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Phil Keown
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FROM THE CHAIR

For those of you eagerly awaiting the arrival of the “Baseline Requirements”, good news! The Baseline Standards are going through the final balloting stages and should become official very soon. We are certainly on track to implement the new standards and checklists as planned, by January 2006.

Although we have been working this issue for almost two years, and found various and varied venues to deliver the baseline message, there are still those who do not fully understand the concept. So, because we are so close to final acceptance, I again address some of the most misunderstood points in the baseline premise.

First, and foremost, there are NO requirements in the Baseline Standards, and no questions in the Baseline Checklists, that have not been agreed to, 100%, by the participating primes. Many people have espoused the theory that “one or two primes are driving these requirements”. This is not the case. If a requirement did not receive unanimous endorsement from the participating primes, it was not included in the baseline. If a prime, or group of primes, felt it was a necessary requirement, it was added to their respective supplements.

The Prime Supplements contain all of the requirements that are unique to that Prime, or group of Primes, but were not unanimously agreed upon by all. Some of the Primes will have more extensive supplements, based on the requirements that go above and beyond those agreed to in the baseline, and others will have none. But this leads to another critical point that will be highlighted and reiterated many times in the coming months.

It is going to be absolutely imperative that suppliers participating in the Nadcap program accurately identify those Primes for whom they do work. This information will tell PRI which supplements, along with the baseline, will define the scope of the audit. If a supplier is doing work for a specific Prime such as GE Transportation (GET), for example, but does not identify to PRI the correct Prime for whom they perform NDT, the audit will not include the relevant supplements that apply to GET (if there are any). The consequence being that the supplier will not hold the appropriate Nadcap Accreditation for NDT, affecting their eventual NDT approval status with GET. Therefore, incorrect or incomplete listing of customers will lead to delays in accreditation, follow-up audits and could also lead to disapprovals from some Prime Contractors.

At the same time, establishing the scope of the audit is not a “wish list”. If you are not a GET approved supplier, but list GET as a part of the scope of your audit, passing the Nadcap audit does not grant you acceptance as a GET supplier. So, obviously, it is of the utmost importance that suppliers accurately identify those Nadcap Primes for whom they are approved.

I would also like to take this time to recognize, and offer a sincere “Thank You”, to Sue Malsch. Sue, a CSR for the NDT Task Group for several years, is a major reason, along with Louise Belak, for the success of this group. Sue will now be moving over to lend her considerable talents to the Chemical Process Task Group. Thanks, Sue, from all of us in the NDT Task Group. It is always unfortunate when, having tasted the best one has to move on to ... something else, but we know your services will be most welcomed by the Chem Processing folks.

To help fill the void left in NDT, Samantha Jeswald will be joining Louise in the enviable task of supporting the NDT Task Group. Welcome to the Big Leagues, Sam !

Hope to see you all in London,

Phil Keown – Chairman NDT Task Group

NDT Newsletter – News to you?

Are you a new reader of the NDT newsletter? If so, here is some information:

The NDT newsletter is published four times a year, prior to the quarterly Task Group meetings. The newsletters are read by the subscribing Primes, Suppliers, Auditors and anybody that happens to click on the latest NDT newsletter on the PRI website (www.pri-network.org). The aim of the newsletter is to communicate information relating to NDT within the Nadcap program to improve our process and to promote the sharing of best practices at all levels. If you have any articles that you feel would benefit the program, feel free to forward these to one of the NDT staff engineers (contact details at the end of the newsletter) for future inclusions.

Jim Bennett – NDT Staff Engineer

NDTNTSTG

The NDTSC (Nondestructive Testing Supplier Committee) has been recognized as a functioning part of the NDT Task Group, with one exception the name has changed to follow Nadcap protocol thus “NDTSTSTG” (Non-Destructive Testing Supplier Technical Support Task Group) this is now consistent with developments toward all supplier task group commodities following this path.

Since the first article was written regarding the NDT suppliers collective in their efforts, progress has been steady forward. I believe we have perceived positive aspects of our performance during these meetings whereby our interactions with the group help to drive NMC (Nadcap Management Council) directives by improvement in the system in these areas:

Our goal is to reduce findings

- **Improve the Nadcap Process** - The Nadcap process improves for everyone. Suppliers play a more active role and have more “buy in” for the Nadcap process and Primes see overall improvement/standardization in supplier NDT processes.
- **Improve feedback on the Nadcap checklist** - Issues regarding Nadcap checklists continue to be discussed prior to the quarterly Nadcap meetings to develop a collective, well thought out proposed solution for the issue rather than just raising it as a problem needing resolution. The feedback has been presented to the Task Group either during the quarterly meetings or added to subsequent meeting agendas.
- **Streamline Task Group Meetings** - Issues (along with proposed solutions) that are identified by the collective supplier base can be presented in an organized fashion for review by the Task Group. If done properly, there should be little discussion except for questions by the Primes to improve their understanding of the issue.
- **Commonality of Understanding** - Some “issues” may not be issues at all once the group exchanges ideas and achieves a common understanding of the requirement.

