



**Mühlbauer**

High Tech International

# Precision engineering at its best from a single source

**Business Line Precision Parts**

Vers. 04/2009 ENG



## Think different - Act different - Be different

# Mühlbauer Gruppe

The Mühlbauer Group is the only one-stop-shop technology partner for the card, Smart Card, passport/ePassport and RFID industry. With nearly 2,000 employees, technology centers in Germany, Malaysia, the U.S. and Slovakia and a worldwide sales and service network, the Mühlbauer Group is the world's market leader in innovative systems and software solutions for the production and personalization of cards, passports and RFID applications. Additionally, Mühlbauer supports its customers in project planning, technology transfer including system integration and production support.



### Business unit Cards & TECURITY®

More than 100 different standard and customized products and intelligent software solutions for data enrollment, border control as well as personalization and production management have been added to the Cards and TECURITY® portfolio. Mühlbauer is the sole company in the world offering a full range of turnkey manufacturing solutions and software embedded processes – from micro-chip die bonding to cards and passport production and personalization to enrollment and verification of personal data. In the last 28 years Mühlbauer has installed more than 17,000 systems across the globe, and was intensively involved in over 200 government related ID projects for the manufacturing and personalization of ePassports, ID cards and other card related security documents. Furthermore, Mühlbauer manufactures complete RFID factory processes from inlay production to RFID converting, testing and personalization for contactless card, labels, tickets or baggage tags. Other units in our Cards and TECURITY® business unit manufacture individual solutions for industrial image processing of cards, coins, bank notes, tubes and other products.



### Business units Semiconductor Related Products and Traceability

Mühlbauer also develops and produces innovative systems such as micro-chip die sorting, flexible solar cells or carrier tape equipment for specific niche applications in the semiconductor back-end area (Semiconductor Related Products), as well as labelling and marking systems for traceability of electronic components (Traceability).



### Business unit Precision Parts & Systems

Mühlbauer's Precision Parts and Systems segment produces high precision components both for the manufacturing of its own products and to other manufacturers in sensitive industries such as aerospace, motorsports, medical and semiconductor industry.



### Maximum power due to strong synergies

While Precision Parts & Systems produces all required components for the complete Mühlbauer portfolio itself, the company's core business, Cards and TECURITY®, benefits from our specialized know-how in handling micro-chips in the Semiconductor Related Products area. These synergies enable Mühlbauer to be a powerful and quick reacting complete solution provider for the Smart Card, passport and RFID industries.



### Exclusive manufacturer service

Mühlbauer offers an exclusive manufacturer service. With production and service locations on five continents a reaction time of down to 2 hours is achieved. Worldwide spare parts repositories and individual service and financing concepts round-off the unique portfolio for all services around the main product.



### See & Believe

In our technology centers all over the world, such as in Germany, Malaysia, South Africa and the U.S., we exhibit our complete Smart Card and ePassport production and personalization products, as well as RFID inlay production and converting processes. Almost any system is available, ready for demonstrations. Additionally, the company drives its know-how directly to the customers with the TECURITY EXPRESS show truck – a mobile high security production center, unrivaled worldwide.



### Technology and market leadership

To ensure its technology and market leadership Mühlbauer, heavily invests in the development of new innovative products and technological processes. The company's research and development centers with over 400 highly qualified engineers and technicians closely collaborate with customers and research institutions. In such manner we can efficiently launch to market reliable solutions in increasingly shorter development and production cycles.



### Open communication

While aiming to extend our leading market position in the emerging areas of government security and biometric applications, Mühlbauer ensures strict privacy from project to project. Thus allowing open channels of communication with our customers. Speed, quality and clear customer orientation make us to the reliable partner for sophisticated industries.



# Precision Parts

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Would you like to be able to rely on a competent partner during the implementation of your projects? Benefit from our long-lasting know-how, an experienced and well-rehearsed team of specialists and use our technical and organizational support. From the very beginning, a contact partner responsible for the project will be at your disposal and takes care of a quick and customer-oriented implementation of your order.

