

## 2023 SMART DEMO

### ADVANCING SOLID ROCKET PROPULSION TECHNOLOGY

Northrop Grumman's Solid Motor Annual Rocket Technology Demonstrator (SMART Demo) is an annual effort to design, develop, build and test a new solid rocket motor and its associated tooling. Each year the design, including configuration and performance, will be tailored to specific industry or warfighter needs. The first annual SMART Demo will test complex additively manufactured solid rocket

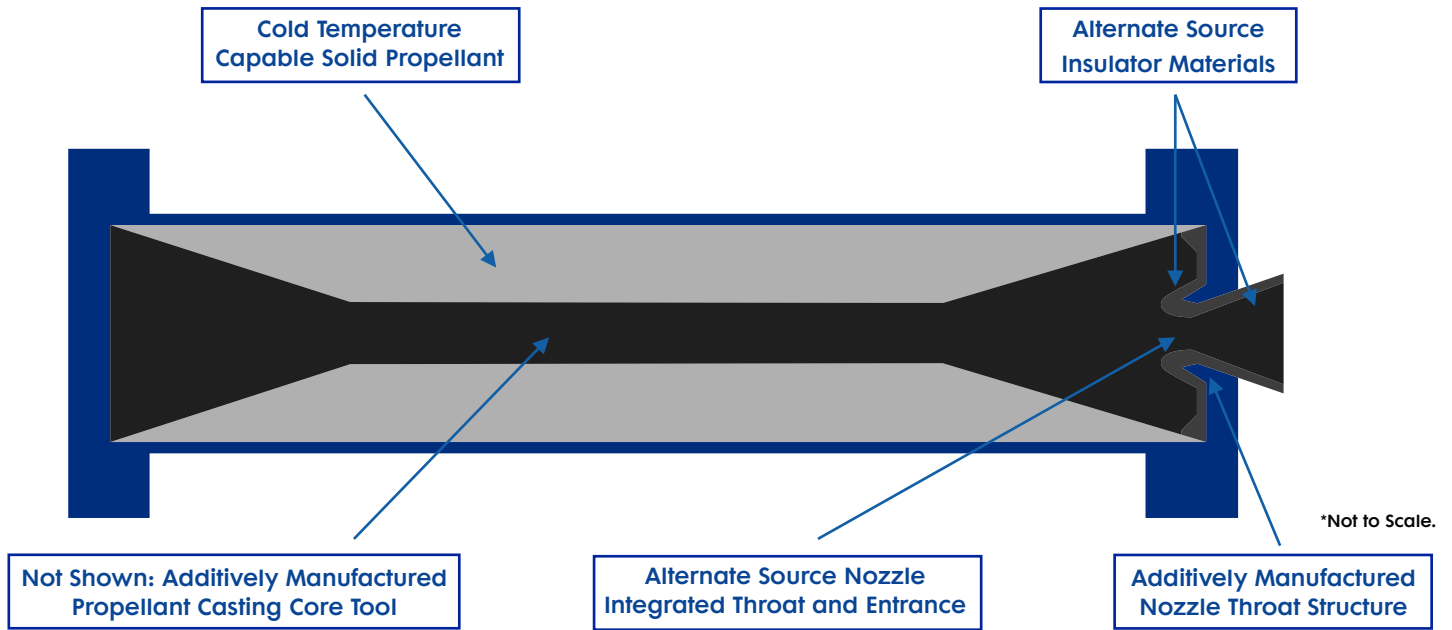
motor components and tooling, alternative manufacturing materials, and advanced processes that could significantly reduce solid rocket motor costs and production lead times.

SMART Demo provides a cost effective, adaptable solution for advancing solid rocket motor technology and processes by providing a flight relevant scale for demonstrating new technologies and processes. By annually demonstrating and qualifying new processes, technologies and materials with SMART Demo, Northrop Grumman will rapidly advance and mature materials, technologies, and processes to

insert them into current and future production programs to meet the fast-changing needs of our customers.

As part of the 2023 SMART Demo, we are testing state-of-the-art technologies and pushing boundaries to enhance learning and continue building on our 60-plus years of solid rocket motor experience. Northrop Grumman is at the forefront of innovation, tackling seemingly impossible challenges to create strategically important propulsion systems for our nation.

# 2023 SMART DEMO OVERVIEW



## 2023 SMART DEMO STATIC TEST

The first annual SMART Demo will demonstrate several innovative technologies and alternate manufacturing materials and processes including:

- A new cost-effective solid rocket motor propellant capable of operating at cold temperatures
- Alternative suppliers and new materials that could supplement or replace other long-lead materials with challenged supply chains
- Additive manufacturing technology produced several highly advanced, long-lead tooling products as well as components of the solid rocket motor's nozzle structure

## ADDITIVE MANUFACTURED TECHNOLOGIES

This test features a variety of highly advanced additively manufactured components:

- A four-piece, 9-foot-long, AM polymer propellant grain forming tool used to cast a required inert version of this year's SMART Demo motor
- A high strength Titanium nozzle throat housing – this piece is integrated into the static fire motor

## ADDITIONAL DETAILS

- First time demonstration of this Propellant-Liner-Insulation combination
- Developed and manufactured in less than one year
- Four aerospace grade aluminum polar bosses, which are the metal ends of Northrop Grumman's composite cases, were 3D printed and will be used in place of long lead forgings in the 2024 SMART Demo build

## MOTOR SPECIFICATIONS

Propellant Mass (lbm)	1,800
Burn Time (sec)	25
Max Vacuum Thrust (lbf)	21,000
Total Length (in)	121
Motor Diameter (in)	24

