

# Successful rocket test for 1000 mph car

**Ian Le Guillou** *experiences the Bloodhound rocket test*



What do you get if you cross a formula one engine, a pump from a cruise missile, 400 litres of hydrogen peroxide and 181 kilograms of rocket fuel? That's what engineers from the Bloodhound supersonic car project were trying to find out in Newquay last month.

Building a car that travels over 1000 miles per hour is no easy feat and needs a lot of planning and testing to get it right. Last month's test, carried out in a bomb-proof hangar on an RAF base, was the first test to put all the components of the rocket system together. It appears to have been a complete success with the rocket burning stably and more powerfully than expected. The test has generated huge amounts of data, which the engineers will be looking through carefully to check that everything worked.

## Breaking a world record

Next year, fighter pilot and current land speed record holder Andy Green will be driving Bloodhound SSC across the Hakskeen Pan in South Africa. Green is expecting a difficult drive: 'I'm controlling all three engines ... keeping the car straight, looking to get it to the right speed through the measured mile, shut down those engines and then I've got the air brakes, parachutes and the wheel brakes to sequence to make sure we stop exactly at the end of the 12 mile track. From a standing start, I'll be at the other end two minutes later.'

The team are using a rocket that combines a liquid fuel and a solid fuel, known as a hybrid rocket. Solid rockets, like the one used on the space shuttle, are very stable but once they start burning they are impossible to stop if something goes wrong. This is not a major problem for the shuttle, because the rocket can be jettisoned easily, but this is not such a good choice for a car. The hybrid rocket gives much better control, as the driver can simply switch off the pump for the liquid fuel, shutting down the rocket.

## Rocket fuel

The liquid fuel, hydrogen peroxide, is pumped through a silver catalyst which breaks it down into water and oxygen. This is a powerful reaction which raises the temperature to 600°C. However, the hydrogen peroxide is very unstable so it needs to be ultra-pure and the holding tank must be cleaned with nitric acid beforehand. Even a misplaced fingerprint could be enough to start the reaction unexpectedly.



Once the chamber reaches 600°C, the solid rocket fuel can ignite. This fuel is known as hydroxyl-terminated polybutadiene (HTPB), a highly stable rubber. You could hold a match to it and it wouldn't burn. At 600°C and surrounded by oxygen it will burn readily, bringing the temperature in the chamber to 3000°C. The engineers were keeping a close eye to see if the HTPB burned evenly – a common problem with solid fuel. The fuel rod was finely tuned by Daniel Jubb, a self-taught rocket engineer, using the same techniques he uses for military systems. This means that they must be kept highly secret and can't even be patented.

## Pushing limits

The Bloodhound system is the largest hybrid rocket of this kind in Europe and there are a lot more tests to complete as the engineers push it further towards its limits. Just like the test last month, the record attempts will be streamed live over the internet so that we can all see what the world looks like at 1000 miles per hour.

**The Bloodhound hybrid rocket engine roars into life**

**See it in action**

Watch how the test happened in real-time:  
<http://bit.ly/VD664v>

Take a look inside the rocket system:  
<http://bit.ly/VD6eAR>