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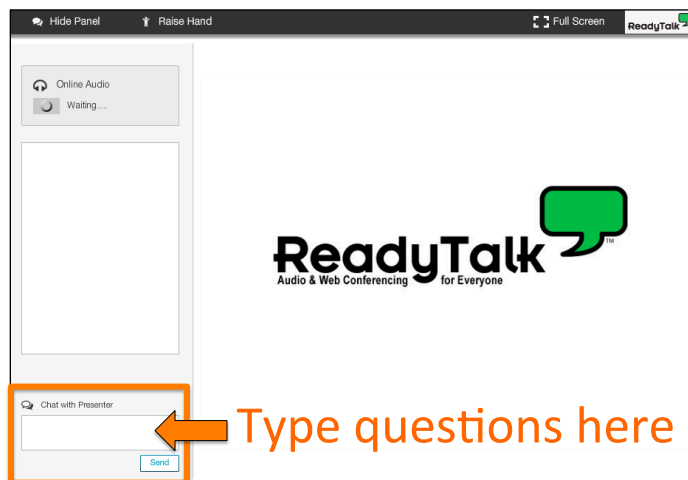
## Implementing the EASA Accreditation Program

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### Questions

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Questions will be answered as time allows.



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## Introduction

- This session will address:
  - Equipment and calibration
    - What is and is not required
  - Internal and external auditing
    - How to plan and what to expect
  - Frequently asked questions received in the first year
  - The most common nonconformities and how to prevent them



## Equipment and calibration

- What is and is not required?
- Short answer for equipment:
  - Equipment requiring calibration is listed in Annex A of the EASA Accreditation Checklist
    - Equipment list is also posted in Accreditation section of the EASA website at [www.easa.com/accreditation/equipment](http://www.easa.com/accreditation/equipment)
    - Complete Checklist and Checklist with Explanations are available at: [www.easa.com/accreditation/audit\\_checklist](http://www.easa.com/accreditation/audit_checklist)



## Equipment and calibration

- Short answers for calibration requirements:
  - All equipment listed must be on site and functional
  - All instruments must be calibrated at least annually to applicable national standards
    - Exception: Gauge blocks 3 years
  - Calibration records must be retained
    - For 3 years or until next external audit
      - Following initial accreditation



## Electrical equipment

Milli-ohmmeter
Ohmmeter
Voltmeter (AC)
Ammeter (AC)
Wattmeter (AC )
Megohmmeter
High potential tester
Surge tester*
Core tester**
Loop test**
Growler (functional; ammeter calibrated)
Test panel (to motor rated voltage; individual instruments calibrated)

- \* Only applies if service center has surge tester
- \*\* Must have either one or both of these items



## Mechanical and physical equipment

Inside micrometers	Temperature meters
Outside micrometers	Burnout oven part temperature control
Dial indicators (verification by service center)	Burnout oven water mist (verification by service center)
Digital tachometer (verification by service center)	Burnout oven analog or digital recorder
Terminal crimpers (verification by service center)	Bake oven temperature control
Vibration measurement	Winding machine with turns counter (verification by service center)
Balancing machine***	VPI system vacuum gauge*****
Gauge blocks (if applicable)****	VPI system pressure gauge*****

\*\*\* Outsourcing permissible

\*\*\*\* Periodic verification by gauge block manufacturer or other qualified external source

\*\*\*\*\* Only applies if service center has VPI system (VPI process outsourcing permissible)



## Reference instruments

- Label “for reference only” if not calibrated
- Instruments not within scope of Accreditation Program
  - Example: DC test panel meters
    - Good practice would be to calibrate all panel meters
- Instruments within scope but not calibrated
  - Example: Inside micrometers
    - Often used as gauges to measure bore dimensions
    - Calibrated outside micrometers measure inside micrometer dimension



## Electrical equipment

- Expansion on Checklist explanations
  - Milli-ohmmeter versus ohmmeter
  - Wattmeter
  - Winding integrity testing



## Electrical equipment – milli-ohmmeter

- A more precise resistance measuring device than an ohmmeter
  - Example:
    - Display on a digital ohmmeter typically has a minimum value of 0.1 - 0.2 ohms with meter leads shorted
    - Not accurate for resistance of ~5 ohms or less
    - Potential error of 0.1 to 0.2 ohms in a 5.0 ohm reading
      - Variance of 2 to 4%
      - Winding resistance should be equal within 1 to 2%
      - Variation greater than tolerance is not acceptable



