Non-Destructive Testing Newsletter

2017

Issue Highlights

Nadcap NDT

From the Chair.....

Welcome to the Non-Destructive Testing Newsletter. It has been a few years since we have published a newsletter. In order for the newsletter to continue we need articles and or topics to write about. I encourage everyone with an idea to submit something. If you have an idea but don't want to compose the article yourself send your idea to a Staff Engineer.

This group has been through many changes since it began in 1990 (we were the first Task Group). From 1 subscriber to the over 50 currently in the Nadcap program. The NDT Task Group has 58 Auditors located all over the globe as of this writing. Nadcap has evolved from an America's based program, NADCAP (does anyone remember what the acronym stood for?) to an international program, Nadcap. The program started auditing to Subscribers' requirements, an Auditor Handbook was developed, and now we have the current baseline checklist. The latest addition is a self-audit that must be completed prior to the actual Nadcap audit. Performing a thorough self-audit will make the audit process easier for both the Supplier and Auditor. The self-audit will provide the Supplier with the opportunity to correct issues that are discovered prior to the audit. The program continues to evolve.

We in the Aerospace industry face many challenges in the coming years. As aircraft age and new technologies emerge, producers of airframes and power-plants are on track for record sales in the coming decades. And of course the Suppliers will be tasked with increasing the production of their products as well. We must continue to improve the quality of the products we produce. One tool that can help in the process is the Nadcap program. I truly believe that Nadcap has improved the quality of the inspection process. Of course we are not alone in this endeavor; there are many groups and programs that are also a part of this: ASTM, AIA, ISO, to name a few.

Each year at the October meeting in Pittsburgh PA, we conduct Auditor training. This opportunity is taken to work with the Auditors to hone their skills and knowledge and share best practices with each other. Using the Auditors' knowledge and experience also helps the Task Group understand problems faced by the Auditors and Suppliers to improve the Nadcap experience.

The Task Group has also conducted Supplier Symposia to highlight issues in the industry. The current symposium is addressing UV-A LED lights. As many are aware the traditional mercury vapor lamps will soon no longer be available. The options for UV LED-A sources are many, and I encourage all of you to investigate your customer requirements prior to purchasing a lamp to ensure it will meet your needs. I would like to thank the UV-A LED lamp manufactures that have contributed to this symposium.

In closing I want to say that it is an honor to serve a Chairperson of this large experienced group of Non-Destructive Testing professionals.

Dave Royce – NDT Task Group Chairperson

NDT Newsletter – Want to be on the Circulation?

The NDT newsletter is published periodically throughout the year. The newsletters are read by the subscribing Nadcap Subscribers, Suppliers, Auditors and anybody that happens to click on the latest NDT newsletter on the PRI website **www.p-r-i.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.

Have you stumbled across the NDT Newsletter by chance? Want to receive it on a regular basis? Keep up-to-date regarding the latest Nadcap NDT information by being added to the distribution list! To receive notification when a new edition has been published, please e-mail Cath Rush at crush@p-r-i.org with your name, company and email address.

The PRI Website

As part of our international focus, this is a reminder that the PRI website **www.p-r-i.org** is available in nine languages. They are English, French, German, Italian, Spanish, Chinese, Japanese, Russian and Brazilian Portuguese.

Of course, a website is always a work in progress and we welcome all feedback to make sure it continues to be a valuable tool for all Nadcap stakeholders. Please contact Joanna Kennedy at jkennedy@p-r-i.org with any feedback.

The NDT newsletters can be found at **www.p-r-i.org/about-pri/media-center/key-documents/**

Nadcap Meeting Schedule

2017	Location
October 23-26	Pittsburgh, Pennsylvania, USA
2018	**Location**
February 19-22	Madrid, Spain
June 18-21	London, UK
October 22-25	Pittsburgh, Pennsylvania, USA

Why Is So Much Time Spent in Nadcap NDT Meetings?

Let me preface this article by stating that first and foremost I have the utmost of respect for all involved in the Nadcap NDT meetings.

I am somewhat known as someone who will speak on issues. It is my intent to never speak out of turn or to speak without knowledge of the topic under discussion. I can be passionate about certain issues but I try to keep my discussions on point.

All issues that are discussed in the NDT Nadcap meetings are extremely important to all of us in the Aerospace field of NDT, especially to those that are required to be Nadcap certified. All of those in attendance have the opportunity to speak and have their voices, opinions and concerns heard. We all have a responsibility to ensure that all items in the Nadcap checklists are fair and understandable. Many times, wordsmithing is a difficult thing to do and all too often the ensuing discussion is boring and tedious. Often we lose members in attendance due to this tedium. One must remember that extreme care must be taken to ensure that any changes are worded so that when it is finished it is fair to all involved. I believe that no one in the Nadcap NDT Task Group has a desire to see invalid findings, but misinterpretation and poor wording of questions do result in invalid findings.

Often things are changed in the Nadcap NDT checklists even though it may or may not be obvious that the group may have made the topic under discussion more onerous and unfair than what it was before. The discussions that occur in these meetings help to vet out these discrepancies. It seems that at each meeting there are new people in attendance; this brings in new perspectives that in turn bring in more discussion on topics that most of us had considered closed. This is actually good for the group because it is a new set of eyes that may bring in valid issues that need to be resolved.

