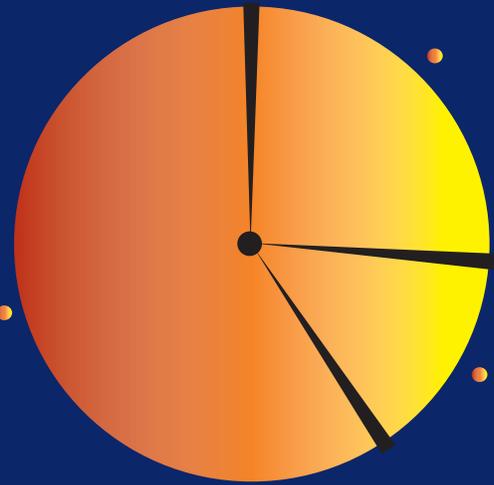


Chemtura Corporation



Chemtura Identifies Chemical Batch Optimization Opportunities Using IncuityEMI OEE Data Drill-Down to Reduce Phase Idle Times.

One of the goals outlined by our corporate management in 2005 was to drive significant improvement in our businesses and processes while continuing to deliver synergistic savings. At our Elmira plant we had already been upgrading our automation systems from PLC-based controls to DeltaV automation systems. In response to this new corporate initiative, we also launched a program to provide better business intelligence (BI) capabilities to our management, our process engineers and plant operators so we could fully optimize operations.

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We are a specialty chemicals batch plant that produces about 70 million pounds per year of additives and intermediate chemical products for the plastics, food, agribusiness and petroleum industries. Batch processes are inherently more prone to inefficiencies than are continuous operations, however. With so many process phases involved in production of complex products – plus the starts and stops involved with batch changeovers from one product to another – the possibility of inefficiencies can rise proportionally to the number of batches. This presents an opportunity to deploy BI applications that can help make our batch processes more efficient, so we can get better value out of every batch, every shift, every day.

To do that requires deeper insight into all process phases so that we can prioritize our optimization tasks. In 2006 we researched new generations of business intelligence solutions that could give us the flexibility and performance we needed. We selected the IncuityEMI™ Business Intelligence for Manufacturing software, from Incuity Software, Inc., in Mission Viejo, Calif. In just a few months' use at the Elmira plant, these applications have already begun achieving significant improvements in our production processes. In fact, within the first six months of use we've identified opportunities to increase production in one of our two major product lines by at least two percent simply by being able to drill down into overall equipment effectiveness (OEE) data to reduce idle time in our batch systems. Since these are sold-out products, this will not only increase top-line sales but will drive excellent savings to the bottom line as well.

Initial Benefits

Among the initial Incuity application benefits we've achieved are:

- Connectivity to and data access from any system in the plant: batch production lines, raw material and finished goods tank farms, lab systems, utilities operations, environmental controls and ERP applications – to better coordinate production activities with enterprise business activities
- A common data source for all personnel, using Incuity's Unified Production Model for creating and populating a master portal and user-customizable, individual dashboards, whether on the plant floor or in management offices
- Multi-level reporting and trending so people can gain instant views of operations they need to monitor and can easily drill down for more information if something needs attention
- Easy import of existing management reporting, including complex Excel spreadsheets, for data reporting and analysis within the portal

- Full compatibility with control systems and data sources, including reuse of Excel-based data, process historian data from new DeltaV systems, data from legacy Fisher ProVOX and Intellution systems, and information from enterprise business systems

Broad Range of Process Operations

Chemtura Corporation makes a wide variety of additives, intermediate chemicals and end use products for many specialized markets. Here in Canada we produce Syntron® high viscosity polyalphaolefin (PAO) lubricants, Naugalube® antioxidants, VitaVax® seed protectants, plus rubber and urethane additives and other products.

Like most specialty chemical operations, we use a variety of different processes and equipment. We use typical equipment such as reactors, stills, separators and filtration systems, but the specifics of each batch process will vary, of course. Some processes require pulling a vacuum and some use catalysts, evaporators or strippers. Some involve corrosives, which require glass-lined vessels rather than stainless steel, and we use sophisticated thermal oxidizers for air pollution control. We currently use a mix of automation systems that have been installed over many years – from PLCs, HMI software and process historians to ProVox and DeltaV control automation systems.

We need this range of capabilities because we have such diversity in our product lines. While there are similarities from one process to another, the details are quite different. We're using the same sciences, but different ways of applying them, which means we couldn't take what we did on one line and just move it over to another one.

