

# CHEMICAL PROCESSING

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## MAINTENANCE GETS A MAKEOVER

Asset management software is spurring more proactivity and greater efficiency

By Seán Ottewell, Editor at Large

**UNTIL RECENTLY** Nova Chemicals, Calgary, AB, was struggling to process upwards of 20,000 maintenance work orders per year at each of its 11 chemicals and plastics resins manufacturing facilities.

The company was running SAP's enterprise asset management (EAM) software but not using its full functionality. Plant maintenance processes weren't integrated with related EAM processes, leading to inefficiency and a lack of transparency. Reporting and analytics activities were insufficient. What's more, Nova's existing maintenance system couldn't provide a complete view of current and scheduled work, materials and dependencies categorized by plant and department — adding to the challenges of capacity evaluation and prioritization of work orders.

“We needed a solution to help make sure that repair work on our equipment and plants is done correctly and as quickly as possible — at the lowest possible cost,” explains Ron Chow, a maintenance and reliability leader at Nova.

Today the situation has changed: the SAP EAM software provides a complete and consolidated view of scheduled maintenance at Nova Chemicals. It facilitates maintenance scheduling, work execution

and material availability processes. All key stakeholders can access information relevant to them — for instance, business users can get a daily and weekly view of work scheduled, priorities, resources required, scheduling conflicts and project status — and gain a better understanding of the wide-ranging effects of maintenance operations.

The software has spurred better coordination and integration of maintenance scheduling, enhanced communication between maintenance and operations, and cut the number of unplanned equipment outages. It has directly impacted the bottom line, e.g., reducing by 47% the time spent on reactive, emergency work; increasing by 61% the time spent on proactive, preventative maintenance; and improving maintenance schedule compliance by 22% — in a year-long process that also included a pilot program.

Nova currently is focused on its next step — the integration of data from other processes such as capacity evaluation, additional forecasting and spending analytics, and maintenance cost budgeting.

### DATA ISSUES

Retrieving and integrating ever more data into

EAM software is posing some increasingly subtle challenges to the broader chemical community.

“The whole chemical industry is focused on data-mining. The Tier 1 companies in particular believe that somewhere inside all that operations data there has got to be information that will help them to better run their business. There is decades-worth of this information available to the larger companies,” says John Harrison, Toronto-based senior solutions specialist for SAP. He is responsible for the chemical industry worldwide and has a particular focus on plant maintenance.

However, identifying the most relevant and accurate data on which to build maintenance and repair strategies is a far less straightforward task than it might appear initially — particularly when it comes to smaller chemical companies. “The quality of what they are recording and for how long they have been recording it is a moot point because they might not even be recording their data properly,” Harrison notes. This can make a nonsense of the key performance indicators (KPIs) that companies are using, he cautions.

“I have a real concern in general about where data comes from and the calculations being carried out using it. I constantly have to deal with these two questions: ‘Are you gathering enough data to generate them?’ and ‘Are you collecting the correct data?’ To me, the bigger problem here is inconsistency in data definitions because these lead to inconsistent and wrong solutions.”

He believes the issue of KPI benchmarking and the master definitions needed to do it should have been fixed decades ago. In the meantime, SAP is working with its KPI group, which includes Dow, Nova Chemicals, Celanese and Chevron Orinite, to try to agree on cross-industry definitions.

So far, there’s a consensus on definitions for the top 30–40 KPIs such as mean time between failures (MTBF) and mean time to failure (MTTF). However, trying to define “failure” itself triggers huge discussions at maintenance meetings, he says.

Despite this challenge, the integration of business KPIs such as payroll and attendance with maintenance KPIs such as MTBF, MTTF, hour utilization by trade, and equipment vibration trends allows chemical companies to look more deeply into issues of concern. For example, it may explain why one shift experiences more shutdowns than another.

From this sort of work, a third, very important layer is emerging. “Here we are starting to see multiple disciplines of information coming together which can show up, for example, if there are higher failure rates either before or after maintenance staff vacations. Do patterns emerge? This is the sort of information that is now becoming accessible.”

At the heart of SAP’s efforts in this area is its

HANA in-memory computing platform — which the company describes as a breakthrough technology that helps users to dramatically accelerate analytics, business processes and predictive capabilities.

“HANA allows us to analyze large amounts of information from multiple data sources at the same time and this is the future. My belief is that as we have access to more and more business data we can begin to ask some quite odd questions,” notes Harrison.

Examples he cites include: Do high (or low) summer temperatures have an impact on plant shutdowns? Does buck fever (deer hunting season) lead to a decrease in production? Why is more electrical tape used by plant technicians in Canada in winter?

