Anlagentechnik Luhden

Thermal Deburring

Process and Application

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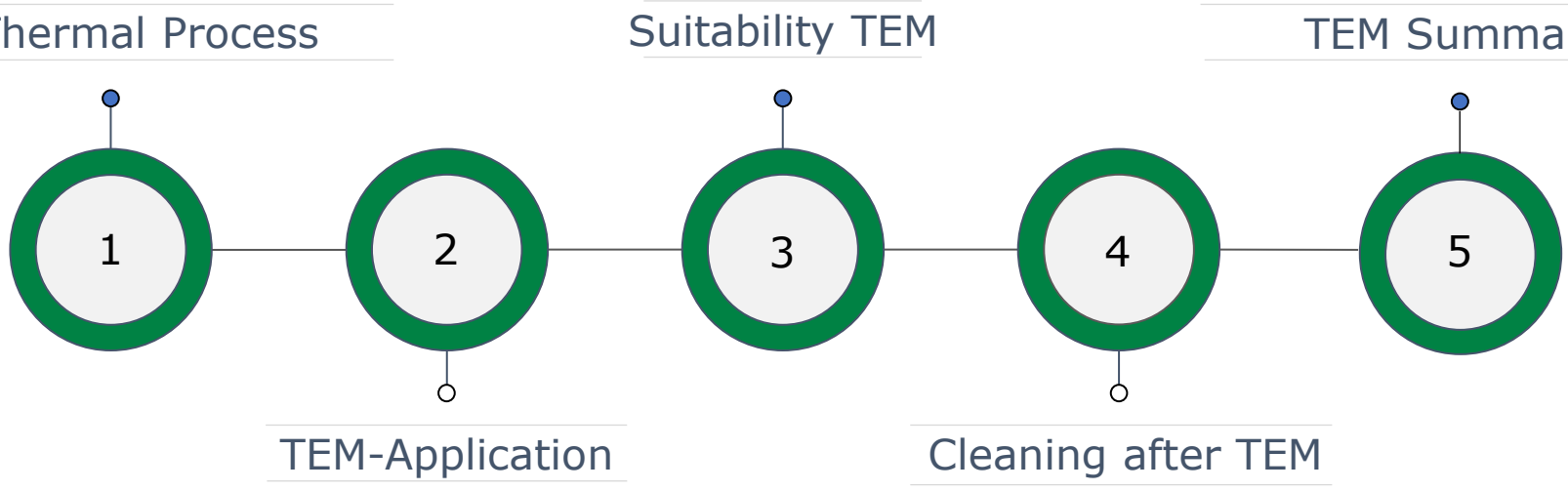
Agenda


Thermal Process
Suitability TEM
TEM Summary
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TEM-Application
Cleaning after TEM

