eQuaLearn® Newsletter

WELCOME TO THE EQUALEARN NEWSLETTER.
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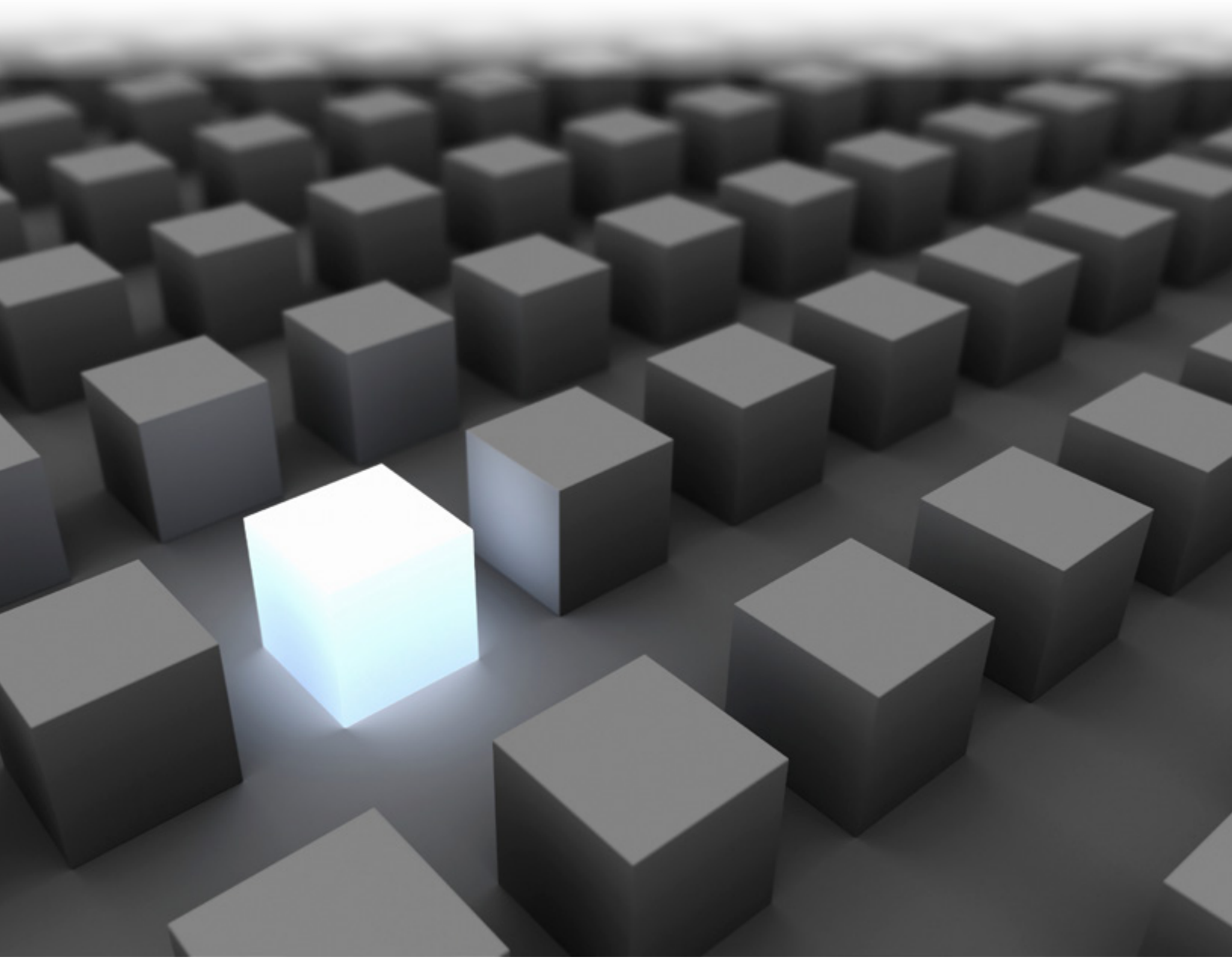


September 2018

Contents

What do you want to read about?

The intent of the eQuaLean newsletter is to provide timely, valuable and interesting content to support the Nadcap community to continually improve their operations. If there is a specific topic you would like to read about, please tell us via email to eQuaLearn@p-r-i.org.

