



Specialists at depth

Complex subsea research and
data acquisition made simple...

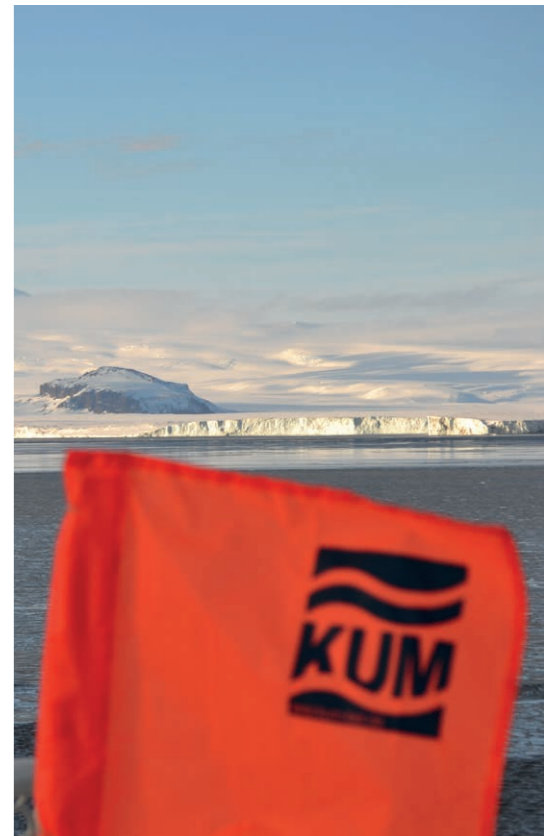
kum-kiel.de

Specialists at depth

Creating unique solutions to help you deliver your future vision

For the past two decades, K.U.M. has supported leading academic centres around the world by developing bespoke subsea technology. Today, we are established as the leading provider of subsea data acquisition systems delivering an end-to-end service from conception through to manufacturing.

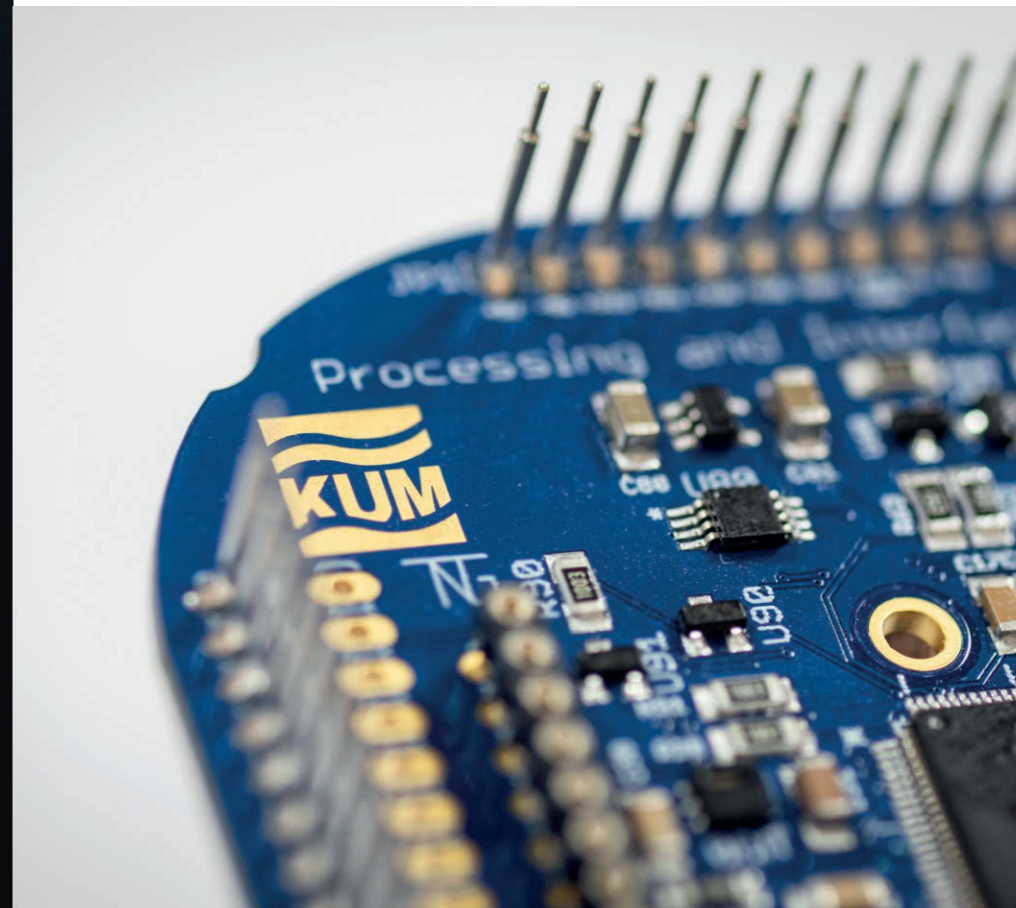
Our vision is to help you make the impossible possible at depth.