There are approximately 58 consultant Auditors that perform Nadcap NDT audits. Our goal should be to make the questions and Compliance Assessment Guidance (CAG) more direct and less interpretative for the Auditors. Allowing interpretation, either in the question or the CAG allows for varying opinions which equate to Auditor inconsistency.

One thing I noticed at a recent meeting: the group was trying to squeeze information into question 6.1.9 of AC7114/2 related to magnetic particle machines pulse timers being calibrated to be within + .1 seconds. A Supplier had a different magnetic particle machine with a pulse duration of .9 seconds + .2 seconds? (Note: the exact verbiage may not be accurate but the example is used to show how wordsmithing a requirement can get confusing.) When you looked at the discussion as a whole, there were two separate issues being discussed. Adding the different time values to the same question (or CAG) was confusing enough to the group, let alone letting it become part of the same question or as separate CAG items of the same question, then depending on the Auditors to sort the ambiguity out. In my humble opinion, as an alternative, what could have happened was a new question and CAG could have been developed for the new magnetic particle machine that covered the unique aspects of the machines in question and then N/A could have been an option if you used the other type of magnetic particle

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machine. Remember, there are different ways that this issue could be dealt with and the idea I present here is just one of many. This one issue took the better part of an hour and still has no clear resolution. Remember this was just one issue and these types of issues are more typical, rather than atypical.

Once the checklist has been vetted by those at the NDT Nadcap meeting, it then has to go to ballot, where people who who may not have been at the meeting have a chance to review the changes and then vote on them. Once in ballot, if there are comments, those comments have to be resolved before the revised edition of the applicable checklists can be released. Although Staff Engineers do work very hard prior to the meetings to get the comments resolved, often the question(s) come back to the Nadcap NDT Task Group for resolution. Once the Nadcap NDT Task Group resolves the issue it goes back out for ballot once again.

By no means is this a perfect system but it is what we have. Over the years that I have been coming to the meetings I have noticed a great deal of improvement in the overall process.

I do not know of anyone that truly enjoys being audited, but if the audit questions are less ambiguous and clearer in what the requirements are, there is less chance of the requirements being misinterpreted. If the requirements are clear there is a greater chance that all involved will have a better understanding of the requirements, resulting in less findings and hopefully aircraft that have parts and assemblies that meet the engineering standards, which in turn, should result in safer aircraft.

Dave Gray – Mitchell Labs

Filmless Radiography

As most of you will be aware, some years ago an ad hoc group was set-up with the remit of developing audit checklists for Computer Radiography (AC7114/8) and Digital Detector Array (AC7114/6). The development of these checklists was challenging because generally the ASTM specifications and Subscriber requirements were either being developed or refined and consequently the checklists could not be considered as baseline.

These days, I think it is now true to say that the technology and reliability of filmless systems is much more understood and the Nadcap program is seeing an increasing demand for audits. This increase was expected and over the last few years we have run several Auditor training workshops which means that we now have sufficient trained Auditors to support the demand.

The previous ad hoc group has now become the Radiographic Method Group which, in addition to AC7114/6 & AC7114/8, now encompasses conventional film (AC7114/4) and remote viewing of images (AC7114/9).

The Radiographic Method Group is also working on AC7114/10 which combines the requirements of AC7114/6 & AC7114/8. This checklist is intended to be baseline.

We recognise that all the members of the Method Group have a “day job” and I would like to take this opportunity to thank the members for their continued support and commitment to this program.

Chris Stevenson – Rolls-Royce

Nadcap Meetings: An Important Company Tool

As a NDT service provider (Supplier) that performs work for most of the Subscribers (Primes), all things that come out of these meetings are very important to the company I am employed by. I am at these meetings as a representative of my company and am being paid to represent it to the very best of my ability. As a side benefit to all other Suppliers, in some way, I represent those that are unable to be in attendance. Almost all of things that come out of these meetings have an effect on all those that are Nadcap NDT certified.

As a Supplier that is not a manufacturer, our financial life depends on work coming in from those manufacturers that do not have NDT within their facility. We are (hopefully) considered to have a very good reputation. To help us maintain this reputation we are in attendance at all of the NDT Nadcap meetings as well as other NDT related meetings held within industry. This is all part of being responsible to our customers in keeping up with the latest news and events in the field of NDT.

The Nadcap meetings provide an excellent source of knowledge and experience that I might otherwise not have access to. I am entering my 38th year of working in the field of NDT. I learn something new every day. Having such a wealth of knowledge available to me 3 times a year at these meetings is priceless in terms of doing business. I establish a vast network of people that I may be able to contact with NDT related issues. I get as close to current information from the Subscribers (Primes) as is possible which is invaluable when you are trying to keep up with current specification revisions.

I am exposed to our competition in an environment that allows us to ask questions on a level playing field. We are not at the meetings for the purpose of negotiating contracts; we are there to ensure that all that are audited to the PRI Nadcap checklists are given a level playing field during the Nadcap audits. Most importantly, we are trying to ensure that we are in compliance to our customers’ requirements.

I do not know of anyone who enjoys being audited, but when you have an opportunity to be a part of the process from conception of the checklists to the completion of the actual audit it provides greater satisfaction to know that you had a voice in the process. Somehow, for me, it makes the audit process easier to deal with.

