

This was a short case study article that was written for an email newsletter taking technical information and making it accessible to both engineers and their managers (Oilgear).

“Sometimes it IS Rocket Science.”

Engineers love a challenge. What if that challenge involved raising 152,000 pounds of highly engineered equipment supporting a rocket, from horizontal to within two degrees of vertical and then moving it out of the way of the launch in under four seconds? And it needs to be reusable. Orbital Sciences of Wallops Island, VA, had such a challenge and selected Advanced Fluid Systems to help design and manufacture a Lift & Launch Retraction System for propelling an Atares rocket into space. Oilgear had the privilege of supplying the pumps required to help make the process work.

This four year project was part of the creation of a new launch pad by the state of Virginia. The first big mission will be the launch of a satellite in September, 2013. The project was so complicated that only one company entered a bid. Not satisfied, Orbital Sciences approached Advanced Fluid Systems because of their reputation for quality application and design expertise. Ultimately, Advanced Fluid Systems was chosen to design and build the hydraulics and all controls for the lift and launch system. Project details:

- A rocket would be built onto a horizontal strongback. Once the rocket is ready to launch, it has a one mile trip on the strongback rolling out to the launch location.
- A 30 minute process to lift the rocket to two degrees (virtually vertical), then umbilicals are pulled out, the strongback is moved down within four seconds (with rapid retract accumulators) to 15 degrees so it is out of the way. Then the rocket launches.
- The entire Hydraulic Power Unit (HPU) must be in a temperature controlled environment for sake of the fluid being used.
- Triple redundancy on some key systems.
- Every aspect of the project must be thoroughly documented.
- A test mission and an additional three to four launches need to be completed successfully.

While it may seem that creating a system with only a 30 minute duty cycle isn't much of a challenge, this project required ultimate precision and an incredible amount of testing to ensure that it was fail proof and addressed strict environmental and safety concerns. NASA engineers oversaw every aspect of the design and testing. For a short video of the project, click here <http://www.youtube.com/watch?v=hv16wSvYz4>

Because they were working near a marine environment and needed a fire resistant fluid, the customer had specified using alternative fluids for the hydraulics. Advanced Fluid Systems

Pump Tech Specs

- Pumps set-up with flooded inlet, 1300 gallon reservoir for the system
- All pumps used pressure comp controls
- Pumps destroyed with max volume stop
- Main pumps run at 1800 RPM, cir pumps run at 1200 RPM
- 30 minute duty cycle to lift the rocket

had good experience working with Oilgear's pumps and knew they were uniquely capable of handling synthetic fluids.

Also, Oilgear's PVG pump was a good fit for the project that required a pressure of 3000 PSI as the pump is rated at 3750 PSI. They also knew that Oilgear would have the product available.

Oilgear's pumps make use of hard-on-hard technology and hydrodynamic bearing design to better handle alternative fluids. In fact, no one else's pumps work with synthetic fluid better. Oilgear will work with customers to design a pump solution to meet the needs of any fluid engineering application. "It is exciting to work with companies like Advanced Fluid Systems who have the application and design expertise to apply Oilgear products to meet their customer's challenges and needs," comments Craig LeFave, Oilgear's (title). It is especially thrilling to see our pumps used to send a rocket to space! Of course most of Oilgear's pumps work on more 'everyday' projects, but it does illustrate how our pumps are engineered to handle the toughest conditions."

If you are working on a process requiring alternative fluids, please contact Oilgear to take advantage of our engineering expertise!