NEW ROLES FOR A DIGITAL AGE

Gary M. Ostrowski, Baker Hughes, a GE company, USA, introduces the concept of the digital technician and explains how this new role can help to solve plant inefficiencies of the past.

Maintenance and repair are necessities throughout everyday life. Some maintenance and repair scenarios are obvious from noises and other visible indicators. For these cases, it is possible to seek help before a bigger disaster happens. Then there are the subtler cases – those that are not seen or heard, and can only be detected by advanced sensors. These are often missed and, if left untreated, can quickly lead to bigger catastrophic problems.

This is the world where the digital technician is essential. The digital technician can look through opaque walls and piping, into the bowels of a system, and can do so from thousands of miles away. These technicians connect devices and collect data to see everything through real time data on top of historical trends. They are able to detect failures and offer quick diagnosis and repairs.

Evolution of the technician

Over the last century, plant optimisation was managed through manual tuning of equipment. As process variations were experienced, maintenance managers would assess all surrounding equipment within the system as possible culprits, and then set tactical plans for further investigations during the next outage. Technicians, armed with toolboxes and wrenches, were then assigned to disassemble all valves

Figure 1. A digital technician setting up valve software to perform an in-situ test on a pressure relief valve.

Figure 2. The digital technician is able to test the valve without removing it in addition to seeing its historical performance.

within the system to physically inspect each component to determine the extent of repair required. Sometimes failure modes were quick to assess with obvious signs such as erosion or cavitation wear, galling or sticking tread marks, or debris lodged inside the valve blocking flow capacity. Other times, all components would come back within specification, and technicians would be forced to reassemble with new soft goods and move on to the next suspect, on-and-on, down the row of equipment until a root cause is definitively found. They would then hope it is within on-site capabilities to repair, or face the setback of operating through another cycle with less than ideal equipment until new components can be ordered.

In these times, plant operation was loaded with inefficiencies that were a normal part of life. Outages were longer than desired in order to conduct ample diligence; resources were always in shortage due to the magnitude of work; and lead times were longer than maintenance windows would allow. As plants were driven to yield competitive product, valve manufacturers were called to innovate solutions to offset these high cost and long outage inefficiencies.

Today's world is migrating to the digital age. So what is a digital technician? And how does this new role help to solve these plant inefficiencies?

A digital technician still leverages the skills of a highly trained, product and technology conversant valve technician. However, digital technicians carry with them a digital toolbox that utilises data and software to quickly find root causes and tune a device. Like a doctor with access to a host of diagnostic tools, such as scans and ultrasonic machines, these technicians now have at their fingertips the ability to understand/diagnose a problem before they even set foot into the plant. But like any good doctor, valve technicians must also have a depth of understanding of all components within the valve body, so that they can complete the service after the initial diagnosis.

The digital world of data

The most important element that digital technicians have at their disposal is data. While a doctor may analyse the blood pressure, weight, and overall health of a patient over their lifetime, the digital technician evaluates and analyses the data from the valve along every step of the way, from the as-specified, as-engineered, as-built valve genealogy to the application data and run-time data for the valve. This host of data is compiled and used in different ways to diagnose, test, tune and repair a valve. The digital technician is like the conductor of a symphony, bringing together all facets of the music to create a song. The digital technician must skillfully utilise knowledge, tools, and historic health data to create a valve in harmony with the process it is in.

Consider the following scenario: a plant is expanding capacity to meet higher demand. A consulting firm is called in to assist with the sizing process for the expansion and associated valves. First, data is collected on the process and the valves are sized. Next, the valves are ordered, engineered, built and tested to meet the application (data is collected). The valves are then installed and tuned to ensure optimal performance in the process using digital instrumentation (data is collected). Finally, the valves are now running in the process (data is collected).

Throughout all of these steps, data is gathered and linked to this exact valve. As such, if future repair is needed, a baseline of data can be utilised by the digital technician to benchmark. In fact, the data collection process does not stop there, because when a valve comes in for typical maintenance, the repair data is also collected via an asset management tool and linked to the valve so that a full picture of this valve is visible. This historic look at the life of the valve is called the 'digital thread' and it is critical for the digital technician.

With data in hand, the digital technician can now utilise the tools of the trade. For instance, in-situ testing tools could be used to verify set pressure of a safety valve. Or, to establish if a valve needs to be repaired during an outage, the digital technician might utilise a diagnostic device to verify a host of critical parameters to see how closely these tests match the valve signature from its inception. In either case, data collected during the digital thread process is used to power each of these valve test devices and is used comparatively to find variances or drift. With this information, the digital technician can now start to put together the puzzle, but not without a strong foundation of orginal equipment manufacturer (OEM) product knowledge. This is what differentiates the digital technician from an ordinary software user – data is important, but the power to know its meaning is essential.

There are many solid technicians out there, but the demand of the future will be to train them to become more comfortable with technology. Are they using the most current and advanced equipment certified by an OEM? Can they produce the certifications that make them OEM qualified, or are they just another technician?

In a recent case, some valves were tested for performance, and in completing the testing it was reported to the end user that these valves were out of tolerance and needed repair. It was later determined that the testing was inaccurate, and the test device was out of calibration and miscalculating by 15%. After allowing qualified digital technicians to re-evaluate the valve, it was determined that the valves were within specification. Understanding the product, using data available and being certified with the OEM was the difference.

Conclusion

The digital age certainly enables data and tools that are important for speed, cost, and efficiency; but this is only the case when combined with the strong OEM product foundation that was essential to valve technicians in the past.