WORKING KNOWLEDGE BY TERRY MACKENZIE HOY

THE DEVELOPMENT OF MOTOR CONTROL CENTRES

A motor control centre – colloquially known as a MCC – is an electrical switchboard that is divided into a number of separate compartments. Usually, each compartment contains a circuit breaker, an electrical contactor and a control circuit. The control circuit causes the electrical contactor to close either by a remote signal or by a pushbutton mounted on the front door of the compartment. Another signal and another pushbutton cause the electrical contactor to open. The fact that the contactor is open or closed is indicated by indicator lights on the front door of the compartment. Generally, there is also an ammeter that indicates the current that is going through the contactor when closed. The contactor supplies a motor. The collection of all these compartments is the motor control centre.

In a typical MCC, all of the compartments are supplied from a set of busbars which runs either through the top compartment of the MCC or, more commonly, through the bottom compartment. Each set of busbars is supplied from an incoming circuit breaker, which in turn is supplied from a transformer. Sometimes there are two incoming circuit breakers and the MCC has a bus-section switch, which can be open or closed. If open, the left-hand and right-hand side busbars are not connected to each other and each gets a power supply from a different transformer. This is for electrical supply security: if one transformer fails then the associated incomer can be opened and the bus-section closed so that one transformer supplies the whole MCC.

Back in the day, MCCs were very different to what they are today. Firstly, the various supplies to the various motors were not compartmentalised but were all mounted on a long chassis plate and access was gained by doors spaced at intervals. These MCCs were insecure since a fault on a feeder would spread to the MCC switchboard, resulting in the complete failure of the MCC. For this reason compartmentalisation was introduced. Compartments were good at preventing the spread of electrical faults but if there was a fault with the control system, then the electrician had do repair work in a compartment where, despite the incoming circuit breaker being open, the top of the circuit breaker was still connected to the busbars. This made working in the compartment hazardous and difficult.

The next development was to make the compartments 'withdrawable'. Once the circuit breaker was switched off, it was possible to undo toggles and pull the whole compartment free from the board, complete with control circuit, contactor and faceplate. The compartment had electrical pin connectors which would withdraw from the busbar dropper. The compartment could then be taken to a workshop for maintenance.

A modern development is to connect all the MCC compartments to an electronic signalling system that allows the status of the contactors, the current drawn by the motors, the busbar voltage and so on to be transmitted to a computer, which sends signals as necessary to start and stop motors fed from the MCC.

Personally, I'm not in favour of the system. I think that if a MCC has a fault or an unexpected trip, the fault should be sent as a single signal to the control room or electricians' workshop and somebody should go to the MCC room and see what's going on (anyway, every MCC room should be inspected regularly).

A well-designed MCC is a pleasure. And a badly designed one is a nightmare. An overdesigned one is silly.

But there is something of historical interest: in the days of old, buses and trams were electrically powered and supplied from overhead wires strung the length of the street and supported by insulators strung from poles on either side of the street. The wires were known as 'bus wires' and, similarly, the first MCCs had wires strung the length of the switchboard, which became known as bus wires. And, when these became solid bars, the term 'busbars' was invented.

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