



WHITE PAPER

ASTM Additive Manufacturing Certification

Maturing Additive Manufacturing supply chain to enable industrialization.

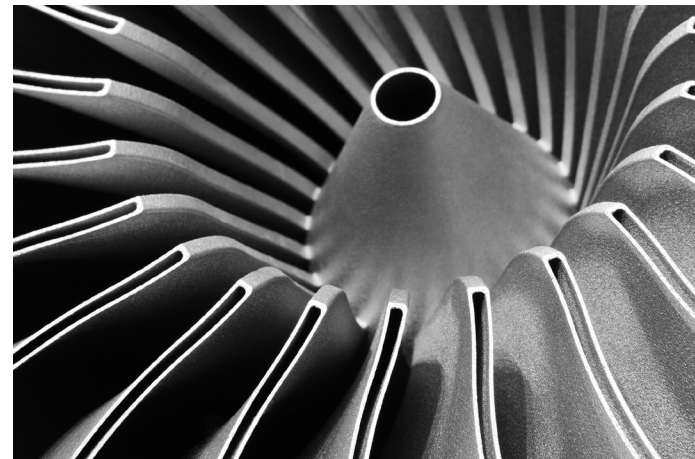


Qualification and certification are integral to advancing the capabilities and credibility of Additive Manufacturing. As the industry continues to evolve, embracing standardized qualification and certification processes will be essential for unlocking its full potential and driving sustainable growth.

Additive Manufacturing (AM) has emerged as a transformative force in advanced manufacturing, offering unparalleled design flexibility, customization, and efficiency. As the industry matures, the need for robust qualification and certification process becomes increasingly apparent. Qualification involves assessing the capability of an AM process to consistently produce parts that meet specified requirements. Certification, on the other hand, verifies compliance with industry standards and regulatory requirements. This white paper explores the significance of qualification and certification for AM, highlighting their role in ensuring quality, reliability, and the means to achieve regulatory compliance across multiple industry sectors.

While additive manufacturing offers many advantages over traditional manufacturing techniques, it also has presented some challenges. Qualification and certification is one of the challenges. Challenges in qualification and certification include variability in AM processes, lack of standardized methodologies, and evolving regulatory landscapes. It is essential to address these challenges through collaborative efforts and continuous improvement initiatives. Over the years many contract manufacturers have evolved to support the growth of AM and large corporations started integrating AM into their manufacturing ecosystem.

The rapid growth in the number of contract manufacturers has left Original Equipment Manufacturers (OEMs) to sort through the capabilities and quality of potential suppliers to find those who can support their needs. Industry standards are being produced in record time to help provide a voice to manufacturer and set common requirements. Unfortunately, most manufacturers are currently still left to use company specific procedures and internal specifications to determine requirements for qualifying



potential contract manufacturers. In order to instill confidence in additive manufacturing processes and additive manufacturing parts for functional applications, an industry accepted qualification program could compliment industry standards and provide a valuable service to OEMs. An effective qualification and certification process requires clear objectives, standardized testing protocols, robust documentation, and ongoing monitoring and validation. Collaboration with industry partners, regulatory agencies, and research institutions is crucial for success.

With the publication of some key industry consensus standards in additive manufacturing, the qualification and certification initiatives are taking on new dimensions. AM certification program covers requirements for materials, processes, personnel, and safety based on published standards. Some of the notable standards published by ASTM and ISO for AM certification include;

Additive Manufacturing Certification Audit Criteria

ISO/ASTM 52920

ISO/ASTM 52901	ISO/ASTM 52904	ISO/ASTM 52930
ISO/ASTM 52941	ISO/ASTM 52942	ISO/ASTM 52928
ISO/ASTM 52931	ISO/ASTM 52926	ASTM WK73227
AWS D20.1	API 20S	SAE AMS 7000 Series
Other government standards		

Overall facility requirements

Covering requirements of material, process, personnel

Requirements from other SDOs

Requirements from government standards such as NASA 6030, Navy Tech Pubs, and others

ISO/ASTM 52920: Additive manufacturing - Qualification principles - Requirements for industrial additive manufacturing processes and production sites. Inclusivity of material personnel and safety in the program

ISO/ASTM 52904: Additive manufacturing - Process characteristics and performance - Practice for metal powder bed fusion process to meet critical applications.

ISO/ASTM 52930: Additive manufacturing - Qualification principles - Installation, operation and performance (IQ/OQ/PQ) of PBF-LB equipment

ISO/ASTM 52941: Additive manufacturing - System performance and reliability - Acceptance tests for laser metal powder-bed fusion machines for metallic materials for aerospace application

ISO/ASTM 52942: Additive manufacturing - Qualification principles- Qualifying machine operators of laser metal powder bed fusion machines and equipment used in aerospace applications

In July of 2018, ASTM International established the Additive Manufacturing Center of Excellence (AM CoE) to help address a variety of industry needs related to additive manufacturing technology. The AM CoE has grown considerably since its inception, offering world class events, webinars, and workshops. Through consortia, the AM CoE offers a variety of research and development programs. Supporting ASTM Committee F-42 by providing outputs from dedicated research, a broad range of standards have been and are being developed to support many aspects of additive manufacturing. AM CoE also supports personnel certificate programs to help ensure that individuals are knowledgeable and capable in additive manufacturing technology areas.

Understanding the industry need for scaling up of AM technology, in July of 2023, ASTM and the AM CoE launched the Additive Manufacturing Certification Committee (AMCC). The purpose of the AMCC is to provide an OEM industry-managed program for the certification of additive manufacturing service providers and suppliers. Formed by 22 major OEMs from the aerospace/defense, transportation, and

medical industries, the committee has focused on the development of certification criteria for additive manufacturing processes. The AMCC is unique in that it is composed of OEMs to help ensure that user requirements are addressed in the certification process. Moreover, the multi-industry composition of OEMs helps in harmonizing some of the best practices each industry currently follows and establish a common set of audit criteria. Drawing from industry standards ISO/ASTM 52901, ISO/ASTM 52904 and ISO/ASTM 52920, the committee is also looking at other industry standards as well as company requirements to develop criteria that fully meets their needs. As the committee is unique in many ways, the group will also be holding discussions and making decisions on a variety of programmatic issues such as levels of certification, frequency of audits, auditor requirements, audit failure levels, and many more.

How AMCC benefits the participating companies and the AM production ecosystem

The AMCC is specifically designed to provide a variety of benefits to the participating companies:

- Supports a culture of compliance among additive manufacturing service providers/suppliers
- Supports continuous improvement by service providers/suppliers
- Provides a clear and consistent set of customer requirements
- Forms part of a risk mitigation strategy
- Reduces the costs of redundant audits for OEMs and suppliers
- Provides greater transparency
- Leads to higher quality audits
- Allows OEMs to direct resources to higher value/ strategic areas

In conclusion, qualification and certification are integral to advancing the capabilities and credibility of Additive Manufacturing. As the industry continues to evolve, embracing standardized qualification and certification processes will be essential for unlocking its full potential and driving sustainable growth.

ABOUT THE ASTM INTERNATIONAL ADDITIVE MANUFACTURING CENTER OF EXCELLENCE (AM COE)

The ASTM International Additive Manufacturing Center of Excellence (AM CoE) is a collaborative partnership among ASTM—and its 30,000 members—and representatives from government, academia, and industry that conducts strategic R&D to advance standards across all aspects of additive manufacturing (AM) which will accelerate the development and adoption of robust, game-changing technologies.

For more information, please write to us: amcertification@astm.org.