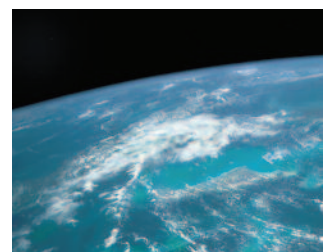


oerlikon
leybold vacuum

Vacuum for a changing world





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High-Tech leadership is a responsibility

A new uniform name and clearly defined mutual goals: the repositioning of the numerous international corporate offices under the strong umbrella of Oerlikon not only focuses on common objectives and tradition, but highlights perspectives and opportunities as well. As part of the globally active Oerlikon industrial group, Oerlikon Leybold Vacuum has become the world's market leader in the field of vacuum technology. As an international leader, we do not recognize only duties and challenges, but also responsibility to our customers.

Partnership in customer relations is just as much an integral part of our corporate culture as continuous investment in research and development, which serve as the basis for new technological standards and innovations.

Throughout our 150 years of company history, we have gained comprehensive expertise in the processes and applications of vacuum technology. Furthermore, we have the largest network of sales and customer service agents in the sector worldwide, with more than 30 corporate offices and more than 50 dealers and representatives.

You will find high-tech applications by Oerlikon Leybold Vacuum not only in satellites and solar modules, but also in MP3 players, television tubes and Tetra Paks. The products and technologies we develop are intended to enrich and inspire our customers and partners – on the earth as well as on the way to new worlds.

Together with our customers and partners we will continue to open up further markets, turn new ideas into reality and develop trail-blazing products in the future as well. This way we ensure profitable, sustained growth to secure our future. Our staff members implement this philosophy based on our promise of quality to our customers, underpinned by the values of excellence, innovation, integrity and teamwork. It is their performance and their commitment that enable us to meet the challenges of the future on a daily basis.







Man cannot live in vacuum, but without vacuum we would have to relinquish many achievements of modern life. The fact that we have mobile telephones or can use compact discs only became possible thanks to the revolutionary development of vacuum technology.

“Nothing is more difficult to explain than the existence of a vacuum”

Werner Mitsch, German astro-physicist

Pioneering performances which changed the world.

As early as the start of the 20th century, Leybold created the foundation for modern vacuum engineering, on which all the vacuum systems in the world are still based. Vacuum conditions are needed in many different areas: in research, in electron microscopy, in the melting of metallic materials and in the production of microelectronics.

The insides of cathode ray tubes of televisions or monitors also have high vacuums, in order to keep the scatter of the electron rays low. Another field of application is the coating of architectural glass. Reflective foils, ultra-violet protective coatings or other surface treatment processes require vacuum conditions in manufacturing.

“Looking into the past only makes sense if it is used for the future.”

Konrad Adenauer, first German Chancellor



The change of time:

When Ernst Leybold started trading with pharmacists' articles in 1850, he laid the foundation stone for an unparalleled company history. In 1867, a workshop for physical appliances was added, later, diffusion and molecular air pumps revolutionised the branch. With cryopumps and helium leak searchers, Leybold finally got to the peak of the trade in the world in 1967.

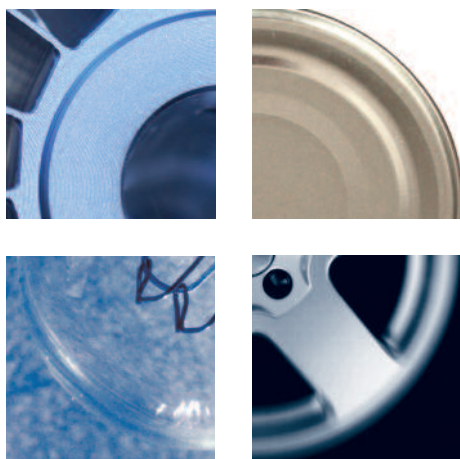
The challenges of globalisation have also left their marks with Leybold. But changes always also mean chances which are to be made use of: As a result of moves of production and global partnerships, Oerlikon Leybold Vacuum is now represented all over the globe with efficient sales and service locations. The consistent branch-orientation to the central markets of process industry, information technology, research and development as well as

analyses and medicinal engineering has given the company an excellent reputation in these fields. At the same time, the concentration to customer benefits, innovation, quality and healthy growth contributed to securing the company's long-term success. And Oerlikon Leybold Vacuum even now still stands for the best know-how in the vacuum branch world-wide. We shall do everything is our power to make sure things stay that way.

