



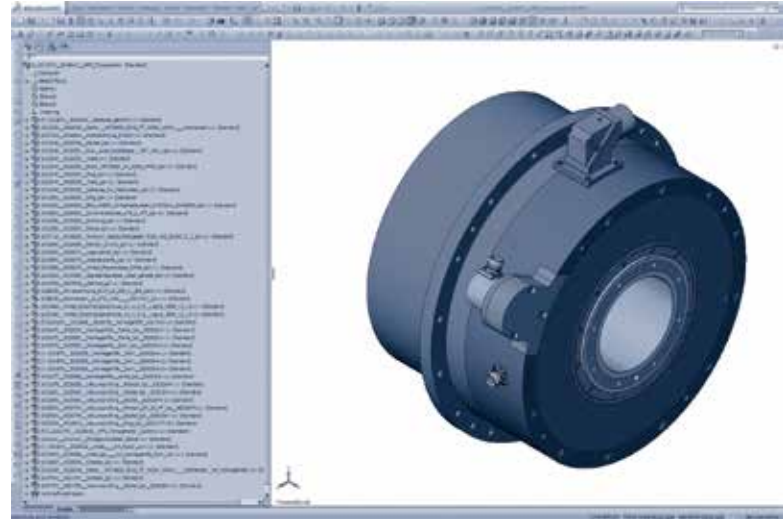
Precision components and subassemblies for ultra-thin vacuum coatings

Vacuum rotary feed-throughs, direct drives and drive units

Core competence in design and component assembly for thin-film technologies

ALMA driving elements GmbH has special experience in the development and fabrication of components for thin-film systems. This means that we are also able to advise our customers on product development and offer design services.

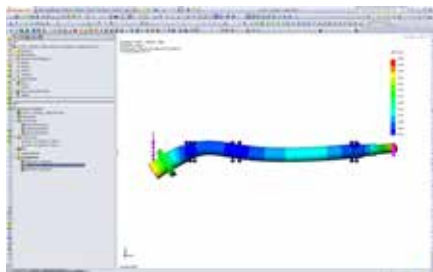
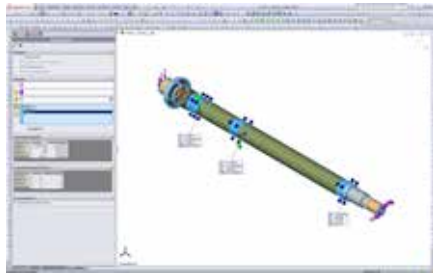
We analyse the customer's requirements and, if desired, offer a complete package extending from planning, project development and design through to the production of tailor-made quality products.



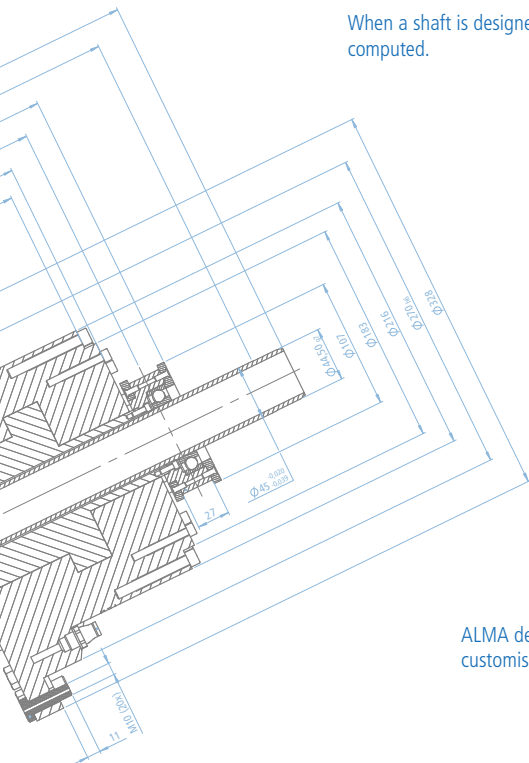
Scrupulous engineering for prototyping and mass production

ALMA's engineering services encompass the development of prototypes and components for mass production in close consultation with the customer.

Our design engineers and technicians use the high-power SOLIDWORKS 3D software permitting data interchange with the customer via a multitude of interfaces and data formats.



