Layered Process Audits…

Don't Believe They're Just Audits

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Driven by demands for zero-defects and aggressive cost-reductions, the need for control of manufacturing processes has never been greater, especially in the automotive industry. In today's business environment suppliers cannot rely on inspection of parts and remain cost competitive. Instead, the focus is swinging to the basics of proactive process control, for both automatic and human-dependant tasks. Fundamental to improving process control, is verifying that critical process elements are compliant with requirements on an ongoing basis.

During the past two years many automotive parts suppliers have implemented Layered Process Audits (LPA). LPAs have been mandated by DaimlerChrysler's Chrysler Group and strongly recommended by General Motors. Other OEMs and Tier 1 suppliers are considering directing their suppliers to implement Layered Process Audits.

The OEMs see LPA as one of the most powerful strategies to take a good supplier and make them better; or take a great supplier and keep their quality metrics from declining. Certainly improvement in customer quality levels is important to the supplier and its customers; but for the supplier itself, those benefits are just the tip of the iceberg.

"Improvement in quality levels is important, but those benefits are just the tip of the iceberg."

Layered Process Audits – Minimize Variation

Simply stated, Layered Process Auditing is an ongoing chain of simple verification checks, which through observation, evaluation and conversations on the line, assure that key work steps are being performed properly.

LPAs for any given line should be performed by different layers of management and various staff on a set schedule. This ensures that each process is viewed with many sets of eyes and all levels of management. Well designed layered audits help eliminate human error and insure that parts and products are produced right the first time.

Since the checks are repeated daily and conducted by all layers of management, it's likely that process errors will be found early. If the LPA checksheet questions are well developed, LPAs will proactively minimize process variation and the result will be evident in process, product and financial metrics, e.g., first-time-quality, parts per million defective, control charts, productivity, overall equipment effectiveness, scrap and rework cost. Plants that have embraced LPAs have found that the payback is very significant.

Overview

- Explanation of Layered Process Audit (LPA) strategy
- Proactive process verification
- Participation of plant manager is key
- Links to Corrective Action system
- Maintaining standards saves money and improves quality

Watch out for the second of this two part series, "Best Practices for Implementing Layered Process Audits"

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At its essence, LPA facilitates two-way communication between management and operations. These interactions strengthen trust and demonstrate shared interest in work being done right.

LPAs Cannot Be Implemented by the Quality Manager

When the requirement is zero-defects, the only way to assure no shipment of non-conforming product is to develop a culture where every person is working towards 'right the first time, every time.' We've found that an organization's quality culture is just as important as their quality system (equipment, procedures, training, etc.) – if not more so.

A plant manager's main concern is the efficient production and shipment of high-quality product. Unless a plant has zero ppm to its customers and very high first time quality internally, having more people in the plant help operators get it right the first time is a very good use of resources. The plant manager, the top leader in the facility, sets the tone and therefore must have ownership and interest in LPA implementation and execution.

Delegating ownership and implementation of LPA to the quality manager, as is sometimes done to 'ease' the plant manger's efforts, just doesn't work. The quality manager manages a department; the plant manager sets priorities for all departments.

Nothing is Immune to Variation

Layered Process Audits are not as technically sound as error proofing, so LPA should never be counted as a detection control. But error proofing is not always shielded from variation and failure. These devices can be misaligned, damaged, mis-calibrated or even turned off. Also, human error can undo almost any system or safeguard. One technology consultant group found that using technology to combat errors is only 20% of the solution. The culture within which that technology resides makes up the other 80%.
The focus in LPA is checking items related to known problems and cause factors linked to high risk problems. These are items that vary over time and lead to undesirable consequences. There are some exceptions, but most LPA checks look at 'inputs' to the process, that is: equipment settings, condition of tooling, craftsmanship and work sequence. Like other process audits, LPAs verify the details of how the process is performed.

Auditors need to evaluate against established standards, or requirements. Since a human can not indisputably judge if a setting or task is 'proper', LPA questions must include a description of the specific requirement. Developing LPA questions takes careful thought and effort – conducting LPAs is easy.

On the Front-line, not the Front-office

Let's look at how an audit is actually carried out on the plant floor. A work area would have a checklist with roughly five to twelve questions that are specific to the work process(es) for that area. Every shift, every day the supervisor for the area will walk the line and check all the items on the checksheet. This will usually take 10 to 15 minutes each shift. A checksheet question might ask, "Is the press temperature set between 190 and 195 degrees Fahrenheit? " That question might appear if the temperature setting was deemed critical to quality of the product.

If an LPA checksheet question is found to be non-compliant (e.g., the temperature was found to be too low at 187 degrees), the situation should be fixed immediately. If the problem is caught early, there may be no impact to part quality and the root cause could be fixed immediately. If caught late in the shift, it's possible that eight hours of non-conforming product has moved to the assembly area. LPAs provide immediate feedback on harmful errors such as unwanted process variation and

"Who would you rather find an error … your supervisor or your customer?"

