Certification challenges in AM: feedback from audits & Nadcap® / ISO requirements

AILEEN Meeting

21-23-Sep-2026, Idonial, Spain

Jim Klingele, PRI

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Agenda

- Nadcap® Program Overview
- Additive Manufacturing (AM) Task Group
  - Participants
  - Audit Criteria
  - NCRs found in AM audits
  - How Suppliers can get involved
- AM international specifications used to support AMTG
- Certification of AM suppliers by aerospace OEMs
- Q&A/Discussion

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Nadcap® Program Overview

Nadcap® Program Overview



Industry Managed Program: Aviation, Defense, & Space

- 66 Subscribers ~ 4600 Suppliers accredited annually
- 26 Critical Process Accreditations
- 6140 audits were conducted in 2025 in 53 different countries and 6100 planned/scheduled audits in 2026
- ~ 350 special process auditors around the world

The Nadcap® program has evolved since it's initiation in 1990 to be an international accreditation program, evolving from NADCAP (National Aerospace Defense Contractors Accreditations Program) to Nadcap. It is now 36 years old.

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Nadcap
Administered by PRI

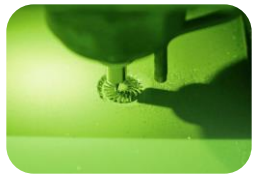


60+ Aviation, Space & Defense OEMs and Government Agencies with design authority focused on special process quality assurance

Cop

Nadcap Program Overview

Nadcap program accredits to 26 critical processes, including Counterfeit Mitigation & Cybersecurity of Physical Products


Additive Manufacturing


Aero Structure Assemblies


Aerospace Quality System


Chemical Processing


Coatings


Composites


Conventional Machining as a Special Process


Elastomer Seals


Electronics – Cable and Harness Assemblies


Electronics – Printed Boards


Electronics – Printed Board Assembly

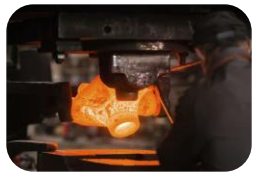

First Article Inspection


Fluid Distribution Systems


Heat Treating


Materials Testing Laboratories

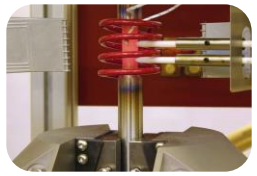

Measurement & Inspection

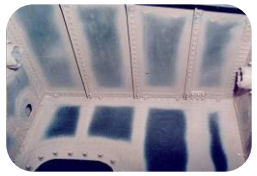

Metallic Materials Manufacturing


Nonconventional Machining


NonDestructive Testing


Non Metallic Materials Manufacturing


Non Metallic Materials Testing


Sealants


Surface Enhancement


Welding

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Additive Manufacturing Task Group

Task Group Composition (highlight denotes mandating AM to their supply chain)

Leadership:
Chairperson - Dave Abbott (GE Aerospace) & Vice Chair – Lee Barber (Raytheon)

Participating Subscribers (OEM's):

- Airbus Commercial
- Airbus Defence & Space
- BAE Systems - Air
- Collins Aerospace (Hamilton Sundstrand)
- Collins Aerospace (Goodrich)
- GE Aerospace
- General Atomics Aeronautical Systems, Inc.
- GKN Aerospace
- Gulfstream
- Honeywell Aerospace
- IAI
- IHI
- Leonardo S.p.A. – Helicopters
- Leonardo S.p.A. Divsione Velivoli
- Leonardo UK
- Liebherr – Aerospace Lindenberg GmbH
- Lockheed Martin
- MTU
- Northrop Grumman
- Pratt & Whitney
- Pratt & Whitney – Canada
- Raytheon
- Rolls-Royce
- SAFRAN Group
- Singapore Technologies
- Spirit AeroSystems
- Textron Aviation
- The Boeing Company

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Additive Manufacturing Task Group

AC7131 – Nadcap Audit Criteria For Additive Manufacturing (Rev C to be published when AC7131/4 is published. Rev D being drafted by sub-team)

AC7131/1 - Nadcap Audit Criteria For Laser & Electron Beam Powder Bed Fusion AM (Moved to 3 day audits from 8-Mar-26 and Rev B being drafted by sub-team)

AC7131/2 - Nadcap Audit Criteria For Additive Manufacturing for Directed Energy Deposition AM (3 audits have taken place to date in Europe & the USA)

AC7131/3 - Nadcap Audit Criteria For L-PBF of Non-Metallic Materials (Selective Laser Sintering) (Published in Jul-26, effective for audits from 18-Oct-26)

AC7131/4 - Nadcap Audit Criteria For Fused Filament Fabrication (Aim to publish in Q4 2026 after test audit and final editorial balloting)