When a shaft is designed, its flexural behaviour is also computed.



ALMA design engineering for vacuum applications: customised combination of a rotary feedthrough with direct drive.

Customer: BÜHLER AG, LEYBOLD OPTICS, Alzenau, Germany
Application: Installation for the high-precision, ultra-thin coating of optical mirrors for astronomical applications
ALMA product: Vacuum rotary feedthrough with a hollow shaft for very high loads and a very low tilting moment

Customer industry

BÜHLER LEYBOLD OPTICS has developed a magnetron sputtering system that makes it possible to highly accurately coat small series of astronomical mirrors with ultra-thin films. This installation can be used for producing aluminium and silver mirrors with protective and high-performance coatings displaying excellent ruggedness and extra-high reflectance.

A total of four sputtering targets with a DC pulsed or DC sputtering power supply is possible. The flexible cathode inclination with respect to curved mirror surfaces provides excellent uniformity across the entire surface of the individual mirror.

Customer system

The new DEIMOS 5500 sputtering system is equipped with four magnetron cathodes for metal and dielectric layers and for the coating of astronomical mirrors with diameters up to 4.5 m.

Substrate and chamber conditioning with MF and DC glow discharge permits perfect preparation for the achievement of optimum coating results in order to meet the highly demanding quality requirements of astronomical mirrors. The movable lower chamber section grants high accessibility and allows easy handling of the mirror.



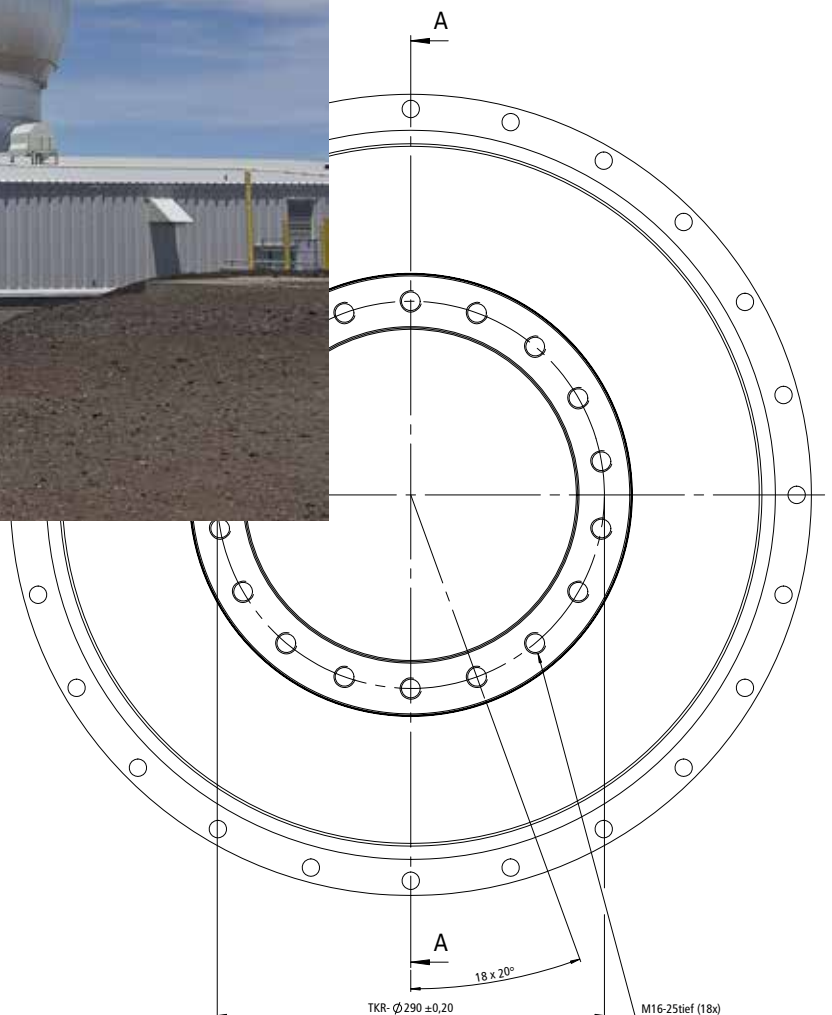
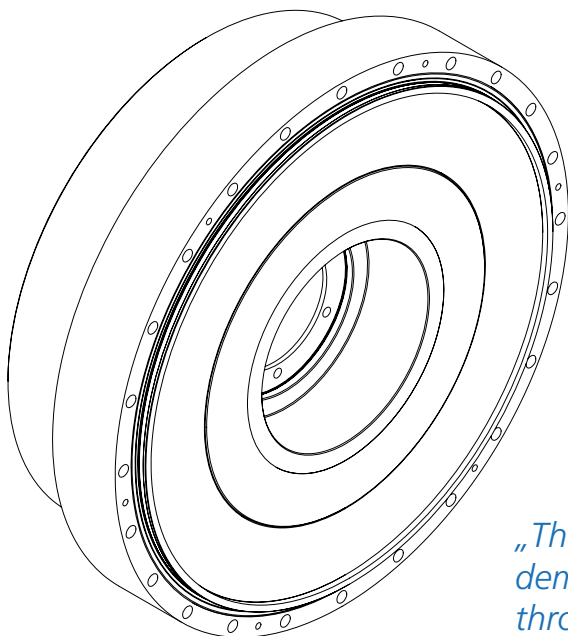
Precision optics for astronomy: ALMA rotary feedthrough in a mirror coating system



