

## Control Valves

The first automatic control systems were being utilized over two thousand years ago. In Alexandria Egypt, the ancient Ktesibios water clock constructed in the third century is thought to be the first feedback control tool on record. This clock kept time by means of regulating the water level inside a vessel and the water flow from the vessel. A popular style, this successful device was being made in the same way in Baghdad when the Mongols captured the city in 1258 A.D.

All through history, different automatic machines have been used so as to accomplish specific tasks or to simply entertain. A popular European style during the seventeenth and eighteenth centuries was the automata. This particular device was an example of "open-loop" control, comprising dancing figures that will repeat the same task 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 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 explaining the exhibited by the fly ball governor. In order to explain the control system, he utilized differential equations. This paper demonstrated the usefulness and importance of mathematical models and methods in relation to comprehending complex phenomena. It even signaled the start of systems theory and mathematical control. Previous elements of control theory had appeared earlier by not as convincingly and as dramatically as in Maxwell's study.

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

New technology and applications 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. As well, control theory was first studied as part of electrical engineering since electrical circuits could often be simply described with control theory techniques. Nowadays, control engineering has emerged as a unique practice.

The first control partnerships had a current output which was represented with a voltage control input. In view of the fact that the right technology to be able to implement electrical control systems was unavailable at that moment, designers left with the alternative of slow responding mechanical systems and less efficient systems. The governor is a really efficient mechanical controller that is still usually utilized by various hydro plants. Ultimately, process control systems became available previous to modern power electronics. These process controls systems were normally used in industrial applications and were devised by mechanical engineers making use of hydraulic and pneumatic control machines, lots of which are still being utilized today.