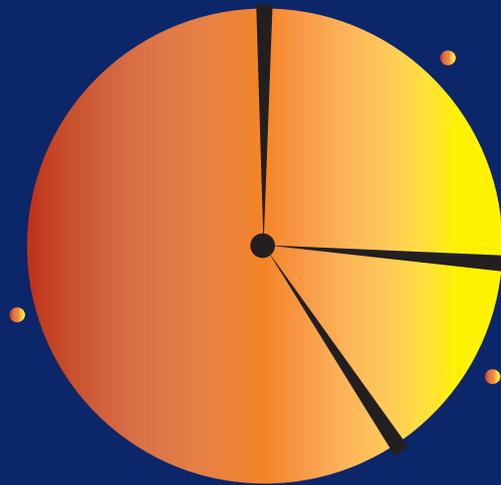# Hexion Chemicals

Hexion Deploys IncuityEMI[TM] As Data Platform for Multi-Plant Enterprise Reporting & Analysis Solution

In 2001, our forest products group division management rolled out programs to upgrade plant control systems with historians and analytics software as part of the company's launch of a Six Sigma quality program. Our first process integration project was installed in eastern Canada -- and for the first time, the staff overseeing the installation included both the IT staff and the process engineering group. This solved the problem of which applications would take precedence, the IT needs or the production needs. The two had always been vewed as incompatible, primarily for network security reasons, but by having the two teams work together, we were able to eliminate those problems and create a secure set of applications that were available to anyone who needed the information.

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Hexion Specialty Chemicals

Hexion Specialty Chemicals is the world's largest producer of thermosetting resins and formaldehyde used in bonding, binding and coating applications for a number of industries, including building products. Although our predecessor companies date back to 1899, today's Hexion was formed in 2005 through the merger of Borden Chemical, Resolution Performance Products and Resolution Specialty Materials, and the acquisition of Bakelite AG. As of the end of 2006, Hexion has more than 100 plants and about 7,000 employees. With revenues of more than $5.2 billion, it is the third-largest North American-based specialty chemicals company.

As the company continues to grow through acquisitions, we've inherited plants that use completely different control systems and historians, including OSIsoft's PI System, the Wonderware IndustrialSQL Server historian, GE Proficy Historian, DeltaV, some legacy Foxboro equipment and even a Honeywell PHD System. We decided that we needed to find a single analysis and reporting solution that could integrate all these different systems and that might also enable us to incorporate data collected at smaller plants that weren't automated.

After considerable research, we selected the IncuityEMI™ manufacturing intelligence software developed by Incuity Software. Incuity allowed us to:

- Aggregate data from all of our disparate control and historian systems
- Do engineering analysis of that data independently of the underlying infrastructure
- Produce detailed analyses and reports that can be shared in a portal and made accessible to users via Web browsers
- Build a standard set of reports, dashboards and key performance indicators (KPIs) once and use them everywhere in the division
- Provide a growth path to link plant operations to our enterprise computing applications so that our corporate staffs can make business use of plant data

Deploying a vendor-neutral solution like Incuity has opened up new possibilities for truly integrating all aspects of operations so that we can eliminate the silos of process information that exist in our division and our company.

Mix of Processing Infrastructure

Our forest products operations involve both batch and continuous processes. We produce formaldehyde in a continuous process for both internal use in the manufacture of a wide variety of resins

and adhesive systems, as well as for trade sales to other chemical manufacturers. Our plants are typically located near major forest products customers and have a smaller footprint as a result. For this reason we deploy much of our IT and engineering resources on a regional basis, allowing support personnel to monitor operations at multiple plants. With no local support, if there was an optimization opportunity or an incident that needed investigation, the regional resources had to travel to the plant site to assist, or the local associates had to enter data in Excel spreadsheets and email them to the regional process engineer. In either case, tt was a time-consuming, reiterative manual process, especially since it involved non-standard systems from plant to plant.

