Advanced Manufacturing Technology
John Vickers, Principal Technologist | 05.23.19
NASA Manufacturing is...

Technology Challenges

- In-space/on-orbit manufacturing
- Additive Manufacturing
- Composites
- Metals Processes
- Advanced Materials
- Digital Manufacturing (e.g. process modeling)
- and more... (e.g. NDI)

Infusion / Cost / Performance / Transformative / Crosscutting
TA 12: Materials, Structures, Mechanical Systems, and Manufacturing

<table>
<thead>
<tr>
<th>Sub-Goals</th>
<th>Goals</th>
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<tbody>
<tr>
<td>Materials</td>
<td>Develop materials that have multiple tailored functions to meet specific mission needs.</td>
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<tr>
<td>Structures</td>
<td>Develop lightweight, robust, multifunctional, smart structures that are reliable and predictable.</td>
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<td>Mechanical Systems</td>
<td>Improve life and reliability of mechanisms to extend the life of space structures. Improve the precision alignment capability of mechanisms to extend the capability of deployable structures.</td>
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<td>Manufacturing</td>
<td>Develop innovative physical manufacturing processes combined with the ‘digital thread’ that integrates modern design and manufacturing.</td>
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Manufacturing Technology Report
117 Active, 59 Partnerships, $702M
Digital Transformation

Desired Future State

• Data Can Be Integrated and Automatically Couple the Virtual and Physical
• Digital Twin – Digital representation of a physical process/system/object
• Digital Thread – Communication framework that allows a connected data flow

Digital Integration Allows Predictive, Detective, and Corrective – Real Time Accurate Decisions
National & Global Alignment

Manufacturing USA – National Network of Manufacturing Institutes

- Digital Manufacturing & Design
  - Chicago, IL
- Sustainable Manufacturing
  - Rochester, NY
- Integrated Photonics
  - Albany, NY
- Regenerative Manufacturing
  - Manchester, NH
- Advanced Fibers and Textiles
  - Cambridge, MA
- Modular Chemical Process Intensification
  - New York, NY
- Bio-pharmaceutical Manufacturing
  - Newark, DE
- Lightweight Metals
  - Detroit, MI
- Additive Manufacturing
  - Youngstown, OH
- Advanced Composites
  - Knoxville, TN
- Advanced Robotics
  - Pittsburgh, PA
- Wide Bandgap Semiconductors
  - Raleigh, NC

✔️ U.S. MATERIALS GENOME INITIATIVE / National Nanotechnology Initiative
✔️ UK Catapult Centers
✔️ Fraunhofer Institutes, Others....

✔️ Develop and transition new manufacturing technologies
✔️ Educate, train, and connect the manufacturing workforce
✔️ Expand the capabilities of the domestic manufacturing supply chain
Thank You
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