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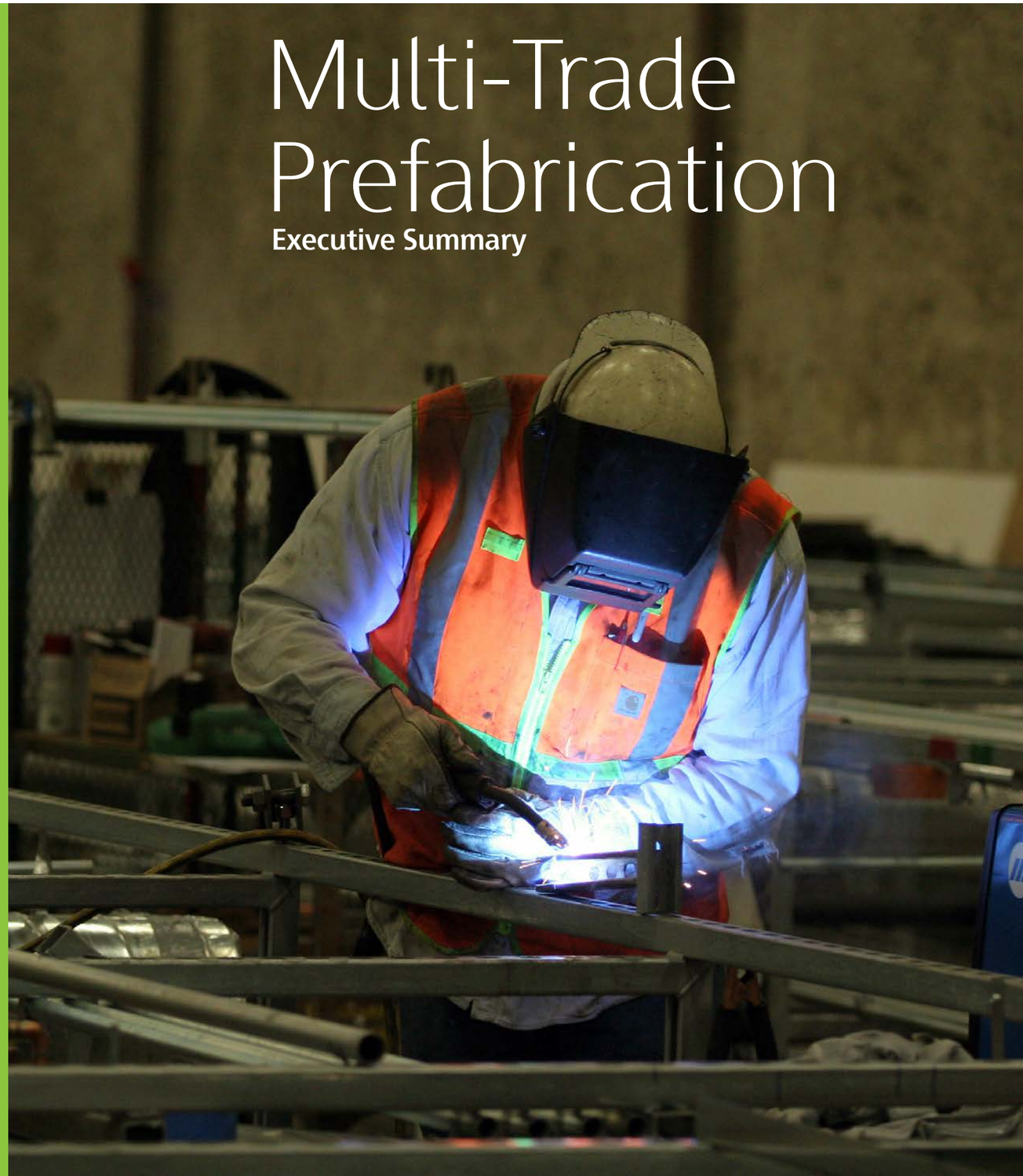
SKANSKA

Multi-Trade Prefabrication

Executive Summary



Multi-Trade Prefabrication

Building Information Model (BIM) of the mechanical/electrical/plumbing (MEP) corridor racks

Dedicated MEP crews building the corridor racks at "bench height"