“This last turns out to be due to pilfering for use on ice hockey sticks and a company might decide that this is irrelevant, but when you start blending these questions together it gives you a much greater sense of how a plant is operating over time. Of course, you do need a very big database to achieve this.”

Chemical companies, especially Tier 1 firms, are very receptive to this line of thinking, Harrison says. With raw materials’ costs rising and selling prices tight, they are desperate to drive out any other costs — and using historical data to identify trends and improve processes to achieve this is proving a popular solution. He currently is working with a number of undisclosed chemical companies in this area.

“The big breakthrough with HANA is being able to ask questions I never thought I could ask before. The other side of this is getting swift answers back. With faster answers, we can do more data blending. The question now is how we use this information.”

He believes the future lies in the ability to more rapidly and better process ever more plant data.

The way this data is presented will be important, too. For example, engineers trained in SAP’s Visual Enterprise applications, 3D diagrams and animated equipment explosions already have cut many days off large-dollar maintenance project executions. Similarly, the advent of 3D technical documentation from equipment manufacturers will make the whole maintenance experience much simpler — and, he notes, more digestible for new people coming into the industry.

“Overall, we are on the cusp of a radical change of how people understand maintenance and deal with it.”

#### **MAINTENANCE TRACKING**

Asset availability is the key issue for the chemical industry, asserts Kim Custeau, Burlington, ON-based director of product marketing for asset management solutions for Invensys. “Customers need to schedule resources appropriately. This includes labor utilization, materials sourcing and so forth. Basically, you need everything in the right place at the right time to carry out the maintenance

or repair job. So, supply chain connectivity is crucial — from the personnel right down to those 60-cent gaskets,” she explains (Figure 1).

Her group particularly focuses on Tier 2 companies, where tight margins are forcing greater proactivity in areas such as maintenance tracking.

“Take predictive maintenance, for example. The guide book tells you that a particular piece of equipment might need maintenance every 30 days. What it often won’t tell you is that the same asset might work very differently in locations with different climate conditions,” she notes.

More than 25% of maintenance done today is unnecessary and can introduce additional failure risks, Custeau points out. Fortunately, use of both condition-based maintenance and a reliability-centered model for operations and maintenance can ward off unneeded maintenance.

To address such challenges, Invensys developed Avantis Condition Manager, part of its InFusion enterprise control system. The system also provides early failure detection to increase asset availability, reduce costs and avoid unnecessary downtime. Invensys’s own figures suggest that plants on average lose 5% of their production due to unplanned outages.

Like Harrison, Custeau also is concerned about the nomenclature used: “People are starting to look at how maintenance data is put onto their systems and the nomenclature that is used alongside it. This is a big issue, so Invensys systems have a lot of pull-down menus which make use of specific nomenclature. However, people still want to have the ability to use freehand text; so one of our key challenges is to encourage companies to change their approach and be more systematic in the way that they do this.” Invensys is partnering with niche maintenance consultants who are experts in culture change to help its users do just that.

#### ACHIEVING SAVINGS

Fertilizer manufacturer CF Industries, Deerfield, IL, has standardized on Avantis.PRO software as its core platform for collection and storage of data on maintenance, repair and operations (MRO) activities. The company also uses Avantis.DSS decision support software to analyze the data for continuous process improvement, and has supplemented its system through adoption of standard catalog descriptions and categories for all MRO items.

This system is designed to automate maintenance planning and tracking activities on nearly 50,000 assets, including vessels, pumps, rotating equipment

#### BROAD CONNECTIVITY



Figure 1. Accessibility to the entire supply chain can provide significant benefits. Source: Invensys.

and electrical motors. It also helps manage and analyze MRO inventory and procurement for more than 60,000 inventory items in the four CF Industries manufacturing locations.

“Avantis.DSS software takes data from available Microsoft documents, such as Excel, and makes useful information out of it, which enables us to monitor assets and optimize efficiency. Data analysis that took two weeks is now done in ten minutes, which opens up new doors for improvement,” notes Dave Wiedenfeld, group project leader, IT.

The software has proven particularly beneficial in analyzing and improving inventory and spending activities. It has contributed to reducing inventory by several million dollars and to savings of approximately \$2 million through improved sourcing and contract negotiations.

“For now, we can actually ensure that maintenance materials and services we need are there when we need them, know what it costs to maintain the plant, and know the best way to maintain it based on history. This puts us way ahead of the game,” Wiedenfeld adds.

#### WHAT’S AHEAD

Mobility will play an important role in the future, Custeau believes. “The maintenance person will take a mobile device of choice and be dispatched to where needed — while having full access to all the information on the office desktop. People expect instantaneous access to all their information, especially the new folks coming in the industry now. So our emphasis is very much on mobility and providing the access to information that they need,” she concludes. ●