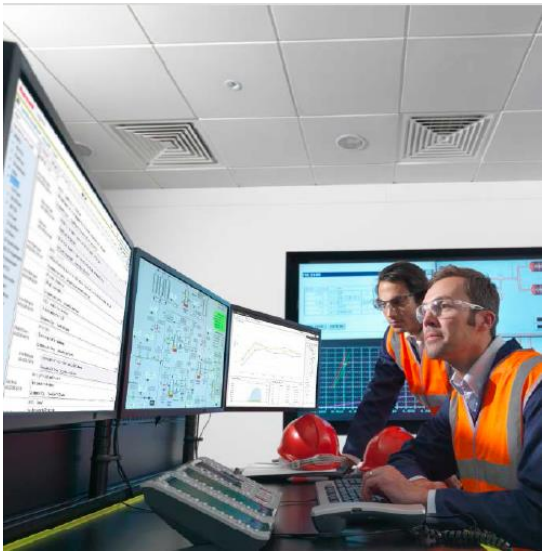
Honeywell | Connected Worker

DELIVERING REAL-TIME UOP OPERATOR GUIDANCE FOR SAFER, MORE PRODUCTIVE OPERATIONS

Protecting plant uptime and reducing operator error on Honeywell UOP licensed process units with DynAMo® Solutions Suite for UOP

White Paper



Introduction

The advanced user interface design coupled with a well-managed alarm system is a well-known industry tactic that actively reduces the frequency and severity of operator error, in-turn reducing expensive and potentially dangerous abnormal situations. However, in the event of an abnormal situation, the control room operator still remains the first line of defence. It's that crucial point in the process where the control system needs help, and the operator is tasked with providing the right response, to the right situation, at the right time. This is key to reducing off-spec product, damaged equipment, process trips and unplanned downtime.

Operators therefore need to respond to alarms in a timely manner, regardless of the other tasks being executed. However, investigations show that it's not just responding to the alarm, but responding in the correct way that is just as important. In fact, in many situations, responding with incorrect actions can actually be far worse than responding with no actions at all.

With no action, safety systems are designed to take over and perform a shutdown of the process in order to make the plant safe, by whatever means necessary. When incorrect operator intervention takes place – either from a misunderstood alarm or poor judgement – it is conceivable that an operator action could in some way undermine the effectiveness of the safety shutdown system, leading to much longer recovery times, greater equipment damage and overall higher engineering costs to bring the plant back to normal operations.

Regular structured training is one strand to ensuring operators make the right decision based on the information presented to them. But operator competency varies across assets; across shifts; so is there a more trusted way of reducing operator error – a way of ensuring the right decision is made every time?

Contextualized alarm help delivered directly to the operator console is a key step to eliminating operator error in a timely and cost effective manner.

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A good alarm management program consists of multiple stages. From alarm philosophy design, to alarm management benchmarking, assessment and reporting, though to alarm rationalization and system improvement.

It's a continual process, with proven advantages, driving improved safety, compliance and operational integrity of your assets.

But what if you could speed up that process, accelerate the benefits of a complete alarm improvement program in a fraction of the time – with knowledge direct from the process licensor?

Alarm Management

Alarm systems, of any type, are used to notify operators of abnormal process conditions, equipment malfunctions, and any adverse situation impacting an assets safety, reliability, availability and operational integrity; a cry for help from the control system so to speak. To be effective they need to be well designed, implemented, and maintained as part of an overall alarm management program.

