

# 7 DESIGNERS

GENERATE PIPING LAYOUTS FOR \$230 MILLION PAPER COATING LINE

by Claes Philipson

With little time and even less manpower, AF designs one of Sweden's largest industrial investments using Bentley AutoPLANT

**A**F, a leading Swedish consulting engineering firm, recently designed a \$230 million coating line for Modo Paper AB, meeting a tight schedule with only seven piping designers. At a cost of \$230 million, the new BM1 coating line in M-real's Husum plant is one of Sweden's biggest industrial investments last year and one of AF's largest individual projects in recent years. The project was a battle against the clock;





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paper for coating. The total capacity of the coating machine will be 300,000 tons per year. For AF, the contract represented approximately 60,000 hours of consultancy services in the areas of process techniques, project management, electrical engineering planning, instrumentation planning and IT services.

#### Decision to Move to 3D

A key factor in the success of the project was the decision to switch to 3D piping design methods.

“We first only intended to use 2D applications to make models of the machines in the Husum project and then

put them in the factory layout for training purposes,” says Björn Westlund, site manager at AF-IPK in Karlstad and project manager for AF’s assignment. “However, we realized that it would be very difficult to have time for the planning work if we designed it in a 2D environment. We therefore made the decision to forge ahead using Bentley® AutoPLANT®, although we would have preferred to do this on a smaller project. Only two designers had experience with AutoPLANT. But after only four days of basic training provided by Cad-Q in Karlstad and two weeks of guidance, the others were familiar with the new design environment.”

Cad-Q also provided technical support and customized the program to meet AF’s pipe standard.

production had to start quickly to produce a return on this major investment. The plant contained a considerable amount of piping, and using traditional 2D methods would have made it difficult to meet the tight deadline. The key to the project’s success was the use of 3D methods, which dramatically reduced the time needed to create isometric drawings and implement design changes.

When AF was awarded the contract as chief consultant for the new off-line paper-coating plant, it was also asked to assume responsibility for all the project planning work, project administration and electrical engineering and instrumentation planning services relating to the conversion of the PM 8 papermaking machine. The PM 8 is being converted from the production of uncoated fine paper to the production of base

“Our designers have many years of experience with AutoCAD—which gave them a flying start—and the AutoPLANT application works well in our AutoCAD® R14 environment,” says Westlund.

Anders Melin, a designer at AF in Karlstad and administrator for AutoPLANT says, “Bentley AutoPLANT is a powerful and easy-to-use tool for 3D modeling of pipe systems. Many commands are the same as in AutoCAD. As a result, we had a fast startup, and, after five days of training, I was able to start designing. Thanks to the 3D model, we were able to deliver complete documentation, which did not have a single piping clash or other problems that would have cost time and money to correct on site. If the pieces fit in on the drawing, they also fit in the factory, provided that all the details have been entered correctly in the model. This saves time during the assembly phase itself, which produces major cost savings.”

### Saving Time with 3D

“We produced the 3D model of the plant, made sure that all components fit in and then started on the piping design,” says Melin. “The key advantage of using 3D is that we only needed to model the plant once and then we were able to select views freely, which always conform to each other in terms of dimensions. If we needed to change something, we only had to do this in one place. If you make a mistake in a 2D drawing, you often have to make several changes. Through the AutoPLANT Explorer viewer, the client was able to follow the design in real time, and design changes could be made during this process instead of needing

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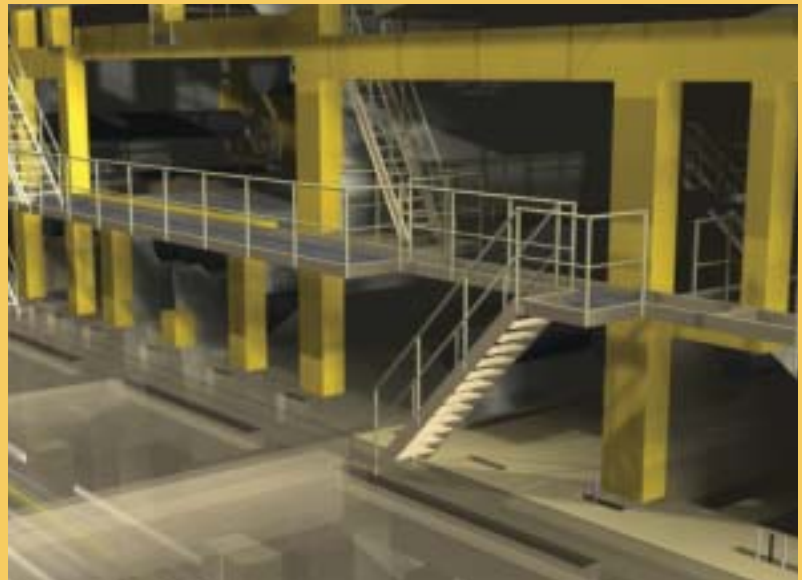
—Anders Melin, designer, AF

to redo half the process. The fitters in Husum have been given paper drawings in 2D, but, in future projects, we hope to be able to transfer the drawings electronically.”

### Collaboration is Critical

Being able to work in teams is a necessity for managing such a large project in such a short time.

“My colleagues and I in Karlstad have exchanged 3D models from AutoPLANT with the designers in Gävle and Norrköping, and this has worked well,” says Melin. He also emphasizes the ability of the software to determine pipe material requirements, “We get complete and exact bills of materials simply by clicking on the pipe components in the Access database. We saved several weeks by doing this. In the past, the



alternative was to perform 'semi-manual' quantification using calculators. This is boring, it takes time and it is easy to make a mistake when you are in a hurry."

### Up and Running on Schedule

"This project was the first time that we had used 3D CAD and Bentley AutoPLANT for all pipe installation drawings in a project," says Westlund. "We produced around 160 plan and section drawings in roughly six months with minimum staffing, and we managed the quantification of pipe materials with several simple button presses. As a result, the new machine went into operation on schedule. Without Bentley AutoPLANT, we would have found it very difficult to get all the pipe installation drawings ready in time before start of assembly."

The building that accommodates the new coating line is 283 meters long, which makes it one of the longest in the country. It is 60 meters wide and has a ceiling height of 25 meters. To make space for the building, they had to blast out 250,000 cubic meters of rock. The capacity is now 320,000 tons of coated fine paper a year, and the paper runs through the coating machine at a speed of 100 km/h. In total, the project involved 40 consultants from seven different AF offices, who have together spent roughly 60,000 working hours.



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