

Parker and Bloodhound: breaking the 1000mph barrier

At Parker Hannifin, we're involved in one of the most exciting engineering projects of recent years.

As one of the product sponsors of the Bloodhound landspeed project, we're providing leading edge technology and technical support to this unique British venture to become the first land vehicle to break the 1000mph barrier.

For those unfamiliar with Bloodhound it's the brainchild of Richard Noble, of Thrust SSC fame which, with pilot Andy Green, holds the landspeed record for a wheeled vehicle, at 763.035 mph. Since Thrust SSC went supersonic (Mach 1.016) in 1997, there has been considerable interest from a number of countries in developing a vehicle that can break the current record; these include the North American Eagle, the Fossett LSR and the Aussie Invader 5R.



Richard Noble and Andy Green

For the Bloodhound team the challenge is to keep the land speed record in Britain – since its inauguration in 1898 we've held it for more years than all other countries combined – and to use the project to create national interest in Science Technology, Engineering and Mathematics (STEM) subjects, and attract new engineers into industry.

This is where the importance of our sponsorship comes in. We're

working with the Bloodhound team to develop precision hydraulic systems, and help promote the project to the next generation of engineers.

Our hydraulic systems will play a crucial role in controlling air brakes and aerodynamic trim. We'll also be supplying equipment for the development and test phases of the project, and for ground support during the timed runs - scheduled to take place in the Hakskeen Pan desert in South Africa in 2012.



The air brakes operate in conjunction with drag parachutes, to slow the vehicle (weighing over 5 tonnes) from over 1000mph, or Mach 1.4, in a maximum distance of 4.5 miles. Below speeds of 250mph aircraft style disc brakes are used.

The challenge for designers is far from straightforward, as airbrake and parachute systems rely on aerodynamic drag, which changes with speed. Aerodynamic drag is proportional to the square of the speed, so the drag from the airbrake deployed at 800mph is 4 times higher than that at 400mph, in turn 4 times higher than the drag at 200mph.

So an airbrake that works well at 800mph is ineffective at lower speeds. To control the rate of deceleration, a parachute will be deployed at around 600mph. This will add a drag load of up to 6 tonnes to the car, increasing



the rate of deceleration by a further 1g, or an extra 20 mph every second.

It's also crucial to maintain a stable attitude during acceleration and deceleration. Again, this is far from straightforward. The aerodynamics and pitch moment change with speed and these forces control the loads on each wheel, influencing their ability to generate lateral forces as each wheel comes into contact with the ground.

Each wheel rotates at around 10,000rpm, generating 50,000g at the rim, with the aerodynamic forces being controlled by the use of programmable, hydraulically controlled winglets.

The technical challenges of Bloodhound are immense, for the vehicle as a whole and for the individual motion and control systems that take the vehicle and driver Andy Green safely from 0-1000+mph and back to 0mph again in just 10 miles.



Bloodhound grabbing attention recently on The Strand

Throughout, the project is breaking fresh barriers, entering a realm where there is little existing practical experience. So, for Richard Noble and the Bloodhound team the ability to partner with companies such as Parker Hannifin, and to share design, engineering and product skills and knowledge with acknowledged industry experts is an essential factor in this exciting record breaking attempt.



Parker Hannifin Ltd.
Tachbrook Park Drive
Warwick
CV34 6TU
Tel: 00800 27 27 5374
email: parker.uk@parker.com

ENGINEERING YOUR SUCCESS.

www.parker.com 00800 27 27 5374



Together, we can break new barriers

Working with Bloodhound to make the impossible possible



Break your machine performance barriers with Parker motion and control technologies.

Our innovative products and systems, unrivalled knowledge and global resources deliver real technical and commercial benefits – that's why leading businesses choose to partner with us.

With Parker you can reach new levels of speed, precision and reliability, breaking the barriers for performance, productivity and profitability.

To learn more call our sales team today on 00800 27 27 5374

aerospace
climate control
electromechanical
filtration
fluid & gas handling
hydraulics
pneumatics
process control
sealing & shielding



ENGINEERING YOUR SUCCESS.

www.parker.com 00800 27 27 5374