That was the point of our search for a business intelligence solution that would allow us to better manage our different processes and

systems. We needed to be able to access information from multiple data sources throughout the plant, to be able to view it in the proper context and analyze it accordingly, so that we could make better use of the information and run the plant more efficiently.

We had been using a graphical reporting tool for several years with our legacy control systems so people could monitor trends and respond accordingly. But when we began our upgrade to DeltaV systems, we needed greater flexibility and functionality. We could trend batch data but could only use pens related to each specific process; there was no way to aggregate data from multiple sources to provide better context. In addition, if we wanted to export a trend so others could view it, we had to export the entire trend and all its pens. There was no way to export only the pens you wanted. Most important of all, it was impossible to drill down into the trends to look more closely at specific data, to see what might be causing changes in a trend.

Better Insight = Greater Optimization

When we started using Incuity we hadn't even received training yet, so we experimented with its features and immediately found very useful applications. We discovered early on that, unlike our previous trend tool, we could drag and drop pens from any data source in the enterprise onto a batch trend, to do comparisons among batches and among related applications.

As an example, we had difficulty finding out why some batches on one of our product lines weren't heating up properly on one line. By overlaying a steam temperature trend from the boilers in our utilities department on the batch heat-up cycle trend, we discovered that the steam temperature simply wasn't as high as it should be. We solved the problem readily and it didn't occur again, but we wouldn't have been able to resolve the issue without the ability to overlay trends from different data sources in the process and utilities buildings. We could also easily export those results to an Excel spreadsheet and publish the trends in Incuity so that people on other lines could view them in their browsers.

PAO Production Status Dashboard

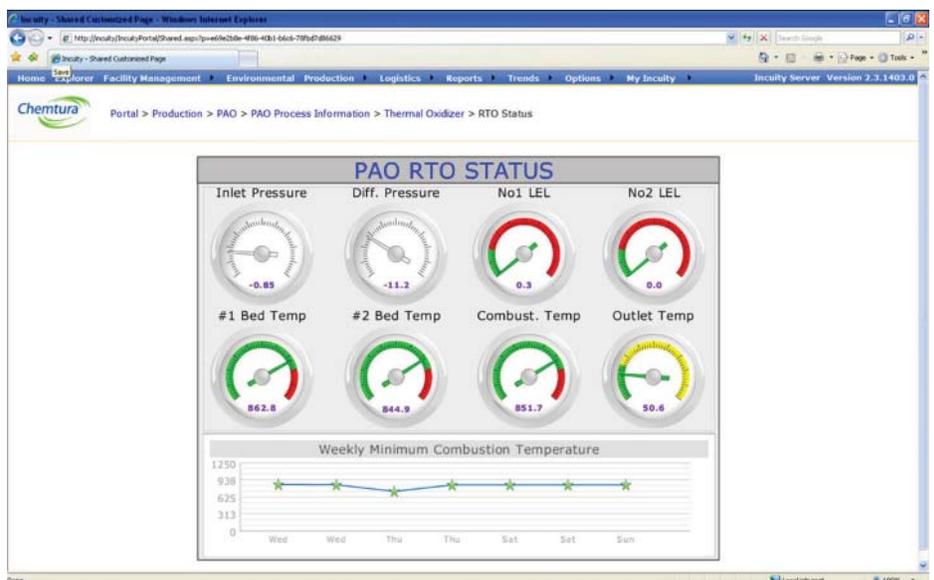
This dashboard gives production personnel a consolidated real-time view of PAO production status, target production and how the shift is

doing presently.

We've learned with OEE that the majority of idle time isn't caused by equipment failure but by equipment downtime, and using Incuity we can drill down to find the root causes of the idle time. For example, we had one vessel on one of our product lines that we assumed was the bottleneck. Being able to drill down from the overview trend to see more detail, we found that in different batches it was idle anywhere from 250 seconds to 900 seconds. Our concern wasn't that the vessel was idle for any specific time, but that the idle time varied so much from batch to batch.

When we asked our production people why there was so much variation, they pointed out that the last phase of the batch was to vent down the vessel – something that was not fully automated. Operators manually turned a valve to vent the vessel, and sometimes they were simply busy and couldn't get to it right away. We're now adding an automated valve to the vent down phase and, based on achieving minimal vent times, we estimate we'll soon be increasing our production on that line by up to two percent a day. It was an easy upgrade decision to make because we could accurately project what the cost of the new valve would be, how much we'd save by adding it, and what the payback should be. With Incuity, we now have the tools to do this, which we didn't have before.

