



SAE AMS– AM Committee Meeting



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SAE AMS AM Committee Chair
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SAE AMS AM was formally established in 2015, yet the first AMS AM-related document was published in 2002

1st AM Spec
AMS 4999
Issued (via
AMS G)



1st Standard
Issued –
Framework
for Metals



SAE-ITC AM
Data
Consortium
Established to
Generate AM
Data for
MMPDS

Regulators
and Users
Feedback –
Gaps and
Pain Points



2002

2015

2018

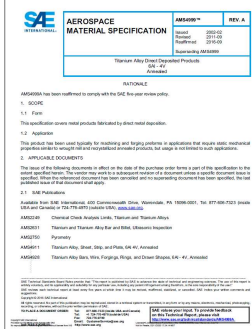
2019

2020

2022

2023

2024



AMS AM
Committee
Started Per
FAA Tasking
Letter



1st Non-metals
Standard
Issued and
Repair
Committee
Established



40+
Published
Specs and
Documents
60 in Work
(WIP)

AMS AM is closely aligned with its affiliate the AMDC (AM Data Consortium) to generate the required specification data






Spring 2023 F2F Special Topic

Regulatory Agency/Customer Engagement

- The purpose of this session was to help build the roadmap of those specs (material, process, feedstock), recommended practices, templates (PCD, certifications, etc.) that from regulatory agency/customer and user perspective are gaps or slowing down the implementation of AM, and the qualification and certification substantiation process
- Agenda topic included review of [2022 FAA-EASA AM Workshop](#) briefing, [America Makes/ANSI AM Standardization Collaborative](#) effort, and [NADCAP/PRI AM](#) updates
- Feedback from regulators (AFRL, NASA, FAA, and EASA) as well as users was captured
- A total of 24 gaps and 31 Actions/Recommendations were identified
 - Feedstock, NDT/Inspection, Process, and AM Part Qual/Cert related

Spring 2023 F2F Special Topic

Regulatory Agency/Customer Engagement

- Gaps and Actions/Recommendations classified as follows-
 - Lead- We need aggressive engagement and leading capabilities. Sole owner, core mission 
 - Follow- Not positioning as prime, but quickly close behind. Critical to committee but adjacent and other partners could help accelerate. We are OK with others doing it 
 - Watch- Emerging or immature topic, will let others take lead. Relevant to the market, we need to consider it but not critical to domain. 

Spring 2023 F2F Special Topic

Regulatory Agency/Customer Engagement - Gaps



FOLLOW

- Risk assessment for contamination
- Inspections of equipment, environment, training procedures
- CT and Radiography Standards
- NDI Acceptance Criteria
- Coupon-to-part equivalency, thin wall effects, cut-ups vs part level, influencing factors
- Better understanding of process parameter space



WATCH

- AM Testing/Inspection (NIST, ASTM, etc)
- Rapid qualification processes, tools, techniques
- Low-cost material test methods (number, scale, complexity)
- How emerging technologies (AI/ML) can be employed to supplement test-based approach
- Effects and limits of powder reuse
- Material compatibility
- Sustainability
- Operator training and certification



LEAD

- Powder Feedstock Packaging Best Practices
- Powder Handling Best Practices (at Suppliers)
- Qualification of AM Suppliers (joint effort with PRI)
- Develop material/part specifications for all powder specs available under SAE AMS AM
- Requalification and Delta Qualification (multiples of same machine)
- Guidance of Acceptance of AM Parts/Guide for Using AMS standards (based on part criticality)
- ARP/AIR- Use ISPM as Part of AM Process Acceptance
- Guidance to Establish Engineering Equivalency
- Guidance for MQ and PQ
- Develop reference document containing metallographic and microstructure examples

2024 Progress



FOLLOW

- Risk assessment for contamination
- Inspections of equipment, environment, training procedures
- CT and Radiography Standards
- NDI Acceptance Criteria
- Coupon-to-part equivalency, thin wall effects, cut-ups vs part level, influencing factors
- Better understanding of process parameter space
- Guidance to Establish Engineering Equivalency (buy-in into material dataset)- Moved to follow
- Guidance for MQ (allowables –MMPDS) and PQ (part/production) – Moved to follow



WATCH

- AM Testing/Inspection (NIST, ASTM, etc)
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- Low-cost material test methods (number, scale, complexity)
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LEAD

- ❑ Powder Feedstock Packaging Best Practices – Jose Muniz
- ❑ Powder Handling Best Practices (at Suppliers) - PRI
- ❑ Reclamation and Reuse of Mixed Powder Feedstocks
- ❑ Qualification of AM Suppliers (joint effort with PRI) - PRI
- ❑ Develop material/part specifications for all powder specs available under SAE AMS AM – Need to make call for champions/sponsors to committee and AMDC
- ❑ Develop reference document containing metallographic and microstructure examples – Keep, but need requirement defined
- ❑ Guidance of Acceptance of AM Parts/Guide for Using AMS standards (based on part criticality and quality levels) – G37
- ✓ ARP/AIR- Use ISPM as Part of AM Process Acceptance – EASA/FAA WG3
- ✓ Requalification and Delta Qualification (multiples of same machine) – Addressed by AMS7032 and AMS7064

There are regularly meetings for the various committees, including face-to-face bi-annual meetings for the general committee

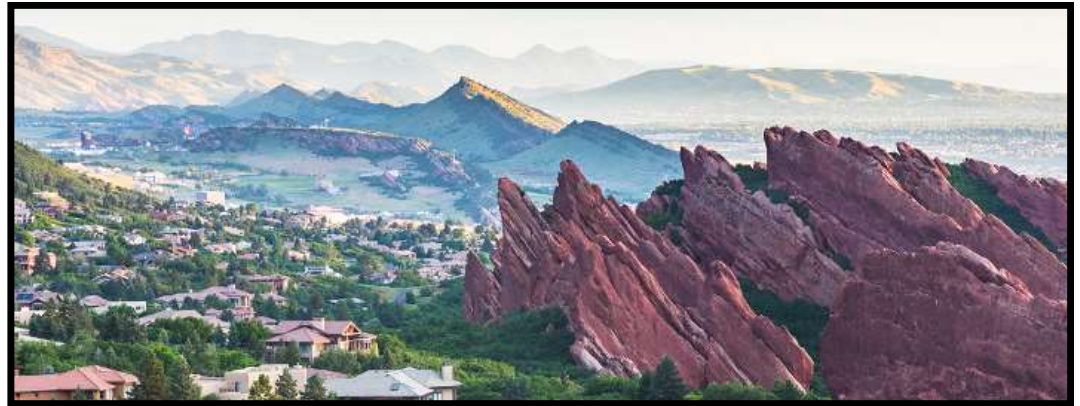
Planned Face to Face meetings for 2024 and 2025:

Fall 2024

- 3DS- Colorado (October)

Spring 2025

- EOS- Munich, Germany (April)



Closing Remarks

- AMS AM specifications are being adopted by Aerospace companies and to support material allowables programs (America Makes, NIAR, MMPDS, etc...)
- Next steps are aimed at closing industrialization gaps
 - PRI – NADCAP certification and surveying
 - Committee and AMDC- Supplier qualification, ISPM, guidance and ARPs
- Call to action
 - Looking for volunteers to lead AM Committee and Subcommittees (Metals and non-Metallics)
 - Looking for AIR/ARP and Spec sponsors to support roadmap execution
 - Collaboration

