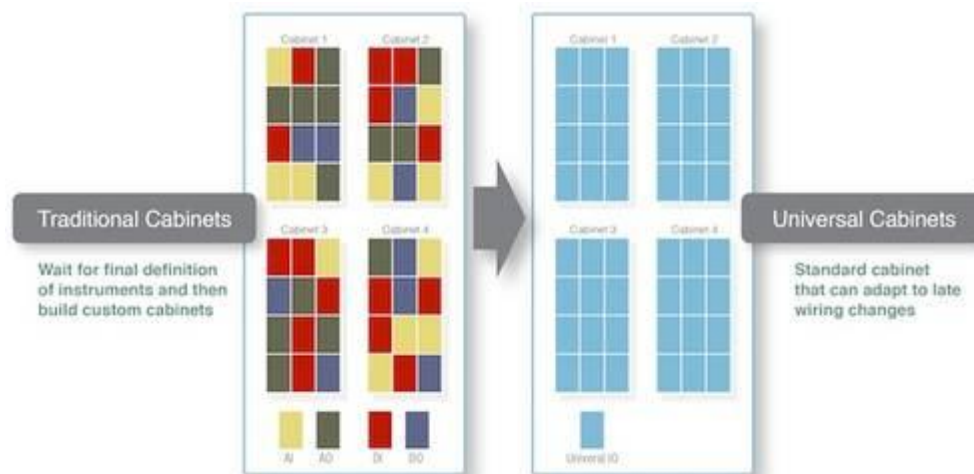


New approaches for remote I/O installations

New modular I/O technologies increase your options for communication with field instrumentation and devices. These are particularly useful when longer distances are involved.

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Advanced functionality with an easier setup: Creating a product that can be described with that phrase is the Holy Grail for just about every type of technology-dependent industry these days, and the increased demand for faster project completion and plant start-up have made it a necessity in manufacturing. The digital plant that seemed so futuristic just a few years ago is providing operators with functionality that most manufacturers never had before. There are still many strides that need to be taken, however, before faster and easier project completion—and therefore faster plant start-up—becomes normal.

One of the more recent advancements that stands to make significant inroads toward solving this problem is in the area of marshalling cabinets for field wiring, which for years have been used to connect signals from thousands of field devices to a control system in a logical and reliable way. This practice is very effective at grouping signals together according to I/O type, but it can be time consuming. Project schedules, however, are continuously being compressed, leading users to search for alternative methods of connecting the field signals to the control system.

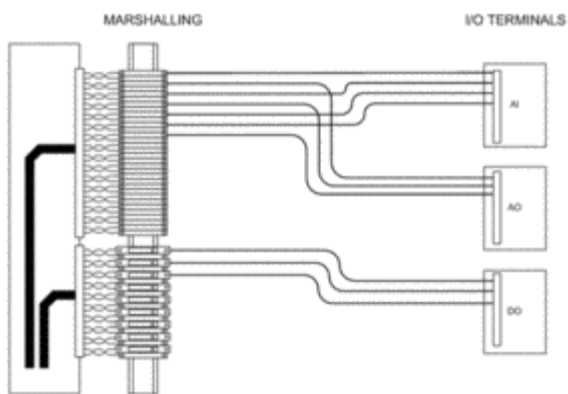
Mounting I/O remotely in the field is one application that has particularly driven changes in marshalling practices. One such change is the concept of universal channel technology and universal cabinets that eliminate the need for marshalling by allowing any signal type, analog or digital, input or output, to be landed on any terminal and configured through software.

At first glance, this emerging approach appears to earn the elusive advanced-but-simple award, as simplifying field-to-control-room architecture can shave weeks and even months off project schedules while still delivering the advanced functionalities in high demand today.

Marshalling concepts

The approach for connecting field signals to process controllers follows a common formula: the field signal wiring is first brought to local junction boxes, which are then consolidated into more centralized junction boxes, which are then grouped into multi-core cables, often with common characteristics like low or high voltage, or analog or discrete. These multi-core cables are then brought into marshalling cabinets, where a variety of methods are used to connect the output of the marshalling cabinet to the control system. The goal of this philosophy is to bring all of the instruments into the control system in an orderly, maintainable, and robust manner that is still cost-effective from an installation and lifecycle standpoint. Three common methodologies for marshalling are half-knit, fan-out, and cross-wire.

