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## Progress towards metal additive manufacturing standardization

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As the metal additive manufacturing (AM) industry moves towards industrial production, the need for qualification standards covering all aspects of the technology becomes ever more prevalent. While some standards and specifications for documenting the various aspects of AM processes and materials exist and continue to evolve, many such standards still need to be matured or under consideration/development within standards development organizations (SDOs). A recent joint ASTM and ISO Partner Standards Developing Organization (PSDO) agreement has provided a unique opportunity to create globally recognized standards for additive manufacturing (AM); the purpose of the agreement is to eliminate duplication of effort while maximizing resource allocation within the additive manufacturing industry. A resource to aid in the identification and development and approval of new standards is a new framework that has introduced a comprehensive structure to target various aspects of the AM space, including feedstock materials, process/equipment, and finished parts properties. This approach will also enable the development of application-specific standards to address the needs of the aerospace, medical device, and automotive industries. In addition, recent efforts to create a gap analysis roadmap through America Makes & ANSI Additive Manufacturing Standardization Collaborative (AMSC) can provide a platform to coordinate and accelerate the development of industry-wide additive manufacturing standards consistent with stakeholder needs, thereby facilitating the growth of the AM industry. This roadmap is designed to identify standards (both approved and in process), assess gaps, and make recommendations for priority areas where there is a perceived need for additional R&D and standardization. Various ASTM technical committees are considering the development of standards for AM; in particular, Committee F42 on additive manufacturing technologies is the focal point for most of the ongoing activities within ASTM. While Committee F42 continues to develop standards (jointly with ISO as well as ASTM-specific), there are opportunities in areas occupied by additional ASTM technical committees where collaboration & leveraged expertise could contribute to the overall standards portfolio described by the structure described above. This brief presentation will provide insight based on the recent ASTM/ISO agreement as well as AMSC roadmap; potential opportunities and technical considerations in support of future standards development. A pathway for qualification/certification of AM parts enabled by the appropriate standardization landscape will also be discussed.

### Biography

Mohsen Seifi joined ASTM International in 2016 as a first Director of Additive Manufacturing Programs, in which he facilitates standardization activities across all ASTM technical committees and building new partnerships as well as development of new AM related products and services within diverse ASTM portfolios. He has also an appointment as a Staff Scientist/Researcher in Advanced Manufacturing and Mechanical Reliability Center (AMMRC) at Case Western Reserve University (CWRU). He received both his Master's degree and Doctoral degree at CWRU in Materials Science and Engineering with emphasis on "Metal additive manufacturing qualification and standardization". He has conducted extensive work on qualification of advanced materials including titanium and super alloys made by additive manufacturing (AM) techniques for use in critical applications. He has co-authored more than 20 publications and has presented more than 60 papers at various technical meetings.

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