

Welcome to our lecture on the topic:

**Experiences with additive components
in surface finishing**

Speaker:

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**Plant manager in the company Perfect Finish GmbH
since 2017; Dipl. Engineer and long time experience
in the food industry**

Subjects

- ▶ **1. Generals about Fa. Perfect Finish GmbH**
- ▶ **2. Field of activities AFM (Abrasive Flow Machining)**
- ▶ **3. Field of activities Vibratory Grinding**
- ▶ **4. Conclusion and outlook**

1. General informations about the company Perfect Finish GmbH

Perfect Finish GmbH is a globally active company in the field of deburring and surface technology.

- ▶ The main areas of activity are:
 - ▶ Perfect Finish GmbH (80% of the total share)
 - ▶ AFM as service provider
 - ▶ Vibratory grinding as service provider
 - ▶ Perfect Finish Services GmbH (20% of the total share)
 - ▶ Manufacturing and sales from machines and systems for surface processing
 - ▶ Manufacturing from AFM Media (grinding paste)
 - ▶ Repair and maintenance

In industries such as:

- ▶ Automotive
- ▶ Textile
- ▶ Shipbuilding
- ▶ Medical technology
- ▶ Aerospace

July 2005: Founding of Perfect Finish GmbH by Ms. Loula-Praks and Mr. Praks, 71686 Remseck a. N.

- ▶ Production on 20m²; 1 system; no other employees

October 2005: Relocation to Max-Eyth-Straße 20, 71686 Remseck a. N.

- ▶ Production on 600m²; 9 systems AFM; 7 Lines vibratory grinding

- ▶ Employees: 15 (until October 2012)

October 2012: Relocation to Max Eyth-Straße 4-6, 71686 Remseck a.N.

- ▶ Production on 2500 m²; 18 systems PFM; 13 Lines vibratory grinding

- ▶ Employees : 30 (until now)



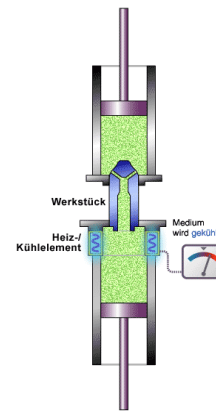
Certifications

- ▶ IATF 16949:2016
- ▶ ISO 9001:2015
- ▶ ISO 13845:2016
- ▶ ISO 14001:2009



2. Field of activities AFM (Abrasive Flow Machining)

- ▶ This process can be used to achieve machining results in geometrically complex shaped components that cannot be achieved using conventional finishing processes such as lapping or honing
- ▶ Mostly thermally processed shapes that are subject to very high quality standards and have internal ridges and contours that are extremely difficult to access are processed using this process.
- ▶ This technology is often used for contours that need to be streamlined or have the highest quality surface roughness ($Ra < 0.2$).
- ▶ This eliminates the need for time-consuming manual polishing and deburring processes



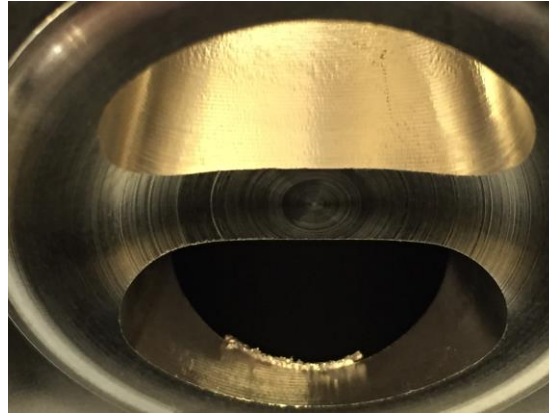
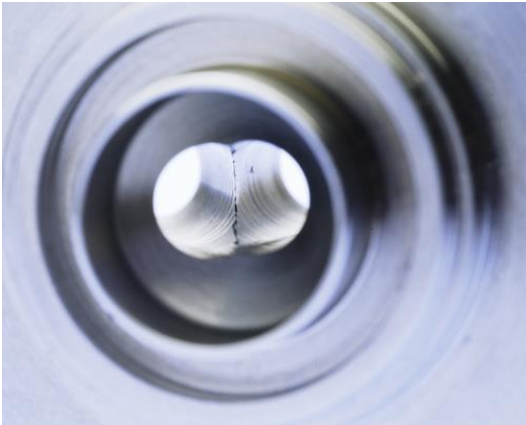
Fixtures

- ▶ The components are fixed using a device
- ▶ This device is adapted to the workpiece and the processing task and manufactured in-house. The device serves to direct the medium to the point of action and to fix the component