Highest commitment for highest challenges

The manufacturing industry has always had an enormous innovation potential. We are living in a time in which the fight for market share crosses all national borders and becomes harder and harder. New ideas and products must therefore be put into practice in shorter periods with limited resources and lower financial means. At the same time, the demands made on process quality and reliability are rising. This particularly applies to industrial production processes in which vacuum technology is used.

These complex, interwoven challenges can only be fulfilled by companies having a supplier who precisely understands their specific requirements and who can implement these requirements in products and systems, thus contributing to the company's success. All over the world, companies with an orientation to process engineering rely on Oerlikon Leybold Vacuum for good reasons: these vacuum pumps and systems excel by maximum precision, outstanding capability, robust construction and resistance and also by environmental friendliness and convincingly low overall operating costs.





Process industry makes use of Oerlikon Leybold Vacuum's global competence

In June 1992 the "United Nations Conference on the Environment and Development", which is considered a milestone in the debate on global warming, took place in Rio de Janeiro. Since this event attracted worldwide attention, there is increased awareness that energy generation and consumption are among the most important issues for the future of mankind.

Renewable energy sources are considered a fundamental solution to the problem of global warming and the limited supply of fossil fuels. However, innovative technologies that facilitate the use of renewable energy not only help to protect the environment, but also play a leading role in industry and the economy.

The conversion of solar energy in particular is regarded as a key technology, as the sun supplies roughly 10,000 times the energy required by the entire world today. Vacuum pumps by Oerlikon Leybold Vacuum play a primary role in the manufacture of photovoltaic modules. A high vacuum is required for the production of thin-layer solar cells with a photovoltaic layer barely one thousandth of a millimeter thick that grows on glass panes in a complex high-tech process.

Photovoltaic technology is increasingly focusing on thin-layer cells, as considerably less material and energy are consumed in their production and the energetic amortization time is significantly shorter than for crystalline solar cells.



IT branch profits from cooperation already in the development phase

Oerlikon Leybold Vacuum creates preconditions for market success:

The demands in information technology can hardly be compared with any other industry. Numerous new and further developed technologies, emerging fields of application, customers' wishes changing at high speed and global markets with great dynamism demand for a tremendously forward-looking and fast reaction from the IT manufacturers. This particularly applies to the development phase of new products, as this is often the time where a later success of a product or a technology is decided.

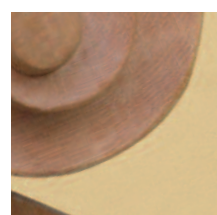
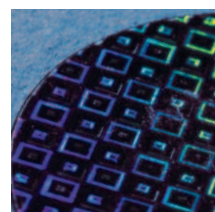
Be it microchips, computer and telephone displays, flat screens, data media such as CDs and DVDs or hard disks – the production of these typical IT products needs vacuum pumps, as production must take place under maximum purity conditions. Oerlikon Leybold Vacuum has a deep understanding of the individual process steps in production and can therefore provide vacuum pumps which precisely match the requirements of the manufacturing process. Not rarely, Oerlikon Leybold Vacuum is included as early as the development phase of a new technology or accompanies the adaptation of a product, thus contributing to mature products and technologies coming onto the market with short lead times.

Efficient overall solution convinces market leaders

Although the market for cathode ray tubes and flat screens is one of the largest markets in Taiwan and is still marked by constant growth, companies here must also face up to international challenge. This means that manufacturers in Asia also have great interest in products and solutions which provide low overall operating costs and simultaneously high output.

