



# Customer Report DOOSAN | Company REUTER

## Complete and of the highest quality standard: Machining with experience

DOOSAN customer report on REUTER Manufacturing AG and REUTER GmbH – Präzisionsteile in Luckenwalde, Germany

REUTER Manufacturing AG in cooperation with REUTER GmbH – Präzisionsteile is a supplier in the machine cutting field. Originally a family-run company with a small workshop in Berlin, operations moved to Luckenwalde in 1995. In January 1995, the company moved to new production and administration buildings here on a site of 6,000 sqm in the newly created "Am Honigberg" industrial estate. At that time the production facilities and offices covered an area of 1,700 sqm. To increase the manufacturing capacity, the production and assembly facilities were extended by a further 1,200 sqm in 2002 with the construction of a new hall. In 2005, REUTER GmbH was awarded the Potsdam Chamber of Trade and Industry's Corporate Innovation Prize and in 2003 the SME (Small and Medium Enterprise) Grand Prize.



Dr. Edgar Reuter, CCO, REUTER AG in front of a DOOSAN S 670LM

### REUTER AG and REUTER GmbH in key words

The main focus of operations at REUTER is in complete manufacturing of "ready to install" one-off and series production parts following drawings or samples, starting from the material procurement through the individual machining steps, including heat and surface treatments through to finish-grinding. A typical order is manufactured within a certified quality management system on modern CNC lathes, CNC milling machines, CNC machining centers and CNC grinders. REUTER also manufactures complete modules, including assembly, or manufactures components with downline final machining. The company's philosophy has always been towards exceptional quality – "specialization rather than series production" is the motto that has held true for decades.



Preparation for the next application



Setting up the DOOSAN S 550L



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### Quality has many facets

Continuous quality control can truly be referred to as “total” – at all stages of production. Apart from the obvious aspects such as a modern machine park or complete certification, there is a principle practiced in this form probably only at REUTER: The absolute personal responsibility of the employees for their respective phase of the machining process. Every employee bears the complete and sole responsibility for his segment – whether turning, milling or grinding, from the drawing through to the work plan. This assignment of personal responsibility is based on the one hand on the experience of well-qualified personnel, and on the other hand on the efficient organization of the company. The quality management system has been regularly audited and correspondingly certified since 1997. However REUTER constantly takes the quality processes one step further – to the benefit of the customer.



Quality management certificates DIN EN ISO 9001 and DIN EN 9100



### Winner of the Corporate Innovation Prize 2005

In 2005, REUTER GmbH Präzisionsteile was awarded the Corporate Innovation Prize of the Potsdam Chamber of Trade and Industry. The prize, awarded on November 2, 2005, was for an innovative lathe cut-off process that permits inexpensive machining of highly complex turbine parts.



In view of the immense rise in airline traffic in recent years, aircraft engine manufacturers are constantly on the lookout for optimization methods for the rapid production of engine prototypes. Advances in the development of modern aircraft engines is determined essentially by increased compressor performance. Accordingly, manufacturing methods and the resulting quality of the high-pressure compressor blades is crucial for the operating behavior of the engines.

The aim of the innovation project at REUTER GmbH was therefore to establish the basic principles for the preliminary machining stages for high-pressure compressor blades in smaller engines. A technology was developed in just seventeen months that permits inexpensive machining, primarily lathe cutting, of highly complex turbine parts which contributes to a reduction in costs and order handling times.

Thanks to this new machining process, highly stressed workpieces such as high-temperature alloy engine parts can be inexpensively manufactured to customers' individual specifications even in small quantities.

REUTER is winner of the OSCAR FOR SMALL AND MEDIUM-SIZED ENTERPRISES (OSKAR FÜR DEN MITTELSTAND)

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Aircraft engine blade main components are made of nickel and titanium alloys. Production from titanium alloys by turning, milling and grinding generally involves high costs and a great deal of time, as titanium materials are very difficult to machine. Extremely complex, high technology parts are becoming more and more common in modern engines so the main focus of further development and production has to be in reducing machining work. With the innovative lathe cutting process developed by REUTER GmbH, the costs and time involved in the production of compressor parts can be considerably reduced, allowing REUTER to establish itself as a regional supplier to aerospace engineering and to create additional development potential. The new production technology has already been successfully employed in generated customers' orders.



