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**As this "go-to" guy for maintenance-related questions at his plant explains, there's more to advanced instrumentation capabilities than improved control. Much, much more.**

The accelerated growth of smart instrumentation in process-industry plants over the past 20 years has been stimulated by visions of greater measurement accuracy, useful diagnostics, reduced control variability and better equipment reliability. The promise of this technology is improved all-around performance and higher productivity.

That promise was part of the vision at the LyondellBasell facility in Clinton, IA, where smart instruments have been in use in the ethylene and high- and low-density polyethylene production units since the early 1990s. Today, more than 1800 HART® and FOUNDATION™ fieldbus instruments, ranging from first-generation analog to the latest digital technologies, are integral components of our DeltaV™ digital automation systems.

While the operations group has derived value through better control of the process with our smart devices, their full potential had not been realized in the Clinton plant prior to 2007. This is because the field-generated diagnostics were not being used to support the predictive maintenance strategies that are possible through DeltaV. Clearly, a more proactive environment was needed to turn the visions of greater reliability and better process performance into reality.

Things began to change when an E/I (electrical/instrumentation) specialist was assigned to establish new maintenance procedures and workflows: That would be me. Midway through 2007, I began managing the operation of the AMS Suite: Intelligent Device Manager predictive maintenance software—*which had seen limited use here since its introduction to the plant in 2000*. This organizational shift spurred the growth of a successful predictive maintenance program that has delivered a range of troubleshooting, calibration, documentation and operating benefits.

As the predictive maintenance "champion," I became responsible for updating the site's smart instrument database and accessing information from the field devices as a means of diagnosing instrument-related issues. One major initiative included the development of alarm parameters to determine which alerts represent potential production problems requiring further investigation and which ones—*such as temporary outages*—result from routine work in the plant.

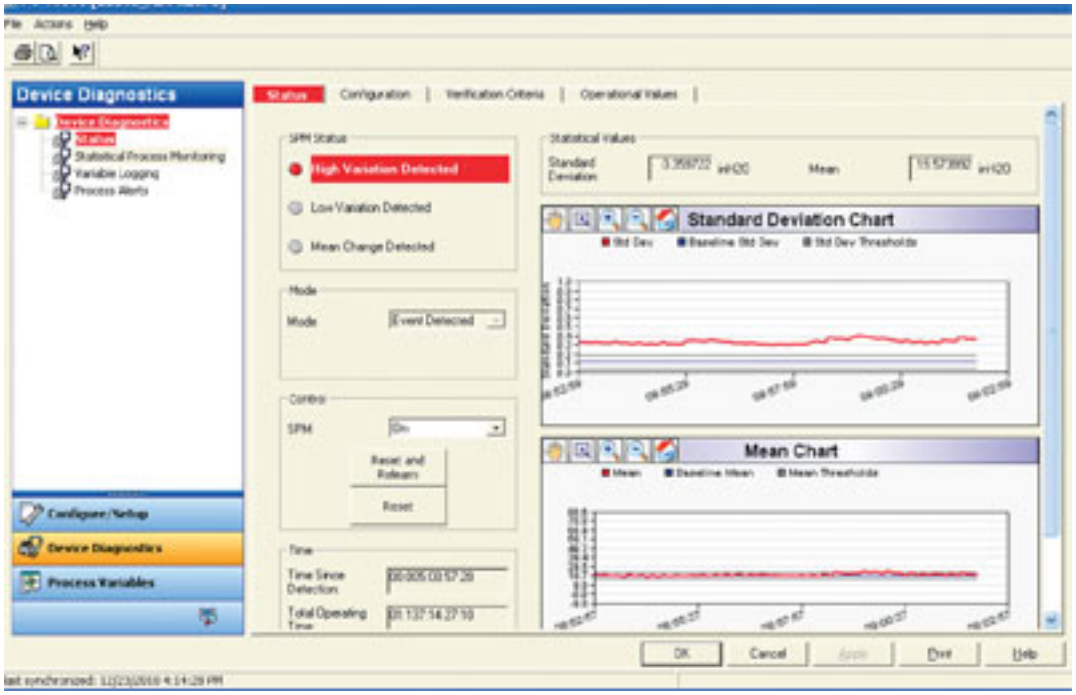


***Fig. 1. A pressure transmitter is checked by clicking on the "Device Diagnostics" box and selecting "Status." The "High Variation" that's detected could be an indication of a plugged sensor line (depicted graphically on the Standard Deviation chart).***

## Predictive benefits

At the Clinton site, AMS Suite is used to provide preliminary diagnoses right from the instrument shop—*something that gives technicians a significant head-start on locating and fixing problems*. This can save up to two hours of troubleshooting time per issue. For example, when a temperature transmitter on a reactor roughly 100 feet off the ground stopped transmitting, our initial interrogation of the point showed that the sensor was open (an indication of faulty wiring or a bad thermocouple). The technician was then able to take the right parts and tools and make one visit to the site, thus minimizing repair time. Upon its completion, the repair was checked from the shop, proving that the transmitter was functioning as desired.

With the ability to provide fast, accurate answers, I soon became the “go-to” person for maintenance-related questions. As people across the plant experienced the benefits of using diagnostics, we received general support for the use of this predictive approach.

