

America Makes & ANSI Additive Manufacturing Standardization Collaborative (AMSC)

AMSC Mission, Proposed Deliverable and Timeline

Jim Williams

AMSC Chair

President, All Points Additive

March 31, 2016 Kickoff Meeting

Philadelphia, PA

AMSC Purpose

- To coordinate and accelerate the development of industry-wide additive manufacturing standards and specifications, consistent with stakeholder needs, and thereby facilitate the growth of the additive manufacturing industry
- Note: America Makes & ANSI Additive Manufacturing Standardization Collaborative (AMSC) is the “outward-facing” name of the America Makes Additive Manufacturing Standards and Specs Coordination Working Group (AM2SC WG)

AMSC Objectives

- Coordinate and provide input to Additive Manufacturing Standards Developing Organizations (SDOs)
- Formalize links into and out of groups influencing the development of standards and specifications
- Identify and track existing, in work, and needed standards and specifications for additive manufacturing and establish a common framework for additive manufacturing standards and specs
- Provide subject matter experts to work with SDOs to accelerate the development of additive manufacturing standards and specs
- Coordinate activities with the America Makes Additive Manufacturing Standards, Specs, and Data Schemas Advisory Group, AM Data Schemas Coordination Working Group, AM Technology Roadmap Advisory Group, AM Maintenance and Sustainability WG, and the DoD AM for Maintenance Operations (AMMO) WG

AMSC Critical Issues

- There has been no process for identifying priorities and interdependencies in the development of standards and specifications for additive manufacturing
- A number of SDOs are engaged in standards-setting for various aspects of additive manufacturing, prompting the need for coordination to maintain a consistent, harmonized, and non-contradictory set of additive manufacturing standards and specifications

AMSC Leadership

- Chair - Jim Williams (All Points Additive)
- Vice Chair - Lauralyn McDaniel (SME)
- Secretary - Jim McCabe (ANSI)
- Sponsor - Kevin Creehan (America Makes)

AMSC Members

- Participation open to any interested stakeholder who supports the AMSC mission and objectives; membership in America Makes and ANSI is not required
- Members include:
 - Industry Additive Manufacturing Users Stakeholders
 - Government Additive Manufacturing Users Stakeholders
 - Academia Additive Manufacturing R&D Stakeholders
 - Additive Manufacturing Standards Developing Organizations
 - Additive Manufacturing Equipment OEMs
 - Additive Manufacturing Materials OEMs
 - Government and Industry Independent Certification Organizations
- Help us identify organizations that need to be involved

AMSC Proposed Deliverable

- A standardization roadmap for additive manufacturing that identifies existing standards and specifications, as well as those in development, assesses gaps, and makes recommendations for priority areas where there is a perceived need for additional standardization, including in relation to needs already identified in the [America Makes Additive Manufacturing Technology Roadmap](#)
- AMSC will not develop standards or specifications; the hope is to help drive coordinated standards development activity
- Decisions will be based on consensus

