MICRO HEGA

SURFACE FINISHING TECHNOLOGIES

INDUSTRIAL CLEANING TECHNOLOGIES

Product catalogue

GOOD REASONS FOR ...

ABRASIVE FLOW MACHINING / VIBRATORY FINISHING / STREAMER PRODUCTION / CONTRACT MANUFACTURING

- \+ More than **30 years** of experience in **grinding medium production / development**
- \+ Own **paid series production**, providing daily experience at the product
- \+ Own **R&D department**
- \+ **Flexible test execution** with corresponding **available equipment**
- \+ Constant **quality control/assurance/recording**
- \+ Certified in accordance for **ISO 9001-2015**
- \+ **Synergy effects** (assembly, construction, software, start-up) through integration into the Pütz Group

- \+ Established in 1988, approximately 90 employees
- \+ Many years of industrial experience
- \+ Central capital base / local flexibility with the greatest degree of freedom and responsibility

Micro + Hega Surfaces GmbH
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HIGH-END-PROCESSING OF EDGES AND SURFACES

QUALITY MADE IN GERMANY
Special machines for your production

Micro + Hega Surfaces operates on a global scale. We develop, design, manufacture and market a range of advanced processes und products for **deburring and surfaces finishing.**

Micro + Hega Surfaces has evolved and redefined the process of **Abrasive Flow Machining.**

AFM systems produce top results for:

- Precision deburring
- Edge contouring
- Polishing

Suitable for:

- Workpieces with complicated areas
- Post-processing of additively manufactured parts
- Extrusion dies (aluminium and plastics)
- Aerospace
- Medical applications
- Automotive
- Hydraulic and pneumatic components
- Chemical and pharmaceutical industry
- Textile applications

HIGH-END-PROCESSING OF EDGES AND SURFACES

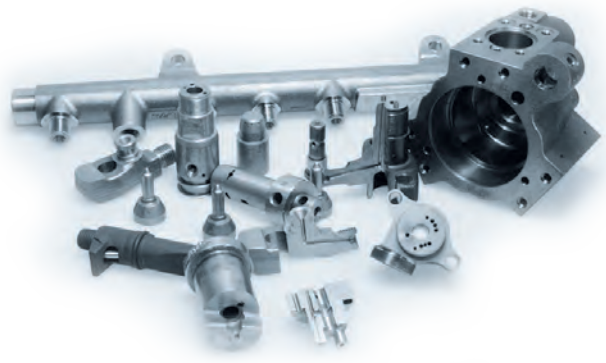
Our services = Your benefit

- Technical advisory service
- Tests and trials
- Process development
- Production
- Training
- Comissioning
- Subcontracting
- Special machine construction
- Customer support and service
- Part cleaning

Our customers come from:

- Space and aviation
- Automotive industries
- Hydraulics and pneumatics
- Precision mechanics
- Food industry
- Tool and mould construction
- Textile industry
- Aluminium industry
- Pharmaceutical industry

We provide individually developed processes and equipment tailor-made specially to suit your requirements.



EVERYTHING FROM A SINGLE SOURCE

Take advantage of the **synergy effects** that result from our integration into the **PÜTZ GROUP**!
In addition to surfaces finishing technologies as well as industrial cleaning technologies, we can also offer you the right testing technology to test surfaces and dimensional accuracy.

