Core values underpin water treatment partnership

Singer "Panda" evolves from the creation of an improved wastewater environmental monitoring system. By Kevin Kevany

Singer, the Auckland and Hamilton-based electrical services provider, is rapidly gaining a first-rate reputation for problem-solving skills, outside the norm – especially in environmental monitoring. So much so that it recently signed one of the biggest contracts in the industry to provide maintenance and other services to Genesis Huntly Power Station for a further five years.

Regular readers will recall recent articles on solving the harmonics problem at the new Auckland University Business School and at Integrated Packaging, where a Singer solution "provided greater flexibility in the mix; allowed for thinner gauge film on that line; better throughput; and less wastage" – just to name a couple.

Jeff Mclaren, MD of the independently-owned company which has been around for over 50 years, has been in the top slot for many years now, but he cannot recall a period when the company has worked so effectively in partnership with customers to solve their problems.

"I put it down to our recently revised core values of being great listeners, available to customers, reliable in everything we do and sharing our knowledge. Obviously there is a lot more to it – and those who know me will appreciate I'm not really interested in 'business philosophies' and that sort of fluff, but this is working, because our people have taken ownership of these. Consequently, Singer is thriving," says Mclaren.

Privatised water treatment

One of the latest examples of Singer's problem-solving skills and working in partnership with others is a beta-site for the privatised water supply and treatment services of one of our major cities.

Working with the customer's principal engineer on the design, energy and control side plus a projects engineer, Singer's Mike Brockway, Shaun Sanders and Jannie Bekker have developed a specialist and modular solution for the implementation of a wastewater overflow data-logging system, at a particular wastewater overflow site – remote and geographically challenging for communications, security and vandalism – to control and monitor any uncontrollable water seepage into the sea, following major storms.

"We control and monitor facilities over a wide geographical area of the city to ensure, amongst other services, effective disposal of wastewater, via a large number of wastewater pumping stations.

"We strive constantly to improve our efficiency and cost-effectiveness, especially in the case of challenging sites, to have adequate overflow monitoring to enable Operations to monitor, predict and prevent overflows.

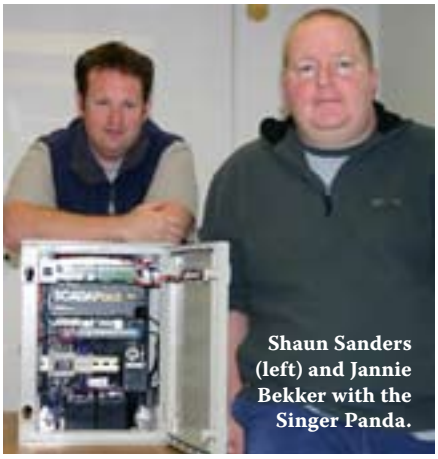
"It is also key to our meeting resource compliance requirements," says the principal engineer, who cannot be named for security reasons.

"It is our responsibility to accurately monitor wastewater overflow conditions at all our wastewater pumping stations and report all overflows on the rare occasions when they cannot be prevented."

He said the portability of the monitoring devices would give greater flexibility as well as delivering more accurate, buffered data which could assist their modelling and efficiency programmes, as well as in emergency situations. The company would gain greater oversight of all operations, improved flexibility in its ability to move devices quickly and easily to developing situations, as well as complete control of its data – no reliance on outside suppliers.

Challenges in system development

The project engineer describes the challenge to develop a cost-effective, monitoring and reporting system, which provides secure, waterproof, modular, battery-powered solution, integrated simply into their SCADA system, so as to provide real-time information



Shaun Sanders (left) and Jannie Bekker with the Singer Panda.

and ensure all historical data would be secure. The unit would have to deal with the most adverse conditions likely and then be replicated in such a way that each installation could be specifically tailored to each site, simply and without incurring additional costs.

"We were required to design and supply one data-logging system, housed in a suitable enclosure, mounted on the wall of a wastewater overflow 'wet-well' to collect level data and periodically and transmit via GPRS modem to the HO control room.

"The system needed to include an ultrasonic level transmitter connected to data-logger, utilise power- saving features of both the RTU and the modem, by going into 'sleep mode' between data-logging sessions. That RTU would have to transmit a buffer of data-logged 'level' information, once a predefined buffer was full (once per day).

"The Singer team had to provide for a coarse and fine data-logging mode to prevent unnecessary power usage, when the level was close to overflow – typically 15 minute updates for coarse monitoring and one minute updates for fine monitoring (close to overflow conditions) as well," Mike Brockway, automation manager Singer, says.

In addition, all Hayes AT commands had to reside in the modem. Cell phone technology was to be utilised to connect the

server via GPRS to the remote data-logging system. Singer would be responsible for the integration of the incoming DNP3 data into the InSQL, via the DNP3 I/O server and display this information as a trend.

Singer team leader, Mike Brockway, describes the company's solution, which followed extensive research on battery life and relative costings – "the pain for gain" formula – always bearing in mind the brief to provide modularised optimum efficiency with maximum cost-effectiveness.

"The PLC, ScadaPack RTU, modem and terminals needed to be enclosed in a polyester IP66 box, with all connection to other parts by way of IP67 sockets. Four battery boxes, each with a single battery, connected to the PLC box by plug-and-socket, connected so that at any one time, two batteries could be removed for recharging without interrupting the supply. A low-gain transmitter pole could be mounted within the concrete walls to aid with GPRS reception.

"The batteries have a charged life of at least 400 days, but I would expect 500 days, given the manufacturers are always conservative on those indicators. Obviously we pre-test under simulated conditions to verify indicators and assumptions."

Given that battery life would be the major barrier on cost and efficiency, the team came up with the concept of using float switches at different "highs".

"This meant that if the level was below the bottom float, set at 500mm above normal flow, then we could enter a preset value. This would save having to turn on the level sensor, with obvious power-saving benefits. We could also use the floats as a backup to the level sensor," Brockway adds.

Singer was aware that the client used ultrasonic devices; so they offered two options: an ultrasonic probe or a pressure-driven level probe.

"We anticipated that with wastewater in a torrid, overflow condition, 'foam' was likely to be a major barrier to a very low-current draw transmitter, would be limited to a 15 m range. Our research confirmed our instincts, so we spec-ed a transmitter efficient at penetrating foam.

"Our second probe option, using pressure, would increase power-saving, having no electronics to run, so the maximum current draw would be 20mA. Being a lot simpler in construction also made it less likely to fail.

"We discovered we could house the probe safely in a conduit attached to the wall. As the water level rises, so will the current output. In all these tricky situations, we have found over the many years – the simpler the better.

"They tend to be more cost-effective too," says Singer's automation manager.

How does it works

Under normal operating conditions, every 15 minutes the PLC logs a value based on the bottom float switch. If this switch is not made, then a predetermined value is logged. When the bottom float is made, then every 15 minutes (coarse logging mode), the level transmitter turns on and a reading taken. Once this value is logged the transmitter powers off to save battery-life.

When the second float is made, the PLC enters in a fine logging mode and takes a sample every minute until the level drops below this point. This is critical if the level is rising very quickly.

"In this case we would still record an overflow and a fault could be generated when the data is transmitted back to their HO," Brockway says. "At a pre-set time, the modem is taken out of 'sleep mode' and transmits the logged data, along with a 'healthy' or 'fault' condition, to aid with servicing of the plant."

"Singer sees great potential in this portable monitoring device – which we have called "Panda" in registering it – we believe will be 'of interest' to all local authorities/district councils, major industrial plants, D.O.C. and others with a need for environmental solutions and monitoring. I'm expecting calls," Brockway adds.

A close-up of the Panda.