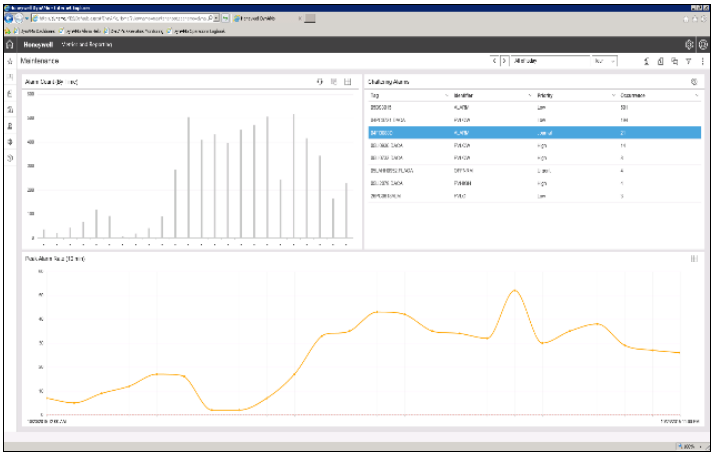

Figure 1: DynAMo's Alarm Suite

A toolset specifically designed to drive alarm management improvement considerably simplifies these tasks and Honeywell Process Solutions leads the industry in this area with the award winning DynAMo® Alarm Suite.

By first measuring, visualizing and then analyzing alarm system performance, these toolsets enable organizations to focus on the most critical areas for improvement, helping them to drive towards industry standards and best practices governed by bodies such as the ISA, IEC, EEMUA and the Abnormal Situations Management (ASM) Consortium – in a timely, progressive, and cost effective manner.

By systematically identifying bad acting, nuisance, standing and stale alarms and then either by re-tuning the alarms or eliminating the un-actionable ones it is possible to dramatically reduce the alarm rate annunciated to operators in a very short period of time. Operators are then able to observe the real alarms as they occur, with adequate time to think, away from the pressure cooker environment an abnormal situation can bring.

Alarm Help

Reducing the alarm rate is a key first step to driving alarm system improvement, and provides the operators with more thinking time to analyze the abnormal situation, which in turn leads to a higher percentage of correct responses to alarms. It also improves the chances of the operator seeing the alarm in the first place.

Across industry today the cost of a single missed alarm can be wide ranging, depending on how much equipment damage and reprocessing costs are incurred, but typically, in offshore, refining and chemical processing units it can be upwards of $3.5M per upset condition. That is clearly a significant amount, and one which organizations will seek to minimize wherever possible. However, when compared to the average cost of a misunderstood alarm, verses a missed alarm, the numbers can be dramatically different.

Missed or misunderstood alarms typically happen when a board operator is faced with one of the following criteria:

- Dealing with a complex task.
- In a high stress situation, for example when responding to other alarms or process upsets.
- Less familiar with the alarm because of their experience level.
- Less familiar with the alarm because it occurs infrequently.
- In a less cognitively aware state because of fatigue or time of day.

The traditional outcomes however can be improved by providing the operator with detailed alarm help on each of the individual alarms in the alarm consoles summary; guiding them to the right decision.
But where would this valuable alarm help actually come from?

Refining and Chemicals	Alarms per Operator per Day
Without Alarm Management	1350
With Alarm Management	250
	Typical Cost
One missed alarm resulting in a unplanned shutdown	$3.5M
One misunderstood alarm as a result of operator error leading to a loss in containment	$15M (Impacted losses as direct result)

Table 1: Impact of poor alarm management

Alarm Rationalization

Another key stage in the alarm management improvement program is the Alarm Rationalization phase. Industry standards and best practice bodies recommend that during the process of alarm rationalization the purpose of each alarm is validated – in turn, creating the alarm help documentation described above. In summary this process entails:

- Assessing if the operator can make a meaningful response to the alarm within a realistic time.
- Identifying the likely causes of the alarm.
- Identifying the potential consequences and impact of not responding to the alarm at all.
- Defining the recommended actions for the console and outside operators when the alarm occurs, and the expected time to respond.

Even though the safety and economic incentives for alarm rationalization are high, the costs associated with the process are also high because it requires a multi-disciplinary team with wide ranging and deep knowledge to scrutinize all of the alarms and their outcomes.

