

VOGELBUSCH
Biocommodities



We make biotechnology work



We find the solutions that meet our clients' needs

Customer orientation and constant openness for innovation are the basis of superior technical solutions designed to meet the individual requirements of our clients.



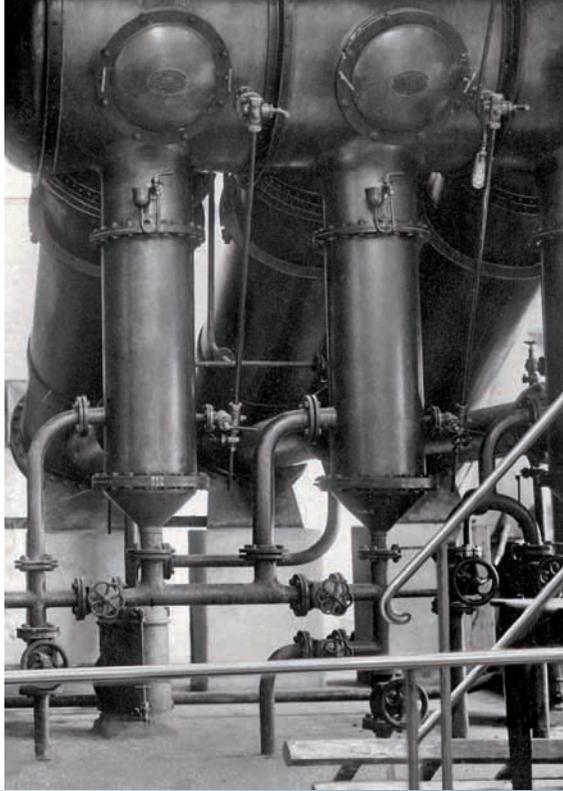
alcohol
yeast
vinegar
organic acids
starch sweetener



To insiders in the biotechnology world, the Vogelbusch name needs no introduction. It stands for unrivalled excellence in the bioprocess technologies required by the biocommodity industries. Our company goes back a long way. The reason we are still in business today is that our processes are not just great on paper, they really work. That is because of our project and client centred engineering design philosophy, our experience, and our research and development capability. Our processes bring returns for the companies that invest in them because we get the economics and product quality right. This brochure explains why this Austrian firm has become one of the major players in bioprocess engineering and consultancy.

Torsten Schulze, Managing Director (right)

Markus Lehr, Deputy Managing Director (left)



A tradition ...

Our company was founded by Wilhelm Vogelbusch in 1921. He rapidly made a name for himself by inventing improved evaporation, distillation and aeration equipment. After World War II the company pioneered new yeast and alcohol production methods, going on to become a leading technology supplier to bioprocess industries around the globe. Its many inventions have won it a place in the

history of chemical engineering and the textbooks read by generations of students.

The business Wilhelm Vogelbusch started is stronger than ever today. It has remained true to its innovative traditions, and its ability to translate cutting edge technology into solid commercial gains is undiminished.



... of excellence



Excellence in research and development is what makes Vogelbusch different. The quality of our R&D is a reflection of our philosophy, our team and the resources at its disposal. Our approach centres on developing processes for people — our clients.

Rather than relying on finding takers for off-the-peg technologies, we gear our research and development effort to finding solutions that meet our clients' needs. We follow each process through from scale-up to implementation, and go back to the test bench whenever adaptations are needed.

None of this would be possible without a large and stable team of engineers who focus exclusively on the technologies we offer. They have access to modern in-house laboratory facilities, analytical equipment and pilot plants. And they can call on a wealth of process data, accumulated in the course of countless full-scale engineering projects.





From process to product

The Vogelbusch Biocommodities division provides bioprocess engineering, consultancy and contracting services, including scale-up and automation, and licences processes. We transfer our technologies to clients and/or help them to improve their own processes. The division specialises in alcohol, vinegar, yeast, organic acid and starch sweetener technology.

You know what goes in and what you want to come out — the inputs and the products you wish to sell. We know what lies between the two. Vogelbusch technologies can start out with many different biological resources and yield many different sustainable processes and competitive products. Most of our technologies have evolved out of starch or sugar processing. The sugar comes from beet, cane or lignocellulosic feedstocks, and the starch is obtained from grain or tubers.