AC7131/5 – Cold Spray AM (Final TG ballots ended 11-Sep-26. Aim to complete balloting in late 2026, looking for test audit in Q1 2027)

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Top NCRs in AM Powder Bed Fusion audits

- Powder storage - humidity, temperature limits in the area not defined
- Reuse testing not indicated for powder feedstock
- Max humidity defined, but humidity measured higher at time of audit
- Calibration procedure not in place
- Procedure for preventive maintenance not in place
- Procedure for software update verification inadequate
- Personnel qualification procedure not in place.
- Equipment qualification and calibration procedure not in place
- Specification revision missing in engineering routing documents - old revision used because of this.
- Instances of noncompliance to internal procedures, e.g. Signatures from all 4 departments required, objective evidence shows only 2 departments signature on completed orders.
- KPV's in PCD not monitored and recorded in line with procedure
- No action plan defined in process document for KPV's exceeding limits
- Non-compliant tensile test results compared to specification requirements
- NDT procedure non-compliant to customer specifications

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How Suppliers can get involved (1)

- Suppliers may be contacted by their Nadcap/OEM customer and instructed to get Nadcap accredited within a given time period (essentially the Nadcap Subscriber is mandating this requirement)
- Suppliers may be encouraged by their Nadcap customer to get Nadcap accredited as some Subscribers do not mandate Nadcap accreditation to their supply chain
- Suppliers may want to get Nadcap accredited, as they want to move into the aerospace sector for parts production. Nadcap aerospace accreditation would help promote their capabilities
- Suppliers need to have an AS9100 QMS accreditation in place to enable Nadcap accreditation
- Nadcap accreditation is initially for 12 months and then extends to 18 months and 24 months based on the number and type of NCRs raised in subsequent audits
- Nadcap audits vary in duration from commodity to commodity
  - AM audits are 3 days duration
  - Other commodity audits may be up to 5 days depending on accreditation being sought
  - All auditees must upload a self-audit into the EAN system 30 days before the audit date

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How Suppliers can get involved (2)

- Nadcap meets 3 times per year face to face (my last slide will show dates for the 2026 and 2027 Nadcap meetings)
- Suppliers can get Supplier Voting member status after attendance at 2 face to face Nadcap meetings, and approval by the Task Group Chair. They can then vote on Audit Criteria ballots.
- Suppliers can join sub-teams to influence the development of Audit Criteria, either new documents or revision of existing ones, and several suppliers have contributed to this process in the last 3 years
- Suppliers can use the Nadcap logos and promote their accreditations on company web sites and company documentation
- Supplier must have a company account for the eAuditNet (EAN) system as all Audit Criteria, guidance documents and audit information are conducted in this system

www.eauditnet.com

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AM international specifications

- The Nadcap AM Task Group refers to the following international specifications when developing Audit Criteria :
  - AMS7003A Laser Powder Bed Fusion Process
  - AMS7007 Electron Beam Powder Bed Fusion Process
  - AMS7005 Wire Fed Plasma Arc Directed Energy Deposition Additive Manufacturing Process
  - AMS7010A Laser Directed Energy Deposition Additive Manufacturing Process (L-DED)
  - AMS7027 Electron Beam Directed Energy Deposition-Wire Additive Manufacturing Process (EB-DED-Wire)
  - ISO/ASTM 52941:2020 - Additive manufacturing for aerospace – System performance and reliability tests for laser metal powder-bed fusion machines for metallic materials
  - ISO/ASTM 52943-2:2024 Standard specification for directed energy deposition using wire and arc in aerospace applications
  - AWSD20.1 Specification for Additive Manufacturing of Metal Components using Powder Bed Fusion (PBF) and Powder Directed Energy Deposition (DED)

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Certification of AM suppliers by aerospace OEMs

- AM suppliers get Nadcap accredited to support their OEM customers
- The Suppliers get certified when they meet the First Article Inspection requirements for the parts manufactured for the OEM customer, that are compliant with EASA or FAA requirements
- Some suppliers go the extra step and get their material and process approved by Battelle for publication in the Metallic Materials Properties Development and Standardization (MMPDS) Handbook. This is recognized by major certifying agencies such as the FAA,EASA, DoD, and NASA, ensuring compliance with regulatory standards

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Concluding Remarks

Nadcap Meetings occur three times per year where stakeholders meet in person to work on program requirements, audit criteria development, etc. All industry stakeholders are encouraged to attend and participate in these free to attend meetings:

12-15 October 2026 in Singapore

15-18 February 2027 in Anaheim, USA

14-17 June 2027 in Paris, France

18-21 October 2027 in Pittsburgh, USA

https://p-r-i.org/nadcap/meetings/

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