Our initial success using Incuity provided us with remote access capabilities so regional experts could remotely access information needed to monitor processes or respond to incidents. On a routine basis, however, there were also many new consumers of the historical information:

- Production managers had new tools to ensure production orders were on track
- R&D labs could now monitor product quality and test new resin formulations remotely
- Shipping & inventory could be monitored easily, based simply on tank levels
- Process engineers could monitor overall equipment efficiency (OEE) and could drill down to resolve problems or optimize production phases
- Site engineers could now track energy consumption

This initial success in Canada also provided a platform for enforcing standards. If the same tools were available at any location, for any users to connect to any data source, then people will use them. In addition, we were able to move away from high volume, per-seat licensing of software to server licensing. The first project's success encouraged us to roll out the next system at a much larger facility in the central U.S. At this point, our Six Sigma organization decided

the success of these first two installations made this solution a necessary ingredient for the success of their initiatives, so they began including these elements in their project proposals. The first such site was on the Gulf Coast, and the installation achieved a savings of about $300,000 in the first year, so it paid for itself very quickly. We now had our standard system for use anywhere, and we began rolling it out to a dozen or more of our larger, integrated plants across North America. We are also installing Incuity servers in South America and in Finland.

Our overriding objective for IncuityEMI is to have one corporate-wide implementation that's accessible in a single portal, that can interact with our global SAP system and that provides a powerful set of standard analytical tools for process use by staff at local plants. We know we're on the right path because we're already seeing proof of how well this approach works just through applications that have been created using the systems we've implemented so far.

Formaldehyde Network Status Report

One of our most important applications, which was easy to create but has a significant cross-functional impact, is our Formaldehyde Network Status Report. Formaldehyde is the building block chemical for everything else we do, so it's important to know at any given time which sites are running and at what rate. The plants run at least 350 days of the year and if there's a problem that shuts down any of them, we need to know where else in the network to locate product for supply to customers. All we had to do was combine three small pieces of information in one graphical report and we now have what anyone needs to know.

First, we chose a piece of equipment that must be running in order for the plant to be operating. For us, this discrete data comes from the main air blower. Second, we use our methanol flow to derive the rate of production. Finally, we use our tank levels to determine inventory status. Putting these three parameters from three

different systems into one portal report tells anyone in the company, at a glance, which plants are running, how much they're producing at current rates and what the inventory levels of formaldehyde are. We produce this network status report on a scheduled basis every two hours, but it can also be generated on-demand by anyone who needs it. What does this provide our users? Our North American supply chain planning manager used to come in first thing in the morning and begin phoning each of our formaldehyde plants to get current status information. Now he can glance at this report and he knows all plant statuses right away and can more quickly respond to changing supply chain requirements.

We benefit from more than just reports. Having remote access to production line information means our regional process engineers can remotely monitor improvement project progress and participate in incident investigations far more easily. Having the ability to overlay trends also helps us drill down into process details to solve production problems. Using the Incuity X-Y plotting tool gives us the ability to look at multiple parameters over time and see relationships among them that wouldn't be discernible otherwise so we can respond to process problems. We've created energy analysis applications as well which help us make the most efficient use of equipment while minimizing energy costs.

We're also doing more with trend analysis and environmental report compilation. At several sites, we have reports to file with the Department of Environmental Quality (DEQ) and we use Incuity to create those reports in Excel. This tool allows us to report more easily and to verify our compliance.

Formaldehyde Network Status — 10:00 AM Pacific Time

FORP EAST			
Plant	SAP No.	Resource	Status/Rate
		FM1	N/A
		FM2	N/A
		FM3	97.3%
		FM4	98.1%
		FM5	102.6%
		FM6	102.6%
		FM7	OFF
		FM8	63.9%
		FM9	64.6%

FORP SOUTH			
Plant	SAP No.	Resource	Status/Rate
		FM10	99.4%
		FM11	OFF
		FM12	99.3%
		FM13	87.7%
		FM14	N/A
		FM15	N/A
		FM16	91.7%
		FM17	107.7%
		FM18	98.7%
		FM19	93.3%
		FM20	96.0%

