



CUTTING
GRINDING
THIN SECTION TECHNOLOGY
because precision matters.



WE SIMPLY LOVE TO BE PRECISE.

Precision, passion and consistency – this is what EXAKT stands for. Our Cutting, Grinding and Thin Section Technology products and Three Roll Mills guarantee our customers maximum precision, quality and reliability Made in Germany. More than 60 years of experience are reflected in their development. With an innovative pioneering spirit of research and passion for technology, we optimize and produce our high performance systems at the company headquarters in Norderstedt, Germany. This allows us to be one step ahead of the competition around the world.



A handwritten signature in black ink, which appears to read 'B. Franke'. The signature is fluid and cursive, with a long horizontal line extending from the top of the 'B'.

Bernd Franke
Owner and CEO

FROM THE CONTENT

- › Basics
 - Cutting
 - Grinding
 - Sample Preparation
 - Thin Section Technology
- › Applications
 - Industry
 - Histology
 - Pathology
 - Anatomy
- › Service

THE μ COUNTS.

EXAKT Cutting & Grinding Technology, arising from research and development, is an essential component for achieving trend-setting results. The current range of applications of our systems is as multifaceted as it is unique. It's tried and tested a hundred times over in daily use around the world: In medical research, industrial damage analysis, the pathology departments of hospitals and the quality assurance of industrial production. Let the wide variety of application possibilities and precision of our technologies inspire you. Make requirements a reality that have seemed unachievable until today.

- › More than 30 years of experience and over 2,800 units in use around the world
- › Largest variety and flexibility for sample preparation applications
- › Consulting competency and expertise for your application
- › Technological leadership developed and produced in Germany
- › Always on site – Our network of certified dealers for sales and service are located around the world
- › Open to innovation – Trusted development partner of research institutes, universities and industry

CUTTING, GRINDING AND THIN SECTION CUTTING TECHNOLOGY

REQUIREMENT

Gentle and extremely precise cutting of soft and hard material composites, the preparation of samples requiring optimum precision, and grinding which must be considerably more precise and thinner than allowed by conventional methods. These demands are very difficult to implement with conventional preparation methods. This was our motivation to implement a completely new idea in precision engineering: EXAKT Technologies for Cutting, Grinding and Thin Sectioning.

WHY EXAKT?

For basic requirements for cutting and grinding in the laboratory, there is a large selection of different equipment in the world. However, the use of microtomes and conventional abrasive grinding systems reaches its limits when requirements for versatility, precision and quality rise:

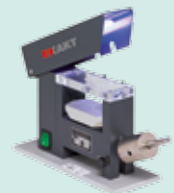
- › Coplanar cuts with excellent surface quality
- › Creation of burr-free cross-cuts of complex components
- › Dimensionally and geometrically stable cutting of sophisticated thermal setting- and thermoplastic objects (e.g. seals, capillaries, etc.)
- › Gentle cutting and structural retention on the cut surface of soft and hard tissues, bones and implants.
- › Reduction in cutting loss to the absolute minimum (down to 190 μm , depending on the application)
- › Coplanar grinding with a tolerance of up to 3 μm
- › Consistent creation of thin sections from composites of very hard and very soft materials
- › Thin sections for transmitted-light microscopy, light-filter use, staining and immunohistochemistry

Fulfilling extraordinary requirements consistently in the laboratory: That's what EXAKT stands for. Our precision-engineered equipment sets the standard when it comes to accuracy down to the μ .

SAMPLE PREPARATION

PREPARATION

- › Dehydration, infiltration
- › Embedding with light polymerization
- › Precision adhesion on the specimen slide
- › Precise sample measurement
- › Processing of defective, embedded samples



EXAKT402



EXAKT 520

CUTTING / GRINDING

- › Excellent surface quality starting with the first cut
- › For all materials and composite materials, tissues, bones and implants
- › Safe operation and minimal risk of the operator being cut
- › Cutting bands for every application



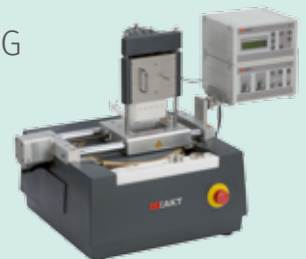
EXAKT 300 CP



EXAKT 311

GRINDING & POLISHING

- › Setting and measuring material removal in μ -increments
- › High-precision coplanar surfaces
- › Easy-to-set grinding parameters
- › Abrasive paper of different grits



EXAKT 400 CS

APPLICATIONS

In medical research, the EXAKT Thin Section Cutting Technology has already been known for decades and is established around the world as a recognized process with its unique performance features. The use of ever more complex production processes in conjunction with new materials results in a wide variety of new industrial applications. For example, the advantages resulting from transmitted-light microscopic analysis of thin section samples have already been shown in the research and damage analysis of materials.



