

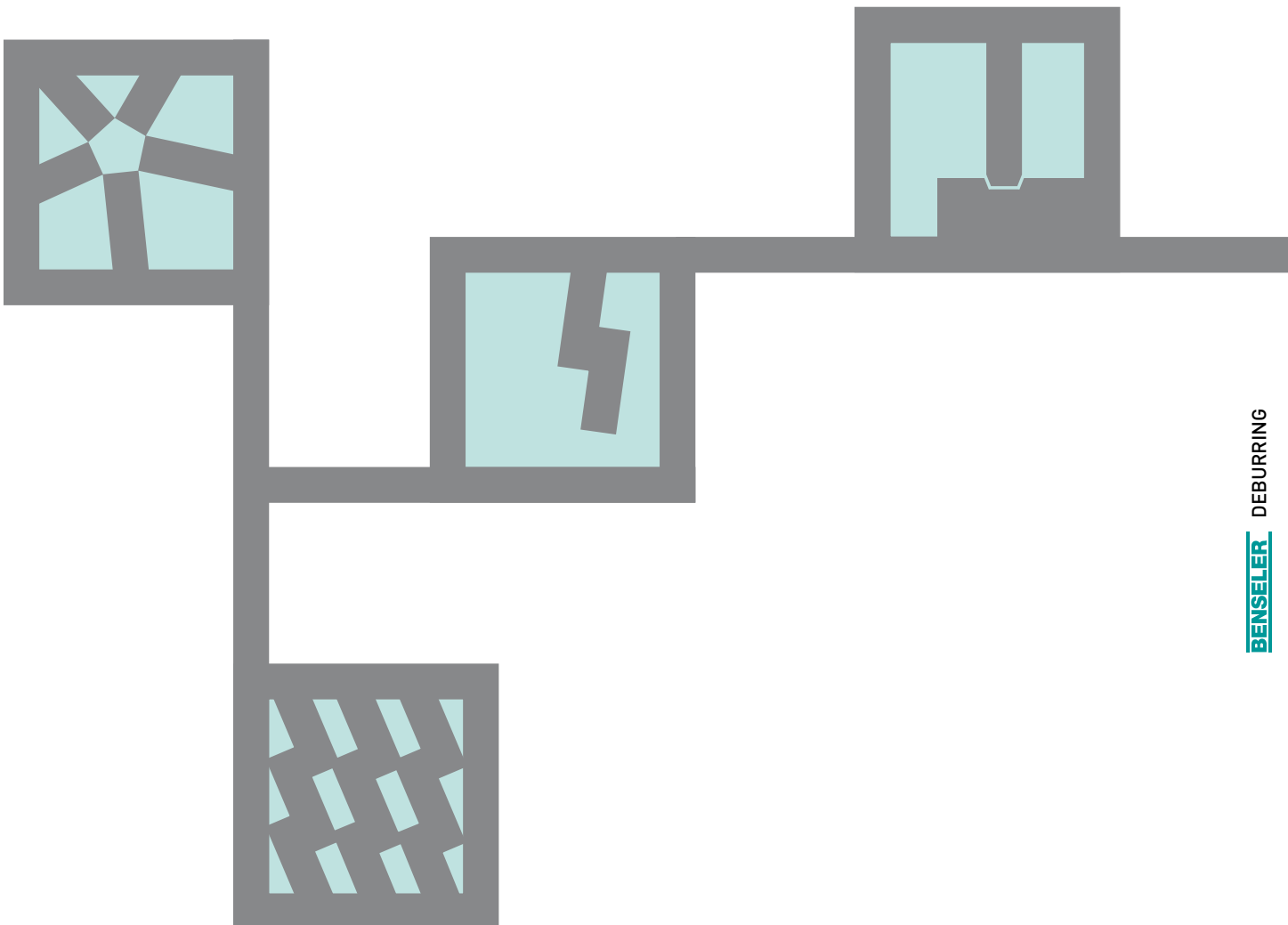
TEM Thermal Deburring

ECM Electrochemical Machining

HDW High Pressure Water Jet Deburring

PECM Precise Electrochemical Machining

Industrial component cleaning



Deburring from BENSELER for Custom Precision

SPECIALIZATION
INNOVATION
SYNERGY
QUALITY

Our name has been synonymous with specialization in the area of burr removal and electrochemical machining for over 30 years. We have made deburring complex components our central focus, using the most modern processes available to offer you the best process reliability and economic efficiency.

