

**America Makes & ANSI Additive Manufacturing Standardization Collaborative (AMSC)
 Phase 2 Working Group (WG) Architecture (updated 9/25/17)**

Working Groups

Participants may sign up for one or more WGs using the sign-up sheet. It is anticipated that WGs will hold virtual web meetings every two weeks to start. WG chair(s) & meeting times to be determined.

Design WG

Design guides
 Design tools
 Design for specific applications
 - Design for assembly
 - Design for printed electronics
 - Design for medical
 Design documentation
 Design verification and validation

Precursor Materials WG

Storage, handling and transportation
 Characterization
 - Chemical composition
 - Flowability
 - Spreadability
 - Density (apparent vs. tapped)
 - Particle size and particle size distribution
 - Particle morphology
 - Feedstock sampling
 - Hollow particles and hollow particles with entrapped gas
 AM process-specific metal powder specifications

Process Control WG

Digital format and digital system control
 Machine calibration and preventative maintenance
 Machine qualification
 Parameter control
 Adverse machine environmental conditions: effect on component quality
 Precursor material handling: use, re-use, mixing, and recycling powder
 Precursor material flow monitoring
 Environmental health and safety: protection of machine operators
 Configuration management:
 cybersecurity
 Process monitoring

Post-processing WG

Heat treatment
 Hot isostatic pressing (HIP)
 Surface finish
 Machining
 Post curing methods

Finished Material Properties WG

Mechanical properties
 Component testing
 Bio-compatibility & Cleanliness of medical devices
 Chemistry
 Design allowables
 Microstructure

Qualification and Certification WG

Identified guidance documents (FDA Guidance, Lockheed Martin AM Supplier Quality Checklist, Aerospace Corp MAIW, CMH-17 and MMPDS Handbooks, AWS D20, NASA MSFC Draft Standard, ASME Y14.46)
 User-group/industry perspectives on Q&C

Nondestructive Evaluation (NDE) WG (of Finished Parts)

Common defects catalog using a common language for AM fabricated parts
 Test methods or best practice guides for NDE of AM parts
 Dimensional metrology of internal features
 Data fusion

Maintenance WG

Standard repair procedures
 Standard technical inspection processes
 Model based inspection
 Standards for tracking maintenance operations
 Cybersecurity for maintenance
 Finishing and assembly, welding, grinding, coating, plating

NEW: Polymers WG. A new "Polymers" WG will consider the need to enhance content on polymers for all horizontal topics across the WGs. New text or gaps identified by the Polymers WG will be shared with the applicable WG above.

ONGOING: Medical WG. Because of resource considerations, the medical sector determined during phase one to meet as a sector to look at horizontal topics across the WGs. It will continue to do so.

Industry-Sectors*

An outcome of the September 7, 2017 meeting was that an appendix listing issues/gaps of particular interest to the various sectors could be appended to the main roadmap document. Therefore, participants are asked to indicate their sector using the sign-up sheet. At some later point in the process, the sectors may wish to meet individually to consider the document from the perspective of their sector, just as the medical sector has been doing.

Aerospace/Defense

Aircraft manufacturers
Commercial airline and
general aviation suppliers
Government agencies
Military personnel and
suppliers

Medical

Clinicians
Medical device
manufacturers
Technology providers

Ground Vehicle/

Heavy Equipment

Commercial/personal
ground transportation
manufacturers/suppliers
Civil infrastructure design
& construction firms
Earth moving &
agricultural machinery
manufacturers

Energy

Nuclear energy providers
Oil and gas companies
Renewable energy suppliers
Government agencies

Industrial & Commercial

Machinery

Manufacturers of
machines that make
production
parts/components for
other end users/systems

Electronics

Electrotechnology
companies

*Stakeholder examples in the Sectors are meant to be illustrative, not comprehensive.