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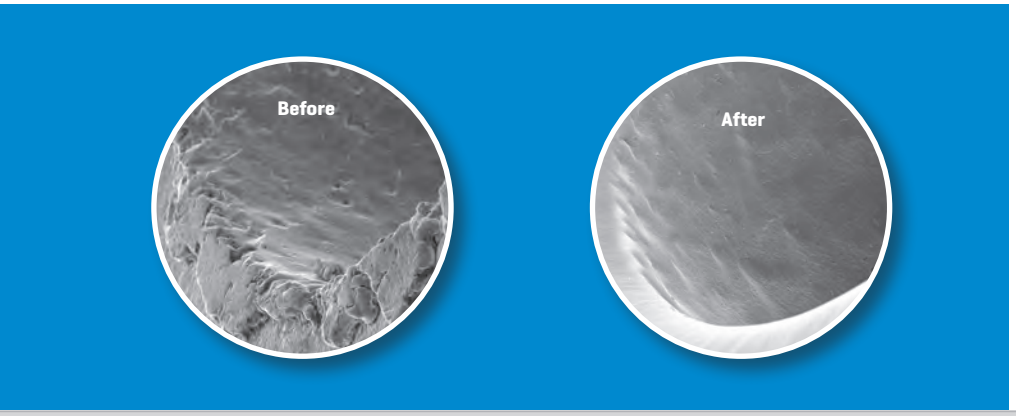
DEBURRING AND POLISHING SERVICES

QUALITY MADE IN GERMANY
Special machines for your production

Where complicated components with internal contours are concerned, highly accurate surface machining and precise edge geometries are decisive for cost-effectiveness and function.

We develop, design, manufacture and market a range of advanced processes and products for deburring and surface finishing.



We can provide the following methods/processes:

- Abrasive Flow Machining (AFM)
- Vibratory finishing
- Edge contouring
- Polishing
- Part cleaning

We provide individually developed processes and equipment tailor-made specially to suit your requirements.

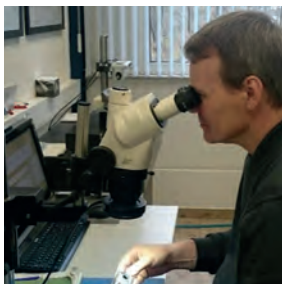
DEBURRING AND POLISHING SERVICES

Our Services = Your benefit

- Test and research laboratory
- Streamer production
- Device construction
- Machine construction
- Latest measurement technology
- Tests and trials

Our customers come from:

- Space and aviation
- Automotive industries
- Hydraulics and pneumatics
- Precision mechanics
- Food industry
- Tool and mould construction
- Textile industry
- Aluminium industry
- Pharmaceutical industry

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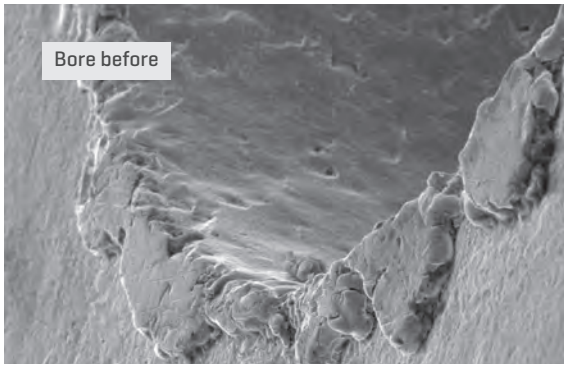
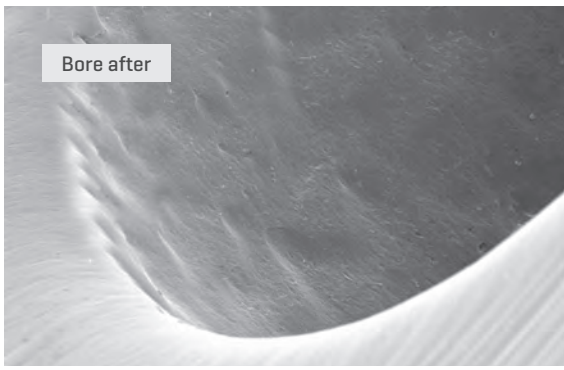
OWN STREAMER PRODUCTION

The decisive tool for the mechanical removal process used in MicroStream abrasive flow machining is the streamer.
Its composition is matched to the customer's processing task on a case-by-case basis. This improves the process significantly, reduces the processing times and delivers the best quality surface finishes.