Processing thin sections – e.g. titanium acetabular cup

CROSS SECTION

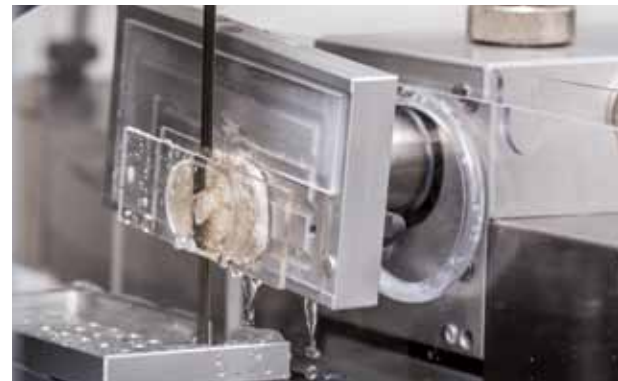
Outstanding surface quality and the retention of structures are often required when a cross section is cut. When executed with EXAKT Diamond Band Saws of the 300, 310, 311 and 312 series, a single work step is all that's required to achieve a level of quality rarely obtainable using other processes. You can expect to achieve unique results through an efficient process.



Industry – cross section of a core

THIN CUTS

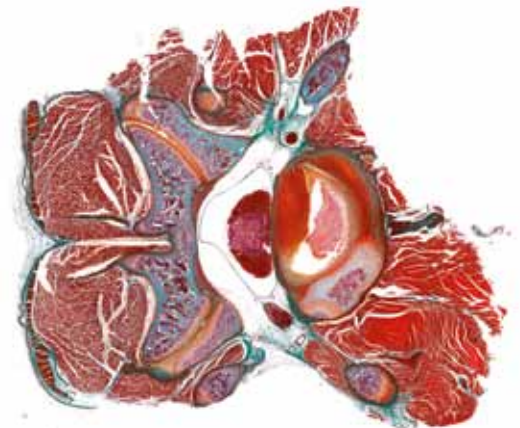
Objects for analysis are generally one-of-a-kind items. This is why the requirement for a reliable and gentle cutting process with minimal cutting loss is very important when creating serial thin section cuts. With EXAKT Diamond Band Saws of the 300 CP and 310 CP series, you achieve unique results with applications which were previously impossible.



Thin section cutting of an embedded specimen

THIN SECTION

The challenge: Creating razor-thin sections, taking the adhesive layer thickness into account and securing them precisely on the slide. Safe and consistent processing of hard and soft objects or material composites made of a wide variety of different materials. To meet this requirement, all the steps of the process for sample preparation must be perfectly matched to one another. From preparation to embedding, adhesion of the sample to cutting and subsequent grinding and polishing, the EXAKT thin section cutting system provides perfect control of every work step, year after year.



Thin section (spine, rat)
Masson Goldner Lightgreen

CUTTING

Gently cutting the uncuttable – Whenever conventional cutting processes reach their limits or the requirements on surface quality of the interface are very high, high-precision EXAKT Diamond Band Saws of the 300, 310 (CL & CP) and 311 series are the solution to your problem. The cutting of sensitive hard-and-soft tissue combinations for histological analysis, complex components made of a wide variety of different materials from industrial production and sophisticated thermal setting plastic and thermoplastic structures, metals or other materials – These are just a few of the example applications from medicine and industry where our EXAKT Diamond Band Saws are used on a daily basis around the world. Precision, consistency, versatility and safety are the main features of our technology and our promise of executing demanding cutting tasks in research, production, quality assurance and damage analysis in a practical way.



