

# CONSTRUCTION'S BEST KEPT SECRET

In the early 1900s, Henry Ford turned manufacturing on its head. His innovations enabled workers to build an automobile in about 90 minutes, down from nearly 13 hours the decade prior. Ford's formula for success was rooted in his belief that every second of a worker's day must be fluid, efficient and safe.

In construction, Ford's principles are as relevant as ever. And were he alive today, perhaps no topic would pique this pioneer's interest more than off-site manufacturing. With this method—commonly referenced as prefabrication or modular construction—elements of a project are built in controlled environments and subsequently transported to the jobsite for final assembly. Off-site helps achieve Ford's three pillars and more, delivering consistent, high levels of quality and driving out material waste and cost.

Off-site isn't exactly a new concept. But with contractors challenged to deliver projects faster with greater cost and labor efficiency, many are implementing it more deliberately and consistently. At Balfour Beatty, we've embraced this tool on projects of varying sizes and scopes. This aligns with our global business goal of achieving a 25% reduction of on-site activity by 2025. Just as importantly, we're passionate about creating environments in which our partners can work most effectively and utilizing techniques that deliver the quality and speed-to-market our clients seek.

In San Diego, California, our teammates constructed classroom buildings entirely out of shipping containers. Just a few minutes away in Chula Vista, we harnessed off-site for the elevator system at Southwestern College's DeVore Stadium. Rather than constructing the system on-site, which poses fall hazards, we completed the welding, rail installation and car assembly off-site and then installed the components in the elevator pit with a crane.

In Atlanta, Georgia we deployed pre-fabricated exterior Sto wall panels that achieved the desired finish while saving nearly \$500,000 compared to traditional masonry or EIFS. Sto is also approximately 15 times safer than field applied exteriors and protects a project from potential weather delays.

At Penn Medicine's new flagship hospital known as "The Pavilion," our team has implemented an off-site manufacturing and construction strategy that follows Design for Manufacturing Principles (DfMA). With this approach, designers create repeatable, scalable elements and standardized components. The project team has identified numerous off-site opportunities such as precast concrete, bathroom pods, pre-manufactured headwalls—and much more. Key trade and engineering partners have been engaged early in the process to create a design that fits the off-site execution method as opposed to the other way around.

Safety, cost, sustainability, productivity—off-site solutions help accomplish them all. And yet, off-site has yet to become mainstream simply due to the way we design and buy out projects. A successful off-site strategy should originate during design so that component pieces can be properly planned and procured. With most project delivery methods, however, design has been finalized long before contractors are selected, making downstream incorporation more difficult and often impossible.

The industry must also work to combat misconceptions that off-site is only practical on mega-projects, and that it doesn't offer much opportunity for customization. In fact, technologies like Building Information Modeling (BIM) and augmented reality are poised to more seamlessly integrate design-led off-site innovations into on-site workstreams.

Through our partnerships with the Lean Construction Institute (LCI) and other industry organizations, Balfour Beatty is actively advancing the off-site dialogue. "Imagine if one day RFPs require off-site strategies," envisions Mark Konchar, senior vice president and chief of innovation for Balfour Beatty. "Changing the status quo is never easy, but it wasn't long ago when now familiar curtainwall solutions were being assembled entirely in the field." Perhaps the most convincing argument for off-site is that it can help trade partners—many already stretched beyond peak capacity—to optimize workflow by reducing project schedules and planning production in the most expedient manner.

*Is this better done in a shop or in the field?* It's a question Balfour Beatty continually examines, because we are driven to deliver maximal value for our clients. By eliminating complex, difficult and potentially dangerous activities from our sites, we allow our trade partners to focus on the work at hand. Henry Ford believed simplification was the foundation of success. With off-site, the construction industry is following in this giant's footsteps.