Over the years, our passion for continuous innovation has allowed us to expand our services and our markets. As our solutions have become ever more targeted and specialised, we have streamlined the way deep sea marine data is captured and processed. Across a wide variety of industries, we now help our customers to go further, see better and understand more.

With our vast experience of supporting academic institutes to undertake cutting edge oceanographic research, we are uniquely positioned to create, build and deliver innovative subsea solutions. Solutions designed to meet the challenges of the deep marine environment.

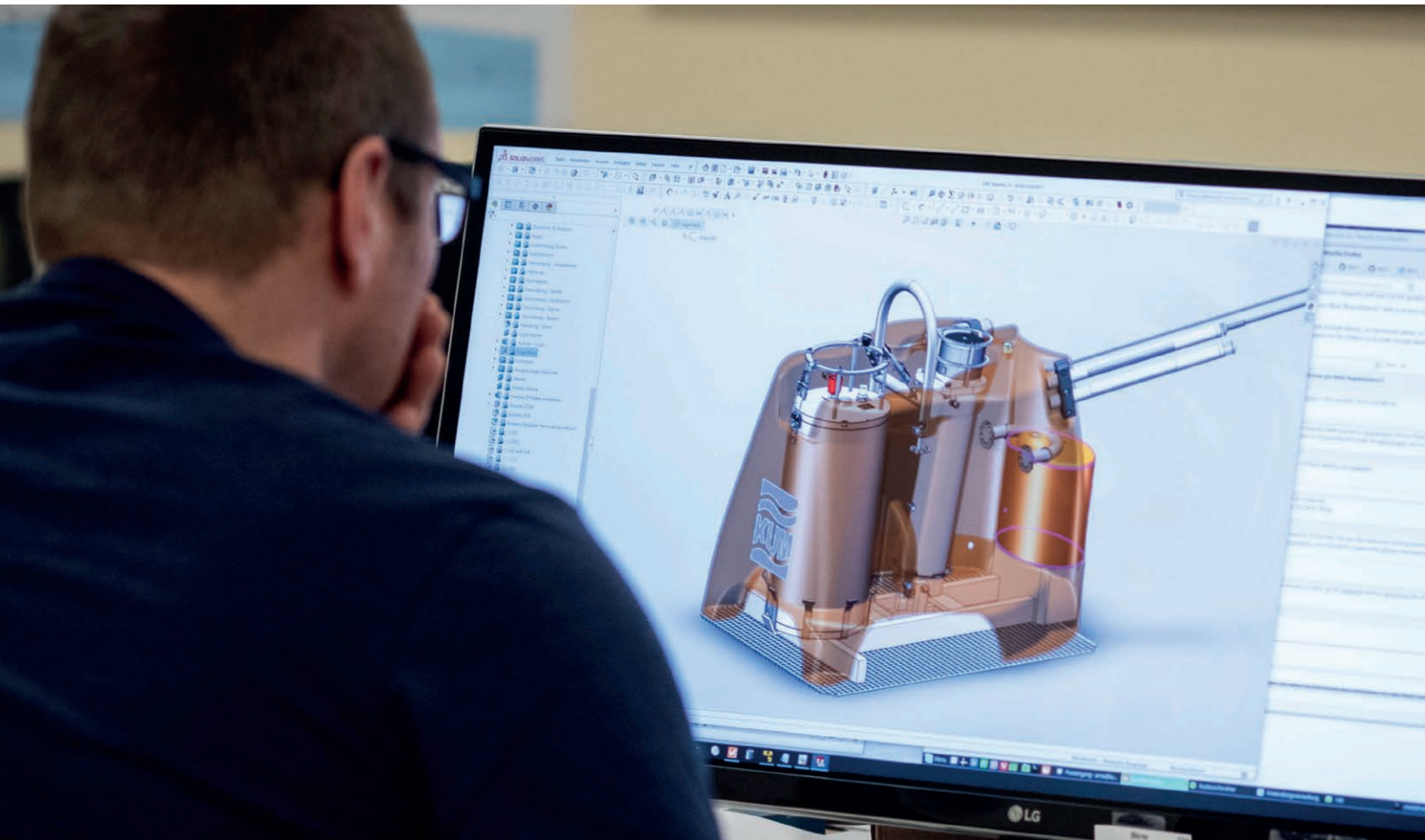
Today, in the offshore energy industry for example, where there is an increased focus on energy transition, cost effectiveness and environmental sustainability, our subsea solutions are arguably more important than ever. For customers seeking new ways to capitalise on future exploration opportunities, we simply bring tomorrow's technology to the table today.