EXAKT 300 – compact laboratory device with splash guard



EXAKT 311 – Precision with large working table



μ -accurate sample positioning with digital micrometer



Parallel control system with precise feed control and automatic sample positioning



Diamond Band: Cutting & Grinding in one step



Various sample supports, ideal cutting with CP technology



EXAKT 300 CP



EXAKT 311

PERFORMANCE

The right solution for the most demanding requirements – The EXAKT 300, 310 (CL+CP) and 311 Diamond Band Saws fulfill all the demands for precise cutting.

A wide variety of sample supports and precise feeding of the sample via parallel guidance guarantee a controlled and gentle abrasive grinding process and especially a coplanar cut. Our specially manufactured diamond cutting bands also achieve optimum roughness values on the cutting surface with minimal cutting loss.

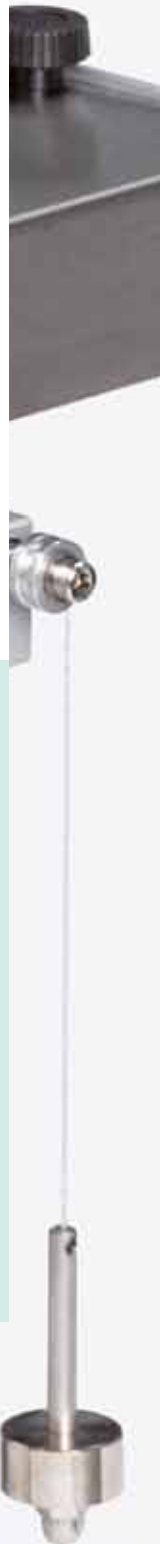
The gravimetrically adjustable feed and optional CP process, where the sample oscillates during cutting, also set our technology apart from others.

EXAKT – because precision matters.

HIGHLIGHTS

- › Excellent cut surface and excellent roughness values
- › Efficient – Up to 10 times faster cutting and reduced wear using the CP process
- › Cutting bands – High quality, long lasting and available in different grits
- › Minimal cutting loss as low as 190 μm^*
- › Cooling water connection with recirculation and precisely adjustable water supply.
- › Gentle cutting – Minimal mechanical and thermal stress on the sample
- › A variety of options for sample support

*Performance may vary depending on model, application and cutting band



CUTTING – INDUSTRY

Whether it's for research, quality management of industrial production or damage analysis: Comprehensive and detailed knowledge of the materials and production processes being used, as well as their mutual interdependencies, are required for new materials and composites, complex production processes and ever-increasing quality and safety demands. Take advantage of the quality of our abrasive grinding units to get an immediate assessment of complex components and their structures without having to carry out additional grinding and polishing steps. To meet this requirement, it is necessary to make informative cross cuts or thin sections for visual or reflected-light microscopic examination. Over time, the added requirement of additional transmitted-light microscopic examination of thin sections down to 10 µm in size is becoming more and more common. EXAKT Cutting and Grinding devices make it all possible. Versatile in use, all of these requirements can be met with just a few pieces of equipment in daily laboratory use.



EXAKT 311 – Cutting of CFC sheet for tensile testing



Gentle cut of a seal profile to guarantee dimensional stability



Motor cross-section



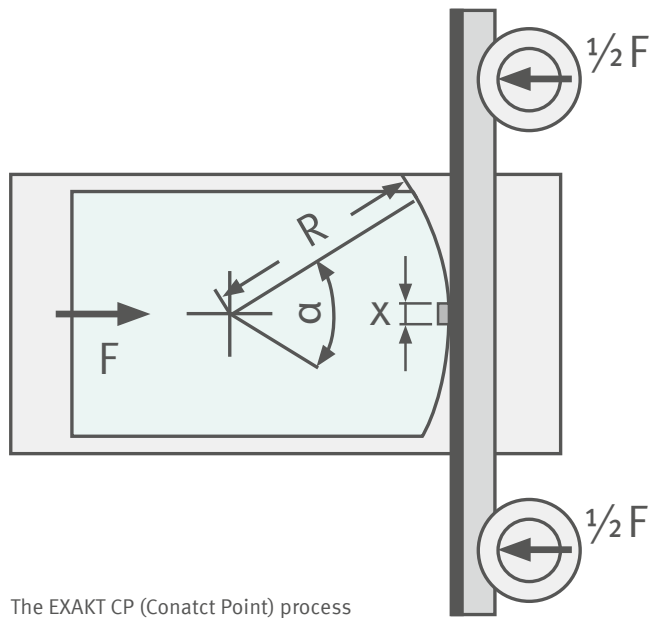
Gentle cut of a delicate shell structure