The streamer is composed of a polymer, the so-called basic medium, and abrasive grits. The abrasive grits, which remove material from the workpiece surfaces, are carried by the basic medium.


Streamer in use


Bore before


Bore after

We will create the most efficient abrasive medium formula for you.

The result = absolute precision!

Precisely matched mixtures are created for different application types.
Depending on the basic medium's specified viscosity, these mixtures differ in terms of the size, type and amount of abrasive grits used.

OWN STREAMER PRODUCTION

Basic medium
The variable viscosities, ranging from very firm to almost liquid, allow for flexible processing tasks:
The processing of bores and internal cross sections measuring approximately 0.2 mm to 300 mm.

Abrasive grits
The basic medium is enriched with abrasive grits.
The most commonly used abrasive grits are silicon carbide, corundum, boron carbide and diamonds.
For optimum results, multi-grit mixtures with different grit sizes are also possible.

Selectable abrasive media sizes:
From coarsely grained F16 mesh (diameter 1,230 µm) to fine F1200 mesh (diameter 3 µm)

Streamer lifecycle
Depending on the application, each medium can be used for over 200 operating hours. Like any other grinding tool, streamers too become blunted and worn down over time.

Processing options:

- Processing of complex internal geometries
- Deburring of hard-to-reach bores as well as crevices, grooves and edges
- Consistently and evenly rounded edges
- Improvement of the surfaces of additively printed components
- Polishing of machined or cast surfacess
- Removal of martensite layers, for example after erodingn

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ABRASIVE FLOW MACHINING OF ADDITIVELY MANUFACTURED COMPONENTS

QUALITY MADE IN GERMANY
Special machines for your production

The surface qualities of additively manufactured components (rapid prototyping or 3-D printing) fail to meet the latest technology standard and are thus only conditionally usable.

Using the Abrasive Flow Machining process you achieve a significant improvement of the surface quality of these elements.
The required grinding medium is called Streamer. It will be individually formulated according to the processed material, the component geometry and the required surface quality.

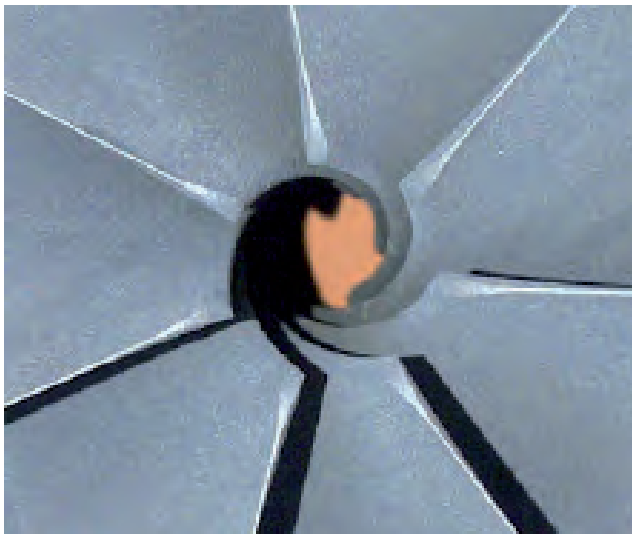
The process is used

- to generate **high quality surface finishes** on interior and exterior contours
- for **targeted precision deburring** of intersections
- for **the defined edge rounding with reproducible work results**

The figure shows an additively manufactured component being successfully processed with AFM.

	Measurements before	Measurements after
Average Ra	5.600 µm	0.560 µm
min. Ra	0.412 µm	0.229 µm
max. Ra	12.027 µm	0.891 µm
Average Rz	27.760 µm	2.650 µm
min. Rz	3.671 µm	1.448 µm
max. Rz	55.259 µm	4.409 µm
Material	Ti6Al4V	
Dimensions	ø 70 x 30 mm	
Process time	90 minutes	

ABRASIVE FLOW MACHINING OF ADDITIVELY MANUFACTURED COMPONENTS



	Measurements before	Measurements after
Average Ra	10 µm	1.200 µm
Average Rz	50 µm	7.300 µm
Material	1.2709	
Dimensions	ø 200 x 300 mm	
Process time	120 minutes	

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PROCESSING OF ADDITIVELY MANUFACTURED COMPONENTS

QUALITY MADE IN GERMANY
Special machines for your production

Additively manufactured components in particular often require final improvements to their surface quality. With the help of abrasive flow machining (AFM), it is possible to process the surfaces of internal channels and complex component geometries specifically and to achieve excellent results.