Today, all device maintenance—*including repairs and configurations*—is automatically recorded in the instrumentation database, eliminating error-prone manual entries and providing an audit trail of device events. The maintenance history of any instrument can be tracked and viewed by referencing the tag number. Analysis by device type enables a quick check of similar devices in other locations to see whether they may be developing the same kind of problems. Accurate documentation on instrument calibrations is, of course, essential to satisfy the requirements of regulatory agencies.

**Device diagnostics**

The Clinton site uses AMS Suite to interrogate field measurement instruments online to determine key operating issues. Figure 1, for example, shows how a pressure transmitter is checked: by clicking on the “Device Diagnostics” box and selecting “Status.” The “High Variation” that’s detected could be an indication of a plugged sensor line (depicted graphically on the Standard Deviation chart). We can track this device over a number of days to determine if the deviation remains within acceptable limits or how quickly it is changing. These diagnostics help us determine whether an immediate repair is needed or if it can be delayed until a regularly scheduled shutdown period. Operators are always kept informed if readings from certain instruments are questionable so they can take necessary actions to maintain production.

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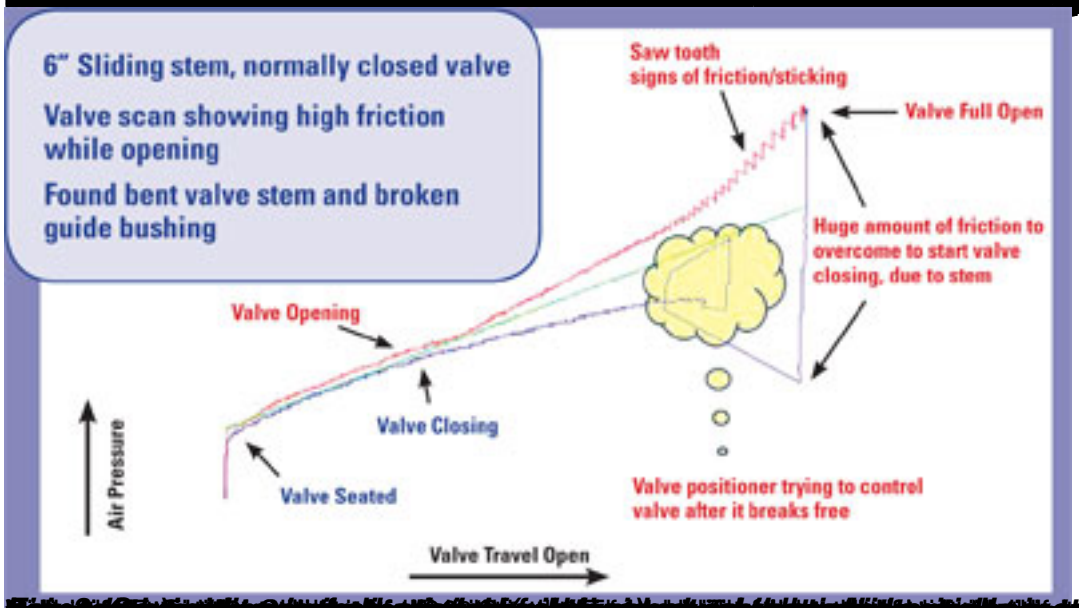


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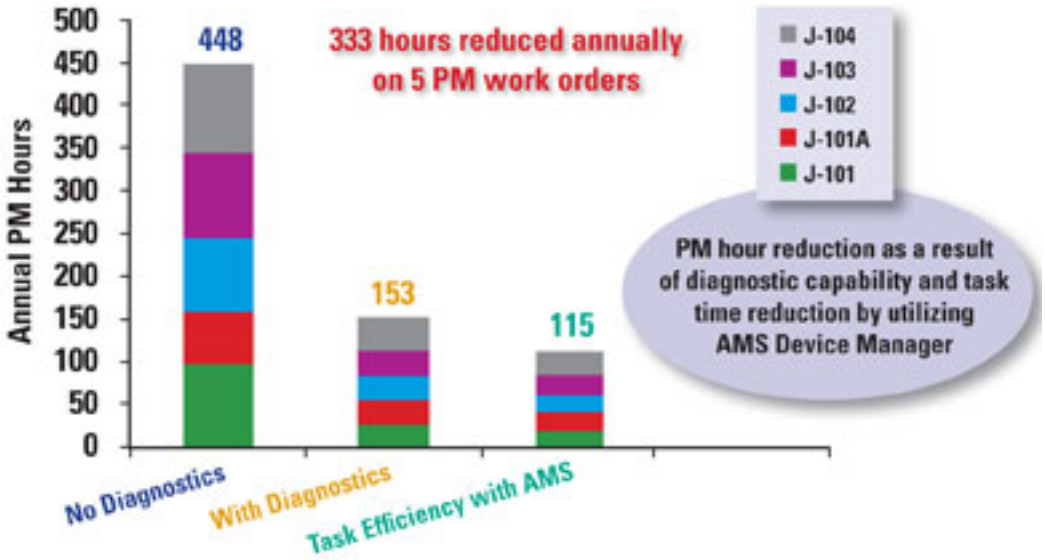


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