Best Practices to Make Layered Process Audits Meaningful

Murray J. Sittsamer, President
Lynne M. Leslie, Business Development Manager
The Luminous Group

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Overview

- 14-Step Implementation Model
- Checksheet Development
- Management Review
- Leveraging Your Investment
- Avoiding Common Mistakes in LPA Implementation

Layered Process Audits (LPA) is a strategy for quality improvement that is growing in popularity. When implemented well, LPA will improve First Time Quality (FTC), reduce waste, improve throughput and curb costs. Layered Process Audits can transform a company's culture to one which embraces continuous improvement. The value of LPA comes from holding the process to the norm, or desired behavior. Simply said, LPA redirects resources from reactionary efforts to prevention activities because it monitors the process, rather than the output.

Unfortunately, many companies implement LPA only to satisfy customer mandates to demonstrate an 'LPA system'. An LPA system developed in haste will not be meaningful – and, in fact, will be a wasteful effort. But there are ways to implement LPA and refine impaired LPA systems by following some basic best practices.

This article will present a straightforward model for implementing Layered Process Audits along with best practices for the most critical steps. For companies that have implemented LPA and haven't yet seen an improvement in First Time Quality – this model can be used to assess where you may have overlooked a crucial step.

Roadmap for Implementing Layered Process Audits

Working with over 100 manufacturers, The Luminous Group has developed a roadmap to help suppliers implement LPA without the struggle of trial and error. The core of the roadmap is a 14-Step model for Implementing LPA (See Exhibit 1). While basically a 'plan-do-check-act' approach, our model breaks the tasks into baby steps – to reduce the chance of missing key elements and permit the work to be completed in busy work environments over several two-hour team meetings. With committed resources, LPAs can easily be implemented within a week, though most companies will want to implement LPA over a two to four week period.

Think Before You Leap (Steps 1 though 3)

Like any other activity that changes the work habits of people, LPA requires careful planning. Planning includes forming the implementation team, performing a gap analysis and identifying the initial area(s) or process(es) to be audited.

The team must have a leader or champion who understands the aim and opportunities afforded by LPA. The leader should be respected by top leadership in order to help him/her stay accountable to the discipline required by LPA. Plant leadership plays a key role from establishing the team through conducting audits and monitoring results. Leadership should charter an implementation team of three to six individuals composed of representatives from the key functional areas.

Implementing Layered Process Audits

		Task	Answers the Question	Purpose
Roadmap for Implementing Layered Process Audits	1.	Form the LPA Team	Who should be involved?	• Obtain proper talents • Involve multiple points of view
	2.	Perform gap analysis	What's different?	• Build upon existing LPA • Assure customer requirements are met
	3.	Identify where to begin	Where should we start?	• Select initial area(s) for LPA • Focus planning activities
	4.	Identify high risk items	What drives risk in the process?	• Address external and internal concerns
	5.	Develop audit checklist(s)	What elements should be verified?	• Structure the audits
	6.	Determine who will conduct audits	Who will conduct the audits?	• Assure accountability • Engage multiple sets of eyes
	7.	Determine audit frequency	When will audits take place?	• Assure coverage • Distribute work load
	8.	Establish a management review system	How will management review effectiveness?	• Make LPA a "closed-loop" system
	9.	Document LPA process	How will we institutionalize LPA?	• Integrate LPA with existing systems and roles
	10.	Train auditors	What do auditors need to know?	• Prepare auditors
	11.	Communicate with and train workforce	What should employees know?	• Explain changes • Obtain buy-in
	12.	Begin audits	What will the audits be like?	• Verify process controls
	13.	Monitor and adjust LPAs	Are the audits helpful?	• Refine LPA methods and forms
	14.	Cascade throughout plant	How can we further benefit from LPAs?	• Maximize LPA benefits • Further protect customers

ment's determination to stick with the strategy. When top management turns its back on LPA, their absence is viewed as an excuse for others to neglect their assigned audits or corrective actions.

To overcome resistance, the LPA team must be prepared. Training in LPA will provide the knowledge needed to push forward. The team will need leadership to drive a cross-current change. Interim implementation milestones should be established for upper management to gage the team's progress and anticipate barriers. Most important, adequate resources to complete the work must be committed by management.

