ttz Bremerhaven

RESEARCH FOR MORE QUALITY OF LIFE

Mankind at centre stage

Carbon-neutral energies

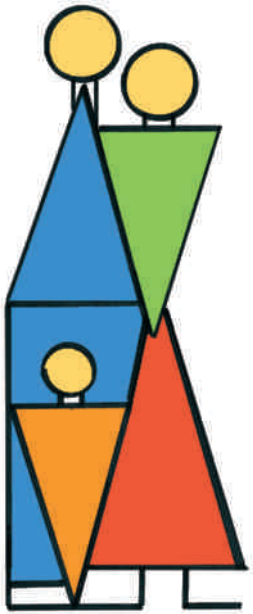
Increased value added

Information and transparency

Support of biodiversity

Process optimisation

Conscious consumption



Science is at the heart of society. New developments and findings serve each day to make life safer, simpler and more sustainable. In a world of limited resources, we are increasingly advised to produce with foresight and consume more smartly.

This does not have to place limitations on pleasure, does however demand a more circumspect handling of natural raw materials. Progress is a basic need – it must however clearly be at the service of mankind in order to find acceptance. And it is vital to keep social requirements in mind and to maintain an open dialogue.

There is no alternative to greater efficiency

The creative spark which spawns new and improved products is the basis for economic strength. Raw materials are scarce and labour has its price. The know-how for the realisation of promising ideas helps secure a competitive advantage. In tough economic times, ingenuity and efficiency are more in demand than ever. An enhanced production technology, an increase in output and the usability of waste can unlock potential and better conciliate economy and ecology.

From abstract idea to concrete benefit

The word innovation is in everyone's mouth – it sounds positive without promising anything in particular. Increasing complexity means it is no longer easy to join the dots. The dialogue between science and society gives innovation a face: The image of an application which is anchored in everyday life. Such messages are remembered and waken the desire to take part in the development process, to discover it for oneself and to integrate it into one's own life.

Innovation is a force which calls for emotional openness: A readiness to dare cross the limit. A society does not just need tinkerers and developers for this – above all it also needs people willing to give an initially irritating novelty a chance. Research organisations can encourage this attitude through an open-door culture. On every possible occasion, ttz Bremerhaven offers the possibility to become acquainted with the practical advantages of its research activities: Open days, offers for school pupils, as well as support for the children's university relay the fascination of natural science topics.

Innovation is the heartbeat of economic structures

Clusters bundle the established strengths of a region. Fostering them further is the joint task of business, science and politics. When upstream and downstream steps in the production process are connected via short routes and specialist expertise is concentrated, synergies are the almost automatic result. A field of competence developed in a concerted approach sharpens a location's profile. In the State of Bremen, the food sector has traditionally occupied a strong position. Structural change has made the topics of environment / alternative energy strong in recent years.

Small and medium-sized enterprises keep a region together: The unity of living and working environment strengthens identity and family ties and motivates the local population to champion pleasant living surroundings. They are a job motor and their attractive training and promotion opportunities counter the migration of skilled labour. Customers trust products from their own region because they can trace their origin and how they were made.

Demand makes all the difference

In a globalised economic world, no region can afford to neglect the productive force of the „spirit of innovation". In particular small and medium-sized enterprises are focusing on their strengths. The outsourcing of research and development work to specialised service providers, such as ttz Bremerhaven, gives them the freedom of space to concentrate on their core activities. The pressure to innovate reduces the half life of knowledge and demands from business players to create a distinctive profile. On the solid foundation of a stable partnership, it is easier to venture on something new.

The optimisation of existing products' composition and / or the modification of production technology so that a new level of quality is reached or processes rationalised are amongst the tasks performed by the highly specialised team at ttz Bremerhaven. Modular solutions do not stop at jointly undertaken and successful development work but instead open up opportunities for enterprises whose ambition is further development.