Deep sea research
Offshore oil & gas
Subsea exploration
Subsea engineering
Military & defence
Medical equipment

Pioneering subsea solutions

Supporting the world's deep sea explorers to go further



We work with some of the world's leading research institutes and major offshore oil and gas companies to deliver innovative technology solutions tailored to the requirements of their specific subsea projects.

In the offshore deep sea environment, these customers demand high performance technology that maximises the use of funds, time and manpower. Our pioneering science-led solutions help to keep our customers one step ahead of the competition.

Ongoing research helps us to imagine the future for clients who need to constantly evolve to meet new challenges. Issues currently being tracked for customers include the tightening of environmental policies, the exploration of new geographies, and the growth of automation. At the same time, our future-scanning looks at development in areas such as microelectronics, enhanced data transfer and artificial intelligence. With all

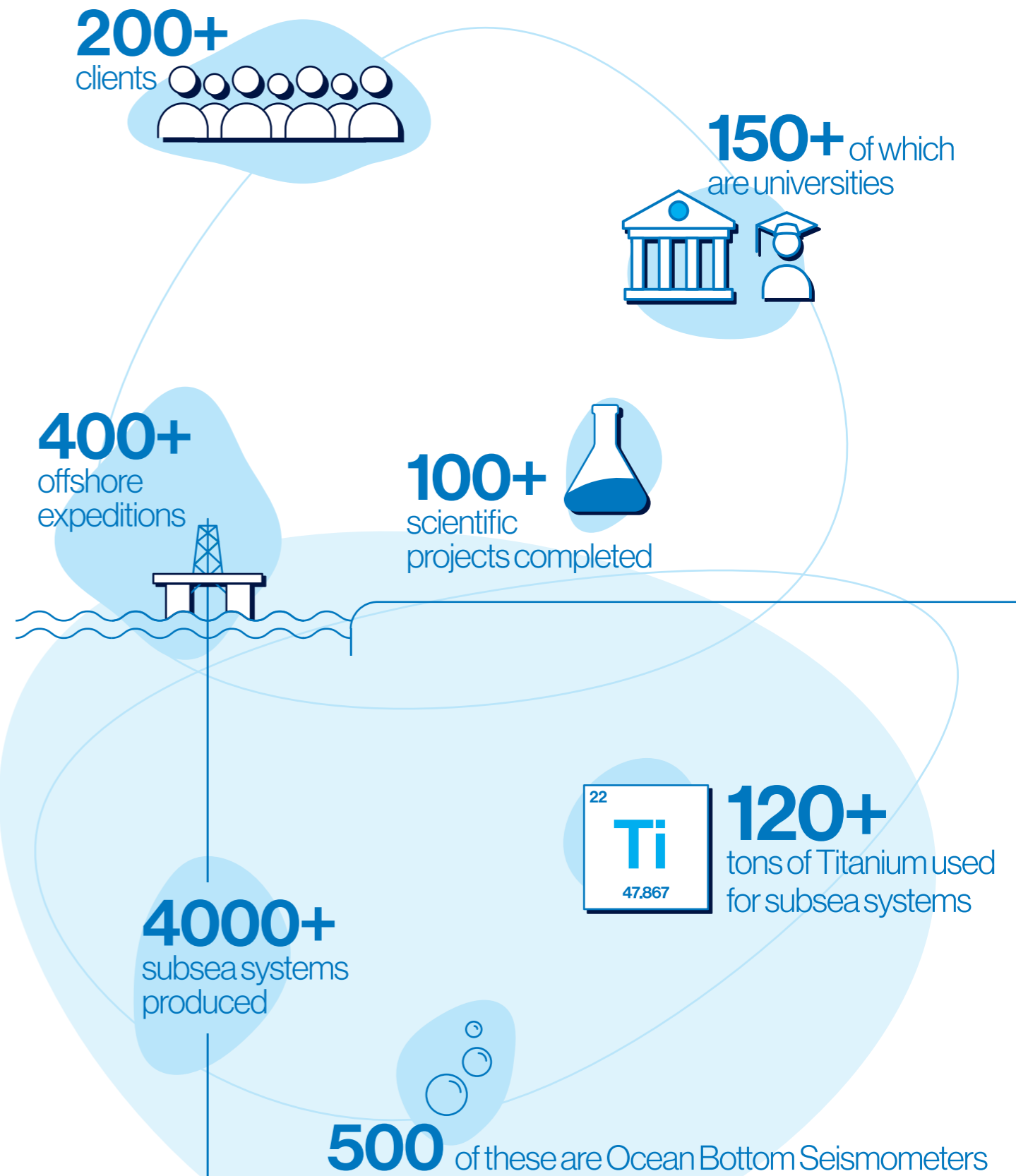
this and more in mind, we're primed to be the subsea partner who can help our customers meet the demands of the modern era.