- **Orientation of Suppliers New to the Nadcap Process** - This group could serve the same purpose as the current “Buddy System” serves but be more specific to the NDT process and associated checklist requirements.
- **Model for the Entire Nadcap program** - Development and Implementation of the NDT methodology, will be directly applicable to all Nadcap Task Groups, thereby improving the overall Nadcap process.

To continue this progress the NDT suppliers meet (in an open session) during the Nadcap quarterly Task Group meetings. For those not able to attend the meetings, agendas and minutes are available on the PRI website on the following web address: <http://www.pri-network.org/PRI> and selecting ‘Nadcap meeting info’ under the Events section.

Suppliers: do you want to reduce your findings or learn more about Nadcap NDT?

As a result of the NDTSTSTG & NDT Task Group meeting, the request for a supplier symposium was introduced, with the planning sessions underway via an adhoc committee. The symposium will focus on areas of improvement within the NDT Nadcap Accreditation Process namely the most common NCR’s, current checklist requirements, future checklist requirements, do’s and don’ts, etc. The symposium is tentatively scheduled for the October ‘05 meeting in Pittsburgh.

Ryan Soule - NDTSTSTG Vice-Chair - Alcoa-Howmet Castings - Corporate NDE manager, Level III

FPI Research Benefits Aviation Safety

Fluorescent penetrant inspection (FPI) is a widely used inspection technique for surface crack detection in both aircraft and engine components during production qualification and in-service assessment. In a recent survey of airworthiness directives issued from 1995 – 1999, Federal Aviation Administration (FAA) reported that FPI was the third most frequent inspection called out behind visual and eddy current inspection methods. Although patented in 1941, significant changes have occurred in the chemicals/chemistry associated with the process, in many cases as a result of environmental considerations. With over 90% of metallic aviation components receiving FPI at least once in their lifetime, the FAA has provided funding to assess factors that affect the sensitivity of the inspection method through two separate programs led by Iowa State University (ISU).

The first program was completed as part of the Engine Titanium Consortium (ETC), a university/industry research program comprised of ISU, General Electric Aircraft Engines, Honeywell Engines and Systems, and Pratt & Whitney that has as its' objective the development of improved inspection methods for jet engine materials and components. ETC partnered with Delta Airlines and Rolls-Royce, in a program that focused on drying and cleaning steps done in preparation for FPI during inservice applications. In-service inspection brings with it unique challenges brought about by service induced conditions and/or materials used as part of the maintenance process. For FPI to provide effective crack detection, the defect must be clean, dry, and open to the surface. There are several methods approved for part cleaning and drying in preparation for FPI. The purpose of this program was to compare approved drying methods and to evaluate the effectiveness of a variety of cleaning methods on a range of typical contaminants. Quantitative methods to assess the changes in FPI indication response were developed and utilized to characterize low cycle fatigue cracks grown in titanium and nickel samples. The samples were characterized in a laboratory environment by means of optical micrographs, measurements of crack brightness, and UVA photographs of the FPI indication. Three separate one-week studies were then held at an airline overhaul facility which enabled consideration of typical cleaning methods and realistic inspection facilities. The first study provided baseline data for the samples and compared two drying techniques, flash dry and oven dry. The second study compared cleaning methods used for removal of service coatings (anti-gallant, RTV, and high temperature sealant) and oil contamination. Between the second and final study, the samples were exposed to various conditions to generate oxidation/scale, soot, or coke/varnish conditions. The third study evaluated the removal of these "baked-on" contaminants. During the course of the two cleaning studies, six mechanical blasting techniques and thirteen chemical cleaning processes were evaluated. The final report has been completed and is available at <http://www.cnde.iastate.edu/faa-casr/fpi/Papers/engineerin%20study%20fluorescent%20penetrant.pdf>

The second FAA-funded program began in September 2001 to determine the most relevant factors for which existing data is insufficient, assess the parameter ranges that provide acceptable

performance for typical aircraft and engine components, and document the results of these studies. The second program is being performed as part of the Center for Aviation Systems Reliability (CASR) and includes ISU, GE, Honeywell, Pratt & Whitney, Rolls Royce, Boeing Commercial, Boeing Phantom Works, United Airlines, Delta Airlines, and Sherwin, Inc. Program plans and results are coordinated with industry partners to ensure they are applicable to aerospace practices and relevant specification modifications will be supported through participation in standards committees, such as SAE Committee K. In addition to engineering studies, other needs identified through industry input are also being addressed. These include self-assessment tools that can be used by the airlines and OEMs to determine effectivity of internal processes and documentation of results which can be used by the industry in effectively instructing personnel in proper processing. As a first step, the team identified twelve areas in which additional data is needed:

- ES – 1 – Developer Studies - Determine effectiveness of various developer application methods
- ES – 2 – Cleaning Studies for Ti, Ni and Al - Compare effectiveness of cleaning methods for in-service components.
- ES – 3 – Stress Studies - Determine the effects of stress on detectability
- ES – 4 – Assessment tool for dryness and cleanliness - Provide a tool that can be used in the airline shop to ensure clean and dry parts
- ES – 5 – Effect of surface treatments on detectability - Determine the effect of surface treatments such as peening, blasting, and coatings on detect ability
- ES – 6 – Light level Studies – Establish effect of UV and white light levels on detect ability
- ES – 7 – Detect ability Studies – Determine if various items which may be encountered in typical shop environments but are not considered contaminants may affect detectability. A quantitative understanding of the effect of the following items on detect ability will be considered: alkaline effect on PE penetrants, effect of silicates, effect of prior red dye use including study of effective removal methods, and effect of water chemistry
- ES – 8 – Study of Pre-wash and Emulsification Parameters - Study of rinse and emulsification parameters for both water wash and post-emulsification processes. Include agitation study and spray pattern comparison to emulsification dipping.
- ES – 9 – Evaluation of Drying Temperatures - Determine the effect of pre-drying temperatures and methods on detectability for a range of penetrant types and surface conditions.

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WHERE ARE THE BASELINES?

You might very well be wondering right about now, where are the Baselines Checklists and Standards that have been talked about so much? Well, ok, maybe there are other things on your mind. If however, you have not been at one of the last eight or so Nadcap meetings scattered across the world, you are likely unaware that the baselines have been worked, re-worked and then worked again and again. There may still be some issues and we have heard from some of you, but rest assured that the NDT Task Group has spent endless hours attempting to make these the best documents that time can buy.

Oh that's right, I was going to tell you where they are. As you read this, the Standards have been balloted and the NDT Task Group and PRI NDT staff are likely trying to resolve comments received from the SAE Aerospace Committee "K". The Checklists and Standards were previously balloted and approved by the NDT Task Group. Committee "K" is the current step in the very long process so please be patient. The Checklists and Standards are currently posted on the PRI website so please feel free to go in and take a look. Let us know your thoughts or better yet, come to a meeting.

Mark D Aubele – NDT Senior Staff Engineer

FPI Research from page 3

- ES – 10 – Part geometry effects – Compare use of flat panels to real part geometries
- ES – 11 – Penetrant Studies – Compare application methods to determine impact on inspectability
- ES – 12 – Relationship of part thickness to drying method – Determine if part thickness should be taken into account when defining drying parameters for drying prior to penetrant application and prior to developer application.

Several studies are in process and preliminary results are being published at the CASR website: <http://www.cnde.iastate.edu/faa-casr/fpi>. In future issues of the Nadcap newsletter, a summary of key conclusions will be provided.

Lisa Brasche - Center for Nondestructive Evaluation - Associate Director, Iowa State University

Nadcap Meeting Schedule

Nadcap Meetings until 2007 updated as of 6/9/2005

	2005	2006	2007
January	—	Crowne Plaza Redondo Beach Los Angeles, CA 23-27	TBD Phoenix, AZ 22-26
April	—	Beijing, China 24-28	Europe TBD 16-20
July	Holiday Inn Kensington Forum London, England 18-22	Madrid, Spain 17-21	Asia TBD 16-20
Oct	Marriott Downtown Pittsburgh, PA 14-20	Marriott Downtown Pittsburgh, PA 13-20	Marriott Downtown Pittsburgh, PA 19-26

The NDT Top Ten Findings – AC7114

Over the next six newsletters, NDT staff will reveal the Top Ten findings in an NDT accreditation audit, which we hope will help the suppliers in preparation for their initial or re-accreditation audit. These findings have been taken from eAuditNet and cover initial and re-accreditation audits from across the world.

This newsletter will deal with the checklist AC7114 and the findings, which cover the year of 2004.

So in reverse order;

In tenth place, paragraph 4.8 with 87 votes
In ninth / eighth place, paragraph 3.4.1 & 4.2b with 88 votes
In seventh / sixth place paragraph 3.11 & 4.3g with 101 votes
In fifth place paragraph 4.2 with 109 votes
In fourth place paragraph 8.1d with 111 votes
In third place paragraph 4.10 with 116 votes
In second place, paragraph 4.7 d with 126 votes
And in first place with 316 votes paragraph 4.1

The relevant paragraphs are:

- 4.8 Does the training course outline conform to MIL-STD-410E and is it approved by the Level III responsible for qualification?
- 3.4.1 Is there evidence of compliance to the procedure referenced in 3.4, which is; Is there a procedure in place that assures the updating of specifications and removal of obsolete documents?
- 4.2 b Level, method, and techniques for which individual is certified?
- 3.11 Is there a procurement procedure to ensure that prime contractor requirements are adequately imposed on the sub-tier supplier, e.g., calibration services, cleaning/etching procedures as related to NDT?
- 4.3g Do level II (and/or Level III, if Level III processes product) practical tests provide evidence that two parts were evaluated?
- 4.2 Are records of training, qualification and certification of NDT personnel complete, accurate, and are they available for review? Do they contain the following?
- 8.1 d Applying controls to ensure that corrective actions are taken and that they are effective?
- 4.10 Does the certification procedure describe re-qualification of personnel that fail the certification/recertification tests or have had their certifications revoked, and does it address the re-examination of personnel?
- 4.7 d Training hours required for each method?
- 4.1 Is there a procedure in accordance with MIL-STD-410E detailing the training, qualification and certification requirements for NDT personnel and is it approved by a Level III?