Composites (Part 2)
From Mud Straw Huts to Resin Fiber Aircraft

IN THE JUNE 2018 NEWSLETTER, WE DISCUSSED "HANDS ON" JOB AUDITS 13 – 24 FOR NADCAP COMPOSITE AUDITS. AS PROMISED, WE WILL NOW DELVE INTO THE AC7118 SUPPORT PARAGRAPHS 2-12.

Oddly enough, these paragraphs seem to generate more NCRs than the parent job audits we reviewed in the last issue.

Paragraph 2 contains a few important details of which an Auditee needs be keenly aware. When Revision E was released, Nadcap had made a universal requirement that all Auditees must submit a self-audit performed to the commodity checklist and scope of their upcoming audit. The self-audit shall be submitted to the assigned Auditor 30 days prior to the actual audit start date. If this self-audit is not received within the allotted time, a minor finding will be issued. This is not the best way to start an audit. Please read paragraph 2.2 for details.

Paragraph 4 has two sub paragraphs that will cause grief if not closely followed:

- Paragraph 4.3 is related to Software Quality Assurance. In this instance, it is best to turn to the handbook, AH7118. There are specific requirements for the development of Numerical Control (NC) software for performance and acceptance of manufacturing functions. I strongly suggest that an Auditee's IT group becomes involved in this part of the audit, as there are specific questions that will create a discussion that is best supported by the source of your documentation.

- Paragraph 4.7 – OSV – Operator Self-Verification. This is a policy that allows specially trained manufacturing individuals to take on certain Quality Assurance functions. This process has very specific requirements including a documented procedure that defines its operation and that Quality Assurance is in total control of all parameters of the plan. Again, turn to the AH7118 handbook for details and take care in implementing the plan. This is one of those areas that has created numerous NCRs over the last couple of years.

Paragraph 5 defines material shelf life and out time control, as well as storage requirements. Maintaining accurate shelf life and out time records is critical and will be closely audited. How this record keeping is maintained and controlled is completely in your hands, but it must work and be understood by the Auditor. Do not underestimate

the critical nature of how prepregs and adhesives are stored. They must be sealed, suspended by the center core, cannot be stored vertically, cannot rest on its material surface at any time, must be thawed in a sealed condition, etc. Your Auditor considers this a basic "Composites 101" operation. Any lapse will trigger an Non Conformance Response, even in a temporary condition.

I strongly suggest that an Auditee's IT group becomes involved in this part of the audit, as there are specific questions that will create a discussion that is best supported by the source of your documentation.

Paragraph 6 describes facility requirements related to Controlled Contamination Area (CCA) and Environmentally Monitored Area (EMA). This paragraph also defines freezer requirements including temperature monitoring, temperature spikes and excursions, thermocouples locations, etc. Your customer may have additional requirements including periodic thermal surveys. In addition, your Auditor will spend time in the freezer reviewing material storage and traceability, general freezer condition and cleanliness. He or she may also request a trace of past temperature records. CCA and EMA requirements are well defined in this paragraph and should be closely followed. Remember, if your customer documentation does not address a requirement, AC7118 takes precedence.

Paragraph 7 simply repeats the requirements of job audit 13. One area that often triggers an NCR is how the release agent is applied. Each customer has their own method of application and the Auditor will watch closely.

Paragraph 8 addresses fabrication. If not followed, many of these questions are an NCR gold mine. I will briefly touch on the heavy hitters:
- Paragraph 8.1.6 – Heat guns. A procedure must be in place and followed for the use of heat guns, as well as, the fact that heat gun temperature output must be tested for accuracy. The Auditor will review all conditions closely.

- Paragraph 8.1.8 – Cutting tools. This paragraph relates to the protection of sub-plies when trimming during layup. This one action is so critical that I have witnessed audit failure based on this finding alone. When cutting ply over ply, protection must be provided to protect the ply beneath. Place a clean shim stock between the plies or use scissors, if clearance permits.

- Paragraph 8.1.9 – Hand sweeps. The use of PTFE is not allowed in contact of prepreg or adhesives, follow customer guidance for alternatives. The Auditor will verify.

- Paragraph 8.2.2 – Traceability. All materials must be traceable back to the source. The Auditor will pay close attention to this requirement.

