

## Control Valves

Automatic control systems were first developed more than two thousand years ago. The ancient water clock of Ktesibios in Alexandria Egypt dating to the 3rd century B.C. is believed to be the first feedback control equipment on record. This particular clock kept time by way of regulating the water level within a vessel and the water flow from the vessel. A popular style, 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 devices have been used to be able to simply entertain or to accomplish specific tasks. A popular European design through the seventeenth and eighteenth centuries was the automata. This tool was an example of "open-loop" control, featuring dancing figures which will repeat the same job over and over.

Feedback or "closed-loop" automatic control tools comprise the temperature regulator found on a furnace. This was developed during the year 1620 and accredited to Drebbel. One more example is the centrifugal fly ball governor developed in 1788 by James Watt and utilized for regulating the speed of steam engines.

J.C. Maxwell, who discovered the Maxwell electromagnetic field equations, wrote a paper in 1868 "On Governors," that was able to describe the instabilities demonstrated by the fly ball governor. He utilized differential equations so as to explain the control system. This paper exhibited the importance and helpfulness of mathematical models and methods in relation to comprehending complex phenomena. It also signaled the start of systems theory and mathematical control. Previous elements of control theory had appeared before by not as convincingly and as dramatically as in Maxwell's study.

In the following 100 years control theory made huge strides. New developments in mathematical methods made it possible to more accurately control considerably more dynamic systems as opposed to the first fly ball governor. These updated methods consist of various developments in optimal control in the 1950s and 1960s, followed by progress in stochastic, robust, adaptive and optimal control techniques in the 1970s and the 1980s.

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

Initially, control engineering was practiced as a part of mechanical engineering. Moreover, control theory was initially studied as part of electrical engineering since electrical circuits can often be simply described with control theory techniques. Currently, control engineering has emerged as a unique discipline.

The very first control relationships had a current output which was represented with a voltage control input. In view of the fact that the correct technology to implement electrical control systems was unavailable at that moment, designers left with the option of slow responding mechanical systems and less efficient systems. The governor is a really efficient mechanical controller that is still normally utilized by various hydro factories. Eventually, process control systems became accessible prior to modern power electronics. These process controls systems were usually utilized in industrial applications and were devised by mechanical engineers making use of pneumatic and hydraulic control machines, many of which are still being used at present.