



VELA SYSTEMS®



TEKLA

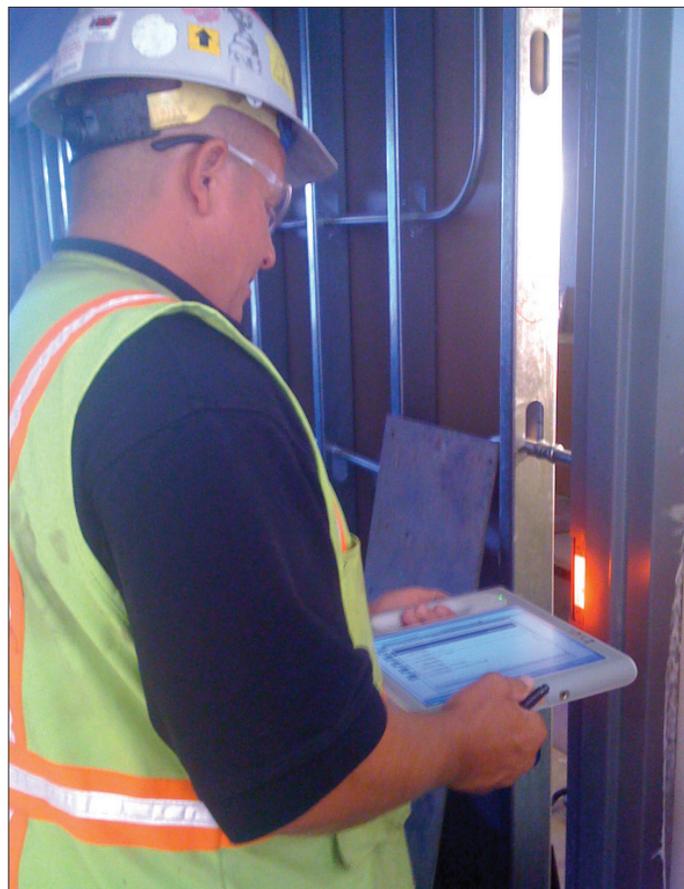
## BIM-enabled Real-Time Supply Chain Management at DPR Construction with Tekla Structures and Vela Systems

Research by DPR and CIFE at Stanford shows integrated system accelerates schedule 20%, eliminates unnecessary reorders, improves coordination and crew allocation

### The System

During construction of the University of California, Santa Cruz Porter B College, DPR Construction used field mobility software, tablet computers and Building Information Modeling (BIM) to manage all aspects of its Door, Frame and Hardware (DFH) process.

The usual DFH workflow involves tracking progress of doors and hardware receipt, quality inspection and installation by making notes on paper logs and drawings and then spending hours explaining, fixing and manually updating printed progress reports.



Darrin Sterlinski: DPR DFH Foreman for the UCSC Porter B project scans a Frame Assembly

DPR Construction chose to replace this traditional workflow with a process that is centered on BIM and material tracking using construction field software. Prior to construction, the facility and the doors and frames were modeled in 3D using Tekla Structures. This information was integrated into the Vela Systems field software Materials Tracker product. As each door assembly arrived on site, preprinted barcodes were attached and scanned using Vela Systems installed on Tablet PCs with integrated barcode scanners. The barcodes were scanned at various stages during the installation process (e.g., received, installed, etc). Field personnel, at each step of the process, could check for a shipment's completeness, correctness or identify any damaged products.

Through this 'connected' project control system, all of the information was immediately available to every project team member. Status information was synchronized from Vela Systems to the Tekla Structures BIM either from the office or the field. The construction field software was designed to be available with or without wireless connectivity. After synchronization, the status of any component was then readily available to project managers, superintendents and others.

In the BIM, each component's status could be monitored visually, and the model could be colorized to show its status in the process or any issues. Automated progress reports were generated from Vela Systems and automatically integrated, in real-time, with a version of the model that could be viewed using a web browser. In contrast to traditional workflows this would show in real-time the status of each opening and could accurately report on progress.

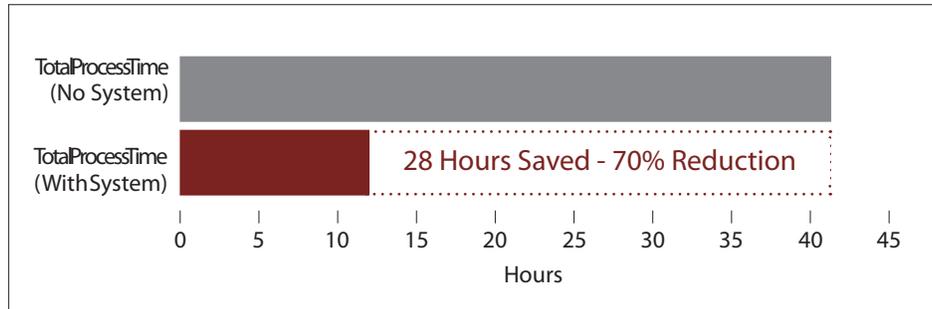
"Before the new system, it was monotonous recording pieces received and installed. I used paper with markers to track. Green = received, Yellow = installed. We'd coordinate the job and record on paper — a massive waste of time and there were still problems."