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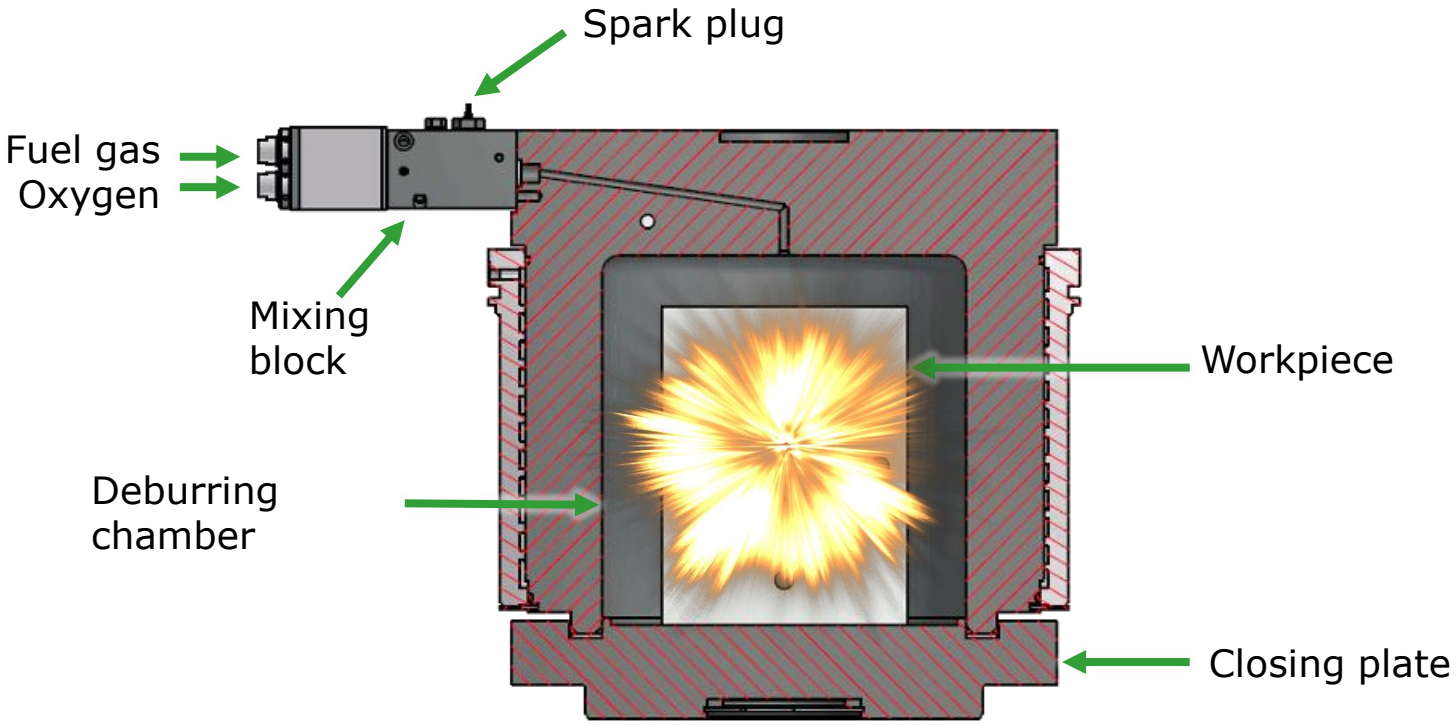
Thermal process

Deburring (Milliseconds)

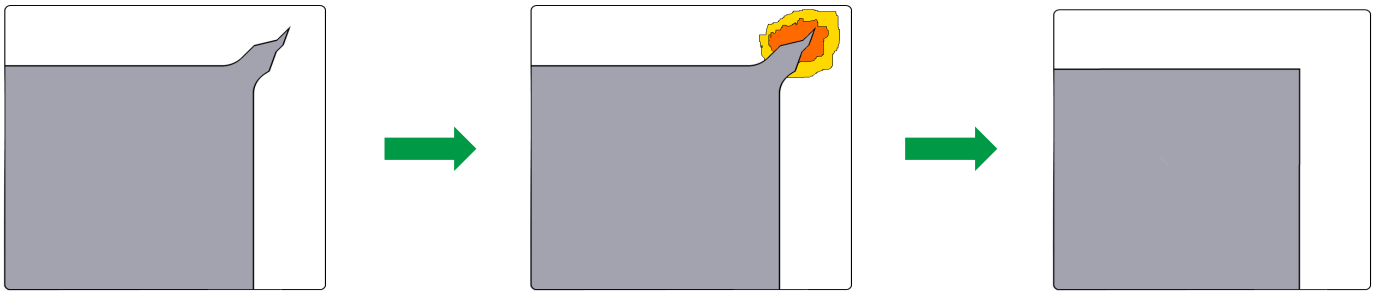
Combustion of the gas mixture via the spark plug. Suitable fuel gases are natural gas, methane and hydrogen.



TEM Process

Parameter for process control:

- Gas filling pressure
- Gas mixing ratio
- Fixture technology



Before deburring

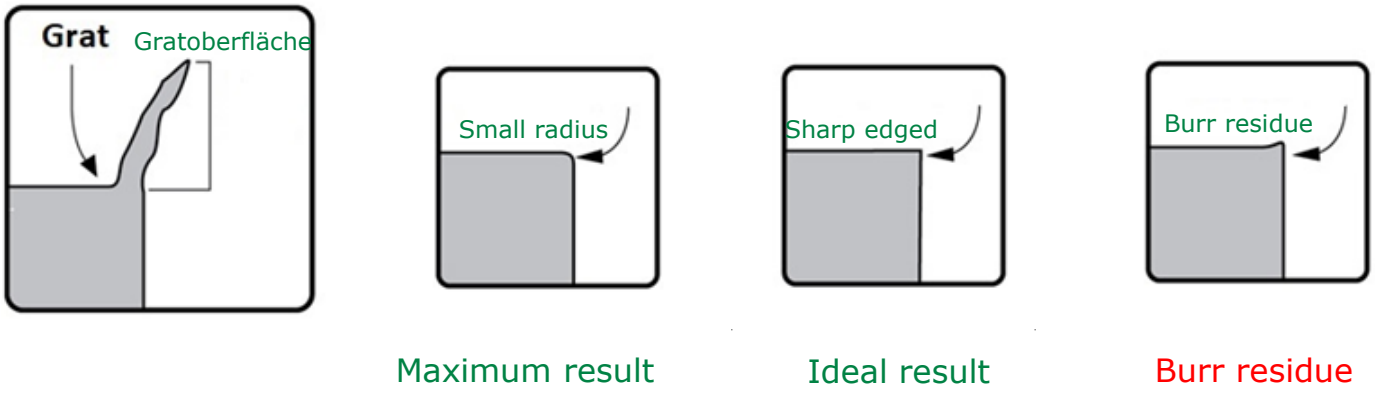
During deburring

After deburring
burr free, sharp edged

TEM Process

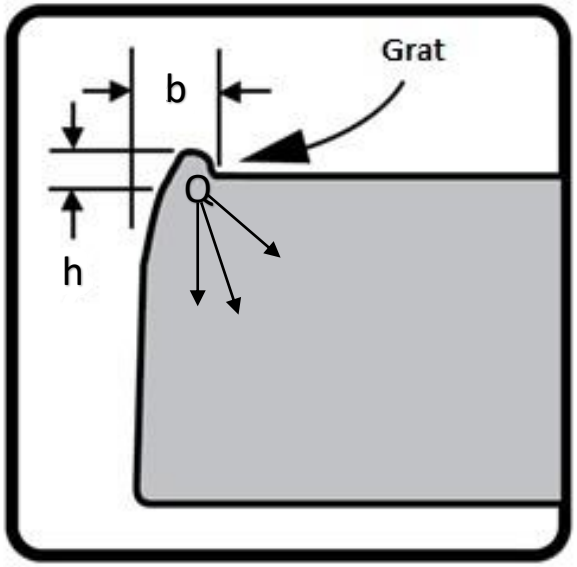
Parameters for process control:

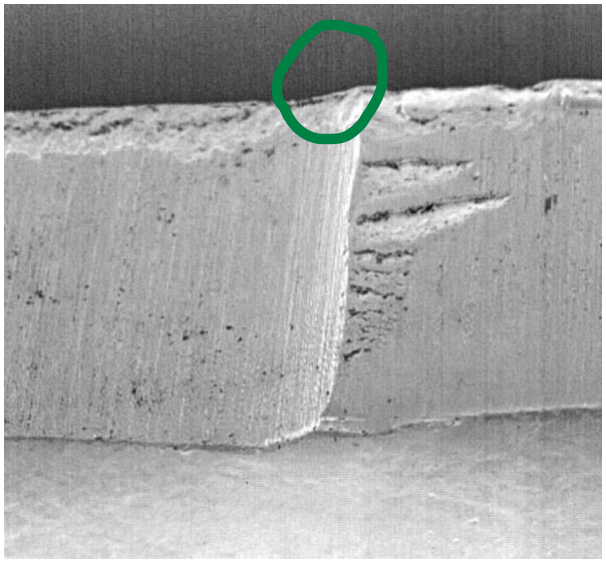
- Gas filling pressure
- Gas mixing ratio
- Fixture technology



The deburring result is influenced by the root thickness of the burr

Example of punching burrs





Punching burrs are not suitable for TEM, as they quickly dissipate the required heat and only heat up the burr.

