Emphatec Control System Migration

Very few of us would consider using our existing PC for the next 30 years.
Buy the latest, most up to date computer and it seems within months upgrades are being promoted.
Manufacturers may not upgrade their DCS (distributed control system) like most of us upgrade our PC but the time will come when an upgrade, or complete replacement, is inevitable.

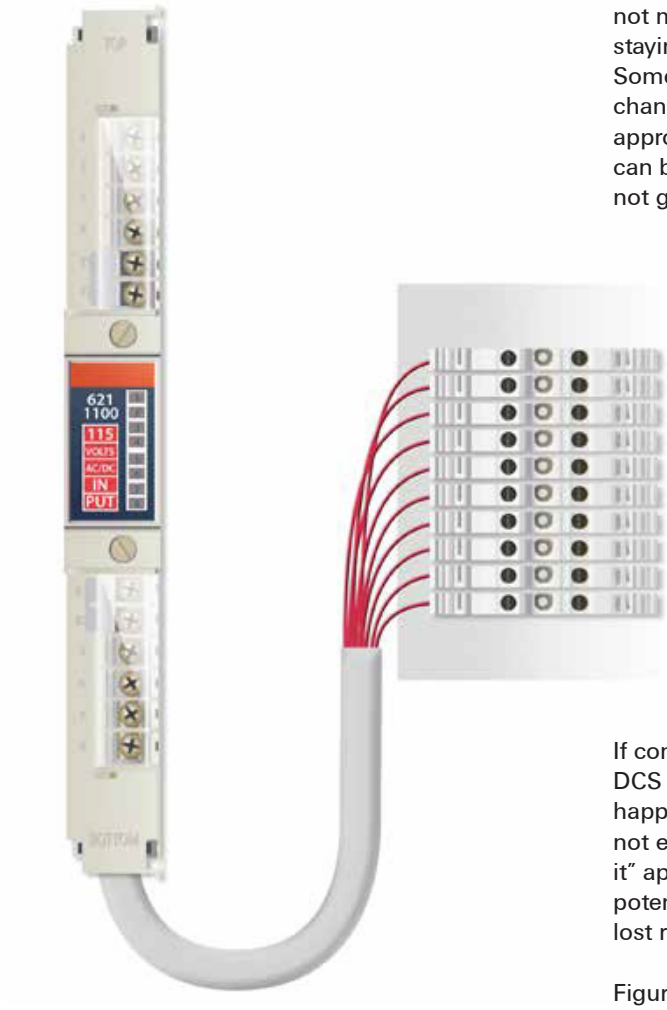
The reasons for upgrading a DCS are many but a major one is the lack of support for legacy systems as new generations of DCS are introduced. Eventually there will be no spare parts available for the legacy system and users will be forced to upgrade – or hope nothing fails and shuts down their production! There's no denying that legacy systems are at increased risk of unplanned shutdowns. DCS upgrades allow new technologies to be used and could allow integration of all manufacturing/ production assets. This could allow for greater flexibility and thus an ability to meet changing market needs while remaining profitable.

$60B
Worldwide

How big is the issue of control system migration? There are estimates that in the US there are $8-12 billion worth of legacy control systems. These systems are at least 30 years old and nearing the end of their useful operating life. Globally, the number increases to over $60 billion! Assuming the plants they control are not simply shutdown and decommissioned this represents a huge market for new control systems. The challenge is to upgrade the DCS while the plant continues to operate and generate revenue.

klippon engineering

Figure 1



Upgrading or migrating control to a new DCS is not an easy task. It is expensive, planning is critical and there is risk involved. However, not migrating to a new system could prove to be more expensive than staying with the existing system.
Some systems are upgraded incrementally while others are completely changed in one step. There are advantages and disadvantages to both approaches but the key deciding factor is the length of time the plant can be out of operation and
not generating revenue.

A key part of control system migration is whether it can be done without shutting down production for an extended period of time. This applies to both a phased-in migration and a complete system migration. Ideally migration would take place while the facility is running. The next best scenario is for the migration to occur during a planned outage. To make this possible most customers insist that the migration does not involve the part of the system that is operating trouble free and is not nearing the end of its useful life – the field wiring (the wiring between the DCS I/O points and the sensors and actuators throughout the plant).

