time period.[13]

During the early 19th century industrial revolution, machine tools were developed in England, Germany, and Scotland. This allowed mechanical engineering to develop as a separate field within engineering. They brought with them manufacturing machines and the engines to power them.[14] The first British professional society of mechanical engineers was formed in 1847 Institution of Mechanical Engineers, thirty years after the civil engineers formed the first such professional society Institution of Civil Engineers.[15] On the European continent, Johann von Zimmermann (1820–1901) founded the first factory for grinding machines in Chemnitz, Germany in 1848.

Mechanical engineers are constantly pushing the boundaries of what is physically possible in order to produce safer, cheaper, and more efficient machines and mechanical systems. Some technologies at the cutting edge of mechanical engineering are listed below:

**Micro electro-mechanical systems (MEMS):**

Micron-scale mechanical components such as springs, gears, fluidic and heat transfer devices are fabricated from a variety of substrate materials such as silicon, glass and polymers like SU8. Examples of MEMS components are the accelerometers that are used as car airbag sensors, modern cell phones, gyroscopes for precise positioning and microfluidic devices used in biomedical applications.

**Friction stir welding (FSW):**

Friction stir welding, a new type of welding, was discovered in 1991 by The Welding Institute (TWI). The innovative steady state (non-fusion) welding technique joins materials previously un-weldable, including several aluminum alloys. It plays an important role in the future construction of airplanes, potentially replacing rivets.

**Mechatronics:**

Mechatronics is the synergistic combination of mechanical engineering, electronic engineering, and software engineering. The discipline of mechatronics began as a way to combine mechanical principles with electrical engineering. Mechatronic concepts are used in the majority of electro-mechanical systems.[47] Typical electromechanical sensors used in mechatronics are strain gauges, thermocouples, and pressure transducers.

**Nanotechnology:**

At the smallest scales, mechanical engineering becomes nanotechnology—one speculative goal of which is to create a molecular assembler to build molecules and materials via mechanosynthesis.

**Design and drafting:**

Drafting or technical drawing is the means by which mechanical engineers design products and create instructions for manufacturing parts. A technical drawing can be a computer model or hand-drawn schematic showing all the dimensions necessary to manufacture a part, as well as assembly notes, a list of required materials, and other pertinent information. Instructions for manufacturing a part must be fed to the necessary machinery, either manually, through programmed instructions, or through the use of a computer-aided manufacturing (CAM) or combined CAD/CAM program. Optionally, an engineer may also manually manufacture a part using the technical drawings.

**Conclusion:**

At last it can be concluded that mechanical Engineering has intertwined throughout the making of our history, and is the backbone of almost everything that we use on a daily basis. Since the days of Archimedes, it has played such a large role in the development of our world, and it's the foundation of so many amazing products and feats in our lives.

I believe that there are not enough Mechanical Engineers in the world to face real problems today, and I believe the major should be expanded to accommodate the larger problems in the world today, instead of completely dropping it to fund a different major.

