FTI GROUP

Specialist in System Development

Refuelling Monitor

Digital Video System for Surveillance of Aerial Refuelling

Mission & Control Systems

Accurate View from any Perspective

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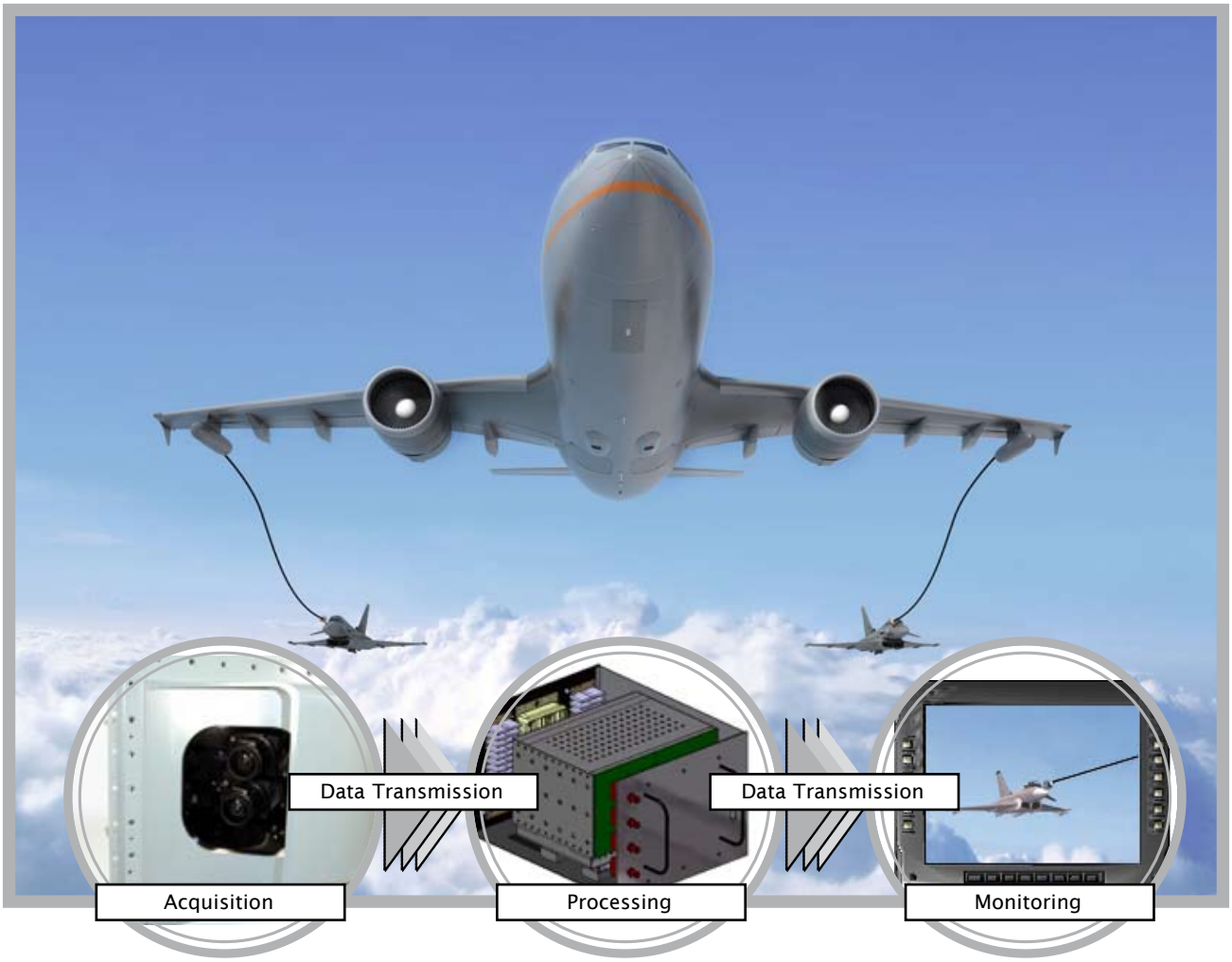
As one of the largest aerospace engineering services providers in Berlin-Brandenburg Region the FTI Group specialises in the development and testing of aircraft systems.
Furthermore we offer aircraft modification and continued airworthiness services.
With our expertise – especially in video technology – we have the ability to develop and build innovative products within a short period of time, meeting high quality standards.
Market-leaders such as EADS Deutschland GmbH, Airbus Deutschland GmbH, Rolls Royce Ltd. & Co. KG already benefit from the capability of the FTI Group.