AFM is always a customised process, which depends on certain component parameters, such as the type, material, geometry or surface quality.

MicroStream
Abrasive Flow Machines
Comfort Line

Abrasive flow machining is particularly suitable for:

- to generate high quality surface finishes on interior and exterior contours
- for targeted precision deburring of intersections
- for the defined edge rounding with reproducible work results

Streamer

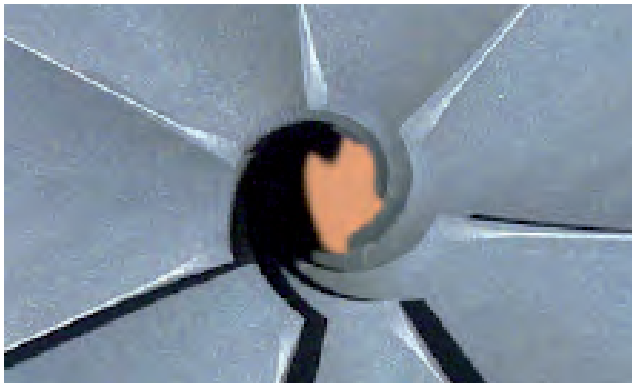
The required abrasive medium is called a streamer. It is individually adjusted to suit the material to be processed, the corresponding component geometry and desired surface quality.

The figure shows an additively manufactured element which could be processed successfully using abrasive flow machining.

PROCESSING OF ADDITIVELY MANUFACTURED COMPONENTS

Example 1:	Measurements before	Measurements after
Average Ra	5.600 µm	0.560 µm
min. Ra	0.412 µm	0.229 µm
max. Ra	12.027 µm	0.891 µm
Average Rz	27.760 µm	2.650 µm
min. Rz	3.671 µm	1.448 µm
max. Rz	55.259 µm	4.409 µm
Material	Ti6Al4V	
Dimensions	ø 70 x 30 mm	
Process time	90 minutes	

Example 2:	Measurements before	Measurements after
Average Ra	10 µm	1.200 µm
Average Rz	50 µm	7.300 µm
Material	1,2709	
Dimensions	ø 200 x 300 mm	
Process time	120 minutes	



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MICROSTREAM
ABRASIVE FLOW MACHINE
COMFORT LINE

QUALITY MADE IN GERMANY
Special machines for your production

The Comfort line of our abrasive flow machining systems is suitable for **single workpieces** as well as **small and medium batches.** Comfort Line is designed in accordance with the current safety and environmental guidelines.

AFM systems produce top results for precision deburring, edge contouring and polishing.

Model 1

Model 2

Characteristics:
Highest precision / Optimum quality / Enormous time saving compared to manual deburring processes / Repeatable results / Independence from geometrical shapes

Comfort Line is also available in a slim, space-saving design.