Knowledge, insights and experience

Our understanding of this new operational landscape is derived from first-hand knowledge of developing end-to-end solutions from the ground up. A combination of unique insights and in-field experience means that we are ideally positioned to integrate new technologies across exploration boundaries.

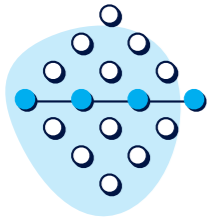
Indeed, as a world leader in marine research and subsea engineering, we don't only invest in R&D to enhance our current systems,

we also seek to anticipate our customers' future needs. For example, by advancing the use of low frequency passive seismic technology alongside ocean bottom seismometers (OBSs), we are rapidly altering the way seismic data is captured and analysed. Our innovative solution simultaneously complements traditional methods and significantly reduces the drilling risks.



What we offer you

Unique insights, in-field experience and innovative technology



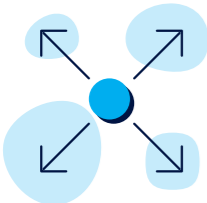
Consistent Quality

This is the cornerstone of everything we do and deliver. Anything we design will work exactly as you expect it to.



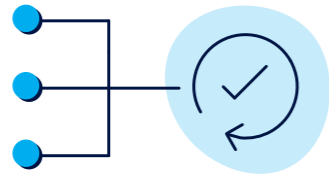
Innovative Technology

We constantly deliver innovation of our products and methods to meet the specific needs of our customers.



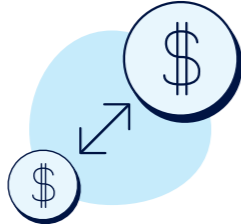
Total Flexibility

From functions to components, we can deliver any part of a customer's project – or we can deliver it entirely.



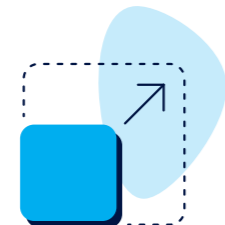
Complete Service

We deliver a full end-to-end service for our customers. From start to finish this is subsea solutions made simple.



Cost Efficiency

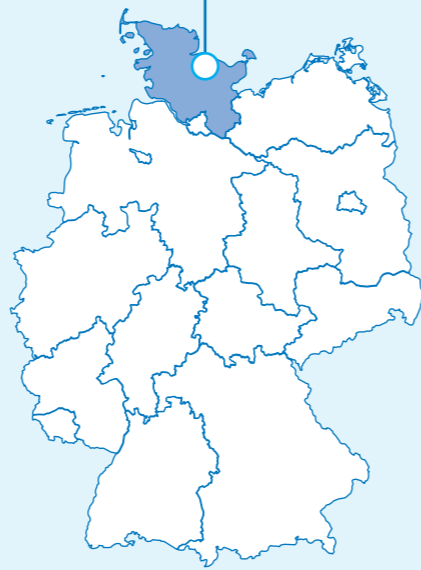
The end-to-end expertise of our team combined with our advanced inhouse facilities helps to keep costs low.



Total Scalability

Alongside our own in-house production facilities, we offer access to a network of specialised manufacturing partners.

 Kiel, Germany



Advanced Facilities

We currently operate two sites in Kiel, Germany, with a total area of 2700 m² split between design, manufacturing, testing, and administrative functions.

To deliver on the most complex projects, we have a wide range of specialist equipment and machinery inhouse. Systems for design, manufacture and testing include the CMZ TC 35-Y, Nakamura Tome AS-200, Quaser MV 204, and Quaser MV 184 P.

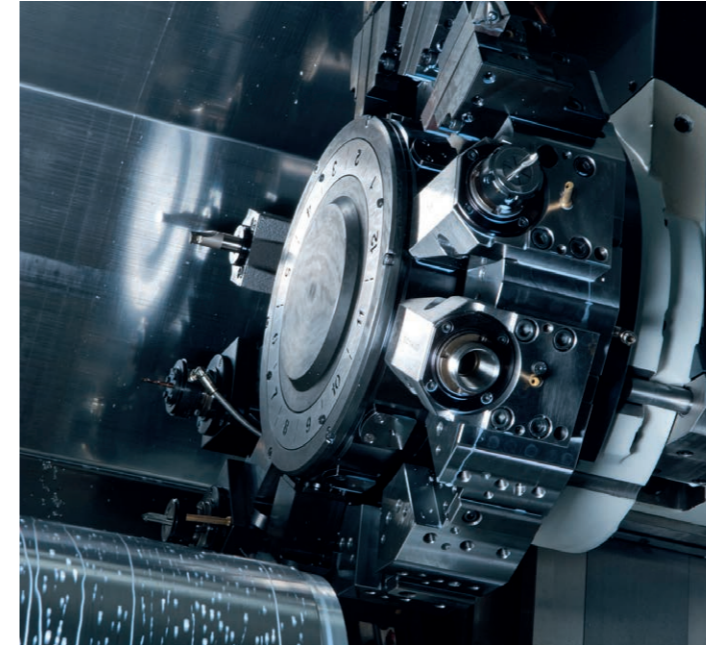
We also operate a pressure chamber to simulate 6000m water depth, and a climate chamber with stable temperature control.