Oerlikon Leybold Vacuum's competence can also be seen on this highly combative market and convinces with technological leadership. Thanks to an operating costs analysis on an oil-free solution with turbomolecular pumps, which excel due to their clean vacuum, their high quality and their excellent suction capacity, Oerlikon Leybold Vacuum has been able to portray the financial and technological advantages over other suggested solutions in an understandable way and has also been able to secure follow-up orders.

This shows clearly, how extensive solutions and exemplary cooperation between sales and service help customers from Oerlikon Leybold Vacuum to cope with their challenges.





Precision engineering against doping and other offenders

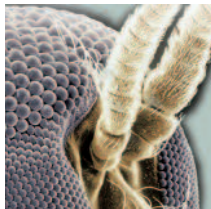


The area of analytical and measurement engineering is not only very extensive and complex, but also demands a maximum degree of precision and reliability. It does not matter whether it is a mass spectrometer, an electron microscope or a leak detector, a simple table-top device or a complex research version – the smallest unreliability can have far-reaching consequences.

Oerlikon Leybold makes an important contribution for the environment, health and safety:

With the help of analytical and measurement devices working under vacuum conditions, new medications are developed, illnesses examined, substances or surface properties determined, blood and saliva tests held or toxins found in drinking water, air and food.

Numerous manufacturers of analytical and measurement devices and the various users rely on the know-how of Oerlikon Leybold Vacuum: the system-capability of the pumps, measurement devices and components, their compact construction, their high technical standard and their outstanding reliability are unique in the branch.

