

Motor Control Examined, Categorized and Optimized

Abstract

Before the first AC or DC motors could be used to drive moving equipment in industrial or commercial applications, some type of switch had to be invented and designed to turn them on and off (connect and disconnect them from the power source). The next step that would obviously follow would be to incorporate a device for an individual to operate the apparatus. Initially it was probably a handle to manually operate the switch but soon an auxiliary device was designed to operate the switch remotely i.e. the first pushbutton. To further expand the control capability, auxiliary relays came into existence that opened the range of possibilities for all kinds of control configurations. All of these controls were hardwired and were cumbersome and time consuming to build and find and correct problems with their operation. The complexity and range of control designs were also limited. With the advent of the Programmable Logic Controller or PLC in the mid 1970's, these limitations were significantly reduced. A new era of endless possibilities for control designs was opened. Software, now configurable with key strokes on a keyboard, replaced hardwiring and new control methods were rapidly developed in the same manner. The Distributed Control System or DCS soon came along in the analog process control world and while for some time was not a direct competitor to the digital PLC device for motor and other logic control did eventually develop the capability to compete quite effectively in the digital world expanding again the range of control designs for motor control. As the capabilities for motor control designs expanded, at some point there was a recognition that there were many 'typical' fundamental motor control designs that originated in both the hardwired and PLC or DCS environment that could be easily standardized in control blocks and used over and over again simplifying the programming process.

This paper takes you through the history of the various types of motor controls over a range of applications and available voltages including variable speed drives, describes other factors to consider when designing those controls and discusses the possibilities for standardization to simplify control software design and programming.