Hydraulic coupling cross-section



Cut of a camera lens



The EXAKT CP (Contact Point) process

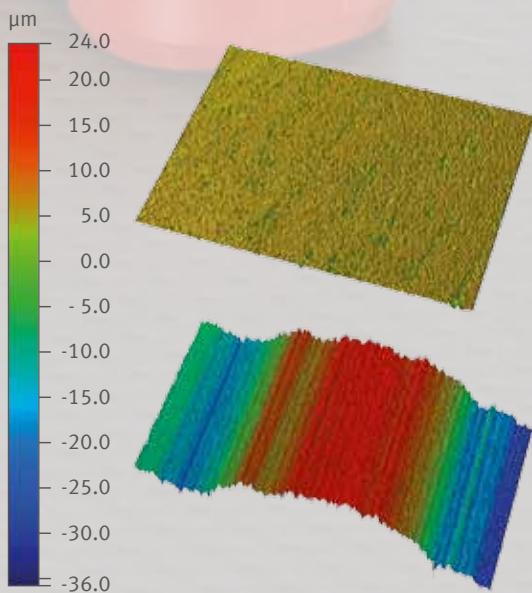
PERFORMANCE

EXAKT Cutting and Grinding devices don't cut with a sharp sawtooth blade, but rather cut and grind with minimal thermal and mechanical stress on the sample. The EXAKT CP (Contact Point) process ensures pinpoint application of energy. Even in complex components with materials of different hardnesses, the cut is guided precisely and the sample surface quality is left unimpaired. EXAKT Cutting and Grinding Technology enables you to approach sample examination in ways which simply weren't possible for your application until now. Long service life, reliability and minimal service expenditure also contribute considerably to the economical use of our systems.

EXAKT – because precision matters.

HIGHLIGHTS

- › Almost no burring, fraying or tearing out on the cut surface
- › Safe operation – Minimal risk of the operator being cut
- › Coplanar cuts with very tight tolerances
- › Flexible and very precise alignment of the samples
- › Cutting process for a wide variety of different materials, composites and components
- › A variety of options for sample support



Roughness value: Comparison of EXAKT Band-saw (upper image) and wire saw (lower image)

CUTTING PATHOLOGY & ANATOMY

Precise – Safe – Ergonomic – Hygienic. Our EXAKT 312 Diamond Band Saw was developed to meet the special requirements of pathology and anatomy (human and veterinary) medicine. With the EXAKT 312, even the smallest cuts down to about 1 mm can be made freehand with almost no risk of cuts to the operator. Whether it's soft tissue, bones or implants in the bone-tissue composite, it can all be cut effortlessly and quickly. Not only this, but it does it with a cut surface quality surpassing every other process available. An initial assessment of the cut can generally be made right away. Outfitted with a variety of different options, the EXAKT 312 can be adapted to individual handling and operating comfort needs.



Large working table with splash guard and rip fence cutting guide



Simple change of diamond band



Water gun and mobility set



Easy to operate and clean



LASER aided sample orientation



LED illumination

The EXAKT 312 is very easy to operate and clean. Band changes can be made without tools or adjustment. The stainless-steel housing is consistently designed for good water and tissue drainage. For thorough cleaning and disinfection, modules can be quickly removed without the use of tools.





EXAKT 312

PERFORMANCE

The EXAKT 312 Diamond Band Saw doesn't cut, it grinds very precisely. This is the reason for the outstanding surface quality of the cut surface. Complete preservation of the sample with a surface free of artifacts, micro-fractures and breakouts enables immediate inspection and assessment of the sample. Even the cell information of very different tissue densities remains intact. Since the cutting band grinds rather than cuts, there is no immediate risk of injury to the operator in case of inadvertent contact, which is a first in work safety!

Tricky samples with implants, in particular, can be precisely and safely processed. Guiding the cut is easy and precise, and the process is clean and quiet. Water cooling also reduces dust development and ensures that the sample doesn't overheat.

EXAKT – because precision matters.

