Control Valves

The earliest automated control systems were being utilized more that two thousand years ago. In Alexandria Egypt, the ancient Ktesibios water clock constructed in the 3rd century is thought to be the very first feedback control equipment on record. This clock kept time by regulating the water level within a vessel and the water flow from the vessel. A popular design, this successful device was being made in the same manner in Baghdad when the Mongols captured the city in 1258 A.D.

Various automatic devices through history, have been used to complete certain tasks. A popular style utilized in the seventeenth and eighteenth centuries in Europe, was the automata. This particular piece of equipment was an example of "open-loop" control, comprising dancing figures that would repeat the same job over and over.

Closed loop or otherwise called feedback controlled machines include the temperature regulator common on furnaces. This was developed in the year 1620 and attributed 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.

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. 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 understanding complex phenomena. It also signaled the beginning 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.

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

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

Primarily, control engineering was carried out as a part of mechanical engineering. Moreover, control theory was first studied as part of electrical engineering as electrical circuits could often be simply explained with control theory techniques. Now, control engineering has emerged as a unique practice.

The very first controls had current outputs represented with a voltage control input. In order to implement electrical control systems, the proper technology was unavailable at that moment, the designers were left with less efficient systems and the option of slow responding mechanical systems. The governor is a very effective mechanical controller which is still usually utilized by various hydro factories. In the long run, process control systems became available previous to modern power electronics. These process controls systems were usually used in industrial applications and were devised by mechanical engineers utilizing hydraulic and pneumatic control devices, lots of which are still being used at present.