

INTELLIGENT CONTROL MODULES

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Abstract

In the "embedded controller" architecture, a personal computer (PC) is used as a hardware platform for motion control. It allows to plan and control the multi-functional movement of control modules and systems, to perform information and measurement data processing functions in one device.

Keywords: boiler unit, mathematical model, identification, modeling, controller, regulation.

Introduction

Planning of functional activities is carried out by an operator on a high-level computer with the help of application software packages. In addition, the computer automatically generates tasks sent to the controller through a standard interface (mn, *RS-232C*). These tasks show the regularity of changes in time of the required position, speed and acceleration of the executive motor shaft.

From the user's point of view, its advantages are simple operating systems and software tools (*AutoCAD*, *Excel*, *Windows NT/95/3.1*, *C++* and b.) integration with motion programming systems. The integration of control computers in one network makes it possible to create distributed control complexes for the automation of cells, workshops and enterprises. In this case, the module structure in the PC protects the hardware from heat, vibration and other effects of production.

Built-in controllers for an additional computer port are produced as *plug-in* cards . Data exchange between the controller and the PC is carried out through a simple (32-bit) bus of addresses and data. Common bus standards can be *ISA*, *STD*, *VME*, and *IBM-PC Bus* . At the same time, the controller board has the necessary connector places for the driving power converter, feedback sensor (analog and digital), and external discrete input/output.

Intellectual Power Modules

We will consider the methods and ways of intellectualization of control modules aimed at integrating motion controllers and powerful converters. Such solutions are appropriate for multi-dimensional control systems where the components are located at a great distance from each other. In this case, it will be difficult or technically impossible to implement the management system on one computer base. Because it is technically impossible to transmit and receive signals over long distances (for example, the simple *RS-232* protocol can only transmit data and signals over a distance of 9.15 m).

In such systems, the control unit of each module is installed in the converter housing or in the terminal box of the electric motor. We call such modules *intellectual power modules (IKM)*.

IKMs are made on the basis of new generation semiconductor devices. Typical manifestations of such devices are powerful field transistors (*MOSFET*), bipolar transistors (*IGBT*), field



controlled closed thyristors (*MST*). The new generation of devices has high speed (switching frequency for *IGBT* transistors up to 50 kHz, for *MOSFET* transistors - 100 kHz) and switching current and voltage (limit current for *IGBT* - up to 1200 A, limit voltage - up to 3500 V) and small control power is distinguished by

In addition to traditional devices of power electronics (switches built on the basis of powerful transistors or thyristors and diodes), IKM also includes elements of microelectronics. They are designed to perform intellectual functions: traffic control, protection in emergency mode and fault diagnosis. The use of IKMs in the driving part of control modules makes it possible to significantly reduce the dimensions of powerful transformers, increase their reliability and improve their technical and economic indicators.

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