The company I work for considers attendance at the Nadcap meetings to be in our best interest. Our attendance helps us to understand our customer’s needs as well as to ensure compliance to our customer’s requirements. Having this understanding plays an important part in the long term health of the company. If we do not understand the needs of our customer, in very short order, we will have no customers.

Dave Gray – Mitchell Labs

Fluorescent Penetrant Trainee-Level 1-Level 2 Relationship

Most NDT methods have trainees, Level 1, Level 2 and Level 3 personnel that perform the functions of the particular NDT test method. Usually each of these levels has certain duties assigned to them. Trainees should never be allowed to work independently. Level 1 personnel are to work under the direct observation of a Level 2 or 3. Level 2 personnel are usually responsible for the processing of the parts as well as the determination of acceptability/rejectability of the parts based upon specified requirements. The Level 3 is responsible for the whole operation including training, certification and the development of procedures and techniques. One method that I have observed through the years where the Level 1 seems to be under less observation than the other methods is the Fluorescent Penetrant Inspection method.

As an NDT inspector I have always moved from one level of inspector to the next level without gaining a replacement at my previous level. In other words as I became a Level 2 I still maintained my duties as a Level 1. All that happened was I still did what I did previous, only adding more responsibility to my duties.

The addition of the new responsibilities was relatively simple. I had become responsible for the processing of the parts as well as the inspection of the parts. It was an easy transition. There was not much thought process as to what I had to do. When I finished the process I was responsible for the stamping of the traveler when parts were acceptable and ensuring that unacceptable parts were segregated from the good parts and clearly indicating how many parts were acceptable and how many were unacceptable on the traveler. I was careful to follow all procedures. I never had to worry about who processed the parts because it was always me.

In many other facilities I have observed there are clear distinctions between the different levels of inspection. You do not move to the next level unless someone leaves. When you move up you vacate the previous level and someone new moves into the position. Union shops usually follow this model religiously. There is nothing wrong with this model but it does bring up some problems.

As a Level 2 inspector you are responsible for the inspection of the parts. This includes the process from ensuring that the parts are clean to the final PT inspection disposition of the parts. If you, or another PT Level 2 or Level 3 do not observe the Level 1 personnel as they perform their assigned duties, how can you stamp off the traveler? You do not know if the process was performed as specified in your company's procedures. As you stamp the traveler you must realize that you are responsible for the whole process. If the process was not performed correctly there is a very good chance that potential discrepancies/ defects may have been missed. As the Level 2 you are responsible, not the Level 1 that processed the parts.

Fluorescent Penetrant Inspection is a process driven NDT method. Each of these processes has a process control test that is required at some specified time. These process control tests are important as they are evidence that the system is performing as required. If any of these tests fail or are not being performed, the whole process is under question. As a Level 2 you should observe the Level 1 perform the tests to ensure that they are being done correctly. You should also observe the whole process to ensure that it is being done correctly. Once you stamp off the traveler you are assuming responsibility of the whole process. If you have trainees and Level 1 personnel that are involved in the Fluorescent Penetrant process, be your own best friend and ensure that you are involved in the whole process. By being closely involved in the whole process you know that the parts you are accepting have been inspected the right way.

(Note: This article was written specifically to the Fluorescent Penetrant process but it is applicable to all NDT methods)

Dave Gray – Mitchell Labs

The Clarification Database

The Task Group spends hours developing the baseline checklists and many more hours discussing how the audit questions are being implemented. In order to keep the checklists down to a manageable size it is necessary to be concise in the wording used and every effort is made to capture the exact expectation in the question and the accompanying Compliance Assessment Guidance (CAG). However, questions are often raised regarding intent or implementation and on each occasion the Task Group resolves the issue. Where it is decided that changes to the checklist are needed there is a process in place to develop a revised draft which will progress through ballot to publication. This process takes some time but the decision has been made to modify the requirements. In other cases the discussions result in a decision not to change the checklist but additional helpful guidance and information is agreed. Without some system of recording the decisions taken following such discussions, this information is lost and there is a danger that the same issues are discussed over and over again.

So, ten years ago the Task Group started to keep a record of such decisions in the "**clarification database**". This useful document is available in the Public Documents section of eAuditNet and is useful to Suppliers, Auditors, Staff Engineers and even to the Task Group. Suppliers preparing for audit may be deliberating over the precise expectation. Auditors encountering a different method of implementation may be unsure of acceptability. Not all of the 5 Staff Engineers are present when the discussions take place so those not there need to be informed of the decisions taken in order that the queries are handled in a consistent manner. The Task Group regularly refers to the previous decisions when the same, or similar, questions recur. Of course, if there have been any changes in the Industry necessitating further discussion the matter may be re-opened but in such cases the previous decision is the start point for new discussion.

Here are some examples of how this can help:

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- If you are in an audit where the Auditor asks you to demonstrate you have a current revision of a specification that you reference on a Purchase Order and you do not believe you need a copy, look at the **clarification database**. You only need on site the specifications you implement on site. Issue sorted!
- If you drop your TAM panel and a crack appears across the corner – can you still use it? Provided this new defect does not interfere with the working part of the panel and you record that this has been assessed and does not affect functionality – yes, carry on!
- I have personnel who only process films through an automatic processor for film RT. Do they need NDT certification? No, but they do need to be adequately trained and competent, and you need to support this with documentation.
- Do I need to identify the central conductor used with the AS 5282 test piece for MT and does it need size certification? Unless you have a customer that has a specific requirement, the bar used only needs to be nominally of the correct dimensions.