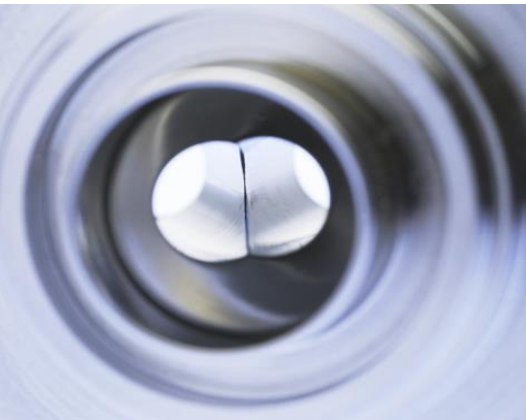


Results after processing (conventional components)

▶ before



▶ after



Results after processing (conventional components)

▶ before

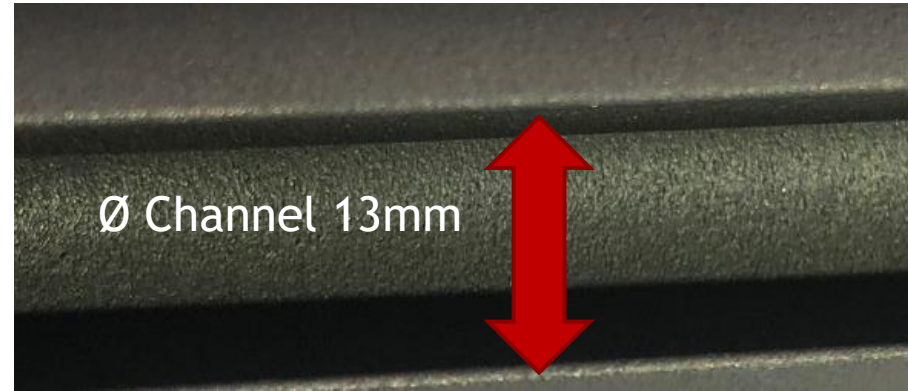
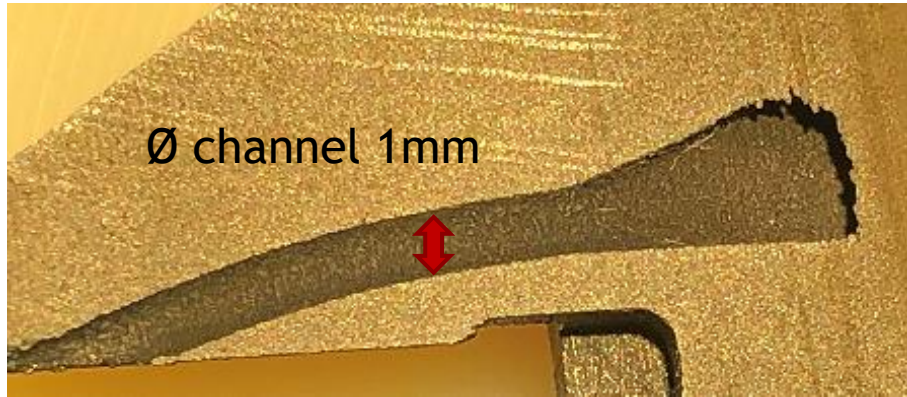


