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German effluent treatment plant is designed in 3-D

The effluent treatment plant at a big German recycling mill has been designed in 3-D on a computer.

The process is time-saving, cost effective and flexible. Last minute changes requested by the mill were easily accommodated even though 60% of the project had to be re-piped.

The 3-D design is providing the maintenance department with excellent training material – it provides a realistic impression of where things are, thereby saving time and money.

Meri Anlagentechnik, a German designer of water treatment plant, has switched to the AutoPlant computer-aided engineering package from EDA, of California. In the past Meri produced piping drawings by hand using double-line techniques, and the isometrics were drawn by the equipment manufacturer.

With the new software, Meri creates a 3-D model of the equipment, which makes it possible to check for interferences in advance, thus saving time in the construction phase. Design time is also saved because once the model is completed, the section layouts and isometrics can be produced automatically. The new 3-D method was first used in an East German paper-mill, and design time was reduced by 35% to 40%.

Meri designs effluent treatment plant including, layout planning, co-ordinate foundation planning, concrete planning and electrical. Their most recent major project was a waste treatment plant for a paper-mill in Schwedt in the former East Germany. This project involved effluent treatment in the de-inking plant, which is designed to recycle 350 000 tons of paper a year, and is one of the first in the world to use 100% recycled paper as raw material.

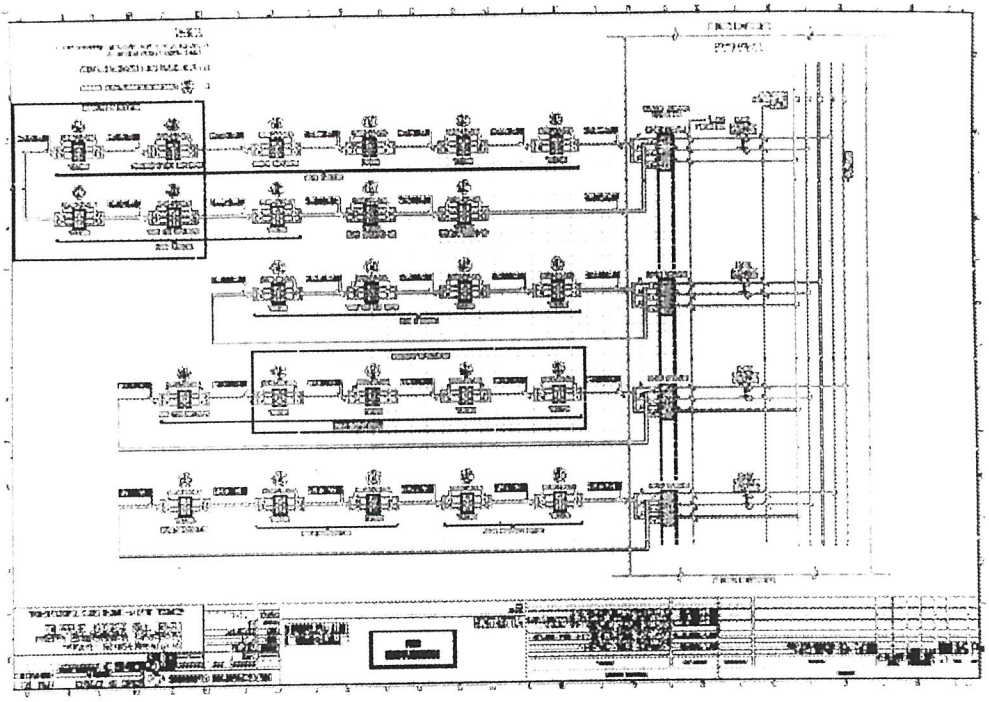
The process for this plant is proprietary, so only the waste treatment plant can be outlined here. The first step is solids removal. Thickeners are used to solidify the waste and it is then moved into a screw press and finally flotated in water to remove the solids compressed with the press. The resulting waste is then burned. The remainder of the effluent goes to biological treatment. Meri designed the piping for the chemical treatment unit; for heating, working air and measurement services; effluent piping; and all the steelwork, walkways and supports for the project.

3-D design: Karl-Heinz Vogel, Manager of Engineering, Meri Analgentechnik

Initial drawings were produced in generic AutoCAD in two dimensions. Horizontal sections – showing equipment position but not piping – were developed and then the company switched over to AutoPlant. The layout was converted into 3-D by adding elevation and thicknesses to each of the drawings; then piping details were added to the model. The 3-D model made it possible to produce more realistic isometrics which aided construction. These drawings provided the locations of each piping line and piece of equipment and showed how they fit together.

AutoPlant brings the following advantages:

- The entire plant layout is produced in 3-D, so rather than merely entering elevation data on the drawing, elevation becomes an integral part of the drawing which can be viewed from any angle to check clearances and fits. This simplifies the design process and reduces the time required to lay out a typical 30-ISO, A0-section to only 180 hours.
- Once the 3-D layout is completed, the isometric drawings can be produced much faster than before. Then, the entities which make up the line are defined, which takes a maximum of three hours including checking.
- Changes can be instituted in far less time. At one point, when the isometrics were completed, the mill requested changes which made it necessary to re-pipe 60% of the entire project. This turned out to be a simple task. Having made the piping changes in the 3-D model and regenerated the isometrics, we simply re-piped in single line mode to optimise speed. The changes then flowed through to the layouts and isometrics. To save time, we



A screen shot of the AutoPlant computer-aided plant engineering package

brought computers to the job site, which took about two days. Then it took about 45 minutes to regenerate each of the five horizontal and three vertical sections that comprise the plant view. This took about a week. In the past, we would have had to redo numerous section drawings plus the affected isometrics – by hand. This would have added two to three weeks to the project.

The project was started in the summer of 1992 and completed in May 1993. The mill was surprised at the speed of completion and was delighted with the clarity and accuracy of the drawings. The key time saving element was AutoPlant's ability to generate isometric drawings for the piping, and manufacturing drawings for the equipment and steel work with very little additional effort once the 3-D model was complete. In fact, we could produce between three and four isometrics a day instead of taking several days per isometric.

Meri is switching all work over to the AutoPlant system and recently a small job in Brazil was completed within two weeks – the steel, civil and piping engineering – rather than five weeks.

The company is using 3-D design as a marketing tool. Detail plants are produced at the proposal stage 'when we already have a solution to the client's problem'. The new system saves time and thus allows Meri to price work aggressively.

3-D design is also bringing benefits in the maintenance area. The 3-D model turns out to be outstanding training material for the maintenance department – it provides a realistic impression of where things are located, and this is saving time and money.