Equipment:

- Ergonomic terminal with Siemens12" touch screen and TIA control
- 7.5 kW Hydraulic aggregate
- Safety light curtain
- Displacement measuring system
- Media spatula, T-piece, Pipe for light curtain test
- 1x Service pack
- Media pre-warming device
- Streamer Heating-/ Cooling systems Comfort Line (incl. Streamer temperature control)
- Teleservice eWON COSY

Options:

- Manual shuttle table for heavy workpieces
- Service pack:
  - 4x Media piston seals
  - 2x Media piston guide tapes
  - 2x Oil filters
  - 4x O-rings for the spacers
- Air conditioning for control cabinet
- Reducing kit

MICROSTREAM ABRASIVE FLOW MACHINE
COMFORT LINE

Technical details:

Type:		75	100	130	160	200	250
Cylinder size	mm	75	100	130	160	200	250
Piston stroke	inch / mm	12 / 305	12 / 305	12 / 305	12 / 305	12 / 305	12 / 305
Media pressure max.	psi / bar	≤ 1 450 / ≤ 100					
Clamp force per cylinder	lbf / kN	2 135 / 9.5					
Workspace	inch / mm	Model 1: 27.55 x 22.83 / 700 x 580 Model 2: 27.55 x 26.38 / 700 x 670					
Opening width min.	inch / mm	7.5 / 190					
Opening width max. w/o shuttle, w/o cooling	inch / mm	19.3 / 492					
Height	inch / mm	106.3 / 2700					
Width	inch / mm	Model 1: 72.44 / 1 840 Model 2: 44.88 / 1 140					
Depth	inch / mm	Model 1: 71.65 / 1 820 Model 2: 74.40 / 1 890					
Work table height over plateau	inch / mm	39.37 / 1 010					
Weight	lbs / kg	4 410 - 5 500 / 2 000 - 2 500					
Media quantity weight	lbs / kg	~ 4.4-15.4 / ~ 2-7	~ 7.7-19.84 / ~ 4-9	~ 12.8-24.25 / ~ 6-11	~ 19-30.86 / ~ 9-14	~ 23.2-41.89 /~ 14-19	~ 46.5-55.11 /~ 21-25
Voltage		400 V / 50 – 60 Hz					
Pre-fusing max.	A	16					
Power hydraulic engine	kW	7.5					

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MicroStream Abrasive Flow Machining

ADVANTAGES OF COMFORT LINE MACHINES

QUALITY MADE IN GERMANY
Special machines for your production

Integrated Heating-/ Cooling system

- Constant temperatures protect the abrasive medium and thus ensure a constant removal performance and consistent machining quality. In addition, the medium's service life is extended.

Process management

- Process management with user levels secured via the control panel
- User management with different access permissions
  > Elimination of possible application errors

Multifunctional system/ parameter monitoring

- Database for storing machining parameters for different components
- Streamer database
- Automatic, digitally adjustable speed control (function can be stored)
- Digitally adjustable medium pressure (function can be stored)
- Automatic adjustment of the machining/flow speed
  as well as the pressure and temperature of the abrasive medium (streamer)
  > Preset parameters are kept constant
  > Operator-independent, reliable repeatability
  > Consistent quality
- Service monitoring
  > Notifications about upcoming medium changes (freely selectable runtime interval)
  > Maintenance alarms (e.g. pending inspections for cylinders, pistons, wear parts, etc.)

Remote maintenance unit with network connection

- Machines from the Comfort Line series are equipped with a remote maintenance unit. Worldwide rapid response times are thereby ensured in the event of malfunctions.
  > Higher effectiveness in terms of error correction thanks to faster error analysis, when to initiate measures and when determining replacement parts
  > Ideal: simple remote troubleshooting or repair instructions
  > Targeted deployment of service personnel
  Specialists from the development department can be called in
  > Optimised maintenance cycles

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MICROSTREAM ABRASIVE FLOW MACHINE SMART LINE

The Smart Line series of our abrasive flow machines is suitable for surface improvement and coating removal of **single workpieces** as well as **small production lots**.

The modular design using standardised parts ensures **low follow-up costs** for maintenance parts.

Location of the machine can be **freely chosen** as all components are fully integrated.

