



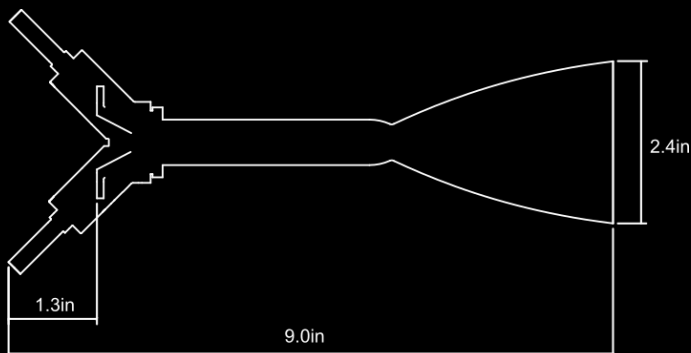
A110

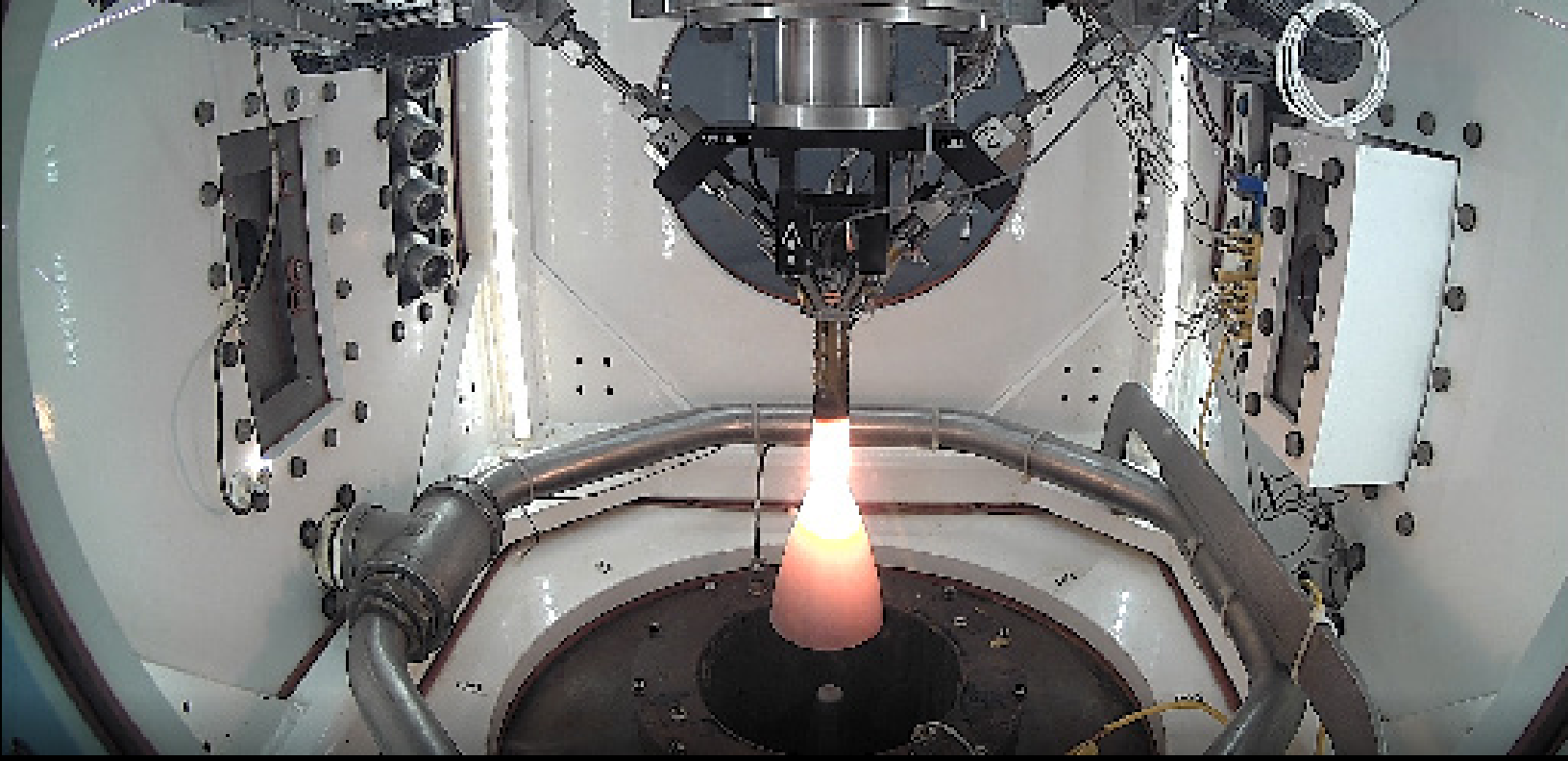
BIPROPELLANT THRUSTER

A110 is a 111.2-N (25-lbf) hypergolic, radiatively cooled thruster for spacecraft attitude control and ΔV maneuvers. The A110 includes two direct-acting single-seat solenoid valves for fast startup and shutdown responses, a refractory-metal chamber and nozzle, and a low-dribble volume multi-element injector. The small form factor, low mass, and a high-precision impulse bit capability support reliable attitude control maneuvers for lunar landers as well as ΔV and attitude control for smaller spacecraft.

Precision pulses of less than 5 milliseconds are accomplished by using custom fast-acting solenoid valves and additively manufacturing the injector. The small dribble volume on the A110 injector minimizes thrust transients on startup and shutdown.

Additive manufacturing is also used for the one-piece refractory metal chamber and nozzle, thereby saving cost by increasing the 'buy-to-fly' ratio and accelerating production time. The inlet tubes are made from Ti6-Al-4V and are friction stir welded to the stainless-steel valve body. Electrical interfaces are provided as flying leads for the valves.





SPECS:

PULSING	Yes
THRUST	111.2 ± 4.45 N (25 ± 1 lbf)
FUEL	M20
OXIDIZER	MON3
INLET PRESSURES	425 - 530 psia [Configurable]
O/F RATIO	0.90
SPECIFIC IMPULSE	≥ 305.5 s
CHAMBER PRESSURE	220 psia
EXPANSION RATIO	70
MINIMUM IMPULSE BIT	≤ 0.60 N.s
CYCLES/LIFE	> 12,000 cycles or 500 s [Qualification spec]
LONGEST SINGLE BURN CAPABILITY	Continuous
LONGEST SINGLE BURN DEMONSTRATED	84 s
START AND SHUTDOWN TIME	<10 ms
TOTAL MASS	340 g including leadwires
FLOWRATE	19.25 g/s (M20) and 17.33 g/s (MON3) at nominal O/F of 0.90
ELECTRICAL INTERFACE	Flying leads or connectors to valves
MECHANICAL INTERFACE	4x #6 fasteners

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ABOUT AGILE:

Based in beautiful Durango, CO, AGILE Space Industries is the premier innovation center for hypergolic propulsion systems.

Agile brings a unique blend of additive manufacturing experience, propulsion design capability, and world leading test facilities to enable the next generation of deep space missions.



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