



Star Hydraulics goes into orbit

SpaceX recently made history in being the first private company to send a spacecraft to the International Space Station. The celebrations were also shared by UK company Star Hydraulics, who provided the project with a series of electro-hydraulic servo valves for the rocket's thrust vector control (TVC) system.

On 22 May 2012 private spaceflight took one giant leap forward when SpaceX's Falcon 9 rocket lifted the unmanned cone-shaped Dragon capsule into space from Cape Canaveral Air Force Station in Florida on a mission to the International Space Station. This was a major triumph for SpaceX, who have made history in becoming the first private company to send a spacecraft to the space station. On 23 May: Dragon orbited Earth as it travelled towards

the space station. On 24 May, Dragon's sensors and flight systems were subjected to a series of complicated tests to determine if the vehicle is ready to berth with the space station; these tests included manoeuvres and systems checks in which the vehicle came within 1.5 miles of the station. On 25 May NASA gave Dragon the go-ahead to attempt berthing with the station. Dragon approached and was captured by station's robotic arm and successfully

attached to the station. On 25 to 31 May astronauts opened Dragon's hatch, unloaded supplies and filled Dragon with return cargo. Then, on 31 May Dragon detached from the station and returned to Earth, landing in the Pacific, a few hundred miles west of Southern California.

Objective

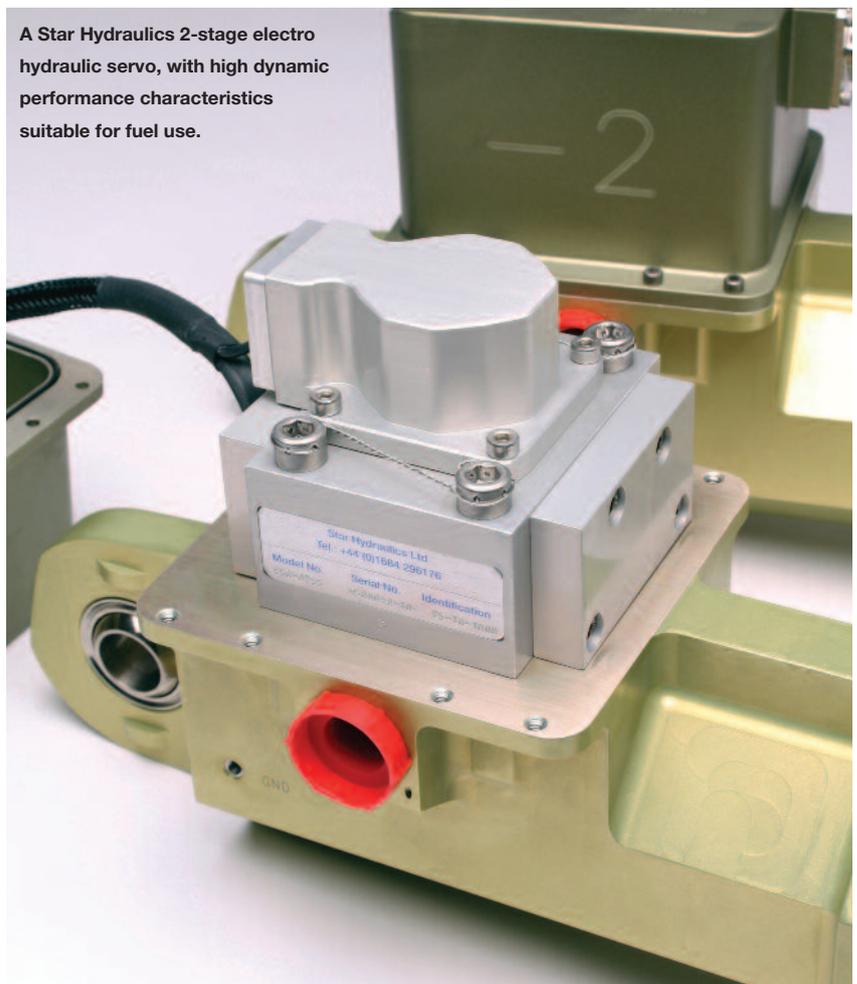
The mission was undertaken in line with NASA's objective to outsource spaceflight to privately funded

companies, and to confirm that the Falcon 9 rocket and Dragon capsule are ready to haul cargo to the International Space Station on behalf of NASA. It is also planned to transport astronauts via Falcon Heavy and Dragon capsule in due course. The launch of Falcon 9 was also a major triumph for the technology providers behind the project. One such company is Star Hydraulics Ltd. based in Tewkesbury, Gloucestershire.

The right performance and capability

Star Hydraulics' involvement began back in 2007 when US-based O Miller Associates LLC and Jansen's Aircraft Systems Controls, Inc., both of whom have been dealing with aerospace technologies for many decades, were actively seeking alternative suppliers of servo valves that have the performance capability and quality suitable for commercial space flight programmes. O Miller first contacted K+S Services, Star Hydraulics' distributor in the US, and requested talks to examine suitability and interest to develop a servo valve to be included within a new TVC design. A number of transatlantic conference calls then occurred to discuss the specifics of the project and the actual requirements of the servo valves as well as the long-term relationship with which to grow this business.

Fully operational prototypes were supplied shortly afterwards for various static and dynamic tests to



A Star Hydraulics 2-stage electro hydraulic servo, with high dynamic performance characteristics suitable for fuel use.

ensure that the core performance criteria could be met and integration into existing hardware. Subsequent units with additional features were then supplied for rigorous 3-axes shock and vibration profiling on shake tables, which was undertaken by an independent test conforming to MIL standards. Every aspect of the valve's design was checked and where necessary changed to mitigate failure during take-off. The SpaceX ideology was prominent from day one that this will ultimately be a fast turnaround, reusable launch vehicle system. All in house test procedures and test data were also subject to direct scrutiny from NASA.

Aerospace roots

Production of the valves commenced in August 2008 so that SpaceX could commit to extensive land-based engine tests at its facilities before proceeding to cold-firing and ultimately the first Falcon 9 launch in June 2010. Servo valves were originally developed for use in the aerospace industry back in the 1950s and subsequently adopted in variety of industrial applications. The

precision and quality of components, together with the skill and finesse of the personnel, enables Star Hydraulics to produce high-quality servo valves that are distributed worldwide. With the development of further industrial and aerospace products Star Hydraulics is relocating to much larger manufacturing premises this August.

Preferred supplier

In 1983 Star Hydraulics founded its repair facilities to provide fast and cost-effective servicing for industrial servo valve users, not only for routine service regimes but also in 'breakdown' situations for almost every brand of servo. In 1993 the company introduced its own range of servo valves with the main focus on extending operational life capabilities to ensure vital testing such as military and civilian fuselage and landing gear tests could operate beyond 5 years. These developments led Star Hydraulics to be the preferred supplier to many large UK based aerospace companies such as BA Systems, Airbus, Agusta Westlands, Goodrich.