

DALBY BIO-REFINERY'S BILL ELLIOT DETAILS AUSSIE PROJECT

June 2004

# Ethanol

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FEW SPECIAL EDITION

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# Automation Alert:

## A new control system migration strategy

Ethanol producers looking for improved efficiency might consider a solution that allows for a complete upgrade of legacy systems with minimal installation downtime.

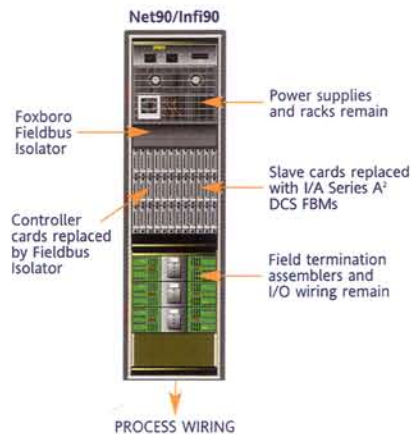
By Hans Alwin and Betty Naylor-McDevitt

The majority of today's ethanol plants have been operating long enough to raise concerns over the longevity of the distributed control systems that automate the process. Automation Research Corporation (ARC), an independent systems analyst company, refers to these control systems as "legacy," meaning there is a definite end of the technology employed by the platform in sight. In the world of personal computers, this concept is well understood. The technology in a brand new PC is significantly eclipsed within six months of purchase. In the world of industrial process plant computer controls, the lifecycle is somewhat longer, but the problem and its significant challenges remain.

Simply put, the control system upgrade approach referred to as "bulldozing" is just not practical. Bulldozing would entail shutting down the process for up to six weeks to tear out and replace an aging control system. This approach is very costly due to lost revenue while the process is down. Recently, the "migration" approach has gained a great deal of momentum for obvious reasons. Foxboro, an Invensys company, has innovated the capability to completely upgrade legacy systems with new, more powerful and faster technology while taking the plant off line for hours—not weeks. Hundreds of legacy systems like Bailey Net90 and Infi90, Siemens Moore APACS, Emerson (Fisher) Provox Series 10 & Series 20, Foxboro's Spectrum/Spec 200, Honeywell TDC2000 & TDC3000, and Westinghouse WDPF have been successfully migrated to the Foxboro Intelligent Automation (I/A) Solution.

### A plug-in migration solution

In 1997, the I/A Series Plugged-In Migration Program was introduced. The objective of this program was to provide customers with a DCS replacement solution that was cost effective, low risk, easy to do and designed to minimize the overall process downtime.



For most projects, the bulk of the time, cost and risk associated with a system replacement is linked to rewiring and retesting of the new system while the process is shut down. Every vendor's input/output (I/O) equipment has a different signature size, shape and I/O capacity and cannot plug into the existing termination assemblies while leaving the wiring intact. As a result, most vendors will recommend a total rip-out (i.e. bulldoze) solution to install their own cabinets, racks and uniquely shaped I/O modules. Others will recommend a cable solution, where a new set of cabinets, racks and equipment is installed next to the original setup. Then cables are run between the two. Often, the capacities of the old and new I/O modules do not line up. Wires need to be moved to spread out the load. Both solutions introduce a tremendous amount of risk (rewiring), added cost (engineering and construction) and significant process downtime (weeks).

The Invensys solution is simple: The I/A Series I/O modules (FBMs) are manufactured to be a form fit replacement for the original I/O modules. The original legacy cabinets, termination assemblies, power supplies and racks are re-used, and the new Invensys I/O modules are substituted for the old. This is done without modification to the wiring or termina-

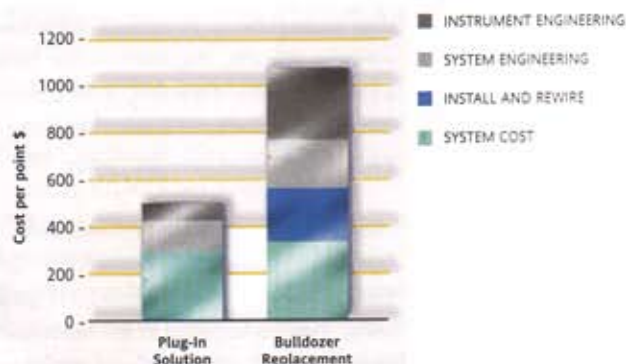
tion assemblies. Each I/A Series I/O module meets or exceeds the capacity of the I/O module it is replacing. Then the new I/A Series controllers and workstations are installed, giving the ethanol plant a 100 percent new I/A Series system.

The replacement I/O modules are standard I/A Series FBMs, manufactured in a new form factor. They are made using the same components as the traditional FBMs. No custom software is involved. They line up exactly with the original legacy I/O wiring terminations.

To simplify and speed the process of replacing a legacy system, extensive planning, testing and preparation is involved.