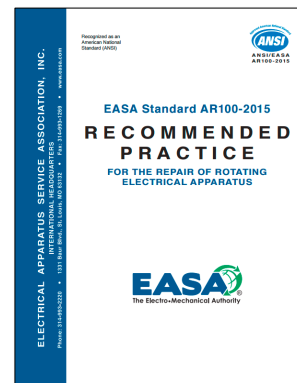
## Wattmeter

- Applicable to two required tests
  - Core loss test
    - Commercial core tester
      - Wattmeter built in
    - Loop test method.
      - Standalone wattmeter
  - Test space heater accessory
    - Standalone wattmeter
    - Alternative test with ammeter and voltmeter
- Standalone wattmeter not required if:
  - Core tester calibrated with built-in wattmeter, and
  - Space heaters tested with calibrated ammeter and voltmeter



## Winding integrity testing

- Three methods at present
  - Surge comparison
  - Winding resistance
  - Winding phase balance (open stator test)
- Any of the above can be used
  - Surge tester not required
    - If second or third methods used
    - If available it must be calibrated
- AR100 2015 revision
  - Will require surge test and resistance test
    - *For audits approved after August 2016*



## **Mechanical equipment**

- Expansion on Checklist explanations
  - Micrometer calibration
    - In-house
      - Need formal program
        - » Identify requirements
        - » Select standards
        - » Controlled environment
        - » Calibration frequency
        - » Documentation and reporting system
        - » Evaluation of calibration program through audits
      - Calibration checks are not calibration
    - External calibration
      - Consider laboratories accredited to ISO/IEC 17025



## **Physical equipment**

- Expansion on Checklist explanations
  - Burnout oven
    - Part temperature control
    - Processing multiple parts
  - Bake oven
    - Temperature control



## **Internal and external auditing**

- What is and is not required?
- Internal audits
  - Beta audits
- External audits



## **Internal audits**

- Select audit team
- Audit at least annually
- Audit complete Checklist
- Report findings
- Follow-up on findings
- Send copy of report and follow-up to external auditor





## Beta audits

- Not a program requirement
  - Highly recommended
- “Mock” accreditation audit
  - Objectivity
  - Follow-up on findings
- Evaluate readiness for external accreditation audit
  - Reports of external audits through March 2015:
    - *Almost all findings could have been identified and corrected as a result of a beta audit*



## External audits

- Purpose:
  - Provide proof of conformance
- Duration:
  - Accreditation one day
  - Subsequent external one day
    - Longer if many follow-ups to findings
      - Original accreditation
      - Internal years 1 and 2
- Preparation
  - Housekeeping
  - Have needed documents available
  - Action plan for findings



## Audit record

**Company Information**  
 Service Center Name \_\_\_\_\_  
 Street Address \_\_\_\_\_  
 City, State/Province, Zip/Postal Code/Country \_\_\_\_\_  
 Phone \_\_\_\_\_ Email \_\_\_\_\_

**Company contact for the EASA Accreditation Program**  
 First Name \_\_\_\_\_ Initial \_\_\_\_\_ Last Name \_\_\_\_\_ Title \_\_\_\_\_  
 Email \_\_\_\_\_ Phone \_\_\_\_\_  
 Signature\* \_\_\_\_\_ Date \_\_\_\_\_

**Accreditation Audit Approval by EASA-Sanctioned Third-Party Auditor**  
 (Check one)  
 Initial accreditation audit       Re-accreditation audit  
 Internal self-audit – year 1       Internal self-audit – year 2

Auditor Company Name \_\_\_\_\_  
 Third-Party (On-site) Audit Date \_\_\_\_\_ Approval (Anniversary) Date \_\_\_\_\_  
 Internal Self-Audit Submission Date \_\_\_\_\_ Approval Date \_\_\_\_\_  
 Auditor's Name (print) \_\_\_\_\_ Signature\* \_\_\_\_\_

\* The auditor hereby certifies that he/she has completed a third-party (on-site) audit of the above-named service center or reviewed its internal self-audit, and that the service center meets all requirements of the EASA Accreditation Checklist in effect as of the stated approval (anniversary) date. By signing this Audit Record, the service center understands and agrees that for its accreditation to remain in effect it must submit internal self-audits that must be approved by an EASA-sanctioned third-party auditor and received by EASA by the accreditation (anniversary) date in years one and two, and that its accreditation will lapse if the approved internal self-audit is not received by EASA within 60 days of the accreditation (anniversary) date. The service center also understands and agrees that another third-party (on-site) audit and payment of the EASA renewal fee are required after three years.