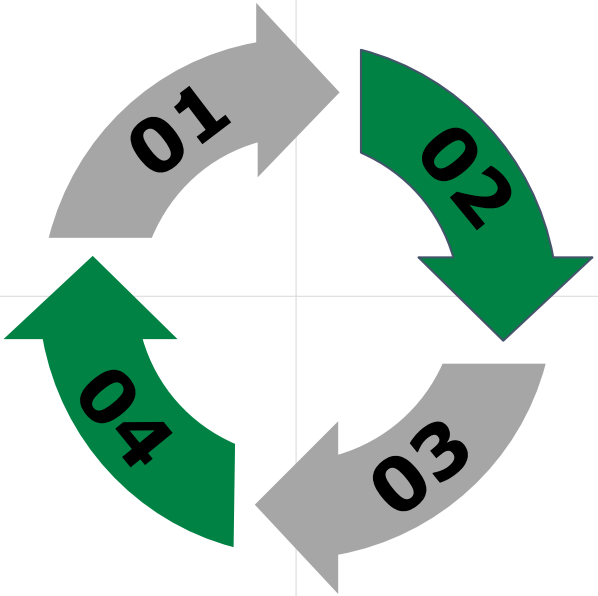
TEM Process

1. Pre machining

Untreated part

2. TEM

After the first shot with an excess of oxygen



4. Cleaning

Finished / cleaned part

3. TEM

Oxide minimization through stoichiometric gas mixing

Suitable materials

Materials for thermal deburring:

- Steel / Stainless steel
- Cast iron
- Aluminum with max. 5% Mg
- Brass
- Zinc die casting (ZAMAK)
- Plastic (Thermoplastics)

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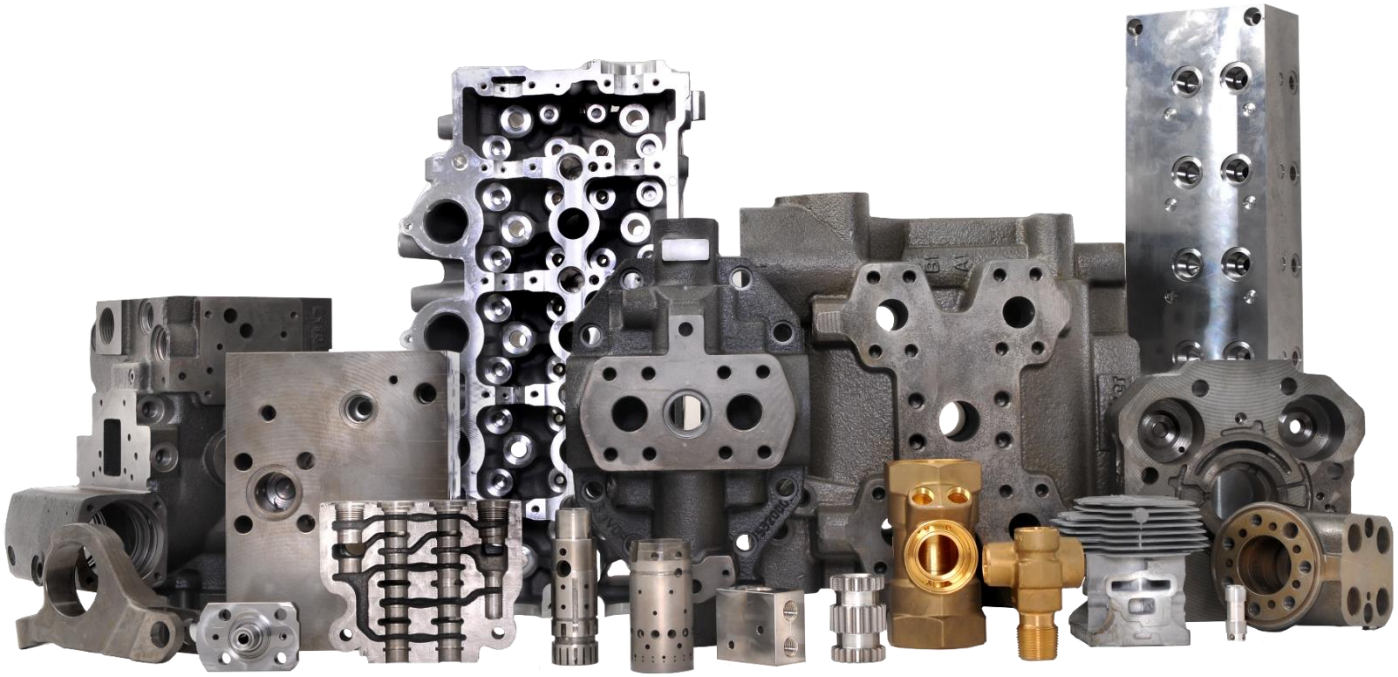
TEM- Application