Without a Question!! The Checksheet is the Foundation (Steps 4 and 5)

The writing of checksheets to be used during process audits is where the rubber hits the road. LPAs check, or verify, variation in the process that wastes time or costs money. LPAs should look at those things that might vary hour-to-hour or day-to-day that, if not on target, would cause some waste or avoidable cost – for example: scrap, rework, customer complaints, JD Power misses or warrantee costs. To identify those high risk items, the team needs to do some research. What are the top quality and throughput issues in the area? How frequently do they occur?

Sources of Input:

It's not reasonable to verify everything in the process every day – there just isn't enough time. Still, you need to find time to verify the top known concerns; otherwise, you're running operations exposed to risk. Invite the operators and the supervisor of the area to contribute their knowledge of the process. Ask, "If the supervisor had only 15 minutes each day to review the process, what are the items that must be checked?" The answer to that question will likely be the starting point for your checksheet.

LPA implementation should be piloted in one area of the plant before it is applied across the facility. There are several ways to determine where to start. Many organizations have one group or department that is eager to try new things. Sometimes the pilot area is the one running the roughest – the one in need of the most improvement. Other times a plant will choose the area dedicated to production for the customer who mandates LPA. Wherever you choose to begin, find the most critical process variables and develop a checksheet which verifies those elements that are most susceptible to variation.

"The nicest thing about not planning is that failure comes as a complete surprise and is not preceded by a period of worry and depression."

John Preston

People resist change, so expect a struggle. If possible, find a middle ground; encourage them to observe and participate. Resistors may want to see proof that LPA works, or more often, they want to test manage-

Here is a list of recommended inputs that should be reviewed to further determine where your audits will provide the most value:

- Customer concerns or complaints
- Warrantee issues
- Scrap, rework, downtime reports
- Process Failure Mode and Effects Analysis (P-FMEA)

Other inputs to be reviewed which will help target the content of the checksheet questions include:

- Root cause problem analysis (e.g., 7-Step, 8D, 5 Whys)
- Standardized Work Instructions
- Process Control Plans
- P-FMEA (for detail on preventive and detection controls)
- Job Set-up procedures
- Preventative maintenance plans
- Tool change procedures
- Errorproofing device inventory
- Operator training materials (manuals, videos, etc.)

Remember that the trick in a process audit is not to look for the defect in the finished product; but to include the most sensitive process variables (root causes) as items to be checked on the LPA checksheet.

True errorproofing, or fail-safes, are always better than observation via LPA, but when product or process design change is not feasible, relying on humans and machines may be the rational alternative. Still, sensors, switches and guards might be misaligned or bypassed without notice by the operator. When fail-safe errorproofing is relied upon, daily challenges to those devices should be incorporated into the LPA checksheet. Verification of errorproofing functionality ensures that the devices used prevent escape of nonconforming parts. Since errorproofing checks often require knowledge of the device and the process, those checks should only be conducted by qualified staff.

"Ask questions that you can learn from."

Checksheet Development:

The checksheet questions must be written to be meaningful and specific. Avoid vague terms that can't be used to verify the process, such as properly, correctly, accurately and appropriately. Rather than ask if the equipment is running 'properly', include what is implied by the word 'properly'. For example, "Is the press running between 600 and 620 rpm?" The development of LPA questions is easy when detailed standardized work instructions (that specify machine settings, craftsmanship and best-practice work techniques) already exist.

Another common flaw in many checksheets is the inclusion of very general elements, rather than process-specific elements. Questions such as "Is the operator trained", or "Is the area free of debris", or "Are relevant quality alerts posted" seem important, but don't add value in process checksheets. Craft questions so that they dig deep into the process at hand. Instead of "is the operator trained?" verify that s/he is loading parts as required. Instead of checking for posted notices, see if the content of the instruction is being practiced at that moment. LPA is about verification though observation of evidence.

Avoid including questions that check things that do not vary from shift-to-shift or day-to-day. "Check the gage calibration sticker to assure it is not past-due." Aside from that being the outcome of a support process which would be monitored via ISO 9001 or TS 16969 audits, asking the question daily adds no value. If the calibration status was valid yesterday, what is the chance that it would be overdue today? Questions like these waste time, frustrate auditors and confound the operators. Avoid those questions.