### The REUTER AG market – the future has only just begun ...

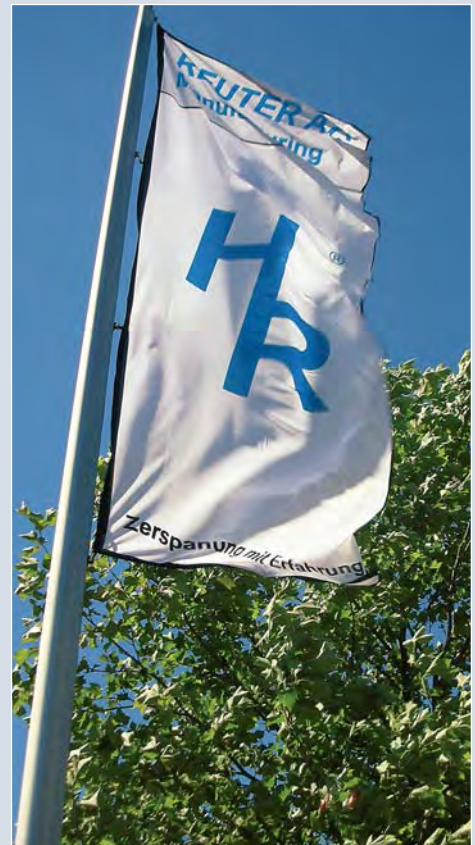
REUTER's customers include numerous leading and internationally operating companies from various branches of industry. Here are just a few:

- Machine tool industry
- Aerospace industry
- Printing machine manufacturers
- Construction machinery manufacturers
- Steel and plant construction industry
- Automotive engineering
- General machine construction
- Electronic systems
- Custom machine construction

### Precision parts demand precise planning and production

A quality concept with extensive employee responsibility in the production process creates the best prerequisites for meeting customer demands with respect to punctual delivery, quality and flexibility. Use of an integrated PPS/ERP system allows continuous monitoring of the production process. Each order item is assigned a production order that runs with the drawing and the material through the production process.

Each completed work step is reported back by the responsible employee by means of a barcode scanner. The current production status of a part can thus be checked at any time. The delivery dates are also monitored using the PPS/ERP system allowing a quick reaction in the event of capacity bottlenecks.





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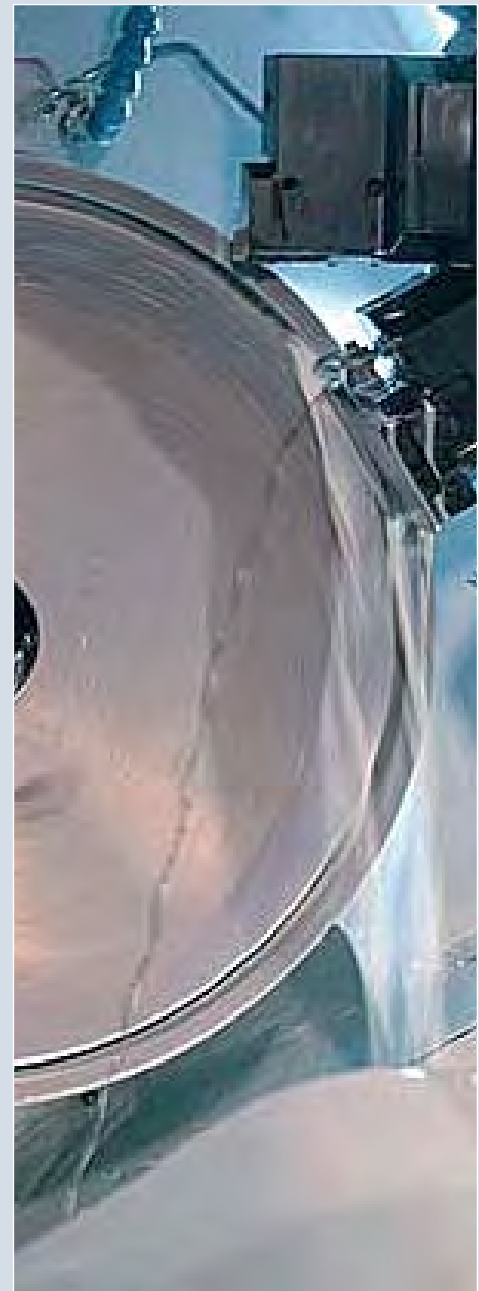


