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Are Owners Seeing in 3D?

Adding a new dimension to planning and execution

■ By **Joe Morray**

The use of 3D models by owners has always been a matter of some debate. Primary among the challenges has been the large expense associated with capturing existing facilities in 3D, though this has been somewhat mitigated through the significant advances in laser and point cloud capture. The other issue is how can owners use 3D models in their typical business processes, centered on operations and maintenance activities?

Foremost in his advocacy of 3D for owners is my Trinity Technologies colleague Ed Anderson, formerly of Air Products. Through his seminars, he discusses a wide array of business processes which are uniquely addressed through the use of 3D models.

"I constantly hear people say, 'It is just too expensive to keep the 3D model up-to-date,'" said Anderson. It is obvious to me these people do not understand the new work practices that 3D enables, and therefore cannot "do the math" to actually determine if keeping the model up-to-date is expensive or actually reduces the cost of operations.

"Countless case studies tell us that it is much more expensive to keep multiple drawings produced by multiple organizations up-to-date and synchronized than to keep one 3D model up-to-date," said Anderson. Among the business processes he cites are:

Owner overseeing construction process

Delivery of a 3D model through viewing software has been shown to greatly improve the planning process at all stages. The high-level milestone plan must be created several months before construction is scheduled to mobilize onsite and the 3D model (actually 4D with time mapped in) is provided to all key stakeholders.

The plan must be formed with all craft supervisors through a coordination process referred to as a "sticky note process." The objective is

for the teams performing the work to create a plan that meets – and preferably exceeds – the high-level plan created earlier. The 3D model makes the entire construction plan visible to all project stakeholders, including management, so that issues can be identified quickly and then resolved.

Plant commissioning

By using the 3D view/redline tool we discovered that we were able to create inspection circuit "drawings" from the model. In one particular example, as a result of reusing the model, the maintenance department was able to:

- Reduce its inspection expense budget by more than US\$293,000 for the baseline study
- Reduce the number of man-hours required to create the inspection circuit drawings by 3,100 hours
- Reduce the plant commissioning schedule by several weeks, allowing the plant to come online sooner – this was the most significant benefit. Note that the plant was actually started up before all baseline inspections were completed and documented.

Use of 3D images to guide the startup crews

Anderson frequently reminds his clients that "no one has to be taught how to read pictures." His best practices for systems startup include cutting from the model a variety of prints of the systems' equipment and piping, with the tag numbers printed on the images. "The startup crew knows exactly what they have to work on, since there is a literal picture of the layout and components," he said. "It's easy to figure out where everything is."

Plant maintenance

"I received a phone call one day from Don, a maintenance planner, whom I had trained some weeks earlier in how to use the 3D view/redline tool, since his new plant had been designed in

3D," said Anderson. "He had discovered a steam leak. 'Discovered' is probably not the operative word, since the air was full of steam and noise. As usually happens with steam leaks, it was not easy to tell exactly where the leak was located, because steam tends to blow out at all insulation joints in the vicinity of the leak.

"As he was trying to assess how to get started, not knowing exactly where the leak was, it dawned on him that he might be able to tell more about the situation if he was to see what the pipe under the insulation looked like, and if he could 'eliminate the steam cloud.' He went directly to his computer and pulled up the 3D model.

"Because he could turn off the insulation and since there was no steam cloud on his monitor, he studied the piping and finally deduced that the leak was probably at one of the small take-offs on the mud-leg. His reasoning was based upon these two areas being the weakest points, and the fact that the entire system was less than five months old. Problem analyzed and solved."

Opportunities

There are literally hundreds of these kinds of examples. There is a great opportunity for owners to add a new dimension to their planning and execution activities. We can see clearly in 3D!



Joe Morray is president of Trinity Technologies Corp., a process and power industries consulting firm that helps owner/operators and EPC firms succeed in the use of information systems. The company specializes in driving companies to align work processes, technology, and organizational change requirements for the plant environment.

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