CUSTOMER STORY

INEOS Chlor

Embed SE Helps Prepare Operators to Run New Membrane Chlorine Plant

INEOS Chlor facility, Runcorn, Chesire.

"At 12,000 blocks, the key skill to writing a dynamic model of this size and complexity is that ... [Embed SE] allows users to split models into individual modules or compounds and set integration step lengths independently, so available computing power is used efficiently."

Philip Masding
Process Control Manager
INEOS Chlor

Chlorine and its derivatives are used in a variety of industrial applications ranging from the manufacture of paints, plastics and textiles through to pharmaceuticals, cleaning products, and personal care. With so many uses, its production is best done on an industrial scale. And a world-leader in its production is INEOS Chlor, in Runcorn, Cheshire.

INEOS Chlor is now building a new chlorine production facility that will use improved membrane cell technology. Philip Masding, Process Control Manager at INEOS Chlor, comments, "[The] new plant is a major investment. However, you're typically caught between a rock and hard place because on one hand you want to have the plant working as soon as possible and on the other hand, you can't afford to rush and make mistakes with any process that involves the bulk handling of chemicals."

When designing a new process, INEOS Chlor traditionally builds dynamic models (or virtual prototypes) as a crucial part of its design strategy. The models allow the company to perform top-level control studies and design sound control schemes. INEOS Chlor builds its models in Embed SE (formerly called VisSim), and has been using the tool for more than 20 years.

INEOS
THE WORD FOR CHEMICALS

INDUSTRY
Industrial

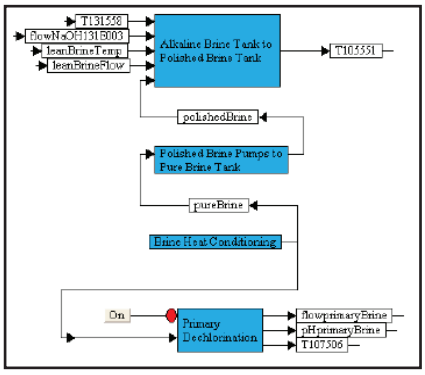
CHALLENGE
Develop a process control training model to rehearse "what if" scenarios, such as pump failures and sticky valves

SOLUTION
Use Embed SE with its OPC capability to develop system models for their distributed control system

BENEFITS
- Intuitive user interface shortens the design process
- Simulation model maximizes quick, safe, and efficient start up process

The Challenge

For INEOS Chlor's application, Embed SE is being used to model the chemistry, heat and mass balance of the brine treatment; the chemistry taking place in the membrane electrolyzers; the cooling, drying and liquefaction of the chlorine; and the de-chlorination and treatment of waste brine. However, with the development of the new plant, INEOS Chlor is building the model for more than just a control study. Masding explains, "We'd heard there were plans for Embed SE to soon have OPC, an interface protocol supported by our distributed control system, so thought it would be extremely useful to interface the model with the controllers – thus enabling us to train the operators whilst the new cell is still being built."



Embed SE model of plant training simulator. The top three blue compound blocks represent the purification and temperature control of the brine prior to electrolysis. During this process, heat is exchanged with other hot streams that have already passed through the electrolysers. The bottom blue compound block treats the spent brine to remove dissolved chlorine.

Industrial Flight Simulator

INEOS Chlor was an early adopter of Embed SE's OPC capability and, being a large application, was an excellent proving ground for the simulator. Further, Masding's team worked closely with the software manufacturer and was able to get an advance copy of Embed SE. "We tried to build a training simulator a few years ago," Masding recalls, "but had to use analog I/O cards to establish a 10-signal link between the controller and the model. Now that [Embed SE] has OPC, we've got close on 200 signals."

The distributed control system (DCS) in use is a Delta V machine from Emerson. These have been linked to Masding's training simulator model, which has upwards of 12,000 blocks and a five-layer hierarchy. The company plans to use the model in much the same way pilots use flight simulators. "We're going to get the operators familiar with the controls and even throw in a few faults," Masding explains. "A pump failure here, a valve stuck there. Basically, to get things right in the simulator so that there are no surprises when it comes to using the real thing."

Model Behavior

Masding continues, "At 12,000 blocks, the key skill in writing a dynamic model of this size and complexity is that if you try to model it too rigorously it will take too long to run. Thankfully, [Embed SE] allows users to split models into individual modules or compounds and set integration step lengths independently, so available computing power is used efficiently."

"One of [Embed SE's] main attributes is that it is an easy program to pick up and use," Masding says, "and it's easy to get more sophisticated the longer you use it. Now, because we have such a detailed, scalable and dynamic model, the new plant may achieve full rates earlier than would have otherwise been possible. And for an operation like INEOS Chlor, saving a few days alone will justify the spend on the simulator software."

In conclusion, Masding says that by extensive use of the simulator they're maximizing their chances of a quick, safe, and efficient start to production.