Why is Process Control Training Important?

Like it or not, human beings are still the most important ingredient in control system performance. We know that the control system does not magically arrive at site with optimum tuning parameters or control strategy. It does not automatically identify and correct control valve problems or sensor problems. It does not identify the root cause of key variability problems. The contribution of the E&I mechanics, process and control engineers, operators and management is therefore *pivotal* to good control system performance – which in turn has a significant impact on overall process performance including product quality, process efficiency and production capacity.

At ProNamics we've been conducting process control training courses for over a decade. We have had a wide range of attendees – from new E&I technicians to operations personnel to very experienced process control engineers. It's fair to say that the majority of the course attendees have some important 'knowledge gaps'. This is not a surprise since process control optimization is a broad, complex topic. However, these gaps can and often do compromise control system performance. A good example is the relatively poor understanding of the functioning of the PID control algorithm. (Calculus!!!) . This particular knowledge gap tends to result in a 'trial and error' approach to controller tuning, which usually leaves plenty of control performance on the table. Some of the more important knowledge gaps – and their negative impact on process performance – are described in the table below.

One major negative outcome of knowledge gaps is that the troubleshooting of process control and variability problems is often convoluted and unsatisfactory. The saying 'You can't solve it if you don't understand it' is especially true for process control diagnostics and troubleshooting. Without a fundamental understanding of the functioning of control loops, a*d-hoc* solutions such as *delays, deadbands and rate limiters a*re attempted that appear to solve an immediate problem but ultimately degrade long term performance. Occasionally even advanced control packages are installed unnecessarily in an attempt to fix problems with the regulatory controls.

So closing the knowledge gaps through training certainly has the potential for substantial financial return. Of course - the training needs to be effective not only in closing the knowledge gaps but providing the attendee with the confidence to start applying the new knowledge. There are many process control stakeholders so the training content needs to be address the immediate job needs of the audience. For example, the operator must be able to recognize poorly performing control loops so that problem can be investigated and fixed quickly. The E&I mechanic must be able to calculate tuning constants that 'fit' the process objectives and recognize / correct loop

health problems. The process and control engineer must be able to investigate process variability problems effectively and design control and tuning strategies to match the process objectives. Management must be able to translate improved process control performance into economic benefit.

Beyond matching course content to job needs, the process control training needs have a substantial 'hands-on' component to lock-in the new knowledge and instil the confidence to apply it. At ProNamics 40 to 50% of our course time is devoted to a computer simulation lab where the attendees demonstrate that they have understood the new concepts. This provides the attendee with a solid platform to continue building their optimization skills when they return to the plant.

Upgrading the knowledge and skills of the plant process control stakeholders offers a clear pathway to improving process performance. Please give us a call or email if you'd like to discuss the impact of process control training in more detail.
Email: dougnelson@omniprocesssolutions.com Tel: 604-922-9524

Knowledge Gap/ Poor understanding of	Control Result	Process Impact
PID algorithm	A Trial and Error tuning approach is used	Higher variability in key process variables
Feedback control capability and limitations	Over reliance on feedback control Over reliance on tuning as a solution to process control problems	High process variability Inefficient troubleshooting
Impact of filtering	Over-application of filters to 'solve' high variability problems	Potential for tuning/filtering induced cycling
Control valve non-linearities	Severe problem before identification and correction	Potential for continuous cycling in Auto mode
Process Objectives / Tuning Strategy	Tuning does not support process objectives	Higher variability in key processes
Benefits from Cascade, Feedforward, Ratio control strategies	Missed Opportunities for improved control performance	Higher process variability
Cost of Variability	High Payback variability reduction projects are not recognized or implemented	Lost profit opportunity