

## NICK'S NICHE

Guest Column

# Operational audits: The best path to improving a powder coating process

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Operational audits can root out areas where you can improve your process and become more profitable and efficient. Furthermore, operational audits can find root causes of finishing defects, improve operator training, and help achieve higher productivity, all important in today's competitive marketplace.

### What constitutes a complete operational audit?

An audit should evaluate every piece of equipment individually and the coating process in total to ensure that all areas of improvement are exposed and recorded. Furthermore, an audit should evaluate how efficiently the coating process is integrated into the overall manufacturing process at the subject facility. Beyond evaluating the equipment, the operators, line management, engineering support, maintenance activities, spare part inventory, consumable material storage, environmental issues, and safety issues must be evaluated in a comprehensive operational audit. National safety code viola-

tions are brought to the attention of the client along with recommendations for corrective action.

Material handling equipment (conveyors, carts, racks, hangers, etc.) must be evaluated for stability, suitability for purpose, structural integrity, grounding, sprayability, part drainage, ease of use, and product density to ensure productivity goals. Pretreatment systems must be evaluated to ensure that they prepare the products to the stated coating performance requirements. Spray and recovery equipment must be evaluated for safety, efficiency, productivity, and efficacy. Cure equipment must be checked to determine that all coated products achieve the required coating performance objectives in a safe and efficient manner.

The entire coating process must be evaluated for how well it achieves the intended production goals with a manageable defect rate in a productive, cost efficient, safe, and environmentally correct manner. The operator's level of

proficiency needs to be judged over the length of the audit. Are their activities driven by accurate knowledge of the process or by tribal knowledge grounded in folklore? Are the suppliers providing the level of service necessary to support the operation and the products they sell the customer?

This level of effort requires a lot of work and observation. Our experience has determined that even the simplest systems can take up to three days to perform a complete audit, while large, more complex systems require up to five days of effort on site to collect the required data and properly test the equipment.

### What tools are required to perform an operational audit?

A complete operational audit requires measurement of numerous performance parameters such as part ground, chemical ranges, water quality, operating temperatures, coating characteristics, environmental conditions, electrostatic performance, and airflow just to mention a few. Test equipment must be constantly upgraded and improved to ensure that all the accuracy certifications are in compliance so that accurate data is measured and collected.

However, having all the right tools is not enough security that you will end up with good audit information. You must have the knowledge on how to use these tools properly to obtain meaningful data. Furthermore, you must take numerous readings over the entire audit period to completely judge the operation and provide useful information to the customer. For instance, just because one oven profile on the largest part shows full cure, does not mean that the lighter parts are not overcured. Taking the temperature and relative humidity readings in the morning does not tell you what the conditions are later in the day or if the air conditioning system is keeping pace with the heat load. You have to take numerous readings at different times to judge all the "typical" operating conditions at a particular facility.

The most important tool is skilled and expert observation. A practiced eye can tell if an operator is really executing their responsibilities properly or if they are just putting on a show for the ob-

server. Examining process records can reveal if the process is in control most of the time. Reviewing product defects or quality documentation will determine how effective the operation is at achieving the desired quality and where the most critical process improvements are required.

### What should an operational audit report look like?

An operational audit report should describe the problems that were found during the audit, the corrective measures taken during the visit, what safety issues need to be addressed, and the level of training of the operators. Recommended corrective action must be clearly communicated. The last point is often missing from audit reports. You only get half the benefit of an audit if the auditor only states what's wrong. The auditor has to explain how to fix the problems for you to gain the most benefit from the audit. Otherwise, what's the point of doing the audit in the first place?

Complete audit reports always include any documents or correspondence from suppliers contacted on behalf of the audit candidate. These documents can detail improvements, new features, or proposed changes to the existing process. The evaluation and presentation of new, more efficient and cost-effective finishing technologies that can improve the candidate's operation is a key component of an operational audit.

The report must be formatted to ensure easy reading. A summary, a list of recommendations, detailed observations, instrument readings, and so forth are necessary to easily communicate all the issues and determine how to best improve the process. The report's findings must be firmly rooted in facts and less dependent upon opinions. Presenting all the obtained data is important.

Using tables, performance graphs, photographs, and other materials to simply and effectively communicate all the information collected, including the results of Design of Experiments (DOE) executed during the audit, is essential.

A simple checklist by itself is not a complete operational audit report, since it doesn't communicate the "how-tos" or the "why-fors" necessary for implement-

ing the recommended improvements.

Since personnel changes occur in every organization, operational audit reports often outlast the persons who originally asked for them. Furthermore, all the recommendations cannot be implemented at once due to funding or timing issues. Therefore, the audit report must be able to "stand the test of time," as it may be shelved and referred to over a prolonged period to accommodate an appropriate implementation schedule that can last years. It is not unusual for our clients to call us with questions years after an audit was performed.

### When is the best time to perform an operational audit?

Some people say that they are too busy to perform an audit while others say they are too slow to justify an audit. The short answer to this question is: Anytime is the right time for an operational audit.

For example, performing an audit during busy times will reveal process deficiencies because the equipment and systems are strained. Auditing during slower times allows for more detailed inspections of the equipment that may be impractical when they are running 24 hours a day, 7 days a week.

Personally, I like to walk the entire conveyor line of a coating process, including through all the ovens and washer. This can prove difficult, if not impossible, when the equipment is running and not allowed to cool due to continual operation. It is difficult to judge the complete condition of equipment when you can only examine from the outside.

There are no "usual" circumstances in most finishing operations. Every day, unusual things happen in finishing systems, making "unusual" a "normal" occurrence. Therefore, operational audits serve purposes in both slow and busy times. The only things that are required to perform an audit are that the equipment is operational and there are at least a few parts that can be coated to judge the results.

### Can you do an operational audit yourself?

It is awfully hard to perform an objective appraisal of an operation that you work

with every day. This does not mean that if you think you are doing something wrong you should not fix it on your own. However, many of our clients say they never saw most of the issues identified in our audit report before. That is what an objective operational audit can do best: Identify problems that you never saw before. By all means, self-improvement is a laudable goal. But let's face it, it is not easy to spot problems with routine operations without expert outside help.

Once an audit has been performed, you can spot-check some of the same things reviewed during the original audit to see if the improvements are taking hold. This is a necessary activity to ensure long-term process improvement and eliminate bad habits from returning. **PC**

### Editor's note

For further reading, see the "Index to Articles and Authors 1990-2015," Reference and Buyer's Resource Issue, *Powder Coating*, vol. 26 no. 6 (December 2015), or click on the Article Index at [www.pcoating.com](http://www.pcoating.com). Articles can be purchased online. Have a question? Click on Problem Solving to submit one.

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