What we offer you

High performance machinery to meet your needs

CMZ TC 35Y

Designed for the heavy-duty market in sectors such as oil and gas, subsea and cryogenics, the CMZ TC 35Y has a machining length of 1100mm and a turning diameter of up to 500mm. Equipped with Y and C axis, complex workpieces are no challenge and a fast tool changer means even a large volume can be processed cost-effectively.



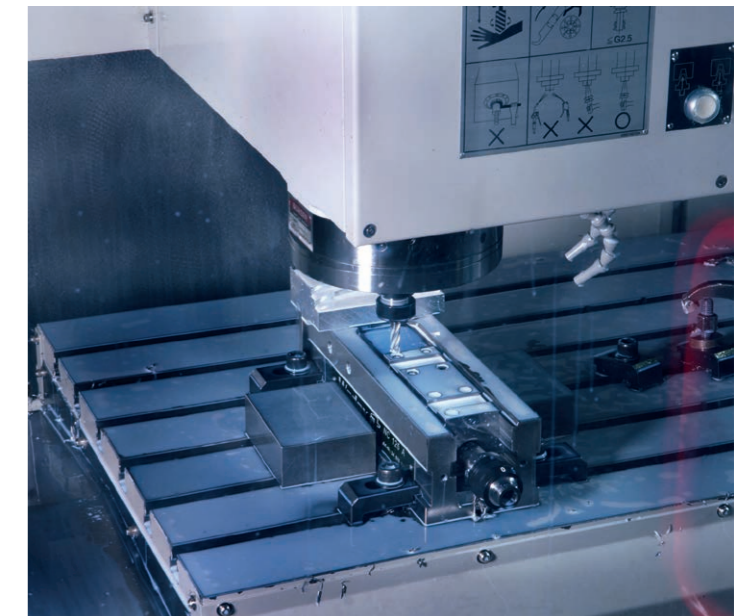
Nakamura Tome AS-200

This powerful, multi-tasking, compact model includes Y-axis milling and C-axis to enable both on-centre and off-centre milling. Complex parts can be manufactured with highest precision in one set-up and on one machine. With internally cooled tools and integrated high pressure cooling system, this machine processes parts up to 145mm diameter and a length of 300mm.



Quaser MV 184P and Quaser MV 204P

Our two high performance vertical machining centres with fourth and fifth axis allow complex components in demanding materials, up to 500kg and 1800kg respectively, to be manufactured accurately, in large volume. The HEIDENHAIN control reduces set-up time and enables prototypes to be produced with the 30-position tool changer and complex 3D machining on the fifth axis. Both machines are also equipped with a 3D high precision measuring probe which enhances machining and measurement ability, delivering components exactly as specified.



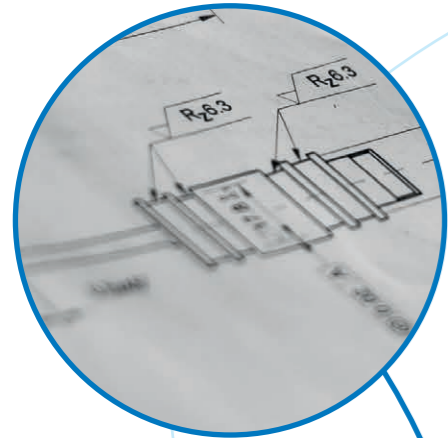
Subsea solutions made simple

Discovering our complete end-to-end service

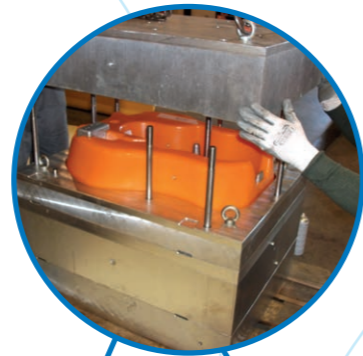
We continue to develop new generations of subsea instruments for customers across a wide range of industries. Our flagship proposition is an end-to-end service that covers designing, prototyping, testing, manufacturing and, where needed, operating unique systems and tools.

Alongside providing this end-to-end service, we can help with a customer's own product development at any stage from design and prototyping through to manufacturing.