Differentiation through innovation

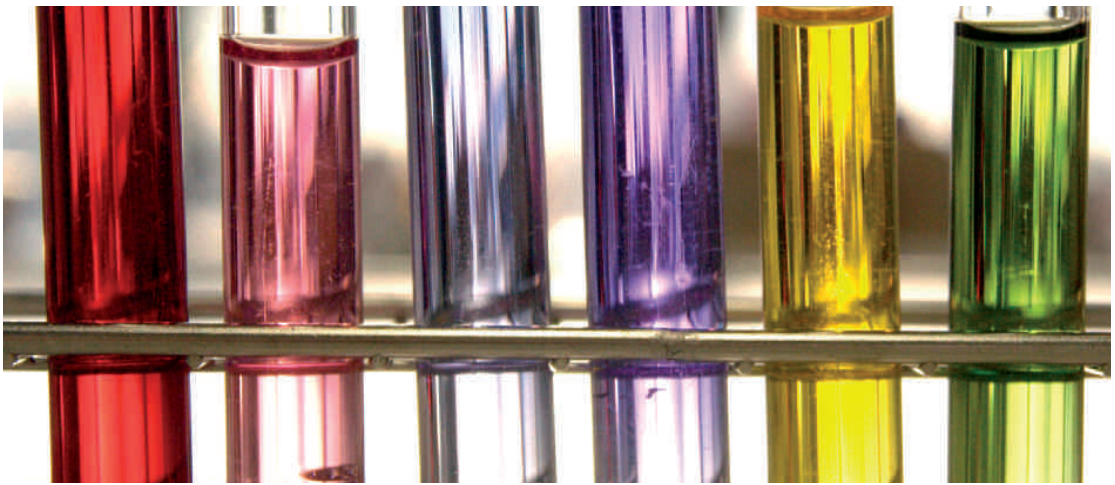
Protection of resources

Sustainability

Augmentation of efficiency

Quality assurance

Pleasure + taste variety



For over 20 years, ttz Bremerhaven has accompanied enterprises of all sizes in their research and development projects. A team of 100 highly qualified employees is working in seven departments on sustainable solutions. A Technical Unit covering 1000 m2 and with state-of-the-art equipment is available for both initial and upscale trials.

The different departments at ttz Bremerhaven bundle their know-how in order to turn the most advanced solutions into reality. Via an expansive international network, we can access the expert knowledge needed to answer highly specialised questions. With the help of local partners, any barriers preventing entry to new markets can be more easily overcome.

Follow the process chain on the next pages and discover the potential we offer!

Water, Energy and Land Use Management

In the Department of Water, Energy and Land Use Management, new approaches for a sustainable and economically efficient handling of natural resources are developed. Research into regenerative energies is carried out and new fields of application unlocked. Refined processes are put into practice both „right on the doorstep“ in Bremerhaven as well as throughout the whole world. For example, ttz Bremerhaven has been supporting the capacity building in the sector of ecological sanitation in India and Africa successfully.

Contract work includes certified analyses, e.g. for the composition of ambient air, and engineering reports, e.g. for the energy consumption of technological processes, as well as the carrying out of controls for the granting of quality certificates.

By way of example, we develop solutions for the following questions:

- How can carbon-neutral energy be produced and stored?
- How can a wastewater system be designed as an efficient closed loop?

Stage 1: Preserving water quality by means of filter systems and cleaning technologies which, for example, prevent pollution through ship traffic, protects the habitat of plant and animal life. Tasty fish – for example salmon – can thrive under these conditions and is a healthy way to enrich our diet.

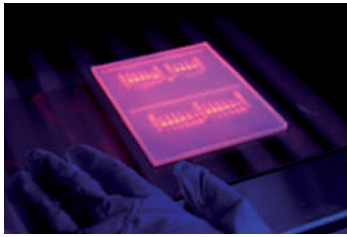
Molecular Genetics

The Department of Molecular Genetics (BIBIS) develops methods for the fast and reliable detection of viruses, human pathogen germs and other contaminants and pathogens. These processes are used in medical diagnostics, wastewater treatment and the food industry. In addition and through variations, the scientists are able to detect mutations in genetic material and clearly typify the species concerned.

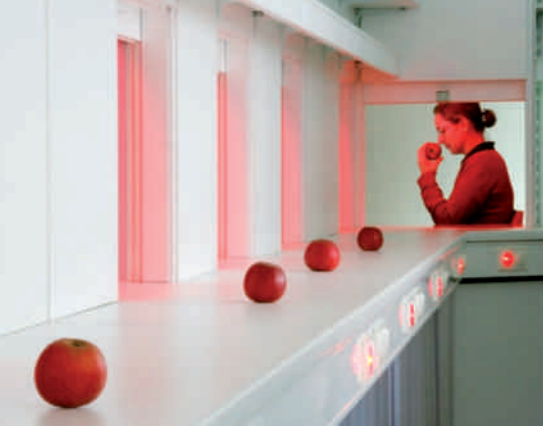
With the PCR method (Polymer Chain Reaction), checks can be carried out, for example, which conclude how fresh a product is from the increase in a strain of bacteria. The outcome is reliable quality control.

By way of example, we develop solutions for the following questions:

- Is it still possible to swim without concern in a natural swimming pool after six weeks of high summer temperatures and peak visitor numbers?
- Is there any health risk involved in eating shellfish from Mediterranean breeding grounds?



Stage 2: Ensuring a constant temperature along the salmon's transport route is a complex task. For example, it varies on a truck depending on the position of the batch: In the middle it is different from near the loading hatch or at the top. Molecular genetic tests can prove that every batch of salmon was constantly sufficiently chilled.