Experts in every stage of the process

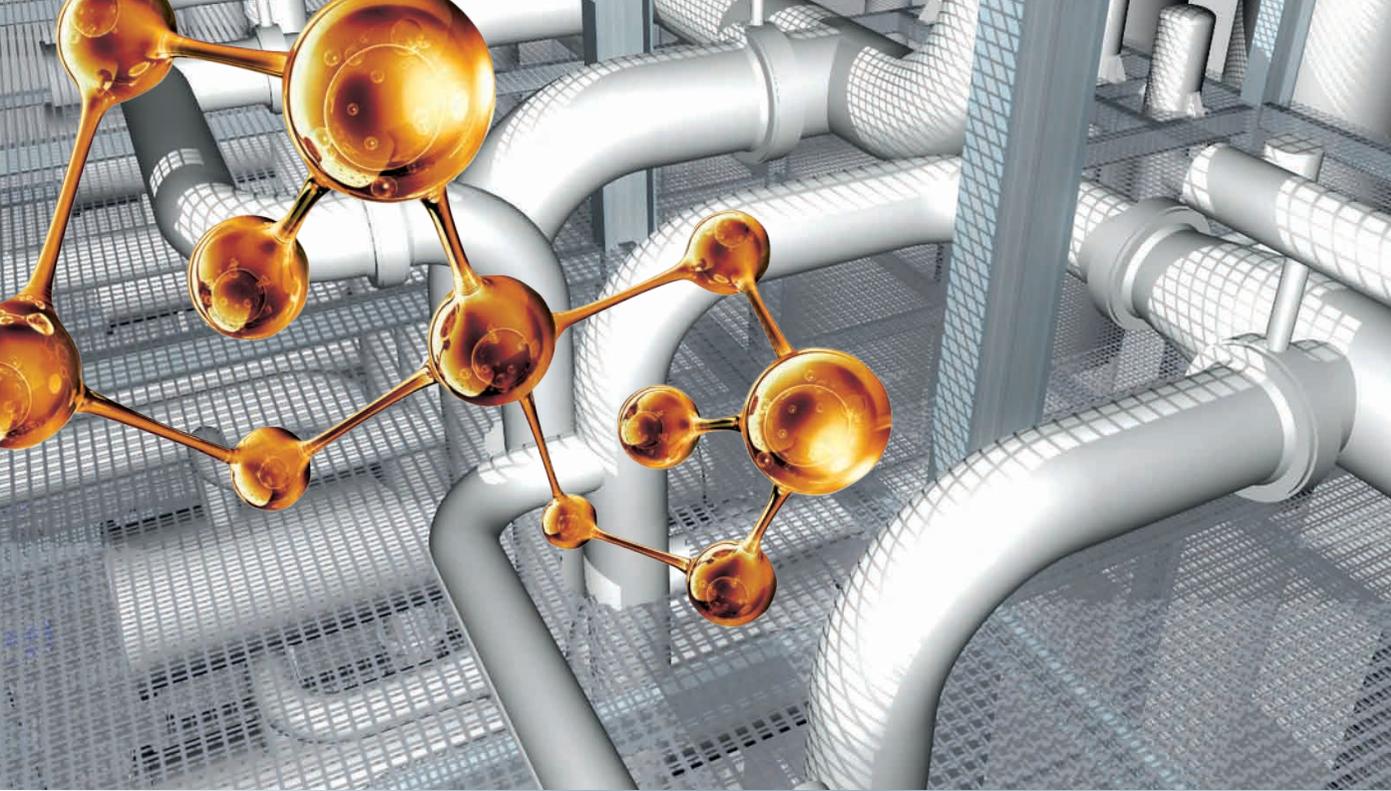
Most bioprocess technologies comprise three stages. The first is raw material preparation, such as the conversion of starch or lignocellulose into sugar or the preparation of molasses. One of our key success factors is our experience of input materials combined with the expertise to analyse them precisely for bioprocess purposes.

The second stage is fermentation. Micro-organisms are used to turn sugar into a variety of products. Our laboratories select, propagate and conserve the micro-organisms required in these processes. A major factor in fermentation economics is the efficiency of the aeration system. Vogelbusch has a wide portfolio of proven proprietary systems for a range of aeration requirements.

The third stage is purification. A variety of methods, including distillation, evaporation, filtration, crystallisation, extraction, chromatography and molecular sieve adsorption, are used to separate, purify and concentrate the product. This is where Vogelbusch can also draw on a wealth of experience, and our expertise enables us to tailor product quality precisely to market demands.

We make biotechnology work

Our corporate claim highlights our ability to translate state-of-the-art technology into profitable plants — laying the groundwork for our clients' commercial success.



Processes for people

The strengths we claim to possess are not just wishful thinking. Scores of plants around the world prove that our approach works in practice. Our processes have a trouble-free record, and perform to rated specification — because the engineering work centres on clients' requirements, and the technology is not just advanced but tried and tested.