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### All machinable materials are processed by REUTER:

- Non-ferrous metals
- Structural and high-grade steels
- Case-hardened and tempered steels
- Tool and nitrided steels
- Stainless steels
- High temperature and high strength steels
- Nickel and titanium alloys
- Cast iron
- Heavy metals
- Polymers



### Perfect results thanks to in-house measurement and testing

REUTER products are subject to continuous testing for dimensional tolerances and material grade. The latest measurement technology is available for this in our own testing laboratories. REUTER employs an Etalon Derby 454 3D coordination measuring machine for continuous dimension testing and a Mitutoyo PV 5000 measuring projector for optical measurement. The TRIMOS Horizon 1000 setting and testing device is used for precise testing and adjustment of all the measuring and test equipment and for checking lengths, inside and outside diameters and threads.

In addition, height measuring instruments are also available in production.

### Turning, milling, grinding – the production range

In the turning area, REUTER has several CNC lathes for small and medium-sized series production and cyclic lathes for one-off and small lot production. A particular strength of turned parts produced by REUTER is in the 10 mm to 650 mm diameter range, although other sizes are possible in individual cases. Apart from purely lathed parts, complex parts with subsequent milling and hardening operations and finish-grinding (e.g. hydraulic pistons) are also produced.

Precision is the best basis for business!



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## Machining data:

Chuck parts	up to 750 mm diameter
Tailstock parts	up to 670 mm diameter
Turning length	up to 2000 mm

## Available machines (selection):

Colchester | Dainichi | DOOSAN  
 DMG Deckel Maho Gildemeister | Hyundai  
 Mori Seiki | Pinacho

Besides vertical CNC machining centers and CNC tool milling machines, REUTER also employs conventional machine tools and universal milling machines. As with turning, REUTER has specialized in the production of small and medium-sized series and individual parts. The parts spectrum covers everything from simple up to the most complex milled parts. Quotations can be produced for both 4-side machining and for simultaneous 4-axis machining (e.g. helical gear wheel). Grinding work is performed on flat, interior and exterior circular grinding machines, also with CNC systems. In addition REUTER offers honing on a manual honing machine. CNC grinding machines allow very precise and complex contours to be manufactured. And a hydraulic straightening press enables hardened shafts or prismatic parts to be straightened.



The DOOSAN S 670L(M) produces outstanding results



## DOOSAN S 550L and S 670LM in operation at REUTER AG

3-axis CNC horizontal lathes



DOOSAN S 550L



DOOSAN S 670LM

- An enormous boost to productivity
- Main spindle with process design
- The professional for the automotive industry, wheel rims and brake drums
- Broad, sturdy DOOSAN disc-type turret with direct tool mounting
- (M) DOOSAN VDI50 disc-type turret
- Direct tool mounting, a prerequisite for high-performance turning
- Automatic trailing tailstock with MK6
- DOOSAN sliding guides that guarantee your lead
- User-friendly swivel arm operating panel
- The latest control technology from FANUC

### Why REUTER decided in favor of DOOSAN:

- Very good price/performance ratio
  - Continuous operation no problem (sturdiness)
  - Modern technology
  - Ideal for lathed parts in the diameter range from 10 to 600 mm
  - Complex lathing operations possible
  - Efficient production of even small series
- Good support from the DOOSAN representative.



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"We and our machines are at your disposal at any time." Dr. Edgar Reuter, CCO, REUTER AG



Where innovation and precision are at home

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