Financial Considerations of Alarm Rationalization

Alarm Rationalization is a well understood process and integral to a complete alarm system improvement program. It's designed to look at each alarm in-turn to determine cause, consequence, actions, priorities, trip points and escalations - amongst other things. It's not a process to be undertaken lightly and it's key to carry it out at the right point in the alarm improvement process. Alarm rationalization too early on in the process and the effort typically takes considerably longer with the potential need to re-do the process 2-3 years later when the alarm system is cleaner and under control in steady state operations.

The alarm rationalization process however requires a commitment by the organization with regard time and effort from automation engineers, design engineers, operators and production engineers to ensure all stakeholders' experience and decisions are taken into consideration – to determine the correct course of action for each alarm.

A recent study by a global oil and gas giant conducted that for a complex process unit it required one experienced alarm rationalization facilitator and up-to four experienced process engineers to review each alarm. The effort equating to approximately $365 (USD) to rationalize a single alarm to the best practice required standard.

This effort results in each alarm being rationalized based on end-user experiences and typically the creation of a spreadsheet containing the rationalized information.

However useful this process is, it still exposes two areas of weakness. How to get the information from a spreadsheet to the operator, when it's needed; and is everyone certain that the final answers in the spreadsheet are accurate, reliable, and will remove operator error regarding correct responses to alarms in abnormal situations? The verdict depends entirely on the team assembled, their experience, and their knowledge of the process.

Introducing DynAMo Solutions Suite for UOP Process Units

Honeywell Process Solutions has collaborated with Honeywell UOP to provide a suite of operator alarm guidance modules for UOP licensed units. These modules provide alarm help documentation for UOP specific unit alarms, leveraging the design intent and UOP's vast process experience. This information can be quickly mapped to the site specific alarm tags and then loaded into the DynAMo Documentation and Enforcement (D&E) master alarm database software, to provide alarm guidance at the point of need – direct to the operator.

DynAMo D&E is a vendor neutral solution, designed to work with any control system from ABB to Yokogowa. However, with Honeywell's Experion EPKS DCS it provides an additional level of integration. Figure 2 illustrates how the alarm guidance is natively integrated into the Experion alarm summary view.

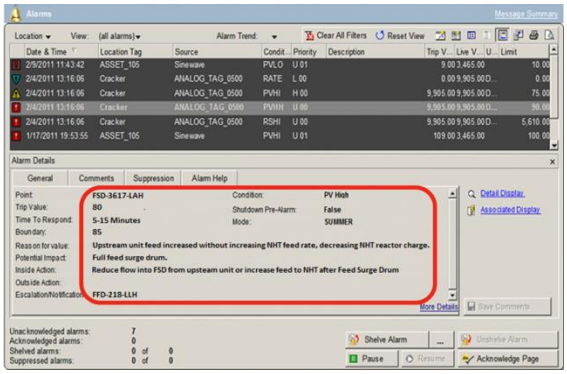

Figure 2: Alarm Help from the DCS Alarm Summary

When a specific alarm is selected, the alarm help tab displays the alarm guidance information. Alternatively, Figure 3 illustrates the alarm help in a faceplate view for a tag selected from the operating schematics. In both cases the alarm help information, managed within the DynAMo D&E database, is provided to the operator at the point of need. Eliminating application switching and time consuming spreadsheet lookup's.

Allowing the operator to stay focused on the console focuses on resolving the abnormal situation as quickly and as safely as possible.

What if there was a way to deliver the correct responses to alarms, all the time, every time, direct to operators – with information specific to the process unit – from the process licensor – without the need for a time consuming alarm rationalization program?

DynAMo's Solution Suite for UOP delivers alarm help documentation knowledge direct to operators. Ensuring your operators make the right decision when faced with process alarms.

Part of the award winning DynAMo Alarm and Operations Management suite of products.