MEP corridor racks lined up in the prefabrication warehouse

MEP corridor racks being delivered to the jobsite

MEP corridor racks being lifted to the floors

Workers guiding the MEP corridor racks onto the floor

Installation of MEP corridor racks

What is Multi-Trade Prefabrication? The Multi-Trade Prefabrication process allows multiple building components to be constructed in an offsite, temperature-controlled environment simultaneously with the building structure and sitework. Projects with complex but repetitive elements, such as vertical and horizontal mechanical/electrical/plumbing (MEP) systems, patient rooms, bathrooms, clinical spaces and building envelope systems, are extremely well-suited for multi-trade offsite prefabrication.

Multi-Trade Prefabrication's Origin and Use: Skanska's European operations have been using this method for over 15 years. After extensively studying the process, Skanska USA pioneered Multi-Trade Prefabrication on the Miami Valley Hospital Southeast Addition in Dayton, Ohio in 2008. Lauded as the "most ambitious U.S. implementation of the strategy" by *ENR Magazine* and the "Leading Edge of Hospital Construction" by *Medical Design and Construction Magazine*, the method is now being used on multiple Skanska projects throughout the U.S. and is moving swiftly to become a standardized practice for our projects.

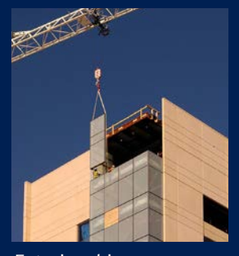
Implementation: Using Multi-Trade Prefabrication requires additional up-front planning. Items to consider include identification of components; identification of a secure location for prefabrication and storage; use of BIM; coordination with local Authorities Having Jurisdiction (AHJ); use of mock-ups; and selecting the right subcontractors.

Prefabricated Components

Patient bathrooms

Patient headwalls

MEP corridor racks



Exterior skin

> "We have been very pleased with the prefabrication process, which has maximized the construction schedule, reduced construction waste, manpower needs and safety concerns."
>
> Bobbie Gerhart
> Executive Vice President and Chief Operating Officer
> Miami Valley Hospital

Advantages of Prefabrication

Minimized Disruption to Campus and Neighbors	▪ Offsite work reduces the amount of noise, labor and materials onsite ▪ Less traffic congestion by reducing onsite labor and material deliveries
Local Participation	▪ Components assembled, transported and installed by local subcontractors, vendors and suppliers ▪ More dollars remain in local community
Improved Safety	▪ Typical overhead work, including welding, is performed at "bench height" ▪ Crews assemble components in an environment with superior lighting, ventilation and with ample room to move around modules ▪ Reduced tripping hazards with a clean and organized space ▪ Seismic requirements can be incorporated in components ▪ Minimizes disruption to existing operations
Enhanced Quality	▪ Typical onsite construction activities are enhanced with the ability to work in a temperature-controlled warehouse ▪ Dedicated crews of carpenters, plumbers, sheet metal workers and electricians gain increased control over production ▪ Tradespeople have 360 degrees of accessibility to MEP components ▪ Standardization of MEP installations limits conflicts among trades ▪ Preliminary inspections by local jurisdictions are facilitated, minimizing last-minute changes
Reduced Schedule and Cost Savings	▪ An average of 30 percent schedule savings facilitates earlier move-in dates equaling earlier owner realized revenue ▪ Cost savings are realized through a reduction in general conditions and improved production ▪ MEP and finish work is completed concurrently with building structure ▪ Use of prefabrication increases speed to market
Lower Labor Costs	▪ Production-line system reduces labor by 75 percent ▪ Offsite work minimizes trade bottlenecks, reducing or eliminating overtime and off-hour wages
Waste Reduction	▪ Reduced scrap because components are ordered to exact lengths required ▪ Fewer mistakes, misalignments and deviations with production-line system ▪ Less waste reduces costs spent on materials, handling, dumpsters and transportation ▪ Easier to recycle what little waste is created
Overall Facility Improvement	▪ Reduced above-ceiling "clutter" with prefabricated MEP systems and repetitive locations of valves, terminal boxes and cable trays. Provides higher efficiency for maintenance and future modifications.