

REPORT: Bulk Metallic Glass cutting by Laser-MicroJet®

For Anonymouse

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TASK

The Laser-MicroJet® technology has been tested for cutting 900µm thick Bulk Metallic Glass Parts. The main target was to determine the feasibility of the process in order to give an overview of the technology.



Picture 1: Drawing used for the test (note that the outer contour has not been processed)

Release of application report			
Project Leader		Responsible Application Group	
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Date:	30.03.2015	Date:	30.03.2015
Visum:	SDE	Visum:	BC

SAMPLE DESCRIPTION AND PREPARATION

The samples were fixed with 2 clamps

SAMPLE	Material	AnonymousAlloy LM105
	Thickness	900 μm
	Quantity	1 pcs

PROCESS: INSTRUMENT & TEST PARAMETERS

For these experiments, the LCS300 equipped with a frequency-doubled Q-switched Nd-YAG laser has been used as the machine configuration in our lab.

In the table below, the machine configuration is summarized:


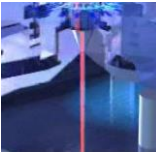

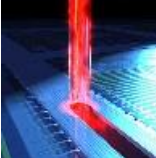
	SYSTEM	Machine type	LCS300
		Helium flow (MFC)	0.9 L/min
		Working distance	10 mm
		Laser fiber	150 μm
		Collimator	250 mm
		Transmission	~55 %
	MICROJET[®] PARAMETER	Nozzle diameter	40 μm
		MicroJet [®] diameter	~32 μm
		Water pressure	350 bar
		Assist gas	He
	LASER PARAMETER	Laser type	L101G
		Wavelength	532 nm
		Pulse frequency	26 kHz
		Average power (in jet)	12 (~7) W
		Pulse width	~140 ns
		Cutting speed	3 mm/s
	CUTTING PARAMETER	Number of passes	80
		Process time	~4 h
		Fixation	Clamps

Table 1: Machine configuration summary

RESULTS

The following microscope pictures give an overview on the quality obtained with the Laser-Microjet[®] technology.



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APPLICATION REPORT

Report No: 153-10

Sample No: 2.2.1600

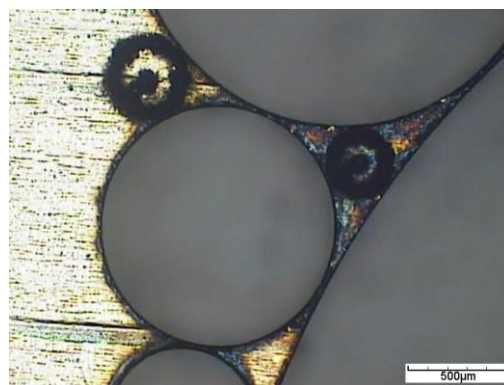
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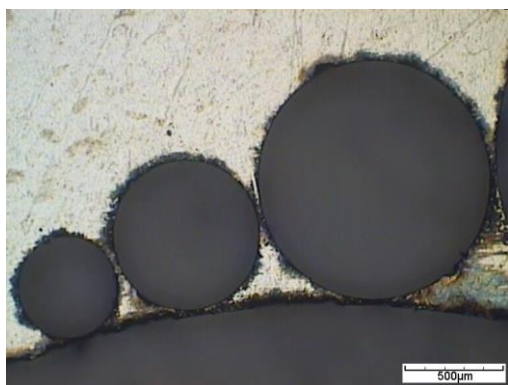
Picture 2: digital camera image of the samples



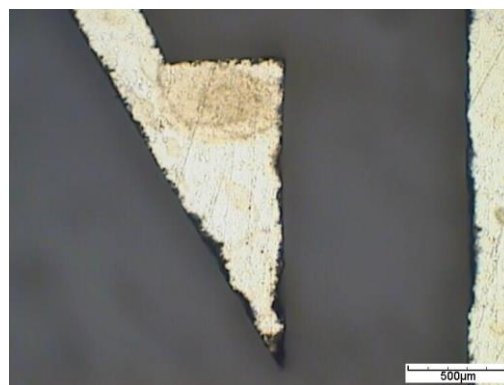
Picture 3: Microscope image of the frontside



Picture 4: Microscope image of the frontside



Picture 5: Microscope image of the backside



Picture 6: Microscope image of the backside

CONCLUSION

The cutting of Anonymous was investigated on SYNOVA LCS300. This machine is based on the MicroJet® technology and combines the advantages of the high energy pulsed laser with a hair-thin water jet. While the laser is used for material ablation, the water jet is used for guiding the laser light, cooling the edges and allowing an excellent accuracy, advantages that are essential for cutting Anonymous with high quality.

This first test shows that:

- It is possible to cut such material with a good quality. However some more developments are required to fine tune the results, in terms of quality and time.
- Further tests are necessary to optimize the drilling of the small holes.

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- Improvement of the overall cutting speed is also feasible by increasing the average power of the laser but the cutting quality may suffer.

We thank you for your interest in our technology and we hope our results meet your requirements. We will contact you soon to obtain a feedback about the analysis of these results and to discuss with you the further steps.