

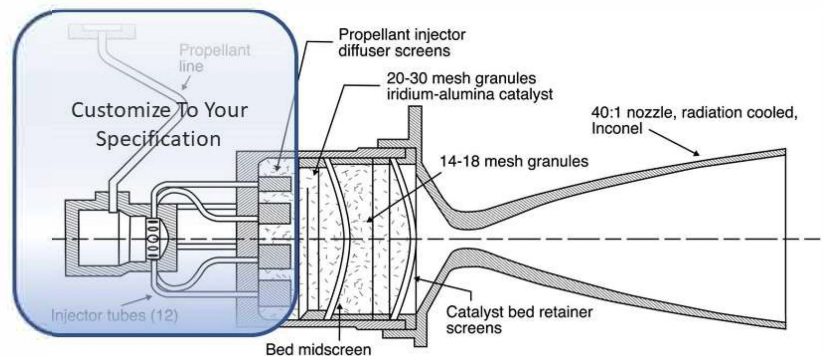
3D PRINTED MONOPROPELLANT THRUSTER WITH COMPUTATIONAL FLUID DYNAMICS OPTIMIZATION



SPACE PROPULSION SYSTEM COMPONENTS

3D DESIGN FLEXIBILITY

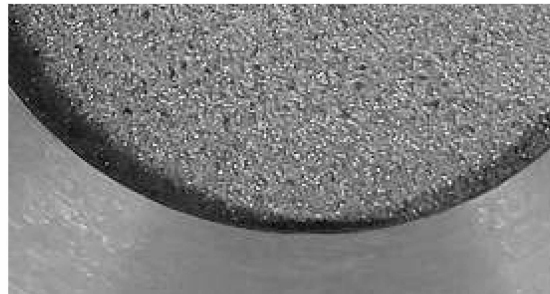
- Customizable injector designs
- Internal thermal soakback management
- Weight savings through integrated design



Generic Thruster Design*

INTEGRATED POROUS AND SOLID DESIGN TECHNOLOGY

- Propellant filters
- Injector diffuser screens
- Catalyst bed retainer screens



Porous-to-Solid (Patent Pending 3DP Technology)

DESIGN CONSIDERATIONS AND CAPABILITIES

Build Dimensions

- 9.7" x 9.7" x 11" build box, feature size as small as 0.010"
- 3D porosity down to 0.5 micron

Structural Qualification

- Propellant pressure drop requirements at injector
- Vibration and shock analysis
- Heat transfer characteristics
- Pressure rated to 20,000 psi or more

**Post-Design Prototypes
in Weeks not Months!**

Material Options for Propellant Compatibility

- Titanium available and other materials can be developed (Inconel 625/718)

In-Process Quality Control

- Verification that every injector assembly operates the same

*Sutton, G.P., and Biblarz, O.,(2017) *Rocket Propulsion Elements*, 9th Ed., John Wiley & Sons, Inc., New Jersey