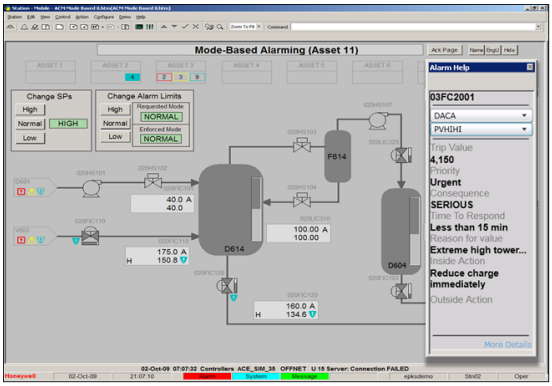

Figure 3: Alarm Help from Experion Operating Graphics

Benefits of UOP Alarm Help

The alarm help information can be leveraged by both greenfield and brownfield sites. In the greenfield context the console operators will have been trained but will inevitably have little operating experience of the specific plant. The alarm guidance information will provide just-in-time support for the operators, helping to reinforce their training and reducing the number of early operating incidents; and more importantly – all from day one of the plants operation.

In the brownfield context the alarm guidance information greatly simplifies the rationalization activity. It provides a reference document, based on UOP best practices, to compare against the currently configured alarms. Some level of engineering effort will be required to cross match the guidance information against the configured site specific alarm database and to ensure that the site alarm philosophy is maintained, however this still represents a very significant reduction in overall engineering effort for premium quality alarm guidance.

Scope of UOP Alarm Help

DynAMo Solutions Suite for UOP provides alarm help documentation for the following UOP licensed complexes:

- Naphtha
- Aromatics
- Gas Processing
- Oleflex

As an example the Naphtha complex includes operator alarm help for units such as the CCR Platformer, the Merox untis, and the Hydrotreater, plus many more.

Table 2 shows an example of the level of documentation provided when, for example, the Feed Surge Drum on the NHT unit reaches a low level of 20% and a high level of 80%.

Service	Type	Setting	Causes	Consequence	Corrective action	Severity	Time to Respond
Feed Surge Drum	LAL	20%	FIC set incorrectly downstream feeding the unit above available feed quantity, feed upset in upstream unit	Unit trip	Confirm flow of fresh feed from upstream and flow to the reactors. Correct imbalance to stabilize and restore level	Major	< 5 min
Feed Surge Drum	LAH	80%	Upstream unit feed increased without increasing NHT feed rate, decreased NHT reactor charge	Full feed surge drum	Reduce flow into FSD from upstream unit or increase feed to NHT after Feed Surge Drum	Minor	5 – 15 min

Table 2: UOP Unit Documentation – NHT Example

About Honeywell's DynAMo® Alarm & Operations Management Suite

It is a software family which delivers advanced capabilities for alarm system compliance, monitoring and rationalization. It brings automated enforcement of alarm policies, measurement and reporting of alarm system performance, notification and alerting of operational problems, and best practice workflows for the communication and visualization of operational objectives – all in a single unified platform.

This comprehensive set of software enables best-in-class operational management, with rigorous compliance to API, EEMUA, ISA and IEC global standards for alarm management and integrity operating windows. In addition, it is vendor-neutral and can be used with any control system. It's also Honeywell IIoT ready.

Conclusions

Honeywell Process Solutions collaboration with Honeywell UOP engineering and technical services enables customers to achieve best in class alarm management practices with minimal engineering effort. This significantly reduces the likelihood of poor operation and therefore enhances safety, reliability and process performance. Alarm help is delivered directly to operators via Honeywell's award winning DynAMo Alarm Suite for Documentation and Enforcement (D&E).

For more details on this unique integrated UOP alarm help offering for your process units, contact your Honeywell account manager or visit www.hwll.co/dynamo.

For More Information

Learn more about how Honeywell's DynAMo solution can improve your operations, visit www.hwll,co/dynamo or contact your Honeywell Account Manager, Distributor or System Integrator.

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