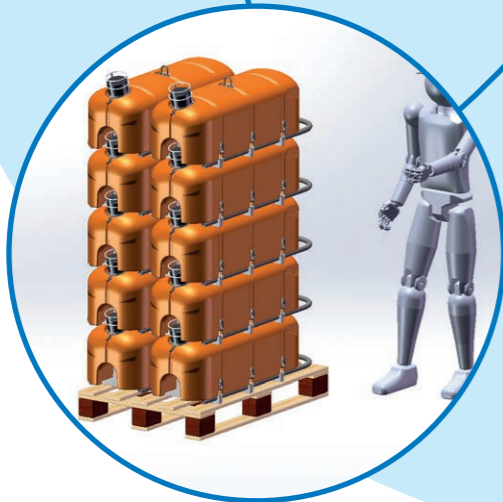
We can also provide field support services including system operators on research vessels, instrument training and equipment maintenance.



Product Design
Transforming innovative ideas into a robust design



Advanced Prototypes
Produced using our highly sophisticated machinery



Computer Simulations
Performing a range of initial computer simulations



Full Manufacture
Inhouse or outsourced to partners for larger volumes



Field Trialling
Either in the real environment or at customer facilities



Rigorous Testing
To confirm full conformance to agreed specifications.



Operator Support
Provision of post-production services including operators

An indepth portfolio

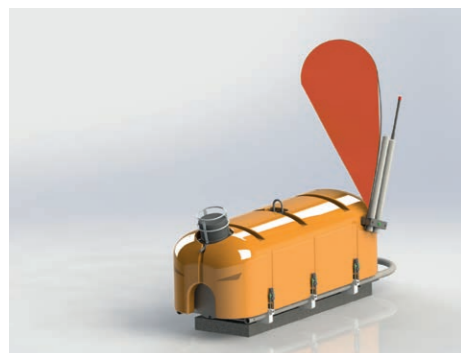
Off-the-shelf solutions and new product development

We provide a wide range of off-the-shelf products, which are available to buy as is or can be modified to a customer's specifications. All the products are designed to operate at a depth of at least 6000m or more.

Our core product proposition is a range of ocean bottom seismometers (OBSs). They include:

ISOPOD

Designed to deliver best results autonomously recording seismic data for over 3 months, ISOPOD is equipped with three 4.5Hz geophones, hydrophone, 4 channel datalogger and acoustic releaser.



Nammu

This is a flexible OBS platform which can carry different types of seismic equipment and at the highest specification has a 120 sec broadband seismometer, 100 sec hydrophone, 4 channel datalogger, acoustic releaser and is designed to autonomously record seismic data for up to 36 months.



We also offer many of our unique OBS components as standalone products to complement customers' own subsea systems. These include:

UHURA

A high precision satellite positioning signal receiver.

StiK

A versatile, compact, subsea data storage device with up to 1 TB at 32Mbit/s.

TUNA

An ultra-low power consumption subsea electronics module capable of controlling any 12V appliances and command them using built in calendar and clock.

DIRC

An OBS control centre performing all functions from deployment to recovery.

Datalogger 6D6

A state of the art 32-bit datalogger capable of recording 8 channels with sample rate 50-4000Hz and 142dB signal-to-noise ratio.

A range of Seismometers

With a wide range of sensitivity options (from geophones to 120 sec broadband options) and where needed with leveling gimbal system.

A range of Acoustic Releasers

For subsea instrument carriers, OBSs or moorings with up to 1000 kg release load and up to 24 months autonomous operation.

For subsea and seabed research, we offer a variety of unique systems:

- A range of sediment traps with multiple sample collectors to optimise maintenance and extend projects for up to 24 months
- Seabed sediment samples collection systems
- Bespoke seabed instrument carriers able to carry a range of instruments
- A series of multi-horizon water samplers suitable for deep-sea deployment
- A high capacity and payload lander capable of carrying and recovering up to 400kg of wide range subsea instruments with a base of 5.4m²

Finally, we can also provide a wide range of products to complement the subsea systems used by our customers. These include cabled titanium pumps; titanium pressure housings; inclinometers; deep-sea drive units; titanium connectors for digital, BNC, Ethernet or fibre optics; chain bag dredges; titanium deep-sea camera housings and fully certified titanium chains, rings and shackles.



Ongoing Product Development

One of the main innovation paths we are currently pursuing is to extend the use of the OBS systems – making them more versatile, easier to handle and capable of supporting a greater range of operational scenarios.

Planned enhancements to the next generation of our OBS systems include:

- Addition of electromagnetic detector to current seismic instrument
- Introduction of new microelectromechanical system (MEMS) module to further reduce power consumption and size of the instruments
- Improvement of operational parameters required for continuous monitoring and Tsunami Early Warning systems, such as event-triggered messages using satellite connection and detachable and ROV replaceable memory and batteries
- Creation of new operational scenarios such as self-relocation OBS system and OBS working as a relay-station as part of a deep-sea network

We also plan to extend the services we offer to our customers to include: OBS-network layout and project design; OBS rental service; offshore instrument service; and data conversion, assessment and interpretation support.

Finally, further development of our modular lander system is another important area of R&D investment and includes the provision of: permanent monitoring support; deep-sea in-situ laboratory facilities covering biology, chemistry, geophysics, and other disciplines; and in-situ support for farming, harvesting, mining and storage of mineral and energy resources.

