FLIR Systems assists NASA in improving safety in space

The NASA Langley Research Center has chosen the FLIR Systems ThermaCAM™ S65 as the preferred infrared camera system for its current shuttle and International Space Station programs

The US Space Agency has opted in favor of infrared technology to inspect possible tile damages on the heat shields of its space shuttles.

One of the reasons for the 2003 Columbia space shuttle catastrophy were damages in the heat insulation on the wing-leading edge (front corner of one of the wings), which failed to protect the shuttle and its crew when they re-entered the atmosphere. The damages occurred right after take-off when pieces of insulation came off from the rocket and hit Columbia's left wing.

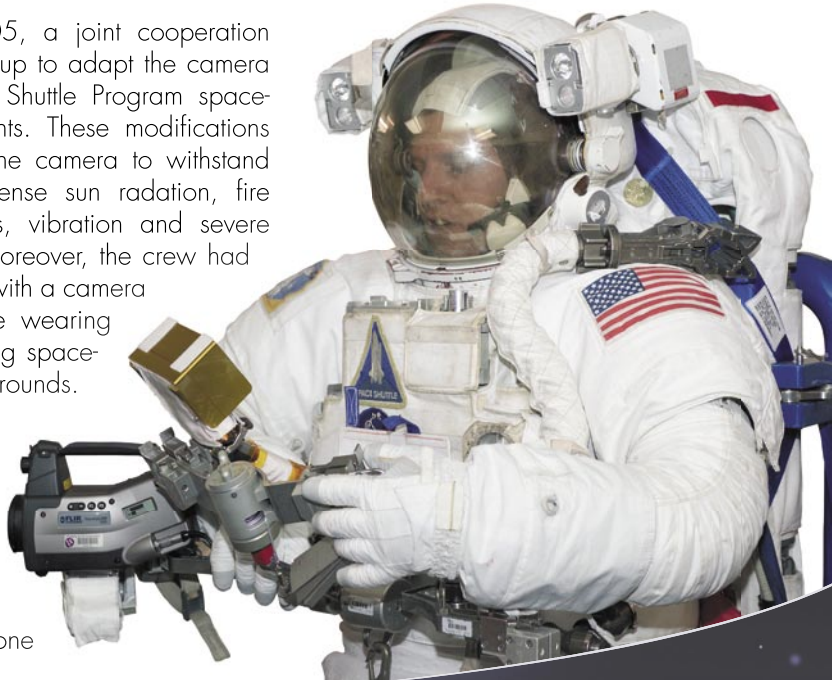
This catastrophy prompted NASA to find and develop a method to increase the safety of its missions. The Langley Research Center chose a thermal imaging solution to inspect and report tile damages on the heat shields.

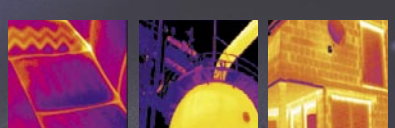
FLIR Systems infrared camera chosen by NASA

After a thorough evaluation of all infrared cameras available on the market, the NASA engineers chose the ThermaCAM S65, a camera developed and produced at FLIR Systems in Danderyd, Sweden. After very tough and extensive testing the astronauts and engineers found the camera to be perfectly suited for their mission.

In January 2005, a joint cooperation project was set up to adapt the camera to the stringent Shuttle Program space-flight requirements. These modifications would enable the camera to withstand cosmic and intense sun radation, fire hazards, shocks, vibration and severe temperatures. Moreover, the crew had to be provided with a camera it could operate wearing big gloves during space-walk inspection rounds.

Two development teams were formed, one at the NASA Langley Research Center in the US and one at FLIR Systems in Sweden. In March 2005, one week before the deadline, seven adapted cameras were delivered to NASA. Very satisfied with both the delivery and the support they received





During a spacewalk an astronaut searches with the ThermaCAM S65 for damages at the wing-leading edge.

The protective housing for the ThermaCAM S65 as developed by NASA

from FLIR, NASA ordered ten identical systems based on the modified versions delivered by FLIR Systems.

July 2005 Discovery mission carries ThermaCAM™ S65

For its July Discovery mission (NASA project code STS-114) the space agency worked out a spacewalk inspection project in case damage would occur on the wing-leading edge. But how does this work?

The shuttle is orbiting around the earth. During the time that it is flying over the part of the earth where it is daylight, it is heated by the sun. Once it flies into the shadow of the earth, the shuttle starts to cool off. At this point in time, during a space walk, an astronaut is looking with the infrared camera at the wing-leading edge. An infrared sequence is stored in the camera.