- Foxboro's *Migration Center of Excellence* is staffed with engineers expert at converting legacy system control and display databases to I/A Series format. Automated conversion tools are used to ensure the conversion is done correctly. Where appropriate, opportunities for optimization are identified and implemented.
- Full system Factory Acceptance Testing (FAT) is performed ahead of time to ensure that all database conversion work was done properly, to the satisfaction of the customer. Therefore, the risk associated with the system upgrade is removed.
- While the plant is operational, the new I/A Series workstations and controllers are put in place alongside the legacy equipment, ready for hook-up.
- On the day the switchover to the new system is to occur, the process is shut down, the legacy I/O modules are taken out and replaced with I/A Series FBM modules, and the network connector is put in place. The ethanol plant is now up and running on I/A Series.
- Loop checkout is performed to ensure that all is working properly.
- The process is re-started.
- Once the operations group is completely satisfied, the legacy controllers and workstations are permanently removed.

## CONTROL



This migration solution is non-destructive. Due to the fact that none of the field wiring is touched, and the existing nests and termination assemblies are unaltered, the original legacy system can easily be put back in place in the event that a problem is seen. Foxboro migration experts can take care of the problem and its resolution off-line, without impacting a plant's production schedule. With other migration approaches, once wires are cut or moved, you are committed to moving forward, however long it takes.

As stated earlier, Foxboro's experience shows that with careful planning, the switchover can be done in hours, not days and weeks. The majority of migration installations have been accomplished in less than a day. Some have even achieved it while on line, without shutting down the process.

Foxboro warrants the entire system, including the remaining legacy equipment, as a new I/A Series system installation. The legacy system racks and termination assemblies have no electronic components to break or wear out. Foxboro stocks replacement parts for the remaining legacy equipment in the event they are needed. The replacement I/O modules are covered under standard terms and conditions for all products sold. The support policy is simple: Foxboro provides *lifetime* support. The ethanol plant deals directly with Foxboro/Invensys for all system parts and service needs.

This "best-in-class" migration approach eliminates the excessive risk, cost and process downtime typically associated with a DCS system replacement. ARC recently stated the only negative aspect of this technique is that not enough manufacturers have adopted the approach.

In addition to a full control system replacement, Invensys/Foxboro can offer interim steps.

- Many Siemens Moore APACS systems use ProcessSuite as their Control Room Graphical Interface (or MMI). This is based on Wonderware's FactorySuite. Siemens/Moore has announced they will no longer continue to provide ProcessSuite updates that track FactorySuite improvements. Since Invensys owns Wonderware, they can upgrade the MMI to the latest and greatest version of FactorySuite, while preserving the investment in graphics, engineering and applications. They will remain unchanged. Foxboro's Migration Center of Excellence can provide this upgrade for all Siemens Moore APACS users.

- The option also exists to do the plant expansions using Foxboro

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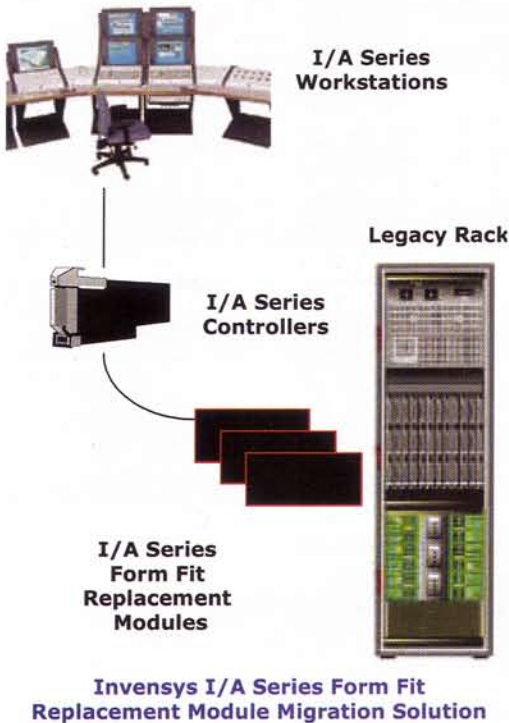
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## CONTROL



I/A Series. I/A Series controllers and I/O modules are installed to control a new area of the plant. Drivers are available to seamlessly integrate your I/A Series data and your existing Siemens Moore APACS data into a common user interface (FactorySuite). The result is that no operator retraining is necessary.

- If the time comes when the cost of maintaining and supporting your Siemens Moore APACS system becomes prohibitive and forces you into a replacement decision, the option remains to do so using plug-in modules manufactured specifically to fit into the existing Siemens Moore APACS racks. This can be done all at once or one unit at a time.