Best practice checksheets also provide two key pieces of information that might be needed by the auditor: 1) the reason why the item needs to be verified, and 2) what to do as a first response if the item is found to be nonconforming. Since the audit may be conducted by almost anyone in the plant, it's helpful to ground the question with a brief explanation of why it's being asked. Perhaps it is related to an ongoing warrantee issue, or perhaps variation in craftsmanship led to significant scrap issues in the last quarter.

A good practice is to word the question so that an unfavorable finding is always answered with a "No". Since the intent of LPA is to verify and correct, the auditor should be more engaged than just checking a box. After observing a work element and likely talking with the operator, if the checksheet item is found to be nonconforming, the auditor should follow a pre-established reaction plan to prompt the operator or supervisor to correct the situation. It's important that LPAs don't just create a listing of nonconformances that are reviewed at a later time. While findings will be documented, analyzed and prioritized for corrective actions (see Management Review below), the primary response is to bring the process item into conformance. If the nonconformance found creates a suspicion of nonconforming product downstream from the current operation, containment should be set up, a break point established for conforming parts, and sorting/inspection should take place as necessary.

After your initial questions are drafted, you should assure that the checksheet is usable by various auditors. To validate your questions, conduct a test audit on the plant floor. Feedback from one or two auditors can be used to fine-tune the wording, and often will make the questions even more effective in detecting process nonconformances.

Stop, Look and Listen
(Steps 6 & 7)

The term "Layered" in Layered Process Audits implies the obligation for multiple layers of management to periodically verify the process using the same checksheet that the supervisor uses. All levels of management will conduct audits on a regularly scheduled basis. The most basic guideline is that processes are checked by the first layer of supervision every shift, every day; and plant managers perform an audit on one process every week. All personnel are additional eyes and ears that can apply their own perspective and assure that all is in order.

The most overlooked benefit of LPA is that it is more effective than inspirational speeches, slogans, and banners promoting quality. Management walking the floor during an LPA can actually move an organization from minimally complying with procedures and instructions to one that embraces quality as the number one priority.

While we know operators try to do their best, merely relying on humans to follow a work instruction will not prevent 'the system' from interjecting some variation. 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. Therefore each additional audit communicates that work was done as it should be; and if the process is found to be nonconforming, the auditor triggers immediate corrective action.

It's Not What You Find, But What You Do With It
(Step 8)

The easiest verification that top management must do – and likely the most influential – is check that assigned audits are completed on schedule. Performing their own audits on time sets the tone, but questioning those that are not getting around to their audits drives home the fact that completing audits is important. As with other Corrective Action/Preventive Action systems, top management also has a responsibility to assure that the solutions are effective, as measured by a decrease in occurrence.

If a nonconformance can be corrected immediately, that's great. Still it must be recorded as a nonconformance on the checksheet. As part of LPA implementation, the team must create information flow diagrams that define how nonconformances will be tracked and analyzed and how action items for problems that cannot be corrected immediately will be assigned or escalated.

Since a corrective action system is no newcomer to most plants, this is not a difficult step for LPA implementation – but it is a very important step. Linkages must be made between LPA findings and the existing review systems. Decide if there are any questions on the checksheet that merit immediate notification to upper management if found to be nonconforming. Unresolved LPA findings from the previous day should be addressed at morning production meetings (or quality Fast Response meetings).

The LPA implementation team must determine how trends in the findings will be analyzed. Set triggers to ensure that repeat issues (and related issues found in different processes) are reported to management. For example, two occurrences of the same issue within two weeks, or three occurrences within a month might indicate a system problem. High frequency and high severity issues must be reviewed and addressed by senior leadership. This is sometimes done during monthly Management Review meetings.

Utilize a problem solving methodology (e.g., 8-D or 7-Step) to address repeat issues. Not all problems are high priority, so apply the same thought process to prioritize concerns and utilize best-practice cross-functional problem solving teams to tackle the root cause of the most frequent or most costly nonconformances.

The LPA system will seem worthless without this crucial connection between LPAs and your plant's investment in continuous improvement. To establish whether LPAs are effective, graph both the number of items checked per week and the key quality metric (e.g., internal ppm, scrap, FTC) on the same timeline. After two to four months, there should be data to determine if LPAs are providing benefit. If there is not a correlation between the number of items checked and quality improvement, management has the duty to determine where there is a "disconnect".

