REPORT: Rubber cutting by Laser-MicroJet®

For Anonymous

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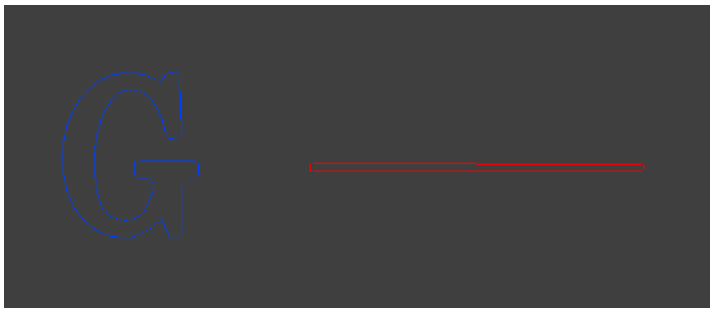
TASK

The Laser-MicroJet® technology has been tested for cutting various types of rubber samples. The main goal was to determine the feasibility of the process in order to give an overview of the technology.
The two following designs were used for the tests:



Picture 1: Designs used for the test

Release of application report			
	Project Leader		Responsible Application Group
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Date:	30.03.2015	Date:	30.03.2015
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SAMPLE DESCRIPTION AND PREPARATION

The samples were fixed with 2 clamps.

SAMPLE 1: EP-090117	Material	Rubber NBR Nitrile
	Thickness	1600 *µm*
	Quantity	1 *pcs*
SAMPLE 2: EP-110154	Material	Rubber FKM vulcarboné
	Thickness	1300 *µm*
	Quantity	1 *pcs*
SAMPLE 3: EP-100116	Material	Rubber FKM vulcarboné
	Thickness	~1500 *µm*
	Quantity	1 *pcs*
SAMPLE 4: EP-130051	Material	Rubber FKM vulcarboné
	Thickness	1300 *µm*
	Quantity	1 *pcs*

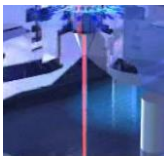
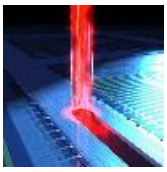
	**SYSTEM**	Machine type	LCS 300
		Helium flow (MFC)	0.9 *L/min*
		Working distance	12 *mm*
		Laser fiber	150 *µm*
		Collimator	250 *mm*
		Transmission	~55 *%*
	**MICROJET® PARAMETER**	Nozzle diameter	40 *µm*
		MicroJet® diameter	32 *µm*
		Water pressure	250 *bar*
		Assist gas	He
	**LASER PARAMETER**	Laser type	L101G
		Wavelength	532 *nm*
		Pulse frequency	30 *kHz*
		Power in jet	7 *W*
		Pulse width	<200 *ns*
	**CUTTING PARAMETER**	Cutting speed	3 (sample 1, 2, 4) *mm/s* 4 (sample 3)
		Number of passes	2 (sample 2 and 3) 3 (sample 1 and 4)
		Process time	Sample1: ~10 *min* Sample2: ~14 Sample3: ~ 7 Sample4: ~10
		Fixation	Clamps

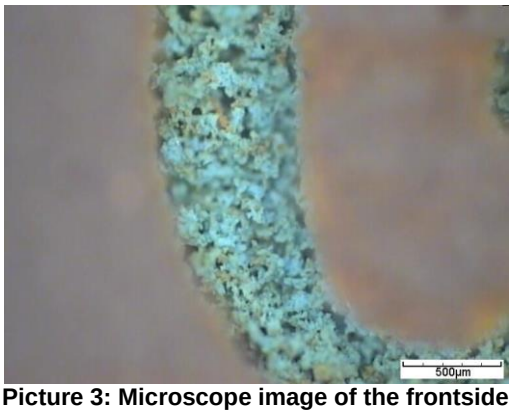
Table1: Machine configuration summary

RESULTS

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

1. Sample 1

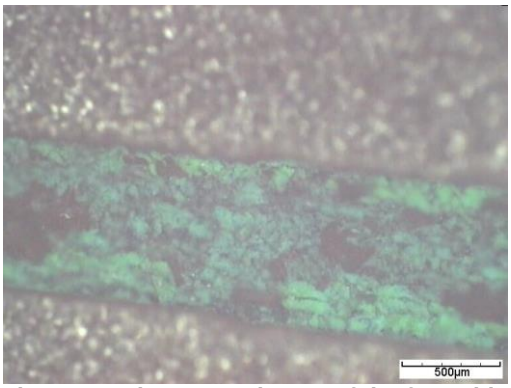
Picture 2: digital camera image of the samples



Picture 3: Microscope image of the frontside

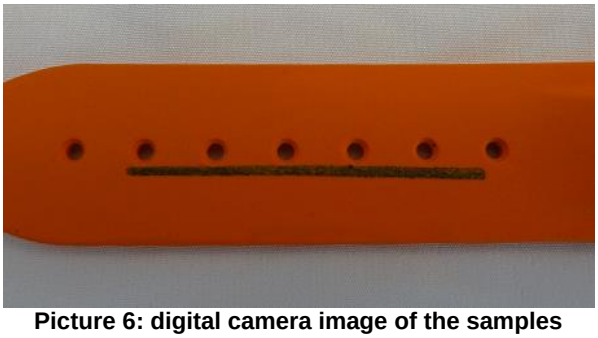
2. Sample 2

Picture 4: digital camera image of the samples

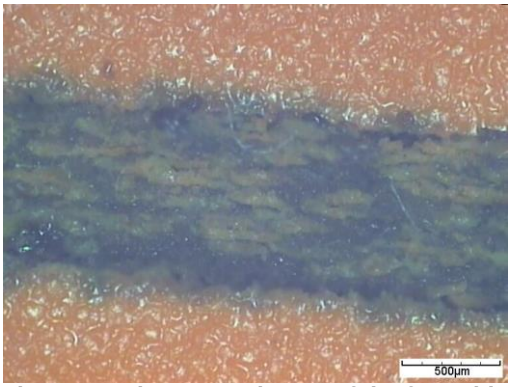


Picture 5: Microscope image of the frontside

3. Sample 3



Picture 6: digital camera image of the samples



Picture 7: Microscope image of the frontside

4. Sample 4

Picture 8: digital camera image of the samples

Picture 9: Microscope image of the frontside

Picture 10: Microscope image of the frontside

CONCLUSION

The grooving of Rubber 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.

Primary tests show that it is possible to groove such material. However the bottom of the groove is irregular and slightly burned.

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.