LITEF

READY FOR THE FUTURE

Milestones

1961 Foundation of LITEF GmbH for license production and maintenance of the LN-3 navigation system

1971 Development and first deliveries of Main Computer and interface units for the TORNADO

1976 Development of the K-273, a dynamically tuned gyroscope for strapdown applications

1980 Development of the accelerometer B-280

1981 Entry into the commercial aviation market with the LTR-81 Strapdown Attitude & Heading Reference System (AHRS)

1983 Development start of the fibre optic gyroscope (FOG)

1988 Development start of the inertial measurement unit for the Eurofighter programme

1989 Successful flight tests with a FOG-based AHRS with ARINC 705 accuracy

Milestones

1992 Introduction of the first µAHRS LCR-92 based on a new generation of fibre optic gyros

1993 Introduction of a new family of small single-axis FOG sensors

1994 Start of the MEMS accelerometer development programme

1994 Market entry into land navigation systems with the LLN product family and GPS hybrid systems

1996 Entry into the European missile development and production programme with TAURUS

1998 Launch of the MEMS Gyroscope Development Programme

2011 MEMS-IMU series production commences

2019 LCR-350B is the first MEMS-based AHRS in Europe to receive ETSO approval

Inertial reference systems and computers for aviation

LITEF provides solutions in flight control, attitude and heading reference, and navigation for military helicopters and aircraft, civilian helicopters, business jets and passenger aircraft, as well as missiles and drones. The different systems and variants are based on ITAR-free sensors and technologies that have been developed and continuously improved at LITEF over many years.

Milestones in LITEF's history are the development and production of computers and inertial measurement units for military aviation, e.g. for platforms such as Tornado and Eurofighter.

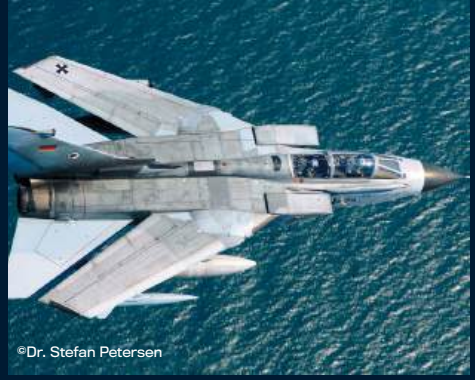
The expertise built up at LITEF in connection with the certification of flight-critical equipment is also applied in the military sector.

Tornado Main Computer

The Main Computer is the central processing unit of the avionic system and is responsible for controlling the cockpit displays, executing navigation calculations, weapon control and controlling data transfer between the avionic subsystems.

Eurofighter IMU

The EF2000-IMU is a quadruplex redundant inertial measurement unit, developed for flight control in the Eurofighter. As an inertial measurement unit, it is the only sensor that measures the movements of the aerodynamically unstable EF2000 aircraft without interruption and feeds it to the flight controller via a STANAG 3838 interface.



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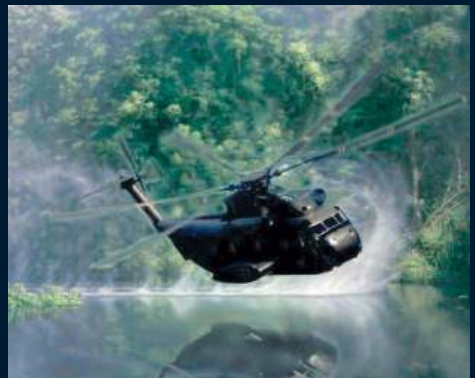

Inertial reference systems and computers for aviation

Low weight, small volume and low power consumption combined with high sensor data accuracy characterise the LCR Attitude and Heading Reference and Navigation Systems. Furthermore, these systems offer excellent reliability and the possibility to provide „hybrid“ position and attitude information with high bandwidth and low noise for navigation and flight control, using external GNSS receiver data.