## Frequently asked questions (FAQs)

- Overview of those received in first 9 months
  - 14 FAQs posted on website
    - Those with broadest applicability shown here
  - 11 less common questions with broad applicability
    - Most of them shown here
- Almost no recurring questions
  - Exception: 6 on calibration
  - Vast majority of questions
    - Relatively specific
    - Rather unique



### FAQs

Question	Answer
Do new instruments need to be calibrated?	Yes. Note: Many, if not most, new instruments do not have a certificate of calibration unless the purchaser requests it.
Does the program apply to three phase AC motors only, or also to DC motors?	The scope states that the program applies to three-phase squirrel-cage motors [only]. Further the scope does not restrict it to any voltage [or power] rating. That is, low and medium voltage three-phase squirrel-cage motor ratings are both included.



### FAQs

When changes are made to AR100 how long will an accredited service center be given to be compliant?	There will be a 1 year grace period following the publishing date of a revised edition of AR100; which should be sufficient time for both auditors and accredited service centers to implement any changes necessary to conform to the revised edition. Further, if there was a change(s) in AR100 that appeared to require a longer period for implementation, that would be dealt with on a case by case basis.
Is part temperature sensing required for the bake oven?	No, oven temperature sensing is required. However, it must be assured that the part being baked has attained the varnish/resin manufacturer's minimum curing temperature, and held at or above that temperature for at least the minimum cure time given by the varnish/resin manufacturer.



## FAQs

<p>There is a requirement to "maintain a record of the accreditation label serial numbers and motors they are placed on." Is there particular information that's required to be documented? Is there a reporting requirement for the information?</p>	<p>The specific text on this topic is given in the program terms and conditions as:                  "Accredited firms must maintain a list of labeled motors with corresponding label and service center job numbers. At a minimum the listing for each accredited repair must include the label number and the service center job number. Additional information about the repaired motor, such as manufacturer, power rating, speed, serial number, etc. can be included in the listing, but is not required."</p>
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## Less common questions

<p>Does the EASA Accreditation process consider using a core loss tester with shaft clamps and magnet paper to depict the rotor bar condition an acceptable rotor bar test as an alternative to growling or the single phase test?</p>	<p>The use of the core loss tester to check rotor cage integrity is not presently included in the Accreditation Program. At present it would be viewed as a supplemental test, as a follow-up to the growler or single-phase test.</p>
<p>It states in the accreditation checklist that a growler is to be used to check rotor bars and also indicates usually used with a hacksaw blade. Is it acceptable to use magnet paper as opposed to a hacksaw blade?</p>	<p>The magnetic paper can be used as a substitute for the hacksaw blade during the growler test.</p>



### Less common questions

<p>Can a service center that doesn't rewind stators be accredited if they send their rewinds to another accredited service center?</p>	<p>Outsourcing stator rewinds is permissible. The outsource vendor must provide the documentation that the service center doing the complete repair will need for their records to indicate compliance with the applicable accreditation program criteria.</p>
<p>Can a standalone stator rewind be an accredited repair? For example, I do many stator only rewinds, if I am accredited, can I put an EASA Accredited label on the stator even though I won't assemble the rest of the apparatus?</p>	<p>Repair of the stator alone cannot be accredited because it is only a part, not a complete motor. That is, the accreditation program applies to "motors", not parts of motors. Of course if the service center doing the motor repair is accredited, and they comply with the answer above regarding the stator, the repair could be accredited.</p>



### Less common questions

<p>Do we need to balance all rotating parts (rotors, fans, impeller) regardless of motor size (HP/kW), does it mean that it should be done every time a motor comes in for repair?</p>	<p>Balancing is required for an accredited repair, regardless of motor power and or speed rating. The rotor should be balance checked in a balancing machine and corrected if necessary to ISO Balance Grade G2.5 or better. The program criteria applies to the rotating element, thus a component that is an integral part such as a cooling fan or impeller is to be included.</p>
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Note: Shaker motor rotors are not required to be balanced.