So apart from the NCR's covering the quality systems requirements of document control, flow down of customer requirements to sub-contractors, procedural control of calibration and non-sustaining corrective action, the main area of concern in AC7114 is the control of NDT personnel qualification and certification. This includes control of personnel records, practical examinations, re-qualification, training hours and the procedure not addressing all the requirements of NAS410 and/or EN4179. The list below gives typical reasons for the NCR's being raised.

- Amalgamation of NAS 410 and EN4179 prior to revision 2 of NAS 410.
- Not addressing unique customer requirements with the NDT written practice i.e. Honeywell (EMS) & Pratt & Whitney (NDTQ).
- Failing to modify the internal procedure to meet current requirements within the required time period.
- Primes not accepting the requirements of the National Aerospace NDT Board (NANDTB).
- NDT inspectors still operating with lapsed certification.
- Inappropriate practical samples i.e. TAM panels used
- The procedure does not cover all the requirements of the NAS 410 and/or EN4179
- Poor record control i.e. no records, no traceability, unable to determine the number of samples used for practical examination.
- Level 3 is not qualified to the company system i.e. they only hold central certification.
- Lack of or unacceptable training course outline i.e. outline taken directly from SNT-TC-1A and covers items such as US regulatory specification or in-motion radiography when static systems are used.

Phil Ford – NDT Staff Engineer

Nadcap Users Compliance and Audit Program (NUCAP)

Nadcap Users, for some time, sought a mechanism by which they too could utilize Nadcap requirements internally for control of special processes. Recognition of this control would provide the ability to benchmark themselves against Nadcap suppliers and provide the opportunity for Users to raise credibility among the supplier's base regarding their commitment to Nadcap. So, when faced with the reality of seeking Nadcap Accreditation themselves, NUCAP was developed.



Nadcap has a long standing reputation for an industry-managed process for approval of suppliers, but did not provide the means for a process whereby a User could be reviewed and accredited. During 2002, a dedicated committee worked on the requirements documents (Program Document -PD3000) for this new initiative. This document outlines the process of NUCAP and the first pilot audit was conducted at Honeywell ES&S in 2003. The NUCAP Management Council was formally recognized by the PRI Board of Directors in September, 2003 and three (3) Program Documents were released in November of that same year. The long awaited first certificate of approval was issued to Honeywell in March of 2004.

NUCAP is based upon three basic fundamentals:

- Establishment of equivalency of auditors through User internal auditor qualifications compliant to Nadcap Operating Procedures (PD3001 NUCAP Auditor Selection, Approval and Training)
- Formalized internal special process audit system compliant to Nadcap through the usage of Nadcap checklists/standards for internal special processes
- Functional Quality System equivalent AS/EN/JISQ/9100, with an effective corrective action system and closure and corrective action through User oversight system (internal)

The NUCAP process involves an audit at the main facility (Headquarters Audit). This audit tests compliance to the Program Document 3100 (NUCAP Audit Criteria for Standard Internal Auditing Requirements for Nadcap Users). Focus of this audit is the verification of internal auditor qualifications, internal audit process of Special Processes etc. In addition to the Headquarter Audit, a test of the overall system is performed through Verification Audits. These are Special Process/Product audits selected across sites and process capabilities, whereby a Nadcap Auditor is sent to perform the audit. This validates the equivalent auditors, as well as ensures the User's oversight system effectiveness. An alternate approach being utilized through the NUCAP program is the usage of Nadcap Auditors to perform all internal special process/product audits.

These audits are then processed by Staff Engineers and combined into one (1) audit report which is then sent to an appointed "Review Team". This Review Team is responsible for review and approval of the User.

To become a member of NUCAP Management Council (NuMC), a Prime must be a Nadcap Subscriber. Since its formation, NuMC has increased over 50% and is now a consideration when evaluating Nadcap Subscriptions. Currently, NuMC is chaired by Mike Spencer (Vought Aircraft) and has two approvals (Honeywell & Vought). Rolls-Royce plc is in the final phases of their audit and approval process.