LCR-100 and LCR-100N

The high accuracy of the fibre optic gyroscopes used in the LCR-100 Attitude and Heading Reference System allows autonomous course alignment to geographic north (gyrocompassing). The LCR-100N version was especially designed to allow continued navigation, even during a GNSS failure.

LCR-350B and LCM-300B

The new LCR-350B Attitude and Heading Reference System complements the LCR-100. Based on gyros and accelerometers using MEMS technology, the LCR-350B has a more compact housing and weighs less. Compared to similar systems using MEMS technology, the LCR-350B offers higher accuracy and better resistance to vibration over the entire application spectrum, as well as maximum protection under adverse temperature and radiation conditions (e.g. radar). The system receives the heading reference from the external LCM-300B magnetometer. The LCR-350B is certified according to the new ETSO/TSO C-201 standard.

LCR-110

The LCR-110 is a cost-effective, lightweight and space-saving inertial reference system based on MEMS accelerometers and fibre optic gyros. The LCR-110 provides information on the position, attitude, course and flight dynamics of the aircraft (rates and speed of rotation), as well as the flight path and drift angle, wind direction and wind speed. A calculation of the navigation solution based on a special Kalman filtering of inertial and satellite navigation raw data allows monitoring the trustworthiness of the GNSS information (Aircraft Autonomous Integrity Monitoring - AAIM). The LCR-110 is, therefore, the ideal solution for implementing cost- and time-optimised flight routes, within the framework of Performance Based Navigation (PBN) with increased reliability, at any time and worldwide.

LLN – LITEF Land Navigators

Based on decades of expertise in the field of inertial technology, LITEF has been supplying the Bundeswehr with inertial/hybrid land navigation systems since the introduction of the Leopard 2 A5. The functionality and performance of the systems have been continuously developed, favoured by the fact that LITEF brings together the entire value chain, from basic sensor research and algorithm development to series production, under one roof. Currently, the LITEF Land Navigator (LLN) product family, based on fibre optic gyros (FOG), is being extended by a system based on the company's own MEMS sensor technology.

In standard mode, LITEF Land Navigators provide a hybrid navigation solution, i.e. optimum position and attitude information calculated from the sum of the sensor data. They support both NATO GPS receivers and several commercial GPS receivers. The combination of the inertial sensors with an external GPS receiver provides a cost-effective solution for the life cycle of a vehicle navigation system in military use.


LLN-GY


LLN-GX


LLN-G1


LLN-GZ

LITEF Land Navigators offer unrivalled system integrity, upon which the driver, the commander and the superior command system can rely.


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Fibre optic gyroscope family

Accelerometer

Inertial measurement unit (FOG)

Inertial measurement units (FOG)

Inertial measurement unit (MEMS)

Platform stabilisation

LITEF has a wealth of experience in the field of stabilisation and missile applications. The fibre optic sensors and inertial measurement units (IMU) used have no moving parts and are, therefore, insensitive to shock and high vibration loads. The associated advantages lead to applications for military weapon stations, stabilisation of optics, antennas and radar systems, as well as missile and guided missiles for various mission requirements. High reliability and no maintenance requirements also guarantee low life cycle costs for the user. Future products will be complemented by MEMS-based sensors and IMUs with variable accuracy.

Development and production in Freiburg

The combination of the expertise of 30 years of civil aviation and six decades of military aviation provides a solid basis that enables LITEF to develop innovative solutions for future autonomous unmanned and manned platforms, covering an even broader range of technologies.

In LITEF's laboratories, the development team continues to work on furthering their basic technologies and on new products. For example, the current focus is on gradually increasing the accuracy of the µIMU – an IMU based on microelectromechanical sensors. At the same time, the form factor and power consumption are to be significantly reduced. This opens up more demanding applications for MEMS technology, which are currently still dominated by fibre optic gyros (FOG). Regardless of the application, all systems developed and manufactured at LITEF are ITAR-free and are characterised by high reliability and robustness, even under extreme environmental and mission conditions.

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