Half-knit

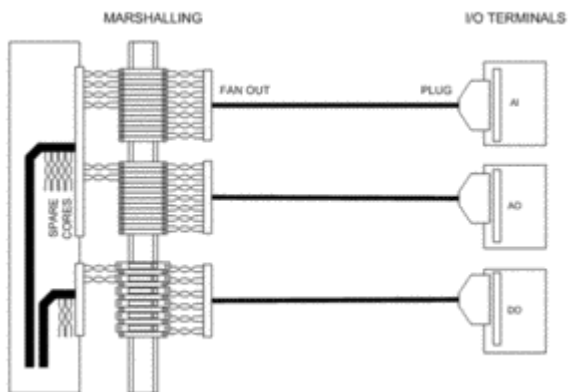


Half-knit marshalling performs the scrambling on the system side. The field cables are terminated on marshalling blocks in pair order, making this very efficient and easy to maintain. This type of marshalling arrangement is suitable in several situations:

- Where cross-wiring is done in a remote instrument enclosure (RIE) or on site. In this case, the scrambling done between the marshalling blocks and I/O terminals is completely contained within the RIE.
- Where marshalling and I/O terminals are in the same system cabinet. Like the RIE example above, the scrambling done between the marshalling blocks and I/O terminals is completely contained within the cabinet.
- Where marshalling and I/O terminals are in different system cabinets, but the cabinets are permanently joined together.

It is less suitable when the marshalling and I/O terminals are in separate cabinets that are assembled in different places, or must be connected to conduct a FAT (factory acceptance test), then disassembled and reconnected when shipped to site. Once delivered on site, the connections between the marshalling and I/O terminals must be redone.

Fan-out



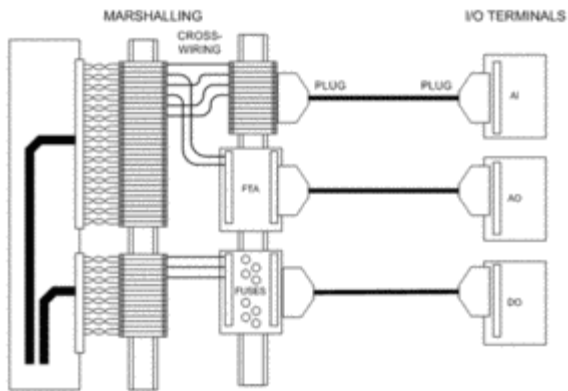
Fan-out marshalling is appropriate for systems where marshalling cabinets and system cabinets are connected during system staging and FAT, but need to be disconnected and shipped separately. The shipping dates may be different depending on construction schedule; often, marshalling cabinets are required several months earlier than system cabinets.

In this arrangement, field wiring is not terminated in pair order, and a custom termination is required per cable. Any spare pairs are left in the duct, increasing the risk of using those spare cores later in the operational lifecycle of the plant.

After FAT, the cables are disconnected from the system cabinets and coiled up in the bottom of the marshalling cabinets. On site, the cables are connected back to the system cabinets. Care must be given to the

connectors, which can be damaged in a construction environment. The cable length must also be known during manufacture, which is much earlier in the process.

Cross-wire



From a high level, cross-wire marshalling combines elements of the half-knit and fan-out marshalling schemes. Cross-wire marshalling takes field cables and terminates them in pair order. Scrambling is done to the disconnects, fuses, or termination assemblies. Common prefabricated cables are used between the disconnects and system cabinets.

This solution is suitable when using separate marshalling and system cabinets. As different cable lengths are available with the prefabricated cables, the final room layout does not need to be known until much later in the process. Additionally, fuses, relays, or isolators can be installed between the field signals and the I/O terminals.

This marshalling scheme has the advantage of being easier to maintain, and it reduces the total amount of installation time on site since it is just a matter of plugging in prefabricated cables on either end of the solution. It has the obvious drawback of requiring additional cabinet space.

Source:

<http://www.controleng.com/single-article/new-approaches-for-remote-io-installations/1d046b190ef45fa5aebce467f0017549.html>