▶ after

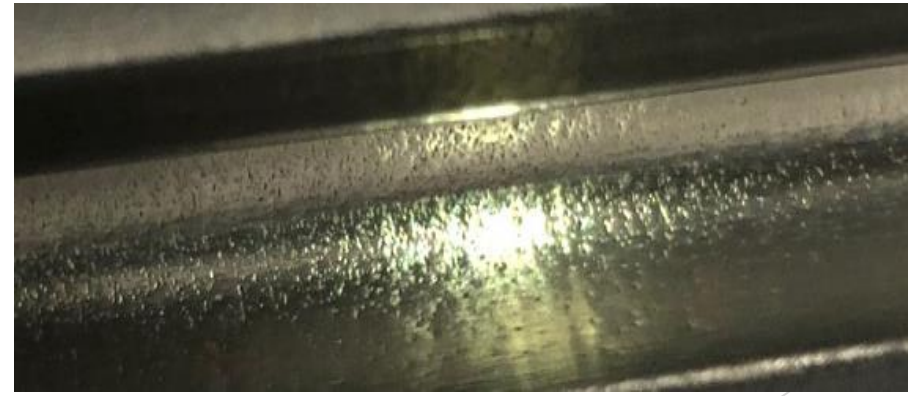
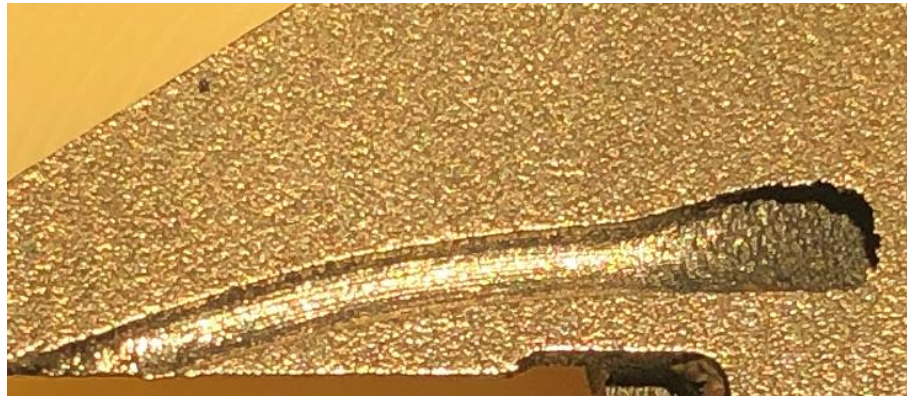


Results after processing (additive components)

▶ before



▶ after



Measurement results after processing (additive components)

Industries	Material	Channel	Rz before	Rz after required	Result
Medical	1.4404 (stainless steel)	13mm	> Rz 60	< Rz 6,3	< Rz 1,6
Food	1.4404	7mm	ca. Rz 45	< Rz 1,6	< Rz 0,8
Automotive	1.4404	1,5-2mm	> Rz 63	< Rz 6,3	< Rz 1
Mechanical Engineering	1.4404	1mm	ca. Rz 50	Rz 1,6	Rz 6,3
Research	1.4404	< 0,8mm	> Rz 60	< Rz 6,3	No significant improvement

Measurement results after processing (additive components)

Industries	Material	Channel	Rz before	Rz after required	Result
Mechanical Engineering	1.2709 (stainless steel)	8mm	> Rz 60	< Rz 6,3	< Rz 1,6
Mechanical Engineering	AIS110Mg	6mm	> Rz 60	< Rz 6,3	< Rz 1
Mechanical Engineering	1.2344 (stainless steel)	4mm	> Rz 50	< Rz 6,3	< Rz 1
Mechanical Engineering	Corrax	2mm	> Rz 60	Rz 1,6	< Rz 1,6
Mechanical Engineering	Inconel718	< 1mm	> Rz 60	< Rz 6,3	No significant improvement

3. Field of activities **Vibratory Grinding**

- ▶ Vibratory grinding is a separating process for surface processing of primarily metallic workpieces. The workpieces to be processed are placed in bulk in a container together with grinding wheels and usually an additive in an aqueous solution (compound). An oscillating or rotating movement of the work container creates a relative movement between the workpiece and the grinding wheel, which causes material to be removed from the workpiece, especially at its edges

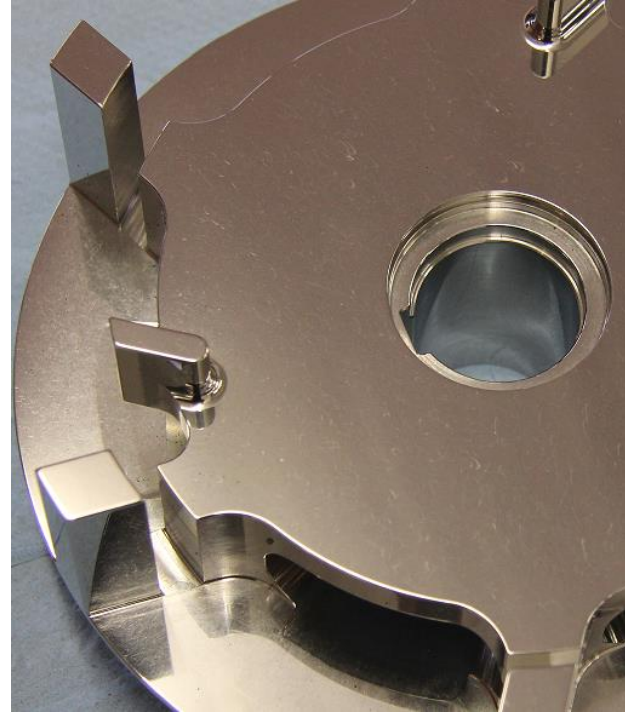
- ▶ Vibratory grinding is suitable for:

Grinding, deburring, rounding edges, smoothing, high-gloss polishing, ball polishing, cleaning, pickling and derusting.