FORP WEST			
Plant	SAP No.	Resource	Status/Rate
		FM21	N/A
		FM22	77.7%
		FM23	OFF
		FM24	99.8%
		FM25	OFF
		FM26	98.2%
		FM27	N/A
		FM28	OFF
		FM29	100.6%
		FM30	83.3%

HEXION Specialty Chemicals

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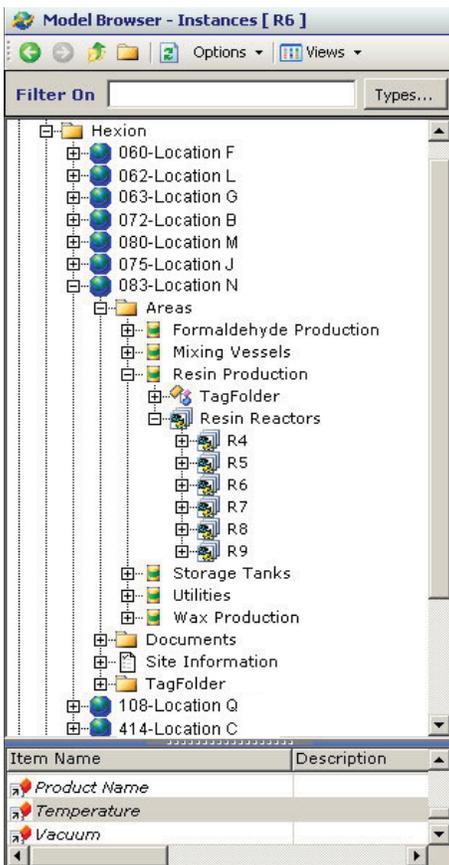headquarters@incuity.com

Additional Locations

Illinois
Massachusetts
Nevada
Texas

Burlington, Ontario, Canada
Duesseldorf, Germany
Johannesburg, South Africa

Unified Production Model is Critical

These are all good results that help us with day-to-day tasks, but the biggest benefit of IncuityEMI is its Unified Production Model (UPM). This is a quantum leap from where we were, in terms of being able to get tags from 15-20 sites across the network, especially when no two sites have the same convention for tag names. It's another one of those things that, in theory, you do the same everywhere, but it's never completely consistent. By putting data in the model and abstracting it from the underlying equipment and tag names, we can bring everything together in such a way that anyone can quickly find information they need.

We piloted our model at a west coast facility, creating the tag name conventions for the different production areas that can be used at all plant sites, since they all have similar production operations, even if some equipment and processes are different. Users don't have to know the equipment-specific tag name but can just click on it in the generic model. We define the number of tags we want to see at a basic level as well as by specific areas of operation. We may spend 100 hours or so mapping tags, but once it's done, everybody can take advantage of the Incuity model. This is very important because it lets us serve just about anybody with the information they need -- from production staff to regional process engineers and to corporate supply chain staff. Once we have Incuity servers at every plant, we can put both real-time and historical information right at the operators' fingertips. They can track product from one batch to the next and make sure they're all produced the same. This will make everyone's job easier.

Long-Term Vision

There have always been issues between IT and process professionals in manufacturing companies; that's just a fact of life. There are usually two silos because of the important security and deterministic concerns from both the business and process perspectives. Historically our company has isolated the two so that process PCs couldn't have access to the business LANs and vice versa. That was a secure approach that insured no interruption in either area, but there were drawbacks. The biggest negative was that there was no access to process information from outside the control room.

We've had a good partnership of IT and process people working on the Incuity solution and it has paid dividends. The systems we've created are a great marriage of IT and process, in a secure fashion that meets the needs of both sides, and as a result, the business as a whole.

Our long-term vision is roll everything up to the top so all our people can see whatever they need at any time, with views into the process level as well as the corporate level. We'll have the same capabilities available over the network, in the control room and in our enterprise systems. The key is IncuityEMI because it can connect to any data source, including IndustrialSQL Server, the PI System, DeltaV, Foxboro UNIX, Honeywell PHD and anything else we may see as we continue to grow. Ultimately, we're going to create interfaces with our global SAP system so that people can see and act on anything, from anywhere in the world, over our secure corporate intranet.