For additional information on NUCAP, please contact Heather Meyer (heathr@sae.org)
 Heather Meyer – PRI Program Manager, Special Processes & Technology Development

NUCAP Management Council Membership Status



Airbus	Camille Valmy
Alenia Aeronautica	Alessandro Ferretti
Boeing Company	Arne Logan
Bombardier Inc.	Michael McLean
Cessna Aircraft	Chatt Rhodes
Eaton Aerospace	Steve Meyer
GE Aircraft Engines	Dan Smith
Goodrich Corporation	Kevin Ward
Honeywell ES&S	Chet Date
MTU Aero Engines	Manfred Podlech
Northrop Grumman	Jay Park
Raytheon	Janice Abeita-Lynch
Rockwell Collins	Jerry Erickson
Rolls-Royce Corporation	David Stevens
Rolls-Royce plc	Jon Biddulph
Vought Aircraft	Mike Spencer

NUCAP - Vought perspective

The Nadcap mandates from many of our customers (Boeing, Airbus, Northrop, etc.) posed a unique dilemma for Vought. Although Vought is a supplier to the Primes (and in many cases their largest supplier) we are also a Nadcap user prime as well. Vought has their own engineering, process specifications, M&P Engineers and technical staff to oversee special process activities in-plant and in the supply base. We have Task Group members that participate in the design of the standards. We felt we didn't need to be audited to a standard we helped put in place. We pushed back to our customers wanting exemptions from the requirement.

The Paradox was that Vought required our suppliers to obtain Nadcap accreditation in 2003. However, from the beginning of our involvement with the Nadcap program we struggled with requiring our suppliers to perform to a standard we were not willing to apply to ourselves.

A solution arrived in the form of NUCAP. The Nadcap User's Compliance and Approval Program (NUCAP) was in its genesis stage, but rapidly gaining acceptance from the primes. It was a program that allowed the Nadcap user to audit themselves to the same standards and controls of the Nadcap requirements, then NUCAP would audit our oversight process to see that we were performing to the Nadcap standards. NUCAP became a win-win situation for both Vought and our customers.

Vought jumped into NUCAP with enthusiasm. The author, was elected the first and current Chairperson of the NUCAP Management Council (NuMC). The NuMC published program documentation (PD3000, PD3001 and PD3100) to formalize the process in early 2004. Honeywell and Vought have since become approved, with Rolls-Royce Plc soon to follow. (See prime intentions in NUCAP Matrix).

The NUCAP program benefits the user prime in that we now can demonstrate to our customer, and our suppliers, we are compliant

NUCAP - Honeywell perspective

Honeywell has been committed to the Nadcap process since Nadcap's inception. Nadcap has proved to be an excellent vehicle to monitor and improve supplier special processes. We started requiring our suppliers to achieve Nadcap accreditation as a condition for continued business since 1998. Around the same time, we insisted our internal special processes to follow the same requirements. Nadcap Users' Compliance and Audit Program (NUCAP) provides us an industry standard for Nadcap compliance to measure ourselves against.

Honeywell has been a driving force behind NUCAP and is the first company to achieve a NUCAP certification. NUCAP certification indicates that its holder's in-house special processes are Nadcap compliant. We audit ourselves to Nadcap standards using our own auditors who meet or exceed NUCAP auditor qualifications. Performance Review Institute (PRI) then audits our audit system. PRI also conducts Nadcap audits of our sites on a sampling basis using Nadcap auditors. Once all the requirements are met per established criteria, a NUCAP certificate is awarded. Our NUCAP certification, first awarded in March of 2004, is applicable to Honeywell ES&S' all OEM sites. We believe this to be a great

NUCAP	NUCAP Approval & Acceptance Status					
	NUCAP Approval	Audits in-Process	Will Seek NUCAP Approval	Evaluating Benefits	No Intention to Pursue	Accept from Supplier in-lieu of Nadcap
Airbus			1			1
AVIO						?
Alexia				1		?
Goodrich				1*		1
Boeing			1			1
Bombardier			1			1
Cessna					1	1
EADS (CASA)			1			1
Eaton Aerospace				1*		1
GE Transportation				1		1
Honeywell	1					1
Northrop Grumman					1*	1
MTU			1			1
Raytheon / Beech				1		?
Rockwell Collins				1		1
RR Corporation			1			1
Rolls Royce PLC		1				1
United Technologies				1		1
Vought	1					1

M. Spencer NuMC Chair * Some Processes are Nadcap Accredited

with the Nadcap standards. However, there is a benefit to the supply base as well. When a NUCAP user prime identifies a Nadcap requirement they feel is non-value added or arbitrary, they must work through the Nadcap tasks groups to change the requirement or comply with it as well. The supplier base will now benefit from primes being audited to the same standards.

Finally, Vought has seen a tremendous improvement in our special processing operations through the efforts put forth to obtain our NUCAP approval. We encourage other user primes to jump on board the NUCAP Express, it's where every prime needs to go.

Mike Spencer - Vought Procurement Quality Manager, Nadcap Management Council (NMC) Representative and NUCAP Management Council (NuMC) Chair.

achievement for us because it validates that our internal special processes are at par or exceed industry standards.

