

**From:** [NICHOL, Marcus](#)  
**To:** [Brown, Frederick](#); [Nieh, Ho](#)  
**Cc:** [Furstenau, Raymond](#); [Thomas, Brian](#); [Donoghue, Joseph](#); [Hovanec, Christopher](#); [Hiser, Allen](#); [Holonich, Joseph](#); [Segala, John](#)  
**Subject:** [External\_Sender] NEI Report Roadmap for Regulatory Acceptance of Advanced Manufacturing Methods in the Nuclear Energy Industry  
**Date:** Monday, May 13, 2019 2:34:12 PM  
**Attachments:** [Letter to NRC on AMM Report 2019-05-13.pdf](#)  
[NEI Advanced Manufacturing Regulatory Roadmap - Final 2019-05-13.pdf](#)

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**Subject:** NEI Report Roadmap for Regulatory Acceptance of Advanced Manufacturing Methods in the Nuclear Energy Industry

**Project Number: 689**

Dear Mr. Brown and Mr. Nieh:

Many companies are pursuing the use of advanced manufacturing methods to fabricate components for use in nuclear reactors. Some companies plan to use advanced manufactured components as early as this year, and a dramatic increase in the use of advanced manufacturing is anticipated beginning in 2022. Advanced manufacturing is becoming more widely used in the aerospace, defense, automotive and other industries. While many advanced manufacturing methods are mature enough to use for commercial applications, we have identified that the lack of understanding of approaches that could be used to provide expedited regulatory approval is a potential barrier to their use in the nuclear industry.

We are encouraged that the U.S. Nuclear Regulatory Commission has been proactive in preparing for the use of advanced manufacturing in the nuclear industry. In November 2017, the NRC held a public meeting to engage industry and Government counterparts to share information on advanced manufacturing. More recently the NRC issued a draft Action Plan (ML19029B355) to prepare the NRC to effectively and efficiently regulate advanced manufactured components.

We have developed the attached Roadmap for Regulatory Acceptance of Advanced Manufacturing Methods in the Nuclear Energy Industry dated May 13, 2019 in order to inform industry, NRC and other stakeholder activities related to the use of advanced manufacturing. The report describes industry's interest and activities, and perspectives on potential regulatory considerations for the use of advanced manufacturing methods. It is noted that NRC approval is not necessarily required to use advanced manufacturing methods for nuclear components.

The report identifies 16 advanced manufacturing methods of most interest to fabricate components for the nuclear industry. Additive manufacturing – or 3-D printing – is the most well-known method; however, there are many other methods – such as powder-metallurgy hot-isostatic pressing and electron beam welding – that have tremendous potential for the nuclear industry. These advanced manufacturing methods have the potential to produce high quality components faster and cheaper, and to enhance the performance of both current operating plants and advanced reactors.

The report's recommended actions that may be of most interest to the NRC are focused on facilitating more rapid adoption of advanced manufacturing in the nuclear industry. We have

identified that systematic engagement between the NRC and industry would help to clarify the regulatory process and accelerate the use of advanced manufacturing methods. We have also identified that an NRC and DOE co-hosted workshop, similar to those held for advanced reactors, would facilitate a common and more thorough understanding of advanced manufacturing methods. Finally, increased NRC engagement in code development and research and development activities could help ensure that these activities are aligned with the NRC's expectations.

We look forward to further interactions between the NRC and industry as we continue to move forward in the use of advanced manufacturing. If there are any questions on this matter, please contact me at 202-739-8131 or [mrn@nei.org](mailto:mrn@nei.org).

Sincerely,

Marcus R. Nichol  
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