TEM Applications

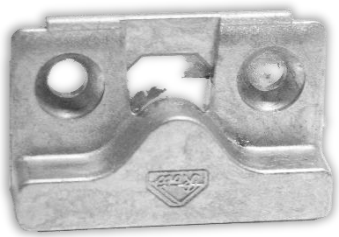


TEM Plastic

TEM in practice

Thermal deburring is best suited for:

Internal burrs	- Burrs that are diffcult to access
Cleanliness	- When „burr - free“ is required
High flexibility	- For small and large lot sizes
Reproducibility	- When a consistent deburring quality is required
Generally	- Burrs after machining such as drilling, milling, turning, or grinding



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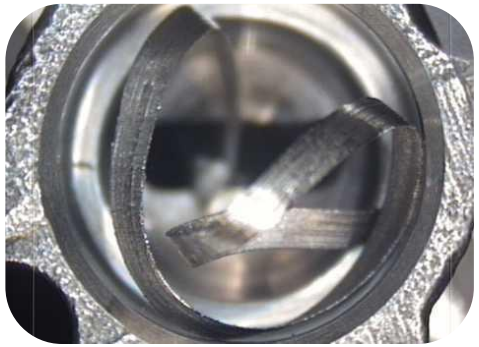
TEM- Suitability

Pre treatment TEM

Pre treatment of the workpieces before TEM is important

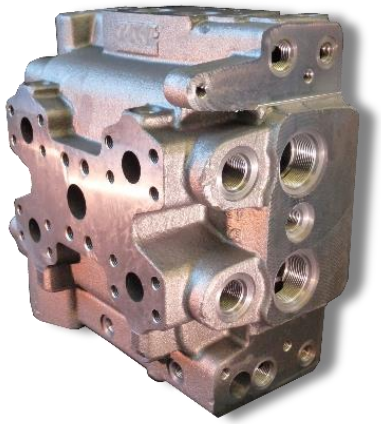
- No large free hanging burrs
- No chips
- Oil free
- Clean and dry



Suitable parts

Hydraulic blocks

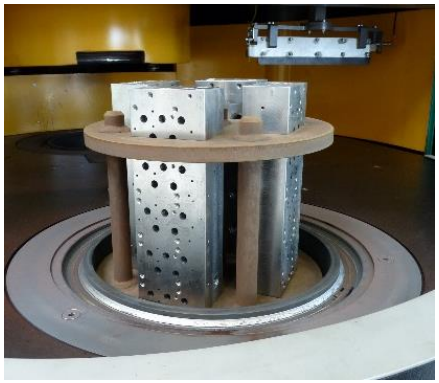
- Removing burrs from cross holes
- Removing burrs from „difficult to reach“ places
- Result: Sharp edges, burr free

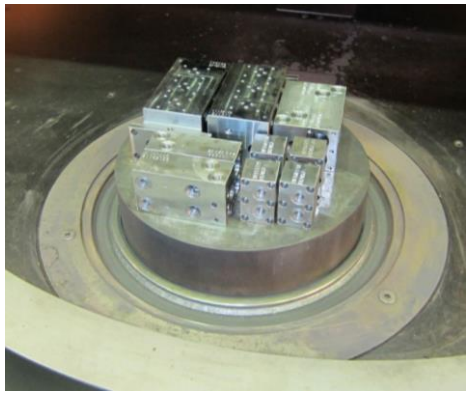


Placing of the parts

Example

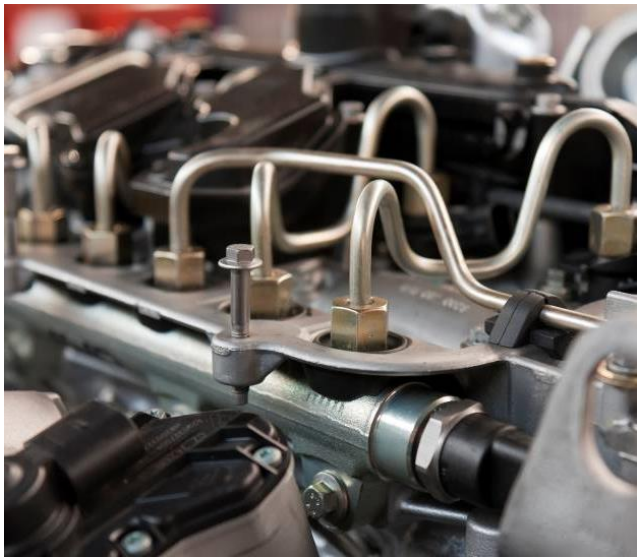
High flexibility for different components





