



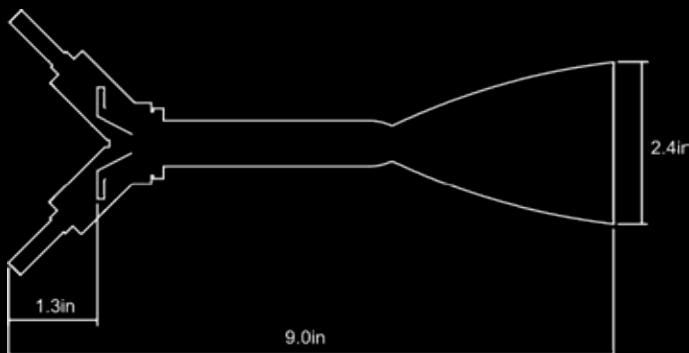
# A110

# BIPROPELLANT THRUSTER

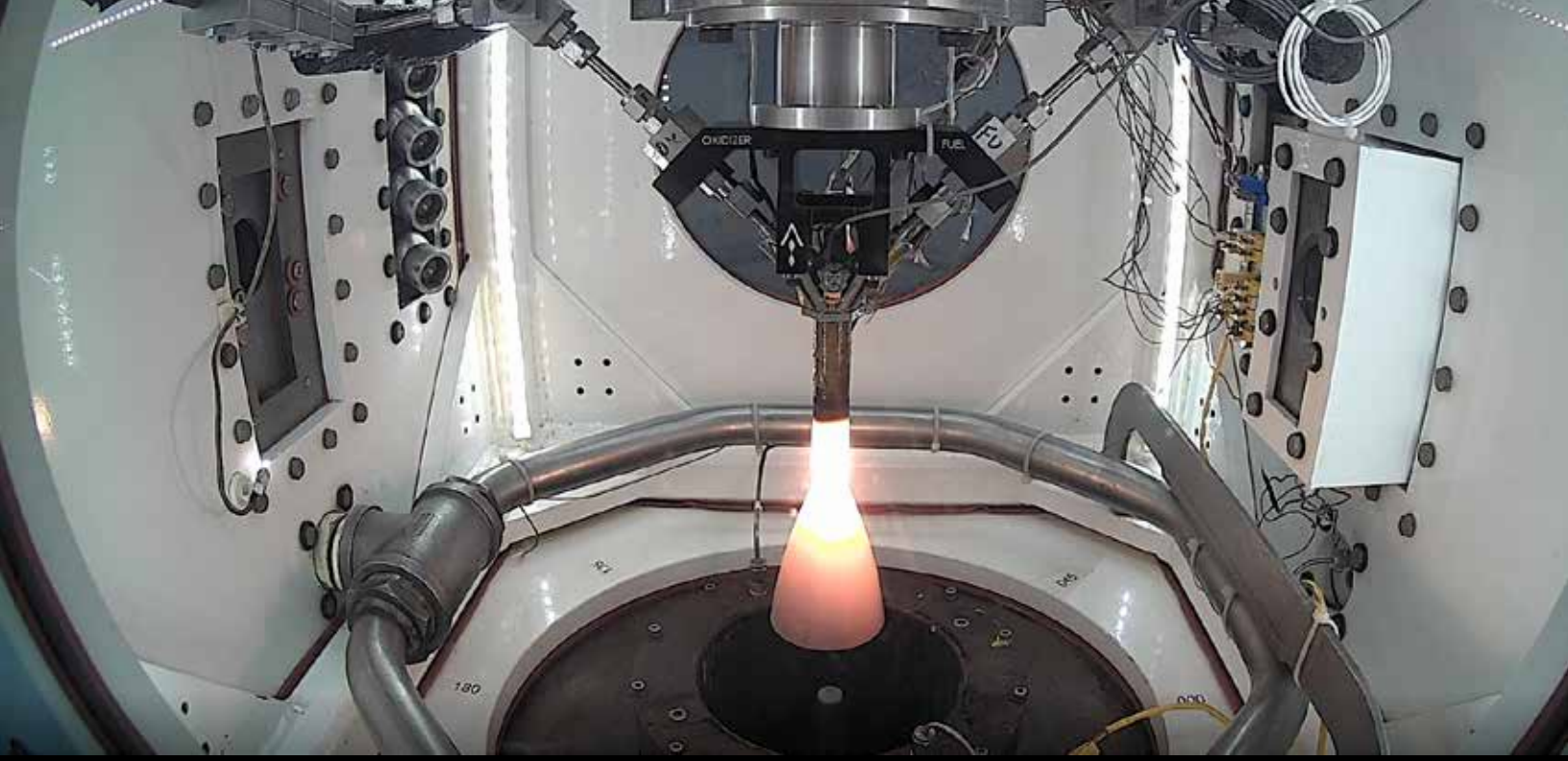
A110 is a 111.2-N (25-lbf) hypergolic, radiatively cooled thruster for spacecraft attitude control and  $\Delta V$  maneuvers. The A110 includes two direct-acting single-seat solenoid valves for fast startup and shutdown responses, a refractory-metal chamber and nozzle, and a low-dribble volume multi-element 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  $\Delta V$  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.



Made in Durango by [Durangatangas](http://Durangatangas.com)



## SPECS:

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



## CONTACT:

[agile.spaceindustries.com](http://agile.spaceindustries.com)

820 Airport Rd, Durango, CO 81303