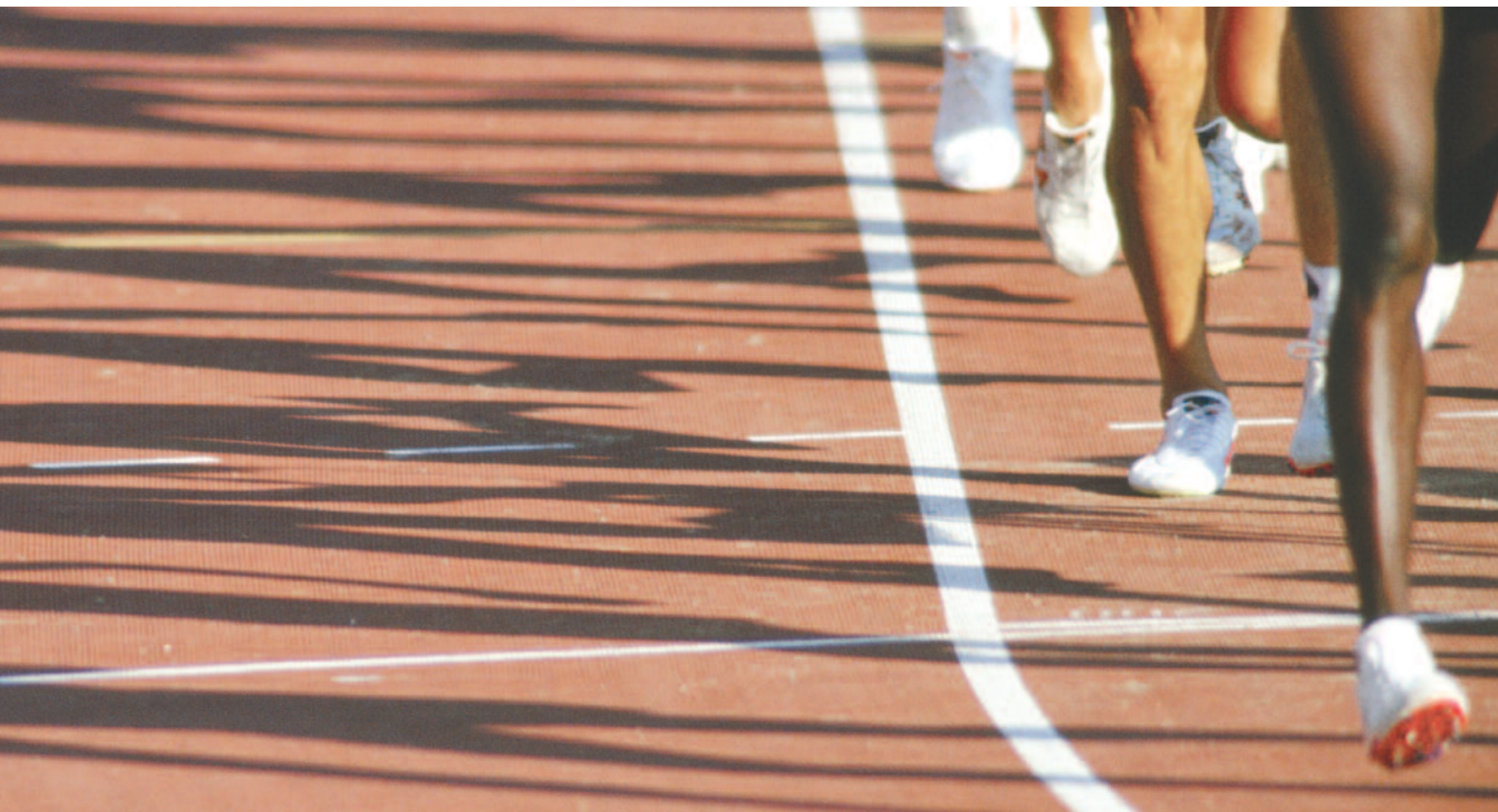


Analytical and medical engineering: looking for clues on the highest level

The Olympic motto “Being there is everything” also applies to vacuum engineering, as products from Oerlikon Leybold Vacuum also start at major sportive events such as the Olympics or the Soccer World Cup. However, no medals are awarded in their disciplines. Being tested “positive” means that medals are taken away again, because then a mass spectrometer equipped with vacuum pumps has been successfully used in doping tests. For this, the samples are prepared in the lab and then compared with the biological fingerprint of the banned substances with the help of a mass spectrometer.

As the quantities of the substances being looked for are extremely small, the disturbing molecules of the ambient air have to be removed in the analysis chamber. This highly sensitive checking method demands a high vacuum, which is why turbomolecular pumps are used.

Spectroscopic and gas-chromatographic examinations not only convict doped athletes, but also render important services in forensic science and combating terror. For example in the identification of fingerprints, blood or saliva traces, or in looking for explosives.



