



# LINCOLN OPERATIONS

Advanced Composites

OTS FACILITIES

LINCOLN, NE

## LOCATION OVERVIEW

General Dynamics Ordnance and Tactical Systems (GD-OTS) Lincoln Operations is a world-class designer, developer, and manufacturer of advanced composite structures primarily for the defense and aerospace markets. Lincoln Operations specializes in composite design and prototype production that can be efficiently scaled to low and/or high production quantities, to ensure delivery of the best quality products that fully meet customer requirements.

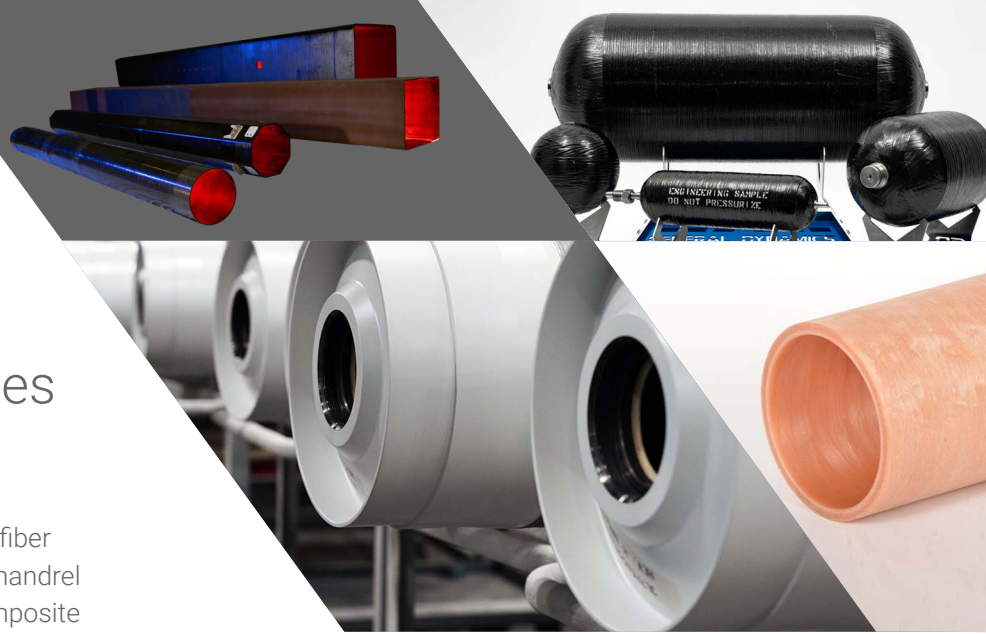
Products are manufactured using the latest in fibers and resin formulations to develop the lightest-weight, and highest-performing composite structures on the market today. Lincoln Operations specializes in rapid and cost-effective prototyping, as well as scalable transitions to production, to meet our customer's schedule and cost requirements. In 2019, Lincoln Operations opened the doors to a new 50,000 square foot manufacturing expansion, building on

rate capabilities, and opened an additional 110,000+ square foot expansion in 2023.

As part of General Dynamics' Tactical Systems group, Lincoln Operations' key product areas include aircraft, missile, and space structures. This includes rocket motor cases, pressure vessels, launch tubes, external fuel tanks, drive shafts, and bomb bodies. Located in Lincoln, Nebraska, the operation houses approximately 410,000+ square feet of manufacturing, lab and office space.

**Today, and every day, General Dynamics is focused on efficient design and the highest quality, in order to continue DELIVERING THE BEST TO THE BEST®**





## Key Process Capabilities

### FILAMENT WINDING

Filament winding is the process of winding fiber filaments onto a permanent or removable mandrel to create a high strength, cost-effective composite product. The process can utilize various fibers and resins. Selection is made based on performance needs and cost.

### RESIN FORMULATION AND PRECISION FIBER IMPREGNATION

Lincoln Operations has developed several cost-effective resin formulations that resist aerodynamic heating. In a wet winding process, fibers are coated as they pass through a resin bath on the winding machine. In the pre-impregnated process, a spool of fiber is precisely coated with resin in a dedicated impregnation work center. The resulting pre-preg product is specifically sized, stored and combined with other spools at the winding machine.

### DESIGN, ANALYSIS AND DEVELOPMENTAL TESTING

Prior to fabrication, computer-aided planning and structural analysis tools are used to design and verify the performance of products and tooling. Developmental capabilities include material characterization, sub-element verification, destructive testing, and non-destructive testing. Sophisticated electronic modeling capabilities allow Lincoln Operations to predict performance and develop alternative designs, collaborating closely with the customer to choose the most appropriate and cost-effective method and materials for the product.

## Fast Facts

### KEY PRODUCT AREAS

- » Composite high-performance and low-weight rocket motor cases
- » Domestically produced and qualified composite pressure vessels for the aerospace market
- » Low-weight launch tubes
- » Low-weight and high-strength drive shafts
- » Composite structures

### KEY PROCESSES

- » Filament winding
- » Resin formulation and impregnation
- » Design and analysis
- » Development and production testing

### MATERIALS

- » Fibers: carbon, fiberglass, Kevlar®
- » Resins: high temperature epoxy
- » Liners: aluminum, titanium, Inconel®
- » Insulators: rubber