

## In This Issue

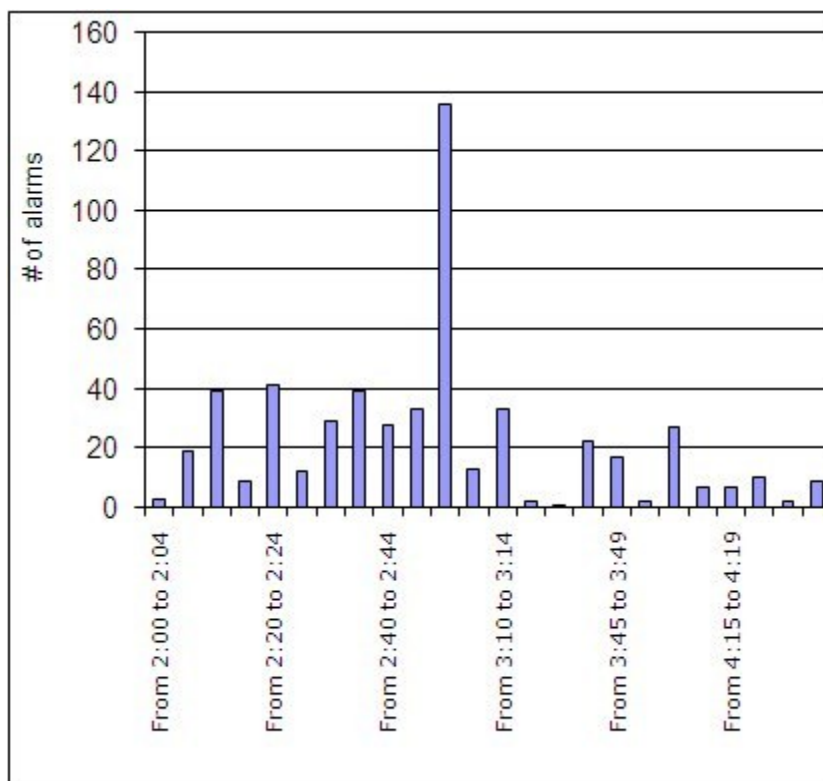
- [Ignorance is Bliss](#)
- [Did you know?](#)
- [Color Usage Study](#)
- [Operator-Cashier Analogy](#)
- [Hazardous Experience](#)

## Ignorance is Bliss

If taking aspirin masks the pain from a brain tumor to the point that you don't get treatment, did the aspirin help? The emphasis in alarm management on elimination of "bad actor" alarms may be a similar phenomenon. It has become a mantra that the first and biggest improvement in alarm management is to remove the nuisance alarms, ones which actuate frequently and have no operator response. Take an aspirin and call me in the morning.

Consider the case of a set of Hydroprocessing units in a major refinery. Over the course of a month, the console operator averaged 4.1 alarms per hour. This was the result of a conscious effort to eliminate the "bad actor" alarms, an effort that has resulted in a reasonable level of steady state alarm activity. Everything is much better, until a minor unit upset occurs.

In this instance, it is a loss of excess hydrogen from a pentane isomerization unit to the other hydrotreaters. The resulting alarms, in five minute increments, are shown in the figure below. Over the two hours of this event, the console operator averaged 24 alarms per five minutes, or about five alarms per minute. These rates are well above most guidelines for alarm response.



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## Did you know... (from our database)?

During the late afternoon/evening, Coker board operators make an average of 7.4 control moves per hour.

Beville's workload database includes over 1800 job samples, representing over 7,000 hours of observation of operators. This amounts to 3.5 man-years.

This was not a major upset, more of a bump in operation. The event was handled without incident. However, how confident should this plant be of the success of their alarm management approach (i.e., the reduction in “bad actors”)? How confident are you that this approach will allow your operators to handle upsets without further incident?

While this type of analysis certainly has its place in an alarm management program, it is (or should be) only one aspect of a comprehensive approach that should include alarm philosophy development; point by point reviews; documentation of alarm causes, responses and consequences; and application of conditional logic . Find out more about Beville Engineering’s approach at [http://www.beville.com/alarm\\_management.asp](http://www.beville.com/alarm_management.asp).

