

MES Solution Delivers Traceability & Flexibility To Juice Concentrate Manufacturer's New Facility

Ignition Platform Unifies Complex Functionality With Intuitive Interface

In 2022, Döhler South Africa realized they were reaching capacity in their production facility, an impasse that countless growing companies have reached. The question always becomes: make do with too-cramped quarters or invest in a long-term solution?

[Döhler](#) — a multinational company that manufactures fruit juices, compounds, flavors, emulsions, and concentrates — chose the latter for their new facility, which specializes in blending and secondary transformation. Located in Paarl, South Africa, the new plant adds tenfold capacity while remaining scalable. “We had to really plan for the future and really give ourselves the capability to grow,” said Dirk Brand, Head of Engineering at Döhler South Africa. “Not only for the next three years, but for the next ten years.”

Integration for a project of this size and complexity has the potential to become a game of compromise, but with the help of [INTEG System Integrators](#), Döhler South Africa successfully implemented a massive manufacturing system built in Ignition — the unlimited industrial automation platform for SCADA, MES, IIoT, and more — that balances a staggering amount of functionality with an intuitive interface.



Döhler South Africa's ISA 88-Compliant Ignition system boasts approximately 1.2 million tags on two gateways, as well as sophisticated batching, navigation, interlocking, and ID generation systems.

Greenfield Development

While the sheer scale of this greenfield project might make some blanch, INTEG viewed this as an opportunity to build from a clean slate. “We could start from the beginning and develop the project like we wanted to, in essence,” said Brian Cooper, Managing Director at INTEG. “On a brownfield project, it's difficult to do that. You've got existing standards, you've got existing equipment, and it makes it difficult.”

While the project requirements remained fairly consistent throughout, on a more granular level there were, inevitably, changes every day. “How we thought it was

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– Tean Butler
Technical Manager, INTEG

going to work versus how it actually worked at the end were two very different processes,” said Brand.

“During commissioning, it became apparent how easy it is to make changes on the fly and build new functionality within the SCADA system very quickly,” said Tean Butler, Technical Manager at INTEG.

Now complete, the Ignition system — built from the core combination of Ignition’s [Perspective](#), [Tag Historian](#), and [Reporting](#) modules along with Sepasoft’s [Batch Procedure Module](#) and the [Canary Historian](#) — boasts approximately 1.2 million tags on two gateways, as well as sophisticated batching, navigation, interlocking, and ID generation systems.

Architecture

INTEG originally considered a standard Ignition architecture on a single gateway. However, it quickly became evident that the system — which encompasses around 200 routes, 2,000 phases, and 400 equipment modules for 1,800 control modules — required some additional architectural complexity.

The system features a load-sharing, bifold structure to match the plant’s two sections, each with their own separate gateway, tag provider, and Siemens S7-1500 1518 PLC.

The first gateway acts as a hub, running Perspective and housing over 600,000 tags, while the second, a “headless” spoke gateway, has over 500,000 tags. Even with Ignition’s unlimited licensing model, a tag count this high requires certain considerations. All of those tags are document text exposed within the User-Defined Type (UDT) structures to allow easy access and increased flexibility with the Siemens PLCs.

ISA 88-Compliant MES

Batching integrates everything in the plant. Using Sepasoft’s Batch Procedure Module as the engine, INTEG developed the MES solution to the exacting standards of the food and beverage industry. “We were quite adamant on using a strict ISA 88 standard,” said Brand.

With an ISA 88-compliant project of this size, it was vital to build the plant according to a set standard, which led INTEG to develop an ID generation system. “The ID generation system was built using Ignition and a database system that helped us to always provide a unique code or unique identifier to each and every single component,” said Butler.

The ID generation system works based on an ownership model to ensure proper interlocking throughout the plant, from general capabilities down to phases, then equipment, and finally to control modules. Because every component in the system has a discrete ID, when an operator runs a batch, the system makes all associated equipment unavailable for any other processes.

Döhler's plant does not function conventionally via SAP recipes; operators have the flexibility to run batches when needed. Each order comprises several batches as it progresses through the plant, the last of which being the transfer to the shipping truck for delivery. "In order to proceed from one station to another, a batch has to be completed," said Butler. "One new batch cannot start before a previous batch has been executed."

Every batch must pass quality control (QC) before moving onto the next process, and equipment must be Clean-In-Place (CIP) before it can be used again. To prevent any batches from starting without proper QC and CIP, INTEG used Ignition's host of scripting functionalities to implement a sophisticated interlocking system.

"As part of the batching standard that we've developed, we've also implemented a unit state," said Cooper. "The unit state determines whether the equipment is dirty or clean or being washed or CIP'd, and that is used to interlock specific systems or specific equipment." The batching system makes cleaning in place exceptionally easy because Döhler can create a recipe to run against the CIP process. The Batch Procedure Module collects this information, recognizing which recipes are linked, and then displays the correct recipe for the operator. This, along with the interlocking that extends down to the control-module level, provides the operator with full visibility of the entire plant from the batching engine.

"Everything is linkable. Everything is trackable," said Brand. "It really does make their life easier."

Navigation

Döhler's staff needed an intuitive method for navigating a system this large and complex. INTEG developed the interface with the simple conceit that an operator should be able to reach any part of the system in three clicks. To accomplish this, they implemented what they dubbed the "breadcrumb" system. "The breadcrumb is an easy way of taking you exactly to that specific area," said Cooper. "It's developed in a logical way, so if you just know the plant and you know where you wanna go, the breadcrumb would easily take you there."

