

## Aerospace Manufacturer Relies on The Hope Group for Design and Construction of Pump Testing System

When a New England based aerospace company specializing in providing an array of flight control system products to both commercial and military establishments was seeking a turn-key testing solution for qualifying the integrity of avionic pumps, which are used to provide cooling to vital electronic systems in high altitude aircraft, they reached out to the automation specialists at The Hope Group. With a spike in orders for

cooling systems and a robust forecast for future demand, the company had an immediate need to upgrade its pump testing systems to meet production goals.

The customer's project engineers met with The Hope Group personnel to discuss the overall requirements for the new test stand. They determined that the test equipment would test each manufactured pump for compliance to standards and be able

to select the destructive testing for extreme conditions including high/low temperatures, shock, varying pressures, lightning strikes, voltage spikes, voltage drop, and precise flows. This full range of environmental conditions would simulate what the aircraft might experience in flight, particularly at high altitudes. Aside from simulation, the test equipment would also require a degree of data collection and input into data acquisition modules. All of this would require specialized software to be programmed in the data acquisition equipment to the individual control system components that create the extreme environmental conditions.

### Partnerships Promote Effectiveness

Recognizing the delivery time line, the need for specialized data acquisition and electronic controls expertise, the team at The Hope Group recruited an established controls company, with whom it had collaborated successfully in the past. The partnering company's expertise of automated testing, data acquisition, and electronic control systems meshed seamlessly with its systems engineering, product component selection, fabrication/assembly and final testing capabilities.

The aerospace pump manufacturer was delighted with the arrangement and with the degree of expertise that all parties brought to the table. As with most projects of this magnitude, there were a number of face-to-face meetings, which included the following: quote review, engineered system design, product verification, planned step-by-step test sequencing, purchase order placement, timeline delivery meetings, on-site fabrication inspections, and final

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### Test Stand Built for Aerospace Manufacturer

A major aerospace manufacturer sought to build a test stand capable of testing the durability of special pumps that would operate critical components on its jet aircraft. To test the pump's integrity under different temperature conditions, the testing equipment's heating and cooling devices varied the temperature of the fluid being pumped. It tested the pump under differing pressures, and subjected them to voltage spikes, voltage drops, and simulated lightning strikes.

## Pump Testing

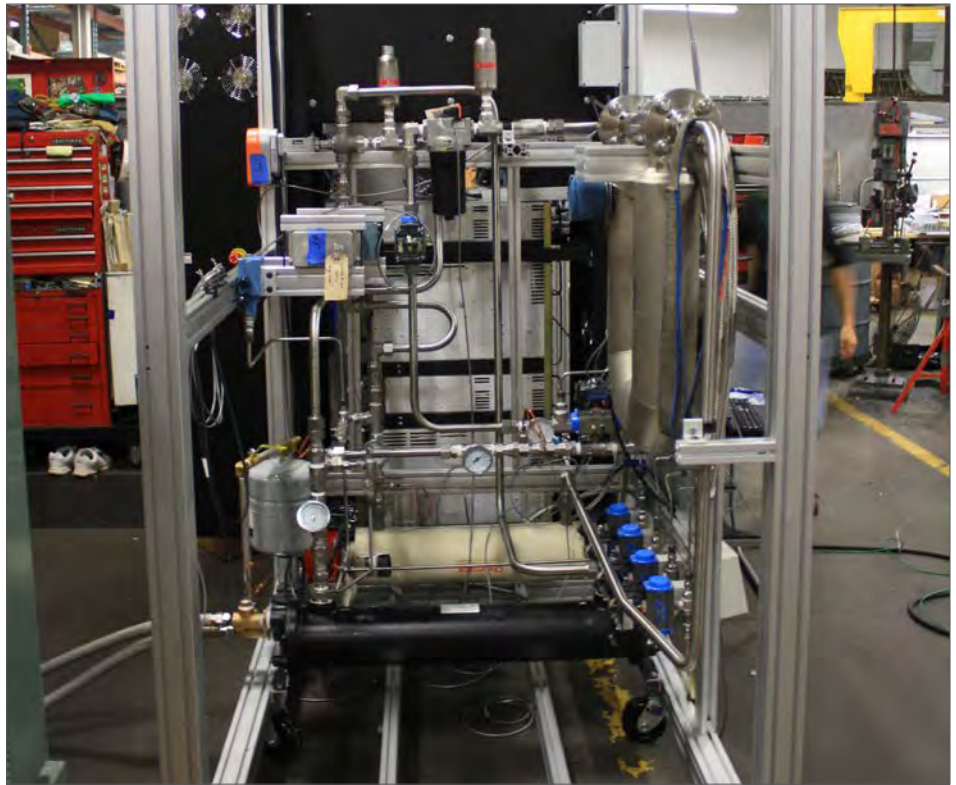
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testing. With all three parties present at each event, all communications were direct so decisions could be made rapidly.

The test stand included the controls company's LabVIEW software and electronic data acquisition modules, which were integrated into a structural aluminum frame. The The Hope Group team designed the circuitry for the sophisticated system used to create the varying flight conditions. It selected the components, fabricated the assembly, connected the fluid lines, and wire the integrated electronic components to the data acquisition modules. A peek at the components bill of material shows an array of chillers, flow meters, heaters, pressure sensors, temperature sensors, shutoff/metering valves, gauges, proportional directional valves, a custom fluid tank, connecting tubing/hose, fluid connectors, motorized ball valves, AC/DC and high voltage power supplies mounted in an electrical cabinet, fluid filters, relief valves, and pneumatic controls.

## Successful Witness Testing

With the fabrication process completed, final witness testing and acceptance was performed at The Hope Group's 60,000 square foot manufacturing, warehouse and headquarters facility in Northborough, Massachusetts. The equipment tested the pumps for functional capability, for flow, pressure, temperature, power consumption and overall quality. To test the pump's integrity under different temperature conditions, the testing equipment's heating and cooling devices varied the temperature of the fluid being pumped. Back pressuring the system coolant fluid with variable orifice proportional valves created changing pressure conditions. Voltage spikes, voltage drops, and a



### The Hope Group Designed Sophisticated Circuitry

*To create the varying flight conditions of heat, cold, pressure, and other threats to the pump's integrity, The Hope Group designed the circuitry of the sophisticated system that simulated those conditions. The Hope Group engineers selected the components, the fabrication team built the assembly, connected the fluid lines, and wire integrated the electronic components to the data acquisition modules.*

lightning hit simulation were controlled through high and low voltage power supplies. Meanwhile, an array of sensors linked to the data acquisition modules monitored pressure, temperature, voltage, and flow characteristics for reference and analysis. Finally, after the step-by-step testing was completed, all lines and components were purged of the propylene glycol and de-ionized water test fluid.

All testing was performed within the confines of the aluminum framed assembly. A spray shield surrounded the pump test area for safety in the event of a fluid rupture during pressure testing. Aluminum framed carts were constructed to transport each pump to

and from the test rig. With initial test acceptance completed, the test assembly was then disassembled and shipped to the pump manufacturer's location. A team of The Hope Group technicians reassembled and shipped to the pump manufacturer's location. A team of The Hope Group technicians reassembled the entire test stand in the designated area on the manufacturer's floor. The new test stand increased production by 25 percent, reinforced quality verification, and occupied 33 percent less floor space than the old method. In every way, the product created a positive impact on the customer's bottom line.