

MAT – Mission Avionics Test Helicopter



Innovative mission avionics under real conditions

Numerous examples have shown that development tests and early testing under real conditions reduce the development risk of complex avionics systems significantly and increase customers' acceptance. This principle is particularly suitable for highly complex systems with long development cycles, in order to save time and money.

The MAT Mission Avionics Test Helicopter is a flying experimental testbed that makes it possible to test systems during the development phase under operational conditions and to evaluate the test data. It is not necessary for the systems to be tested to be flight certified.

With the MAT, innovative mission avionics can be determined in conjunction with the human component ("man in the loop"). The testing runs from individual components to whole

systems – such as sensor systems for flight control, map devices, integrated helmet systems or man-machine interfaces for different avionic components.

An essential characteristic of the MAT is the separation of basic helicopter equipment and test equipment. The Bell UH-1D, an established model of the Bundeswehr, was identified as the most suitable helicopter, based on the criteria of availability, operating costs and interior space. On board are two of each essential avionic component. This duplication ensures only minimum testing is necessary for test equipment. A development test with laboratory prototypes is now possible.

Two equipment racks on the nose are a special characteristic of the MAT. Sensors with a total weight of up to 140 kilograms can be attached there.

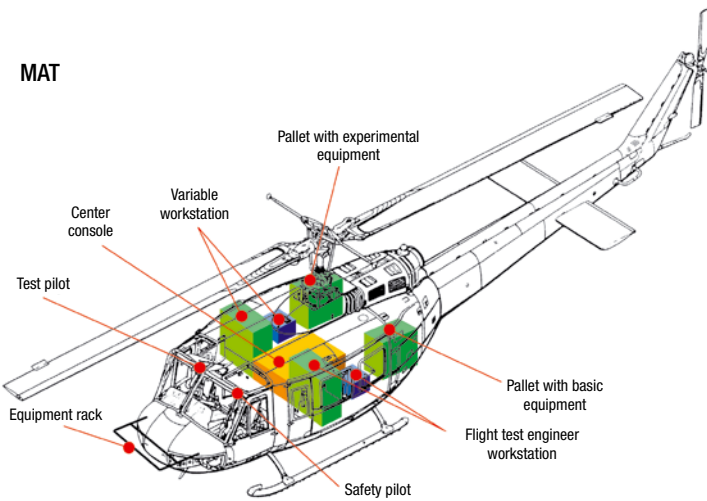
SERVICES OF ESG:

- ▶ Main Contractor of BwB
- ▶ Conception of the MAT
- ▶ Conception, realisation and integration of the avionic system, the mission and test equipment
- ▶ Realisation of the measuring equipment in the helicopter for verification and evaluation
- ▶ Planning, implementation, evaluation and assessment of the flight tests
- ▶ Coordination of utilisation

ADVANTAGES OF THE MAT:

- ▶ Global usability
- ▶ Individual devices => complete equipment packages
- ▶ Ground and flight tests
- ▶ Man-in-the-loop
- ▶ Separation of basic helicopter equipment and test equipment
- ▶ IFR capability
- ▶ Minimum qualification requirements of the test equipment components
- ▶ Modular exchangeability of the test equipment
- ▶ Integrated measuring and test system
- ▶ Possibility of reproducing different target systems
- ▶ Investigation of complex topics, e.g. sensor fusion
- ▶ Development test
- ▶ Possibility of industrial testing
- ▶ "Flying" laboratory

MAT



OVERVIEW OF MAT'S CAPABILITY CHARACTERISTICS:

Crew concept

- ▶ Co-pilot, test pilot,
- ▶ Safety engineer, FVI

Safety concept

- ▶ Complete separation of helicopter avionics and experimental avionics
- ▶ Simplified verification for experimental equipment

Maximum weight in the nose

- ▶ 140 kg

Integrated measuring instrument

- ▶ Recording of all measured variables
- ▶ Online monitoring
- ▶ Online evaluation
- ▶ Offline analysis

Pallet concept

- ▶ Three pallets with operating devices for experimental and measuring equipment.
- ▶ Two pallets for experimental and measuring equipment

MAT-UTILISATION

Flight test

- ▶ Since January 2006 flight test
- ▶ Since October 2006 in utilisation

FLIR range tests

- ▶ Completed
- ▶ December 2006 to October 2007
- ▶ Flying hours: 42

Sensor based aid to land (SELA) for Brown-Out-Landings

- ▶ Since August 2007 laboratory period
- ▶ From April 2008 to December 2009 flying period
- ▶ Flying hours: 150

Verification of new infrared sensors

- ▶ From May 2008 laboratory period
- ▶ From May 2009 flying period
- ▶ Flying hours: 100

Flexible test equipment

In the rear area of the cell there are two work stations for the flight test engineers. They are completely integrated with the avionics system. The flight test engineers can use these during the test flight to carry out tests which, due to their complexity, would overload the pilots.

The engineers have the ability to evaluate the recorded data during the flight. They operate the measuring and recording system via a control and display unit and can access all essential system data in real time.

Both work stations are built on pallets and can therefore be quickly replaced

as a whole. The left work station is always integrated. The measuring, recording and monitoring system „Quick Look“, which is integrated into the MAT test equipment, is controlled from here. The engineer can additionally access three multifunction displays, a PC, a control and display unit as well as various other operating elements.

The right work station is not needed to operate the MAT. Depending upon need, pallets with different experimental components can be inserted there. The design of this work station is freely definable, depending on the experiment: So for example, it is possible to imitate a tandem cockpit, to

simulate guidance and connecting terminals or to fulfil evaluation and analysis tasks. In addition, industrial personnel can test the behaviour of devices in the operational environment here.

The test equipment is also fastened on two large pallets, allowing it to be replaced quickly. The pallets are secured forward by a crash wall. Thus, laboratory prototypes without flight permission can also be tested in flying operation in the MAT.

