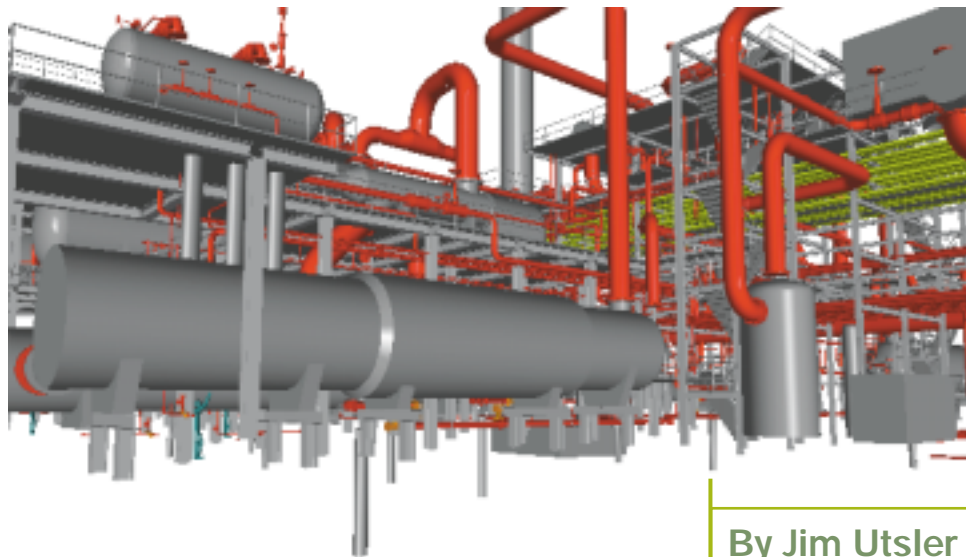


A Forward-Looking Philosophy



By Jim Utsler

**VECO Alberta Ltd.'s use of
PlantSpace on Shell's proposed
Athabasca Oil Sands Project is
resulting in a much more efficient
design and engineering cycle.**

In today's world, technology is rapidly changing. And this is most evident in the realm of computer-aided design and engineering. As design and engineering applications become increasingly sophisticated, their users are reaping benefits beyond merely being able to draw onscreen. They are able to model manufacturing and processing plants in three dimensions, use those models for detailed design work, and then share that data through the engineering, construction and operation of a facility.

Indeed, products such as Bentley's PlantSpace, coupled with a data-sharing application such as the Bentley's Enterprise Navigator, are changing the face of plant design and engineering, saving users both time and money. Enterprise Navigator allows users from any location in a large-scale enterprise like this one to access all related information smoothly and easily.

A recent example of a company putting this forward-looking approach of design and engineering to good use is VECO Alberta Ltd. of Calgary, Canada, a subsidiary of the Anchorage, Alaska-based VECO Corp.

VECO is one of the growing numbers of large-scale engineering firms to reap the benefits of electronic engineering and design tools. VECO cites the flexibility, ease of use and the universal acceptance of products such as PlantSpace as the reasons why it has embraced this leap into a new era of plant design technology. As a result of its forward-looking philosophy, it is producing three-dimensional models that can be used to detect and communicate details of highly complex project plans much quicker and more accurately than it ever could have before.

A stake in the ground

VECO, in a collaborative effort involving several other engineering firms, is working on the proposed Athabasca Oil Sands Project being lead by Shell Canada Limited. The project, portions of which are still in the early design stage, consists of two geographically dispersed but integrated components, including the Muskeg River Mine and the Scotford Upgrader.

Located in Alberta, Canada, the project is a massive undertaking whose cost will be upwards of \$2 billion (USD). The goal of the project is to produce bitumen from the Muskeg River Mine, and then process the bitumen at the Scotford Upgrader, where it will be used to create synthetic crude products. Plans for these two project elements have been completed and are currently undergoing the approval process. A decision on the project go ahead is expected later in 1999 and if approval is received, construction will begin immediately.