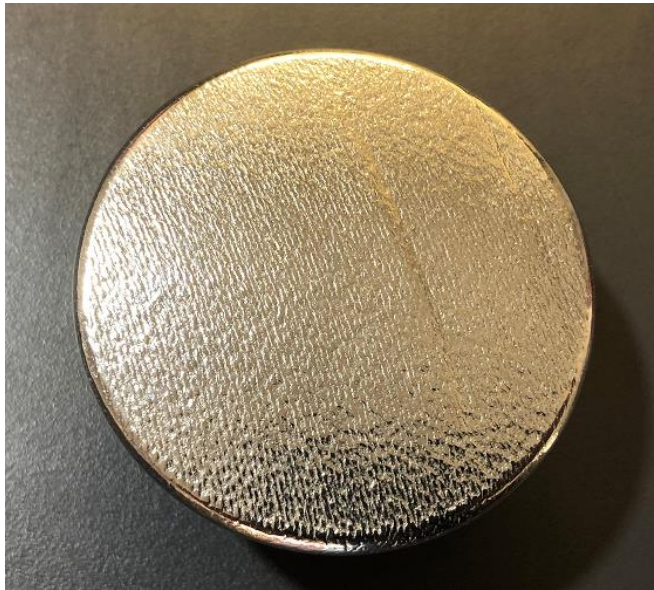
- ▶ We process materials such as:

Steel, stainless steel, cast, titanium, aluminum, copper, brass and plastic

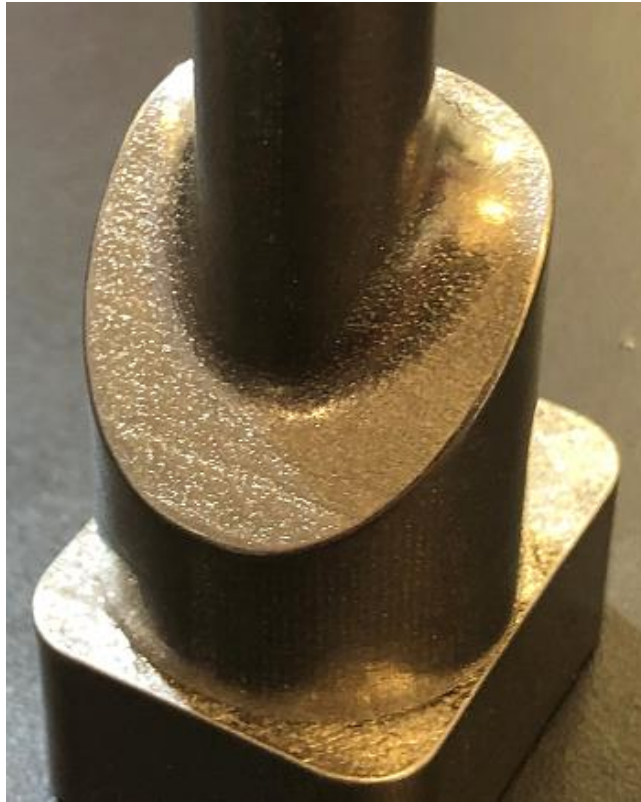
Results after processing (conventional components)



Results after processing (additive components)



Results after processing (additive components)



Measurement results after processing (additive components)

Industries	Material	Parts	Rz before	Rz after required	Result
Modelling	1.4404 (stainless steel)	Railway wheels	> Rz 50	< Rz 6,3	< Rz 6,3
Medical	Plastic	Dentures	ca. Rz 20	< Rz 1,6	< Rz 0,8
Sanitary	1.4404	Armatures	> Rz 63	< Rz 6,3	< Rz 1
Food	1.4404	Spray nozzels	ca. Rz 30	Rz 1,6	< Rz 1
Research	1.4404	Benchmark study	> Rz 60	< Rz 6,3	< Rz 1

4. Outlook and conclusion

- ▶ Demand for processing additive components has doubled in the last 2 years
- ▶ The geometries are becoming more complex and boreholes are becoming smaller and smaller
- ▶ Feasibility is currently limited to an inner diameter of $> 0.5\text{mm}$
- ▶ Further development of grinding wheel geometries and grinding media that better cover such border areas (external and internal geometries).

Thank you for your attention!

