AFRL

ROCKET FACTORY IN-A-BOX

MISSILE PROPULSION ANYTIME, ANYWHERE

FIRST STEP TO WEAPONS ANYWHERE IN THE DOD LOGISTICS CHAIN

NEW APPROACH TO MANUFACTURING SOLID ROCKETS

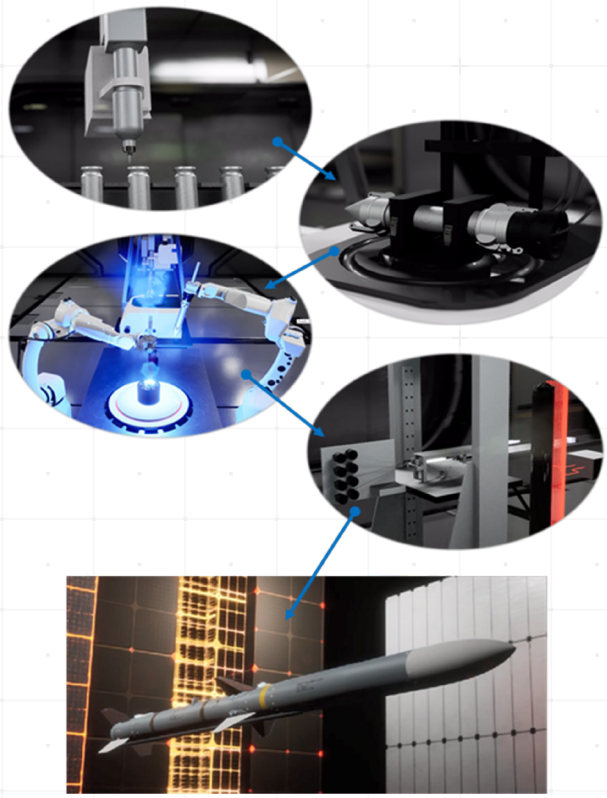
AFRL's Rocket Factory In-a-Box (RFIB) program is developing a mobile, containerized Solid Rocket Motor (SRM) production capability by aggregating revolutionary design and component manufacturing techniques, thus enabling rapid SRM manufacture in a small footprint with the flexibility to tailor performance to specific missions. This approach contrasts current industry practices requiring significant infrastructure and resources (time and money), which often results in design constraints.

ANATOMY

- Ingredient Synthesis: Precision generation of propellant ingredients with continuous microfluidic reactors leads to unprecedented property control.
- Resonant Acoustic Mixing: Vibrational propellant ingredient homogenization reduces processing time up to 20X with lower property variance.
- Additive Manufacturing: 3D printing of fuel grains enables compositional gradients, integration of performance-enhancing features, and in-situ curing.
- Case-on-Propellant Processing: Direct installation of rocket structural case onto propellant accelerates production and eliminates manufacturing tooling.
- Automation: Robotic staffing of factory eliminates need for human labor, improves process control, and enhances operational safety.
- Non-Destructive Evaluation: The use of comprehensive imaging tools aids in construction of digital twins for manufactured rockets.
- Digital Engineering: Computational design of requisite rocket aids in prediction of as-built system and provides governance over automated fabrication.

KEY BENEFITS

- Agile, resilient, and persistent logistics for solid rocket propulsion supports requirements for 21st century competition and conflict.
- Rapid design, development, and fielding of new systems helps the U.S. meet emerging threats.
- Flexible manufacturing expands the design space and performance of solid rocket propulsion.



Revolutionary design and component manufacturing techniques, together with state-of-the-art digital engineering tools, enable missile propulsion anytime, anywhere.

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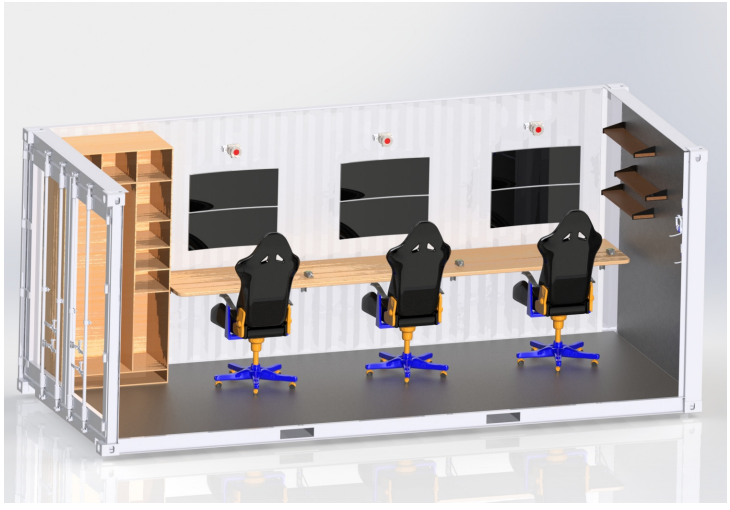
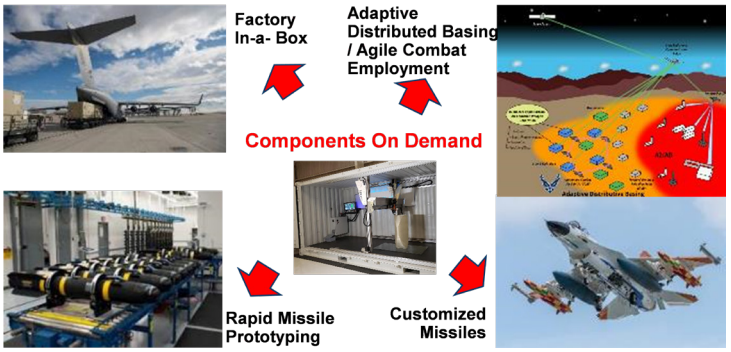
A NEW PARADIGM IN ROCKET & WEAPON LOGISTICS

Mobile, small, and clandestine manufacturing centers for SRMs and weapons ensure continuity of necessary force application capabilities for warfighters by augmenting the resilience of logistics chains during conflict, answering raw material obsolescence, increasing survivability, mitigating unpredictability and improving lethality depth within enemy threat rings. RFIB will prove beneficial to several key Major Commands including Air Combat Command, Air Mobility Command, Air Force Special Operations Command and Pacific Air Forces.

Current rocket propulsion systems of air-launched missiles can take years to enter full rate production due to iterative design, build, and test methods practiced by industry. Furthermore, the U.S. industrial base has consolidated into just a few manufacturing centers for bombs and missiles. Meanwhile, our adversaries' capabilities have significantly improved in the last decade. RFIB is key to avoiding potential strains placed on our nation's ability to provide sufficient and suitable weapons to the warfighter in future conflicts.



Rocket Factory in a Box demonstration. Rendering of the "Control Conex", one of four containers in X-Bow Systems' planned RFIB demonstration. Credit: X-Bow Systems



Capabilities made possible by aggregating AFRL's new SRM component level manufacturing technologies developed as part of the RFIB program.

PARTNERSHIP

AFRL's in-house team has laid the technological ground-work necessary to make RFIB a reality. Now, AFRL is collaborating with industry partners to accelerate development and transition the capability to the warfighter. The team brings together established defense contractors with emerging aerospace companies.

X-BOW

NEXT OFFSET SOLUTIONS

spa SYSTEMS PLANNING AND ANALYSIS INC.

GETTING INVOLVED

IPT membership is open to all stakeholders (or potential stakeholders) that are eligible to receive Distribution C information (U.S. Government agencies and their contractors).

Applicable white papers are considered through the AFRL Rocket Lab Hermes BAA (FA9300-20-S-0001), a two-step open BAA.