This type of quick navigation lends itself naturally to acknowledging alarms. Integrating the breadcrumb system with Ignition's Alarm Notification Module, INTEG created an easy way for operators and maintenance staff to pinpoint alarms. From the system homepage, operators can simply click on the notification in the header, then filter down through the sections of the plant, following visual indicators to specific areas and process cells.

Alternatively, if operators already know what they're looking for, they can use the search function. The system follows ISA 95 naming conventions, so by either entering the control module prefix or copying and pasting parameters, operators can quickly scan through the available equipment.

High-Performance HMI

During the commissioning phase, Döhler was unsure whether the plant would have a dedicated control room or field-mounted stations. Ultimately, they opted to forgo a large control room, a decision that greatly influenced the HMI design.

With operators not tied to a central area, INTEG aimed to heighten situational awareness with a high-performance HMI. The grayscale palette reserves color for events or notifications that require immediate attention. “It’s easy to build a lot of P&ID pictures and confuse the operators,” said Cooper. “So we developed different layers.” As operators drill down through the layers, they go from overview tiles and simple routes to detailed P&ID-style views, giving individual operators the ability to decide which style works best for them.

“You have buttons and options and menus for everything, but the learning curve was a lot shorter than what I imagined it would be,” said Brand. “Operators pick it up quite quickly.” The Ignition HMI standardizes the look and feel across the whole plant, allowing operators to move from one process to another easily. That flexibility extends to process improvement, letting Döhler add new screens to the Ignition application without restarting or reinstalling the system.

Historical Data And Trending

As with any MES application, historical data and traceability are paramount. Using Ignition, Döhler has complete visibility of their data and the tools to perform

root-cause analysis. “It’s quite easy now to, within the click of a few buttons, know the exact origin of the problem, the resolution of the problem, and what was done to fix it,” said Brand.

This historical data can also be put to more immediate uses like trending. “We realized that it is necessary for operators to be able to pull up trends easily from the user interface,” said Butler. The system allows operators to access the trending tool from any control module faceplate and easily add values from the same pop-up.

Linguistic Diversity And Symbols

South Africa is host to a huge amount of linguistic diversity, with twelve official languages and at least thirty-five languages spoken in the region. In Paarl and the Western Cape area, there are only three dominant languages, but English — which is used exclusively in Döhler’s Ignition system — would still likely be a second language to much of the company’s staff.

Even without this linguistic hurdle, there is an inherent learning curve for a system with this many moving pieces (not to mention routes for moving those pieces). INTEG sidestepped this potential issue by including symbols throughout the screens to clearly indicate each piece of equipment’s capabilities. “Symbols really helped ease the transition for a lot of the operators,” said Brand. “Something like a mixed proof valve might not be something that’s familiar to all the operators, but a picture of a valve makes it clear.”

Maintaining consistent symbols from screen to screen has made it simple for operators to connect the physical plant floor with the representation on the HMI. “The operators picked up on a complex system very easily,” said Cooper. “They, in a short period of time, were able to operate the plant and get product out the door.”

A Communal Success

The success of Döhler’s new facility was truly a group effort. “What really impressed me about the INTEG project team is their product knowledge. The experience with similar plants and similar processes, how proactive they were in identifying potential problems and solving [them] before it becomes a problem,” said Brand.

Likewise, INTEG appreciated the two-way communication during development. As Cooper said of Döhler, “They are knowledgeable people. They gave us feedback and input on control philosophies, on control narratives, and on the methodologies that we used to develop this batching system.”

In addition to technical assistance from Inductive Automation, the project also received support from Element8, the Authorized Ignition Distributor for Sub-Saharan Africa. Butler said, “Any project such as this will encounter technical difficulties, but they had our back all the way.”

With scalability built into the system, Döhler is already looking toward future improvements. “There’s almost no limit to what Ignition can offer a client,” concluded

Butler, adding that Ignition “makes it easy for developers to express themselves more deeply within the SCADA systems.”

Döhler is a global producer, marketer and provider of technology-driven natural ingredients, ingredient systems and integrated solutions for the global food, beverage and nutrition industry. Döhler is all about mastering sensory performance and nutrition. Being sustainable by nature, Döhler helps to nourish the world better: Good for people – Good for planet.® Learn more at doehler.com/en.

INTEG leads the way in providing custom industrial automation solutions to a diverse range of industries namely: food & beverage, water & wastewater, and pharmaceuticals. INTEG has built a strong presence in these sectors, with expertise that goes beyond their boundaries. With this comprehensive knowledge base ingrained within their organization, INTEG confidently navigates complex challenges while ensuring utmost safety and efficacy in every solution they provide. Learn more at integ.co.za.

Project Scope

Start Date: March 2023

Deploy Date: Phase 1: December 2023,

Phase 2: May 2024

- Tags: 1,200,000+
- Screens: 80
- Clients: 7
- Alarms: 6,400

- Devices used:
- Two Siemens S7-1500 1518 CPU
- 600+ ASi-Valves
- 200+ IO-Link Instruments
- 200+ Profinet Remote IO
- 70+ Flowmeters and Drives
- Architectures used: Hub & Spoke
- Databases used: PostgreSQL for access control, trending tool and materials library. NoSQL for historical data logged.
- Historical data logged: 30,000

