TECHNOLOGY by Jocelyn Bouchard and Martin Émond

Who you gonna call?

The difference between process control, instrumentation and control systems expertise

Photos courtesy of Xstrata Nickel

The control room at Xstrata Nickel's Nickel Rim operation

Poor little Johnny; he had excitedly assembled his first bicycle all by himself only to discover that it just won't go, even though it looks fine. Then again, the instructions were not exactly crystal clear. Frustrated, he declares his shiny new bike a lemon and asks his parents to replace it. After a little investigation, Johnny's father found that his son had made a few mistakes while assembling the kit — the brakes were not tight enough and it was impossible to switch gears. When fixed by a competent shop, the lemon was transformed into the dream bicycle his son had dreamed of.

But what does this have to do with process control in mining, you might rightfully ask? However fanciful or seemingly simplistic Johnny's scenario might sound, it is not dissimilar to the frustrations that process control personnel may encounter at a mill. An technician might spend his days wrestling with a stubborn PLC (programmable logic controller), trying to stabilize the grinding circuit to stop the level of flotation cells from oscillating, only to discover that nothing works. As in the case of Johnny, he may wrongfully think that he has a lemon or that the process is too complex to be handled by the PLC using PID (proportional integral derivative) controllers, and an expert system is required.

Asking the right questions

In such process control situations several questions need to be addressed:

- What kind of instrumentation is in place? Is the right technology always used? Do the installations always follow best practices?
- Are the signals used in the PLC, for process control purposes, properly sampled and filtered? Are the PID controller configurations consistent?
- Are the control strategies appropriate? Do the controllers require sporadic manual adjustments by the operator? Are the process constraints and interactions properly handled in the PLC? What is the method used for PID tuning? Do existing control strategies take advantage of cascade, feed forward and multivariable configurations?

In other words, the root causes of the problems need to be examined. One needs to determine whether the problem is related to instrumentation, control systems or process control. Where to start investigating and who to consult are also important considerations.

There is no such thing as an omniscient expert. Instrumentation, control systems and process control are closely interrelated, and expertise in any one of these fields will imply some fundamental knowledge in the others. However, proper design and efficient troubleshooting generally requires more than basic knowledge — this means it will often take more than one expert to tackle the problem. Where does one start? Here are some tips.

Instrumentation

These problems are so common that it is estimated that 30 per cent of control valves exhibit mechanical problems and that 15 per cent of instruments and control systems are not installed properly. To avoid these problems, one should look for multiple references — suppliers, users, consultants, integrators, etc. — with whom to develop a network and share your own experience. It is also useful to carry out trials with new technologies. You can always team up with manufacturers and suppliers to share the risk and even develop your own in-house expertise. Although it seems obvious, it is worth stressing that you must always follow the instrument manufacturer's installation specifications. Finally, it is highly recommended that you work with recognized integrators — they spend 90 per cent of their time solving issues that you encounter 10 per cent of your time. They could save you a lot of trouble.

Control systems

It is vital to make the distinction between the content and the container. A skilled PLC or DCS (distributed control system) programmer is not a process control expert. Developing


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competent in-house programming resources is easier than developing process control expertise. Always ensure that the PID configuration standards are reviewed by recognized and competent process control experts. Ask for their records and talk to their customers (e.g. to investigate whether the control strategies they commissioned are still in place). Also, do not hesitate to ask for external auditing of the control system. Finally, trust your instincts. If you are not fully satisfied with what you get from your PLC or DCS, or if the operator interface (HMI) does not meet your expectations, it is unlikely that industry best practice standards will be met.

Process control

Process control is the poor cousin of instrumentation and control systems. Gnlike with instruments and control systems, where failures are glaring and demand to be fixed as soon as possible, shaky process control is often seen as acceptable. It is not uncommon to encounter default factory PID tunings in operating plants. So pervasive is the lack of attention to this area that a fifth of all control loops are improperly designed and a whopping 85 per cent of them are improperly tuned. In fact, 30 per cent of control loops cannot be operated in auto because the tuning parameters do not make any sense.

PIDs represent 97 per cent of all controllers encountered on the market. However, only 5 per cent of PID controllers contribute to reducing variability when they operate in automatic. Gsing the trial-and-error approach to tuning is time-consuming and is unlikely to lead to optimal performance. Only a systematic method can yield robust and sustainable benefits.

Closing the loop is the last step, as proper process control relies on proper instrumentation and control systems. Process control experts have a global vision of the situation and are well-equipped to identify where the problem originates.

It is important to bear in mind that nowadays, PLCs and DCSs are very powerful. One can go a long way before being limited by the control system capabilities. The power, robustness and versatility of PID controllers are generally underestimated. online arities, interactions and multivariable systems do not preclude their use. Keeping it simple is still the best approach for maximum robustness and reliability.

Designing advanced control strategies and implementing them in a PLC or DCS may require external resources. However, when applicable, maximizing the use of the existing control system is by far more cost-effective than buying an external system (expert systems, optimizers, etc.). Optimizing the PID controller tunings and control strategies represents the best possible return on investment because it takes advantage of equipment that has already been paid for and installed.

Instrumentation, control system and process control issues can sometimes look burdensome until you ask the right person. Do not accept the status quo and do not be afraid of paradigm shifts. While there are clear links between the three fields, they need to be clearly differentiated. 2xpecting a single person to wear all three hats at once is unrealistic. Only with a clear understanding of the distinct fields and a full appreciation of each expert's specific expertise is it possible to ensure optimal control. CIM

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Giving Back

Syncrude steps up to the plate

Oil sands giant **Syncrude Canada Ltd.** has signed a three-year sponsorship agreement with Fort McMurray's Minor Baseball League. Gnder the $0, 000-a-year agreement, Syncrude will have naming rights to the press box and canteen at the R n Morgan Baseball Park. Syncrude's president and C2O Tom Katinas said: Sy ncrude is proud to support youth recreation here in this region. Our young people are great ambassadors for the Wood Buffalo region and we feel it is important to help reinforce the many positive attributes of our community. This sponsorship is part of Syncrude's community investment program under the aegis of which the company has contributed over $. 5 million to various community ventures since 00.