The database is a live document and is changed from time to time in an effort to provide a useful repository of information. It has been developed over a 10 year period but this does not mean it is complete. If you encounter an issue where clarification would help you, then there is a good chance it would also be helpful to others so please share it. Simply ask a Staff Engineer to take the matter to the Task Group and depending on the result of the discussion there could be a new entry in the clarification database!

Clarification database can be found in eAuditNet under Resources/Documents/Public Documents/NonDestructive Testing

Andy Bakewell – E. M. Inspection Co. Ltd.

Why You Must Contest an Invalid Finding

Nadcap has its place and is justified in its existence. It should help those involved in the Nadcap process become better in their special process skillset(s). It may open your eyes to different aspects of what you do that you may not have given much thought prior to being audited. When you have legitimate findings, investigate and do a thorough root cause and corrective action, and follow it through. By the same token if you have an audit finding that may be invalid, you must contest the finding. Do not readily accept an invalid finding. Invalid findings are readily costly to all involved. Invalid findings may result in additional findings, and may continue on to other companies.

Invalid findings are a waste of your time as well as the Staff Engineer that has to review the finding(s). By the time you have performed your investigation you will have probably lost at least $1,000 in lost time completing that investigation, if it is closed on the first submittal. Additionally, the Staff Engineer loses time in reviewing the submittal(s). Finally, it is reviewed by Subscribers who will be wasting their time reviewing an issue that was never supposed to be written up in the first place. All adding up to a total waste of time and money.

How do you close a finding that is invalid in the first place? You cannot close a finding if it is invalid. How do you fix something that is not broken? The only thing you are doing is perpetuating the problem. You should not be afraid to question findings. Auditors are human and make mistakes, just as you or I do. What is the worst thing that will happen in questioning a finding? If you are wrong, you have learned something. If you are right, the Auditor learns something and stops writing other companies up for the same finding.

First, try to convince the Auditor that he/she is wrong. Never argue with the Auditor. If the Auditor disagrees with your rationale, inform him/her that you disagree with the finding and that you will present your argument to the Staff Engineer. When you present your argument to the Staff Engineer, have all your evidence together and be prepared for some discussion. If the Staff Engineer disagrees with you, you have the right to contest the finding through Task Group Resolution. If the Task Group agrees with you, the finding will be voided; if not then the finding is deemed valid and you must respond to it. Once again, you have not lost anything. You have gained insight and experience.

I have had Auditors tell me that they have written up other companies for the same thing, therefore the finding is right. Not necessarily; the auditor may still have been incorrect in his/her interpretation of the issue. Many other companies should have contested the invalid finding instead of wasting time and money answering findings that never should have occurred in the first place. What happens at your next audit when the Auditor verifies the corrective action from the previous audit and it is still occurring? You will receive a non-sustaining major audit finding for not closing the audit finding as stated in your previous corrective action. If you have merit you will lose it. All from not arguing a finding that should never have occurred.

Audits are good for all involved. It provides insight to the Subscribers sponsoring the audit and it keeps us all honest in the work that we do. Answer all legitimate findings with sincerity. Do what is necessary for good root cause and corrective action then follow through. Do not accept immediately invalid findings. Discuss them in a professional manner. Be prepared for your argument to go either way. If you are right your company will save time and money as well as the headache of the root cause and corrective action. Additionally, other companies may not have to endure the potential of an invalid finding. If you are wrong, you have learned something. As long as you are professional in your argument nobody loses.

Dave Gray – Mitchell Labs

Why ISO 18490:2015 for Near Vision Test?

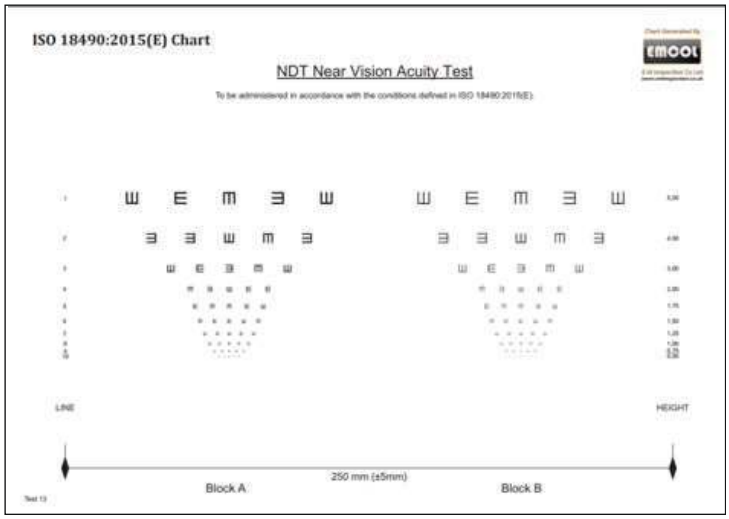
Obviously there is a need to verify that inspection personnel are capable of seeing adequately when carrying out inspection operations and for some time, in the Aerospace Industry, the Jaeger test was the most common near vision test to be used for NDT personnel. However, as part of an FAA study, it was found that the size of Jaeger text is not standardized. This led to a proposal to use Snellen charts specifically produced for near vision testing instead. Further investigation, after the FAA report, showed that Snellen charts also differ in format and sometimes in size. The other issue with using reading charts is that the candidate uses reading ability as much, if not more, than vision acuity to distinguish the characters. Those who use the modern English alphabet will instantly recognize the 26 letters used – this simple task, however, will be much more difficult for those who use other alphabets. All medical experts seem to agree that when testing vision, the brain and the eye work together and it is difficult to separate the function of the sensor (the eye) from the processor (the brain). For example, it has been shown that when reading, it is the shape of words and the context that helps, and only the frist amd lozt loltens noad to be correot. For letter charts, only certain capital letters are deemed suitable for vision tests – for example H and N are commonly used but M is not. This is also due to the way the brain interprets the visual image.