Environmental responsibility

Working in the deep sea marine environment, we take our environmental responsibilities very seriously. Our products are also used to support a wide range of research into global warming and climate change.

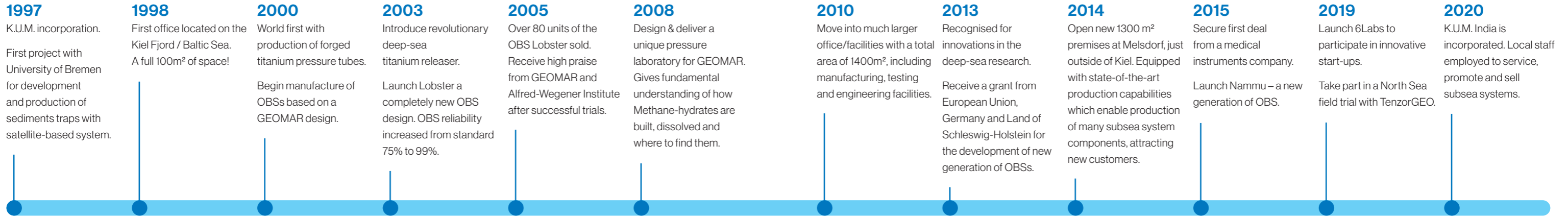
For example, our sediment traps are used in research to better understand the impact of climatic change on our polar environments. Likewise, our OBSs have been used to record seismic data passively without the use of air-guns or explosives – ensuring no harm is done to cetaceans or other marine animals.

In product production, we also aim to maintain the highest standards of sustainability. Our pressure tubes are forged inhouse from high strength titanium with all unneeded material being fed directly back into the production process. This is not only cost-effective, but also helps to reduce waste. Furthermore, in order to guarantee a high level of operational safety, our tubes are sealed with titanium screws to prevent any contamination of the environment from leaked operating materials – and rechargeable batteries are used in the development of most of our systems.



