Consistent Alarms Improve Process Economics and Increase Process Safety

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ABSTRACT

There has never been a method for finding values for process operating alarm limits other than a few strength-of-materials calculations of safety limits which are outside the scope of this paper. Almost all previous work on Alarm Rationalisation has started from the Process Alarm Log. We show how much better values for operating alarm limits can be found starting from process history data instead and demonstrate with implementation examples. Much tighter alarm limits are usual with our method giving the operator more correction time in the event of a process excursion as well as a process excursion caught earlier in its development so usually requiring less dramatic corrective action. The new alarms are geometrically Consistent with each other so take the first steps towards recognising that alarm limits interact with each other in consequence of the process variables interacting with each other. Our better alarm limits reduce the proportion of false alarms resulting in increased operator confidence and leading to alarms being used as positive aids to assist the operator in the achievement of operating objectives and in identifying improvement targets for process control. Alarms are shown to contribute economic value to a plant in their own right leading to a more positive environment for improving or rationalising alarm systems than exists in todays environment where the motivating forces are either legislation or avoidance of the very small probability of a major plant disaster. Implementation for multiple process operating Modes (also known as State-based alarming) is straightforward and will be shown. The method requires no mathematics so gives better alarm limits and a safer process while also being faster and easier to use than existing methods of alarm rationalisation. The method extends to fully include the effects of variable interactions resulting in dynamic Alerts whose objective is to keep the process inside its fixed HiLo alarm limits thus contributing even further to increased process safety. This will be introduced and, from experience of its use in fault detection and multi-phase batch process control, the possibility will be discussed of its use in time-varying Modes such as Start-Up and Shut-Down.