Although we take it for granted that the lighting conditions will be “suitable” when a near vision test is administered, those of progressing years will be well aware that more light makes reading “easier”. Therefore, without some control on lighting, the results of a near vision test can vary widely. Practical tests showed that without control on lighting conditions, results in the ISO 18490 test can vary by 2 or more lines, which would probably equate to a candidate being able to meet Jaeger #1 in very bright light but only Jaeger #3 in subdued lighting.

Scanning the medical research papers also shows that there are a number of other factors that can affect the results of near vision tests. So in 2009, an ISO Working Group was set up to try and find a standardized method for determining the near vision of NDT personnel. First, a search was carried out to find an existing standardised near vision test, which failed to find anything. So research was carried out and work started on developing a standard that was meaningful, reliable, fail-safe and internationally achievable. Various options were considered and it was decided during the early work that to rely on distinguishing between English alphabet words or characters is limiting. It discriminates against those who do not recognise these characters, and for those who use them regularly, it makes it difficult for the examiner to differentiate between reading ability and vision perception.

Technically the Landolt C test, which is a range of reducing size circles with a

Typical Snellen and Jaeger Charts



ISO 18490 Chart

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small break at different orientations, is an excellent test. However it proved to be almost impossible to produce test sheets or cards of the required quality locally, which was one of the goals of the group. So the "Tumbling E" chart was developed. The concept was not new. Similar charts are available for use today which are commonly called the "Illiterate E Chart", giving a clue as to why they were developed. What was new, however, was ensuring the charts are all identical with regard to the actual form of the characters and the spacing. It is also new to any near vision test to have controlled lighting conditions and to explain to the examiner how to administer the test.

This near vision test is now the only permitted near vision test for UK NAndtB controlled examinations. The UK board took the decision to only permit the one, internationally published test not only because it was a better controlled and more standardized than the other tests but it also recognized that NDT Level 3 personnel were not able to make "equivalency" decisions as was previously allowed. Indeed, not even eye experts can really make equivalency decisions because there are too many variables when comparing tests. This is why NAS410/EN4179 now does not allow any "equivalent" tests.

The ISO 18490 test is not regarded as a medical examination as it simply determines the detection capability of the human inspector at the time of the test, comparable to the control checks we implement in all NDT methods. Therefore it is advisable to also have a medical examination carried out to determine the health of the eye, but this need not be controlled by the NDT Level 3. The test should not be confused with detection capability under defined conditions. In this context, perhaps a good comparison is checking a UV lamp at 15 inches, which does not determine the viewing conditions at the inspection surface – but it does provide a standardized test of the equipment, which was exactly the target for ISO 18490. A real standardized test for near vision acuity.

So, in summary, ISO 18490 is a test specifically designed to test NDT personnel near vision acuity. It is easy to administer, removes the variables and provides a real standard for the industry. You don't need to take my word for it – try it yourself. ISO 18490:2015 compliant charts can be downloaded from **eminspection.co.uk**, using the purple tab, "Vision Charts". Remember though that there are other requirements in ISO 18490 including a light level between 500 and 750lux.

Andy Bakewell – E. M. Inspection Co. Ltd.

Tribal Knowledge

Every company has those individuals or groups that for whatever reason tend to do things their way. Sometimes their way is good and sometimes not. These individuals do not share their information with their fellow employees or do not have their ways of doing things documented. If someone new comes in to do the same type of work as these individuals they cannot match their production or quality levels. The new employee is soon asked why and cannot explain. This is one of many forms of tribal knowledge. There is nothing good about tribal knowledge. Those who practice tribal knowledge try to justify it in many ways. They may want to look good to their peers or boss, ensure job security or just like knowing something that no one else knows. None of which justifies the practice of tribal knowledge.

Employees that practice tribal knowledge may do things faster than others and often are the go to person to get things done. The boss praises them which may feed their ego. They may brag that they get things done when others cannot. As others come along and develop their own skills they may tend to not share their knowledge with others in hopes of someday being able to be that go to person that receives all the praise. This may become a perpetual cycle that becomes difficult to stop.

In reality, knowledge should be shared between employees, and documented. Employers should demand and encourage the documented sharing of information. Production will rise. When new employees come in it will take a shorter amount of time to get them up to speed on what they will be doing. When different employees are asked to demonstrate what they do it should be very close to what their fellow employees demonstrate. Those employees that were the holders of the tribal knowledge will be encouraged to be innovative to find better ways of doing things. They will still be able to shine but in a different and better way.