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— Bob Zunti, Discipline Manager of Piping, VECO Alberta

The VECO office in Calgary, Alberta, is responsible for one element of the Scotford Upgrader—the Sulfur Complex portion, which is comprised of the Amine Regeneration Unit (ARU), the Sour Water Stripper Unit, and the Sulfur Recovery Unit (SRU). Using its many years of experience in the oil, gas and petrochemical fields, VECO began preliminary engineering on its units of responsibility in the fourth quarter of 1998, with the three-dimensional modeling, using both MicroStation and PlantSpace, beginning in March 1999. It finished the preliminary models in June 1999.

Bob Zunti is the discipline manager of piping for VECO Alberta. He explains how this process, which might have taken another firm a considerably longer time to complete, was wrapped up neatly.

"We took typical equipment sizes based on the process data available, as well as comparisons of equipment from existing facilities designed by VECO, and used that as the basis to model. From that, we located the equipment within the facility and created a representative plant."

It sounds simple, but the design was much more complex than that. The initial design team also routed more than 12 kilometers of pipe ranging in size from 1/2" to 72" through the facility, running it from the central pipe rack to and from the more than 120 pieces of equipment. Once this was completed, with the piping feeding and coming off of the equipment, the engineers and designers had to tweak the layout to make sure everything fit, both width- and height-wise, into the available space, which is 160 meters by 90 meters. (The overall size of the Upgrader Facility is approximately 1 kilometer by 1 kilometer.) The models were then shown to the client. Using PlantSpace Enterprise Navigator, VECO conducted "walk-throughs" of the plant so the appropriate Shell operations and maintenance personnel could check for any construction and maintenance issues that might arise.

"There's considerable benefit to showing the 3D model to the people who are actually going to be operating and maintaining the facility before we even put a stake in the ground," says Zunti. "It is far more economical to address the end-user concerns in the engineering and design stages rather than in the midst or at the end of construction."

Much of the modeling work, which turned out to be quite detailed, was completed as part of the conceptual design phase. The knowledge VECO gained from this accurate portrait of the proposed physical units, which included the input from the Shell operations and maintenance personnel, was used in cost estimating, which VECO included in its final proposal.

Once the layout had been completed, bills of material were extracted from the PlantSpace model and shopped to several vendors for competitive pricing. This gave both VECO and the vendors a much better idea of the scope of materials that would be involved in the design and ultimate construction.

“When personnel like the software they’re using, their productivity automatically increases. Designers can concentrate on designing rather than worrying about complexities or constraints within a software program.”

– Bob Zunti, Discipline Manager of Piping, VECO Alberta

An Overall Design Philosophy

When VECO moves forward with the engineering of its portion of the Athabasca Oil Sands Project (the entire project is scheduled to be completed in late 2002), the initial models it has developed will be used to create the working model and drawings. With much of the study work already completed, finalizing the design will involve reworking what’s already there, although the reworking will require some level of detail and additional time.

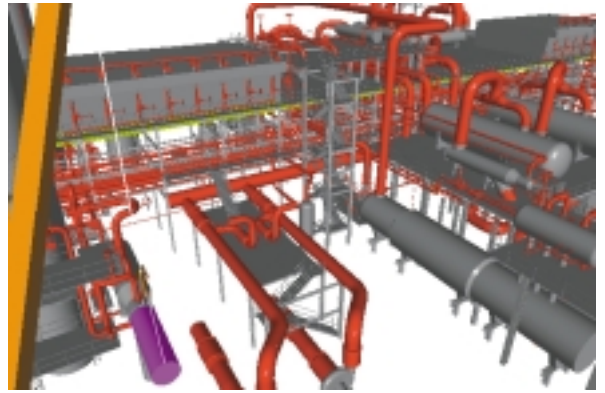
According to Zunti, “We’re only doing an estimate at this time. What we want to get from this model is the overall design philosophy that we’re going to proceed with in detailed design. As we get more detailed information back from Shell and the pipe and equipment vendors, we’ll adjust the model accordingly.”

Nearly 20 engineers and designers were involved in the early design phase of the project. Ultimately, the company expects to utilize more than 90 individuals, including specialists in electrical, mechanical and piping disciplines, for the project. Many of these specialists will be working at the construction site even after the construction begins.

