

Your Reliable and Competent Partner for Complex Sensor Systems

Digital Magnetometer DM-Series

Ultra High Resolution Digital Data Acquisition DX-Series

Mobile and Stationary Electric and Magnetic Multi Influence Measurement System

Earth Magnetic Field Simulator

Deperming Systems

Signature Analysis and Deperming Software

Magnetic and Electrical Calibration Systems

Ultra Homogeneous Coil Systems

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DM-Series

Digital Magnetometer

The DM-005, DM-020, DM-050 and DM-060 Digital Magnetometers combine STL's 32-bit resolution low noise data acquisition system, state-of-the-art low noise fluxgate sensors, and STL's data acquisition software. The complete and miniaturized three-axes magnetic field measurement system uses an ethernet based data acquisition system for over 1000 simultaneously triggered magnetometers. The DM-Series covers a range from $\pm 80 \ \mu\text{T}$ to $\pm 1 \ m\text{T}$ in different noise levels.

Highlights

- Low power consumption
- Very low noise, large dynamic range and high linearity
- Digital temperature compensation minimizes drifts
- True field vectors. Sensor output digitally error corrected with respect to scaling, offset, orthogonality and alignment
- Total field monitoring
- Small size and lightweight
- Single coaxical cable for power and data introduces minimal magnetic signature

- Data acquisition software operates under Windows 7
- Underwater version available

Software Features

- Total system and experimental control
- Viewing / recording of magnetic field components
- Real-time viewing of total fields
- FFT frequency spectrum plot
- Data storage
- Offline viewing of data files
- Ethernet + USB device drivers
- Windows 7



DM-System on the spot

DX-Series

Ultra high-resolution digital data acquisition system for uncompromising readout of sensors in field application or lab.

Highlights

- Compact, light, simple and flexible in use
- Sensors: magnetic (fluxgate, SQUID, AMR, coils), electric (UEP), accelerometers, seismic, tilt, bridges
- Low frequency qualified
- Fast and highly accurate, 8½ digits, DC – 4 kHz bandwith
- Field application, IP65 and higher

- Array capability (>1000 sensors)
- Application software included
- Underwater version available



Mobile and Stationary Electric and Magnetic Multi Influence Measurement System

STL supplies Mobile and Stationary Electric and Magnetic Signature Underwater Measurement Systems.

Three or more multi influence sensor platforms are connected to a base station via underwater hub by a single cable used for power and data transmission as well as for deployment and recovery.

The analogue electric sensors are formed by UEP carbon electrodes followed by ultra low-noise isolation preamplifiers and a 3-axes low-noise fluxgate.

In addition the system can be equipped with acoustic, seismic and environmental sensors to measure temperature, pressure and water current as well as conductivity.

The digital part is based on high performance 32 bit analogue-to-digital converter with temperature and geometry compensation.

The three magnetic and electric field vector components are complemented by a pair of high resolution tilt sensors to achieve the precise software alignment of the sensor platform with respect to magnetic North and the Earth's gravity center.

Underwater

Hub

The sensor system also DGPS includes and, therefore, is able to visualize the target traces with high precision in real-time.

> Multi influence sensor

Multi Influence Sensors

Highlights

- Real-time signal monitoring
- Fully digital with 8 digits dynamic range
- Bandwidth up to 4 kHz
- E- and B-field synchronously measured
- DGPS precision tracking
- Geodetic autoleveling
- Up to 100 m water depth
- Multi-modal sounding
 - Signatures: Electric, magnetic, acoustic, pressure, seismic
 - Environment: Temperature, current, conductivity, pressure, tilt



Offshore cable

Hybrid power + data

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Earth Field Simulator German Navy

Earth Magnetic Field Simulator and Deperming Systems

STL offers Earth Magnetic Field Simulator (EMFS) and Deperming Systems as well as Cage Type Deperming Systems tailored to the specific requirements of the customer.

The EMFS of the German Navy situated in Lehmbek demonstrates STL's capability in this field.

Due to the increasing Navy's wide operational area in national and international missions, the threat by mines and torpedoes with magnetic igniter increases.

Therefore, it is essentially important that the Navy has the capability and the feasibility to reduce the ships magnetic signature of ferromagnetic vessels by deperming systems to minimize it by pro-



per calibration of the onboard degaussing system (OBDS). In order to explore and verify the stability of the OBDS in various operational areas worldwide an Earth Magnetic Field Simulator (EMFS) is vital.

The combination of EMFS and deperming system results in a Cage Type Deperming and Measurement System (CDMS) which offers best deperming efficiency possible and can be installed in nearly every harbour.

Earth Magnetic Field Simulator

The picture above shows the German Earth Magnetic Field Simulator where STL has supplied the complete sensor array, data acquisition system as well as the control and evaluation software solution.

The Earth Magnetic Field Simulators are typically being installed in a bay area or river estuary as well as artificial harbour where the water tide can be reduced by natural environmental barriers to a minimum or by the help of a floodgate.