Every bioprocess project presents its own challenges that demand peak performance from every individual and the team as a whole. Our ability to bring in projects on time and budget comes from the strength of our human resources and the way we deploy them. All projects are assigned to expert teams of technologists, engineers and commercial staff. Their profound expertise comes from involvement in numerous projects over the years.

Each project is followed through to execution by a single team. This means that all concerned think in terms of the completed, industrial-scale plant, and share responsibility for its success. Competent staff stand ready to work on site whenever necessary.

Long-term profitability

The priority on every project is top performance over the long run relating to:

- | product quality
- | process economics
- | environmental impacts

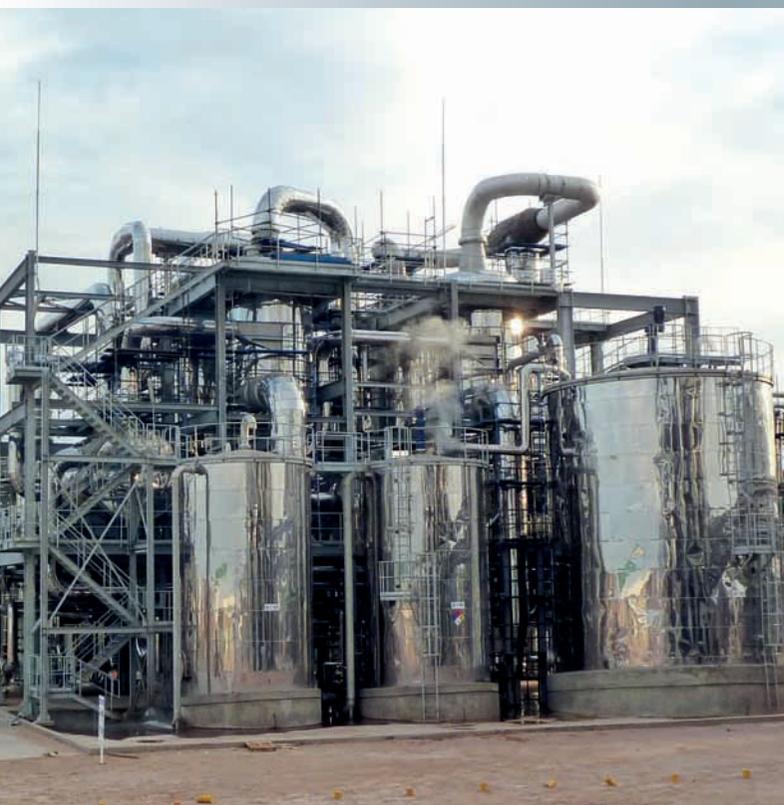
The ultimate aim is to optimise the long-term project cost-benefit ratio. Overall economic performance means taking investment and operating cost into account whilst also ensuring maximum reliability and plant availability.

Continuous development and improvement of know-how, coupled with first-hand contact with the operations of existing plants, ensures that all technology is truly state-of-the-art. The latest advancements are made available to both existing and prospective clients.

We pay close attention to sustainability issues and compliance with environmental standards. Our plants are designed for best-of-breed performance in terms of primary energy and freshwater consumption.

Naturally, clients are also interested in quick payback, and here a significant factor is short project cycles. Our quality management system significantly reduces cycle time. At the same time our systematic approach to project coordination also frees up creative energy.

Together our strengths add up to a key benefit — investment security. The many Vogelbusch plants in operation around the world are the best proof that our technology really works.







People for processes

Vogelbusch is a technology company, so everything revolves around knowledge — which means people.

Our main asset is our highly qualified workforce, about two-thirds of whom are graduates. Most of our key personnel are process technology graduates, and some join us while still at university. Since many of our staff remain with us throughout their careers, we have a good mix of youth and experience.

Biotechnology interfaces between biology, chemistry and engineering science. Its complexity calls for a highly interdisciplinary approach, and this is reflected in the qualifications of our personnel, who are experts in fields such as microbiology, biochemistry, and process, plant, mechanical and automation engineering.

Our project-based organisation requires all our specialists to be generalists as well. They are involved at every stage, from research through to process design, project execution and start-up. Since each individual must be a microcosm of his or her team's skills, lifelong learning is a matter of course.

Our core values are customer orientation, flexibility and acceptance of responsibility, and these in turn depend on empowerment. Our people are free to reach for the heights of excellence.

Progress through partnership

Since Vogelbusch exists to provide customised solutions, our way of working depends on constant communication with clients. Personal relationships play a vital role, which is why employees are assigned to given clients, acting as a single, long-term point of contact.

Our highly specialised solutions grow from intensive information exchanges on objectives and ideas. This implies a ground-up approach, as attaining clients' objectives depends on precise analysis of the economic and technical framework of the project, as well as the specific scope of services the client requires.

