CASE STUDY

Effective alarm and boundary management optimizes offshore platform startup

Key facts:

Industry: Oil and gas

Octave products used: Tempo Control System Effectiveness *(PAS PlantState Integrity)*, Tempo Boundary Analytics *(PAS InBound)*

Key benefits:

- Greenfield alarm and boundary optimization project avoids costly problems
- Faster startup without unnecessary shutdowns
- Improved abnormal situation handling
- Reduced operator fatigue
- Automatic notifications of changes that violate established boundaries
- Automated management of change of alarm and safety system configuration

About the company

A new deep-water oil production platform is a gigantic project costing hundreds of millions of dollars. The startup and initial operation must be smooth and uneventful. Historically, major and expensive problems occur with the alarm and control systems during the startup of a new platform.

The leading energy exploration and production company owners were determined to have better results in the startup of one of the world's largest offshore platforms. They engaged Octave for initial best practices for alarm configuration and new technology for managing operational boundaries.

Challenge

In previous projects in the company, initial designs of process alarm systems were regularly suboptimal, which resulted in poor alarm system performance in production. These previous failures to properly configure the alarm system in the first place led to startups that were plagued with thousands of nuisance alarms, high alarm rates and major alarm floods. Instead of realizing its intended purpose, the alarm system became a serious distraction, and operators lost the ability to detect and resolve abnormal conditions, resulting in needless and expensive shutdowns.

It is well known that correcting alarm problems post-startup can take years of expensive rework. This major project aimed to have a properly configured alarm system from the outset.

Solution

Because this was a greenfield deployment, the team could not leverage historical alarm data. That meant the team had to rely solely on best practices to guide their work. The alarm design had four major goals:

1. Translate the platform's design documents into meaningful operating envelopes that reflect process safety, reliability and economic operating constraints
2. Design an alarm and process boundary system that spans the gap between the control system and the independent, automated safety systems, accurately reflecting the above-mentioned operating envelopes
3. Enable the operator to take corrective actions before the safety systems initiate an expensive shutdown
4. Ensure that anticipated changes resulting from initial testing (and later operation) could be safely and consistently incorporated into the complex control and alarm configuration

"Never in our history has a platform alarm system attained acceptable performance so quickly after commissioning."

Project Automation Lead Engineer

Alarm rationalization

Octave was engaged as an industry expert to review the platform owner's internal documents on alarm management, which were based on the international standards ISA-18.2 and IEC 62682, as well as the practical advice given in Octave's *The Alarm Management Handbook* (formerly PAS's *The Alarm Management Handbook*).

The asset owner implemented Tempo Control System Effectiveness from Octave to fully document the alarm, control and safety systems, including all interrelationships and dependencies. Beyond software, Octave experts also delivered a comprehensive alarm documentation and rationalization project to define the meaning of each process alarm and eliminate all unnecessary alarms. It was determined that only 13,000 alarms (of 110,000 possible) were needed, resulting in an 88% reduction. These included 4,000 for the fire and gas system and 9,000 for production, utilities, rig and hull.

Octave incorporated all alarms into a master alarm database with valuable information on causes, consequences and corrective actions. Operators can access this data via their control system HMI.

Boundary management

The process included documenting a safe operating envelope that reflects process operability, safety and reliability constraints. The asset owner deployed Tempo Boundary Analytics to identify and map the relationships of all operating envelope parameters, which are typically scattered and poorly documented. The application supports dynamic equations for each operating envelope boundary condition to determine when a constraint has been violated and notify the process operators. More than 900 boundaries and 2,000 constraints were configured for the project.

Tempo Boundary Analytics also provides notification of configuration changes that violate the established boundary constraints. During platform testing and commissioning, dozens of control system settings and logic changes were identified. In many cases, these planned changes reflected a partial understanding of the complexity of the control schemes. For example, some proposed changes placed alarms on the wrong sensors or would have set trip points above environmental excursion settings. Tempo Boundary Analytics identified and reported all such improper changes so that corrections could be made quickly. In the operational phase, Tempo Boundary Analytics also shows the state of the platform in real-time relative to all process boundaries and automatically tracks and reports exceedances, including their cost impact.

"Without Tempo Boundary Analytics flagging the violations, the errors would have been much more difficult to find and could have caused delays, lost production and unnecessary shutdowns."

Project Automation Lead Engineer

The result: Optimal start-up

The optimization of the platform alarm system performance and boundary settings significantly improved both the efficiency of the startup and the safety of ongoing operations. Using Tempo Boundary Analytics also ensured error-free configuration changes to alarm and trip settings in the post-startup optimization phase as well.

Summary

Alarm system design for a complex greenfield project poses unique challenges. Experienced people and the right tools can enable optimal and safe startup and smooth production operation.

About Octave

Octave is a leader in enterprise software, turning data into decisive action and intelligence into your edge. Our software solves for and simplifies complexity, from the design and build to operations and protection of people, property, and assets– for any scope, at any scale. For decades, we've partnered with customers to sharpen performance, elevate efficiency, and amplify results. From factory floors to entire cities, our solutions are tuned to scale up what's possible from day one onward.