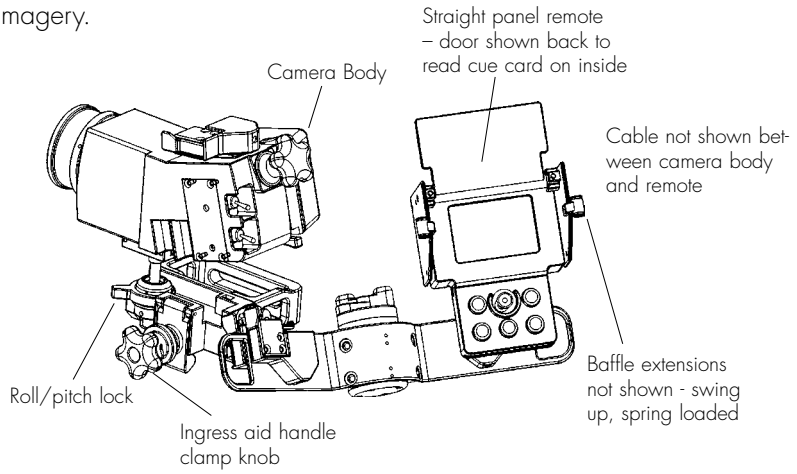
Once back in the shuttle, this sequence is downlinked to earth where image processing can decide if cracks or laminations are present. Smaller cracks and delaminations, which can be extremely dangerous, cannot be seen with a visual inspection. The FLIR camera system was flown on STS-114 as a contingency in case damage would occur. Luckily, this did not happen.

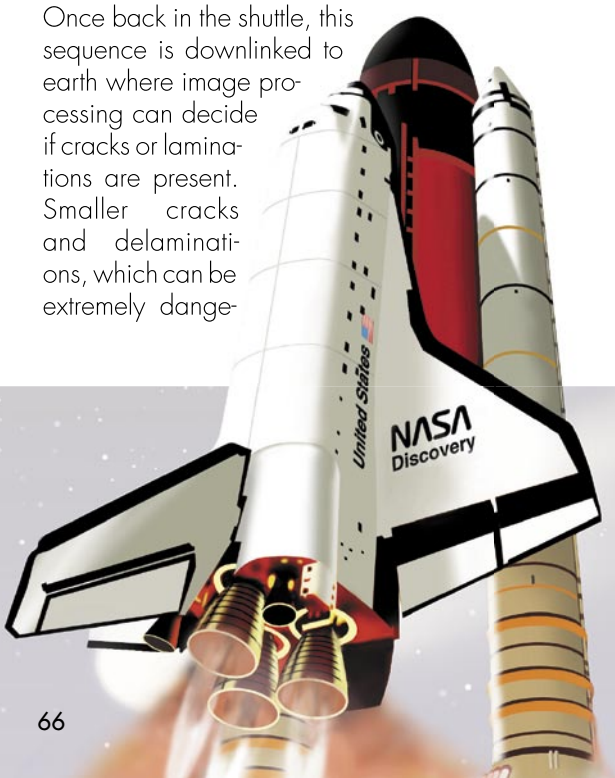
Further Projects

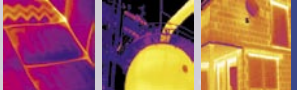
But NASA has understood the great benefits of thermal imaging for its other in-space applications. The camera system flown on STS-114 was transferred to the International Space Station (ISS), an international, predominantly US-Russian space program. It will be used for regular inspections of various instruments and systems inside the Space Station as well as for leak detection and machinery inspection. The infrared images will be downlinked to the ground. This will demonstrate operation of the ThermaCAM S65 camera in-space and the ability to downlink recorded imagery.

Moreover, a second camera unit is ready to fly on STS-121, the next shuttle mission, scheduled for March 2006. The cargo bay of Atlantis, the vehicle for STS-121, contains a sample box with an array of damaged Reinforced Carbon-Carbon (RCC) samples and damaged tile samples. These samples will be used to test tile and RCC repair techniques. In addition, crew members will inspect two of the damaged RCC samples with the infrared camera to verify the inspection technique.

The camera flown on STS-121 will be transferred to the ISS as well – leaving two camera systems on the station. Both systems will be brought back to earth on STS-115, the third shuttle flight.







For further information contact:

FLIR Systems AB
World Wide Thermography Center
Rinkebyvägen 19
SE-182 11 Danderyd
Sweden
Tel.: +46 (0)8 753 25 00
Fax: +46 (0)8 753 23 64
e-mail: sales@flir.se
www.flir.com