One of the best features of IncuityEMI is that my small department doesn't have to brainstorm what trends and reports need to be created. I only have seven technicians and technologists on my team, so it would be difficult for us to conceive of everything our



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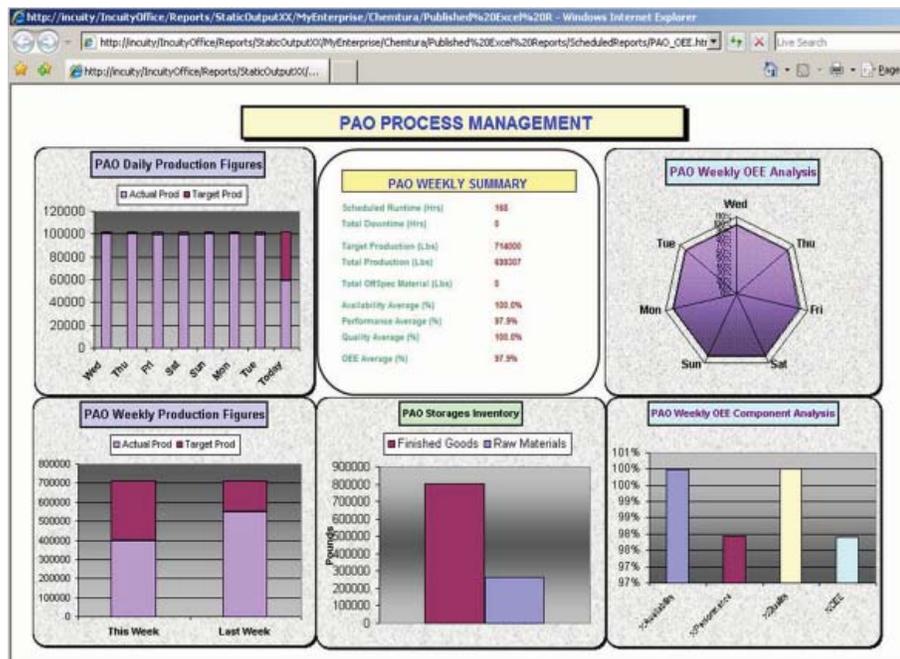
Nevada
Massachusetts
Texas

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

production people might need or want. With Incuity, we don't have to think about what trends we need to build – we can let people do that themselves. Incuity allows them to deal with information in the proper context and in the exact form they'd like to see it. That flexibility also means people more readily use the dashboards they create in the portal, because it's their own design. They can mirror their natural thought processes about what specific things might be affecting their batches. With the old system they were fixed; they didn't have the ability to use an open mind and think about what was causing issues. That represents a very real soft dollar value to us.

Deatiled PAO Dashboard

This dashboard screen – created from an accounting department spreadsheet – gives product management an overview of PAO production with multiple levels of detail. People can check at a glance what production has been for the last week, for the current week, inventory levels for raw materials and finished goods, and overall equipment effectiveness.



We're now extending this capability upward to business applications within our SAP system. Our accounting department produces a monthly spreadsheet that takes data from SAP and breaks down our production, by product line, with monthly and year-to-date figures for budget, actual and variance. As is typical of spreadsheets, it can be difficult to decipher. We now import each month's spreadsheet into Incuity and present it graphically in charts and report form as a dashboard. It takes five minutes to do, and now it's available in the Incuity portal to any authorized users who need to see it. The pie and bar charts make the information instantly understandable and the end result is that we're leveraging work done by another department in our plant.

Stronger Bottom Line

A lot of people might say they use OEE, downtime analysis or similar applications, but the flexibility of Incuity has allowed us to create dashboards that empower users at all levels in our plant. We started using it just for our process engineers, providing trending and dashboards to analyze the process to the Nth degree and measure ROI for all our production operations. At the same time, we now can take that data, roll it up and move it up the food chain right to the corporate office. The flexibility is so good that if we can think about it, we can do it.

Incuity has paid for itself in well under six months. We believe that if we can continue and extend our improvements in production cycle times, we'll be able to increase production by more than the one to two percent we've already achieved on one of our lines. Since we can sell all we make of these products, that could amount to huge ROI in those two product lines alone – and as we extend it to our other product lines we should be able to continue this efficiency trend and significantly enhance the corporate bottom line. We're already in discussions about extending the use of Incuity company-wide at all our plants. In the meantime, the next application on our agenda is to deploy the automated batch reporting package that comes with the newest version of IncuityEMI.