

## Control Valves

The first automatic control systems were being used over two thousand years ago. In Alexandria Egypt, the ancient Ktesibios water clock made in the 3rd century is thought to be the first feedback control device on record. This clock kept time by regulating the water level inside a vessel and the water flow from the vessel. A common design, this successful machine was being made in a similar way in Baghdad when the Mongols captured the city in 1258 A.D.

Different automatic machines throughout history, have been utilized in order to accomplish specific tasks. A common desing used through the seventeenth and eighteenth centuries in Europe, was the automata. This device was an example of "open-loop" control, featuring dancing figures that will repeat the same job over and over.

Feedback or also known as "closed-loop" automatic control equipments include the temperature regulator found on a furnace. This was actually developed during the year 1620 and accredited to Drebbel. Another example is the centrifugal fly ball governor developed during 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 1868 "On Governors," which was able to explaining the exhibited by the fly ball governor. So as to describe the control system, he utilized differential equations. This paper exhibited the usefulness and importance of mathematical models and methods in relation to comprehending complicated phenomena. It also signaled the start of systems theory and mathematical control. Previous elements of control theory had appeared earlier by not as dramatically and as convincingly as in Maxwell's study.

Within the next 100 years control theory made huge strides. New developments in mathematical methods made it possible to more precisely control considerably more dynamic systems than the original fly ball governor. These updated methods comprise various developments in optimal control during the 1950s and 1960s, followed by advancement in stochastic, robust, adaptive and optimal control techniques in the 1970s and the 1980s.

New technology and applications of control methodology has helped make cleaner engines, with more efficient and cleaner methods helped make communication satellites and even traveling in space possible.

At first, control engineering was practiced as a part of mechanical engineering. What's more, control theory was first studied as part of electrical engineering since electrical circuits could often be simply described with control theory methods. At present, control engineering has emerged as a unique practice.

The very first control relationships had a current output that was represented with a voltage control input. As the right technology to implement electrical control systems was unavailable at that time, designers left with the choice of slow responding mechanical systems and less efficient systems. The governor is a really effective mechanical controller that is still usually utilized by some hydro plants. In the long run, process control systems became offered before modern power electronics. These process controls systems were often utilized in industrial applications and were devised by mechanical engineers using hydraulic and pneumatic control devices, a lot of which are still being used nowadays.