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SUMMER 2021

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DEFINING

How to undertake layered process audits

Dr David Scrimshire, TEC Transnational Ltd, explains how to plan, undertake and report an effective layered process audit using 'work instructions' as your audit criteria

A layered process audit (LPA) is a workplace activity focused on observing and verifying how products are made, rather than inspecting finished products or evaluating the quality management system (QMS). The LPA looks at individual process elements involved in manufacturing and service delivery in every department and area concerned.

Organisations expend considerable resources planning, implementing and controlling the processes needed to create products or deliver services. In the automotive and aerospace sectors, the process is highly structured and is known as Advanced Product Quality Planning. This proactively identifies and corrects potential risks in product design and (manufacturing) process design to guarantee the ongoing delivery of perfect product to the customer – zero parts per million defects, on time and in full, within budget.

Nevertheless, problems can arise; for instance, there could be a lack of consistency in working to the established work instructions at the shop-floor level. If this is left unmonitored, experience has shown that 'mission drift' is inevitable.

To proactively prevent this problem, a radically different type of audit is required to augment the conventional QMS internal audit programme. This is where LPAs come to the fore.

LPAs focus on controlled conditions

The focus of LPAs is controlled conditions, which ensure that products and services are created and delivered in the same manner, every time, by everyone, using the same materials and tools – so as to produce perfect deliverables for customers.

Central to this objective are work instructions, which specify in unambiguous terms what the operator needs to do.

LPAs are designed to 'turn up the magnification' and focus on the detail. They systematically evaluate the extent to which work activities align with the process steps contained in the work instructions.

Question	Explanation	Reaction plan
WHAT/WHERE/HOW to check	**WHY** the question was selected	**HOW** the auditor is to react when a nonconformance is found
Intended to verify general work elements that have a direct impact on quality or are likely to vary day-to-day. Review relevant risk aspects by using tools such as Process Failure Mode and Effects Analysis (PFMEA), Turtle Diagram, or Ishikawa Diagram.	All questions must have a defined purpose and an expected response. Answering "Why?" underlines the value of the question and its relationship to key performance indicators, controls and the process.	For example, a pre-established reaction plan to prompt the responsible individual to correct the situation: 1. Action #1 2. Action #2 3. Action #3, etc.

LPA personnel

LPA derives its name from the requirement that multiple layers (ie, personnel at various levels) of an organisation conduct the audits.

This is not the quality assurance manager or the QMS audit team, but:

- operators (shop-floor workers from other departments or cells)
- team leaders and supervisors
- department managers and top managers (eg, the plant manager).

It is advisable to designate an LPA process owner. Never, under any circumstance, should the job be 'abdicated' to the quality manager! The best choice would be the operations manager as she/he is ultimately responsible for the quality of products and services being created for customers – they have a vested interest.

Selecting processes

Manufacturing and service processes are selected for LPAs based on the risk to the quality of the product or service, which require the identification of processes or process steps that are causing serious or frequent problems.

LPA check sheet questions

A crucial element of LPA deployment is defining the check sheet questions (see above table, for example) that focus on work instruction elements. Each question is listed with an associated explanation of why it was selected.

The questions also have a pre-defined 'reaction plan' (ie, how the auditor is to react if nonconformance is found).

LPA questions verify what is actually happening in real time (snapshot) compared with what is expected as defined in the work instructions.

A cross-functional team provides information and ideas to develop the LPA check sheet questions. They focus on work instructions and the individual process steps/elements.

The questions should include whatever the organisation believes is critical to product quality. The items are typically those that pose a high risk to customer satisfaction, downstream operations and/or product safety and durability.

Once created, the set of LPA questions must be revised as required to incorporate the latest improvements and process updates based on audit findings, employee suggestions, etc.

LPA tips

First, identify the locations (eg, manufacturing cells) where LPAs will take place. Concentrate LPAs where they will be most effective.

LPAs must be undertaken on a regular and predetermined frequency. Stick with the LPA schedule.

Then, set up a Layer 1 (operators, shop-floor workers) audit schedule for each location/cell to cover all shifts (as applicable).

LPAs are fast and furious! They should:

- take 10–15 minutes;
- include 5–10 questions;
- be performed every day;
- cover all shifts (if applicable).

The frequency of LPAs is adjusted depending on the results obtained (ie, number of nonconformances encountered).

LPA schedules for higher levels of management will be less frequent:

- Layer 2 (middle management) – weekly/monthly.
- Layer 3 (plant managers, directors) – quarterly/annually.

Management must be involved in updating the LPA schedule. The schedule must be approved by the location (cell) management. Once established, the audit schedule should be followed and results recorded.

Preparing for an LPA

First, review the list of audit questions based on the selected manufacturing cell and the associated work instructions. Remember, 5–10 questions are needed.

Schedule a day/time for the LPA and obtain agreement of the department manager. Plan on taking 30 minutes or so for the first LPA. Normally, a LPA should take no more than 15 minutes.

Conducting the LPA and recording results/actions taken

Conduct the LPA using the check-sheet questions to:

- identify nonconformances;
- deploy a reaction plan (auditor with the operator);
- record actions taken (who/when);
- correct problems during the audit.

LPA results are either:

- okay (work element is being undertaken as specified in the work instruction); or
- not okay (work element is not being undertaken as specified in the work instruction).

Unlike a QMS internal audit, where corrective actions must always be undertaken by the auditee, with LPA the auditor is actively involved in correcting problems and nonconformances. It is an immediate fix reminiscent of Kaizen Blitz.

Report the LPA results to the department manager on completion and agree timescales for any actions which cannot be undertaken immediately – these should be the exceptions.

Conclusion

The LPA places people of multiple layers (levels) of the organisation where the work is being done to verify critical items. This facilitates communication between management and the shop-floor team members.

Above all, the LPA demonstrates to all personnel that following work instructions to the letter is very important. "If the plant manager is here to verify that it is done, it must be critical!"

The deployment of LPAs will help instil a culture of zero defects throughout an organisation – zero parts per million defects, on time and in full, within budget.