### **Most common nonconformities and how to prevent them**

- Some statistical data – through March 2015
  - Findings from initial 36 accreditation audits analyzed
  - Average # of findings per Checklist category -- 4.3
  - Categories with the most findings:
    - “Winding removal and core integrity” -- 18
    - “No-load tests” -- 10
    - Top 5 “most findings” categories accounted for 50% (49 of 98) of all findings
    - Average # of findings per accreditation audit -- 2.7
  - Most findings addressed during day of audit
    - However: 14 audits (39% of total)
      - Resolution required additional time
      - Delayed approval of accreditation




### **Most common nonconformities and how to prevent them**

- More statistical data
  - About 2/3 of all findings resolved on day of audit
  - Longest time from date of external audit to approval of accreditation -- 51 calendar days
  - Average delay in service center accreditation pending resolution of findings -- 18 days
  - Half of the delays resolved -- 10 days or less
  
  - To date there have not been any cases where the external auditor needed to return to the service center to verify resolution of any findings



Item	Category	Findings	Accreds delayed	Findings vs average
11	Winding removal and core integrity	18	6	422%
18	No-load tests	10	5	235%
16	High-potential tests	8	5	188%
10	Accessories	7	4	164%
2	Terminal leads, connectors and boxes	6	2	141%
5	Bearings (ball, roller; sleeve)	6	1	141%
14	Winding impregnation	6	5	141%
17	Bearing insulation	6	2	141%
4	Shafts	5	2	117%
3	Cooling system	4	1	94%
8	Squirrel cage rotors	4	0	94%
1	Identification and condition assessment	3	0	70%
7	Frame and bearing housings	3	0	70%
9	Balancing	3	1	70%
20	Calibration	3	0	70%
15	Winding insulation and coil tests	2	0	47%
6	Lubrication	1	1	23%
13	Stator windings, insulation system, conductors and coils	1	0	23%
C	Internal audits	1	0	23%
A	Housekeeping	0	0	0%
B	Training	0	0	0%
12	Rewind data (specification)	0	0	0%
Total number of findings		98	35	--


Summary of external audit findings  
Last column is % findings per category vs average



### Findings per category

- Details of categories with above average findings
  - Notes regarding calibration (3 findings):
    - Issues with calibration resulted in 19 findings in categories other than Calibration
    - Those findings resulted in 14 cases of delays in accreditation

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		72 of 98	32 of 35	--



## Findings per category

- Details of categories with above average findings
  - Top 5 categories with greatest delays in accreditation

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		72 of 98	32 of 35	--



## Findings: Winding removal and core integrity

- 18 findings – by far the most findings in a category
  - In 8 cases there were multiple findings
  - 7 cases: Lack of proof of pre- as well as post-winding removal core test
  - 7 cases: Comparison of post- versus pre-winding removal core tests was lacking
  - 5 cases: Calibration of the core tester
    - Or lack of proof of calibration
  - 3 cases: Part temperature control or monitoring was lacking
    - More on this in next slide
  - 1 case: Watts loss value was not being recorded
    - Illustrates importance of documenting what was done
  - On 4 occasions auditors observed stators with splayed teeth
    - Repaired while auditor was present
- Despite relatively large number of findings only 6 accreditations delayed





## Findings: Winding removal and core integrity

- Part temperature control or monitoring
  - One of the few Checklist criterion that was modified after initial Checklist published
  - In some cases it appears to have been misunderstood
    - Thus unfair to state it had been missed or overlooked by service centers
    - Current text of the requirement needs to be reviewed by service centers
      - And effective action taken if needed to conform
- Prevention:
  - Checklist criteria review
    - Implement needed procedures
    - This category is the program “poster child” for this point
  - Thorough and effective beta audit



## Findings: No-load tests

- 10 findings – second highest for a category
  - 5 cases: Lack of meter calibration
  - 2 cases: “OK to ship” tag missing
    - Prescribed by service center procedures, but not implemented
  - 2 cases: Verification of tachometer lacking
  - 1 case: No-load speed not recorded
    - Illustrates importance of documenting what was done
- In 5 cases resolution of nonconformity delayed accreditation
- Prevention:
  - Checklist criteria review
    - Implement needed procedures
  - Thorough and effective beta audit