Prior to receiving our NUCAP certification, Honeywell was Nadcap compliant for over two- three years, so on a technical grounds it was rather easy for us to get NUCAP certification. Another advantage we had is of one unified quality system: our all manufacturing sites are under one quality system and under one AS9100/ISO9000 certification. However, when the NUCAP requirements came out, we had to make some changes to our auditing system to accommodate additional organizational, system and training requirements. The key changes included:

- Documented and verifiable process for special process audits and auditor selection applicable to all OEM sites
- Rigid auditor selection and training criteria
- Rigid and well-documented criteria for task-group representatives' involvement in internal processes and for providing feedback to the Nadcap process.

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Honeywell Perspective from page 7

The NUCAP audits were very thorough and gave us a good idea about our strengths and improvement opportunities. We used these audits to further strengthen and standardize our special process control system.

We also noticed some gaps in the Nadcap audit process, specifically, occasional ambiguity in Nadcap checklists as well as their limitations when applied to in-house, captive special processes of a major type certificate holder like Honeywell. We used these lessons learned to improve Nadcap checklists by working with the task groups to update the checklists. We strongly believe

that the NUCAP program will improve User's internal special process control system, at the same time, will improve the Nadcap process.

Now that we are NUCAP certified, we are committed to maintain the certification. That means on a day-to-day basis we, just like our suppliers, must comply with the Nadcap standards for special processes!

Chet Date - Director, Quality Systems and Initiatives - Honeywell Engines, Systems & Services, NMC Chair and NuMC representative.

NUCAP – Rolls-Royce plc Perspective

Rolls-Royce plc made the decision to achieve NUCAP certification in order to improve the control of Special Processes deployed within our UK manufacturing facilities because we recognised from the outset that Nadcap was applicable to all manufacturers. The Nadcap program in its current form could not automatically be deployed, as Prime review of Prime audits was unacceptable, as would Supplier review of Supplier audits. NUCAP was the solution, a methodology for applying the Nadcap approach to control Special Processes, which are carried out within the Primes own manufacturing facilities. This uses the same basic audit criteria as applied to Suppliers but allows the Primes to use either their own or Nadcap auditors. The process is overseen and controlled by a Management Council, however the audit results are not shared with other primes who may be in direct competition to each other.

Towards the end of 2003, Rolls-Royce plc committed to achieving NUCAP certification and put in place a 2004 audit plan to Nadcap assess Special Processes across our entire UK manufacturing operations. This represented 71 audits across our 9 manufacturing sites addressing 7 Special Process commodities, i.e. Chemical Processing, Coatings, Heat Treat, Material Testing Laboratories, NDT, Welding, Non-Conventional Machining and Surface Enhancement.

Rolls-Royce plc made the decision to contract in existing Nadcap approved auditors via PRI, this allowed a much greater degree of independence which would not have been achieved by using our own internal resource.

All the Rolls-Royce plc Operating Business Units found the audits to be a tough and probing experience from which some areas are still recovering. We have a much greater appreciation of the pain and effort our Suppliers may experience, but likewise, we can directly appreciate the benefits from the process. Post internal audit reports published on our global shared drives consistently praised the auditors as being professional, excellent, knowledgeable, fair etc. Upon conclusion of all audits, we had clocked up a total of 994 NCR's averaging out at 14 NCR's per audit. NCR responses were all submitted to assigned Task Group Staff Engineers who were responsible for their closure. We fully appreciate their advice, support and professionalism in this regard. Application of the Material Test Laboratories (MTL) AC7006 criteria to a business with an embedded AS9100 quality management system and captive laboratories supporting our special processes proved to be a bridge too far and the decision was taken to withdraw from seeking MTL certification, reducing the final NCR count by 35% as a consequence.

The temporary deviation process, which allowed us to manage Nadcap requirements, which were not Rolls-Royce requirements, highlighted the size of the delta between the two. Some 150+ deviations have been approved with timescales to eliminate, this being achieved by seeking revision of the Nadcap checklists or revision to our own specifications. Whilst the current Nadcap

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Rolls-Royce plc Perspective from page 8

baseline checklist criteria will address many of the deviations, the remainder will be eliminated by specification change. Our suppliers will start to see the effects of this and hopefully appreciate that this is part of the journey leading towards harmonisation of Special Process standards.

In summary, NUCAP is driving improvements within our UK manufacturing operations and is supporting the move towards

harmonisation of Special Process standards. The process has generated an additional cost but the benefits in terms of compliance and reduced quality escapes are already apparent and will continue to improve.

Jon Biddulph – Rolls-Royce Head of NDE, NMC Representative, NuMC Representative & NDT Task Group Representative.

Prime Perspective – Clarification of Boeing NDT Issues

1. Use of and Reference to BSS / BAC Documentation

Nadcap NDT compliance jobs require documenting both the process specification and acceptance standard being used - with appropriate revision. For the Industry standards this seems to be well understood. MT Example: ASTM E 1444-01 for the process standard and a possible reference to MIL STD 1907 Class A for acceptance. For Boeing, many of our own NDT specifications, BAC's, PS's, DPS's, etc., now require and reference a common NDT inspection process standard. These BSS standards have been in use for some time and hopefully have been well implemented at suppliers. However, recent audit package reviews have raised some concerns, especially as they relate to compliance job documentation.