[ [Return to Top of page](#) ]

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## Operator-Cashier Analogy

For years, industrial engineers have dealt with issues of balancing manufacturing production. What is the most cost-effective amount of production capacity given variable demand for the products? You don’t want idle equipment, but you also don’t want to lose sales by not having enough product. Consider this case -

Imagine that you manage a retail store. Early on the rate of customers arriving to check out is less than the rate at which the cashier can check them out. There is no line, and the cashier has some spare time. As the store gets busy, the rate of customers to check out exceeds the cashier’s check out rate and a line/queue forms.

Eventually fewer customers arrive, and the line disappears. If the line gets too long, some shoppers will leave without buying. If they are purchasing one low price item, you are only mildly concerned, but it really isn’t worth adding another cashier.

However, you don’t want to lose a shopper buying a large number of high priced items. You could add cashiers so that no queue ever formed. You could add cashiers to prevent the line from getting so long that anyone left, ensuring that customers with big ticket items don’t leave along with the dollar general crowd.

Cost/Benefit analysis might indicate that the cost of losing some of the low-dollar customers is less than adding cashiers, certainly less than adding cashiers so there is never a queue. Or, if you could identify the high dollar folks, having a special lane or opening a special register would cost less than adding a full time cashier.

Now, make some small changes to the situation. Make the customers job-related tasks and the price of the items their priority (required speed of response \* consequence of inaction). The cashier is the operator. A customer leaving is a task not attended to in time for successful action to be taken on it. There is no problem as long as the length of the queue does not result in losing customers (tasks).

It still might be okay for a short time to lose the low dollar (low priority tasks) customers as long as it doesn’t also cause a loss of the high dollar (high priority tasks) customers. The goal in staffing is to match the right personnel, with the right skills, to the required work, at the right time.

What’s the point? Refinery managers are often faced with the critical



## Color Usage Study

What is the best display background color? This is a frequent question Beville associates are asked when working on display and alarm projects.

A recent study adds more information on the issue (Greco, M., Stucchi, N., Zavagno, D., and Marino, B., “On the Portability of Computer-Generate Presentations: the Effect of Text-Background Color Combinations on Text Legibility, Human Factors, Vol 50, #5, 2008, p821-833).

A study on color usage was also recently funded by the Center for Operator Performance. For more information about the Center or to view a discussion on the relevant data including these studies, visit the Center for Operator Performance’s website ([OperatorPerformance.org](http://OperatorPerformance.org)).

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question -- How many people are needed to safely and efficiently operate a process unit?

First, steady-state demands of a unit may exceed the minimum 24/7 staffing required to secure a unit. In such a case, a day operator position ("special register") may be utilized to serve as a focal point for administrative and maintenance tasks. Second, it might be okay to have periods of times when a queue of tasks develops, as long as they can all be handled within their required time period. Third, it might also be okay to have short times when some tasks are not completed, as long as they are of low importance.

[ [Return to Top of page](#) ]

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## Hazardous Experience

Experience with hazardous situations can be a two-edged sword. While the experience obviously gives the individual the opportunity to develop skills and reduce the anxiety about such events, it can also potentially lead to greater risk taking.

So says a recent study on pilots and their experiences flying in hazardous conditions (Pauley, K., O'Hare, D., Mullen, N., and Wiggins, M. "Implicit Perceptions of Risk and Anxiety and Pilot Involvement in Hazardous Events" Human Factors, Vol 50, #5, 2008, p723-733).

The study used the Implicit Attitudes Test (IAT) to measure attitude toward risk. Those pilots with the lowest perception of risk toward flying in hazardous conditions were also the ones who had flown the most often in hazardous conditions.

Since this was a correlation study, it could not be determined if the lowered risk perception was the cause or the effect of experience with hazardous flight, although it might possibly be both.

[ [Return to Top of page](#) ]

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