Researchers use Oerlikon Leybold Vacuum to take a look into the future

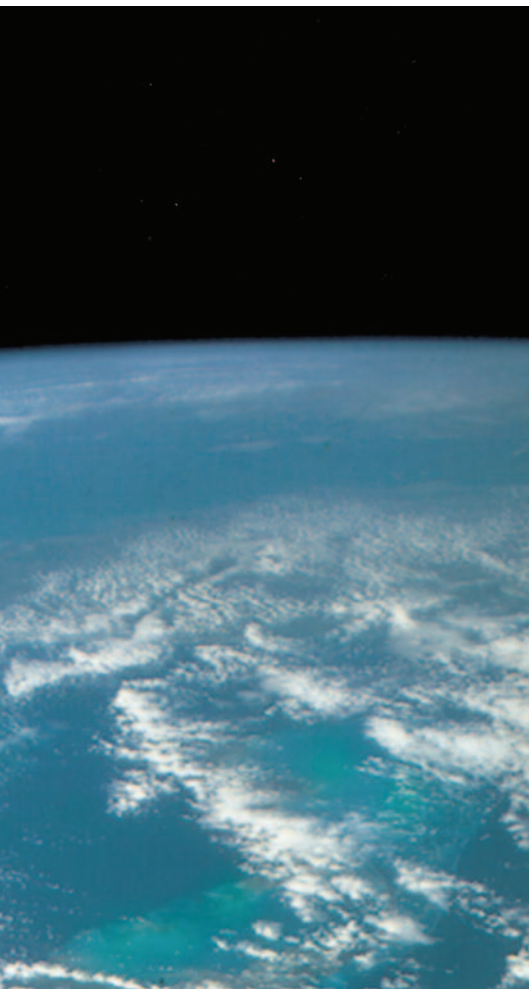


Test, test and test again: Many research and development projects all over the globe – and products and technologies developed from them are unthinkable without vacuum engineering. Be it space or basic research, nano-engineering or high-energy physics, vacuum engineering helps researchers and developers to carry out tests and thus to answer important questions.

For example, CERN in Geneva, the largest particle accelerator in the world, the German Electron Synchrotron (DESY) in Hamburg or the BESSY electron storage ring in Berlin work with specific, highly capable vacuum pumps from Oerlikon Leybold Vacuum. Vacuum conditions are also necessary in drop towers, in order to carry out tests under short-term weightlessness. Here, conditions are created which

can otherwise only be simulated in space and thus at considerably higher cost – if only for a few seconds.

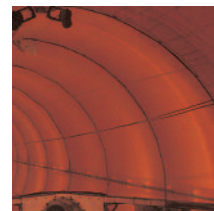
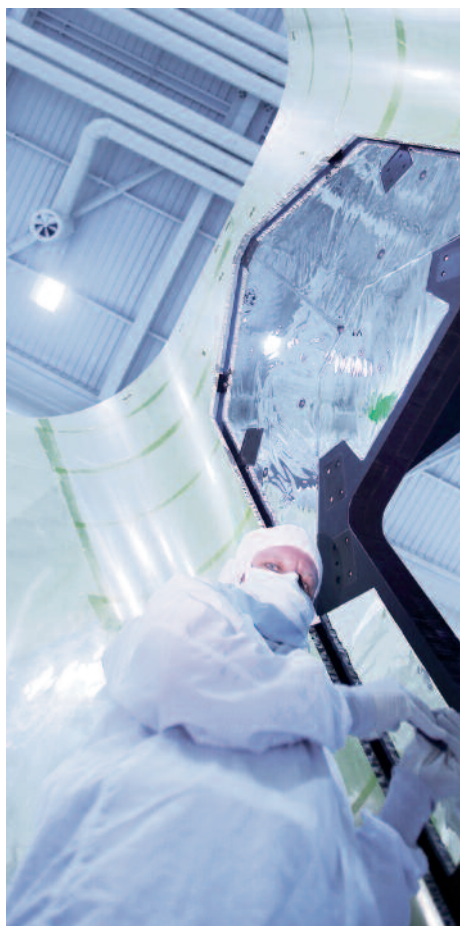
Vacuum pumps not only enable a look at the future, but also into space – and thus into the past. Giant telescopes such as the Observatory of Hawaii, the IAC Tenerife or the ESO Chile put their high precision down to a mirror coating which is carried out in a vacuum.



Unusual conditions demand unusual solutions

The engineers at Oerlikon Leybold Vacuum are accustomed to unusual orders, but what the CIRA Major Research Institute in Naples, Italy, demanded, beat everything up to now. In order to simulate the entry of a space shuttle into the earth's atmosphere in a plasma wind tunnel, a test chamber creating true-to-life temperatures and pressures was to be built. The particular thing about this test chamber: in comparison with similar test chambers, it was to be distinctly more compact, because it was to be built on an area of only 25 square metres outdoors. This resulted in the most compact dry vacuum system which Oerlikon Leybold Vacuum has ever built.

The system comprises nine SCREW-LINE SP 630 dry pumps and nine RUVAC WS2001 roots pumps. High-capacity electronics, visualisation of all processes via a touch panel and pressure regulation for simulation of the flight altitude round this system off.



