RADAR SYSTEMS TECHNOLOGY
REACHING BEYOND BOUNDARIES
For more than 20 years our fascination to explore the universe has been the driving force behind our development of advanced radar systems for space, air and ground.

RST is proud to offer world-leading radar technology that meets a broad range of business activities, from aerospace to geophysical science.

Customers benefit from RST’s know-how and wealth of experience. Our team of specialists works together to create the perfect solution for every challenge.

From innovative custom design to extensive consultation service, your project will be expertly guided and supervised from start to finish.

On behalf of the entire RST team, we guarantee continuous quality assurance and cost effective solutions.

Prof. Dr. Hans Martin Braun and Dipl. Ing. Angelika Braun
Since 1992, RST has been a pioneer in the industry, developing Synthetic Aperture Radar, Radar Altimeter, and Ground Penetration Radar. In addition to leading the development and production of radar technology, RST’s comprehensive consultation services have been growing in importance.

For many years, RST has been a reliable business partner, advisor, and coach for the aerospace industry, national and international ministries, operation centres, environmental organisations as well as decision makers in governments, industry, and research.

Situated in Salem near Lake Constance, our company headquarters – which was funded by a state project of Baden-Württemberg – features a striking modern architecture and is an inspiring place in which to work. It is where technological developments go hand in hand with consultation and service.

Our highly trained staff has extensive experience, and our customers benefit from their comprehensive service, hands-on project management, and premium product development. We are proud of our interdisciplinary team of experts, which includes software and hardware engineers, computer scientists, process engineers, physicists, and laboratory technicians. Our shared motivation thrives in an applied culture of mutual respect and appreciation. We firmly believe that a positive working environment is the best basis for long-lasting success.

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Radar is a key technology in the fields of earth observation and planetary research.

To create both an overview and insight, RST focuses on the development of innovative systems, technologies and devices.

This mission drives every little thing we do. It pushes us to get to the bottom and beyond, to reveal the secrets of our universe, and to recognise correlations that help us create the best possible radar solutions.

More information on: www.rst-group.biz/space
Digital satellite technology opens up new dimensions in earth observation. Synthetic Aperture Radar (SAR) scans the earth surface by using electro-magnetic waves, generating two-dimensional high-resolution images in all lighting and weather conditions.

Whether the goal is to measure earth movements, update maps, chart resources, observe crisis zones, or monitor the interaction between oceans, polar ice and the atmosphere ...

Radar enables us to expose what cannot be displayed by optical systems: find water beneath the surface of Mars, locate ice layers on the south pole of Moon and measure surface structures, even through gas atmospheres.

Synthetic Aperture Radar (SAR) allows researchers to gain important visual impressions of planets. Ground Penetration Radar (GPR) makes it possible to delve deeper, providing the basis for valuable geophysical, topographic and geological findings.
SAR – Excellent image results in all circumstances

Synthetic Aperture Radar (SAR) systems allow for a virtual high-resolution image generation of surfaces and are capable of extracting complex information from these images using modern computer technology.

SAR offers an advantage over other photograhical and display devices, as it is not affected by light and atmospheric conditions.

RST develops SAR systems for both air and space. Quality control is unsurpassed as the entire system is from one single source. RST is responsible for the design and development, installation, testing and operation.

Particular attention is given to processing algorithms, which is what makes the generation of high-resolution SAR images possible.

RST’s services include:
- SAR analysis and design
- SAR raw data simulation
- SAR processor development
- SAR parameter generator (SPG) software development
- Testing of radar system in all development and integration steps
- Installation of the test system
- Transponder with Active Radar Calibration (ARC)
- SAR calibration in orbit and measurement quality control

GPR – Rising to the challenge of planetary exploration

RST pioneered a new technology for the European Space Agency. The "Stepped Frequency GPR" will be used to explore foreign planets in subsequent missions.

Originally designed for planetary vehicles, RST’s new Stepped Frequency Radar is now being used as Ground Penetrating Radar on Earth. RST perfected this technology for exploring near-surface soil layers. It offers the advantage of high measuring quality at a low data transmission rate. The end result: high-resolution images with extremely low energy consumption.

SAR-Lupe

The SAR-Lupe project is one of many successful collaborations between RST and leading European space companies, the German government and its space agency DLR.