Extrusion die

Abrasive Flow Machine: Smart Line

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Equipment:

- SPS control and display
- Safety two-hand control
- Adjustment of number of cycles
- Operating hours counter and display of processing time
- Streamer pressure adjustment analog manual
- Basic functions:
  - Clamping Close
  - Clamping Open
  - Automatic / Start
  - Emergency stop
- Hydraulic oil supply
- T-tool, streamer spatula, user manual

Options:

- Media Pre-Warming device
- Service Pack:
  - 4x Media piston seals
  - 2x Media piston guide tapes
  - 2x Oil filters
  - 4x O-rings for the spacers

Your benefit:

- Easy handling
- Own construction of single and multiple fixtures
- Ergonomic design according to DIN 33402
- Improved clamping effect considering minimizing wear of hydraulic parts
- Fast return of investment (ROI)

MICROSTREAM ABRASIVE FLOW MACHINE
SMART LINE

Technical details:

Type:		160	200	250
Cylinder size	inch / mm	6 / 160	8 / 200	10 / 250
Piston stroke	inch / mm	12 / 305	12 / 305	12 / 305
Clamp force per cylinder	lbf / kN	2 135 / 9.5		
Workspace	inch / mm	29.1 x 26.3 / 740 x 670		
Opening width min.	inch / mm	6.3 / 160		
Opening width max.	inch / mm	1.45 / 545		
Height max.	inch / mm	95.3 / 2 420		
Width	inch / mm	44.9 / 1 140		
Depth	inch / mm	47.25 / 1 200		
Work table height	inch / mm	36.8 / 935		
Weight	lbs / kg	3 500 – 4 400 / 1 600 – 2 000		
Media quantity weight	lbs kg	~ 19 – 30.86 ~ 9 – 14	~ 23.2 – 41.89 ~ 14 – 19	~ 46.5 – 55.11 ~ 21 – 25
Voltage	V / Hz	400 V / 50 – 60 Hz		
Max. Pre-fusing	A	16		
Power hydraulic engine	kW	4		

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MICROSTREAM ABRASIVE FLOW MACHINING PERFORMANCE LINE

Abrasive flow systems of the **Performance Line** series are suitable for **series production of large workpieces.**

QUALITY MADE IN GERMANY
Special machines for your production

Characteristics:

- Highest precision
- Optimum quality
- Enormous time saving compared to manual deburring processes
- Repeatable results
- Independence from geometrical shapes

Component of aircraft engine

Abrasive flow system: Performance Line

Equipment:

- Siemens TP1200 touch screen with TIA portSafety light curtain
- High Performance hydraulic oil cooling system
- Streamer Heating-/ cooling systems (GLYCOL) with temperature control (automatic +/- 5°C)
- Streamer Media heating system (Homogenization)
- Streamer Media Reservoir
- Automatic Powered Double Shuttle Table
- Automatic counter pressure
- Teleservice unit (diagnosis, trouble shooting)
- Hydraulic oil supply
- Streamer spatula + T-tool

Options:

- EVO I Software Upgrade - network connection + diagnosis
- EVO II Streamer Media management and reconditioning system
- Heating jackets for lower cylinder
- Air conditioner for control cabinet
- Improved oil cooler
- Service Pack:
  - 3 media cylinders,
  - 3 media pistons,
  - 20 O-rings,
  - 4 oil filters,
  - 1 LED light

MICROSTREAM® ABRASIVE FLOW MACHINING
PERFORMANCE LINE

Technical details:

Type:		300	400	600
Cylinder size	mm	300	400	600
Piston stroke	mm	500	500	500
Media pressure	psi	650	464	348
Clamp force per cylinder	kN		9.5	
Theoretical piston speed per cylinder forward max.	m/sec		1.2	
Height max.	inch		138	
Width	inch		114	
Depth	inch		114	
Diameter max.	inch		47.75	
Opening width min.	inch		8.50	
Opening width max.	inch		34.75	
Work table height over plateau	inch		39.75	
Weight	lbs		13 300 – 17 700	
Media quantity volume	US.liq.gal	44.2	66.4	88.5
Media quantity weight	lbs	664	995	1 330
Voltage			3 Ph. 400 V / 50 – 60 Hz	
max. Pre-fusing	A		32	
Power Hydraulic Motor	kW		7.5 kW	

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ECONOMIC PROCESSING OF EXTRUDER TOOLS IN THE PRODUCTION

QUALITY MADE IN GERMANY
Special machines for your production

Until now, the manual precision work of tool polishing was performed by qualified specialists. These manual and time-consuming works lead to high tool costs.