If the temperature and other items are found to be conforming to requirements, there is still a lot of value in these audits. Many see LPA as a formalization of "management by walking around". LPA gives operators subtle but well deserved recognition that, if truth be told, it's really the front line that impacts quality minute by minute, not the front office. LPAs show respect for operators by giving feedback – feedback that they are complying or not complying.

LPAs aren't designed to catch workers making errors. The 15 minute window per shift allocated to LPAs is way too small for that. Regardless of how attentive an operator is, lack of timely, relevant and accurate feedback is sure to have a negative impact on performance.

So just doing your best, or following a work instruction, will not alone prevent 'the system' from causing problems. What really changes employee behavior is when they do things right and are recognized for it. People do what gets measured; and employees respect what you inspect.

A well-executed LPA makes management presence on the plant floor commonplace. Unfortunately in some organizations, top management only interacts with operators when a significant problem occurs… and that is not always a welcome interaction. By routinely taking the time to understand operators' concerns, operators become more willing to volunteer suggestions for improvement and question potentially detrimental situations.

Pre-flight Checklist

LPA can be compared to a preflight checklist. Is my operation ready for take-off? Am I confident that everything is in place to build and ship conforming product to my customer? When the flight, or day, goes smoothly, management and operators can use the time saved to work on improvement of marginal processes and further preventive action.

When LPAs keep standards in place and free resources to further reduce variation, customers will start liking you better since they see less variation in product; and shareholders will appreciate the reduction in waste, non-value added prob-

lem recovery costs and improved profit margins.

Getting to the Root of the Matter… Turbocharged!

Problems don't go away by themselves. They must first be identified, causes found and solutions implemented. Implementing LPA is like putting a turbocharger on your plant's preventive and corrective action system. Daily LPA audits identify problems way upstream, days or weeks before your customer might otherwise identify a problem. Management involvement in the audits and their regular review of most frequent nonconformances helps guide the appropriate resources to fix the problem.

But what about keeping corrective actions in place? How often is a solution implemented but not validated; or maintained for a week, until shortcuts are taken or the new errorproofing is bypassed? A working LPA system would add to their existing checksheet a new question related to holding a new corrective action in place. An example of this might be, "Mis-build one casing by omitting the bracket. Does the (new) errorproofing device at Station 15 detect a missing bracket and guide the casing onto the rework table?"

In this example, if the errorproofing is known to be working every shift, it's very unlikely that a casing will be built and shipped without the bracket ever again. As previously experienced problems are prevented from recurring and risks are controlled through LPA verification, management and operators have more time to do the work-at-hand without frustration and distraction of investigation, downtime and consequences imposed by the customer.

Implementing your LPA system

While implementation of Layered Process Audits requires significant planning, the effectiveness of LPA only results from careful execution and consistent management follow-through.

Like any other change effort, implementation of Layered Process Audits requires high-level management commitment, awareness and understanding, and thoughtful planning to assure linkages to other systems. If any of these are missing or short-changed, it's likely that you'll be pushing uphill… and the effort to implement and even conduct the daily audits will far exceed any benefit.

After two to four months, you should have some data to determine if LPAs are providing benefit for you. If they're not, take time to assess the weak links. Most companies find that after conducting LPAs for three or four months the nature of their audits shift from 'validate-and-fix' to 'validate-and-improve'.

Conclusion

Layered Process Audits is a high leverage strategy that protects your customers and you from shipment of nonconforming product. But that's only the most obvious benefit. It's less costly to manufacture product correctly the first time -- and LPA checksheets that focus on process inputs help achieve first time correct quality. When used well, LPAs find and reduce variation, which is prevalent in any production workplace. When variation of product is reduced, operations flow smoother and customer satisfaction and employee morale is increased. These in turn lead to significant cumulative cost savings.

You can't expect to find all problems by doing a 15 minute check once a shift. But conducting brief LPAs every day, on elements critical to quality which are likely to vary, will have a tremendous impact. The benefit of LPA comes from all levels of management constantly emphasizing the importance of quality and variation reduction…in every department, every shift, every day. Each audit layer is expressing interest in the work being done, and verifying that the most critical elements are completed correctly.

Companies that see the value of the LPA strategy choose to do LPA for their own benefit, not to satisfy a customer requirement. Targeted questions, adherence to daily audits and management follow-through on issues found during daily audits are key indicators of a plant's genuine commitment to its customers and its employees, and of its ability to get better.

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By assuring that standardized procedures are in place the organization will move from minimally complying to an organization where quality and conformance to product and process requirements is the #1 priority.

Improvements in customer quality can save thousands of dollars in sorting, containment and corrective actions. And those cost savings are just the tip of the iceberg. Within a few months of properly implementing LPAs, improvements will be seen in customer quality, repair and rework, productivity and even safety.

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About the Author

Murray Sittsamer is the president and a lead consultant at The Luminous Group. He has extensive experience helping cross-functional teams plan and implement quality and productivity improvements. With extensive knowledge of the automotive industry, Murray has received recognition for his expertise in Advanced Product Quality Planning (APQP), Failure Mode & Effects Analysis (FMEA) and Layered Process Audits (LPA).

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