Those employees that think that they are increasing their job security by not sharing their knowledge are actually causing more harm than good. When they are asked to demonstrate how they do things faster or better than their conterparts it is soon shown that they are not following procedure. If this is demonstrated during an audit who knows what the ramifications may be.

For those who just want to know what others may not is utter nonsense. What good is knowledge if it is not shared? Share the knowledge. Revel in the fact that you taught others something that is valuable to your company. Ensure that it is placed in procedures so that it becomes common knowledge and practice. Foster growth within the organization and know that you were part of that growth.

Tribal knowledge does no good for anyone. It puts you and your company at risk. You may not necessarily be a company person but at the very least protect the company. The company you work for is your source of income so do your best to protect it. When you leave a company, leave a legacy that will be remembered. Be known as someone that shared knowledge, not one who hoarded it. In the end, the company you work for will be better and you will be a happier person.

Dave Gray – Mitchell Labs

In Step with Cath Rush

Hello, my name is Cath Rush. I began my tenure at Performance Review Institute on April 15, 2015. It has been my pleasure to support Nadcap's Non-Destructive Testing Task Group in my current position of Coordinator – Industry Managed Programs. In this role, I also support Nadcap's Aerospace Quality System Task Group, Transportation and Power Generation's Non-Destructive Testing Task Group as well as MedAccred' s Plastics and Aerospace Quality System Task Groups.

I earned my Bachelor of Arts Degree in Sociology from Upsala College in New Jersey. My professional career has been very rewarding and I have acquired extensive experience as an Office Manager focusing on small and medium sized companies across a variety of industries. Most recently I was the Office Manager / Human Resources Manager for a company in the information technology industry. Clearly this has prepared me well for the challenges of working at PRI.

Originally from New Jersey, my husband and I have lived in Western Pennsylvania for the past 26 years where we have enjoyed raising our two sons. Outside of work I am passionate about family, friends and gardening.

In Step with Dave Royce

Hi, I'm Dave Royce. After several years as the Task Group Secretary, and a few years as Vice Chair, I am now the Chairmen for the NDT Task Group. I am employed at Pratt & Whitney in East Hartford CT USA. I am part of the Quality Assurance Core Group, Non-Destructive Testing. My group oversees the NDT systems at our supply base as well as internally. I have been a member of the Task Group for 18 years. I am certified as a Level 3 in PT MT, RT (conventional and digital), and UT Thickness per the Pratt & Whitney requirements and also NAS 410 for PT and RT. In the past, I was certified as an ASNT Level 3 PT, RT and a Certified Quality Auditor (CQA) by The American Society for Quality (ASQ).

I am married and my wife and I have two beautiful grown daughters, and we are lucky enough to have three adorable grandchildren and another on the way. We live in Southeastern Connecticut USA.

I began my career in NDT in 1974 while working in nuclear submarine construction as a welder. I started with visual inspection on my welds (of course they were all acceptable!), and in 1976 transferred to the Radiography Department and continued there for a few years. I left the shipyard for nuclear power plant construction, where I continued with radiography and also certified as a Level 2 PT and MT. When the plant was completed I briefly worked for a field NDT contractor, mostly RT of natural gas pipelines. In 1986 I got my start in the Aerospace industry at a machining and manufacturing facility where I inspected electron beam, semi-auto and manual TIG welds. While there I obtained my first Aerospace Level 3 certifications. The facility relocated out of state and I stayed in Connecticut. I then worked at an investment casting foundry as the NDT Level 3 / Supervisor. It was during this time I had my first exposure to the Nadcap process. I was audited a few times over the years but will never forget the first one. The Auditor is still performing audits. It was different prior to the implementation of baseline checklist; one never knew what to expect. I believe with the current baseline, if a thorough pre-audit is performed and the Level 3 is prepared with supporting documentation, it is easier to be in compliance. I'm sure some of the suppliers will argue that point with me!

In my spare time (actually anytime) I like to golf, I'm a New York Yankees baseball and a NASCAR fan. I also enjoy spending time alone in the shade of a large tree pondering life, and reading a good romance novel. Just kidding about the last one!!

Hope to see you at a meeting,

Dave Royce

In Step with Elizabeth Strano

My name is Elizabeth Strano and I am the newest member of the Nadcap NDT Staff Engineer Team at PRI.

I am a native of Western PA. I started my career in NDT in 2007 when I entered the Air National Guard and completed the Non-Destructive Inspection Apprentice Course to include in depth training in PT, MT, ET, RT, UT and Oil Analysis. I then obtained a full-time NDI technician position, stationed at the 171st Maintenance Squadron, Pennsylvania Air National Guard, in Coraopolis, Pennsylvania.

As an NDI Craftsman, I am responsible for inspection of Aerospace weapon systems, components and support equipment for structural integrity using nondestructive inspection methods and performing fluid analysis on jet engine oil. I am the primary point of contact for Air Force Audit preparation for Assessments of Hazardous Materials handling and storage. In addition, I am also responsible for upgrade training and mentoring of new Airmen. I have completed several special inspections (emergency to safety of flight) to include; Pressure Bulkhead, Landing Gear Torsion Links, Cargo Door Lock and Rutter PCU. I have performed Active Duty in direct support of Enduring Freedom, Noble Eagle and Odyssey Dawn.