Expectation: Compliance jobs with correct entry for both processing and acceptance criteria - including revision. Suppliers need to show the Nadcap auditor how these are being implemented. Nadcap auditors are to assure that the process standard (BSS) information is complete, including revision and enter this for applicable compliance jobs. This may be in addition to the Boeing specifications stated earlier and of course in addition to the acceptance criteria - if they are not the same. Adding the suppliers own processing standard is optional, but should not be entered in lieu of our required process standard. We need to be able to assure correct flow down of this requirement and compliance when reviewing audit packages. Some of the key BSS's to be looking for include: BSS 7039 (PT); BSS 7040 (MT); BSS7055 and/or BSS 7052 for (UT) and BSS 7041 (for film RT).

2. Boeing "approved" Level 3 sources.

Boeing treats the supply of NDT Level 3 services as a controlled process requiring approved sources. Similar to how many would treat an NDT process itself. For example: Penetrant inspection per a Boeing specification requires use of a D1-4426 approved source. Likewise, NDT Level 3 services per NAS 410 would require use of a D1-4426 approved source. Although this seems to be well understood, we are seeing some issues where our approved Level 3 sources do not seem to understand this at times. Examples include: Bringing in another Level 3 for additional training, using an outside Level 3 for approving procedures / techniques or when using an outside source for their own certification/ qualification testing.

Expectation: Use of Boeing approved level 3 sources. Suppliers need to verify that the Level 3 source being used is listed in D1-4426. Realize that we generally list, companies, firms, consultant agencies as "approved" sources. Not necessarily individual Level 3's.

Of course, these are only examples and do not purport to address all instances or possible exceptions that might exist.

*Pete Torelli - Boeing NDT Task Group Member
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NDT Newsletter Archives

Want to review previous NDT Newsletters? Use the following address to direct you to the NDT Commodity web page:
<http://www.pri-network.org/Nadcap/supplier/commodities/NDTesting.htm>

Jim Bennett – NDT Staff Engineer

Auditor Perspective - Drying Oven Controller Calibration

This article is essentially written around ASTM E 1417-99 dryer oven calibration requirements. My apologies to Rolls-Royce, or any other Primes, who flow down their own standards, but the ASTM is the only industry NDT standard that seems to address dryer oven calibration in any detail. If I am found to be incorrect, I will blame a secretary.

I was detailed to write this article about penetrant dryer oven calibration (particularly controllers) as I seem to hold some sort of record for nonconformances (NCRs) written against para. 5.11 of AC 7114/1, soooo... let's begin.

Basically, ASTM E 1417-99 requires dryer oven controllers and temperature indicators to be calibrated quarterly, unless extension/reduction of that time can be substantiated by actual technical/reliability data as noted in Table 1. (Keep "... substantiated...actual technical/reliability data..." in mind, as the concept will appear again in this article).

Specific parameters for what constitutes a successful dryer oven calibration are very clearly stated in ASTM E 1417-99, para. 6.6.2, "The temperature shall be controlled with a calibrated device capable of maintaining the oven temperature at +/- 15°F (+/- 8.3° C) of the temperature for which it is set. The oven shall not exceed 160°F (71°C). The temperature indicator shall be accurate to +/- 10°F (+/- 5.6° C) of the actual oven temperature." Neither of these calibration requirements is difficult to meet.

I do not recall reviewing any oven calibration certifications that did not report the results of the comparison of a temperature indicator to a potentiometer or master thermometer, but I have seen numerous certifications of oven calibration compliance, which included no record of the minimum/maximum temperatures that represent the controller capability. This is the source of most of the dryer oven NCR's that I write.

The capability of a controller is always based on "worst case" conditions. For a dryer oven, the verification of the maximum temperature attained, for a given set-point, is the peak temperature during ramp-up from the ambient oven temperature at start-up. The initial cycling around the set-point will also identify the low end of the controller capability. The following example should be explanatory:

If the controller set-point is 150°F and the indicated temperature climbs to 157°F before the temperature begins to fall back, then the oven overshoot is 7°F. As the oven cools the temperature indicator might drop to 146°F before there is an indication of the temperature beginning to rise again. This hysteresis tells us the controller capability is +7°F and -4°F, and is within specification. It also tells us that use of any set-point higher than 153°F probably would have us processing out of specification, at least part of the time.

If the supplier does not know these numbers, he has not satisfied the ASTM E 1417-99 calibration requirements. Further, if they are not recorded, the supplier cannot take advantage of extending the calibration frequency as provided for by ASTM E 1417-99. (see the third paragraph).

