

## RESEARCH

## R-R opens Darmstadt UTC centre

Rolls-Royce has opened its latest University Technology Centre (UTC) at the Darmstadt Technical University (TU) in Germany.

The 25th UTC that the company has established in Europe, the Darmstadt centre is the third in Germany and will specialise in the aero-thermal interaction between an engine's combustor and turbine. In the last two years, UTCs were established with the Brandenburg Technology University and at Dresden University.

"Improving the environment is a big challenge for us all, and TU Darmstadt will play a key role for us in helping to meet future targets the industry has in this area," says R-R engineering and technology director Colin Smith.

R-R has set up a network of 27 UTCs, initially in the UK, but more recently in the USA, Norway, Sweden, Italy, Germany and Singapore. They tackle engineering disciplines from combustion and aerodynamics to noise and manufacturing.

## FANRAFT ARIE EGOZI / TEL AVIV

## X-Hawk takes to virtual skies using bespoke simulator

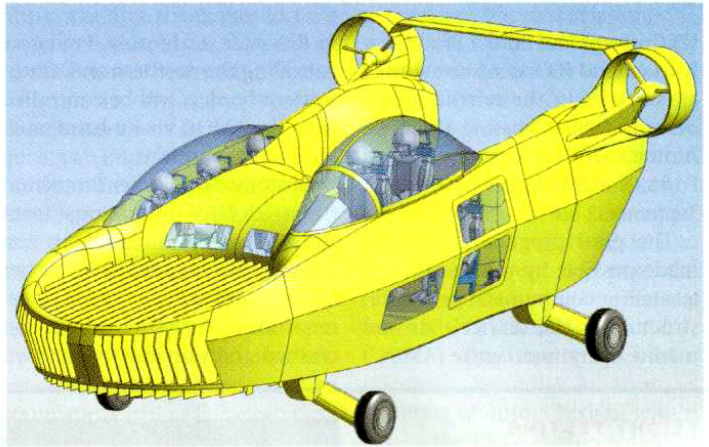
Urban Aeronautics' developmental module will formulate flight modes and control laws

Flight modes, cockpit layout and control laws are being developed for Urban Aeronautics' X-Hawk using an internally developed simulator. Described as a fancraft, the X-Hawk is a vertical take-off and landing vehicle with tandem shrouded rotors, designed for use in urban canyons. First flight is set for 2009.

The flight simulator is located at the company's headquarters in Yavneh, Israel. "The simulation runs on Matlab/Simulink [software] and drives two image generators in parallel, mounted inside the dome," says Urban. The 5m (16.3ft)-diameter dome has hydraulic pitch motion.

The X-Hawk will have a fly-by-wire control system, with upper and lower vanes on the rotor ducts providing pure lateral control, without roll. The control vanes and shrouded rotors will enable the X-Hawk to hover while in contact with a wall, Urban claims.

Urban and high-rise rescue are among missions proposed. The



Israeli company is pursuing a military version with Bell Helicopter and Penn State University in the USA, and is also studying an unmanned version called the Mule for combat-zone supply and medical evacuation missions. The Mule would be 25% smaller than the X-Hawk with a maximum take-off weight of 1,090kg (2,400lb) and a payload of 454kg.



X-Hawk is set for first flight in 2009

## ENVIRONMENT GUY NORRIS / RENO

## Team in talks to continue Silent Aircraft project

Members of the Silent Aircraft Initiative (SAI) team, led by the Cambridge-MIT Institute, are to meet NASA and Boeing in March to discuss options for extending the future of the project (*Flight International*, 7-13 November 2006).

The meeting, to be held at MIT, will include several other companies involved in the three-year SAI study that formally ended in 2006, and will examine "what specific next steps we should take if we were to go forward with it in a concentrated way, rather than random academics," says MIT SAI lead Edward Greitzer.

Future directions could include a revised design aimed at maximising fuel reductions rather than noise, as well as more work on nearer-term, lower-risk versions. Specific

follow-up research areas will also be required in propulsion/airframe integration, structural aspects of the non-circular pressure vessel, variable-area/thrust-vectoring nozzle and low-speed aerodynamics.

"The most evident challenge is the propulsion system," says Greitzer. He says work is needed to focus on inlet design, aero-mechanical areas, operability and performance. The biggest single challenge of the current SAX-40 configuration is devising a fan able to cope with distortion caused by the boundary layer, which is ingested over the top of the fuselage.

Speaking at the American Institute of Aeronautics and Astronautics aerospace sciences meeting in Reno, Nevada, Cambridge University SAI lead

Ann Dowling said the project took a "more revolutionary than evolutionary approach, and pushed the envelope". The result, she added, "are a number of technical challenges that we've flagged and which will have to be addressed before this could become a real aircraft".

Study members are being encouraged to extend the SAI project by the reaction of industry and the US Air Force, which is showing interest in the design implications of the integrated propulsion technology for potential improvements in long-range cruise and low-observable performance.

Technologies attracting interest from the USAF include the SAX-40's cambered lifting centrebody for low approach speed and efficient cruise; its embedded, dis-

tributed propulsion system with ultra-high bypass engines and variable-area, thrust-vectoring nozzles; the flapless wing with continuous-mouldline deployable drooped leading edges and elevons with trailing-edge brushes to reduce approach noise; and faired landing gear to eliminate noise sources.

The cambered lifting centrebody is also of interest to Boeing, which continues its long-running studies of the similarly configured blended wing body. BWB pioneer Robert Liebeck, Boeing's BWB programme manager, says: "The military is every bit as interested. The F-117 that was shot down in eastern Europe - they shot at the noise. And a C-17 that was descending in weather was hit because they shot at the noise."