ALMA product

For the BÜHLER system, ALMA has developed a vacuum rotary feedthrough with a large hollow shaft and for very high loads with a very low tilting moment.

The special design challenges here were the demanded low height and minimal overall diameter of the rotary feedthrough.



„The ALMA design engineers have fully met our specific demands for a compact and high-performance rotary feedthrough permitting very high loads with an extremely low tilt moment.“

Daniela Eller, Purchasing Agent, Bühler AG, Leybold Optics

Customer: MANZ AG, Reutlingen, Germany
Application: Coating systems for solar cells
ALMA product: Vacuum rotary feedthroughs with shaft cooling and drive units

Customer industries

A globally leading high-tech machine manufacturer, Manz AG in Reutlingen, Germany, pioneers innovative products on fast-growing markets.

The company founded in 1987 specialises in seven technological sectors: automation, metrology, laser processing, vacuum coating, wet chemistry, printing & coating, and roll-to-roll processes.

These technologies are employed and developed further by Manz in the three strategic business sectors of Electronics, Solar and Energy Storage.



With its extensive product portfolio for the manufacture of thin-film solar modules, MANZ AG sets international standards in increased efficiency while lowering production costs. In contrast to crystalline solar technology, in thin-film solar technology the semiconductor is deposited on a glass substrate. This technology is so-called because the conductive layer is about 90 times thinner than in crystalline technology.

Customer systems

The Manz product portfolio in the vacuum engineering sector comprises vertical and horizontal inline and batch systems for the three deposition methods of PECVD, sputtering and evaporation.

Using these systems, extremely thin films are achieved (of a few nm to several μm) that can be deposited on rigid or flexible substrates.

Solar modules: ALMA rotary feedthroughs and drive units for vacuum thin-film processes



The VCS 1200 PECVD (plasma-enhanced chemical vapour deposition) system coats the front and rear of silicon wafers. (Photo: MANZ AG, Corporate Communications)

ALMA products

For the vacuum coating systems at MANZ, ALMA has designed and built a high-performance rotary feedthrough with shaft cooling that features very high precision coupled with reliability.

In addition, ALMA has supplied components for drive units, largely from its own production.

For this, several hundred individual parts such as gear motors, motor mountings, drive rolls and shafts, belt pulleys, vacuum screws etc. had to be order-picked and punctually supplied.



This vacuum rotary feedthrough with shaft cooling operates reliably in the MANZ systems.

„ALMA reliably handles not only the production of tailor-made rotary feedthroughs, but also the order-picking, packaging and punctual delivery of hundreds of components for the drive units.“

Richard Heilos-Hahn, Strategic Purchasing Vacuum Engineering, MANZ AG, Karlstein location

Customer: SCHMID VACUUM TECHNOLOGY GmbH, Karlstein, Germany
Application: Vacuum coating systems for flexible roll-to-roll materials
ALMA products: Rotary feedthroughs and vacuum drive units requiring high standards of precision

Customer industry

Under the FlexBlue sputtering systems brand, SCHMID VACUUM Technology GmbH produces high-performance roll-to-roll systems for the vacuum coating of flexible materials.