And lastly and importantly, this manual trade is continuously subject to high quality variations, while reproduction is impossible, particularly for multiple strand profiles.

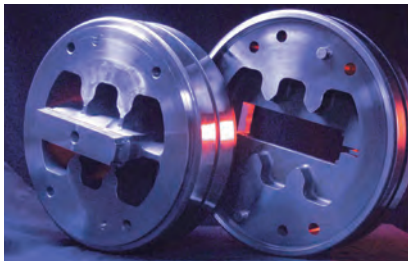
The increasing requirements on the quality of aluminum profiles and demand for economic products of the same and even higher quality force the extrusion business to optimize their procedures and lower their costs.
This requires tools which are resistant to higher loads for a longer service life and a higher surface quality.

We have the solution:
MicroStream
Abrasive Flow Machining

Your benefits:

- **Higher quality** of the end product, the aluminum profile
- **Reproducible results** withsame quality
- **Increased extruding volume**
- **Huge cost reductions** in the whole process
- **Higher service life** of tools
- **Less waste**

ECONOMIC PROCESSING OF EXTRUDER TOOLS IN THE PRODUCTION



An extruding tool is completely processed within **a few minutes**. According to the processing time, surface values of Ra 0.2 µm and Rz 1 µm are obtained.

The MicroStream Abrasive Flow Machining remove gray layers and small fissures and guarantee **identical rough depth values** everywhere.

Subject to the tool dimensions and the selection of the machine size, **matrices with one strand and multiple strands** are processed.

The Abrasive Flow Machining are further optimized by the **flow-dynamic chamfer of the edges.** Hollow-chamber profiles are jointly processed in one workflow. For profiles with different wall thicknesses, the whole area is polished uniformly.

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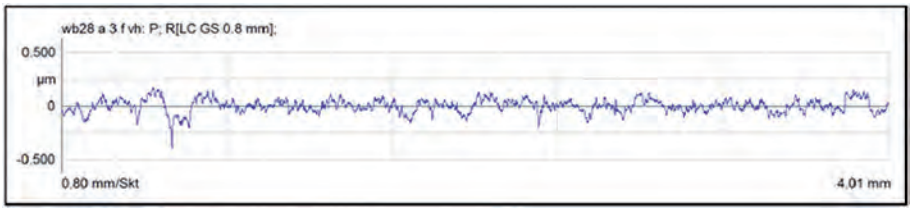
ECONOMIC POLISHING OF PLASTIC EXTRUSION TOOLS

QUALITY MADE IN GERMANY
Special machines for your production

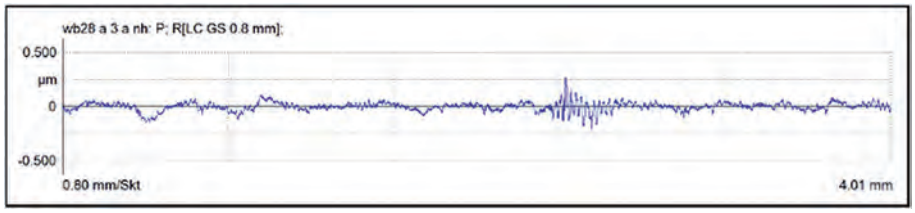
The quality of the surfaces of window, door and other plastic profiles depends strongly on the surface quality of extrusion nozzles, screens and calibrations.
The processing of complex geometrics in high-quality tools while achieving the same accuracy is a huge challenge for the tool design.

We have the solution:
With MicroStream Abrasive Flow Machining (AFM)
we offer a procedure for the best results constantly.