Additionally, for those suppliers who include Rolls-Royce plc in their customer base, and who must meet RPS 702 as well as ASTM E 1417-99, it is critical that the suppliers know the minimum/maximum capability of their controllers, as the combination of RPS 702 and ASTM E 1417-99 temperature requirements will restrict the allowable range to between 140°F (60° C) and 160° F (71° C). Uniformity surveys have not been addressed here as they do not impact the items discussed.

Lastly, this calibration need not be as complex a process as that required of heat treating. Once the oven temperature indicator has been determined to be accurate to a given tolerance, it is a simple matter to set the oven to the desired temperature and then watch the temperature as it peaks and then drops to its low point before beginning to climb again. Record these high and low values and the controller capability has been verified.

See you in October.

Ed Alloway - Nadcap NDT Lead Auditor

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Thanks Sue!! Hello Sam!!

I thought that I would take this opportunity in this quarters newsletter to inform everyone that as of May 23, 2005, Sue Malsch, who has been a CSR with the NDT bunch along side Louise Belak and Jennifer Walker for several years, is moving on to be the one and only CSR for Chemical Processing, reporting to Mike Graham. This move was decided by management to streamline the Nadcap process and was accompanied by several other moves across PRI. Sue was a very valuable asset to us here in the NDT department. I am certain that being in the NDT department has provided her with many stories that she can tell at parties for years to come and her time here has certainly provided us with many a good memory.

Please feel free to send Sue your best wishes in her new endeavors with the Chemical Processing group. She will certainly be missed by us in NDT.

At the same time that we are sad to see Sue move on, we also want to enthusiastically welcome to our group, Samantha Jeswald, who comes over to us from the Heat Treat group. Samantha graduated from Indiana University of Pennsylvania with a major in Child Development/Family Relations and a Psychology minor. Prior to working for PRI, she was a preschool teacher for a year and then became a Therapeutic Staff Support (TSS) for several months. Samantha has been with PRI for 7 months working as the Heat Treating Secretary. Again feel free to welcome Samantha to our group. Samantha will be attending the auditor training in October and everyone should make a concerted effort to meet and welcome her to our group.

You may contact Samantha at: samanthajeswald@sae.org
Mark D Aubele – NDT Senior Staff Engineer

In Step with the NDT Staff Engineer

Name: James E Bennett

Title: Staff Engineer (NDT)

Duties: Review audit reports, disposition corrective action responses in accordance with NDT Task Group guidelines, make Mark Aubele smile (which is a challenge), laugh and cry with my English humor and other assigned duties.

Background: Began my career in the Aerospace Industry working for Rolls-Royce plc, England from the year of 1990 until 2003. Initially trained as a machinist, I was given the opportunity to work in the External Supplier Control Department, where I was tasked to review and approve First Article Inspection Reports prior to component installation on Engine Build. Further to gaining metallographic experience from the numerous micro and macroscopic evaluations, I became the Fastener specialist for the department, performing special process audits at suppliers and final component approval. It was at this point where I was introduced to Eddy Current Testing for material sorting of Fasteners and the brotherhood, that is the 'Brotherhood of NDT...'

Further to the retirement of one of the most illustrious NDT Level 3's within the company, not mentioning any names (Denis), there was an opportunity to join and train as a young NDT Apprentice with two Masters of NDT (Jon Biddulph and Clive Perry). From then on I obtained the required qualifications & experience for subsequent certification to level 3 for PT, MT & RT.

During my time as a Level 3, I was part of a team responsible for performing initial and maintenance NDT audits within the external supplier network, providing me the opportunity to travel the world, experience different cultures, and not to mention 'Open my Eyes' to the big world of NDT. In 2002 I was given the envious task of becoming a Nadcap NDT Task Group Representative for Rolls-Royce plc, which I took on with a great deal of enthusiasm and interest.

Jan 1 2004, I began my employment with PRI as an NDT Staff Engineer located in Warrendale, PA, USA

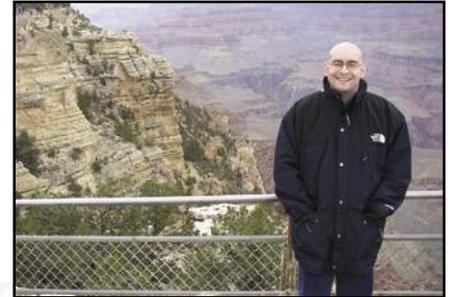
Certifications: Previously held Rolls-Royce plc, Level 3 PT, MT & RT Certification. Other NDT qualifications held for Eddy Current Testing.

Currently certified Nadcap NDT Auditor.

Education: Bachelor's Engineering Degree – Materials Engineering

Personal: Married to Roberta, we have no children, but two English pussy-cats (who undertook the long trip from Duffield, Derbyshire, UK to Cranberry Twp, PA, USA), numerous tropical fish and an adopted American dog who manages to understand our English accent and the English 'meowing' from the pussy-cats (when he upsets them)!

Enjoys riding Motorcycles (although need to purchase one following the move), Swimming and Scuba Diving. Current hobby is working on our new home with the various jobs my wife orders, I mean requests!



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