Closing the loop on quality control in the aerospace and defense industry:

It's all about end-to-end management of details, details, details

Quality is everything

There's little doubt that the aerospace and defense (A&D) industry is one of the most quality-conscious business segments. Few other manufacturing industries have such high levels of regulatory compliance, such rigorous performance standards, and such a need for tight program management. The main reason is obvious: Quality control leads to better safety. When passenger, crew, and pilot safety is at stake, there is no room for imperfection—or doubt.

There are other factors at play, as well. Raw materials—like titanium—are costly. When non-compliant components have to be scrapped, the cost is substantial. Excessive waste from process errors can also add up. And poor quality control systems can erode customer confidence and threaten contract renewals. A&D companies operate on thin margins and tight timetables, so unexpected delays from equipment downtime can have a major impact on the bottom line.

It's no wonder that most A&D manufacturers, contractors, and suppliers have several layers of quality control, systems of checks and balances, and a zero-tolerance policy for sub-par performance. Raw materials have to pass muster, and production equipment and manufacturing processes must perform perfectly all the time.

Personnel are held to the same high standards. For most manufacturers—whether they supply fighter jets for the Department of Defense or seats belts for commercial airlines—personnel are highly trained for their roles and their performance routinely monitored.

The impact of quality control

Product complexity, an extensive global supply chain, and regulatory burdens make managing quality mandates with manual solutions labor intensive and unreliable, at best. So, to manage these quality control programs, A&D manufacturers typically rely on technology solutions.

According to recent research published in *Quality Magazine*, A&D businesses with closed-loop quality control processes report a median 99% rate of products in compliance—a total that is 3 to 4% higher than companies that have yet to adopt such systems. Are such single-digit variances worth the extra effort and investment in quality assurance tools? Consider a company that produces 100,000 parts a year; this improvement represents the elimination of 3,000 non-compliant products. This represents significant operational improvement and reduction in risk, which can be measured by eliminated scrap, rework, and even recalls.

Harvard Business Review recently conducted research on quality control in manufacturing and the impact the company culture has on the overall achievements. Report findings include:

- Roughly 60% of manufacturing employees surveyed say they work in an environment without a culture that emphasizes quality.

- Companies at the low-end of the spectrum spend $774 million a year to resolve errors, many of which are preventable. That's $350 million more than the top performing companies, which spend $424 million resolving problems. (Assuming an hourly wage of $42.55) So, although the top performers save a substantial amount, they still have a long way to go to achieve a quality environment with minimal quality issues.

How A&D companies can achieve quality

Quality starts with building the basic functions into process workflows. These functions include things such as document control, compliance management, non-conformance/corrective and preventive actions (NC/CAPA), and audit management. Then, there are additional steps to make the process two-way, collaborative, and proactive.

End-to-end visibility is a necessity, as are role-based dashboards and the ability for personnel throughout the organization to monitor key performance indicators (KPIs) in real time. Line-of-business managers must be able to drill into exceptions and track them back to their point of origination. Finding the earliest cause of the exception is critical to correcting the process, so the error or noncompliance is not repeated.

Early intervention saves time and money. If a non-compliant component can be red-flagged before it reaches the assembly line and is installed, the manufacturer can save quite a bit. If the problem is not detected until the craft rolls off the line, major rework is involved. Numerous check-points and continuous quality monitoring help to spot potential non-compliance issues before they reach a critical—and costly—stage.

It is also important to embed in the system the appropriate response trigger, prevention steps, and corrective measures. These help close the loop, making the system a continuous flow of improvement. This is sometimes called "closed-loop quality," and it's critical to identifying and resolving quality issues and defects closer to their source.

"The faster a potential quality issue can be identified and addressed, the easier it will be to address from a compliance standpoint and the less it will impact the overall cost of poor quality," *Quality Magazine* said in an article, "How Closed Loop Quality Can Drive Near Perfect compliance in A&D."

Some other steps A&D organizations can take to improve quality include:

- Integrating employee training into the quality flow and educating personnel on their role in continuous quality control and verification

- Implementing sound document management processes to manage changes to specifications and equipment versions

- Integrating suppliers into the overall quality control plan and connecting them into the loop of communication and compliance

- Putting in place traceability systems, so that components and materials can be easily tracked in case of recalls

- Planning for the unexpected—quality control and risk management go hand in hand

Each of these quality control measures can help A&D manufacturers manage the market pressures they face today. Although a closed loop system requires advanced planning and support from advanced IT solutions, it is critical to helping manufacturers adhere to strict compliance mandates. This is a proactive step in the right direction for improving quality, controlling costs, and increasing margins in A&D. After all, there are no compromises when it comes to quality.

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