A track record of success

World leaders in marine research and subsea engineering



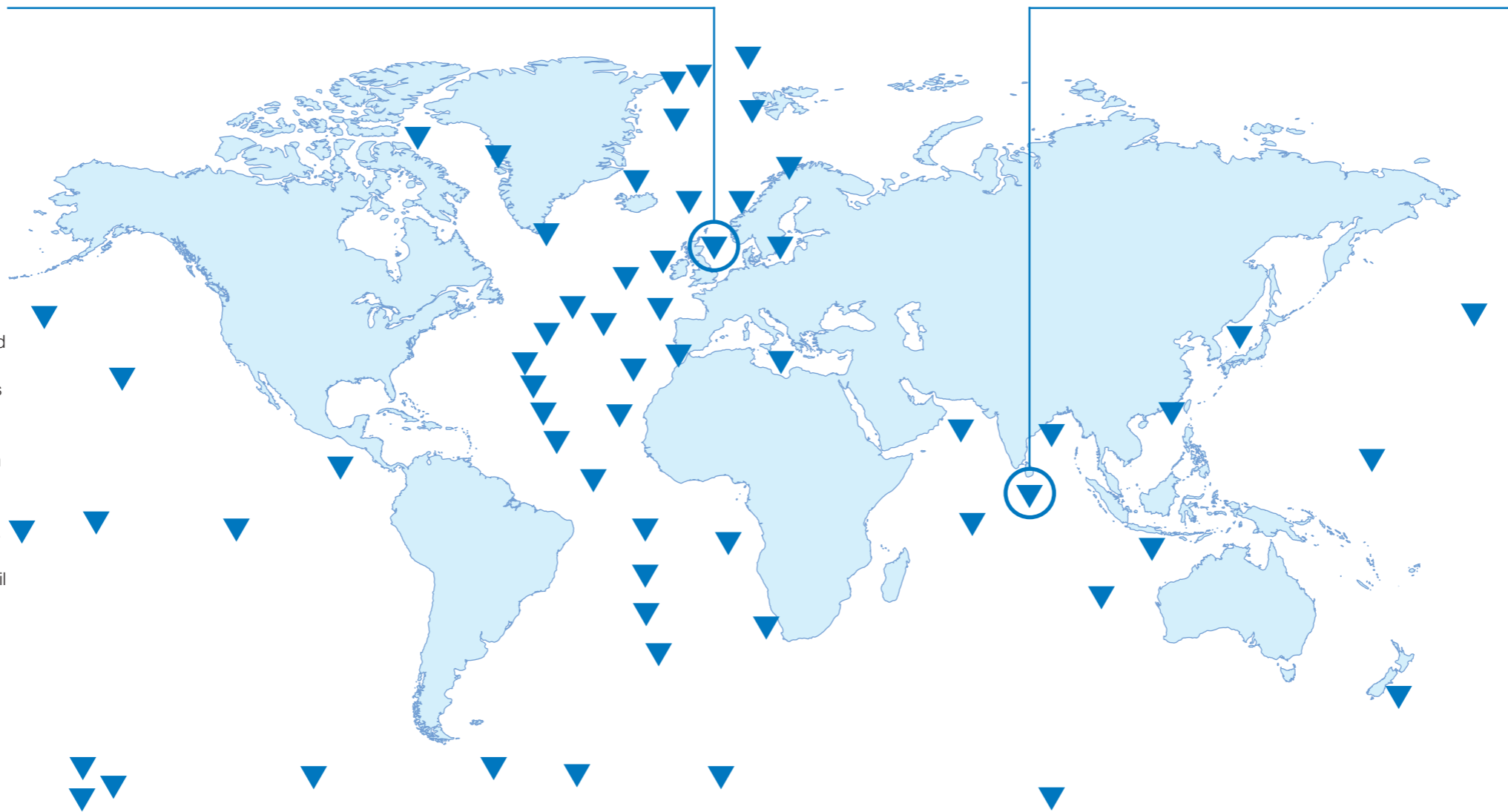
CASE STUDY

Play an integral part in a week long offshore oil and gas passive seismic appraisal campaign in the North Sea funded by a super-major oil company and a UK technology innovation agency.

February 2019

In this project, a total of 25 ocean bottom seismometers (OBSs) previously successfully deployed in academic studies proved equally effective at collecting seismic data in a blind survey of a 3.3km² area of the North Sea that featured an oil-water contact line. Thanks to the joint efforts of the diving support vessel crew and our engineers, all the OBSs were deployed and recovered twice in winter conditions with no loss or damage.

This trial demonstrated our capability to perform an oil and gas offshore appraisal test in line with strict safety regulations, while working 24/7 shifts to ensure maximum operational efficiency. Once interpreted, the data revealed how low frequency seismic can be used successfully in oil and gas exploration and appraisal.



OPERATION LOCATIONS

CASE STUDY

Participate in a multi-institutional project aimed at studying a 106-metre anomaly south of the Indian peninsula – the largest equipotential gravitational field distortion in the world.

May 2018

Funded by the Ministry of Earth Science in India, the project is aimed at discovering what caused the Indian Ocean Geoid Low (IOGL), its relationship with deep mantle structures and how it differs from Earth's other geoid anomalies. Following a detailed marine geophysical reconnaissance study of the area, 17 of our NAMMU ocean bottom seismometers (OBSs) were deployed twice for a period of one year to facilitate the second stage of the research.

The NAMMU was selected as the most robust and sophisticated instrument developed for deep-sea data-capture operations and capable of self-installing on the seafloor. The data captured advanced understanding of the causes of the IOGL, and will help to potentially close a long-standing global debate about its origins.

Our management team

Combining the best experience
in the industry

Today, we employ a total of 45 people across all our operations. In our main office in Kiel, we employ 33 with the majority holding mechanical or electronics engineering, physics, or geophysics degrees including three PhDs.

Our senior management team consists of:



Thomas Kumbier
CEO

Thomas has been active in marine technology for over 35 years and played a major role in the development of the sediment traps in the mid 1980s. He polished his skills at two marine technology companies in Germany, before establishing K.U.M. in 1997. With his tireless passion for innovation and creativity, Thomas drove the business through many difficulties to build it up into a successful subsea research systems company. Thomas has participated in various offshore research expeditions across all the oceans of the world.



Arne Schwenk
CTO

Arne is a world recognised expert in subsea physics and engineering and his drive and innovative thinking have provided the foundation of much of the company's success. Arne joined K.U.M. over 20 years ago and has participated in more than 20 offshore scientific expeditions, personally handling operations of OBSs and other subsea systems.



Erik Labahn
Head of Mechanical Engineering

Erik is one of the founding fathers of K.U.M. and currently leads our mechanical engineering department. Throughout the company's history, Erik has led from the front, successfully delivering numerous projects thanks to his know-how and passion for quality and innovation. Erik has taken part in over 15 offshore scientific expeditions.



Dinesh Babu
Director, K.U.M. India

Over the last 28 years, Dinesh has managed professional business support services for several organisations in India with specific focus on marine, deep sea technologies and oceanographic domains. Working on niche products from world leading companies, he successfully defined strategy, drove business development and established in-country support services. His diversified global and regional experience and his ability to understand detailed customer requirements make him a valuable addition to K.U.M. family, where he is responsible for K.U.M. India.

Talk to us

The pioneering technology solutions we design and deliver create a robust foundation for the relationships we build with all our customers.

These are relationships built on science and trust.

As the specialists at depth, we would be delighted to discuss your next deep sea challenge or seismic exploration project.

If you think we can help – and we can – then please do get in touch with us today.



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