Our experience as a deburring specialist is clear from the trusted techniques we use at our four locations; these can be adjusted to a wide variety of materials and components. Besides finding the deburring appropriate for your material, you can also take advantage of our knowledge in the area of surface coating.

Our expertise is available for you, from component development to deburring itself; we look forward to partnering with you. We are consistently on the lookout for even better solutions, and ready to question existing processes and develop new ideas at all times.

Our goal is to prove our abilities professionally, discretely, and flexibly. Because BENSELER Entgratservice stands for the synthesis between quality, synergy, and innovative capacity, growing from our committed and trusting collaborations with our customers and partners.





TEM Thermal Deburring

AREAS OF APPLICATION

We use the thermal deburring method anywhere the quality of the deburring process has a significant influence on the function of a component, or anywhere we need to replace labour-intensive deburring work.

THE PROCESS

During this process, all burrs on a workpiece are burned in a deburring chamber filled with a blend of oxygen and combustible gases. Burning the burrs, which removes no workpiece material from the surface of the component, takes just a few milliseconds and only raises the temperature of the workpiece by an insignificant amount.

We determine deburring quality, in particular the complete stabilization of all burr edges, partially through the volume of gas used and partially through the ratio of oxygen to combustible gas in the blend. The optimal design of any required deburring devices is key to achieving the desired results.

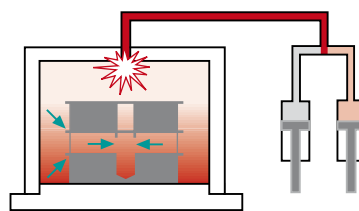
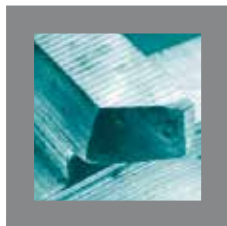
THE ADVANTAGES

- all burr locations on the workpiece are deburred at the same time
- very high level of process reliability
- burr roots are sealed

before



after





ECM Electrochemical Machining

AREAS OF APPLICATION

The electromechanical machining method is suitable for precisely machining edges and intersections between drill holes at precisely defined locations. This technique also allows us to incorporate new geometric shapes and contours into the workpiece surface, such as bell hollows and transitional areas between surfaces.

THE PROCESS

The burrs on the workpiece, which is connected to an anode, are precisely electrolytically dissolved in this process.

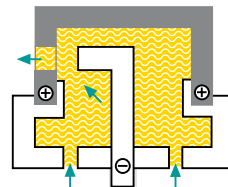
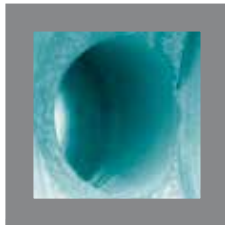
THE ADVANTAGES

- does not subject components to thermal or mechanical stress
- precise machining on defined surfaces
- no secondary burrs
- works with different alloys and microstructures
- works with different burr thicknesses and textures
- also suitable for casting burrs, flashes, and forging flashes

before



after



Machining a bell hollow





HDW High Pressure Water Jet Deburring

AREAS OF APPLICATION

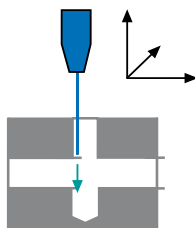
Deburring using a high pressure water jet is especially suitable for workpieces made of lightweight metals. In this process, we remove burrs using only water in areas where other processes reach their limits, both technical and economically.

