Rethinking Microsystem Manufacturing

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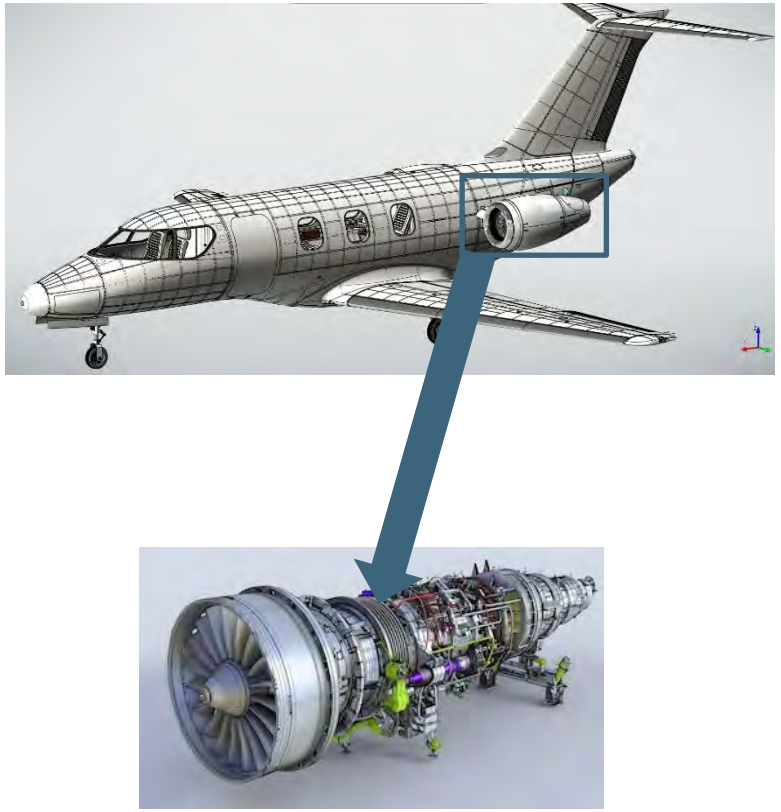
Get Ready World!

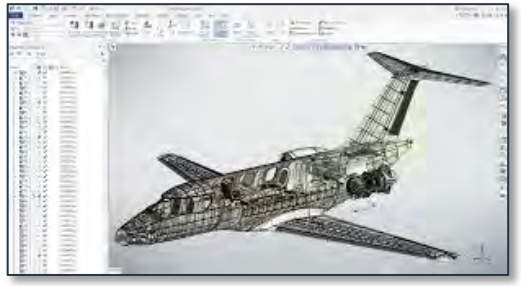
<u>Vision</u> Create a portfolio of manufacturing programs that will revolutionize multiscale manufacturing

Design it	• Revolutionize how we **invent** multiscale systems
Build it	• Revolutionize how we **manufacture** multiscale systems
Test it	• Revolutionize how we **analyze and test** multiscale systems
Applications	• Create multiscale systems with **revolutionary** functionality



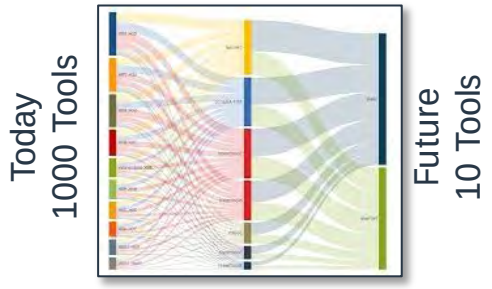
Design It – Multiscale Manufacturing of Complete Systems

Start with a multilength scale hierarchical design



Simplify design pattern to achieve product functionality that is manufacturable with available tools

Material and tool substitution

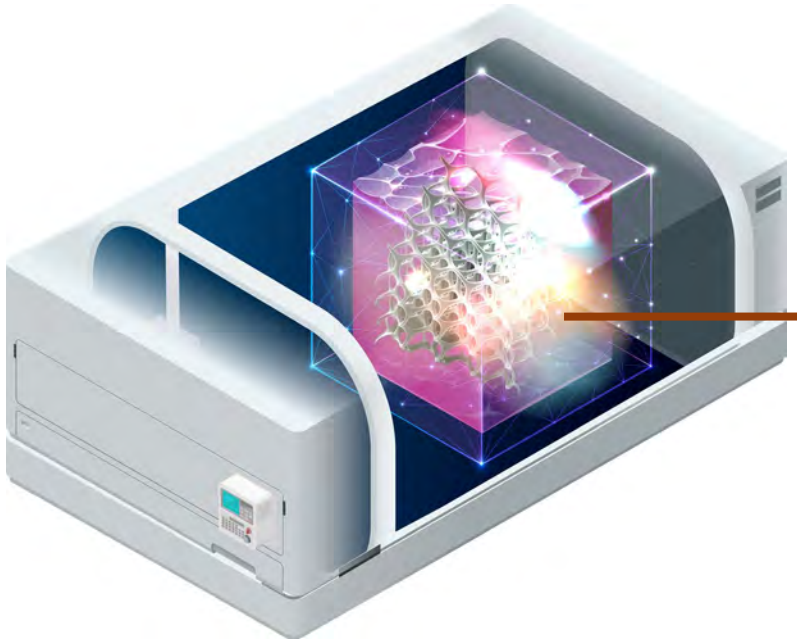


Fully automated manufacturing

Revolutionize the economics of onshore manufacturing

Build It – Additive Manufacturing of MicrosystEms (AMME)