Suitable parts

Deburring of special nuts for injection systems

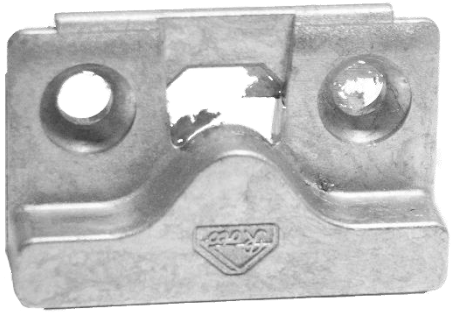


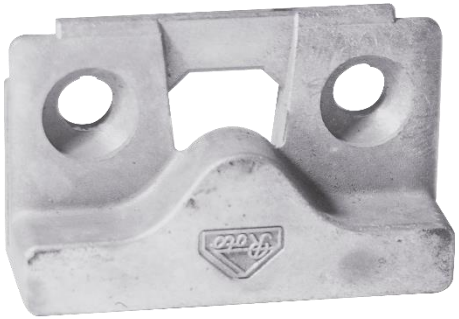
Throughput of high quantities in the bulk material process

Suitable parts

Zinc die casting (ZAMAK)

- Removal of casting skins, reduction of burrs at the edges of the mould joints
- Incineration of tinsel burrs
- Suitable for large quantities

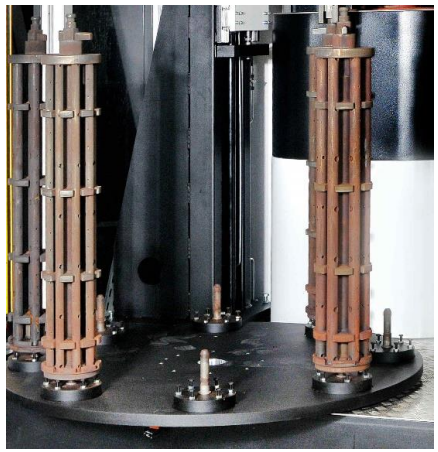




Suitable parts

Engine and transmission parts(Automobile / Truck)

- Complete deburring of all inner and outer contours during one cycle
- Deburring of bulk material
- Deburring of high numbers of pieces



Suitable parts

General machanical engineering / military industry

- Tem- Deburring offers a high degree of flexibility for different components and materials. All this with high process reliability.
- Deburring of military / sports weapon parts

Comparison deburring process

TEM

- Many inner holes
- Burrs in hard to reach places
- Sharp-edged deburring, no detachable burrs

Waterjet deburring

- Few internal holes
- Good accessibility of the burrs
- Light material
- No thermal stress

ECM

- Distinct root of the burr
- Good accessibility of the burr
- Edge rounding

iTEM Machine types

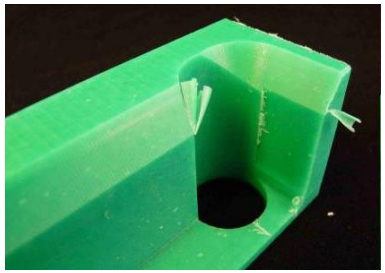
- ***iTEM** 320 NG* – 5 deburring stations, chamber size from Diameter D250 to D320 mm, Height H300 to H400 mm
- ***iTEM** 400*+ – 5 deburring stations, chamber size from Diameter D400 to D460 mm, Height H600 mm
- ***iTEM** LC* – 5 deburring stations, chamber size from Diameter D200 bis D250, Height from H1000 bis H1200

Deburring of plastics

Deburring of thermoplastics

- Deburring of machined plastic parts and for injection moulded parts without glas fibre content.
- Smoothing of the surface structure.