***We make sure your ideas  
will become reality***



# Product realization

- ✓ **System solutions in every phase of the product lifetime cycle**
- ✓ **Personal service**
- ✓ **Professional consulting and construction**
- ✓ **Efficient and customer-oriented organization**

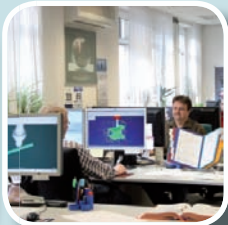
- Large team with experienced specialists
- Extensive knowledge in the various production and measurement technologies
- A contact person responsible for the project from the very beginning
- Focusing on a quick project handling in your interest
- Complete solutions for high-tech products
- Extensive technical support due to the consolidated combination of development, production and assembly
- Most recent data processing systems ensure quick and efficient processes



Do you have a lot of ideas, but are not absolutely sure about the technical implementation? Use our knowledge and our experience in mechanical engineering and the full panoply of it! You will receive more than individual components from us - we consolidate development, construction and production and thus can offer you all services around your technical idea. We have successfully provided 30,000 of our own systems successfully worldwide up to now.



***Well thought-out, from the very beginning***



# Process management

- ✓ **Latest communication and programming systems**
- ✓ **Numerous interfaces ensure a smooth cooperation on all levels**
- ✓ **Software-supported production management from A to Z**

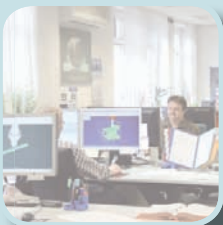
- Programming department with a total of 12 CAM workplaces
- Implementation of your data models and drawings in processing programs for CNC machines
- Processing of the whole spectrum of 2D parts up to the 5-axle simultaneous machining of 3D parts
- Direct interfaces to all current CAD systems (e.g. Catia V4/V5, Pro-E, Solid Edge, Solid Works, Unigraphics, Autodesk, VDA-FS, etc.)
- Every machine operator can program 2D parts independently on his/her machine
- Internal interfaces assure the advantages of our entire know-how
- Cost-efficient data transfer
- Production planning and scheduling (PPS)
- Integrated capture of production data (BDE)





The raw material is the basis of every work with metal. We guarantee our production readiness with our well-assorted storage and make sure that all orders can be processed as quickly as possible. The latest technology and an optimum material utilization allow both time and cost advantages. When purchasing our raw materials, we look after highest quality - guaranteed by material certificates. They can be accessed for every order and at any time - just like the batch assignment and all further necessary and relevant data!

## ***Basis of our flexibility***



# Raw material storage

- ✓ **All established raw materials are always available**
- ✓ **Proprietary CNC pre-cutting centers**
- ✓ **Cost reduction due to effective use of raw materials**
- ✓ **Material certificates are the guarators of materials of the highest quality**

- Well-assorted storage with 3000 different materials
- Rush orders from the stock at short notice can also be realized
- Precision panel saw for NE-metals for a panel size of up to 3100 x 3100 x 150 mm
- Band saw machines for round stock up to a diameter of 450 mm
- Dividing hunter for trimming all kinds of profiles
- Trimming machines for all profile shapes
- Cost advantages due to optimum material use
- Certified raw materials ensure 100 % fulfillment of your specifications
- Assignment of appropriate batches and certificates to every single customer order
- Traceability at any time, as for all individual items, even for sheet cuts or rest bars, all relevant data can be accessed at any time





Almost every form can be realized with sheet metal - provided you have the know-how! We have been acquiring extensive knowledge in sheet metal forming for many years. Nowadays, we work with an ultra-modern high-bay storage, which mainly works automatically and without human assistance. This guarantees short processing times and facilitates large cost advantages in this field! Our sheet metal specialists are responsible for further processing and guarantee an ideal implementation of your conception!