In addition to the work in the NDI lab, I am very active on the base and within the local community. I have been the President of the Airmen's Council since 2014. I spearheaded the organization of the Wing's Family day 3 years in a row. I have been the driving force for numerous fundraisers, morale events, and projects such as: council breakfasts, veteran hospital visits, benefit luncheons, morale shirt creation & sales, Children's Hospital events, the Wing Dining Out, Project Bundle Up, and more. I have been awarded the Chief's Council Excellence Award Coin and a Certificate of Appreciation from the First Sergeant Council. I have also been awarded the Air Force Achievement Medal, AF Outstanding Unit Award, Air Reserve Forces Meritorious Service Medal, National Defense Service Medal, Global War on Terrorism Service Medal, Nuclear Deterrence Operations Service Medal, AF Training Ribbon, PA Governors Unit Citation, PA Gen Thomas J. Stewart Medal with one device, 171 ARW NCO of the Year 2016, and PaANG NCO of the Year 2016.

In February of 2016, I left the Air National Guard as a full-time technician to fill the position as NDT Staff Engineer with PRI. I am currently a Traditional Guardsman with the 171st Maintenance Squadron, Pittsburgh, Pa. In that position I continue to perform my duties as an NDI Craftsman on a part-time basis. Outside of my work, I enjoy time with my daughter and my charity work.

EDUCATION

1999 Bachelor of Science in Business Management, Robert Morris University, Coraopolis, Pa.

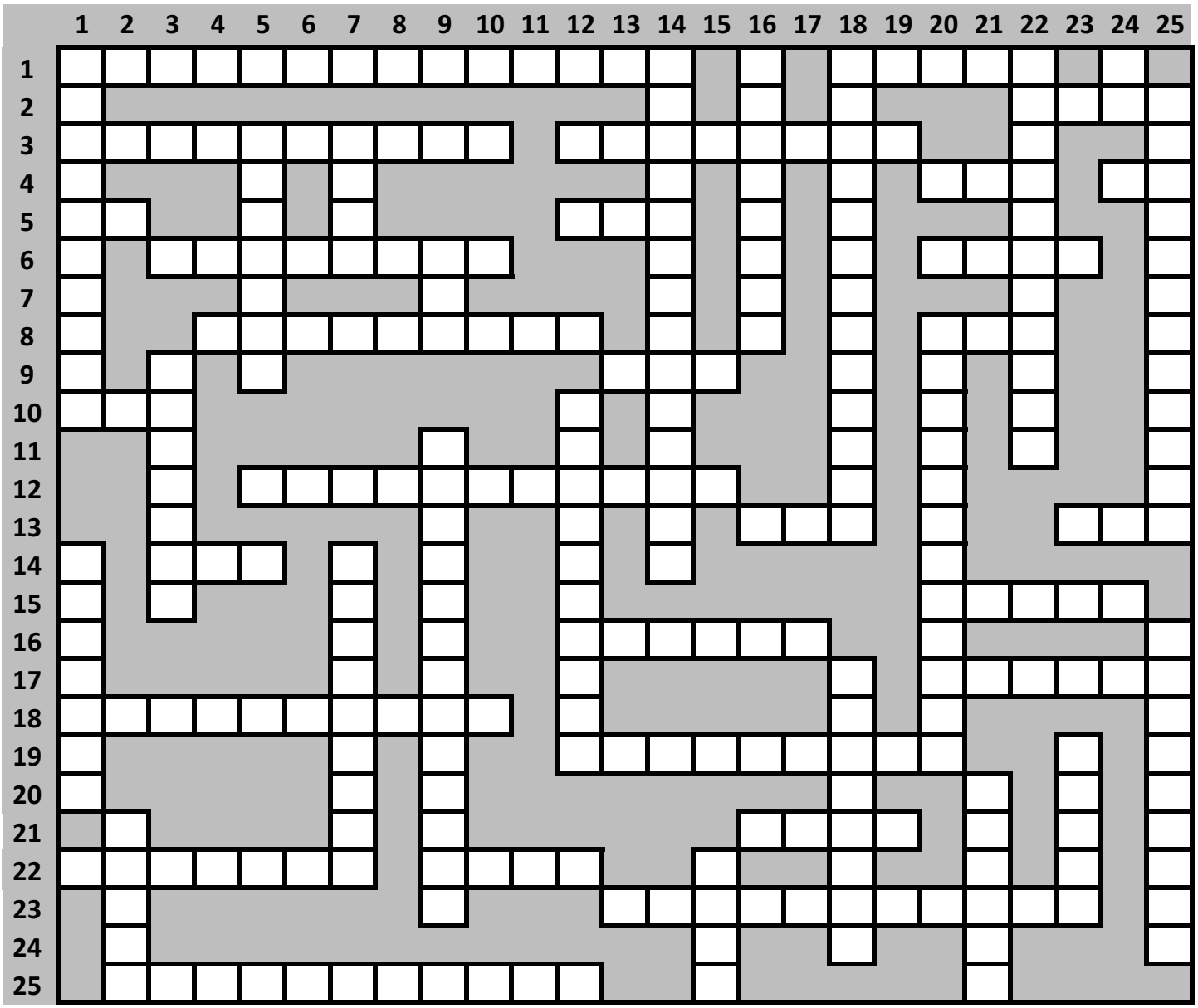
2006 Masters of Training and Education in Business and Computer Technology, Robert Morris University, Coraopolis, Pa.

