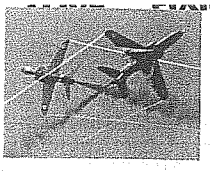
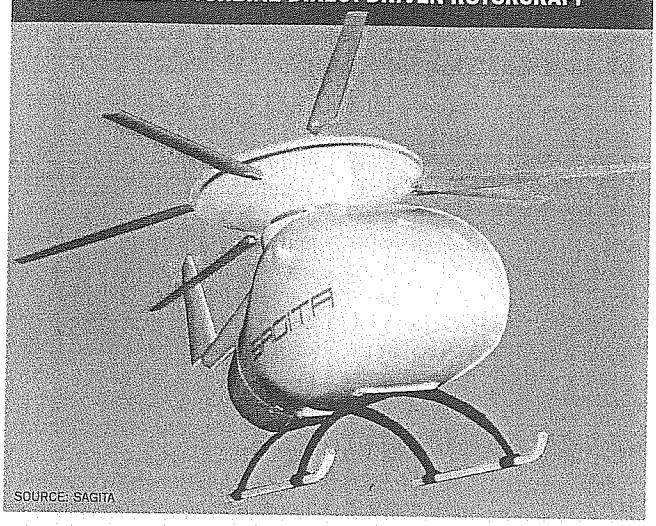


RIAT storms back after a washout in 2008
PHOTO SPREAD P26

SAGITA SHERPA TURBINE DIRECT-DRIVEN ROTORCRAFT



SOURCE: SAGITA

ROTORCRAFT ROB COPPINGER LONDON

Helicopter driven by engine exhaust in windtunnel test

Focus on autorotation qualities, fuselage drag and flight stability

Wind tunnel testing of a one-fifth scale-model exhaust gas driven co-axial rotor helicopter called Sherpa has been carried out by a Belgian consortium.

The Sherpa is a two-person helicopter with a dry mass of 540kg (1,190lb), a rotor diameter of 5.6m (18.3ft), a top speed of 129kt (240km/h), hover ceiling of 7,210ft (2,200m) and a 400km (216nm) range.

Its exhaust gas propulsion system is called Turbine Direct Driven Rotor or the acronym REDT.

Using the Belgian University of Liege's wind tunnel, the first campaign occurred in December 2008 and focused on auto-rotation qualities and fuselage drag. A second campaign starting later this year will examine flight stability. A remote controlled one-fifth scale-model version of Sherpa has also been flight tested.

REDT uses a centrifugal compressor that feeds air to two piston engines and directly to the turbines that turn the co-axial rotors. The direct bypass air is fed at 1.31 bar and 120° celsius while the piston engines, which also drive the compressor, also direct their exhaust gases to the rotors' turbines.

The consortium claims its REDT's benefits are a reduced number of moving parts, with no gearbox or tail rotor, and improved reliability.

Corporate consortium member Sagita's founder and managing director Hubert Antoine told *Flight International*: "The retreating blade stall effect has been eliminated with our coaxial rotors as we always have one blade advancing forward on each side, like the Sikorsky X-2."

He adds that the blades' tip cannot exceed 655ft/s (200m/s) as the direct drive's circumferential turbine speed is limited to a maximum of 163ft/s.

The blades are also very stiff allowing for a very narrow distance between the two rotors. Sherpa is funded by its four corporate partners and Walloon regional government funding. The universities of Liege and Brussels are the two academic partners. ■

PROPULSION ROB COPPINGER PARIS

European open-rotor blade study under way

Results of wind tunnel open-rotor blade testing that started in Russia earlier this month for the European project DREAM (valiDation of Radical Engine Architecture systeMs) will be available by the end of the year.

At Russia's Central Aerohydrodynamic Institute one fifth- and one seventh-scale blade testing is being carried out on existing electrically powered rigs at speeds of up to Mach 0.85. Started a year ago DREAM is a three-year €40 million ($56.5 million) project led by Rolls-Royce to investigate open-rotor engines and new fuels.

A baseline open-rotor engine design is now being validated until November after "brain storming" in March led to concept study work beginning in May.

"A few weeks ago we provided the baseline [open-rotor] design [to DREAM members] wth some mechanical parameters," Snecma's Guy de Spiegeleer told the 3rd European Conference for Aerospace Sciences held in Paris. Snecma is one of the DREAM partners and the French company will lead work on a direct-drive type of open-rotor. R-R is studying a geared solution.

Another area of research de Spiegeleer described is integration between the fuselage and pylon that connects the open-rotor engine to the cabin. This includes active blowing systems to add energy to the pylon's trailing edge's boundary layer.

DREAM's fuels work is studying synthetic kerosene produced using the Fischer-Tropsch process as well as biofuel candidates. ■

NANOTECHNOLOGY

United Aircraft invests in research into compact storage of hydrogen

Russia's United Aircraft is investing heavily in nanotechnology research and foresees an intial application for the compact storage of hydrogen for aerospace purposes.

A drawback to using hydrogen in aerospace applications such as fuel cells and its direct combustion in a turbine is that in its gaseous form it requires large pressurised tanks and as a liquid it requires cryogenic storage, all of which have mass penalties.

"We are conducting a very deep investigation [in nanotechnology]," says United Aircraft research and development director Vladimir Kargopolstev.

The company is studying compact hydrogen sources with the help of Russia's nuclear science centres and the Belarusian Institute of Nuclear Systems. Another application being examined is the use of diamond coatings. ■

PROPELLANTS

MBDA prepares for Mach 7 gel fuel flight trial

A flight test of gel fuelled propulsion is to be conducted by MBDA in October or November this year. Gel fuels have the storage advantages of solid propellants but under shear stress they act like liquids. The test vehicle will fly at up to Mach 7.79.

The motor that uses the gel fuel had its combustion efficiency measured last year, and while the insulation used at the time was determined to have had some bearing on the motor's effectiveness, efficiency levels of 85-95% were achieved.

MBDA project engineer Ralf Stierle says: "There is also work on bipropellant [versions]." ■