

### **Issue Highlights**

Auditor Training  
e-Business  
From the Task Group  
Next Meeting

### **Editors**

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### **From the Chair...**

Happy Holidays! As we all get ready for the new and exciting challenges facing our businesses in the days ahead, I would like to share a few of the highlights from the October 2001 meeting. Emphasis was placed on the subject of "Corrective Actions" and Root Cause Analysis. As was stated in the last edition of the Newsletter, we are stressing the need for everyone to do a thorough job of reviewing findings, determining the extent of the condition found, and implementing a corrective action that addresses the true root cause. This was discussed, in great detail, with the auditors during the Auditor Training. There will be more on this in the summary of the Auditor Training.

Another item of interest is the high number of NCR's written against the Qualification & Certification procedures that are reviewed for each audit. Many suppliers have neglected to incorporate the requirements for "Auditors" and "Instructors" in their Internal Qualification Procedure. I would suggest that everyone take a few minutes to review these requirements and to make sure they have been incorporated into your internal procedure.

Another item that bears reiteration is calibration of gages. It is important to remember that there should be a minimum of three points taken for calibration, and these points should cover the usable range of the gage. For example, a dryer oven that is calibrated using a single point, at 1000 degrees F, is not adequate for an oven that is not to exceed 160 degrees F.

These are simple items that, when ignored, can add time and cost to the certification/recertification process.

The task group would like to take this opportunity to wish everyone a Happy Holiday Season and our best wishes for a healthy and prosperous New Year.

### **Auditor Training**

All of the NDT auditors were brought to the Task Group meeting for the annual training session, and they did a wonderful job of educating the Task Group. These sessions have evolved into beneficial technical exchanges that not only serve to keep the auditors up to date on changes at the participating primes, but to keep the Task Group representatives aware of what is happening in the supplier world.

A great deal of time was spent discussing the fact that we want to make sure we are having a positive impact on our business. To do this we need to make sure that we are making improvements, not just changes. This is where we stressed the need for true root cause analysis and corrective actions. If there are a number of instances where customer requirements have not been incorporated into an internal procedure, the NCR should be written against contract review and flowdown of customer requirements. And the supplier should address not only the items highlighted in the NCR, but a complete review of the

flowdown process and any other documents that could be affected. In subsequent audits if similar issues are noted, even if the documents involved are not the same as those noted in a previous audit, the finding will be considered a repeat and the corrective action "non-sustaining". As everyone should be aware, this would adversely impact the supplier's eligibility for extended frequency.

Another item given some clarification dealt with the adding of penetrant materials to working baths. If a new batch of penetrant is added to a working tank, the new batch becomes the standard for that mixed tank. For example, if Batch # 99201 is in the tank, and Batch # 10336 is added to the tank, a new virgin sample is taken from the new batch and is then used as the standard for the brightness and removability testing.

## ***e-Business***

### ***What is your e-mail address?***

In today's "digitized" business world it is becoming more and more important to utilize the electronic media available to us to increase efficiency. Use of the Internet and e-mail not only reduces supply and mailing costs, it also reduces cycle time. An email is so much faster than posted mail. Future editions of this Newsletter will be posted on the NADCAP Web Page, with an email notice alerting you to its Web address. Also, we are encouraging all Suppliers to utilize email to answer NCR's, supply requested information, and to ask or answer any questions dealing with your audit. Please take a moment to send Mark Aubele your email address so we can update our current listings.

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## ***From the Task Group***

### ***BACK TO BASICS***

#### ***MIL-STD-1907 Acceptance Criteria***

The following is my own opinion only and is not necessarily the opinion of the Northrop Grumman Corp.

Many older aerospace programs still use MIL-I-6866 and MIL-I-6868 as a standard callout for spare parts on Penetrant and Magnetic Particle Inspection because these specifications are listed on the original prints. Numerous NADCAP accredited NDT houses accept P.O.'s with these specifications, after contract review and certify to these MIL-Specs and/or the superceding ASTM's E-1417/E-1444 along with MIL-STD-1907 Grade C as a default. This practice is not only unacceptable but is patently dangerous. It is easy to fall into this trap as MIL-STD-1907, para. 4.1 states, "If no classification is specified, inspection shall be to the grade C level for both Penetrant and Magnetic Particle inspections". With the current direction of new aerospace programs gravitating to existing industry standards this problem is magnified.

The current solution of not allowing the inspection entity to specify acceptance criteria is not working. Contacting the 2<sup>nd</sup> tier buyer (the manufacturer) will not result in an acceptable solution as they are not knowledgeable in NDT disciplines and do not have design authority. The fact that it has been this way for 40 years is always the answer. The manufacturer is also reluctant to contact the prime because the inevitable delay at the last processing point is not conducive to good business practices as the parts are already "hot".

