



Goodman Fielder's electrical engineer, Toby Atkinson (left), and state operations manager, Greg Langusch, explore the Footscray site via the RSBizWare-enabled recipe management portal.

Goodman Fielder balances the blends

At Goodman Fielder's edible oil manufacturing facility, a RSBizWare-enabled batch management solution forms the essential link between the plant's ERP system, the production scheduler, the QA laboratory and the factory floor.

At end of shift, the day's last tanker truck leaves the weighbridge of Goodman Fielder's edible oil manufacturing facility in the Melbourne industrial area of Footscray. The 40-tonne capacity twin-tanker is just one of around 40 tanker trucks that come and go from the facility during the course of any day, carrying the lifeblood for this, Australia's largest edible oil refinery.

Goodman Fielder is Australasia's largest food manufacturer, and manufacturer of well-known brands such as Uncle Tobys, Meadow Lea, White Wings and Bluebird. The Footscray edible oils facility is one of four refineries owned and operated by the company.

The plant—one of Asia Pacific's most

technically advanced—manufactures the complex blends of canola, cottonseed, soyabean, sunflower, corn and other oils required for today's supermarket shelves. It also produces a range of hydrogenated oils—the semi-solid oils that provide the basis for margarines and other thickened oil products.

The quest to move to more market responsive 'make-to-order' manufacturing schemes, and to support market demand for an ever-growing number of oil blends, inspired a production strategy rethink at Goodman Fielder. In 2001, the company embarked on a program—known as Project Benchmark—to realise world-class efficiencies in its edible oil refinery

operations. Flexibility of production, access to real-time production data, security of batch control and reliability were all deemed essential. The Footscray plant was selected as the prime upgrade site, and industrial automation group, Rockwell Automation, as the automation solutions provider.

Simple process; complex strategies

Crude oil arrives at the plant via tanker truck, is unloaded to storage, then run through one of the plant's two refining lines where solid, liquid and coloured food-grade contaminants are removed. The refined product is then blended, hydrogenated where required (to convert liquid oils to semi-solid 'hydrogenised' forms), then run through deodoriser—the plant's vacuum

range of Allen-Bradley PLCs—primarily PLC-5 and ControlLogix—plus a third-party SCADA system, with seven SCADA terminals located about the facility. As a result, real-time plant operation data was difficult to access across the large site. A legacy batch controller linked to the SCADA system loaded the various recipe parameters for each batch to the PLCs. All PLCs, SCADA terminals and the batch controller were linked via a plantwide Ethernet network.

Batch controller blues

The batch controller presented an immediate and important challenge. Functionally limited, it was unreliable and prone to failure, and propped up by a costly vendor maintenance agreement. "We really had lost

confidence in the old batch controller," recalls Goodman Fielder's State Operations Manager, Greg Langusch. "On weekends we were never certain whether we'd make it through the production program."

A further tedium was the transfer of the production schedules from enterprise resource planning (ERP) system to PLC. Plant orders were dropped from the ERP system every couple of hours via an Excel spreadsheet. The production scheduler reviewed the spreadsheet and modified it to suit any 'real world' issues within the plant. The final spreadsheet was then walked across to the control room where the entire schedule was manually keyed into the batch

controller—a time-consuming process that was susceptible to error.

The weak link provided by the legacy batch controller, coupled with the limited operational visibility of the plant around the facility, prevented any move to true end-to-end automation. "We had implemented limited automation of the deodoriser loading process, but we weren't prepared to take this further with the old batch controller. It simply wasn't reliable enough," says Langusch.

"We knew that we sought a more responsive, more flexible total plant control strategy," he adds. "ERP systems certainly play a role, but this is just part of the solution. A seamless and efficient link between the ERP and plant floor batching operations, and plantwide visibility of operational status were absolutely essential."

SCADA-independent

Under the guidance of Langusch, the company's National Engineering Group explored batch controller options as part of 'Project Benchmark'. These options included Rockwell Automation's proposal—a solution founded on the company's Rockwell Software RSBizWare family of modular, scalable middleware solutions for manufacturing enterprises.

Conceptualised by Rockwell Automation Australia's Michel Cahill, the proposed solution provided access to batch information and real-time operational data via a web-based portal, ensuring any plant PC equipped with a web browser could access the batch data. Three key elements formed the foundation of the RSBizWare-enabled solution: RSSql industrial transaction manager, the FactoryTalk Data Model, and the ASP.Net web access solution.

Founded on the OLE for Process Control (OPC) standard, RSSql provides transaction-oriented linking between the database environment of the portal, and the controller platform. It offers connectivity to all major controller vendors' products, and links these to all the database products across a facility. "This is the beauty of the RSBizWare



Over 500 valves (pictured) control and regulate oil flow about the Goodman Fielder Footscray site, via a maze of piping spools and tanks.

steam distillation unit, where undesirable flavours and odours are removed. The deodorised product is then drawn off, stored and pumped to tanker trucks for supply to commercial customers, or to the site's retail product packing lines.

The sheer number of intermediate blend combinations, base products and finished products makes the process complex. The plant's production lines operate in accordance with a list of over 200 recipes, each with tens of variables. The site comprises over 130 storage tanks (ranging in capacity from 25 to 500 tonne) linked via a maze of piping spools and 500-plus valves.

The plant is entirely controlled by a

offering—its OPC connectivity to the controller base ensures it is completely hardware independent,” Cahill says. “Other solutions link directly into proprietary SCADA. Implementation often requires a SCADA system changeout—an expensive exercise!”