Dr. Jean Blondeau

One of the challenges of developing the new Refuelling Monitor was to modify and certify an existing system under military standards. The Refuelling Monitor System developed by FTI Group is one of the most modern systems for surveillance of aerial refuelling which is certified under ISO EN 9100:2003.
Being a full service supplier, FTI Group not only offers a ready system. Flexibility is one of our biggest strengths and thus also an asset of our products. The Refuelling Monitor and its components are adjustable to any aerial operation. We are a reliable partner for the development, integration and maintenance of your Refuelling Monitor.

Marco Nadermann



Fast Connection without Quality Losses

System Overview

The Refuelling Monitor is a camera system which serves the fuel operator for control and surveillance of aerial refuelling operations.
The Refuelling Monitor is installed in the A310 MRTT (Multi Role Transport Tanker) and was completely modified by the FTI Group.
The new system offers digital technique (replacing analogue) and with its modern colour and infrared cameras it illustrates the refuelling operation in high quality under all surrounding conditions (day/night/sun/fog), records it and allows analysing it.

Surveillance Computer

The Surveillance Computer is the "brain" of the Refuelling Monitor System. It was realised as Arinc 600 size 8 case with cPCI subchassis with 2 independent cPCI-express computers:
the Acquisition Computer and the Display and Recording Computer. The main considerations in the development of this high end machine were:

- **airworthiness computers appropriate to top level requirements**
- **supply voltage 28V DC**
- **bridging of power failures for at least 200 ms**
- **a digital video-recorder (external swappable hard disc in the FOS)**

Furthermore there were a lot of inter-faces to be realised: Cameras, FOS operating panel, illumination system, ARINC A429 Displays. The software of the Refuelling Monitor was completely designed by the FTI Group and meets the following requirements:

- **Control of the digital cameras**
- **Acquisition of digital image sequences**
- **Transfer of resolution compressed image sequences to the displays with data overlay**
- **MPEG-compression of the image sequences & recording on hard disc**
- **Administration of registered sequences**

Reliable in any Circumstances

- **Interface to the control elements at FOS-console**
- **Operation of FOS-commands**
- **Interface to the Mission-Computers (ARINC 429-Interfaces)**
- **Interface to the illumination elements**
- **System health monitoring and**
- **Human machine interface**

Digital Video System

Each camera of the Refuelling Monitor is exchanging data with the Surveillance Computer through its own Ethernet link. This connection type allows a direct connection of each camera to the Surveillance Computer without the use of a frame-grabber unit. The architecture provides a picture transfer from the cameras to the computer without quality losses.
Also the use of independent LAN cables terminated with independent LAN interfaces minimises the impact of a single camera-cable interface failure on the overall system functionality.

Container

Hermetic housings of the cameras enable the system to meet the requirements for anti-fogging, anti-icing, a consistent temperature range and angular visibility.
The smooth outside profile (Camera Dome) of the housing minimises aerodynamic turbulences.
The flat oblique borosilicate glass window helps avoiding clogging, is transparent to near infrared light, is temperature insensitive and shows good resistance in case of possible spilling of technical liquids (fuel, de-icing fluid).
The camera containers will be delivered fully equipped as complete units.

Surveillance Computer

Computer Properties

Processor	High-end multi-processor computer unit in ARINC 600 housing (for avionics bay of the MRTT)
Connector	ARINC 600 size 3 connector
Provision	Provision is given for transfer from the RSS computer to the FOS Monitor over a coaxial cable for PAL signal as well as a shielded cable for high resolution SVGA transfer
Input power	28 V DC, <= 250 VA
Hold-up time power supply	>= 5s

Computer Components

Housing	ARINC 600 size 8 MCU (connector type 3)
Chassis	Inside chassis with 2 separated cPCI-e backplanes, each with at least 2 cPCI-e and 2 cPCI slots PICMG 2.x
Flash Disc	2 internal flash disc, at least 32 GB each
CPU-Board	2 CPU-boards: CPU Core 2 Duo
Graphics	1 Graphic cPCI-e with 1 analogue XGA port 1024x768 pixel, true colour, 60 Hz and 1 PAL port
Boards	2 cPCI-e boards with 4 GLAN-ports each 1 cPCI board with 8 relays, 2 A 1 Arinc429 cPCI board with 6 Arinc-ports (five Rx and one Tx) and Digit-I/O 1 cPCI board with 64 digital I/O (optic coupler)
Operating System	Win XP

Video System

Containers (1RH, 1LH), each equipped with

Power conversion	2 power conversion 28V DC to 12V DC for the cameras
Heating	1 heating unit with an interface to 115V AC
Cameras	2 colour cameras with WFoV- and NFoV-lenses (Wide Field of View and Near Field of View) 2 B/W-cameras (near IR) with WFoV- and NFoV-lenses
Transmission of camera	Digital video transmission over GLAN

All components – the camera system, the container and the Surveillance Computer – can be customised.

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