Customized comprehensive solutions ensure the success of your projects

Projects which require vacuum technology are frequently not only highly complex, but also unique projects. The challenge is to fulfill the individual requirements with regard to technology, precision and quality while maintaining optimal cost-effectiveness. That is precisely what Oerlikon Leybold Vacuum specializes in.

We do not believe in one-size-fits-all solutions. The success of a project is just as important to us as to our customers. Thus we always make optimal use of our entire range of expertise and extensive knowledge base in everything we do, so that every project stays on the right path from the very beginning. Thanks to customized planning and individually designed pre- and high-vacuum pump systems, our clients benefit from reliable process solutions for complete vacuum systems as well as electronic control systems adapted specifically to their needs.

Often the requirements are so extraordinary – and extraordinarily complex – that everything depends on the impeccable functioning of the vacuum technology. Space simulation chambers for the technical analysis of materials used in space shuttle flights or for the largest mass spectrometer in the world are only two examples of projects that require consultation, design and technology at the very highest level.

No time for expensive experiments.

Numerous industrial processes are based on many years of technically sophisticated, scientific series of experiments that have to be run as efficiently as possible.

Oerlikon Leybold Vacuum offers interesting solutions for experimental systems as well:

- Universal experimental systems for vacuum coating
- Highly flexible systems for laboratories
- Manual or automatic process control
- Various chamber sizes
- Final pressure up to 10^{-7} mbar





Enormous effort for a tiny particle.

At the Forschungszentrum Karlsruhe (Karlsruhe Research Center), the most precise scale in the world is currently being constructed. KATRIN (Karlsruher Tritium Neutrino Experiment) is to determine the mass of a neutrino for the first time.

The effort involved in creating the largest ultra-high vacuum chamber in the world is enormous: With a main spectrometer of 10 meters in diameter and 24 meters in length, measurements are to be undertaken under vacuum conditions within a measuring range of 3×10^{-34} grams. Oerlikon Leybold Vacuum developed the vacuum technology required for this purpose.

The energy of electrons will be measured by the main spectrometer with previously unachieved precision. To accomplish this, the tank must be set at a constantly stable high voltage of 18,600 volts. This is feasible only in an ultra-high vacuum. The equipment is designed so that the previous experi-

mental measuring sensitivity is increased by a factor of 100. KATRIN will thus forge ahead into the cosmologically interesting weight range. More than 120 experts will now try, in an experiment that is unique worldwide, to answer an exciting question: How heavy is a neutrino?



Good products are one thing, but even vacuum pumps do not exist “in a vacuum”. They are integrated into a complex world of products, processes and persons with individual and permanently changing market requirements.

For Oerlikon Leybold Vacuum, the high claim to quality is thus inseparably connected with an intensive customer relation, consulting, and services. Service is of utmost importance in a marketing situation which is determined by a high degree of export business and extremely complex systems being installed in production plants all over the world.

Service nearby, worldwide



- Maintenance, repair and processing guidelines in cooperation with our development and production departments, also for foreign brand products
- Decontamination of own and foreign brand products
- Employee training and workshop audit for continuous quality improvement
- Definition and planning of spare parts and parts subject to wear and tear for high local availability
- Planning and structuring of replacement and back-up pools
- Extension of the service network by continuous expansion of the internal and on-site services
- Development of new offer, e.g. the “Customer Care Programm” with process and system-specific inspection and maintenance contracts
- World-wide coordination of rules and contracts of multinational customers

Largest service network for satisfied customers all over the world



Oerlikon Leybold Vacuum manages an extensive network of service offices in the main factories, the sales and service companies and representations. No matter whether you make direct use of our products or you integrate them into your systems and market them – a highly capable Oerlikon Leybold Vacuum service centre with committed and excellently trained employees is always in your area. Thanks to this network, we not only ensure a direct and close contact to our customers, but also achieve standardised global quality standards with it.