## *Sheet metal - a fascinating material offering unlimited possibilities*



# Sheet metal forming

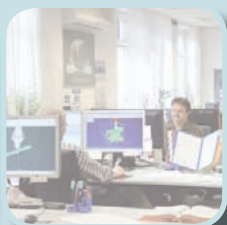
- ✓ **Newest technological equipment**
  - ✓ **Automated production due to fully-automated raw sheet loading from the high-bay storage**
  - ✓ **Highest requirements on design and looks feasible**
  - ✓ **Optimized, continuous process chain**
- 
- High-bay storage
    - 450 stock-yards for metal sheets and cuts
    - Fully-automated loading at the laser units
    - Format sizes of up to 3000 x 1500 mm
  - Programming systems
    - 6 workplaces
    - 2 workplaces Trumpf Tops and RADAN 2D/3D programming
    - Processing of all current CAD data
  - CNC laser cutting
    - Work area: 3080 x 1580 mm
    - Performance: 5000 W
    - Cutting thickness: depending on the material, e.g. steel up to 25 mm, stainless steel up to 20 mm, aluminum up to 12 mm
    - High-speed cutting up to 20 m/min - depending on the raw material and thickness
    - Special raw materials on demand
    - Cutting accuracy:  $\pm 0.1$  mm
  - CNC-punch-laser processing
    - Work area: 4000 x 1650 mm
    - Performance: 3200 W
    - Maximum punch force: 220 KN
    - Maximum punch diameter: 76.2 mm
    - Maximum metal sheet thickness: 8 mm
    - Position accuracy:  $\pm 0.1$  mm
    - High automation degree due to automated loading and unloading as well as skeleton removal
  - Combination of all advantages of laser cutting and punching (drillings, breaches, threads, shaping, roller embossings, etc.)





Welding is a fundamental area in the metalworking and offers varied options and technologies. Like in all our areas, we focus on the highest quality for materials and utilities and on highly-qualified personnel. We give our best! Because our motto is: What belongs together should stay together!

## ***A durable connection***



# Welding

- ✓ **Employment of all established welding procedures**
- ✓ **Certified welding specialist according to DIN 188800-7:2002-9**

- Manufacturer qualification C
- 15 system welding workplaces for steel treatment
- Five separated system welding workplaces for the processing of stainless steel and aluminum
- Equipment:
  - MAG welding plants up to 400 A
  - MIG welding plants up to 400 A
  - WIG welding plants up to 350 A
  - NC stud welding machine with automatic stud loading, traversing range of 550 x 450 mm
  - Resistance stud welding DALEX PL 63-2, 6 mm sheet steel, 1.5 mm sheet of stainless steel, 4 mm aluminum
  - Flame straightening
  - Soft-soldering, hard-soldering
  - Straightening pressing





It all began with a turning lathe - since 1981, we have been developing to a globally operating company with almost 2,000 employees! CNC turning is still one of our core competences in the field of precision part manufacturing. Thanks to our extensive and modern machine park and our highly-qualified personnel, we are able to meet the highest requirements, more flexible and quicker than anybody else!

***Perfection is not a matter of course***



# CNC lathes

- ✓ **Implementation of all lathe requirements in respect of size, precision and quantity**
- ✓ **Machines conforming to the current state-of-the-art provide incomparable output concerning price and delivery time**
- ✓ **Highest quality independent on the numbers ordered**

- 5-axle CNC turning lathe with C-axis
  - Turning length of up to 1000 mm
  - Processing size of up to  $\varnothing$  300 mm
  - Rod diameter of up to  $\varnothing$  70 mm
  - Up to 12 driven tools
- 4-axle CNC turning lathe with Y-axis and C-axis
  - Turning length of up to 1000 mm
  - Processing size of up to  $\varnothing$  600 mm
  - Rod diameter of up to  $\varnothing$  120 mm
  - Up to 12 driven tools
- 3-axle CNC turning lathe with C-axis
  - Turning length of up to 1000 mm
  - Processing size of up to  $\varnothing$  500 mm
  - Rod diameter of up to  $\varnothing$  90 mm
  - Up to 6 driven tools
- Cycle-controlled turning lathes
  - Turning length of up to 2000 mm
  - Processing size of up to  $\varnothing$  800 mm
  - Rod diameter of up to  $\varnothing$  100 mm
- Manual turning lathes
  - Turning length of up to 1000 mm
  - Processing size of up to  $\varnothing$  510 mm
  - Rod diameter of up to  $\varnothing$  52 mm