RST was responsible for the radar system design, performance assurance, calibration and processing in the SAR-Lupe project. The international teamwork resulted in a five satellite constellation providing the best spatial resolution of a satellite SAR system worldwide at this time.

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SAR Calibration Transponders

RST’s Active Radar Calibration (ARC) transponders are designed for L, C and X band as well as end-to-end calibration of a satellite-carried SAR system.

To increase resolution requirements for SAR imagery, radar transponders are the best possible solution for the calibration of SAR satellites. RST’s remote-controlled ARCs are pre-programmed. They automatically activate prior to a satellite pass, align to programmed coordinates, and return to a safe stand-by position after successful contact. Collected data is saved in the ARC and can be downloaded on site or transfered to a centre via GPRs.

The robust design of the transponder makes it suitable for use in all weather conditions.

Since the very beginning, RST has contributed significantly to the successful development of the SAR-Lupe project. With the design of the SAR sensor and the outstanding image quality of the whole system, the specialist in radar technology has broken new ground.
When lives need to be saved, only one thing counts: 100% precision. RST provides the high-sensitive sensors and advanced software that help rescue as well as salvage teams, coast guards and climatologists improve the quality of their measurements.

The development of technology to service mankind and protect our environment is RST’s guiding principle.

We are continually looking for innovative new ways to apply airborne radar.
When environmental disasters occur in coastal areas, the quickest possible limitation of damage is paramount. RST radar images provide rescue and salvage teams with highly accurate information on the status of land and water.

RST developed an airborne imaging radar system specifically for missions over water. Oil spills, which change the reflectivity of the water’s surface, can be seen especially well. This cost-effective solution is also well suited to applications over land. In addition to having a resolution of 5 metres (Single Look Mode), the real-time image generation on board is an important advantage.

A helicopter landing radar was designed to increase the safety of rescue operations. Even in adverse weather conditions, the system reliably identifies obstacles during the flight and landing phase.

Extensive experience in satellite technology, combined with advanced sensor products, makes RST your perfect partner.

The Earth’s climate is considerably influenced by existing ice deposits. Due to the immensity found in the Arctic and Antarctic, area-wide ice investigations can only be carried out with satellites.

Within the framework of a project with the European Space Agency (ESA), the reciprocal influences of polar ice and global warming are investigated. For this purpose, RST developed a measuring instrument (Radar Altimeter), which is used on planes flying over the Arctic and Antarctic. Since the middle of the last decade, RST’s technology has significantly contributed to environmental research and has helped calibrate the ice observation satellite for the ESA.
Airborne radar systems get their measuring quality from a highly sophisticated software application. Since the company’s foundation, the development of this software technology has been among its core competencies. It is what transforms all RST radar systems into unique products.

Software development is supported through realistic radar raw data simulation. This makes it possible to develop and test software programmes while the hardware is still in development.

WSMS (Water Surface Monitoring System)
WSMS is an airplane-carried radar system designed to identify the sea’s surface pollution and detect vessels as possible perpetrators.

The successful use of WSMS over the North Sea proves its value. The wave structure of the water surface is clearly visible. Movements of the airplane are optimally compensated. Ships can be detected up to a distance of 46 km with a resolution of five metres.

Helicopter Flight & Landing Radar
RST is leading an international development team that includes the Israeli company ELBIT and the German helicopter-based rescue organisation DRF. The aim is to develop a radar system that improves visibility for helicopter pilots when landing.

The radar, positioned below the cabin, generates a 3D topography of the area beneath the helicopter. The radar is capable of penetrating dust, snow, fog and rain and is not dependent on daylight. A power line detector in flight direction supports the flight phase.

ASIRAS (Airborne Synthetic Aperture & Interferometric Radar Altimeter System)
RST’s airborne interferometric radar altimeter has been successfully used in the exploration of ice fields in the Arctic and Antarctic.

ASIRAS measurements increase the reliability of statements on climate change. Hardware consists of a send receive unit, a control panel and two PCs for instrument control and data storage.
Ground Penetration Radar with Stepped Frequency technology ensures large penetration depths, high resolutions and low energy consumption.

