ASME Section III, SG-MF&E Materials, Fabrication and Examination, TG-AM Task Group Advanced Mfg.

GAIN-EPRI-NEI AMM Qualification Workshop
August 24th and 25th, 2021.
Virtual Meeting

Daniel Mann - FLOWSERVE
TG Chair, TG on AM

Task Group Goal

- Write rules for the adoption of Advanced Manufacturing processes by Section III, Div. 1 for incorporation into the 2023 and future Editions of Section III

Formal ASME Task Group Charter

- *The Task Group on Advanced Manufacturing is responsible for developing, clarifying, and prescribing rules for the fabrication and stamping of items manufactured by techniques including: Powder Metallurgy / Hot Isostatic Pressing; Powder Bed-Additive Manufacturing; Direct Energy Deposition-Additive Manufacturing / Wire; Cold Spray Deposition/Cladding; and Diode Laser Cladding.*

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1st formal TG meeting 1-27-2021

- Meeting Cadence: during the 2 weeks prior to each ASME Code Week (Quarterly)
- Process Specific Focus Groups meeting monthly
  - Quality Assurance
  - PM/HIP
  - DED-GMAAM
- Members of TG include representation from ASME Section II (Materials), Section III (MF&E), and Section IX (Welding) as well as representatives of Industry

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TG Charter

- TG determined Process specific Advanced Manufacturing (AM) methods should be limited to a selected scope achievable for 2023.
- TG did not want to miss the next publication cycle due to an excessive scope which was not supportable by current resources.

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AM Specific Methods

- TG Identified and evaluated the status of current Code actions, supporting AM, to identify the specific methods for the TG to address for 2023.
  - Powdered Metal/Hot Isostatic Pressing (PM/HIP)
  - Direct Energy Deposition Gas Metal Arc Additive Manufacturing (DED-GMAAM)
  - Laser Powdered Bed Fusion (LPBF) – Evaluated and held for the 2025 Edition

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Topics required to be addressed by the TG to address for incorporation of AM into BPV III

- Where to place the requirements in Section III, (New Article, New Section, Appendix)
- How to handle the AM items as a new “Product Form(s)”
- Evaluate the use of existing product form data as support of AM product form
- Appendix to Address Specific: QA Requirements, Material Requirements, Fabrication Requirements, NDE Requirements

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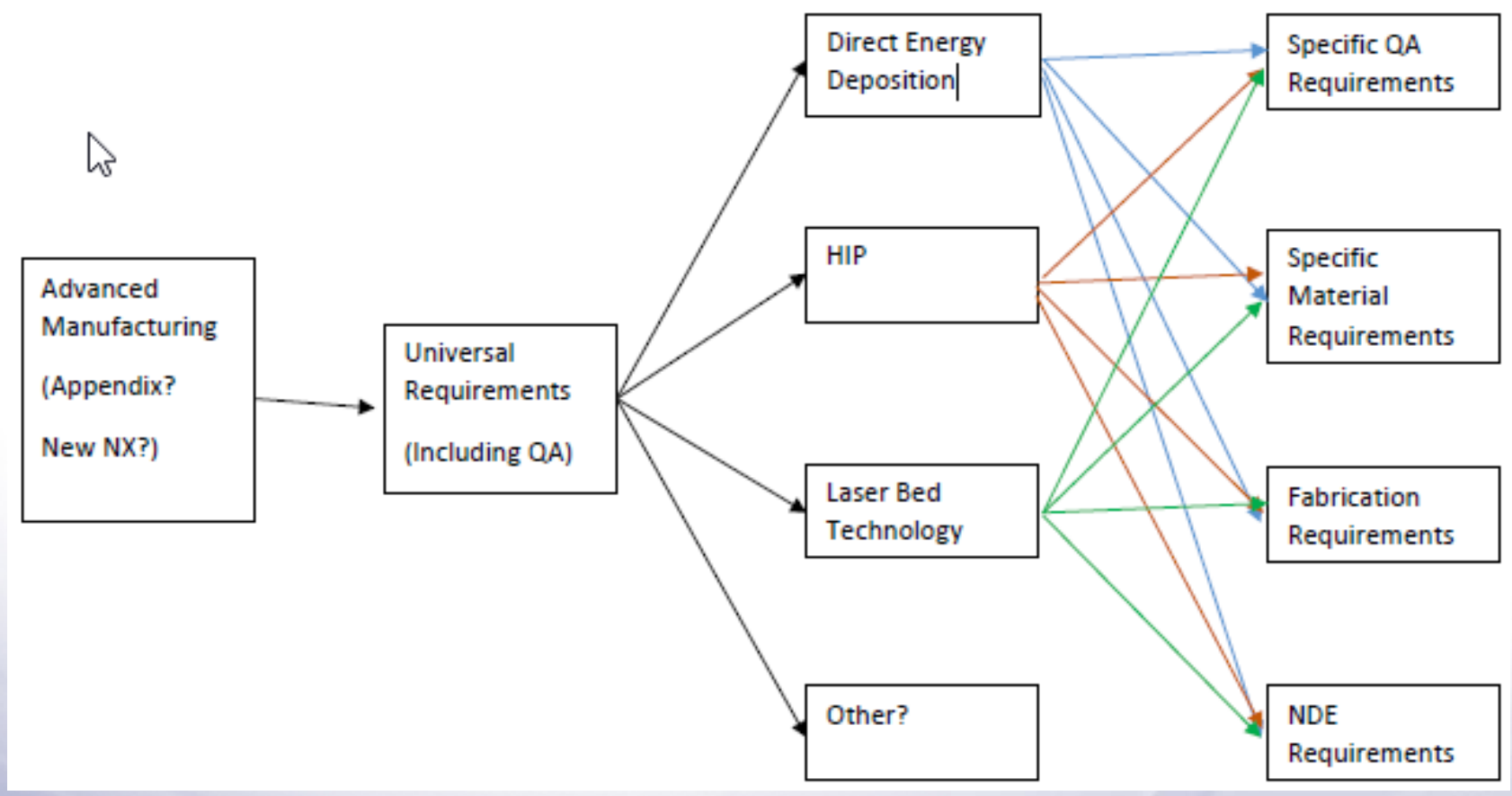
Philosophy for AM Incorporation into Section III: Section III, Article 2000 to support AM Product Form and reference Mandatory Appendix for AM rules:



PM/HIP

- Structure incorporation of PM/HIP based upon approved Code Case N-834 ASTM A988/A988M-11 UNS S31603
- We are Currently focused on alloy 316L as represented in CC N-834 supporting utilization in Section III
- Expanding scope to include additional alloys in the initial release of this Appendix would likely negatively impact incorporation into 2023 due to scope creep
- The Appendix will be expanded to incorporate additional alloys following current Code rules for new materials
- Industry to drive the prioritization of which alloys are incorporated

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Directed Energy Deposition - DED

- Selected DED-GMAAM as the 1st DED Process to be incorporated
- Structure incorporation of GMAAM based upon approved Section IX Code Case 3020
- GMAAM selected as it is an extension of current industry experience. Welds and weld metal build up technology with decades of demonstrated in-service experience.

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Quality Assurance

- Intend to incorporate NCA-4200/-4300 (Material Organization) quality requirements as criteria as these standards have already been accepted for other product forms and processes.

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Questions/Comments?