## Accessories

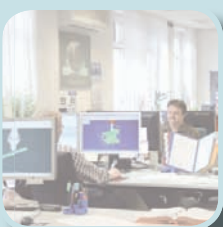
- Zeiss measuring machines
- TESA height sensing device
- Zoller presetting device



Quality, accuracy, innovation - we have been one of the top companies with regard to CNC milling for many years. Highly-qualified personnel - the majority has been trained in-house - who is kept up to date with advanced training, as well as the latest and best machines form an effective entity for the implementation of the highest requirements. No matter if this is aerospace engineering, medical engineering, Formula 1 or any other sensitive industry in which highest precision is basic requirement - we will meet your requirements!



***Unbeatable power and precision***



# CNC milling

- ✓ **Cost-effective production of precision parts**
- ✓ **Realization of the smallest milling contours and smallest thicknesses**
- ✓ **Processing of all materials**

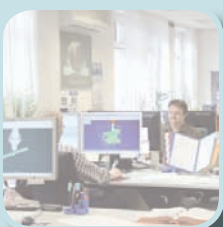
- 5-axe milling machines
  - 22 machines with a traverse path of up to 1250 x 800 x 800 mm at a maximum
  - Spindle speed 18,000 RPM
- 5-axe micro milling machine (Kern and Mikron)
  - 2 machines with a traverse path of up to 500 x 500 x 400 mm at a maximum
  - Spindle speed 42,000 RPM
  - Accuracy  $\pm 0.001$
- 5-axe milling machines with robot assembling
  - 1 machine with a traverse path of up to 700 x 400 x 620 mm
  - Spindle speed 15,000 RPM
- Horizontal machining centers with rotary table (Heckert und Makino)
  - Pallet exchanger and/or pallet rotary storage
  - 5 machines with a traverse path of up to 800 x 500 x 500 mm at a maximum
  - Spindle speed 15,000 RPM
- Bed-type milling machines
  - 2 machines with a traverse path of up to 2500 x 800 x 800 mm at a maximum
  - Spindle speed 3,000 RPM
- Bed-type milling and drilling machines with swivel head
  - 2 machines with a traverse path of up to 4250 x 1500 x 2000 mm at a maximum
  - Spindle speed 6,000 RPM
- Moving column milling machines Mazak, Deckel Maho, AXA
  - 5 machines with a traverse path of up to 4000 x 700 x 400 mm at a maximum
  - Spindle speed 15,000 RPM
- 5-axe moving column milling machines with swivel head and rotary table on W-axis
  - 1 machine with a traverse path of up to 7000 x 1500 x 2000 mm at a maximum
  - Spindle speed 6,000 RPM
- Portal milling machine Edel
  - 1 machine with a traverse path of up to 4000 x 1500 x 800 mm at a maximum
  - Spindle speed 12,000 RPM
- 4-axe milling machines
  - 9 machines with a traverse path of up to 900 x 630 x 500 mm at a maximum
  - Spindle speed 15,000 RPM
- 4-axe milling machines with H+V head
  - 10 machines with a traverse path of up to 1600 x 800 x 800 mm at a maximum
  - Spindle speed 8,000 RPM
- Manufacturing center HSC processing Chiron, Brother
  - 8 machines with a traverse path of up to 500 x 400 x 410 mm at a maximum
  - Spindle speed 27,000 RPM
- Vertical machining centers (with pallet changer) Maho
  - 2 machines with a traverse path of up to 500 x 360 x 400 mm at a maximum
  - Spindle speed 6,000 RPM
- 3-axe milling machines
  - 22 machines with a traverse path of up to 1400 x 600 x 500 mm at a maximum
  - Spindle speed 12,000 RPM
- Conventional milling machines with digital display and control unit Mikron, Deckel-Maho
  - 15 machines with a traverse path of up to 500 x 500 x 350 mm at a maximum
  - Spindle speed 4,000 RPM





You can also count on us in the field of grinding and eroding! Like in all fields, we can convince with the latest technology and assure you that you only receive products of the highest quality. During the entire production of our and your components, we focus on quality, accuracy and ideally coordinated processes!

