

# Audits from Nadcap's perspective

by Scott Nelson, Nadcap NMSE & AQS Staff Engineer

**A**s the Nonconventional Machining and Surface Enhancement (NMSE) and Aerospace Quality Systems (AQS) Nadcap Staff Engineer, I have the opportunity to work with leaders in the aerospace industry including the Nadcap subscribing primes, special process suppliers and my fellow Staff Engineers. I work primarily with aerospace primes to develop industry standards and audit criteria to assess compliance to the customer and industry specification.

The NMSE Task Group currently performs an average of 250 – 275 audits per year across the Americas, Europe, and Asia and maintains an auditor base of eleven auditors. We also have more than 16 aerospace prime contractors who mandate Nadcap accreditation for their NMSE suppliers.

The Nadcap process utilizes independent contract auditors who go through rigorous screening and interviews by the Nadcap Task Group prior to approval. These auditors are an elite and professional group of which 80-100% typically hold B.S. degrees in Metallurgy/ Material Science or other relevant fields and the average years of relevant experience generally number over 30. Nadcap uses these experts to evaluate the special process suppliers to the defined Nadcap aerospace standards and audit criteria. The audit reports are submitted to the Nadcap staff engineer and reviewed for technical compliance and completeness.

The NMSE Task Group routinely studies and evaluates the most common noncompliances found during our audits and these studies have shown that flowdown of customer specification and Nadcap requirements into workstation instructions are the most common non-conformances to the Aerospace Standards, AS7116 (Nonconventional Machining) and AS7117 (Surface Enhancement). Generally, in the shot peening audits, we will see the lack of flowdown in areas such as critical process parameters (air pressure, translation rates, and coverage), set-up instructions and masking, and pre-peen inspection for sharp edges and damage and post-peen coverage inspection.

As a result of these types of audit findings, it is common to receive a root cause response from the supplier stating "operator error" or "operator failed to follow instructions" and action to prevent recurrence which states "re-trained operator". These responses are not acceptable for Nadcap and will always require further response from the supplier. It is important to realize that human error is not completely avoidable, but that it is manageable.

In the example presented above, the first thing I ask myself as the audit and root cause corrective action reviewer is **WHY?**

- Why was there operator error?
- Was it due to inadequate detail in the workstation instructions?
- Does the supplier provide detailed technique sheets specifying critical process parameters and tolerances?
- Are set-up sketches and other visual media given to the operators to use during processing?
- Are inspection requirements specified in the workstation instructions?

Once the supplier answers these questions pertaining to shop floor level documentation, they also need to determine

whether their quality system procedure such as contract review, specification review, and planning are detailed enough to ensure consistent identification and flowdown of these critical process parameters and controls. Only when suppliers go to this level of root cause will they be able to identify their systemic problems and begin to take steps and put process controls in place to help reduce and manage operator error.

I always stress to the NMSE supplier base that it is important

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to give these operators correct and detailed information that they can use to ensure compliance and repeatable processes. We normally see situations where someone in the office creates travellers, technique sheets, data cards, etc., without ever going out to the shop floor and communicating with the operators and discussing concerns during the planning stages. It is easy to cite operator error, but if the operators are not given the information they

need to meet requirements it is hard to totally blame the operator. The biggest faults that I see in most suppliers is the failure to involve the operators (or at least have some level of communication with them during planning), and to give operators a method of providing feedback to engineering and quality when it's found that shop floor paperwork is incorrect or not detailed enough to ensure controlled and repeatable processes.

As a staff engineer, it is still important for me to understand and promote to my auditors that all suppliers will be different and that there is no one "right way" to ensure proper flowdown and the reduction of operator error. There are different levels of technical expertise across industry, varying situations involving language barriers, different quality system structures, and one of the most important variables is management dedication and support. We realize that in some companies it may be required to have very detailed workstation instructions with visual images and precise operator instructions and in some facilities they may only require lower level general instruction. The questions we need to ask are: Are the workstation instruction adequate to ensure compliance with the customer requirements, the audit criteria, and the suppliers internal procedures; and are the operators following the instructions.

In my experience, the greatest thing about the Nadcap process and its industry-managed structure is the open communication between the primes, suppliers, staff engineers, and auditors which allows a sharing of information so all can benefit. It is my hope that suppliers take advantage of the information in this article so that we can improve the flowdown of process controls to operators and shop floor personnel. This is where the real action takes place and in most cases, these technical hands-on personnel are probably the most important assets to suppliers. ●



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