—Darrin Sterlinski, DFH Foreman, UCSC Porter B project



## The Benefits

As a part of a research project affiliated with the Center for Integrated Facility Engineering (CIFE) at Stanford University, a detailed study was done of the implementation and benefits of utilizing this system. Three key benefit areas were identified: 1) Time Savings, 2) Clear Project Visibility, and 3) Reorder Rate Reduction. Each is explored in turn below.



Researchers found significant time reductions from the Tekla-Vela Integrated Solution

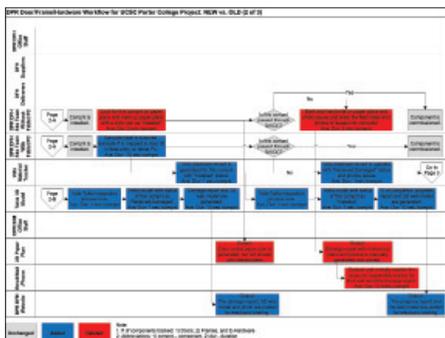
### 1. Time Savings

“With the old process, I had to fax huge amounts of paper work (e.g., fax door IDs) and make countless numbers of calls for status updates. We have gained substantial time savings with the new system.”

—Darrin Sterlinski, DFH Foreman, UCSC Porter B project

The researchers studied the DFH workflow processes before and after the implementation of the integrated Field BIM system. Overall, using the integrated system DPR realized a time savings of between 50% and 80% (depending on task) for DFH tasks. More than 28 hours of time were saved in recording, documentation, communication, and reporting. This time savings led to the 20% improvement of DFH work productivity.

The time savings came from faster processes, removal of steps, and faster information flow. The researchers found that 5 steps were removed in each phase of receipt + QA/QC inspection, installation + QA/QC inspection, and final walkthrough for DFH.



Red workflow steps are no longer needed due to the Tekla-Vela Integrated Solution (details blurred for confidentiality)

In addition, two time-consuming steps were transformed in the new process:

Old Method	Tekla-Vela Enabled Method
At time components are received or installed, field superintendent must manually review plans and update statuses	Field superintendent uses barcode scanning to instantly access component information, update status, and then output is automatically color-coded in 3D visualization
At receipt and installation any QA/QC issues are marked on plans and must be re-entered into daily reports (hours or days later)	QA/QC issues entered in the field into the tablet PC generate electronic reports and 3D visualization in “real-time” for communication to all

### 2. Clear Progress Visibility

“With the integrated system we moved from saying ‘We think we are 75% complete’ to saying ‘We know exactly which 75% is actually complete.’”

—Lisa Thomas, Manager, DPR DFH

Using Tekla Structures web-based BIM, DPR was able to publish the 3D model to its project website. With the regular updates from the field through the Vela Systems software, this web-based model could be updated in real-time. Daily, crews could see in 3D what the current status of each component was and thus what needed to be completed next in the sequence. Not only saving time, it also permitted DPR to calculate accurate progress reports and manpower statistics.

“All the project participants can check the web page for status from anywhere, anytime.”

—Lisa Thomas, Manager, DPR DFH

As another benefit, the progress visibility was used to gain a better understanding of the productivity of the team members over time.

“On this project, we were able to have an accurate picture of what can actually be installed with the number of people on the project. This helps for future planning.”

—Lisa Thomas, Manager, DPR DFH

### 3. Reorder Rate Reduction

Typically, a portion of any reorder of material is unnecessary and a clear financial loss to the project. The Tekla Structures/Vela Systems solution improved visibility into the availability of openings (e.g. ordered, onsite, damaged, installed) such that zero reorders were needed for the project, translating into direct financial benefit to the project. By making information immediately available to the DFH foreman in the field at the point of construction in Vela Systems, better decisions were made about what and when to reorder. Not only did a 3D view of the project provide immediate insight into reorder requirements, but it also provided a high level of assurance and accountability.

“The 2% of job cost related to QA/QC and reorder is now ‘virtually nil’.”

—Lisa Thomas, Manager, DPR DFH



### Conclusion

Like most jobsite material management processes today, traditional DFH workflows involve tedious paperwork, frequent phone calls/faxes and challenging coordination. DPR Construction used Tekla Structures and Vela Systems Field Mobility Software to implement a visual, automated and connected solution that brought efficiency and accountability to the process. Whether tracking DFH or any other critical path material, equipment, or components, integrated solutions of BIM and Field Software are streamlining construction industry supply chain management.

#### About Vela Systems

Vela Systems construction field software automates the execution and oversight of field activities on construction and capital projects. Instead of carrying a field notebook and paper plans or specs, jobsite users work with Vela Systems software on mobile computers to electronically access documents and to complete field reports, QA/QC inspections, worklists, punchlists, update the BIM and many other critical field activities. Construction happens in the field - Automate it.™

#### About Tekla

Tekla Structures for Construction Management is a Building Information Model-based software solution that supports contractors, sub-contractors, and project/construction management professionals by helping them to centralize and visualize project information.

#### About DPR Construction

DPR Construction is a forward-thinking general contractor and construction manager specializing in technically complex and sustainable projects for the Advanced Technology, Corporate Office, Healthcare and Life Sciences markets. A proven leader in green building, building information modeling, and lean/integrated project delivery, DPR continuously looks for opportunities to improve the construction supply chain management and provide a higher level of quality services on projects of all sizes and complexities. More information at [www.dpr.com](http://www.dpr.com).