## *The standard for accuracy*



# Erosion/grinding

- ✓ **Economic and effective machining**
- ✓ **Fast and extremely precise cutting erosion with an accuracy of  $\pm 1 \mu\text{m}$**

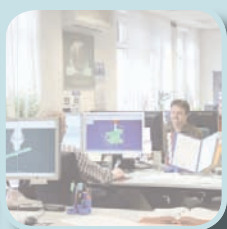
- Surface grinding
  - Surface grinding of soft and hardened materials in a grinding range of 780 x 600 x 300 mm
- Profile grinding
  - CNC controlled profile grinding in a grinding range of 400 x 180 x 200 mm
  - Programmable profiling device
  - Oscillating stroke with up to 24 m/min
  - Finish quality depending on the material smaller than Rz 1
- Circular grinding
  - CNC-controlled external and internal cylindrical grinding
  - Circular grinding with a center width of up to 1000 mm
  - Center height of 175 mm
  - CNC-controlled profiling device
  - Finish quality depending on the material smaller than Rz 0.8
- Jig grinding
  - Jig grinding in a work area of 500 x 300 x 450 mm
  - Grinding of external and internal contours, Drillings
  - Positioning accuracy  $\pm 0,002 \text{ mm}$
- Wire eroding
  - Wire eroding up to a work piece height of 400 mm
  - Work area of up to 600 x 300 mm
  - Smallest possible corner radius of 0.07 mm
  - Finish quality depending on the material of up to Rz 1.6
- Die sinking
  - Die sinking from soft materials to hardened steels to hard metal
  - Burnish sinking depending on the material of up to Rz 1.6



A perfect surface is the „finish“ for every high-grade item - for the optics and/or for protection. Highest accuracy and an extensive know-how is demanded so that your component will be really perfect. With our extensive electroplating inclusive a proprietary laboratory, we will fulfill all your wishes!



## *Perfect looks for perfect components*



# Surface treatment

- ✓ **More than 20 years experience in coating and varnishing technology**
- ✓ **Consolidated knowledge of all refining techniques**
- ✓ **Optimum process control owing to our modern laboratory**

## Aluminum up to 1700 x 900 x 300 mm

- Pretreatment according to DIN 65080  
E 0 = bating minimum abrasion  
E 6 = bating for smoothing
- Eloxadizing/anodizing according to DIN 17611  
EV1 = nature  
EV6 = black  
blue 2 LW 1700 x 900 300 mm  
red ML 1700 x 900 x 300 mm  
Masking operation is possible on arrangement
- Hard anodized aluminum  
CU-share of up to 0.5 % in the structure  
with PTFE with red, black and blue pigmentation
- Chromating according to DIN EN 12487 C 1

## Steel

- Burnishing up to 1080 x 700 x 350 mm according to DIN 50938 A/f

## Zinc coating with chromizing of steel and brass

up to 1080 x 700 x 350 mm

- according to DIN 50961  
A = colorless chromized  
B = blue chromized  
C = yellow chromized  
F = black chromized  
X = optional chromized