Sensory Technology

The Sensory Laboratory uses consumer tests to establish the sensory acceptance of products. In this way, the financial risk entailed in the market introduction of new products is reduced. The statements made by sensorially trained testers (panelists) give the enterprises important clues for product development, quality assurance and marketing. The recommendations help food manufacturers to make a realistic comparison with competitive products and to occupy market niches systematically.

The correlation of sensorial and analytical data facilitates to a wide extent an objectification of the individual sensations experienced by the testers. The service range also includes professional sensorial training for enterprises' personnel. Know-how regarding the methods and evaluation processes used in sensory testing upgrades enterprises' competence and forms the basis for in-house quality management.

By way of example, we develop solutions for the following questions:

- Do organic products taste different to conventional foodstuffs?
- What correlation is there between a sensory impression and a food's ingredients?

Stage 3: Does a salmon from the sea taste different to the same species from aquaculture? What fish are consumers going to prefer on the basis of what characteristics? For the market introduction of a new frozen fish dish, the Sensory Laboratory is able to predict its popularity amongst consumers and make recommendations on how to optimise the recipe in terms of taste.

Bioprocess Engineering / Food Technology

The Department of Bioprocess Engineering and Food Technology develops and optimises processes and recipes for foodstuffs. A focal point is, for example, the further development of molecular gastronomy concepts. The impetus for new approaches is a sound knowledge about the material changes occurring in cooking processes. This know-how is complemented by know-why, the understanding and mastering of sophisticated process engineering. Dishes can be presented in a form not previously known.

Processes to safeguard the quality of food are being continuously improved so that consumers can enjoy it without worrying. This also includes the development of novel packaging solutions and smart labels. Systematic process adaptations make manufacturing and processing techniques more efficient in terms of energy and resources. Bioactive substances are recovered through the value-added utilisation of by-products from the food industry.

By way of example, we develop solutions for the following questions:

- How can natural taste variety be maintained?
- How can vegetable sources of protein be developed which satisfy the growing demand?

Stage 4: Fish oil is rich in Omega 3 fatty acids but not everyone has fish on the menu several times a week. The encapsulation of fish oil in a tasteless alginate casing ensures that valuable substances are supplied to the body in a simple and taste-free way.

Baking and Cereal Technology

In the BILB/EIBT, baking processes and products are optimised in order to save energy in manufacturing and processing as well as to improve aroma and quality. These processes can frequently also be transferred to other product groups, e.g. the Microtec process, which uses a fine aerosol mist to produce moisture, can also be used for vegetables and meat.

The use of old and traditional types of cereals expands the known taste palette and also offers consumers of organic products new alternatives. The efficiency of baking processes is improved through innovative technological approaches for kneading, raw material, refrigeration and baking additives management. Training and know-how transfer help bakers worldwide to be equipped for toughening competition.

By way of example, we develop solutions for the following questions:

- How do changes in climate influence flour quality and what targeted counteraction can bakers take in order to offer their customers consistent quality?
- How can aleuron cells be recovered from the cell wall of the grain and processed to a powder which increases the nutritional value of white bread?

Stage 5: Apart from nutritional value, functional food ought to have a positive influence on bodily functions. For example, small „pearls" of encapsulated fish oil can be baked into bread. It tastes the same as normal bread but offers an additional effect in terms of nutritional physiology

Health Technology

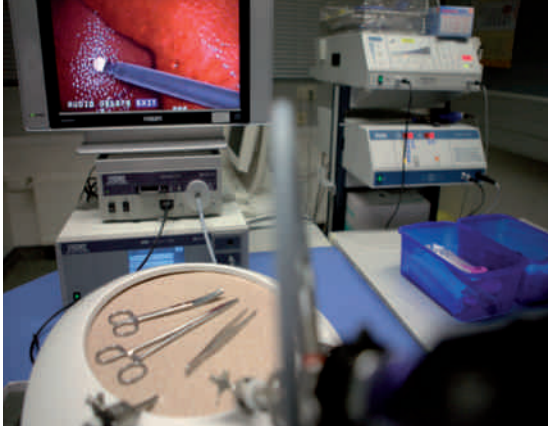
This Department supports the development of medical technology equipment. For example, a platform is available which delivers important findings regarding the design of new instruments for minimally invasive surgery to medical technology enterprises and surgeons. On behalf of medical technology enterprises, data management for clinical trials in the framework of statutory approval procedures for new appliances is carried out.

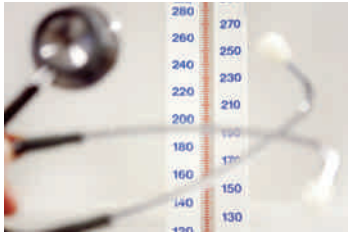
In addition, software systems are designed which support doctors in particular activities. This includes a teleconsultation system with which pathologists can call up a second opinion from colleagues when carrying out an especially difficult investigation of potentially cancerous tissue. Planning tools for plastic/reconstructive breast surgery are also developed here.