These systems are used in the manufacture of flexible circuit boards, touch panels, flexible displays, window films etc.

Customer systems

FlexBlue was designed specifically for the vacuum sputtering of different metal and non-metal films. The films are applied onto flexible substrates from roll to roll in a batch type process.

With its motor-driven move-out sections on both sides, FlexBlue provides operator-friendly machine design.



With FlexBlue sputtering systems from SCHMID, various metal and non-metal films can be applied onto flexible substrates from roll to roll in a vacuum.



ALMA rotary feedthroughs with magnetic fluid seals are also used in the FlexBlue sputtering systems.

Sputtering systems for flexible substrates: ALMA components for vacuum coating



ALMA products

For SCHMID’s PentaBlue system, ALMA has developed a drive unit that satisfies several complex design requirements.

Firstly, rotary motion is transmitted into a vacuum by means of a magnetic-fluid-sealed rotary feedthrough with the integration of shaft cooling because of the high temperatures.

Secondly, this drive solution facilitates a highly accurate linear stroke with high load requirements into the vacuum.

ALMA’s package of services ranges from design, production and assembly through to the final leak-testing of the unit.

For SCHMID’s FlexBlue systems, ALMA also produces hollow-shaft rotary feedthroughs with highly efficient, maintenance-free magnetic fluid seals.



„ALMA has found outstanding design solutions for our precision requirements and demanding drive specifications.“

Sven Craatz, Divisional Director Operations,
SCHMID Vacuum Technology GmbH

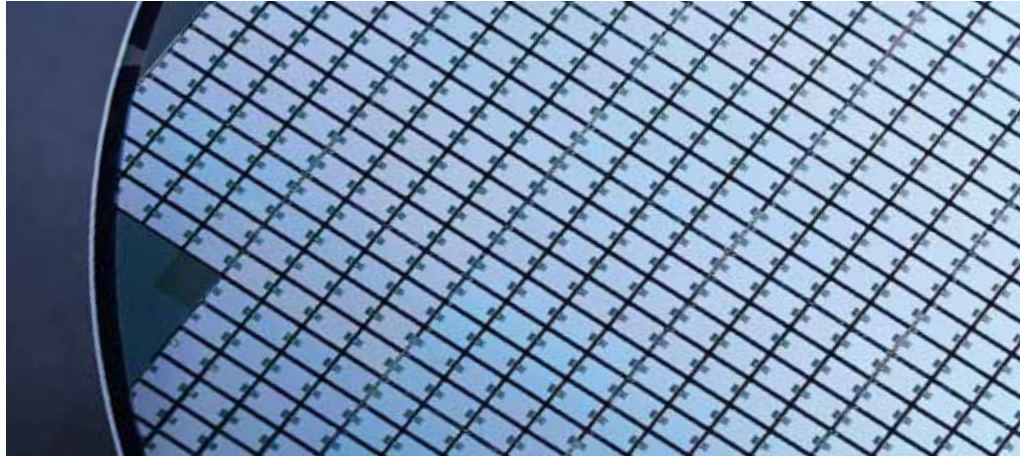
This ALMA motorisation solution for PentaBlue systems facilitates the transmission of both rotary motion and linear stroke motion into the vacuum.

Customer: SINGULUS TECHNOLOGIES AG, Kahl a.M., Germany
Application: Coating systems for semiconductors and magnetic storage elements
ALMA products: Rotary feedthroughs for single-articulated-arm and solenoid-stroke drive units

Customer industry

SINGULUS TECHNOLOGIES is a renowned manufacturer of advanced thin-film deposition equipment for MRAM, thin-film head, sensor and other semiconductor applications and is constantly building on its leading position in thin-film technology for semiconductor production.

SINGULUS production platforms permit the application of ultra-thin metallic and insulating films down to a thickness of a nanometre and below and of stacks of such films with highly precise material thickness and high uniformity specifications.