THE PROCESS

The water jet is directed towards the area of the workpiece we want to machine at up to 1000 bar pressure using CNC controls. This allows us to reach even intersections and drill holes which are difficult to access. The high kinetic energy of the water jet not only quickly and reliably removes burrs on the machined edges, but also removes chips and other contaminants adhering to the component.

THE ADVANTAGES

- deburr, clear swarf and clean in one operation
- targeted approach and deburr of predefined sites
- also suitable for large workpieces
(travel distances: x = 300 mm, y = 300 mm, z = 600 mm)

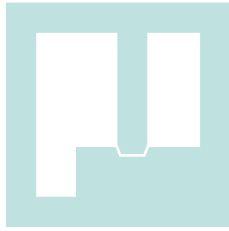


before



after





PECM Precise Electrochemical Machining

AREAS OF APPLICATION

With PECM, it is possible to precisely machine metals within a very short time no matter their hardness level – with good component quality and lower manufacturing costs in comparison to traditional processes.

THE PROCESS

PECM is a further development of ECM. In this electrochemical process, workpieces are anodically dissolved using an oscillating cathode in a non-contact procedure. PECM is useful for small and large series production processes, and for prototype manufacturing.

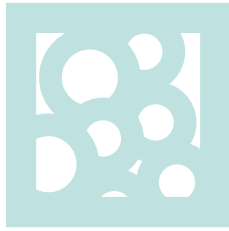
ECM / PECM PROCESS CHARACTERISTICS

- non-contact machining without thermal and mechanical influences
- burrless processing
- process does not cause cathode wear
- surface roughness to Rz 0.2 / Ra 0.05 (depending on material)
- positional accuracy < 20 µm
- processing of hardened components
- apparatus design means cycle time can be scaled



Machining example,
detail of surface texture





Industrial component cleaning and cleanliness analysis according to VDA 19

AREAS OF APPLICATION

The purpose of the cleaning is to improve the functional capabilities, quality, and service life of complex components and assemblies such as hydraulic, braking, or injection systems.

THE PROCESS

Component cleaning is completed in a closed multi-chamber immersion cleaning unit with automatic feeding. A large number of different components and workpieces are cleaned here in a watery solution. Besides lifting, lowering, and turning movements, the cleaning effect can also be intensified using 12 kW (20 watt/litre) ultrasonic transducers. Even particle contaminants can be reliably removed from deep drill holes or in hard-to-reach locations with this method. Components are dried in a rotating and heated vacuum dryer.

THE ANALYSIS

Technical cleanliness is assessed in our own laboratory according to VDA 19, or in accordance with customer-specific guidelines:

- extraction
- gravimetry (up to 0.1 mg)
- microscopy (automated)
- assessment protocol

5µm membrane filter for cleaning results before component cleaning



magnification approx. 20x

after component cleaning



magnification approx. 20x



Our locations



**BENSELER Entgratungen
GmbH & Co. KG**

71672 Marbach a. N.
Max-Eyth-Straße 6

Phone: +49 7144 903 12
Fax: +49 7144 903 19
E-mail: info@benseler.de
www.benseler.de



**BENSELER Entgratungen
GmbH & Co. KG**

Branch location: 45525 Hattingen
Beuler Höhe 35

Phone: +49 2324 902924 0
Fax: +49 2324 902924 9
E-mail: info@benseler.de
www.benseler.de



**BENSELER Sachsen
GmbH & Co. KG**

09669 Frankenberg/Sa.
Chemnitzer Straße 61B

Phone: +49 37206 661 0
Fax: +49 37206 661 14
E-mail: info@benseler.de
www.benseler.de



PROVE TECH CZ s.r.o.

CZ-251 01 Říčany Jažlovice
Zděbradská 56

Phone: +42 724 127 712
Fax: +42 323 637 016
E-mail: prokop@provetech.cz
www.provetech.cz