- Paragraph 8.6.7 – Mix ratios. The verification of mix ratios for two-part resins, adhesives, potting compounds, etc. must be performed by those methods as defined in this paragraph. Note: This applies to all mixing whether in miscellaneous bonding, core potting, LRP or any other operation that requires component mixing.

- Paragraph 8.7.1 – Cure verification. This must meet customer requirements for all parameters and cure cycle verification can only be performed by Quality Assurance. OSV is not accepted for cure cycle verification.

- Paragraph 8.8 – Core Processing. This is an overview. Without going into particulars regarding the processes, the one area that draws NCRs is the storage and transportation of core blanks and details as they travel from operation to another. There are specific methods of protection that must be followed. These requirements are well described in the handbook, paragraphs 8, 5, 11, 12 and 15.

Paragraph 9 has many questions repeated from job audit 22. Pay attention to Numerical Control program traceability and conformity as related to paragraph 4.3. Also take care in drilling composite laminates, the Auditor will be sensitive to ply breakout.

Paragraph 10 is the support paragraph to job audit 24 (Material Testing). The keys to this paragraph are:
- The traceability of all test specimens to the material or part they represent must be maintained.
- Work instructions must be prepared for each test performed and they must reference the standard called out by customer specification.
Paragraph 11 is called out as "Job Audit Common Requirements" and that is exactly what it is – sort of "all the things we forgot or want to make a point of".

- Paragraph 11.2 repeats the questions related to material storage and out time. As an audit reviewer, I find that neglect and lack of attention to material storage requirements create NCR after NCR.

- Paragraph 11.3.2 – 11.3.4 – "Say what you do, do what you say." Work instructions must be sufficiently detailed allowing a knowledgeable Operator the ability to easily follow them and complete the task. Work instructions must be available to the Operator so that the Operator can follow them. The Auditor will watch the fabrication process with a work instruction in hand. If the Operator performs a task not defined or if he or she skips a defined task, an NCR will be initiated. Please note that if an Operator makes a mistake, it is not a finding if the error is caught by QA and handled through the Supplier's non-conformance system. In fact, an instance like this will usually give an Auditor higher level of confidence in your quality system.

- Paragraph 11.4 – FOD – Foreign Object Damage, the D should stand for Disaster. FOD at any stage of production from fabrication to preflight can create a catastrophic situation. In the composites world, a Supplier must have a FOD procedure/ program and evidence of operator training. The Auditor will look and touch all areas of concern to see how well the training has worked and may ask some embarrassing questions if he or she senses a lack of FOD awareness.

Paragraph 12 covers Receiving (Goods In). The questions are typical of any receiving audit, however one area that seems to regularly draw NCRs is matching the purchased Material Specification revision called in the purchase order to the revision of the received material certification. When auditing to paragraph 12, the Auditor will normally choose material from an in-process job and request the purchase order, material specification, supplier certification, receiving inspector work sheet, internal test results (if required), shipping temperature records and any other relevant data he or she may consider important. The problem arises when the purchase order does not call out a revision or calls out a revision that does not match the material certification. This happens far more often than I would expect and when it does an NCR is generated. I would suggest a close review of receiving records before your audit.

Before we conclude, I would like to touch on a few questions and situations that invariably arise at one time or another during an audit.
- "Where do these checklist questions come from?" All the questions in the checklist have been created by the Task Group.