2006 Teaching Certificate in Business Education, Robert Morris University, Coraopolis, Pa.

2007 Teaching Certificate in Family and Consumer Science, Robert Morris University, Coraopolis, Pa. 2008 Completed Basic Military Training, Lackland Air Force Base, San Antonio, Texas.

2009 Non-Destructive Inspection Apprentice Course, Pensacola Naval Air Station, Pensacola, Fla. 2011 Airmen Leadership School

Crossword



ACROSS

1 a) The process of dispersing one liquid in a second immiscible liquid.

b) ‘’ _____” time is the period of time wherein the liquid penetrant remains on the surface of the part.

2 a) American Society for Testing and Materials.

3 a) The process of one material (liquid, solid or gas) merging with a second material by penetration into the particles of the second material.

b) The difference in visibility between an indication and the surrounding surface.

4 a) Liquid Penetrant Inspection.

b) Foot Candle

5 a) Ultraviolet.

b) The chemical component added to a penetrant vehicule to provide a caracteristic color to the penetrant.

6 a) The action of the developer in soaking up the penetrant from the surface of the discontinuity, so as to cause maximum bleed out of the dye penetrant for increased contrast and sensitivity.

b) A hole or void in the wall of an enclosure, capable of passing liquid or gas from one side to the other under action of a pressure or concentration difference existing across the wall.

8 a) A liquid of high surface tension and high capilarity action which is a vehicule for a colored or a fluorescent dye, used to penetrate into the defect and detect surface discontinuities.

b) Fluorescent Penetrant Inspection.

9 a) A unit of illumination, equivalent to 0.0929 foot-candle and equal to the illumination produced by luminous flux of one lumen falling perpendicularly on a surface of one meter square.

10 a) Non Destructive Testing.

12 a) Having a affinity for, attracting, adsorbing, or absorbing water. A substance soluble in water.

13 a) Free from moisture or liquid; not moist, not wet.

b) The chemical component added to a penetrant vehicule to provide a characteristic color to the penetrant.

14 a) Non Destructive Evaluation.

15 a) A discontinuity that has a relatively large cross-section in one direction and a small or negligible crosssection when viewed in a direction perpendicular to the first.

16 a) National Aerospace and Defense Contractors Accreditation Program

17 a) The outlet end of a gooseneck, or the fitting that joins the gooseneck to the sprue hole of the die.

18 a) The surface of the test part upon which the indication is viewed. It may be the natural surface of the test part, or it may be the developer coating on the surface.

19 a) Defect that form within the casting. Isolated pool of liquid form inside solidified metal, which is called hot spot. The '' _____" defect usually form at the top of the hot spot.

21 a) The term used to describe the ability of a penetrant vehicule to maintain an adequate suspension of visible or fluorescent dye material.

22 a) The standard of something as measured against other things of a similar kind; the degree of excellence of something.

b) Themally insulated chamber used for the heating or drying.

23 a) The standardization of the instrument, prior to test, to a known reference value.

25 a) The degree or intensity of heat present in a substance or object, especially as expressed according to a comparative scale and shown by a thermometer or perceived by touch.

DOWN

1 a) The process of deciding as to the severity of the condition after the indication has been interpreted.

b) Capable of being discerned by the eye.

2 a) Essential management tool used for verifying objective evidence of processes, to assess how successfully processes have been implemented, for judging the effectiveness of achieving any defined target levels, to provide evidence concerning reduction and elimination of problem areas.

3 a) Subjecting the surface of a metal to preferential chemical or electrolytic attack in order to reveal structural details.

5 a) Solvent-type liquid used to clean penetrants from the surface of a material.

7 a) A procedure intended to establish the quality, performance, or reliability of something.

b) A measurement of a liquids resistance to change of shape or flow. Also referred to as flow resistance.

9 a) Non Conformance Report.
b) Any material in the wet suspension other than the liquid vehicule being used. This could be shop dust, lint, soil from improperly cleaned parts, oil, etc.

12 a) The luminance of a body, apart from its hue or saturation, that an observer uses to determine the comparative luminance of another body. Pure white has the maximum '' _____" , and pure black the minimum" _____".

14 a) A wide group of analysis techniques used in sience and technology industry to evaluate the properties of a material, component or system without causing damage.

15 a) An imperfection in an item or material that may or may not be harmful.

16 a) Random pits or holes in the object.

18 a) An interruption in the normal physical structure or configuration of a part such as cracks, laps, seams, inclusions, porosity.

b) A concept that has been established by authority, custom, or agreement to serve as a model or rule in the measurement of quantity or the establishment of a practice or procedure.

20 a) The property of absorbing light of short wavelength and emitting light of longer wavelength.

21 a) Refer to the entire series of materials supplied by one manufacturer, necessary to perform a specific type or process of inspection.

22 a) Discontinuities in plate, sheet or strip caused by pipe, inclusions, or blowholes in the original ingot; after rolling or forging they are usually flat and parallel to the outside surface.

23 a) Free from dirt, marks, or stains.

24 a) Penetrant Testing.

25 a) A crack of microscopic proportions.

b) Material, wet or dry, which will draw or absorb penetrant from a surface crack or defect to the extent the defect will be visible under natural, artificial or black light, as applicable. '' _____" also control the background of the high contrast penetrant color system.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