HIGHLIGHTS

- › Superior cut surface quality
- › Maximum working safety enables cuts down to 1 mm
- › Integrated water cooling prevents overheating of the sample, reduces dust development and keeps the cutting band cleaner
- › Cutting band changed without tools or readjustment
- › Fast and easy cleaning through the tool-less removal of contaminated modules
- › Reliable and time-tested – Hundreds of systems are already in use around the world

GRINDING AND POLISHING

The final touch – The last step of sample preparation is decisive! Assuming the sample has been well prepared, it's the job of the grinding process to produce the final thickness and surface quality of the sample. Depending on the sample and target thickness, the sample is processed in several steps using increasingly finer abrasive papers. Maximum precision is required to prevent over-grinding and to avoid the destruction of the sample. The EXAKT 400CS Grinding Unit enables total control of the grinding process. Thanks to its unique design and operating philosophy, this unit is among the most precise and reliable systems for grinding and polishing applications in sample preparation.

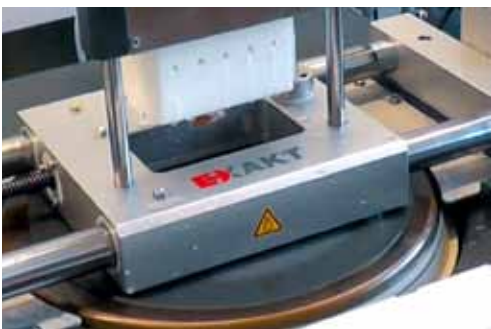
The result is perfect grinding and a smooth and coplanar surface that has yet to meet its match.



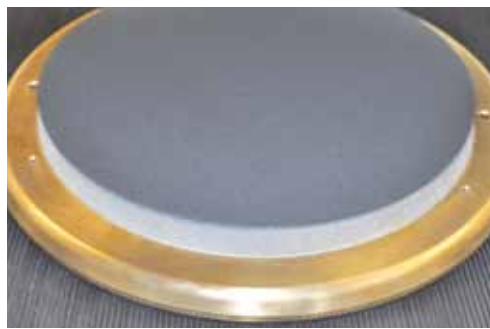
Oscillation slide



μ -precise setting & control of sample removal



Vacuum head to fix specimen slide



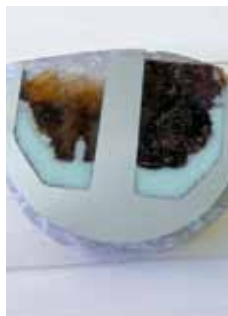
Grinding plate: Diamond coated or with grinding paper



GFRP thin section
Polarization microscope



GFRP thin section



Titanium prosthesis



Thin section of a rat-spine
Pikrosirius red



EXAKT 400 CS

PERFORMANCE

The EXAKT 400CS Grinding Unit is considerably different from conventional grinding units. Its especially solid construction guarantees tolerances of just a few micrometers with especially stable and vibration-free running of the grinding disk. The high-precision measuring system enables precise setting and measurement of ground material down to the micron. The unit stops automatically once the target for material removal has been reached. The precise and extremely stable EXAKT oscillation system guarantees material removal of the sample through a gravimetrically set grinding force.

In conjunction with uniform water rinsing, continuously adjustable speed of the grinding disk and the oscillation of the sample, the result is a perfect, coplanar grind with minimal mechanical and thermal loading of the sample. Precise control of all grinding parameters guarantees a reliable and reproducible grinding process.

EXAKT – because precision matters.

HIGHLIGHTS

- › Coplanar tolerance – Precise down to the μm
- › Vacuum mounting for different specimen slide sizes
- › High-precision measuring sensor for precise setting of the material removal through grinding in μ increments.
- › Gentle and controlled material removal through gravimetric setting of the grinding force
- › Uniform grind thanks to continuously adjustable oscillation of the sample and grinding disk speed
- › Integrated water rinsing in the vacuum head
- › A variety of abrasive and polishing papers (backing material and grit) suitable for your application

PREPARATION

In the most frequent cases, examination and assessment can only be carried out if samples have been removed and prepared beforehand in accordance with further analysis technologies. The entire preparation process is of tremendous importance. Improper sample preparation can distort results or even destroy the objects, which are often one-of-a-kind items. Process reliability and consistency are of extremely high importance throughout the entire sample preparation process. The proper and complete dehydration of histological samples, total and bubble-free embedding in plastic and precise adhesion technologies for thin sections to ensure knowledge of the adhesive layer thickness – every aspect of sample preparation is controlled with precision at all times with the EXAKT system for sample preparation.



