

SPAWGLASS IMPLEMENTS TABLET PCS TO DRIVE BIM-ENABLED CONSTRUCTION

RESHAPING THE JOBSITE WORKFLOW
ACTIVITIES TO DRIVE EFFICIENCY



Company	SpawGlass
Industry	Construction
Country	USA
Website	www.spawglass.com



BACKGROUND

Building a Bigger and Better University in Texas

"All the information – design data and RFIs – is at my fingertips. Better yet, if a specialty contractor calls with questions, I simply look up the details on the F5. I never have to go back to the office trailer to review paper drawings or supplemental documents because those documents are always with me. There is no question that the F5 saves time and provides better jobsite coordination."

Dan McClure
Superintendent, SpawGlass

In November 2008, SpawGlass, a general contractor, construction manager, design/builder and civil contractor, began construction on the first phase of the Student Activity Center/Liberal Arts Building at a major university in Texas.

Completed ahead of schedule, the first phase of the project included a 109,000-square-foot Student Activity Center with several theatres, conference rooms, a food court, dining rooms, organization areas, offices, student lounges and

entertainment venues. The upper two floors total 40,000 square feet and house offices, conference rooms, study facilities and labs for the College of Liberal Arts. The building has an additional 46,000 square feet of landscaped courtyards and roof terraces.

Phase two of the project, the approximately 200,000-square-foot Liberal Arts Building was then constructed with classrooms, labs and office space for the College of Liberal Arts.

Raising the Bar on BIM

When construction of the Student Activity Center/Liberal Arts building was complete, people marveled at the structure's environmentally sustainable features and functionality. However, SpawGlass believes that the structure's digital, mobile data management solution warrants an even bigger stir. This was the first time that SpawGlass delivered a current, digital building information model (BIM) and database that university facilities managers can use to maintain the structure throughout its lifecycle. Perhaps surprising to some, the foundation for this innovation is a rugged tablet PC.

In Search of Mobility

In the years leading up to this project, SpawGlass came to realize that it needed to replace time-consuming, paper-based construction management processes with a digital mobility solution, built around mobile tablet PCs, to better coordinate and communicate jobsite activities. According to Chris Tisdell, BIM technologist at SpawGlass, "During construction, there needs to be a way to communicate design intent to the field and as-built conditions back to the office. This is particularly true when dealing with 3D models in relation to actual construction developments."

In selecting the tablet PCs, the SpawGlass team required a device with a barcode scanner, security protection, GPS functionality and a built-in camera with streaming video capability. After a technology assessment, SpawGlass selected the rugged Xplore F5 Tablet PC, designed specifically for field-based computing.

Texas-sized Savings

Part of SpawGlass's construction manager-at-risk role is to set survey control at the jobsite that contractors and specialty contractors use to locate foundation lines and anchor bolts, among other activities. For the second phase of the university project, SpawGlass's field layout professionals took the F5-based digital mobility solution a step further by taking advantage of an innovative survey solution that utilizes the F5 to connect the BIM with the field, increasing the ease, speed and accuracy of the job.

SpawGlass combined the F5 with Primavera P6 project management software, Navisworks Simulate design, simulation and project review

COMPANY PROFILE

SpawGlass is a Texas-based general contractor, construction manager, design/builder and civil contractor – with expertise in Building Information Modeling (BIM) and green building, serving clients in corporate, higher education, healthcare, government/public, senior/campus living and more.

THE SOLUTION

In selecting the tablet PCs, the SpawGlass team required a device with a barcode scanner, security protection, GPS functionality and a built-in camera with streaming video capability. After a technology assessment, SpawGlass selected the rugged Xplore F5 Tablet PC, designed specifically for field-based computing.

THE BENEFITS

- Saves time
- Improves efficiency
- Streamlines project site management
- Provides project owners with a portable asset management solution



software and Carlson surveying equipment with a robotic total station solution.

“We’ve replaced the laptop, data collector and paper drawings with the Xplore F5, which has increased our mobility and production while further driving the transfer of digital data from the office to the field and back again,” said Mike Sanford, superintendent with SpawGlass.

With the survey software loaded on the F5s, SpawGlass is able to select control points directly from the CAD drawings or 3D model while in the field and manipulate, layer and overlay drawings on the fly.



“In past efforts, we’ve had data transfer issues between the data collector and the laptop, particularly when comparing shots of existing conditions to a BIM or CAD drawing,” recalled Sanford. “With the F5-driven survey solution, there’s no need to go back to the drawing board because the drawing board never leaves my side.”

Built to integrate seamlessly into existing business IT infrastructures, the Xplore F5 features an Intel® Core™ i5 or i7 vPro™ for superior performance, which can run virtually any application and, in many cases, replace laptops used in the office or in the field. The F5 also is available with the Intel Core i3 processor for a lower starting price point and

balance of power and battery life.

For SpawGlass, the F5 significantly outperforms the 800 MHz data processors integrated within the robotic total station.

“The Xplore F5 replaces the data collector and runs the robotic total station using Bluetooth technology with almost no latency even when drawings are open in the program,” said Sanford. “We can actually see where we are on the drawing and identify problems in real time, which was not previously possible on a standard-sized screen.” Sanford and his team also use the Xplore F5 built-in Bluetooth® technology to download up-to-date drawings while in the field. With Navisworks Simulate software running on the F5, the team is able to view in real time what is being installed as it relates to the finished product, therefore identifying and eliminating problems in the field before they become a cost impact. As questions arise, surveyors can show specialty contractors 3D drawings of elevations as well as the finished product. Running the Primavera P6 Enterprise Project Portfolio Management scheduling program on the F5 makes it easy for surveyors to share the project schedule with field personnel in real time as well as input schedule updates while in the field.

