

DEVELOPMENT MICHAEL PHELAN / LONDON

Rutan bids for \$10 million X-Prize

Preparation of two-stage design under way in California as Scaled Composites works to win private rocket contest

Scaled Composites is preparing its challenge for the \$10 million X-Prize private rocket competition. Its two-stage sub-orbital design comprises a conventional take-off and landing high-altitude aircraft, coupled with an air-launched, rocket-powered second stage and re-entry vehicle.

The first-stage vehicle, dubbed White Knight, is a turbojet-powered high-altitude research aircraft which Mojave, California-based Scaled Composites first flew in August last year. Powered by twin afterburning General Electric J85-GE-5 engines, the 28.4m (93ft)-span aircraft can

seat three people and climb to over 53,000ft (16,100m), says the Burt Rutan-led company.

The three-seat SpaceShipOne rocket stage features the same cockpit and systems as the White Knight, including avionics, electrics and environmental control system. After release from the White Knight at 50,000ft, the craft is boosted to an altitude of 100km (62 miles).

SpaceShipOne uses a specially developed hybrid rocket motor that burns nitrous oxide (NO₂) and hydroxy-terminated polybutadiene (HTPB), essentially rubber, for safety reasons. Rutan says the

HTPB fuel and NO₂ oxidiser can be stored safely without the special precautions required for solid rocket fuels or liquid hydrogen and oxygen tanks.

"Starting the motor requires introducing a significant source of heat into the fuel and then the oxidiser. It is a safe and simple alternative to its liquid and solid cousins," he says. Motors are being developed competitively by Environmental Aeroscience of Miami, Florida, and SpaceDev of San Diego, California, and the composite NO₂ tank and case/throat/nozzle were developed at Scaled Composites.

Another unusual feature is the second stage's ability to convert to a stable, high-drag shape for atmospheric entry. This configuration allows a "hands-off" re-entry and "greatly reduces aerothermal loads", says Rutan. The cockpit is designed as a "shirt-sleeve" environment, and the vehicle is equipped with three flight-control systems – manual-subsonic, electric-supersonic and a cold-gas re-entry control system.

The SpaceShipOne is flown manually during the entire boost and re-entry phases, and Scaled Composites and FunTech of Orlando, Florida, have developed inertial navigation and GPS systems which provide the pilot with guidance during flight and approach, as well as vehicle health monitoring.

The X-Prize, launched in 1996, offers a cash reward to the first privately financed, built and launched spacecraft able to carry three people to an altitude of 100km, return them to Earth and repeat the flight within two weeks. The flights must be completed before 2005.



SpaceShipOne uses a specially developed hybrid rocket motor that burns NO₂ and HTPB

SCIENCE TIM FURNISS / LONDON

Mars rovers take advantage of telescope delay

The much-delayed launch of NASA's last Great Observatory, the Space Infrared Telescope Facility (SIRTF) has been pushed back again, this time until mid-August, to allow time for engineers to change out one of the nine solid-rocket boosters on the hybrid Delta

II heavy launch vehicle at complex 17 at Cape Canaveral.

The nozzle of the suspect booster had suffered multiple delaminations, which could have caused a burn-through during launch.

The delay is also to give time for the two Mars Exploration Rovers

(MER) to meet their Delta II launch windows from the same complex at Cape Canaveral, which close on 13 July. MER 1 is set for a 6 June lift-off and MER 2 for 25 June.

Meanwhile, the seriousness of wiring faults found in the two craft, which had already delayed

MER 1, is becoming more apparent with an admission that they could have caused both craft to fail. The MERs were found to be suffering from electrical connector faults that could have caused short circuits that would have made the radar landing control system fail.

MOON MISSION

India's Somayana 1 lunar polar orbiter to go ahead in 2007-8

India will proceed with a plan to launch a lunar polar orbiter, Somayana 1, aboard its Polar Satellite Launch Vehicle in 2007-8. The 4 billion rupee (\$85 million) mission would conduct global imaging, mineralogy and chemical mapping of the moon from a 100km orbit, producing a three-dimensional atlas with a resolution down to 5m.

India also reports that its C-band, Ku-band communications satellite, GSAT 2, will be launched aboard the Geostationary Satellite Launch Vehicle D2 from the Satish Dhawan centre, Shriharikota, in May.

SPACE FACILITY

Italy's Kenyan pads face closure

The two main launch pads of the Italian Broglio Space Centre (formerly San Marco) off the coast of Malindi, Kenya, are likely to be closed soon due to a lack of funding. The site, from which Italy launched its first satellite using a US scout booster, faces closure despite a recent drive to resurrect it after the facility was

renamed after the father of the Italian space programme, professor Luigi Broglio, late last year.

There had been speculation that Broglio could be used for the development of the FiatAvio-led Vega launcher programme.

Most of Italy's space activities are now integrated within the European Space Agency.