If control is to migrate from a legacy system to a new system, either a DCS or in some cases a PLC based system, the preference is for it to happen without modifying the field wiring. In fact, the preference is to not even touch the field wiring. The old adage “if it ain’t broke don’t fix it” applies here. Changes to field wiring increases risk by introducing the potential for wiring errors and this could delay restarting the plant, i.e. lost revenue.

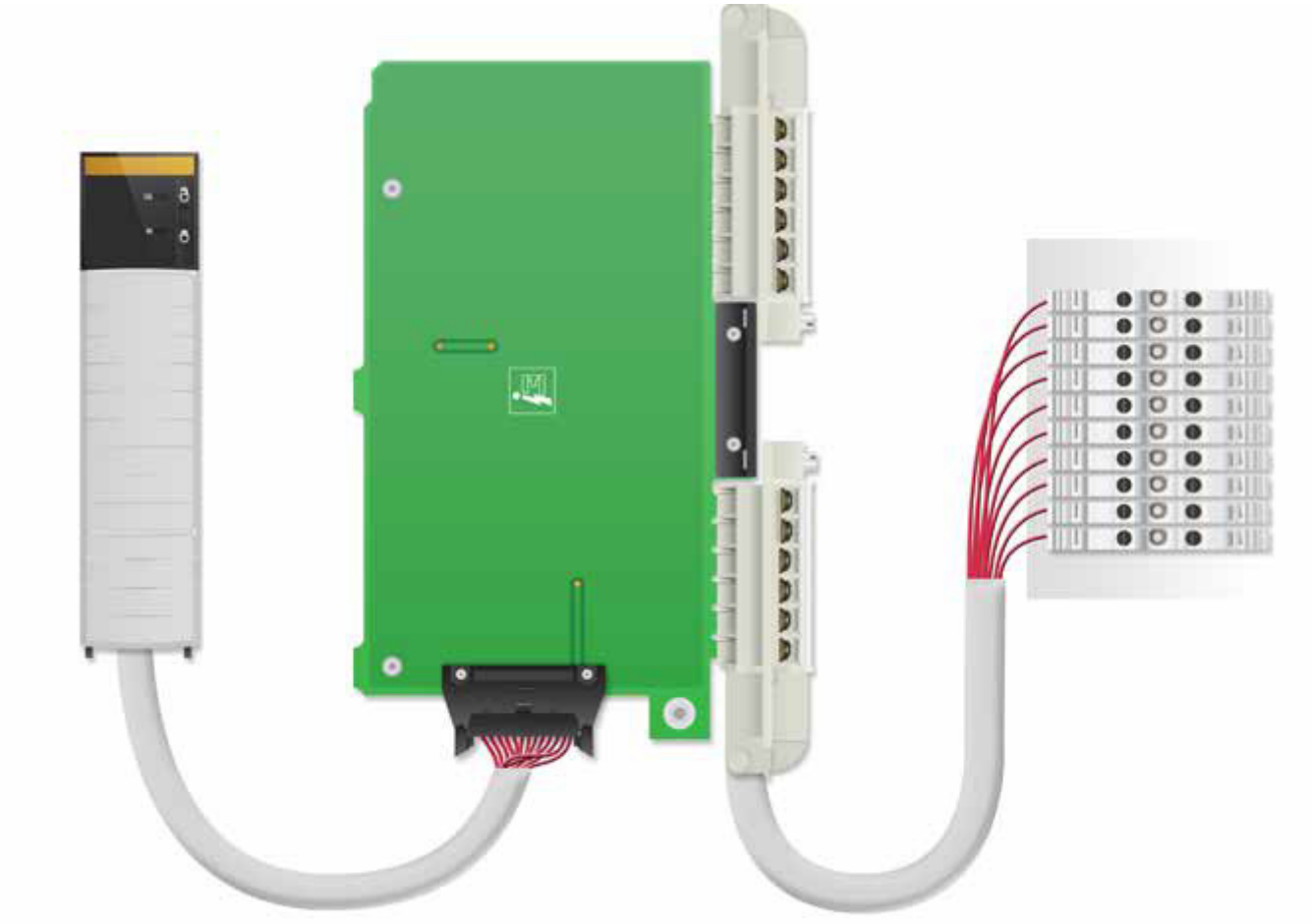
Figure 1 shows a typical wiring configuration. Wiring to and from field devices such as transmitters, switches, sensors, relays, indicators, etc. terminates on terminal blocks in junction boxes or marshalling cabinets. The terminal blocks are often a combination of feed through, fused and disconnect types. Here the signals are grouped together and taken via cables to I/O cards in racks. In some cases the terminal blocks are replaced by interface modules which might include functions not available in terminal blocks.

