CASE STUDY • AEROSPACE

Case Study: Better Accuracy and Reliability with Micro Motion™ ELITE™ Coriolis Meters for Rocket Launch Company

Customer

An American rocket launch company that designs and manufactures rockets for commercial orbital launch services.

Application

Measurement of liquid oxygen and liquefied natural gas flow rates, which are propellants used to test rocket engines. This measurement is crucial to determine how the engine is performing, similar to fuel mileage on a car, and allows the company to make changes to improve performance. Meters installed in a rocket engine test stand.

Results

- Better accuracy and repeatability resulted in improved efficiency and performance
- Improved efficiency led to significant cost savings

Challenge

Our customer designs and manufactures cost-effective, high-performance, and reusable rockets. It is a highly competitive market in which lower launch cost and improved efficiency are a big focus. The company used to rely on turbine flow meters that required temperature compensation, which is not ideal for this challenging application due to its low temperatures (-265 °F to –295 °F) and high vibration environment.

They were looking for a solution that would perform well in varying temperatures and provide direct mass measurement of propellant flow for better accuracy and repeatability.

Solution

Emerson installed two Micro Motion ELITE Coriolis Flow and Density Meters with CMFHC4M Sensors and Micro Motion 5700 Coriolis Transmitters featuring Smart Meter Verification. CMFHC4M was selected because of high flow rates capability, cryogenic conditions, and best turndown. The 5700 Transmitter was selected due to its easy to use interface, USB port, and extremely useful diagnostics capabilities.

EMERSON

Case Study: Better Accuracy and Reliability with Micro Motion™ ELITE™ Coriolis Meters for Rocket Launch Company

With Emerson's expertise in cryogenic applications combined with the measurement accuracy and reliability of our ELITE meters, Emerson was able to build trust and credibility with the Propulsion Test Engineering team at this company. As they design and develop new engines, Emerson will be their go-to vendor for measurement solution needs on their engine performance. Below is a more in-depth explanation on how Coriolis technology is being used by this customer to measure propellant flow rates:

> *"To maximize performance, we need to see the impact of small changes, and that's easier with Coriolis."*
>
> ***"Sr. Manager, Propulsion Test Engineering"***

The engine is first prepared for testing by cleaning it thoroughly and inspecting it for any damage. The propellant tanks are then filled with liquid oxygen (LOX) and liquid natural gas (LNG), and the quantities are carefully measured. To start the engine, the igniter system is activated, igniting the propellants and creating a high-pressure, high-temperature gas. High-pressure Coriolis meters such as the Micro Motion ELITE Coriolis Flow and Density Meter measure the flow rates of the propellants during this process.

The engine is then fired for a specified duration, and test engineers monitor its performance, including thrust, chamber pressure, and exhaust temperature. Once this test is completed, the engine is shut down by deactivating the igniter system and the propellant tanks are drained. The engine is then inspected for any damage. This process may be repeated multiple times under different conditions to gather data on the engine's performance. This data is used to improve the engine's design and ensure its reliability.

For more information, visit
Emerson.com/MicroMotion

00830-4300-4799 Rev AA

MICRO MOTION™

EMERSON™