### Findings: High-potential tests

- 8 findings – almost twice the average per category
  - 6 cases: Accessory high-potential test not recorded
  - 1 case: Not all test results recorded
    - Documenting what was done would have avoided the above 7 cases
  - 1 case: Megohmmeter not calibrated
- In 5 cases resolution of nonconformity delayed accreditation
- Prevention:
  - Checklist criteria review
    - Implement needed procedures
  - Thorough and effective beta audit



### Findings: Accessories

- 7 findings – well above average per category
  - All cases: Documentation of testing was lacking
    - Particularly for space heaters
      - Illustrates importance of conformance in every aspect of a criterion
- In 4 cases resolution of nonconformity delayed accreditation
- Prevention:
  - Checklist criteria review
    - Implement needed procedures
  - Thorough and effective beta audit



## Findings: Winding impregnation

- 6 findings
  - All cases: Lack of calibration for vacuum pressure impregnation (VPI) gauges
  - 1 case: Gauges for VPI vessel not used for AC stators not labeled “for reference only”
- In 5 cases resolution of nonconformity delayed accreditation
- Prevention:
  - Checklist criteria review
    - Implement needed procedures
  - Thorough and effective beta audit



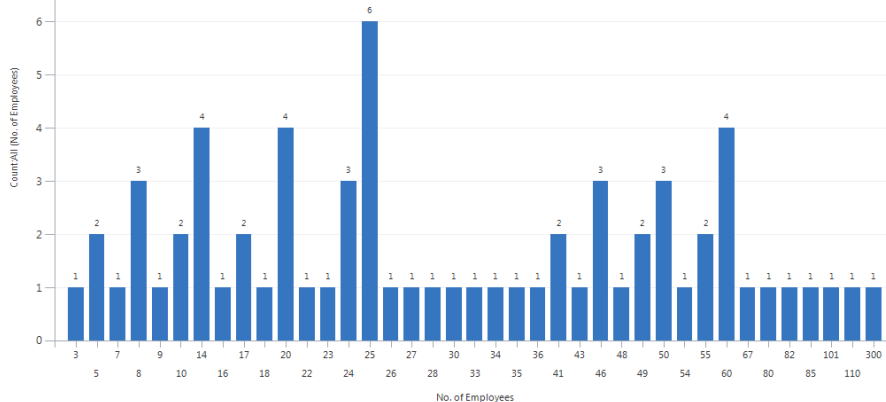
## Conclusion

- Results of accreditation audits indicate “recipe for success” can be summarized as follows:
  - Create internal task group to facilitate implementing Accreditation Program
  - Review Checklist and Checklist with Explanations
    - Become familiar with referenced clauses in:
      - ANSI/EASA AR100
      - Good Practice Guide
  - Confirm that all required equipment is available and calibrated
  - Perform beta audit(s)
    - Follow-up on findings of beta audit(s)
  - Expediently follow-up on any findings from external accreditation audit



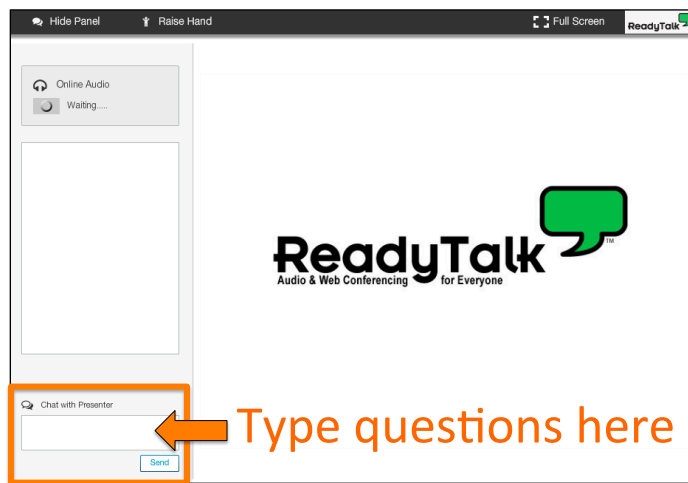
## Update

- As of 1/20/2016:
  - Accredited service centers: 67
  - Applications pending: 29



## Questions

Please submit all questions using “chat.”  
 Questions will be answered as time allows.



## Next Webinar

# Minimizing Calibration Costs

Wednesday, February 24, 2016

12:00pm – 1:00pm CST

Presented by Mike Howell



## Survey / Recording

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- A link to a recording of this presentation will be emailed to you. This recording will be available for **30 days** from today.