In the 60's and 70's it seemed as though NDT Level II's were acting as Liaison Engineering and the Material Review Board of a prime who referenced MIL-Specs for NDT because acceptance criteria limits were not established. If a stringer or non-metallic

inclusion broke the edge it was rejectable thru tribal knowledge. Porosity, lack of fusion, seams, laps, shrinkage, etc. were dispositioned acceptable or rejectable based on the experience of the Level II, with little or no oversight. No individual would ever accept cracks, but acceptance criteria for other discontinuity limits were not used because they did not exist or were not referenced

Remember MIL-STD-1907 did not come into effect until 1989. Acceptance criteria limits noted in MIL-P-47158 for Penetrant and MIL-M-47230 for Magnetic Particle Inspection have been in effect since 1974, but either the engineering community was not aware of these specifications, or they trusted the experience of NDT personnel, because they had very limited use.

What is unacceptable about the use of a MIL-STD-1907 Grade C default relates to ASTM E-1444, para. 5.1, that states, "Acceptance requirements such as MIL-STD-1907 shall be incorporated as part of the written procedure" and "These acceptance requirements shall be as approved on or as specified by the contracting agency". ASTM E-1417 references MIL-STD-1907 acceptance criteria "as an example". No approval from any knowledgeable contracting agency would allow the extreme discontinuity limits of Grade C, and I am not aware of documentation from any prime that approves the Grade C default.

One example is MIL-STD-1907 Grade C Table I Wrought Products that allows seams or laps 1.5" long on unmachined surfaces and .25" long on machined surfaces. In addition, stringers or nonmetallic inclusions are allowed up to .750" long surface and 1.125" long subsurface. Typical aircraft quality steel is allowed stringers .125" to .250" long in non-critical areas while seams or laps are not allowed in any length. A Grade A default to MIL-STD-1907 still allows a .5" seam or lap on an unmachined surface of a forging.

Another example of the improper use of

MIL-STD-1907 is welding (Table III). Lack of fusion listed as acceptable in Grade C, acceptance criteria is .250" long and .031" deep for base metal <.183" thick and .375" long and 1.047 deep (typo) for thicknesses >.188". No prime aerospace company allows any lack of fusion in a weld. Grade A allows lack of fusion up to .125". In addition, depth determination of LOF is not possible in MT and PT.

The casting discontinuity allowance (Table II) is more in line with current prime standards, except for the shrinkage sponge areas allowed in Grade C of .625", which may include small cavities, and cavity stringers. Grade A still allows .250"

Parts machined from plate stock are not addressed which is the majority of an airframe structure.

It is obvious to any experienced aerospace Level II or III inspector that the above discontinuity limits should not be accepted and probably aren't in most cases.

The Redstone Arsenal in Alabama published MIL-STD-1907. Its intended use is assumed to be for the original unmanned ICBM's that obviously have a one-time use and short flight duration. Today's aerospace vehicles are expected to last twenty to forty years or more and fly daily with all the accumulating metal fatigue. It is unknown how this specification has been incorporated into everyday use other than the oblique references in the ASTM's.

What is dangerous about this common industry practice, is in the event of failure of a component, an investigation would uncover the unapproved acceptance criteria default. If this event is catastrophic, failure analysis may be unable to determine the mode of failure and the inherent acceptable defect size may be assumed. Liability for the inspection agency may occur.

## **Conclusion:**

The NDT community needs better engineering support and a concerted effort to eliminate the use of this specification as an acceptance criteria reference. Until an ASTM is published with reasonable discontinuity limits that are accepted by contracting agencies, one option would be to certify that “no relevant indications” were found. All parts with discontinuities should be rejected and submitted to the customer. This will increase cost and delays but is the only safe option available today.

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## ***New Auditors***

Our staff of auditors has once again grown slightly, by two. Please welcome Phil Ford and Matt Clark, both of whom will be concentrating their efforts in the European theatre. Phil holds Level III's in RT, UT, PT, MT and ET, and has certifications in many disciplines from several Primes. Phil also has an extensive quality background. Matt holds Level III's in UT, RT, MT and PT with several certifications from primes. Matt is also a certified ISO Lead Assessor.

As for current openings, yes, there are several. In the UK we still need 4 new auditors and in the States, an additional 6 are needed. So again, if you know someone or you are that someone who is qualified in at least 3 NDT disciplines and have aerospace and audit experience, please get in touch with us here at PRI.

## ***Next Meeting***

The next NADCAP meeting is scheduled for Tempe, AZ, January 21 – 24, 2002. The meeting place is the Fiesta Inn, and the NDT

Open Meeting will be held Monday afternoon (Jan. 21). We hope that the New Year brings an opportunity for more suppliers to attend and participate. This is your program, too! For more information please reference the NADCAP homepage at [www.pri.sae.org/NADCAP/nadcap.htm](http://www.pri.sae.org/NADCAP/nadcap.htm)