Before:



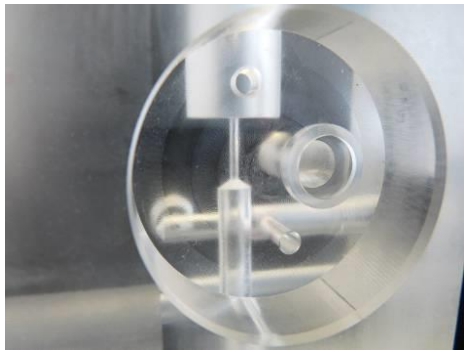
After:

Deburring of plastics

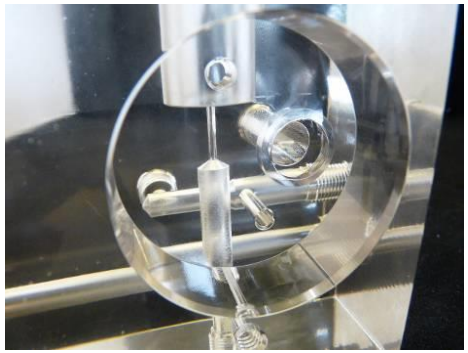
Treatment of PMMA (Polymethylmethacrylat)

- Before deburring the material is matt, afterwards crystal clear
- Smoothing („polishing“) the mechanically machined surface
- Removing burrs

Before



After



iTEM Plastics

***iTEM** Plastics* – max Diameter of square components:
360 x 360 x 760 mm,

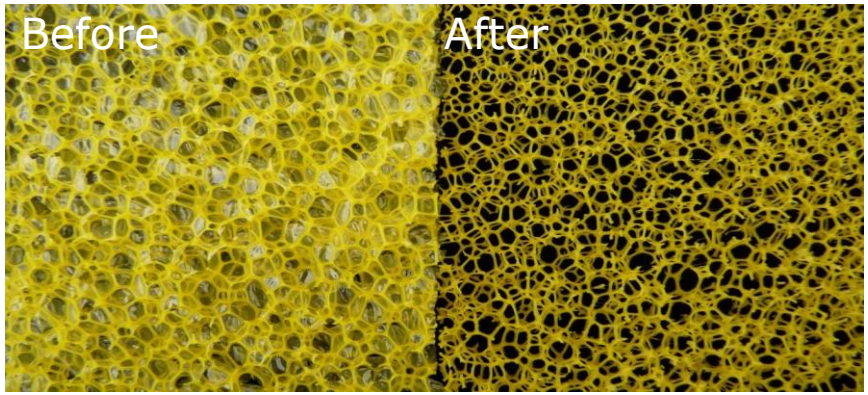
Operating gases:

- Hydrogen
- Oxygen

Foam Reticulation

Special application

- Left: Pores in the foam are closed by skins
- Right: Reticulated foam, open pored structure
- **Aim: Very good air permeability**



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Cleaning after TEM

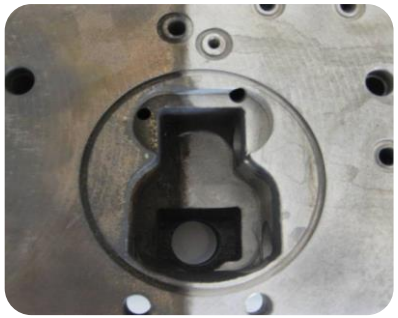
Cleaning after TEM

Many components can be used directly after the TEM process and doesnt require a post treatment (e.g. aluminum).

In case of heavy oxide deposits or defined quality specifications, a subsequent cleaning must be carried out (e.g. steel, cast iron).

Recipe for the best TEM aftercare:

- Suitable chemical substances
- Suitable washing method
- Ultrasound support



Cleaning after TEM

Cleaning machines (waterbased)

Chamber type

- Ultrasound
- Rotating basket
- Vacuum drying

Transfer type

- Ultrasound
- Oscillating basket
- Vacuum drying

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Summary

Summary

Not suitable components for TEM:	➡ Only external burrs ➡ Wall thickness too thin ➡ Too large dimensions (max. Ø 450 X 600 mm or max. Ø 200 X 1200 mm) ➡ Components with punching burrs ➡ Parts with defined edge rounding
Industries:	➡ Hydraulics, Pneumatics ➡ Automotive ➡ Medical (Plastics)
TEM-suitable components:	➡ High quantities (Exception of large components) ➡ Components with complex internal deburring ➡ Suitable for almost all materials (Exept alloys with more than 5% Mg content) ➡ Where cleanliness and process reliability is required
TEM deburring result:	➡ **Sharp-edged-burr-free** ➡ **No defined radius**

Thank you!

Do you have any questions?

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