“All round carefree”. Oerlikon Leybold Vacuum offers globally acting customers specifically tailor-made contracts. Each market has its own specific dynamisms and requirements, which is why we offer not only our world-wide service presence, but also an exhaustive sales and consultancy network, which is individually matched to the regionally differing requirements of the markets and the customers. Our customers’ requirements are our business.

Exhaustive sales and consultancy. Oerlikon Leybold Vacuum possesses the largest sales and after sales network in the branch. This network is supported by unlimited commitment and competence of our employees – as “customer satisfaction” only becomes tangible and noticeable through them.



High investments in research and development pay their way

This naturally applies on the one hand to our customers: as we keep expenditure for basic research, development and technology acquisition at a consistently high level of about eight per cent of our turnover, we can regularly extend our range of products by new and even more capable vacuum pumps. On the other hand, Oerlikon Leybold Vacuum itself naturally profits from it, as permanent technological innovations and further developments mean a strengthening of our market position and thus securing the future of the company.

Basis research relevant for practice:

Each industrial process, each technical achievement can only survive in everyday use if thorough and expensive research and development processes are carried out beforehand. This is why Oerlikon Leybold Vacuum develops tailor-made products for tasks in research and development together with leading research institutes. From this cooperation, we obtain valuable experience, from which our customers naturally profit later.



For us, product development means concentration on product quality and customer benefit. This is why we place great importance not only on application orientation, but also on the fact that our products keep what customers are used to from Oerlikon Leybold Vacuum in everyday work: maximum precision, maximum reliability – maximum quality. For this, each individual product – pumps as well as all the accessories – are subjected to hard stress and lifetime tests during the development phase, and are optimised if necessary. Only products which successfully pass these tests are included in the range of products. In addition, an intensive in-house qualification of production processes internally and at suppliers ensures that any defects are recognised and can be remedied at an early stage.


Cooperations and transfer of knowledge across all borders. Oerlikon Leybold Vacuum places great importance on employees exchanging their knowledge. Our coaching and training programmes bring people from various areas and locations together. In 2006, further production lines for oil sealed rotary vane and for roots pumps were set up at the Tianjin location in China. The project was implemented under the leadership of a German-Chinese transfer team. The employees responsible for engineering and production were trained in Germany. Experts from Germany finally monitored the start of production in China. Thanks to the close cooperation, the set-up of production in China was done in a record time.

Cooperations and transfer of knowledge across all borders

Research and development.

At Oerlikon Leybold Vacuum, around 1,378 people are employed at the moment. Almost ten per cent of the employees exclusively dedicate themselves to the areas of research, development and engineering.





Innovative power is seen not only in forward-pointing products, but also in a production strategy which can cope with today's and tomorrow's demands.



Efficient production enables high quality at low costs

Oerlikon Leybold Vacuum subjected production to a complete re-organisation. This resulted in paths and through times reduced by 30 per cent, productivity higher by a total of around 15 per cent and distinctly lower complexity. This entails extremely efficient production processes with an exemplary quality.

To implement the new production concept, which was developed by leading employees at Oerlikon Leybold Vacuum, a new production building was erected. For a number of production areas, the changes were enormous. For example, the areas of fore-vacuum and high-vacuum were clustered and reorganised according to material flow criteria. The cryo assembly in Dresden was also reorganised following the same parameters. Apart from quality, quantity has also been improved, with the result that peaks of capacity are compensated for. This enables Oerlikon Leybold Vacuum to react faster and more efficient to cyclical demands of the markets.

Investments optimise productivity.

As production in several areas had already reached its limits, Oerlikon Leybold Vacuum invested in additional new production technologies, for example turning and milling centres, surface treatment and coating processes. All manufacturing and assembly processes were critically analysed regarding their customer impact on the value chain.

Outsourcing with an open mind.

