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Known by names such as prefab wiring, prebuilt wiring and modular wiring, manufactured wiring systems (MWSs) have been in existence for about 25 years. Although MWSs are recognized as a serious alternative to conventional wiring methods, the debate between the traditional pipe-and-wire approach to electrical installations and MWSs goes on.

“MWSs’ evolution has been driven by the necessity to reduce cost and fast-track electrical construction activity,” said Serge Oberoi, vice president, process development and transformation for Electec Ltd., Ottawa, Ontario.

According to Jeff McDermott, product manager for Legrand/Wiremold, West Hartford, Conn., one of the reasons for refocusing on MWSs is to help deal with the perceived labor crisis in the construction industry as older electricians begin to retire.

“MWS minimizes the number of hard connections that need to be made and enables more work to be delegated to apprentices,” he said.

James Anderson, product manager, Cooper B-Line, Highland, Ill., agreed. “The driving force behind establishing MWS was the desire to save time and labor and to increase efficiency,” he said.

OK, it’s clear the market is growing, but what exactly makes up an MWS? An MWS is an easily installed modular distribution system that is more efficiently prefabricated off-site in a controlled environment.

According to the Tratos Group, Stefano, Italy, an MWS enables electricians to provide a complete installation—from the prewired plug-in distribution board, which is completely wired internally, to the farthest points of a circuit—by simply connecting the components together and using a series of preterminated cables and prewired connecting hardware, such as extenders, drops, taps, phase splitters, distribution boxes, etc., to power luminaires, receptacles and other electrical devices in a building.

“An MWS is a flexible system that uses factory-manufactured components that clip together and eliminate the tedious and repetitive work of installing pipe, pulling wires, cutting, stripping, and screwing wire nuts,” Oberoi said.

Some MWSs are more comprehensive than others. Several manufacturers supply modular systems that can address the wiring needs of any building in as little as 20 percent of the time required to perform a project of similar scope with traditional methods. The most basic MWS will include brackets, boxes, mud rings and ground wire, while midlevel offerings include installed devices with the wiring partially completed.

“The most comprehensive offerings provide a complete turnkey solution that includes the devices, supports for the boxes, and all the wiring required to connect those boxes,” Anderson said.

The heart of any turnkey solution is the power distribution box (PDB).

“The PDB is essentially an enclosure that is factory-wired with a specified number of modular ports and circuits. Standard boxes typically have nine modular ports and three circuits,” said Tony Kranidis, engineer for Camino Modular Systems Inc., Toronto, who added that the PDB can be customized, depending on the layout of the space and specific project requirements.

The second component consists of the modular plug-and-play connectors that plug into the PDB on one end and into the service outlet on the other. Standard service outlets typically have connections for electrical receptacles and for voice and data cabling jacks. When combined into a service center, they normally are located at workstations and equipment locations in boardrooms and meeting rooms and as general service outlets in corridors.

According to Oberoi, an MWS can be used as an economical alternative to traditional wiring in commercial, industrial and institutional buildings.

“MWS has gained a foothold in schools, hotels, office buildings, factories, big box stores, warehouses, airports, shopping malls and sporting arenas,” Oberoi said.

McDermott said that MWSs enjoy the most success in raised-floor and dropped-ceiling environments because of the easy access they provide.

“The modular nature of [an] MWS makes it easier to perform future moves, adds and changes with few new wiring connections and to reconfigure for extra capacity and scalability for added circuits,” he said.

The perception problem

Opponents of an MWS often claim that the potential savings from using the system are inflated.

“In spite of the fact that simply inserting a plug into a receptacle is faster than making hard connections, many opponents of MWSs continue to discredit the labor savings,” Oberoi said. The objection, he said, is perhaps rooted in the fear that MWSs might contribute to job losses in electrical construction trades.

Opponents who accept the savings argument may still assume that an MWS plug-and-play feature is not as easy as manufacturers claim.

“We can overcome this misperception by continuing to use quality materials and demonstrating that the product has tight connection tolerances,” McDermott said.

Perhaps the greatest incorrect assumption about MWSs, according to Anderson, is that the cost is greater than traditional assemblies.

“This misconception can be overcome by educating contractors and distributors to look instead at the total installed cost of the system, not just the materials,” Anderson said.