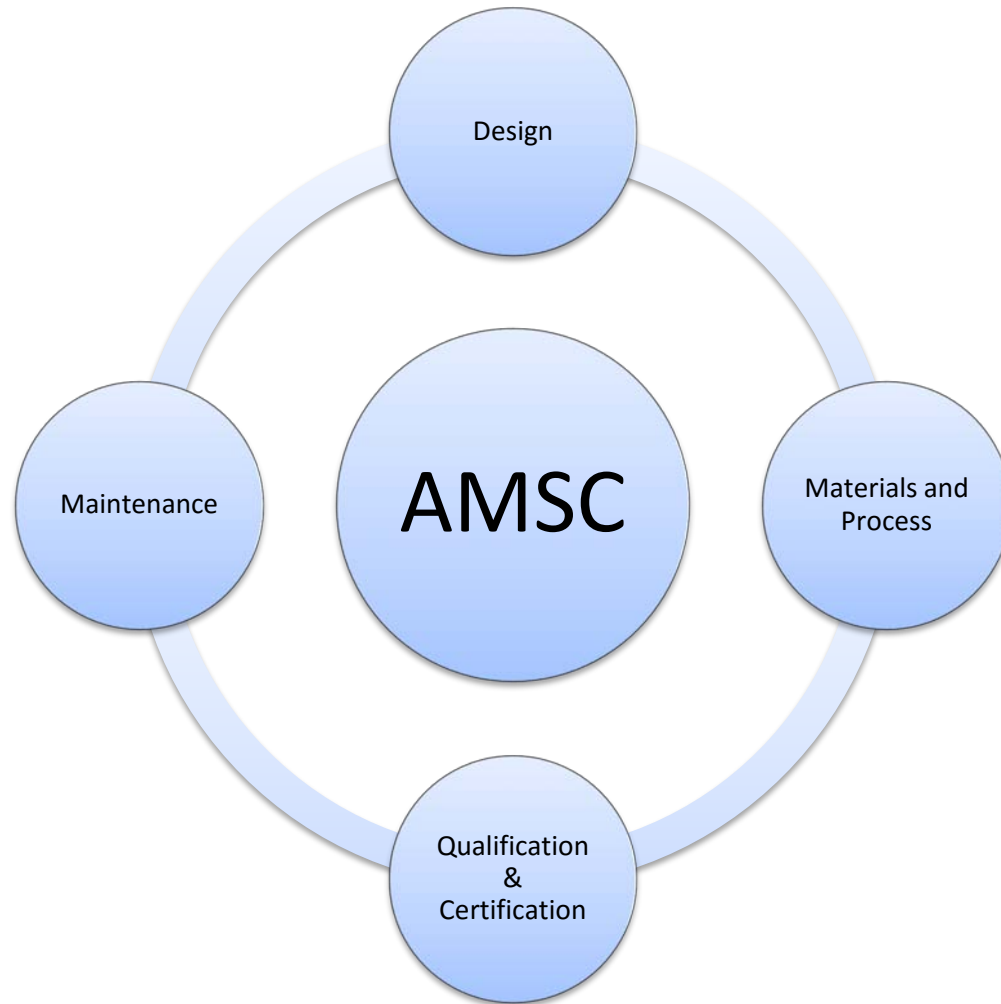
AMSC Proposed Timeline

- Target roadmap publication by end of 2016
- Kickoff meeting (March 31)
 - Determine Working Group subgroups and leadership
 - Review landscape of existing standards / specs and those in development; assess what's missing
 - Discuss industry needs and coordination issues
 - Set up schedule of WG conference calls every 2 weeks
- Cataloguing Phase (April)
 - Complete standards landscape
- Gap Analysis Phase (April - June)
 - Identify gaps and priorities for needed standards

AMSC Proposed Timeline (continued)

- Draft Roadmap (July - Sept)
- Second face-to-face meeting (Sept)
 - Does the roadmap meet our expectations?
 - What needs to be refined? Are gaps and recommendations clearly delineated?
 - Will the document be used?
- Seek Public Comments on Roadmap (Oct)
- Refine Roadmap (Oct - Nov)
- Publish Roadmap (Dec)
- Promote Roadmap (2017)
- Assess Need for Roadmap Updates (2017)

AMSC WG comprised of 4 Subgroups



Process and Materials WG - 4 Subgroups

Future State: Left to Right Enabling Commercialized AM products

Precursor Materials

- Chemistry
- Cleanliness
- Feed stock characterization
- Safety & Training
- OEM process & ctrl

Process Control

- Equipment
- Digital format
- Calibration
- Parameter ctrl
- Powder handling
- Powder reuse/recycle
- Operator training
- Safety
- Machine qualification

Post-Processing

- Heat Treat
- HIP
- Surface finishing
- Machining
- Hybrid machines

Finished Matl Property

- Design allowables
- Component testing
- Component certification
- Microstructure
- Chemistry
- Mechanical properties
- Cleanliness
- Bio-compatibility

Design

- Design guides
- Product definition data sets
- Neutral build file
- Design intent
- Design for assemblies
- Validation
- Design tools
- Simulation and modeling

Qualification and Certification

- Ensure that all stages of a particular AM process have a set of commonly understood standards to enable Qualification
 - Initial Definition of Qualification Discussed
- Ensure that each AMSC working group has adequate representation from industry & government
- Generate checklists to address all aspects of AM, to cover variability, repeatability, suitability, etc.
- Proposed that NDE/NDI (Non-Destructive Evaluation Non-Destructive Inspection) reside under Q&C

Maintenance

- Standard repair procedures
- Standard inspection processes
- Model based inspection

Working Group Co-Chairs (to be confirmed)

- Process and Materials
 - Todd Rockstroh, GE Aviation, and Art Kracke, AAK Consulting LLC
- Design
 - John Schmelzle, NAVAIR, and TBD
- Qualification & Certification
 - Armen Kurdian, U.S. Navy, and TBD
- Maintenance
 - David Coyle, NAVSUP WSS, and TBD

Working Group (WG) Sign-Up Sheet

Please sign me up for the following Working Groups and Subgroups (check all that apply)

- Design WG _____
- Process and Materials WG _____
 - Precursor Materials SG _____
 - Process Control SG _____
 - Post-Processing SG _____
 - Finished Materials Properties SG _____
- Quality & Certification WG _____
- Maintenance WG _____

** AMSC Subgroup sign-up sheet is available by contacting Jim@AllPointsAdditive.com

Questions? Comments?