Looking at the next 10 years in the ethanol industry, two very certain trends will emerge. First, it is certain that ethanol production will continue to increase at astonishing rates through plant expansions, improved plant efficiencies and new plant construction. Second, it is even more certain that over half of the existing plants will be forced by a need for improved control,

updated technology and greater information management to replace their control systems. Clearly, migration—not bulldozing—represents the safest, most cost-effective and least invasive method to bring your plant automation into the future. **EP**

Hans Alwin works for Swanson Flo-Systems' Ethanol Performance Group. Swanson Flo-Systems, based in Plymouth, Minn., has participated in the automation of nearly 60 U.S. ethanol plants and provides an entire integrated package of pre-engineered plant-floor-to-boardroom application-specific solutions for the ethanol and biodiesel industries. For more information visit [www.swanflo.com](http://www.swanflo.com). Alwin can be reached at [hansa@swanflo.com](mailto:hansa@swanflo.com). Co-author Betty Naylor-McDevitt is the director of migration for Invensys. She has authored many articles touting the advantages of the type of migration technology discussed in this article. Many of these articles, as well as customer testimonials, can be viewed at [www.foxboro.com](http://www.foxboro.com). Naylor-McDevitt can be reached at [bnaylor@foxboro.com](mailto:bnaylor@foxboro.com).

## Hi Roller Enclosed Belt Conveyors: ...New Standards, Innovations, and Solutions in Material Handling

The advertisement features a large background image of industrial silos and conveyor systems. A smaller inset image shows a close-up of a conveyor's tail section with the text 'Tail Section Reloads Spills' above it. Below the main image is a list of applications with arrows pointing to the right.

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## COPRODUCT

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Tilstra also discussed what he called the “theoretical maximums,” or the amount of distillers grains that could be produced and sold in North America if all “limiting factors” were removed. The number: 150 million tons of DDGS per year.


“If you removed all the restrictions—all the limiting factors—it would be possible to reach that number, but the more realistic number is closer to 14 or 15 million tons per year,” he said. “We are producing and marketing over 4 million tons into the market now, domestically. If we go to 5 billion gallons of ethanol in the next few years, we will be looking at 9 million tons of distillers on the market.”

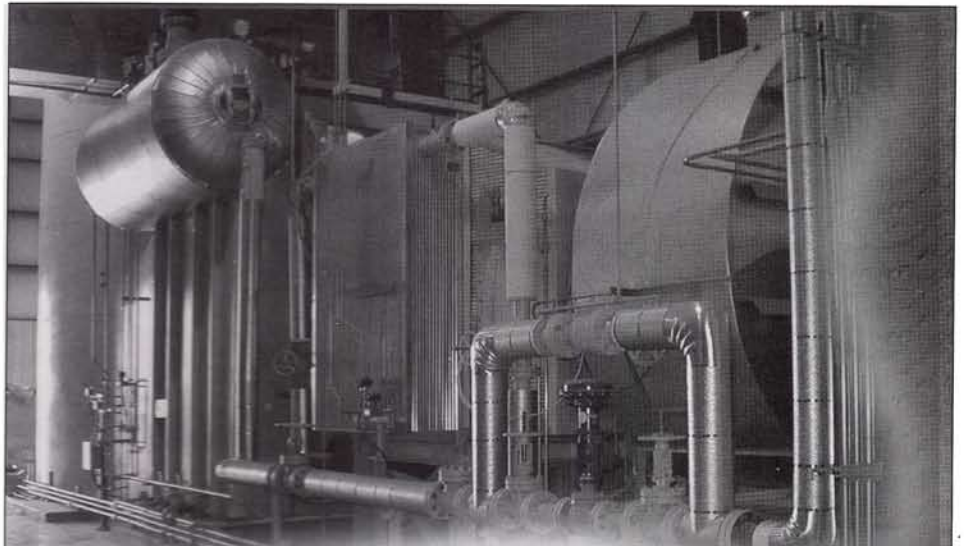
After a presentation by Dr. David Weakly, director of dairy research at LongView, Dr. Jeff Heldt of Land O’Lakes presented on distillers grains use in beef cattle. He spoke about the nutrient properties and protein value of the product and said “particle size, digestibility, flowability and consistent size” are all issues that are important to consumers.

He said determining the “true” energy value of distillers grains has proved to be a challenge due to the product’s varied forms, source facilities, associative feedstuffs and other variables.

“What is the true energy value of this product? I don’t think we know,” he said, adding later in his presentation that he believes environmental issues related to nitrogen and phosphorous in feed will be a “long term” issue the industry will have to deal with.

In addition to presentations from Dr. Dennis Short and Dr. Brenda de Rodas, Dr. Mark Whitney of the University of Minnesota, spoke about his work with Dr. Jerry Shurson in the area of distillers grains use in swine rations.

“The university has received support from many companies and Land O’ Lakes is one of them,” he said. “A couple of years ago, just 2 or 3 percent of the distillers grains produced was going into swine and poultry. Now it’s 15 percent. A lot of people think that research never pays. ... That’s a good number that proves that sometimes it does pay.” 



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