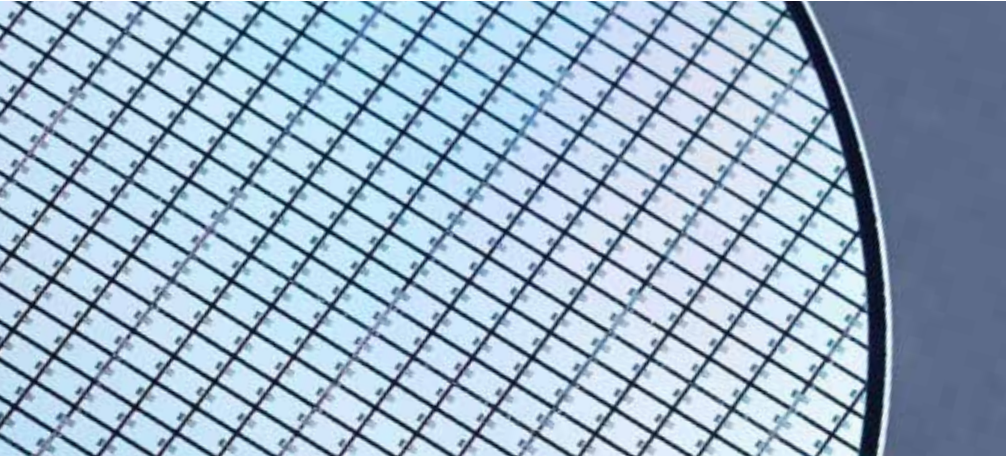
Customer systems

SINGULUS has already established and qualified its second system generation on the market in the shape of the TIMARIS PVD Cluster Tool platform and offers customers a complete portfolio of process modules for a huge diversity of applications.

As of today, more than ten process modules are available to configure a TIMARIS system to customer needs. These include the Rotating Substrate Module (RSM), the core module of the ROTARIS platform, the sputtering system for special R&D applications.



High-grade semiconductors and magnetic storage units: ALMA rotary feedthroughs for coating systems



ALMA products

SINGULUS requested a system making it possible to achieve long-distance linear motion on the vacuum side of coating systems.

ALMA responded by designing three rotary feedthroughs connected by an articulated arm.

The special challenges involved facilitating high loads, smooth motion and outstanding true running of the rotary feedthroughs.

In addition, ALMA has also produced the solenoid-stroke drive unit and vacuum chambers for these systems.

„For more than ten years, we at SINGULUS have been using ALMA rotary feedthroughs, which are noted for their long service life and great precision.“

Reiner Schwarzkopf, Project Purchasing,
SINGULUS TECHNOLOGIES AG



Customer: VON ARDENNE GmbH, Dresden, Germany
Application: Systems for the high-precision, ultra-thin coating of glass substrates for photovoltaic cells
ALMA products: Maintenance-free vacuum rotary feedthroughs



VON ARDENNE GmbH production shop with thin-film photovoltaic modules on the façade.
(Photo: VON ARDENNE Corporate Archive)

Customer industry

VON ARDENNE makes use of ALMA feedthroughs in systems for the horizontal coating of glass substrates for thin-film photovoltaics.

These modular, highly automated inline systems operate on the principle of depositing metallic contact films, transparent conductive oxides and various absorber films, e.g. for CIGS and CdTe solar cells.

The system's modularity features a high degree of standardisation with reliable and cost-effective production combined with the flexibility to configure the equipment according to the needs of the customer.

Customer systems

The vacuum process systems are based on turbo-molecular and dry screw pumps. The sputtering chambers consist of a customised number of universal compartments in a modern grid arrangement.

All compartments have identical dimensions to ensure maximum flexibility. They are designed to accept turbo-molecular pumps in their lid or sputtering sources of different design from Planar Cathodes (WSM) to Rotatable Dual Magnetrons (RDM) for DC or AC sputtering.

Additional tools and advanced process control systems can be easily integrated.



PIA | nova® – modular platform for the coating of glass for thin-film photovoltaics.
(Photo: VON ARDENNE Corporate Archive)

Thin-film photovoltaic cells: ALMA rotary feedthroughs for inline coating systems



ALMA products

ALMA rotary feedthroughs are employed in VON ARDENNE's mature PIA | nova[®] platform for the coating of glass in the manufacture of thin-film photovoltaic modules.

