Machining

Precision for plastic components
Machining is the fastest, most economical way to arrive at a finished plastic component, in particular for small production runs. In this field, Ensinger can provide a complete production service for your precision components, systems and assemblies. In our Cham location, our highly skilled engineers produce precision components to the very narrowest tolerances.

Over 30 years of experience in the field of engineering and high-temperature plastics form an outstanding basis for the most stringent quality standard. No matter what the design of your plastic part and the complexity of its geometry: You will benefit from the pooled expertise of the entire Ensinger group. Our Sales Department will be pleased to support you throughout the implementation of your complete project. The advice we offer includes not only material recommendations and component configuration, but also the design of the finished part taking into account the material used and all defined tolerances.

In the vast majority of cases, we process semi-finished products or injection moulded parts from our own production. The experience spectrum of the Machining Division encompasses every key branch of industry. Outstanding customer satisfaction is guaranteed by our highly motivated and qualified team of experts. Ensinger attaches enormous importance to training its own skilled personnel in-house and reducing the turnover of staff. Our aim is to achieve the best possible economic outcome for our customers.
During an initial discussion, we enquire about the functions to be performed by the component in its intended application. Advance consultation and co-operation with our technicians and engineers produces valuable knowledge which flows into the design process, eliminating a number of steps such as time-consuming and cost-intensive modification and grinding. On the basis of the designs, drawings are then derived complete with dimensioning and plastic material-specific tolerance specifications. Manufacture of complex, top-quality plastic components can then begin.

**Extensive machine base – extreme production output**

Our machine shop in Cham is equipped with highly flexible ultramodern equipment. 26 milling centres and 23 turning centres take care of high-performance production and supply reliability in a three-shift operation.
Production possibilities

**Milling**

- Twenty-six CNC machining centres
- Thirteen 5-axis centres, of which three are automated
- Seven 4-axis centres, of which three are long-bed machines
- Five 3-axis centres

**Benefits in production**

- Milling centres with internal tool cooling systems
- Solid model milling program generation
- Insertion system for medium and large volume runs
- Production and machine data acquisition
- Clamping system with female coupling and pallet on each milling centre
- Milling automation

**Five-axis milling with post-processor**

- Machining of freeform surfaces
- Solid model milling program generation
- Milling with simultaneous actuation of 5 axes
Turning

- Twenty-three CNC machining centres
- Five machining centres with Y-axis
  (of which one with B axis)
- Three machining centres for large volumes
- Two machining centres for the production of single parts and prototypes

Benefits in production

- Turning centre with powered tools
- Counter-spindle for reverse-side machining
- Two turrets for simultaneous machining
- NC-controlled machines for prototype production
- Insertion system for medium and large production runs
- Bar feeder with 3 m length and short loader with 1.5 m length
- Production and machine data acquisition

Finish machining

- Surface finish on components using blasting systems and vibratory grinding
- Laser inscription for engraving of parts (for batch traceability)
- Deburring and part cleaning with disinfectant and check under the microscope
- Ultrasound welding
- Assembly and packaging in the clean room
- Module assembly and function tests, e.g. seal tests
We attach maximum importance to supply our customers with the best quality at all times. To allow our work results to be assessed in compliance with current standards, our products and processes have to be continuously monitored. Equipped with everything from tactile co-ordinate measuring machines to optical measuring devices, surface gauges, a contourograph and a large selection of other measuring instruments, we are ideally placed to meet every conceivable measurement-related challenge.

Quality assurance
Our daily work includes in-process recording and documentation. Above and beyond certification to DIN EN ISO 2001, we are also geared to currently valid sector-specific requirements. In addition to the standard audits, our company is regularly audited and assessed by our customers. Customers and suppliers are subject to the specific standards and regulations of their respective branches of industry. Our various certifications verify our compliance with these requirements.

Batch traceability
Seamless batch traceability is a matter of course at Ensinger. And the fact that a high percentage of the semi-finished products we process are from Ensinger’s own extrusion department represents another clear quality advantage. Internal article number management with storage of fixtures for production help to optimize repeat accuracy. The result: a consistent standard of component quality.
### Application examples

<table>
<thead>
<tr>
<th>Assembly for a computer tomograph</th>
<th>Pad cover</th>
<th>Capillary carousel for PCR analysis</th>
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<tbody>
<tr>
<td><strong>TECAPEEK (PEEK)</strong></td>
<td><strong>TECAPEEK (PEEK)</strong></td>
<td><strong>TECAPEEK MT black (PEEK)</strong></td>
</tr>
<tr>
<td>→ Internal geometry manufactured using 3D milling</td>
<td>→ Parts are pre-processed and thermally treated several times</td>
<td>→ High precision drilling tolerance</td>
</tr>
<tr>
<td>→ Machining on 5-axis milling machine</td>
<td>→ Machining in 5-axis milling centres using 3D milling technology</td>
<td>→ Tolerances of ±0.05 mm are implemented</td>
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<tr>
<td>→ Dimensional tolerances of ±0.02 mm are adhered to</td>
<td>→ Part-specific geometry entails a major risk of warping (shape and position)</td>
<td>→ 100% inspection of drilling tolerance</td>
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<tr>
<td>→ Issue of shape and position tolerances, adherence to a concentricity of 0.03 mm and radial runout of 0.05 mm</td>
<td>→ Dimensional tolerances of 0.05 mm are implemented</td>
<td>→ Complete module assembly</td>
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<tr>
<td>→ 100% inspection of dimensional, shape and position tolerances using co-ordinate measuring machines</td>
<td>→ Perpendicularity of 0.05 mm and parallelism of 0.1 mm are implemented</td>
<td>→ Laser lettering</td>
</tr>
<tr>
<td></td>
<td>→ 100% inspection of dimensional, shape and position tolerances using co-ordinate measuring machines</td>
<td>→ Cost reduction implemented</td>
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<tr>
<td></td>
<td></td>
<td>→ Prototypes and small production runs made from stock shapes, volume production from pre-injection moulded blanks</td>
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