The working models are currently housed at VECO’s Calgary office and are accessible

through a local area network (LAN). Once construction begins, however, the models and drawings will be moved to the site, allowing VECO’s onsite personnel to access and alter the drawings as needed, without the worry that someone back in Calgary will make unannounced changes.

VECO also plans to keep Shell up to date by conducting frequent walk-throughs using Enterprise Navigator. This will allow the client to keep up with all phases of design and engineering, from the working drawings to the final construction. This effort will hopefully negate any surprises as the process nears completion and the plant readies itself for actual operation.



“If you give people 2D drawings covering all the disciplines, they generally won’t be able to piece together what the facility’s actually going to look like,” says Barry Brad, manager of CAD/CAE information systems for VECO Alberta. “It’s a lot easier for them to be able to look at a 3D model than to visualize the plant using drawings.”

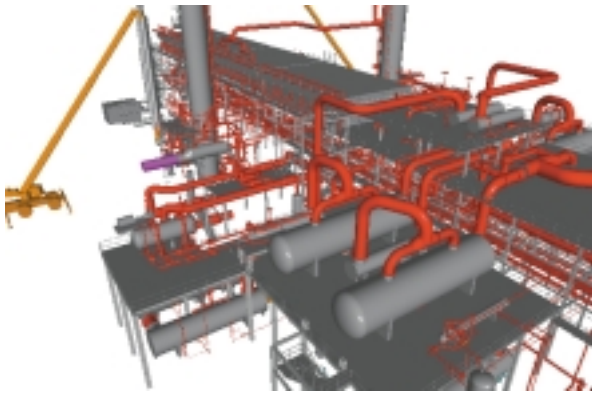
One thing that VECO is sure of is the cost savings it has experienced using PlantSpace. In addition to the Athabasca Oil Sands Project, the company is working on jobs around the globe. Some of them, such as those in Africa and the Middle East, demand an accurate accounting of what’s needed for their construction.

By extracting exact bills of materials from the models, the company can be more assured that all of the proper materials are on hand to complete the job. The alternative is components that are missing and an undeveloped transportation infrastructure to get them where they’re needed, which increases the cost of the project.

“A lot of the work we do is overseas,” says Zunti, “and our materials management has to be very accurate. If you miss purchasing material, it could take eight to 10 weeks to get it on the construction site because of the difficulties in transportation and passing through the local-area customs. Accuracy of materials is a very important aspect of what we do.”

An accurate portrait

VECO expects to have the engineering part of the project finished in October 2000, which it can accomplish with much more accuracy and fewer personnel than if it relied on older, less advanced technology. Using PlantSpace, the company is well ahead of the game, offering its clients an early but accurate portrait of what




VECO's portion of the Athabasca Oil Sands Project is going to look like when it is completed.

For his part, Zunti is very pleased with how PlantSpace fits into VECO's operations: "In my opinion, the PlantSpace suite of products comprises the best design tool on the market today, for three primary reasons:

"**One:** its flexibility. PlantSpace Enterprise Navigator is quickly becoming the product of choice for linking design data together. Whether you're using the PlantSpace products, PDS, AutoPlant or another engineering and design platform, Bentley's Enterprise Navigator has the power and flexibility to bring all the design data together so it can be manipulated from a single platform.

"**Two:** its efficiency. VECO has seen a dramatic increase in productivity in the past two years since moving to the PlantSpace Design Series. It's never an easy decision to switch from one engineering design tool to another, but the PlantSpace products have proven to be easily installed, customized and maintained to meet our various clients' needs.

"**Three:** its popularity among designers. Most of our 3D designers are multilingual in various 3D engineering and design tools on a variety of platforms. The most common feedback we get from the personnel using PlantSpace is one of approval. When personnel like the software they're using, their productivity automatically increases. Designers can concentrate on designing rather than worrying about complexities or constraints within a software program, confident that the software is taking care of itself."

With 41 seats of MicroStation and an additional 20 seats of PlantSpace in its design and engineering arsenal, VECO has embraced technological progress, accepting it as not only part of the future, but also the present. 

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