“In the past, we’ve lost a significant amount of time going from the field table to the site and back again, responding to questions or issues that arise,” said Sanford. “Keep in mind that the setup of a robotic total station takes about 30 minutes – and while we’re gone, the specialty contractors are left waiting. Now, we never have to break down the survey system to check paper plans at the field table.”

The F5-driven survey process also has helped facilitate BIM data management. As the Liberal Arts Building Phase II portion of construction advanced, SpawGlass surveyors were able to record actual field developments on the F5 and then instantly upload those changes to the BIM.

“We take our office with us,” concluded Sanford. “In short, the F5-driven survey solution has changed the world of field engineering, creating a more seamless, efficient process that pays dividends in the form of time, profit and deliverables, while easing frustrations in the field.”

“The F5 streamlines jobsite activities, allowing users to not only augment the daily process, but moreover, reshape the process to drive efficiency.”

Model Connections

The first step in the construction management process was to create a detailed 3D model that incorporated the necessary geometry and design protocols, along with schedule, required materials, personnel and equipment resources and cost information. Once construction began, the models were converted to PDFs with links to requests for information (RFIs).

On any project, regardless of size, RFIs are a common occurrence based on the way design and construction teams traditionally coordinate a project. Although the Student Activity Center/ Liberal Arts Building is not an exception to the rule, the way SpawGlass interacts with RFIs and the design team is far more proactive and efficient than ever before.

For the first phase of construction, SpawGlass created thumbtack links of the rooms where there were design changes, marked RFIs on the digital drawings and exported the files to the F5.

“All the information – design data and RFIs – is at my fingertips,” said Dan McClure, superintendent with SpawGlass. “Better yet, if a specialty contractor calls with questions, I simply look up the details on the F5. I never have to go back to the office trailer to review paper drawings or supplemental documents because those

documents are always with me. There is no question that the F5 saves time and provides better jobsite coordination.”

As changes or revisions occur in the field, superintendents use wireless connections on the F5 and jobsite data servers to funnel the information back to the BIM team in the office, who revises the model accordingly. Some changes require the modification of objects within the model, while other changes require the modification of the data.

“All information passing through the tablet PC connection is captured digitally and can be incorporated into the BIM as data or as linked attachments,” explained Tisdell. “The F5 streamlines jobsite activities, allowing users to not only augment the daily process, but moreover, reshape the process to drive efficiency.”

Incorporating BIM

Monitoring construction progress was just the first step in SpawGlass’s technology evolution.

“What many people forget is that it’s not the 3D geometric model that provides the greatest value to the owner – it’s the data in the model,” said Tisdell. “Whether the architect builds the model or we do, a model that is maintained throughout construction contains a huge amount of data that owners can use to manage the structure.”





To make the most of a BIM, owners must be able to share its data with proprietary facility management systems. To make this connection, these links must go beyond a model that is hyperlinked to a PDF or embedded with an image file as well as methods typically based on scanning, PDF transfers or digital printouts. Once something changes in the model, these digital documents become obsolete.

“Our ultimate goal is to deliver a current digital 3D model and database that property owners can use to manage the lifecycle of a structure and as a starting point for renovation or retrofit,” explained Tisdell.

Database Connections

The first step in creating the BIM/database connection is to map every object in the 3D model to a field in the database.

“The connection is bi-directional – if an object in the model changes, the database automatically changes as needed and vice versa. Therefore, no matter where the data is updated, the most current information is shown in both locations,” said Tisdell.

Tisdell and his team then develop a connection between objects in the native 3D model and the corresponding, real objects in the structure. All connections are made with the ability to command

and control over a wireless area network. These connections utilize existing protocols, such as BacNet, and project-specific controls software that relate each “intelligent” object, such as smart ballast lighting. SpawGlass relies on the Construction Operations Building Information Exchange (COBie) IFC-compliant format as a baseline for all of the facility’s data that is gathered and pushed out to the connected database.

“As the model evolves through design and construction, it will gradually incorporate additional data requested by the owner,” said Tisdell. Once the model hits critical mass and the data contained within is no longer created on a large scale, but rather simply revised, SpawGlass’s 3D model will be exported to a purely data-driven (no modeled objects), bi-directional database.

“The bi-directional database is primarily useful to the owner simply because most of the existing infrastructure that owners operate cannot directly connect to a BIM,” added Tisdell. “The key is to have as few handoffs of information as possible between an owner’s end product and the BIM.”

At present, SpawGlass has developed a process where there is only one connection between any owner and the native BIM model deliverables – and the firm is putting the methodology to work on the Liberal Arts Building Phase II project.



Owner's Edge

During construction, all relevant information used to design, construct and coordinate the building process will be readily accessible to anyone on the project team. To prepare the model for use by the owner, SpawGlass BIM experts will tag building components with a barcode number within the model. Initially, SpawGlass will barcode major and minor MEP equipment for the Liberal Arts Building Phase II project.

By selecting an object's barcode, the owner or facility manager will be able to view detailed information about each component. Each barcode will include all requested information, such as commissioning data, installation data, maintenance schedule, startup procedures and much more.

When construction is complete, SpawGlass will download the model and database to the F5 for use in commissioning. At handover, the owner will have a mobile deliverable that provides the level of coordination in the own and operate lifecycle stage that SpawGlass employed while constructing the project.

"The ability to hand the owner the F5s with all the commissioning data and the model that directly

connects to their server system is very powerful," said Tisdell.

Once the database/model connection is "plugged in" to the owner's existing infrastructure, it then becomes the repository for all future information pertaining to that particular building.

The first phase of the university Student Activity Center/Liberal Arts Building is complete, with the second phase currently under construction. The project will be LEED certified at the Silver or Gold level and minimize adverse environmental impacts and include rainwater collection systems, solar hot water and many other green features.