ALMA's vacuum rotary feedthroughs permit installation design with exterior drives for the feed system.

This makes it possible to achieve the optimum vacuum conditions that are necessary for highly sensitive coating processes. The benefits of this design make maintenance work on the feed system considerably easier.



„ALMA rotary feedthroughs with their maintenance-free seals are designed for a long service life. Well over a thousand of these important system components are in operation in our systems worldwide and demonstrate their dependability and efficiency day after day.“

Lutz Ryster, Purchasing Manager, VON ARDENNE GmbH

Vacuum component expertise for R&D: everything from the vacuum screw to the UHV chamber

Customer industry and systems

RI Research Instruments develops and produces components and systems for particle accelerators. The product range extends from beam guidance structures to experimental chambers, e.g. for experiments with X-rays and light from synchrotron radiation sources.

ALMA products

The range of products supplied by ALMA to RI runs from thousands of small, reliable vacuum screws to complete chambers for basic research.

„ALMA satisfies our high expectations of quality and documentation and of punctual processing of the chambers for our UHV applications.“

Bernd Griep, Project Engineer, RI Research Instruments GmbH



Assembly of the inner chamber workings at RI Research Instruments.



For particle accelerator specialist RI, ALMA produces not only vacuum screws, but also complex chambers.



Customer: RI Research Instruments GmbH, Bergisch Gladbach, Germany
Application: Systems for basic research with particle accelerators
ALMA products: Chambers and vacuum screws

Vacuum components for international market leaders: ALMA supplies drive solutions all over the world

Precision products for industry and R&D

Leading research institutes and industrial companies, e.g. from vacuum engineering, display production, semiconductor manufacture, photovoltaics, lighting equipment (LED/OLED) and tool coating, trust in the expertise of ALMA as a maker of precision components, feedthroughs, direct drives and drive subassemblies for vacuum engineering.

Thanks to our experience of the production of precision parts, we will also be capable of meeting your requirements.

Put us to the test and entrust us with your complex design and production projects.



List of customers (selection)

Aixtron SE
 ALD Vacuum Technologies GmbH
 Applied Materials GmbH & CO KG
 ASML Netherlands BV
 Bestec GmbH
 Bruker Advanced Supercon GmbH
 BTE Bedampfungstechnik GmbH
 Carl Zeiss Optronics GmbH
 CERN European Organization for Nuclear Research
 CreaTec Fischer & Co. GmbH
 DESY Deutsches Elektronen-Synchrotron
 Diamond Materials GmbH
 Diener Elektronik GmbH Co. KG
 Dr. Johannes Heidenhain GmbH
 Evatec AG
 Feedback Technology Corporation
 FHR Anlagenbau GmbH
 Forschungszentrum Jülich GmbH
 Fraunhofer Institut
 GSI Gesellschaft für Schwerionenforschung mbH
 Gühring Maschinenbau GmbH
 Helmholtz-Zentrum Berlin für Materialien und Energie GmbH
 Hind High Vacuum C.(P) Ltd.
 ICT Integrated Circuit Testing GmbH
 Ionbond Netherlands BV
 IPP Max-Planck-Institut
 Linn High Term GmbH
 LZH Laser Zentrum Hannover e.V.
 Max-Planck-Institut
 Merck KGaA
 OC Oerlikon Balzers AG
 ODEM Scientific Application Ltd.
 Osram GmbH
 Pascal Technologies, Inc.
 Paul Scherrer Institut
 Pfeiffer Vacuum GmbH
 Philips GmbH
 PINK GmbH Vakuumtechnik
 pro beam AG & Co. KG
 PVA Industrial Vacuum Systems GmbH
 Robert Bosch GmbH
 Roth & Rau MicroSystems GmbH
 Specs Surface Nano Analysis GmbH
 Surmetal AG
 Theva Dünnschichttechnik GmbH
 Trinos Vakuum-Systeme GmbH
 VTD Vakuumtechnik Dresden GmbH
 XERION GmbH
 XTREME Technologies GmbH



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