According to the Footscray site’s electrical engineer, Toby Atkinson, the RSBizWare-enabled solution was quickly seen to be the best option. “RSBizWare was the simplest to implement. It was also completely independent of the SCADA system—it links straight into the controller, and this was a big attraction,” Atkinson says.

A team solution

Drawing on the resources of Rockwell Automation’s Global Manufacturing Solutions team, Cahill worked in close collaboration with Goodman Fielder Footscray site personnel. An intensive period during the second quarter of 2003 saw the portal’s database and ‘front end’ displays developed. “We spent a lot of time workshopping with the Goodman Fielder operators and managers, to make sure we had a fairly detailed and accurate functional specification,” Cahill says.

Most important was the systematic structure of the portal’s database. The Rockwell Software FactoryTalk Data Model provides a powerful foundation for the portal, and has ensured the ongoing robustness of the solution. “The FactoryTalk Data Model is the richest toolset that you can have,” says Cahill, “It’s documented, the documentation is freely available, and it’s built on open SQL server or Oracle architecture. It is really a mini ERP system for the factory—that’s the whole concept of manufacturing execution systems (MES).”

The FactoryTalk Data Model design is based on the widely recognised International Society for Measurement and Control’s (ISA) S95 standard for enterprise to control system integration. S95 defines eleven distinct functions in the MES space—functions such as data collection, acquisition, performance analysis, dispatching and genealogy. “S95 saves you money and integration time. The

functions, naming conventions and detailed data flows are all predefined. It also provides a structure that permits easy—and essentially limitless—growth of the database,” Cahill says.

The resultant tailored solution presents five distinct portal views of the plant: ‘schedule’, ‘reports’, ‘recipes’, ‘materials’ and ‘location’ modules. The ‘schedule’ module displays the batches currently running, those currently scheduled and the last three run, while the ‘reports’ module can show the performance details of every batch ever run in the plant. The ‘recipe’ module lists all the recipes grouped according to the plant’s four production lines, and provides a detailed listing of all recipe set points, dosing times, ingredients,

areas and so on. The ‘materials’ module provides a listing of all the different oil types currently on the site, while the ‘location’ module advises on the status and content of each of the site’s storage vessels.

The portal supports five distinct levels of authorised access, ranging from ‘view only’ through to ‘master controller’. With the appropriate authority, the addition of a new recipe or oil blend to the system is simple and straightforward—a refreshing change from the legacy batch management system.



The massive deodorizer is the centre of the Goodman Fielder edible oils facility.



Goodman Fielder state operations manager, Greg Langusch, inspects one of the site's many Allen-Bradley PLC controllers.

Quick deployment; impressive results

Rockwell Automation's comprehensive site workshops, bench tests and factory trials, ensured that the changeover to the RSBizWare-enabled portal in June 2003 was more than straightforward. "We ran two batches with both batch controllers running in parallel," Atkinson recalls. "The portal worked from the first batch, so we simply turned off the old controller!" The portal now provides 'vision' of the plant production status right across the plant—up to 20 active clients are regularly accessed by a range of plant personnel, including production managers, schedulers, team leaders and maintenance engineering staff.

Production data-intensive activities, such as 'hazard analysis and critical control points' (HACCP) analyses, have been

greatly simplified, as has the task of the production scheduler. The Excel-based production schedules can now be simply uploaded to the portal with one key or mouse stroke—no manual keying in is required. As a result, significant labour reductions have been realised in all areas across the entire site.

Savings have been made in downtime and product spoilage too. "We estimated the old batch management system caused around \$20,000 worth of downtime and 'cocktails', or incorrect blends per year. In contrast, the portal hasn't faulted in 12 months of operation," Langusch says. Similarly, the site has saved the \$40,000 annual maintenance agreement required for the legacy batch controller.

Plantwide automation

The reliability, vision and security of the portal has permitted Langusch and his team to embark on a comprehensive plantwide automation program, in the quest to provide portal-driven automatic oil processing, blending and transport across the facility. The group is currently automating those remaining valves not fitted with actuators, plus the hydrogenation plant, and the tanker unloading bays.

"The real benefits for us are realised when we upload directly from the recipe management system," says Langusch. "For example, the deodoriser selects the output tanks, draws up the selected oils, makes the blends, draws the oil through the deodoriser, all automatically. We'll actually make most of the day's product without any operator intervention."

The vision for the tanker unloading process is that the driver will key in his truck registration at PanelView human-machine interface units that are currently being installed at each of the six tanker unloading bays. The portal will receive the vehicle registration data, recognise the truck and its contents, then set the valve configuration accordingly. The portal will advise the laboratory staff to test the tanker's contents, and when the lab's QA testing is proven 'all clear' on the load, the unloading will commence—automatically.

With completion of the current automation program in the first half of 2005, the portal will have provided new levels of plant efficiency and flexibility. "When this is all complete, we will have actually reduced our operational labour requirements by around 50 per cent," Langusch explains. "The entire plant can be run from anywhere on the site, from a head office environment, or even from home if we want, via the portal."

The solution has been replicated at both the company's Murrarie, Queensland and Mascot, NSW sites, with similarly impressive results. It has also underpinned the Goodman Fielder's 'make-to-order' production strategy. "We can actually convert customer demands on the system that are generated by the customer sales departments into plant production orders, simply by dropping these down from the ERP to the portal," Langusch says. The RSBizWare-enabled recipe management system has helped the company realise the most future-proof of production schemes: one where production is tightly linked and immediately responsive to market demand—no matter how complex the final blend! ■

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