

Taking ghosts out of the (cargo) machine

By Kevin Kevany

A major integrated safety project for one of New Zealand's largest export cargo operations presented itself as the perfect opportunity to debut the Singer Group's "full suite of services", which the company had been gearing up for over a period.

While the client was high-profile and the task ultra-sensitive (had it not gone well), Singer believed this was the moment to debut a fully-fledged service offering based on thorough preparation, experience, innovation and creativity, as well as the very latest technology – in some instances being evolved and tested as the team implemented the parallel change and upgrade.

"So we rolled it out, determined to demonstrate our full capabilities, while appreciating at all times that we were operating in a highly strategic facility, with a client we are steadily building a reputation with," says Mike Brockway, industrial automation services manager at Singer, determined as well to establish a context for the project and what the new terminology encompassed, other than "more than a turnkey operation".

"Oh, and did I mention our solution involved the commissioning of the first Siemens Wireless Safety System in New Zealand, a major feature of which is its being web-based. Plus developing a SCADA system to test the performance and 'boundaries' of the latest version of Siemens' WinCC software.

"For a number of years now, under Jeff McLaren's leadership, the company has focused on

its apprentice programme and working alongside the electrical engineering departments at a number of universities. Just over a year ago, we drew in graduate engineers from Waikato University to do the first major 8,000-hour service on the 385MW Mitsubishi e3p combined cycle gas-turbine power plant – one of 50 operating around the world – at Genesis Energy's Huntly Power Station and came close to establishing a world record for the job.

"I'd say our profile in the trades and the universities has grown such that Singer has become an attractive place to work. That has allowed us to recruit top calibre engineers at the sharp end of the latest technology.

"But we were also conscious that some established players in the cargo handling business had been involved ahead of us, meaning we would really have to be on top of our game, too. And the fact that highly rated international cargo shippers were also involved, all added to our resolve to get things right first time," Brockway adds.

A 15-person team of apprentices, experienced "sparkies" and graduate engineers was assembled and headed for the site, aware that any slip on their part could negatively impact on the export of anything from fresh and frozen products to hi-tech and fashion goods – the proverbial pin to an anchor.

Singer project manager, Shaun Sanders, a Siemens' drive expert, says the existing plant was made up of dated PLCs connected by a drag-chain with hard-wired "E-Stops" (emergency).

"A combination of design and coding modifications and the testing of available options to improve performance, along with an expectation of 'future-proofing' the plant with newer technology, meant the legacy system would present some challenges when we ran the new system in parallel and then progressively swapped it in – all the while ensuring minimal disruption."

Much of the work had to be done between 4AM and 6AM, with a maximum disruption allowed of 10 minutes. The challenge to be met by Singer's "full suite of services" was to add more storage conveyors, with additional IO to the existing PLCs and a SCADA upgrade.

Sanders again: "We came to the conclusion that the only suitable solution needed Siemens to come to the party with WinCC version7, plus the training and back-up to support it. While that was going through the approval process, the drag-chain connecting the two dated PLCs was severed. This presented an opportunity to remove an always vulnerable feature in the system too – the wires," Sanders says.

Singer was able to implement a solution using a CPU 317F-2 PN/DP and remote IO that also carried a Siemens Safe E-Stop. This PLC would also provide the backbone for further enhancements and control remote functions for moving the vehicle the PLC was mounted in.

Brockway describes the original PLC codes "like kids' adventure books, where you read to the end of the page and are then faced with making a

decision, before turning to the next relevant page".

Where the "ghosting" comes in is where the miss-written code would attempt to take the kiddie reader to the wrong page within an (also incorrectly) identified chapter. That means it simply sits there like a kid would do if the numbers didn't synchronise – rather than a process where the entire book is being constantly scanned and aligned to ensure a correct outcome.

He believes that the Singer decision to simulate the project at Singer premises, now a feature of Singer project management, was an important factor in the project's success.

"In a 'live' environment where we could not afford to crash the system, especially at peak times, the simulated work and proof-testing enabled us to deliver confidently. I'm just so surprised few, if any, of our competitors use this 'insight technology,'" Brockway adds.

Singer mechatronics engineer, Tim Lawton, described how the code was converted from the dated PLCs to Siemens using a combination of ladder and graph blocks.

"It was a challenge, as not only was it necessary to sift through and understand what each section of the code was doing, but also to make adjustments and improve the functionality where needed.

"Another key feature was that it was designed using Safe PLCs, rather than conventional safety relays. Two Safe PLCs control their own zones, and provide safe communications between the two.

"The system was designed using high density 64bit IO cards, which were cheaper than



Members of the Singer "full suite" team from left, Phil Wright, Chris Baker, Tim Lawton, Mike Brockway.

the 32bit IO cards and had the added advantage of a smaller size, thereby reducing the space in the cabinet," Lawton says.

His Singer electrical engineer colleague, Chris Baker, notes: "The WinCC version 7 gave the new system a huge advantage over the old. Many of those features had become redundant and others for one reason or another had ceased functioning, and could still be addressed and integrated into part of the design."

According to Baker, the cleanout and upgrade removed the "ghost" crate containers which would appear "lifelike" in the old system, and prove most disconcerting for an operator looking at an empty conveyor, only to find a package "ghosting past" on the screen.

"The fully-fledged new system also has the great advantage of running web clients instead of simply "thick" clients, which the previous set-up was limited to. WinCC also has a much better method of handling faults and alarms, which are easily displayed and acknowledged."

Overall, Singer CEO Jeff McLaren is pleased with the first outing of the "full suite of services", noting it is "so much more than a simple turnkey promise".

"In addition with what has been

outlined above, I'm pleased we were able to deliver on the creativity and safety aspects – like re-orientating the display outputs to deliver an actual operator point-of-view, rather than one with a simplistic geographic reproduction, which could even be the very opposite of what was being seen with the naked eye.

"It's that added-value bonus that I know turns the lads on and customers are crying out for it, most especially in times of tight budgets."

He believes the derived benefits include:

- Faster cargo processing times
- Reduced down-time through more descriptive alarm logs making for simpler trouble-shooting
- Fewer engineering call-outs.

"The newly implemented system has not only laid the foundations to assist the client in further developing their safety procedures and equipment, but the process as a whole can be upgraded to introduce inline screening for the cargo, barcode scanning and communication to a high level controls server."

Brockway reckons that any company using a drag-chain system should contact him immediately, or watch helplessly every two months as the drag-chain gets tangled and snaps.

Singer

ELECTRICAL INSTALLATION & MAINTENANCE

WWW.SINGER.CO.NZ



16 Edinburgh St
Newton
Auckland

PO Box 816
Auckland

0800 474 643