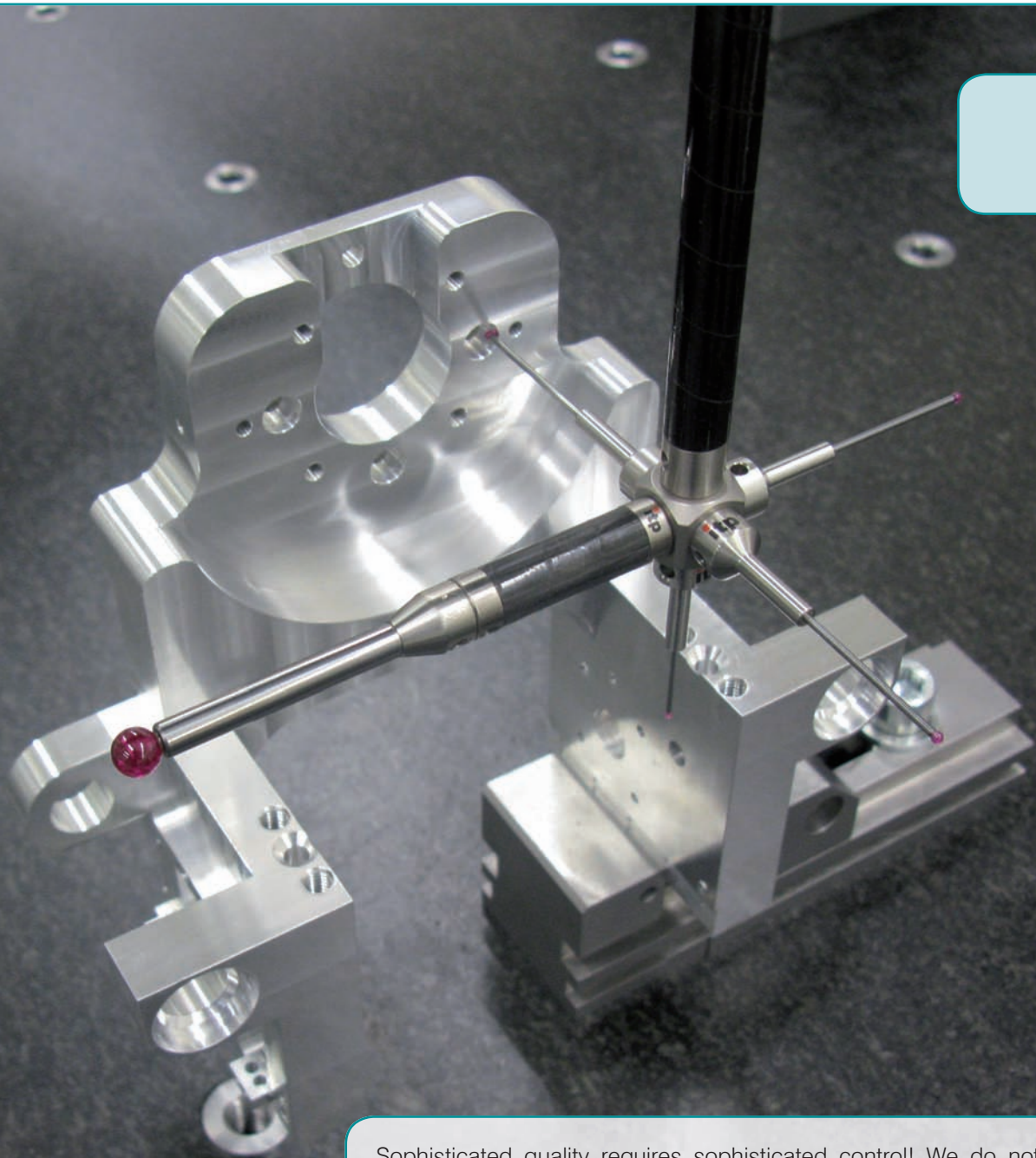
## Finishings/2K

- Air drying
- Burning-in in a branding furnace of up to 1700 x 1050 x 1300 mm (max. 90 °C)

## Blasting

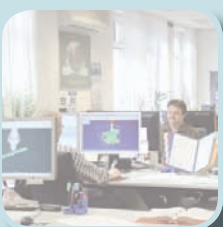
- with steel shot of 0.6 mm up to 4700x 3300 x 1700 mm
- Glass beads of up to 300 x 500 x 800 mm with 70 - 190  $\mu$ m





Sophisticated quality requires sophisticated control! We do not miss a single mistake with our reliable quality management. We guarantee an optimum product quality. We measure by means of the latest technologies and fulfill various standards and DIN regulations, which you can consult as a reference. Do not agree to compromises! Flawless quality is an obligation!