Comparison before-after:



Before:
Rz appr. 1 µm



After:
Rz appr. 0.3 µm

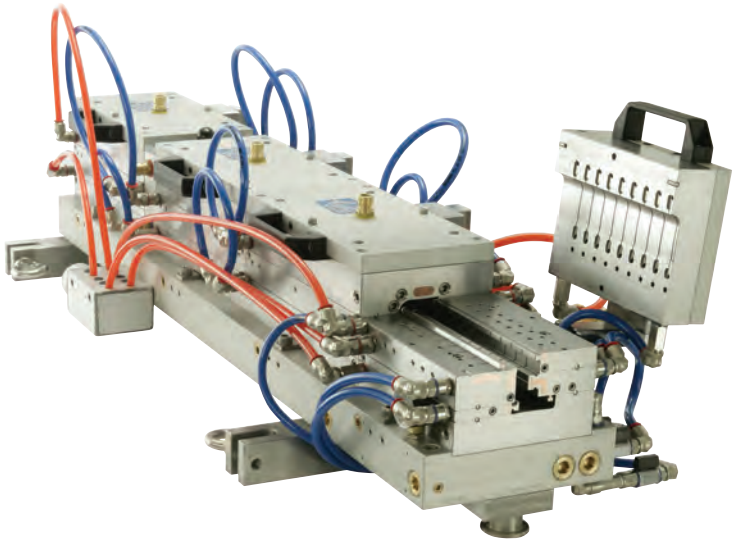
Your benefits:

- **Higher quality** of the end product
- **Huge cost reductions** in the whole process
- **Reproducible results** withsame quality

ECONOMIC POLISHING OF PLASTIC EXTRUSION TOOLS

MicroStream technology, dies are polished in the extrusion direction. This process results in optimal surface roughness values that give the extruded profile a perfect surface.The processing tool is positioned between the lowerand upper medium cylinder.

The grinding medium consists of a plastic polymer and is enriched with an abrasive grit according to the tool geometry and material. This medium – called **Streamer** – is conducted cyclically and alternatively along the tool contour.



EVERYTHING FROM A SINGLE SOURCE

Take advantage of the **synergy effects** that result from our integration into the **PÜTZ GROUP**!
In addition to surfaces finishing technologies as well as industrial cleaning technologies, we can also offer you the right testing technology to test surfaces and dimensional accuracy.

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Questionnaire work pieces

Fax +49 7141 91167-29

This questionnaire will help to clarify technical details / requirements for the treatment of customized work pieces through the Micro Surfaces AFM process from the very beginning.

Please ALWAYS add a technical drawing of your work piece.

Customer:

Company	
Contact person	
Phone	
E-Mail	
Date	

DIE Specification :

Description / Item Code	
Outer-Ø of die	
Height of die	
Weight of die	
Measurements of profile	
Wall thickness of profile	
Surface quality of profile	
Lowest / highest weight of your dies [kg]	
Smallest / largest dimensions [mm]	
Material [Material-No., alloy[s]]	

Work piece specification :

Description / Item Code		
Measurements (mm)		
Material (Material-No., alloy(s))		
Surface quality of the areas to be processed?		
Size of burr?		
Is the shaping of burr constant?	○ Yes	○ No
Information about pre treatments		
Are there sensitive areas which must not be processed / reached by the abrasive paste? If Yes, which ones?		

Your requirements:

You want to improve the surface quality? (Rz, Ra, Rk and so on.) If Yes, what is the target value?		
You want to deburr and / or round the edges?	○ Yes	○ No
You want us to measure the processed areas incl. written report?	○ Yes	○ No
Shall we quote a complete cleaning process additionally?	○ Yes	○ No

Volume:

Which annual quantity has to be considered?	

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MICRO HEGA

SURFACE FINISHING TECHNOLOGIES
INDUSTRIAL CLEANING TECHNOLOGIES

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