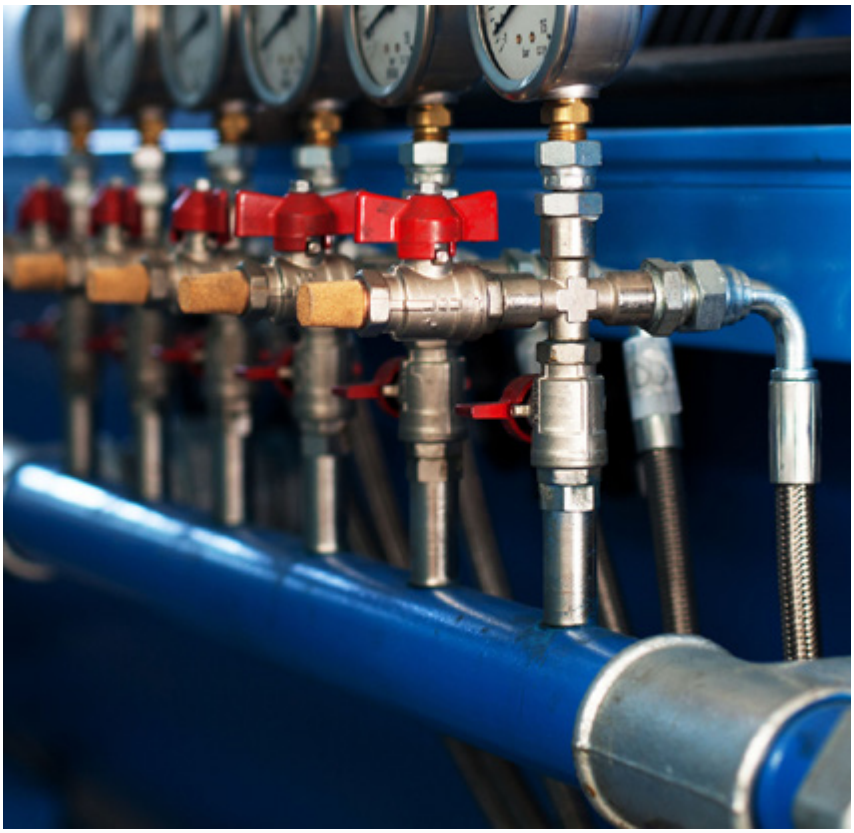
For some reason, Auditees tend to think that these questions are put together by Auditors or just pulled out of the air. All checklist questions come from your customers and it should be noted, that if your customer specification is silent to a requirement, the checklist takes precedence.
- When preparing for an audit, remember that unless there is specific documentation that states that a Task Group member's work is exempt from Nadcap requirements, all work from any Task Group member is available to the Auditor whether mandated or not.
- When an NCR is reviewed by the Task Group, your customer may have no comment and may accept your response, but another Task Group member, unrelated to the work described in the NCR, can still reject your response and request clarification.
- Non-sustaining NCRs – If the corrective action you submitted on your previous audit is accepted by the Task Group, make sure that the corrective action has been implemented and is still functioning during the present audit. If this corrective action is not in place and operational, it will create two Major NCRs. One for the repeat of a previous finding and one for a poorly functioning Quality System (Paragraph 3.2). You do not want this to happen.
Well, I have enjoyed this meander through the checklist and rummaging through past audits. If I were to leave a suggestion or two, it would be to lean heavily on the AH7118 handbook. It can be found in eAuditNet.com under Resources – Documents –

Public Documents – Task Groups- Composites – Handbooks & Guides. Remember, Auditors generally have the same goal as you.

A complete review of Nadcap Composite requirements are covered in the eQuaLearn Nadcap Audit Preparation- Composites course. The last remaining 2018 training will be held in Torrance, CA on 8-9 October 2018. Please visit our website www.eQuaLearn.com or email eQuaLearn@p-r-i.org for a complete list of all remaining eQuaLearn course dates and locations.

Written by Dave Kennedy, eQuaLearn Instructor

Disclaimer: The views and opinions expressed in this article are those of the author and do not necessarily reflect the position or views of the Performance Review Institute or any of its employees or programs.



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Process Failure Mode and Effects Analysis (PFMEA) for Aerospace

New and Revised for 2018

FAILURE MODE AND EFFECTS ANALYSIS (FMEA) HAS BEEN A FOUNDATION OF ADVANCED PROCESS QUALITY PLANNING (APQP) FOR MANY YEARS. IT HAS BEEN USED, WITH GREAT SUCCESS, IN A WIDE RANGE OF APPLICATIONS – FROM PRODUCT ASSEMBLY TO HEALTH AND SAFETY.

One result of its success, is that many different variations exist, none of which have been aimed at the particular problems of the aerospace industry.

Until now: we have developed Aerospace dedicated formats for both Design and Process FMEA.

Over the past few years the International Aerospace Quality Group (IAQG) – the body responsible for the 9100 series of Aerospace standards – has developed and maintained a Supply Chain Manual giving guidance and instruction to anyone in the Aerospace supply chain. The process development and management sections of the manual were updated in 2017 to include detailed APQP structures and formats, including FMEA.

