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VirtualSTEP: 4D simulation

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VIRTUALSTEP - 4D SIMULATION

THE NEED

Schedules, costs, and resources play important roles in construction industry. 4D simulation models provide a solution to organize blueprints, schedules, and cost reports into a database that integrates three-dimensional drawings with time. If construction professionals waste less time rigging work-around and fixing mistakes that could have been foreseen using a 4D model, the firms that realize the cost savings will push adoption of the technology as other firms find it increasingly difficult to compete without it. And with 8-15% of labor costs on an average project going down the drain thanks to mistakes that cause change orders, delays and rework, the notoriously slim margins of the construction industry could increase.

The main value from 4D is derived from using it proactively to visualize the construction sequence. Another benefit is the ability to run what-if scenarios to determine optimum scheduling and resource management. Also, by linking 3D drawings to a project schedule, all project stakeholders, from the owner to the tiling subcontractor, can see how the project is supposed to progress.

THE TECHNOLOGY

VirtualSTEP Products include 4D Project Navigator, Conflict Coordinator, Project Reporter, and Project Analyzer. All these products are web-based.

FIGURE 1 VIRTUALSTEP PROJECT NAVIGATOR

VirtualSTEP 4D Project Navigator allows for three-dimensional viewing in conjunction with project schedules to create a 4D simulation that visualizes construction progress and expedites project coordination among the project team (see Figure 1). The system also provides a web-based progress update for team members. VirtualSTEP Conflict Coordinator coordinates each conflict and collaborate to resolve the interferences through a web-interface workflow engine (see Figure 2).

FIGURE 2 VIRTUALSTEP CONFLICT COORDINATOR

The system will automatically identify building components that have been created in 3D CAD and are potentially designed in error. VirtualSTEP Project Reporter manages contracts, progress payments, and the change order process throughout the project lifestyle.

Contract ID	Contract Name	Contract Type	Contract Value	Contract Status	Contract Date	Contract Location
0001	Project Construction	General Construction	\$100,000	Active	2010-01-01	Site A
0002	Foundation Work	Foundation	\$20,000	Completed	2010-01-01	Site A
0003	Foundation Work	Foundation	\$20,000	Completed	2010-01-01	Site A
0004	Foundation Work	Foundation	\$20,000	Completed	2010-01-01	Site A
0005	Foundation Work	Foundation	\$20,000	Completed	2010-01-01	Site A
0006	Foundation Work	Foundation	\$20,000	Completed	2010-01-01	Site A
0007	Foundation Work	Foundation	\$20,000	Completed	2010-01-01	Site A
0008	Foundation Work	Foundation	\$20,000	Completed	2010-01-01	Site A
0009	Foundation Work	Foundation	\$20,000	Completed	2010-01-01	Site A
0010	Foundation Work	Foundation	\$20,000	Completed	2010-01-01	Site A
0011	Foundation Work	Foundation	\$20,000	Completed	2010-01-01	Site A
0012	Foundation Work	Foundation	\$20,000	Completed	2010-01-01	Site A
0013	Foundation Work	Foundation	\$20,000	Completed	2010-01-01	Site A
0014	Foundation Work	Foundation	\$20,000	Completed	2010-01-01	Site A
0015	Foundation Work	Foundation	\$20,000	Completed	2010-01-01	Site A
0016	Foundation Work	Foundation	\$20,000	Completed	2010-01-01	Site A
0017	Foundation Work	Foundation	\$20,000	Completed	2010-01-01	Site A
0018	Foundation Work	Foundation	\$20,000	Completed	2010-01-01	Site A
0019	Foundation Work	Foundation	\$20,000	Completed	2010-01-01	Site A
0020	Foundation Work	Foundation	\$20,000	Completed	2010-01-01	Site A
0021	Foundation Work	Foundation	\$20,000	Completed	2010-01-01	Site A
0022	Foundation Work	Foundation	\$20,000	Completed	2010-01-01	Site A
0023	Foundation Work	Foundation	\$20,000	Completed	2010-01-01	Site A
0024	Foundation Work	Foundation	\$20,000	Completed	2010-01-01	Site A
0025	Foundation Work	Foundation	\$20,000	Completed	2010-01-01	Site A
0026	Foundation Work	Foundation	\$20,000	Completed	2010-01-01	Site A
0027	Foundation Work	Foundation	\$20,000	Completed	2010-01-01	Site A
0028	Foundation Work	Foundation	\$20,000	Completed	2010-01-01	Site A
0029	Foundation Work	Foundation	\$20,000	Completed	2010-01-01	Site A
0030	Foundation Work	Foundation	\$20,000	Completed	2010-01-01	Site A

FIGURE 3 VIRTUALSTEP PROJECT REPORTER

A variety of budgeting and cost reports are automatically updated by a central database and accessible to all levels of management depending on their set permission. Reports are accessed through a web browser. Project Analyzer empowers managers to review the impact of proposed changes and compare different construction alternatives in a visualized environment (see Figure 4).

FIGURE 4 VIRTUALSTEP PROJECT ANALYZER

BENEFITS

The software and projects can be hosted by the company and used at <http://www.virtualstep.com>, or installed locally.

Contractors can post 2D drawings to a project area on the Website, where software will combine the drawing and schedule and create a 4D simulation of the construction plan, checking for conflicts at the same time. The system supports drawing files created in AutoCAD or MicroStation, and schedules created by Microsoft Project or Primavera P3.

The conflict detection feature lets users identify and resolve potential conflicts in a structured manner. The system looks for hard conflicts, where objects try to occupy the same space; spatial conflicts, where code requirements for access or clearance are violated; and dynamic conflicts, where the construction sequence and schedule create unworkable situations.

The primary advantages are:

OWNER / DEVELOPER

- View 4D “Snapshot” Image of Project Status
- Utilize Existing Hardware / Software Application
- Ease of Use and Minor Adoption Training Cost

DESIGN PROFESSIONALS

- Evaluate Impact of Modifications
- Monitor Design and Construction Progress
- Reuse Archived Data to Speed Design Process

CONSTRUCTION TEAM

- Progress Payment and Cash Flow Management
- View Anticipated Delays in Advance

- Tighten Resource Allocation
- Better Subcontractor Collaboration and Direction

STATUS

VirtualSTEP founded in 1999. Their products are a series of web-based software applications that collaborate construction scheduling, cost control, and project management through ASP model. VirtualSTEP target markets are Building and Facility Owners, Design Professionals, Construction Managers, General Contractors, and Subcontractors of building projects. Headquartered in Hayward, CA., VirtualSTEP services are gradually being utilized in USA, Taiwan, and Japan. With little marketing budget and efforts, VirtualSTEP has received increasing attentions from the market.

BARRIERS

The one of the barriers to using VirtualSTEP directly was that users must have access to the internet. Because of the huge data in drawings, schedules, costs, and resources, it takes a long time to connect the website if the net is busy. An improvement of this problem has been done in April. Now, the software and projects can be hosted by the company and used at www.virtualstep.com, or installed locally.

POINTS OF CONTACT

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REVIEWERS

Peer reviewed as an emerging construction technology

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PUBLISHER

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