At the I/O card end of the cable is a connector of some type. Often this is a connector proprietary to that particular DCS system. This is where migration to a new control system can get challenging. The operator of the plant does not want to touch the field wiring because re-wiring is time consuming and a potential source of errors and delays in restarting, i.e. increased costs. But the chances of the cable plugging directly into the new system are slim. Even if the new control system is from the same supplier as the legacy system the existing cables and new I/O may not be compatible.

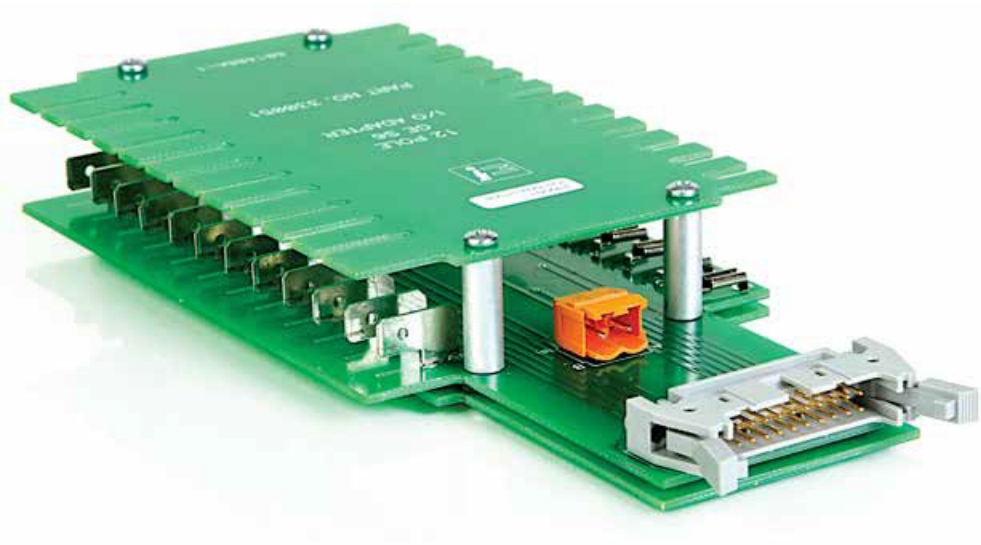
A solution is to install another layer of interface between the existing field wiring and the new control system I/O. This consists of an adapter module and a new cable. The adapter module is an interface between the existing proprietary connector and a new cable that connects to a new I/O card. Adapters can be DIN rail mounted, chassis mounted or attached to new mounting hardware. When chassis mounted, the best scenario is to re-use the existing I/O chassis but when this is not practical it is often possible to install the new chassis in place of the legacy system I/O chassis. In some cases the new I/O can be mounted on the face of the adapter module chassis. This eliminates the need for additional cabinets and minimizes the lengths of the new cables.

The advantage of the configuration shown in Figure 2 is that the existing field wiring remains and is not disturbed. Most of the engineering is spent designing the new cables for installation between the adapter modules and the new I/O cards (and of course writing the software for the new control system).

Figure 2



Adapter for GE Series 6 I/O



Adapter modules are usually completely passive meaning there is no electronic circuitry. This makes agency approvals easy and minimizes cost. Creating the mating half of the legacy system proprietary onnector can be quite challenging. It is often required to assemble it from individual components instead of using an off-the-shelf multi-pole connector.

An interesting development is that some users of legacy DCS are choosing to migrate to a PLC based control system. Weidmuller's Controllogix platform is a popular alternative as it is scalable from less than 10 to several thousand I/O, interfaces easily to drives and MCC's, is readily available from an extensive distribution network and is supported by a large network of system integrators.

Weidmuller has developed several migration products under the Emphatec MiBridge® brand. To date adapters have been developed for the GE Series 6, Westinghouse WDPF, and Honeywell IPC-620 systems and others are in development. They have been used in a Canadian steel plant and a forest products facility in California. To date all of Emphatec's MiBridge® products have been used to migrate control from a legacy DCS to the Controllogix platform.

Weidmuller Ltd.
10 Spy Court
Markham, ON
Canada
L3R 5H6
Toll Free: (800)268-4080
www.klippon-engineering.com/emphatec

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