Validation of design data in our in-house laboratories opens the way for the development of bespoke technical and commercial solutions. Some of these are exclusively based on our proprietary technology while others are derived from that of the client or form part of a larger overall process.

We specify apparatus according to process requirements and in most cases go on to supervise the procurement process. In addition, we assume responsibility for the supply of critical equipment. Our work takes us to the construction site where we oversee installation and commissioning, train operators and provide subsequent technical assistance.

We complement our clients' skills

Our aim is always to complement our clients' know-how, not to duplicate it. We provide additional resources for every stage of greenfield and upgrade projects. The scope of services provided is tailored to clients' corporate structures and requirements.



Long-term partnerships

Our business is built on long-term partnerships, meaning that customer satisfaction is vital, since only satisfied clients come back.

Many of our assignments go much further than one-off projects. Our clients receive technical support beyond the commissioning of their plant; we frequently advise, handle further projects at a given site, and work for the same client at a number of different facilities. We assist with changes in raw

material quality and product quality requirements, and with efforts to improve yields, capacity and process economics.

Customer satisfaction comes from quality products and services and the arbiter of what constitutes quality is the client. Measurable competitive advantages also depend on enduring relationships with suppliers who share our business philosophy: the construction of world class production plants — on time, on budget and to specification.





Our services

We support you every step of the way and offer:

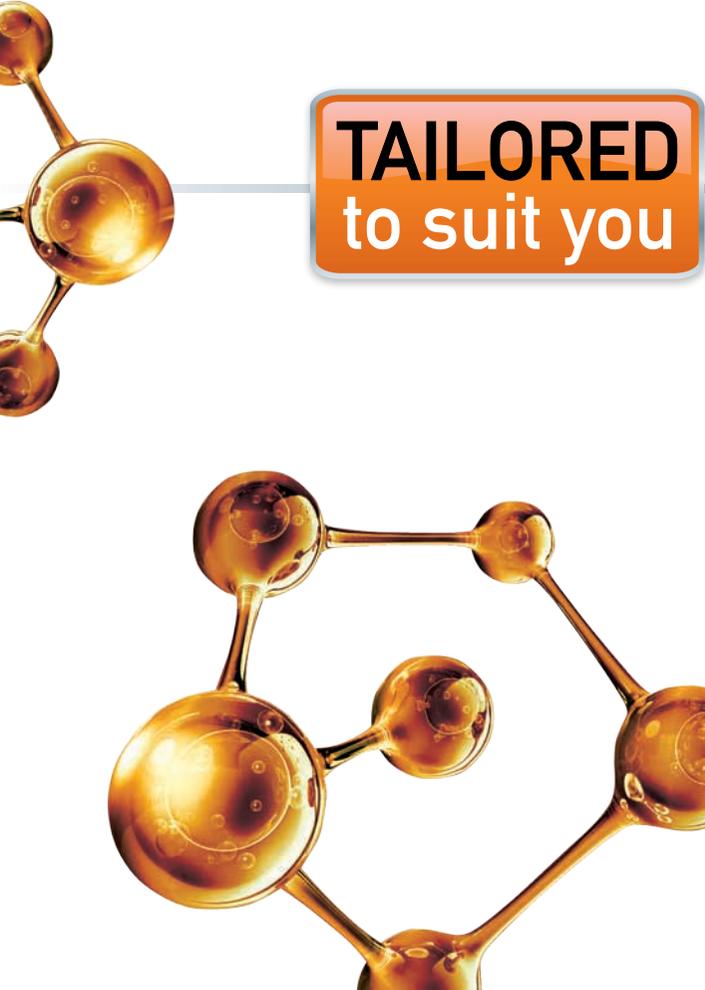
- | Pre-engineering
- | Basic process package comprising
 - Technology and process design
 - Delivery of key equipment
 - Commissioning support and operator training
- | Detailed piping engineering
- | Detailed mechanical engineering and vessel design
- | Process automation
- | Turnkey supply of complete plants or single process sections

Proprietary processes for the production of:

- | Alcohol
- | Yeast
- | Vinegar
- | Organic acids
- | Starch sweetener

Stand out from the rest with a customised state-of-the-art plant

Instead of starting out from standard solutions, we focus on our clients' specific requirements from the outset — in terms of raw materials, product quality, plant configuration and the scope of service delivery. We concentrate on understanding their particular issues and coming up with the best possible solutions.



TAILORED
to suit you

Over to you

That is enough said about us. The best way to find out more about our background and expertise is to get to know us in person. We'd like to meet you to talk things over and discuss your objectives – because ultimately all our services come down to you, and what you need.

We make biotechnology work



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