Dehydration and Infiltration Device EXAKT 510

- › Optimized for the low sample volume in research
- › Fast penetration through agitation
- › Six parallel steps in a single ascending dilution series
- › Vacuum attachment for perfect infiltration



Light Polymerization Device EXAKT 520

- › Reproducible polymerization process
- › Timers for two different intensities
- › Cooling unit for samples
- › Embedding molds of various sizes



Block Drying and Post Infiltration Device EXAKT 530

- › Repair of cracks, bubbles and artifacts
- › Dehydration under vacuum heating plate at 40 °C
- › Time-controlled light polymerization



TECHNOVIT – Resins and adhesives

- › TECHNOVIT 7200 – light polymerizing embedding resin
- › TECHNOVIT 7210 and 7230 light polymerizing adhesives
- › TECHNOVIT 4000 – Shrink-free adhesion of the embedded sample
- › TECHNOVIT 9100 Neu – Embedding plastic for hard tissue; cold-polymerizing and removable, for Immunohistochemistry





Adhesive Press EXAKT 401

- › Easy handling for precise adhesion
- › Vacuum unit for slides



Precision Adhesive Press EXAKT 402

- › Bubble-free adhesion via Plexiglas block
- › Vacuum unit for slides
- › Adjustable contact pressure
- › Light polymerization function

HIGHLIGHTS

- › Dehydration and infiltration of samples
- › Embedding process with light polymerization and controlled energy application
- › Bubble-free adhesion and securing of the sample, coplanar and with a definable adhesive strength layer thickness
- › Adhesion without tension or shrinkage
- › Draw residual moisture from samples
- › Repair cracks, bubbles and defects afterwards

THIN SECTION CUTTING TECHNOLOGY – HISTOLOGY

The creation of histological thin sections from non-cuttable tissues and materials is a very important process in many sectors of medical research. The thin section cutting technology required here was especially developed for this and then influenced and advanced by Prof. Dr. Dr. Dr. Karl Donath (died 9/23/10) in Hamburg, Germany, in the 1980s. Creating thin sections from hard tissue preparations (tissue, cartilage, bone, teeth, implants etc.) requires maximum precision and process control over the entire process. In cooperation with Dr. Donath, EXAKT developed the equipment required for this. From dehydration and infiltration of the sample and embedding in plastic to precise cutting and grinding, precision down to the micron is guaranteed over the entire process.

Cell information remains intact, as the sample does not need to be decalcified. Precise assessment of the interface between the soft tissue, bone and implant is insured, as deformation-free processing of the sample is guaranteed over the entire preparation process.

Unique precision for excellent results – contact us to learn more about the possibilities and variety of applications of EXAKT Thin Section Cutting Technology.



Embedding of specimen



Gluing of specimen on slides



Cutting the specimen



Grinding of the thin section



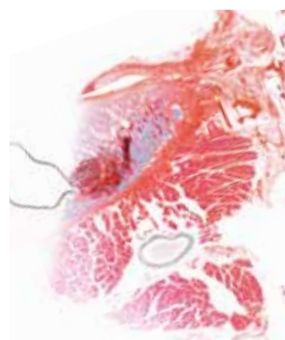
Ankle of a rat
van Gieson – Elastin



Spine of a rat
Toluidine blue



lower jaw of a rat
Masson Goldner Trichrome



lower jaw of a rat
Masson Goldner aniline blue

SERVICE

ENSURING LONG-TERM QUALITY AND PRODUCTIVITY

Precise, consistent results and reliability characterize EXAKT precision equipment. To make sure things stay this way over time as well, we recommend performing maintenance on your systems on a regular basis. Whether it's on site at your location, by our qualified specialist dealers or at our repair center in Norderstedt, Germany, EXAKT provides you with professional service to ensure quality results.

KNOWLEDGE IN DETAIL: APPLICATION WORKSHOPS AND INDIVIDUAL TRAINING COURSES

Our aim is to guarantee optimum results and quality over the years, starting from day one. At our training courses and workshops, we convey to you and your employees the required specialized knowledge and expertise for handling our systems in a practice-oriented and safe way. Contact us and learn about our individual custom-tailored training options.