The quantity and type of used sensors will be designed by STL with respect of the requirements of the Navy.

The total size and the dedicated sensor array as well as the cabling and the customized software of the Earth Magnetic Field Simulator is based on the magnetic analysis and designed reflecting the types of vessels and the specific requirements of the navy.

For further information please contact STL Systems AG.



German Navy submarine measurement



German Navy mine hunter measurement

Overrun Deperming and Measurement Range System

The Overrun Deperming and Measurement Range (ODMR) is a system dedicated to reduce the magnetic signature of ferromagnetic surface vessels and submarines.

It allows a magnetic treatment to control the permanent magnetic signature of the ships in such a way that the ships magnetic signature is minimized.

The deperming efficiency depends on the individual class of vessel undergoing treatment, the magnetic behaviour of the steel used, the building process and the magnetic history of the vessel and the operational area with respect to its vertical magnetic field component.

The fields of the ODMR are sufficient large to allow a deperming and ranging for all missions required. The ODMR can be designed for all kind of surface vessels and submarines independing of the displacement with maximum length of up to 250 m length, with the dedicated beam depth.

STL can supply:

- Complete system design
- All power related components
- Deperming software and IT infrastructure
- Providing data acquisition and sensor platform
- Control and power cabling
- Building construction
- Underwater construction
- Turnkey supplier



Typical modeling of Deperming and Measurement System layout



Realized Deperming and Measurement System

Deperming Underwater Construction

Due to different project experiences STL has as well the capability to provide the underwater construction according to our own layout of the deperming system, the cable weight with respect to the existing seabed.

In the following there is an example of possible underwater construction with a quantity of cables up to 100 km.



Cage Type Deperming System

The next generation of earth field simulators will contain the combination of measurement systems together with deperming systems to optimize the magnetic signature of an undergoing treatment vessel in saving time and costs by optimization the usage of the specified area.

The Cage Type Deperming System allows to retrieve the permanent and magnetically induced signatures of the ships and to apply the magnetic treatment for reducing the signature in one system.

The system design takes into account that the magnetic field of the operational area varies significantly with respect to its vertical component. Therefore, the signature reduction implies also the possibility to establish a permanent vertical signature to counteract the vertical induced one.

> Typical modeling of sensor arrays with deperming coils in X, Y and Z-direction

STL can supply:

- Complete system design
- All power related components
- Deperming Software and IT infrastructure
- Data acquisition and sensor platform
- Control and power cabling
- Building construction
- Cage construction
- Turnkey supplier

For further informations please contact STL Systems AG.



MMI of Analysis & Deperming Software

Signature Analysis & Deperming Software

The signature analysis software allows the extraction of the permanent and induced magnetic moment from the recorded data. Based on these data, the deperming settings are calculated. The analysis also allows the prediction of the vessel's signature at any target location on earth. During deperming an alternating field is applied to the overrunning ship. The amplitude and frequency are dependent on the vessel type and adjusted to the maximum deperming efficiency.

The below figures show examples of the existing MMI of the signature analysis & deperming software. The amplitude and frequency can be manually controlled or selected from a pre-defined ship-dependent program.



Magnetic and Electrical Calibration Systems

Due to the long experience of STL and the own research and development of sensors and measurement systems, STL has the capability to develop in situ calibration methods and procedures for electrical and magnetic measurement systems.

The calibration of the underwater measurement system provides the value of the in situ system accuracy and the system uncertainty by generating a defined measurement environment with respect of the geometrical orientation to the reference system.

The typical accuracy of the calibration system is around 1° and the deviation less than 10 cm.

STL validates customers measurement system and generates a customized calibration and validation method.



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About STL

STL is specialized in solving complex and demanding technical challenges by high technology system approaches used for naval and industrial applications. STL excels in the ability to combine specific requirement of discerning customers with various sensor influences, field generating systems and sophisticated data processing using STL's flexible sensor modules in combination with analysis tools. Special know how is accumulated in the area of magnetic and electric field measurement systems and data analysis by using ultra precision digital data acquisition systems and mathematical algorithms.

Core competence of the company is the technical solution of any demanding measurement task. This is realized using precise generation, measurement and analysis of magnetic field, electrical fields and other signature parameters by innovative system concepts including COTS and special purpose sensors with adapted data acquisition and current sources.

Innovative coil systems with ultra high homogeneity, high fields or frequency also in combination with extremely low magnetic signature are possible and driven by STL's ultra high efficiency current sources.

STL delivered key-technology in several projects for marine costumers. Close to 800 highly reliable fluxgate sensors and the data processing technology are STL's contribution to the Earth Magnetic Field Simulator in Lehmbek Germany. Furthermore two land based degaussing ranges in Germany have been upgraded with STL's sensor technology. Several Nations are using STL's mobile Multi Influence Signature Measurement System (MIMS) for either harbour protection and/or ship signature measurement.

In 2012 STL has been awarded the contract to provide a modern Overrun Deperming and Measurement Range for an Asian Navy.

Additional references can be found on our homepage.

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