RST provides efficient and cost effective applications as well as expert supervision of your project, from analysing data to software consulting.

More information on: www.rst-group.biz/ground
GROUND

FIELDS OF APPLICATION

Whether the goal is to detect cracks in mines, find hidden objects in bricks or soil, analyse natural resources or determine glacier volumes, non-destructive radar scanning provides infinite possibilities for safe examination and clear measurement results.

RST develops custom-made Stepped Frequency GPR for precise geological measurement and reliable locating procedures.

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Ground Penetration Radar systems have proven to be the optimum measurement method in diverse fields of application, equally capable of determining the water depth of a lake to exploring for fresh water in the desert.

RST does not rely on theoretical forecasts. We focus on the processing and testing of innovative technology until we find the best possible solution for your project.

Many of our developments have proven their value. For further information on RST references, please visit our website: www.rst-group.biz

SERVICES

In the processing industry, everything depends on reliable results – regardless of the high temperatures, excessive temperature variations at the measurement location, and heavily soiled measurement atmosphere.

RST worked with Z&J Technologies GmbH to develop a contact-free method to measure filling level and material distribution. The HORA radar technology can be used during the operation of a blast furnace.

INDUSTRIAL PROCESSING

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The highly efficient Stepped Frequency Radar offers a variety of advantages compared to short pulse GPR:

- Provides high bandwidth
- Carries out reflection measurement in both absolute and phase value
- Sender and receiver feature the same high switching speed as short pulse technology
- Improved technology through bundled antenna with very high bandwidth
- Operates on ground-based or airborne vehicles, as well as satellites and planetary orbiters
- "Gated" system allows for large penetration depth from flying platforms

HERA-G (Helicopter Radar)

RST developed highly efficient SF-GPRs for helicopters to provide quick, non-destructive and contactless exploration of wide areas and layer structures of the soil.

The HERA-G helicopter radar is based on a Stepped Frequency system with reduced pulse length for superior sensitivity. The complete electronics are positioned on the lower outer antennas. Only data evaluation is conducted inside the helicopter.

PRIS (Potash Roof Inspection System)

This high-resolution PRIS radar system allows for extremely quick data acquisition through contactless measuring. This technology identifies distinctions between normal geological boundaries, such as enclosed clay layers and separations or cracks. Even cracks that are very close to the surface are reliably recognized. The installation of the RST device on a trolley enables an even measurement at a speed of approximately 5 km/h, providing both low interference and low energy consumption.

HORA (Blast Furnace Radar)

This topography radar was developed for use in blast furnaces.

The radar-based HORA sensor displays the spatial distribution of bulk materials in the blast furnace with a horizontal resolution of approximately 30 cm and an absolute height accuracy of approximately 10 cm. During operation, the sensor identifies all areas that are not filled optimally. The overall surface of the filling is measured within one minute, so that after each filling updated images of the blast furnace's filling status are available. When measuring the surface topography, the HORA sensor sends out pulses of radio waves and determines the running time until the echo is reflected from the material surface. Through the gapless scanning of the complete blast furnace cross-section, a three-dimensional image of the surface is generated.
Perfectly tailored radar technology for professional tasks: customized products and service packages have been at the heart of RST’s business since day one. Scientists, politicians, military and civilian decision makers from round the world bear testimony to RST’s success in transforming visions into concrete solutions.

More information on: www.rst-group.biz/customdesign
We’ve got Your Project on the Radar!

Whether you want to perform topographic measurements or static testings, locate hidden objects or fresh water, our interdisciplinary team focuses on your goal to work out the perfect solution for your requirements.

CUSTOM DESIGN

CONSULTATION

NEEDS ASSESSMENT

PROJECT MANAGEMENT

SOFTWARE AND HARDWARE DEVELOPMENT

DATA ANALYSIS AND PROCESSING

Yvonne Krellmann, Geoscientist, RST Quality Manager

“Whilst we are working in a highly technological environment, we are not living in an ivory tower of science. Customer service has top priority. Personal consultation and hands-on project management is paramount. At the end of the day, the best software and hardware is of little use if it is not applied and analysed in the most efficient way.”

References on: www.rst-group.biz/customdesign
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Custom Design Benefits at a Glance:

Company

Space

Air

Ground

Custom Design