In addition, sensible outsourcing of simple components reduced the number of parts produced by Oerlikon Leybold Vacuum considerably. The strategy behind this: consistent concentration on core competencies. At the same time, strict quality controls were introduced with suppliers. Whether components are produced in-house or by external service companies depends only on the question of who can produce a specific component in outstanding quality. So it is not about outsourcing at any price, but about finding the most efficient path to high product quality. Of course, being part of a global technology leader as Oerlikon offers considerable synergies also for these activities.

“Knowledge which does not extend to the future is no knowledge.”

Hans-Peter Dürr (*1929), German physicist, 1987 Alternative Nobel Prize

Future is not fate. The future can easily be designed, and we at Oerlikon Leybold Vacuum have precise ideas of what this future is to look like for us and for our customers and partners. We wish to enable healthy, lasting growth – and not growth at any price.

The chances of reaching this objective are good. In the past decades, vacuum technology has developed into a real key technology, which is the prerequisite for many modern production methods. At the same time, the variety of applications and the speed of innovation are continuing to increase, with the result that the future will hold numerous further, new production methods for which vacuum technology is needed.

The market for vacuum products has been growing continuously for years and achieves growth rates between three and six per cent, depending on the market segment. The most distinct growth increases are expected on the American and Asian markets. This is why Oerlikon Leybold Vacuum will be purposefully investing in these regions, in order to adapt the infrastructure for sales and service to the requirements of the market.

Innovations secure the future. The past has shown that companies which have been successful and leading for a long time can lose their dominating market position to competitors in the wink of an eye because they have underestimated the importance of innovations. Products and technologies which are nowadays considered state-of-the-art can have “had their day” as early as tomorrow and thus throw a company into a vortex. The annals of the world economy are full of such examples.

Farsightedness, flexibility and the permanent search for innovative solutions, products and technologies are top on our list, if it comes to designing the future of Oerlikon Leybold Vacuum. This is why we place great importance on always being close to what is happening on the market and cooperating closely with our customers and partners. Only in doing so can we recognise new possibilities, requirements and demands and develop suitable solutions with the required speed.

Innovations originate in people's heads. Oerlikon Leybold Vacuum is proud of having the best employees in vacuum technology. People who possess enormous knowledge and experience and have an unbroken passion for new ideas.





The technological innovative
power of a company correlates
directly with its future-capability.



“You cannot tie a knot with only one hand.”

Mongolian proverb



Joint values as a foundation. In the course of the “One Company” philosophy of Oerlikon, personnel systems and executive development are standardised across the group and the corporate values of excellence, innovation, integrity and teamwork have been determined. These values are the basis for a competence model which defines the requirements on a management level and with which we can internationally identify, support and deploy the best talents.

Cross-border knowledge transfer. We actively support the transfer of knowledge by joint projects, for example in the training of local specialists or in international project groups.

Promising possibilities of development. Belonging to the Oerlikon Leybold Vacuum team means not only being able to design the future of a unique company, but also your own future – in a market with varied challenges and in a company which is integrated into a successful multinational group. The combined knowledge, creativity and commitment of these employees are our most important potential. Therefore, we wish to be an attractive employer for these people and support them in an individual way.

Training and coaching. Important locations also have technical training centres, at which employees and customers are given further training world-wide. In order to reach the best university graduates, an international trainee programme has been introduced, entailing not only cooperation with universities, but also an Internet-based procedure. Apprenticeships also have a tradition with us and are regarded as a social responsibility and task.

Oerlikon Leybold Vacuum Academy. The Academy offers a complete and systematic training program covering the whole range of vacuum technology.

Our Training Schedule offers courses for the following topics:

- Rough, fine and high vacuum
- Leak detection
- Maintenance and repair of vacuum pumps

Alternatively to these offers which are held in our own training centre in Cologne, we offer individual trainings at the customers' site. All trainings are available for internal staff, and for our customers.

Success is based on knowledge and the optimal use of it.

We are engineering our success.

www.oerlikon.com

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