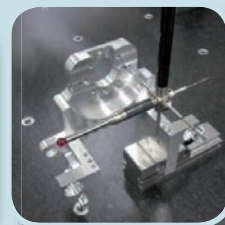
## *No room for compromise*



# Quality control

- ✓ **Guarantees convincing quality**
- ✓ **Fulfillment of your specifications and standards by optimum measuring and checking technology during the entire process**
- ✓ **Certified QM system in accordance with DIN EN ISO 9001**
- ✓ **Conditioned measuring range**

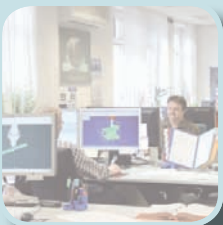
- 3D measuring machines
  - 5 Zeiss measuring machines with scanning technology
  - Traversing range of up to 1200 x 900 x 600 mm
  - Integrated rotary table
- CNC video measuring device
  - Measuring range up to 200 x 200 mm
  - Accuracy  $\pm 15 \mu\text{m}$
- Extremely precise calibration machine
  - Helius Supra 500
  - Calibration of
    - Mandril gauges
    - Gauging rings
    - Dial gauges
    - Thread inspection equipment
- Various measuring devices
  - Height sensing device
  - Profile projector
  - Measuring microscope
  - Roughness depth checking device
  - Universal hardness testing device
  - FAG rotation checking device
  - Contourograph
  - Laser labeling unit
  - Mandril gauges, gauging rings, etc.
  - Endoscopes
- Measuring services
  - First part releases
  - Batch splitting
  - Particular serial number system
  - Individual component number tracing
  - Release process
  - Interim controls
  - 100 % final check
  - Detailed documentation
  - Traceable designation via laser marking





You do not only require individual components, but also complete systems? No problem! You can count on us with regard to electronic and pneumatic components, software integration or clean room assembly - especially with regard to special requirements! Due to our extensive experience in mechanical engineering, you can rely on us as a reliable and competent partner for the construction of your components and systems! Quality has the highest priority here, too!

## ***Unique symbiosis of mechanics, electronics, pneumatics and software***



# System assembly

- ✓ **System assemblies for any requirements**
- ✓ **Implementation of complex systems including software integration**
- ✓ **Longtime, proven effective know-how with 30,000 machines of the Mühlbauer Group in service worldwide**
- ✓ **Clean room assembly**

- Availability of various media (e.g. DI - water, N2 - gas, formin gas, compressed air, vacuum, cooling water)
- Power supply at 16 places with 230 V and 400 V (16 A, 32 A)
- Internet access
- Acid suction, external dust suction
- Fume hood with DE water, nitrogen and town water
- Packaging of the machines in clean area (material security entrance gate and material security exit gate)
  
- Assembly of prototypes
- Assembly of serial machines
- Control
- Helium leak test
- Electronics test
- Creation of function protocols
- Ultrasonic cleaning of small parts with various media (e.g. DI water, Isoprophylalkohol, Aceton), packaging suitable for clean rooms



Our service for you does not end with production and assembly. Because an adequate delivery is as important as professional production! After all, the goods are to arrive quickly and in good condition. The correct packaging and a thought-out organization of the logistics save time, money and nerves. The correct goods at the correct time and at the correct location - these are the principles and aims of good logistics, especially if delivery must be accurate, e.g. with just-in-time deliveries, which can save you considerable storage costs! Especially in this field, you need a reliable partner - otherwise, the intended savings could become enormous losses!



***Precision right up to the customer***



# Logistics

- ✓ **Individual packaging solutions**
- ✓ **Individualized transport solutions for part and full loads**
- ✓ **Freight cost minimizing and clear planning with fixed agreements**

- Defined flow of material and goods
- Just-in-time deliveries
  
- Daily delivery tour from Roding to Munich
- Daily delivery tour from Stollberg to Roding
- Production of special packaging in the proprietary joinery
- Vacuum packaging
- Shock sensors
- Worldwide connection with sea and air freight
- Production of returnable packaging



Contact us

# Mühlbauer - always on site

Germany ■ France ■ U.S.A. ■ Mexico ■ Australia ■ Brazil ■ China ■ India ■ Malaysia ■ Russia  
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