Ready, Set, Go!!!
(Steps 9, 10, 11 and 12)

With decisions made about what will be checked, how often and how findings will be addressed, the team is nearly prepared to roll-out the LPA in the initial area. The defined LPA process and responsibilities should be documented in an LPA procedure, as would any other standard work process within a quality management system. The procedure should show how the plant's LPA system integrates with existing systems, such as revisions to P-FMEA, Control Plans and corrective actions.

LPA auditors don't need extensive training, but do need to be oriented to the philosophy of LPA and their new responsibilities. This is best done with a one or two hour overview of LPA and the drafted checksheet(s), followed by a mock audit on the plant floor. As with other training, records should be kept to show evidence that auditors understand and can apply LPA concepts.

Once the auditors are comfortable with the checksheets and operators are informed of the new practice, Layered Process Audits can begin. Whether the auditor is the supervisor, accounting manager or plant man-

ager, for the next 15 minutes or so that person is a Layered Process Auditor. Their job during that time is to help the operators by providing feedback to them and correcting process nonconformances.

Walk Before You Run (Steps 13 and 14)

The final two steps in our 14 step implementation model are monitor and adjust, and cascade LPA throughout the plant. Fine-tuning will likely take place as routines are established and audit methods are sharpened. If the audits aren't helpful, check to see if audits are completed frequently enough. Perhaps questions, now asked by many people, need to be more specific and targeted at root-sources of variation. As corrective actions are implemented, make sure that new questions are appearing on the LPA checksheet(s) to hold those improvements in place.

When management is comfortable with the effort and benefits obtained through LPA, it can be introduced to other areas within the plant. While the focus of LPA has been in manufacturing areas, it certainly can be applied to support activities as well. Any organization or activity that has a desired standard process can apply LPA. Consider LPA for administrative and support processes that have unpredictable outcomes. LPA could be applied to shipping and receiving, tool room, purchasing, engineering change management, training, new hire orientation processes; just to name a few.

The growing popularity of LPA has created a market for software solutions for the LPA administration functions. Several competitive products are now available which send automatic audit notifications, analyze audit findings, monitor completion of corrective actions and generate reports for management and customers.

Conclusion

If you haven't implemented LPAs yet, consider how it might be applied, even if only in one isolated, problematic area. LPA should only be put in place to help you achieve better results. If you've implemented LPA but are not seeing results, review your checksheets, examine how auditors ask questions and assure there is a defined path for resolution of nonconformances. Review the questions in Exhibit 2 to make sure you've avoided common mistakes. When the core components of LPA are in place, your plant will have a strong foundation to further close the gap between current and target performance metrics.

When implemented with well-written, targeted checksheets and committed auditors, Layered Process Audit is a very effective tool to proactively reduce variation. When thoughtfully planned and supported by top leadership, LPA shifts resources from inspecting product and addressing customer complaints to activities which keep the process in control; actually reducing wasteful, non-value-add operating overhead.

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Exhibit 2

Common Mistakes in LPA Implementation

From experience working with many manufacturing plants that had problems implementing LPA on their own, we've found several common mistakes. Asking the following questions will help you prevent or debug common issues:

- Is top management actively involved and committed?
- Was LPA implemented by Operations or the Quality department? (LPA needs to be "owned" by Operations to be effective.)
- Are there appropriate consequences for not conducting audits?
- Are management reviews performed on a regularly scheduled basis?
- Is a generic checksheet used for all operations? If so, this is a mistake. Checksheets should be specific to the process at hand and the variables in that process.
- Are checksheets too burdensome, making audits difficult and time-consuming?
- Do checksheets consider actual sources of process variation?
- Do LPAs result in positive feedback to operators?
- Is a process clearly defined for scheduling audits, verifying completion and reviewing findings?
- Is LPA grounded in the daily routine of supervisors and managers?

About the Authors

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).

Murray holds a Master of Science in Industrial Administration from Carnegie Mellon University. He earned his undergraduate degree in industrial engineering from the University of Pittsburgh.

Lynne Leslie is business development manager at The Luminous Group. She played a key role in the development of Layered Process Audit training materials. Lynne regularly works with clients to understand and fulfill their support requirements for Layered Process Audits.

Lynne earned her Bachelor of Arts in Communications from the University of California at Berkeley.

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