

## Control Valves

Automatic control systems were first created more than two thousand years ago. The ancient water clock of Ktesibios in Alexandria Egypt dating to the third century B.C. is believed to be the very first feedback control equipment on record. This particular clock kept time by means of regulating the water level in a vessel and the water flow from the vessel. A common design, this successful device was being made in a similar fashion in Baghdad when the Mongols captured the city in 1258 A.D.

All through history, various automatic machines have been utilized so as to accomplish specific tasks or to simply entertain. A popular European design in the 17th and 18th centuries was the automata. This device was an example of "open-loop" control, consisting dancing figures that would repeat the same job repeatedly.

Closed loop or otherwise called feedback controlled devices consist of the temperature regulator common on furnaces. This was actually developed in 1620 and accredited to Drebbel. Another example is the centrifugal fly ball governor developed in the year 1788 by James Watt and utilized for regulating steam engine speed.

The Maxwell electromagnetic field equations, discovered by J.C. Maxwell wrote a paper in the year 1868 "On Governors," which was able to describing the exhibited by the fly ball governor. So as to describe the control system, he made use of differential equations. This paper exhibited the usefulness and importance of mathematical models and methods in relation to comprehending complex phenomena. It also signaled the start of mathematical control and systems theory. Previous elements of control theory had appeared before by not as convincingly and as dramatically as in Maxwell's study.

New control theories and new developments in mathematical techniques made it possible to more accurately control more dynamic systems compared to the first model fly ball governor. These updated techniques include various developments in optimal control in the 1950s and 1960s, followed by advancement in stochastic, robust, adaptive and optimal control techniques in the 1970s and the 1980s.

New applications and technology of control methodology have helped produce cleaner auto engines, cleaner and more efficient chemical processes and have helped make communication and space travel satellites possible.

Primarily, control engineering was carried out as a part of mechanical engineering. As well, control theory was firstly studied as part of electrical engineering as electrical circuits could often be simply described with control theory techniques. Currently, control engineering has emerged as a unique practice.

The very first controls had current outputs represented with a voltage control input. So as to implement electrical control systems, the correct technology was unavailable at that time, the designers were left with less efficient systems and the alternative of slow responding mechanical systems. The governor is a really effective mechanical controller that is still normally utilized by some hydro plants. In the long run, process control systems became accessible before modern power electronics. These process controls systems were normally utilized in industrial applications and were devised by mechanical engineers making use of pneumatic and hydraulic control machines, a lot of which are still being used today.