When contractors consider the increased labor costs and maintenance of traditional installations, MWS solutions end up being more cost effective.

End-users also may not realize that they can experience reduced costs for space remodeling and tenant changes. With an MWS, rewiring is unnecessary because the end-user simply unplugs the system, reconfigures it to the new layout and plugs the system back in.

“Manufacturers need to continue to educate contractors and end-users in the benefits and long-term cost saving of MWSs, particularly in repetitive applications,” Kranidis said.

The why and why not

Clearly a cost advantage exists, but what other benefits do MWSs offer? Quality is the next most attractive benefit of modular wiring, Oberoi said. Factory production is better controlled than on-site wiring, and repetitive short-cycle manufacturing delivers consistent quality.

“In the construction setting, however, variables—such as working conditions, weather, working heights, low lighting, and fatigue—create a more challenging environment in which to maintain consistent quality,” he said.

Another benefit: purchasing the entire preassembled system helps eliminate the need for double-checking measurements.

While building tenants gain easier space reconfiguration capabilities through the use of MWS, electrical contractors can use the technology to perform more repetitive installations without increasing work force levels.

“The repeatability factor is key. With labor being one of the biggest costs of any job and the hardest element to predict, MWSs make installations more controlled and predictable and ensure that bid amounts are more accurate and profitable,” McDermott said.

There are challenges inherent to MWSs that continue to stall wider acceptance among electrical contractors, such as the transfer of labor dollars from the construction site to the factory floor. In addition, the systems mean meticulous quantity takeoff, and estimating is key.

“Errors in estimating can result in short shipments that can cause delays to a project, and although rare, such incidents can give modular wiring a bad reputation,” Oberoi said.

Shopping smart

Electrical contractors have a choice of suppliers of MWSs in North America and need to perform due diligence in choosing the best, most cost-effective ones. Oberoi said the most important features a contractor should look for in choosing a product and supplier include a proven track record of quality, on-time delivery and customer service; a wide range of products and cable lengths; customization capabilities; color-coded systems that are tamper-resistant and integral molded; environmentally friendly products, such as low-smoke zero-halogen that are reduction of hazardous substance (RoHS) compliant; lightweight connectors and cable ends that are made with insulating, nonmetallic material; systems that are tested to make or break at 347 volts or better; systems that are compatible with lighting controls and building automation systems (BAS); and products and systems that comply with all applicable electrical codes and standards and offer adequate warranties.

Contractors have sources to turn to for help. In North America, Article 604 of the National Electrical Code (NEC), ANSI/NFPA 70, and the Canadian Electrical Code Part 1, Section 12-2500 cover the permitted uses and installation requirements of MWSs. The safety standards for MWSs include ANSI/UL 183 and CSA C22.2 No. 203.1-94.

“These minimum safety standards provide the basic requirements for product construction, performance, manufacturing and testing methods. While there is a movement to harmonize U.S. and Canadian standards, there still exists some distinctions,” said Chris Pezoulas, Electec’s vice president of business development.

There are some practical engineering aspects to look for, McDermott said. Check that the earth-to-ground connection is the “first to mate, last to break,” that connections are easy to make and that they have high tolerance levels, that there is solid contact between connections with an audible click heard when connections are made, and that the system will interface with various wire management solutions.

“The most important features a contractor should consider are quality, versatility, lead time and cost,” Anderson said, adding that system versatility allows the contractor to assess the number of different applications for which one product can be used. “And when considering the total cost of material, the contractor should include labor and maintenance time.”

Future outlook

“As construction costs increase, the popularity of MWS has nowhere to go but up,” Oberoi said. Manufacturing companies, he believes, are likely to invest in more process automation as MWSs gain market share, which will lower production cost and spur further growth.

McDermott agreed that MWSs are only going to gain in popularity.

“As the economy continues to struggle, contractors will need to continue to look for more ways to improve margins through cost savings and faster and equally accurate installations,” he said.

MWSs are certainly not a fad and have the potential to replace traditional wiring techniques in those repetitive applications for which they are best suited.

“As contractors try to perform more work with the same amount of labor, they will look to MWS to accomplish their goals,” Anderson said.

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