By way of example, we develop solutions for the following questions:

- What blood pressure measuring devices for home care use are so accurate that they can be used in the framework of hypertension treatment?
- How can software assist surgeons in planning the result of plastic/breast surgery together with a patient?

Stage 6: A diabetes patient must monitor his diet exactly. A telemedical system helps him keep to the guidelines. The system rates the consumption of fresh fish positively.





Project Management

In view of the high degree of specialisation and short product life cycles, innovations are today mostly no longer the „stroke of genius“ of a luminary but instead the product of constructive co-operation in networks of experts expanding across the globe. The contacts and sectoral knowledge have been growing for over 20 years and have become an important capital for us.

The variety of our international contacts is also reflected in the team at ttz Bremerhaven. Experts from different disciplines accompany your idea from first evaluation and market assessment to selection of an appropriate funding programme and formulation of the proposal to marketing support. Projects of all sizes can be successfully implemented in this way.

We provide answers to the following questions:

- What funding scheme is suitable for which project and what criteria decide whether an application will be successful?
- How can an effective working relationship be achieved across national boundaries with partners from different countries when there is only limited personal contact?

Stage 7: In projects undertaken together with small and medium-sized enterprises from the region, unusual fish recipes for ready-made fish dishes are developed with the aim of unlocking new consumer segments. Marinade with a hint of coffee and chilli bring variety to the shop shelf.

Analytics

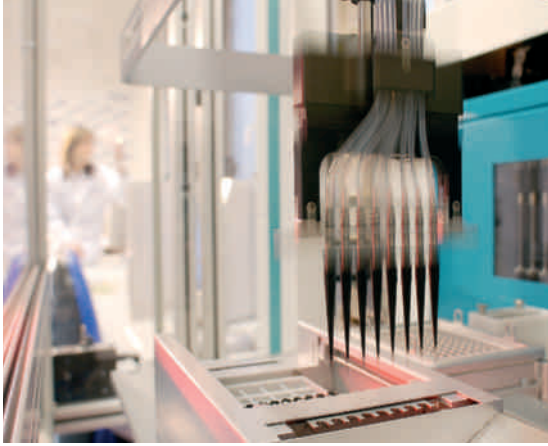
State-of-the-art analytical equipment/processes for the investigation of gases, liquids and solids are used at ttz Bremerhaven. Raw materials for the production of foodstuffs or cosmetics are characterised and qualitatively assessed. Nutritional value, additives, trace elements, amino acid and sugar spectra can be reliably detected and quantified.

Solubility, foam formation, anti-oxidant effect – techno-functional analyses permit forecasts about the behaviour of ingredients during/after processing. Storage and shelf-life tests allow precise predictions and increase consumer safety

By way of example, we offer solutions to the following questions:

- Do a Riesling from a wine shop and a Riesling from the supermarket differ in terms of their aroma profile?
- Staff at XYZ regularly complain about headaches. Are there pollutants in the air which are causing this and where are they coming from?

Stage 8: The manufacturer of a ready-made fish dish is losing more and more market share to the competition. He therefore has the product's packaging analysed and learns that volatile substances are impairing the taste. A new packaging coating is able to solve the problem.



Training for Experts and Young People

Training courses & workshops

Research is the productive displacement of the boundaries of the possible. So that newly generated knowledge is transformed as rapidly as possible into practical applications, ttz Bremerhaven regularly offers training courses and workshops for users and developers. The practice-based communication of state-of-the-art knowledge makes the advantages of a technology application/process development transparent and facilitates its realisation. On behalf of enterprises, we design training courses which are precisely customised to your requirements and development objectives.

Solar Energy Training Centre

At the beginning of 2009, a training centre for the utilisation of renewable energies is opened in Khulnar/Bangladesh. Together with the University of Bremen, ttz Bremerhaven has designed and built the facilities for training fitters and firms' representatives. In particular the south west of the country offers considerable energy potential for the use of solar power. The nationwide electricity grid is highly prone to breakdowns and makes it especially difficult for those enterprises to plan which must keep to manufacturing deadlines. Greater use of solar energy defuses the situation.

The one-stop shop for solutions

Now we have come full circle

The tour through our departments has shown that water quality, molecular genetic virus detection, food testers, bread with Omega 3 fatty acids and a PC as a health coach have more in common than would at first glance be assumed. Finding and fostering the links presupposes creativity and networked thinking. As a business partner, we offer more than just a clever but isolated solution – we unite the know-how of all our departments in order to achieve the maximum value added for your purpose. Technologies and processes are not restricted to the boundaries of a specific sector. The unbiased approach of an outsider helps you in your search for solutions which can open up new paths. We meet the challenges of a highly competitive market with pragmatism and passion.

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