Microsystem manufacturing at the voxel level



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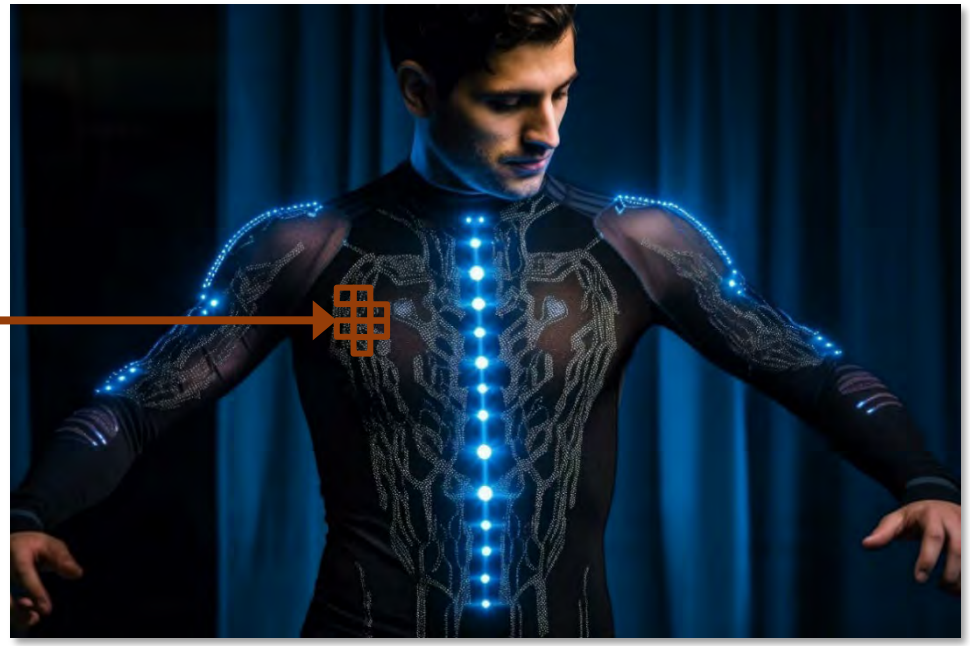
Enabling novel technologies for future missions



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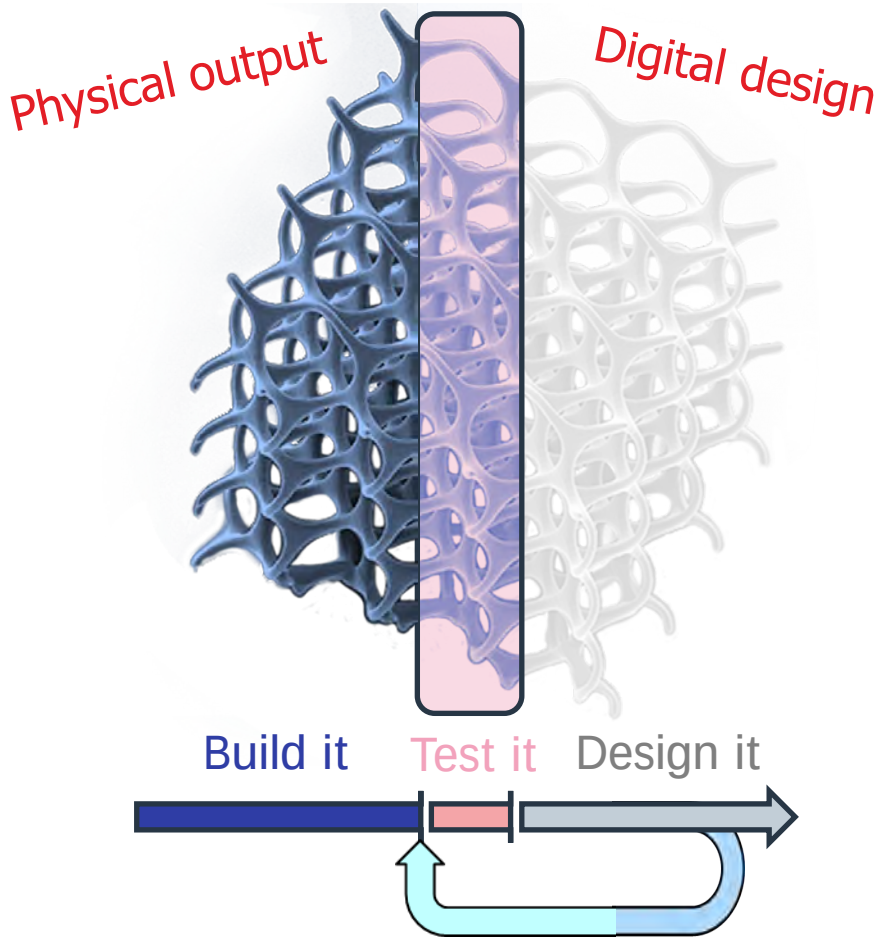
AMME enables a new class of microsystem manufacturing

[1] DARPA

Test It – In-Situ Testing at the Voxel Level



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What if we could test material placement, quality, and functional performance at the voxel level?

- Future manufacturing systems will synthesize unique microsystem geometries at the voxel level resulting in a massive number of unique QA test methods
- Ensure physical output matches the digital design at the voxel level
- Forward predict component QA functionality
- If the remaining digital design fails, update the design to compensate and guarantee functional performance

Guarantee performance of every unique microsystem at the voxel level

QA: Quality assurance

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Resilient Cybernetic Systems for Extreme Environments

Enhanced Actuators

Strength, Dexterity, Durability

- Developing robust physical functionality for manipulation and interaction with the environment

Multimodal Sensing

Wisdom, Haptics, Vision

- Fusing disparate sensor data hierarchically to create a comprehensive understanding of the environment

Von Neumann Transformers

Intelligence, Recall, Goal Setting

- Developing advanced memory architectures for contextual awareness and decision-making

Create truly robust, adaptable cybernetic solutions in ANY environment

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