Process FMEA training has been offered by eQuaLearn since 2010. Aerospace examples were used, but the format and analysis were not specifically targeted at Aerospace users. It was based on the most commonly used format – the one used as part of APQP in the automotive industry – because nothing else existed. Now that an Aerospace structure exists, the revised eQuaLearn course presents the new format and to place FMEA in context as part of Risk Management in Aerospace.

The approach is unchanged for current users of FMEA. It starts with 'Identify the process'. Then identify 'what can go wrong' at each step – these are the failure modes. For each mode, try to imagine 'what will happen as a result' – these are the failure effects. These can be rated from 'someone will die' down to 'no-one will notice'. We then assess how likely each failure is to happen.

This is called occurrence and can be rated from 'almost never' to 'all the time'. Then consider the current inspection or detection systems that are in place. How good are they at spotting the problem? This can be ranked from '100% guaranteed to be found' to 'only detected by sheer luck'.

Combining the rankings gives a good measure of comparative risk. FMEA then allows for actions on the high-risk items, which should result in reduced comparative risks until all protentional problems are reduced to an acceptable level.

What is new is that PFMEA is now identified as being primarily a planning tool – essential as a part of process planning. The practice may well be to play 'catch up' for existing parts, but the role is still within advanced planning. Thus, PFMEA should start before the product design is

finalized and should be completed before the process is finalized.

The inputs to FMEA are unchanged – essentially product design, process routings, process history and experience on related parts and methods. This still requires a cross functional involvement to ensure that all the inputs are considered.

The outputs are reinforced. PFMEA will generate information about parameters that need control or special treatment. These can become Key Characteristics. Also, the PFMEA effectively drives the suggested Process Control Plan – an essential part of a Process Approval submission.

While important, these changes are simply highlighting what was already good or best practice. The biggest difference in the Aerospace version of PFMEA comes in the methods of ranking that are then combined to give the Risk Priority Number.

PFMEA in automotive, and many other industries, is predicated on high volume/low variant production of parts that are then used in various forms of personal transport. Aerospace usage is essentially the opposite to this. Manufacture is usually of low volume/high variant parts going into mass transport applications.

Therefore, the assessment of severity, the measurement of occurrence and the ease of detection by 'users' should, and will, all be different. It is here that the Aerospace version deviates from other versions of PFMEA. The course now uses the ranking systems recommended by IAQG in the Supply Chain Handbook – Aerospace versions of the tables for Severity, Occurrence and Detection.

The PFMEA format that is presented also has a customized appearance for Aerospace, reflecting the slightly different information required for Aerospace development projects. This newly revised course presents the background to FMEA, places PFMEA in context within APQP and highlights how it contributes to Risk Management. The steps of PFMEA are presented and discussed with examples and exercises to highlight important points. PFMEA is best learned by doing, so the exercises build through all the steps of a PFMEa – right through to actions and improvements.

eQuaLearn's PFMEA should be of benefit to anyone thinking of doing FMEA for the first time, from any discipline, as well as those who have experience of FMEA in other industries outside aerospace. Contact a member of the eQuaLearn team to know more about future PFMEA course dates in your area or organise an onsite training session and visit the PFMEA course page on our website to learn more about the course.

Written by Martin Bridge, eQuaLearn Instructor

Disclaimer: The views and opinions expressed in this article are those of the author and do not necessarily reflect the position or views of the Performance Review Institute or any of its employees or programs.

Free Training at the October 2018 Nadcap Meeting in Pittsburgh

eQuaLearn will once again offer complimentary courses at the next Nadcap Meeting, which takes place in Pittsburgh, PA, USA , on 22 - 25 October 2018. This complimentary training is based on a first come, first served basis. There are currently no spaces available but if you see a course that interests you, you can join the wait list to be notified when a space becomes free.

