

The Automated Transfer Vehicle Jules Verne

## The first Supply Ferry to Space

When the International Space Station (ISS) is complete, and fully manned, the station will need a regular supply of propellant, food and other supplies for general maintenance activities onboard. The most cost effective way to achieve this is to use unmanned ferries for one time use. Europe's main contribution to the station is developing and building the required number of such ferries. The Automated Transfer Vehicle (ATV) is today in the closing stages of development/

The structural model is being tested and building the first flight vehicles is in progress. The ISS will require re-supply every twelve months and plans are now being made for launching nine ATVs, with the first launch scheduled for 2004.



The ATV Structural Thermal Model (STM) is standing on the vibrator table.



Manoeuvring Thrusters at the lower part of the structure.

The ATV will be launched with Ariane 5 from Kourou and docked to the station several hours later. Each ATV will remain docked for several months and during this time its engines can be fired to raise the Space Station's altitude, compensating for the gradual lowering of the orbit caused by the Earth's atmosphere and solar pressure. During this time, the ATV will function as a store for the station, with onboard supplies regularly being taken out and replaced by rubbish. At the end of its useful life the ATV will be undocked and sent on a self-destructing return flight into the Earth's atmosphere.

With a total weight of 20.7 tons, the ATV can carry:

- Dry cargoes: 1,500 - 5,500 kg
- Water: up to 840 kg
- Gas (O<sub>2</sub>, N<sub>2</sub>, air): up to 100 kg
- Propellant for refuelling: up to 860 kg
- Propellant for reboosting: up to 4.9 tons

### Industrial production.

As with construction of Ariane, the ATV will be built in sufficient numbers as to provide participating industrial companies with continuous production over several years. The industrial team is headed by the French EADS-Launch Vehicles and

includes industrial companies from ten of ESA's member states. Vehicle integration for all the ATVs will be completed in Bremen, Germany, before the final ground tests of the flight models at ESTEC. Due to its size, the vehicle will be shipped in two parts from ESTEC to Kourou, where it will be reassembled prior to launch.

Today the status for the programme is: Three models to be built and tested before the first launch.

- The Structural and Thermal model is currently testing at ESTEC.
- The Electrical Test Model will be tested at Les Mureaux, France, beginning September this year.
- Construction of the protoflight model, the first to be launched, is under way. Work has begun on the Avionics Bay in Toulouse, France, and on the Cargo Carrier in Torino, Italy. Construction of the Propulsion Bay is scheduled to begin in Bremen, Germany, in July 2002.

### The test programme.

The test of the first Structural and Thermal Model (STM) of ATV began in ESTEC last December and will be in progress for 11 months, until November this year. The test period will be carried out in three main phases, to check how well the model stands up to the stresses of an Ariane 5 launch.

The first step incorporates acoustic tests: during the launch, the ATV will be subjected to the same level of acoustic stress that is generated by Concorde's four jet engines during takeoff. Next are the vibration tests to see how well the ATV handles stage separation during launch. The final step, the space environment tests spanning thermal tests and the deployment of the solar panels is scheduled for this spring.

The spacecraft's electrical systems are due to be tested to the middle of 2002, using another model. These tests will be performed at EADS Launch Vehicles, as will tests on the flight software, nearer the end of the year.