ALL-AROUND EXPERTISE

- › Training – Optimum results from the beginning
- › Competent and on site support – Qualified service from EXAKT
- › Reliable and precise – Guaranteed machine availability through regular maintenance
- › Original EXAKT spare parts and consumable materials – Guaranteed quality and reliability



CONTACT

For further information or if you have any question, please do not hesitate to contact us or one of our experienced sales partners.



FACILITY 1 (SALES & TECHNICAL CENTRE)

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FACILITY 2 (SERVICE)

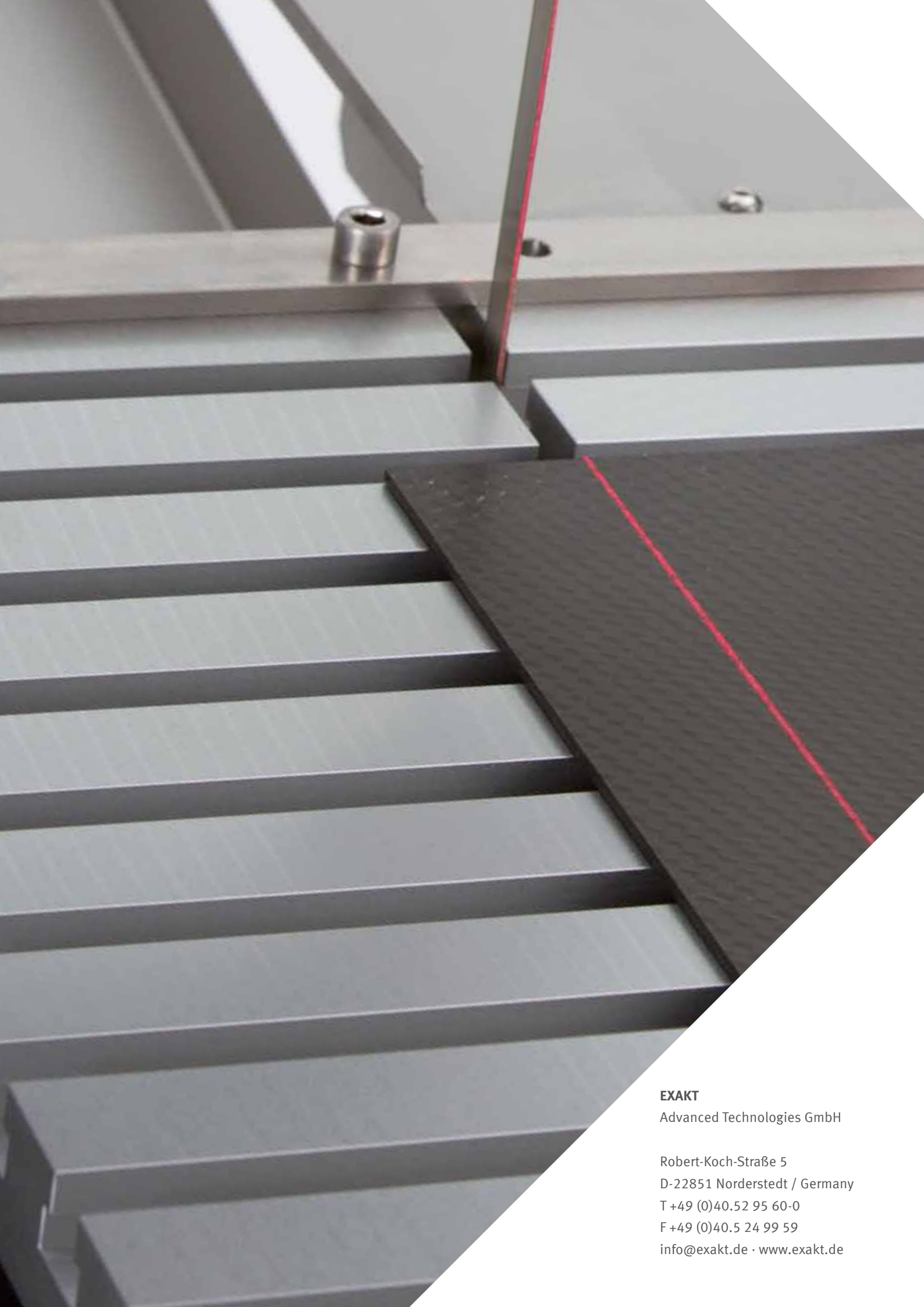
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Check application videos at www.exakt.de and our
EXAKT Advanced Technologies YouTube Channel



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