Free Training Schedule in Pittsburgh

Join the Wait List

Course Title	Course Summary	When
Root Cause Corrective Action Nadcap Style	Designed to provide a clear understanding of the basic concepts of (RCCA) and application of how to apply those concepts to eliminate errors and defects. This training also provides a basic understanding of the requirements needed to respond to a Nadcap audit non-conformance (NCR).	22 October (1:00pm-4:00pm)
Nadcap Audit Preparation	Designed to provide a complete overview of Nadcap requirements related to the audit.	22 October (1:00pm-4:00pm) 25 October (10:00am-1:00pm)
Contract Review	Developed to show Contract Review as a multi-disciplinary process which should ensure that all potential problems are identified and addressed before any commitment to supply is made. This course describes what must be done. The requirements are explained and illustrated by discussions around common problems and weaknesses.	23 October (8:00am-11:00am)
Nadcap Checklist Review: Heat Treating	This course is designed to provide a complete overview of Nadcap requirements related to the Heat Treating audit. Course content includes the scope of the Heat Treating audit, an explanation and clarification of the AC7102 checklist series requirements and top audit findings related to Heat Treating. Note: Participants will receive a certificate of completion.	23 October (8:00am-5:00pm)
NDT AC7114/1 Penetrant & NDT AC7114/2 Magnetic Particle	eQuaLearn has developed a new NDT webinar course. This course will be delivered classroom style and will address the both Nadcap NDT AC7114/1 Penetrant Survey and AC7114/2 Magnetic Particle Survey Checklists.	23 October (1:00pm-4:00pm)
Basic Heat Treating	A tool kit to help identify in-process changes, which might be detrimental to end product, and take appropriate corrective action to reduce the risk of nonconformity.	24 October (8:00am-11:00am)
AS9100 Changes in Rev D	Provides a review of AS/EN/JISQ 9100 and illustrates how compliance leads to continual improvement. Note: Participants will receive a certificate of completion.	24 October (8:00am-5:00pm)
Internal Audit Systems Overview	Designed to assist in the process of building an internal audit system and how to structure its key elements for success while also explaining the vital relationship between Quality and Management.	24 October (1:00pm-4:00pm)

Make the Most of Your Training

Training Offer for 2018

With 2018 coming to a close in a short few months, why not take some training courses before the end of the year? eQuaLearn is offering a range of courses until December of 2018, so register now! The end of the year is a great time of catch up of training, some eQuaLearn's upcoming courses in October through December include Chemical Processing: Electroplating (in Pittsburgh, Pa, Torrance, CA and Manchester, UK), Chemical Processing: The Science of Anodizing (in Hartford, CT) and many Nadcap Audit Preparation courses, such as Measurement & Inspection (in Torrance, CA), Metallic Material Testing (in Sheffield, UK), Composites (in Torrance, CA), and Chemical Processing (in Hartford, CT). For more information on the eQuaLearn schedules, please contact a member of the eQuaLearn team or click on the following links for your convenience: Americas, Europe or Asia schedules.

New Language Courses

eQuaLearn has released a new combination courses in French, Spanish and German. The Nadcap Audit Preparation & Root Cause Corrective Action course was released in Toulouse, France in April. The Contract Review & Root Cause Corrective Action course will be conducted in Spanish in Toledo, Spain on 3 Oct 18 and a Nadcap Audit Preparation & Contract Review course will be held in German in Frankfurt, Germany on 28 Nov 2018, both of which are now open for registration. These courses combine two of our shorter courses to match as best as possible training requirements. Visit the eQuaLearn schedule for Europe on our website to know more or contact a member of the Europe team if you have any questions!

Onsite Training

Remember that you can request any courses from the eQuaLearn catalog to be delivered at your facility as a private session! Onsite training allows you the opportunity to schedule courses at your company's convenience and is a great way to train several employees at the same time while saving on travel and accommodation. eQuaLearn onsite options allow you to customize the training material with the instructor beforehand to match your training requirements as much as possible. We can organize training sessions face to face, but also via webinar (online training) for some of our training. Contact a member of the eQuaLearn team to know more!

Training Schedule October - December 2018

AMERICAS

Course Title	Location	Dates
Heat Treating: Owner	Hartford, CT	1-2 October 2018
Introduction to Pyrometry	Hartford, CT	3-4 October 2018
Introduction to Pyrometry	Phoenix, AZ	2-3 October 2018
Nadcap Audit Preparation: Heat Treating	Phoenix, AZ	4-5 October 2018
Chemical Processing: Electroplating	Pittsburgh, PA	3-4 October 2018
Nadcap Audit Preparation: Composites	Torrance, CA	8-9 October 2018
Nadcap Audit Preparation: NDT	Hartford, CT	8-10 October 2018
Introduction to Pyrometry	Wichita, KS	10-11 October 2018
Introduction to Pyrometry	Troy, MI	7-8 November 2018
Introduction to Pyrometry	Torrance, CA	12-13 November 2018
Nadcap Audit Preparation: Heat Treating	Torrance, CA	14-15 November 2018
Root Cause Corrective Action	Torrance, CA	16 November 2018
Introduction to Pyrometry	Syracuse, NY	14-15 November 2018
Nadcap Audit Preparation: Chemical Processing	Hartford, CT	4-5 December 2018
Chemical Processing: Anodize Science & Engineering	Hartford, CT	6-7 December 2018
Nadcap Audit Preparation: Chemical Processing	Torrance, CA	11-12 December 2018
Chemical Processing: Electroplating	Torrance, CA	13-14 December 2018
Nadcap Audit Preparation: Measurement & Inspection	Torrance, CA	13-14 December 2018

EUROPE

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Introduction to Pyrometry *	Toledo, Spain	1-2 October 2018
Contract Review/Root Cause Corrective Action *	Toledo, Spain	3 October 2018
Nadcap Audit Preparation: Chemical Processing *	Toledo, Spain	4-5 October 2018
Introduction to Pyrometry	Sheffield, UK	1-2 October 2018
Heat Treating: Owner	Sheffield, UK	3-4 October 2018
Nadcap Audit Preparation: NDT	Sheffield, UK	8-10 October 2018
NDT Level III	Sheffield, UK	11 October 2018
Nadcap Audit Preparation: Metallic Materials Testing Labs	Sheffield, UK	15-16 October 2018
Nadcap Audit Preparation: NDT	Prague, Czech Rep	15-17 October 2018
Nadcap Audit Preparation: Chemical Processing	Prague, Czech Rep	11-12 October 2018
Nadcap Audit Preparation: Heat Treating	Manchester, UK	5-6 November 2018
Introduction to Pyrometry	Manchester, UK	7-8 November 2018
Pyrometry Essentials	Manchester, UK	9 November 2018
Nadcap Audit Preparation: Chemical Processing	Manchester, UK	12-13 November 2018
Chemical Processing: Electroplating	Manchester, UK	14-15 November 2018
Root Cause Corrective Action	Manchester, UK	16 November 2018

EUROPE CONTINUED

Nadcap Audit Preparation: Heat Treating	Migdal-Tefen, Israel	12-13 November 2018
Introduction to Pyrometry	Migdal-Tefen, Israel	14-15 November 20218
Nadcap Audit Preparation: Heat Treating *	Milan, Italy	20-21 November 2018
Introduction to Pyrometry *	Milan, Italy	22-23 November 2018
Root Cause Corrective Action *	Milan, Italy	26 November 2018
Nadcap Audit Preparation: NDT *	Milan, Italy	27-29 November 2018
Nadcap Audit Preparation: Chemical Processing *	Toulouse, France	19-20 November 2018
Nadcap Audit Preparation: Welding *	Toulouse, France	21-23 November 2018
Nadcap Audit Preparation: Heat Treating *	Toulouse, France	26-27 November 2018
Introduction to Pyrometry *	Toulouse, France	28-29 November 2018
Root Cause Corrective Action *	Toulouse, France	30 November 2018
Introduction to Pyrometry *	Frankfurt, Germany	26-27 November 2018
Nadcap Audit Preparation & Contract Review *	Frankfurt, Germany	28 November 2018
Introduction to Pyrometry	Bristol, UK	10-11 December 2018

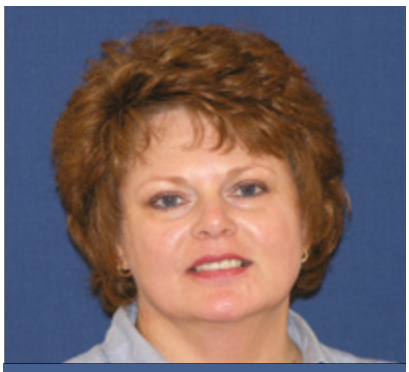
* Courses are delivered in local language

2019 Public Course Schedule Release

Registrations for our 2019 public courses will be available on 5 October 2018 when eQuaLearn releases the yearly schedule on our website. Request a reminder on our release day so you can secure your training early for 2019!

Our Team

If you are registered to attend the Nadcap meeting in Pittsburgh, PA, USA in October 2018, please visit the eQuaLearn Helpdesk to discuss public, hosting or onsite training opportunities with the team.



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