

REPORT: Aluminium cutting by Laser-MicroJet®

For Anonymous

By Mr. Stephane Delahaye, Synova SA

1. TASK

The Laser-MicroJet® technology has been tested for drilling small holes (~200 µm) in an aluminium sample. The goal was to give a first overview of the technology.

2. TASK DESCRIPTION

SAMPLE	Material	Aluminium
	Thickness	500 µm
	Quantity	3 pcs

Release of application report			
Project Leader		Director of Applications Engineering	
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Date:	06.07.2015	Date:	06.07.2015
Visum:	SDE	Visum:	




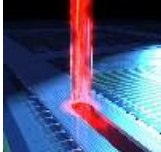
3. PROCESS: INSTRUMENT & TEST PARAMETERS

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. It is a manually loaded machine, allowing cutting and drilling any kind of materials.

Major advantages of the Laser MicroJet® technology with regards to your application are:

- Advantageous process rates
- Cutting of arbitrary shapes
- Low heat damage to the material

In the table below, the optimised processing parameters used in the experiments are summarised:

	SYSTEM	Machine type	LCS300
	MICROJET PARAMETERS	Nozzle diameter	30 μm
		MicroJet diameter	~24 μm
		Water pressure	450 <i>bar</i>
		Assist gas	He (0.9 <i>L/min</i>)
	LASER PARAMETERS	Laser type	L101G
		Wavelength	532 <i>nm</i>
		Frequency	6 <i>kHz</i>
		Pulse width	~140 <i>ns</i>
		Power	10 <i>W</i>
		Power in jet	~4.5 <i>W</i>
	CUTTING PARAMETERS	Motion speed	4 <i>mm/s</i>
		Pass numbers	70
		Overall speed	3.4 <i>mm/min</i>
		Time of process	~7min

4. RESULTS

The following pictures give an overview on the quality obtained with the Laser MicroJet technology.



SYNOVA

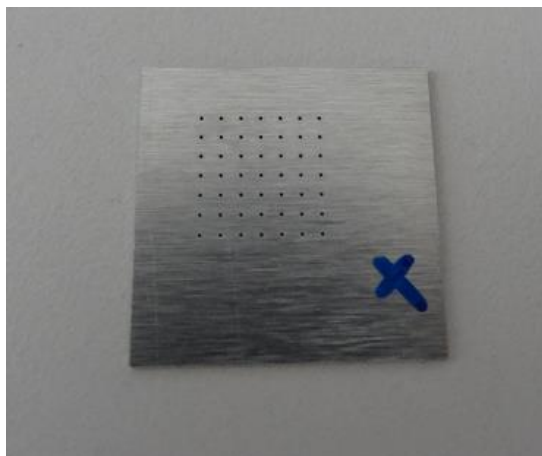
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APPLICATION REPORT

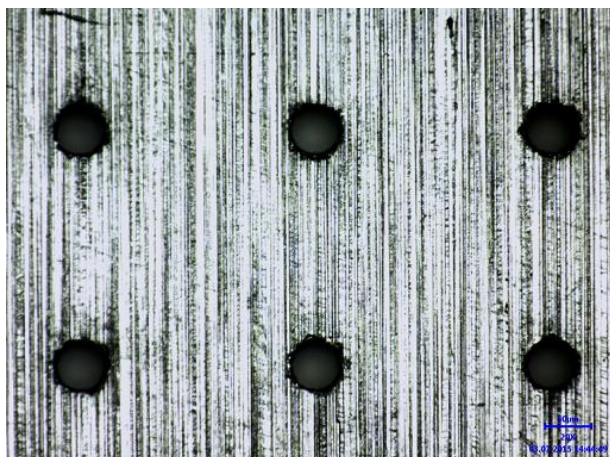
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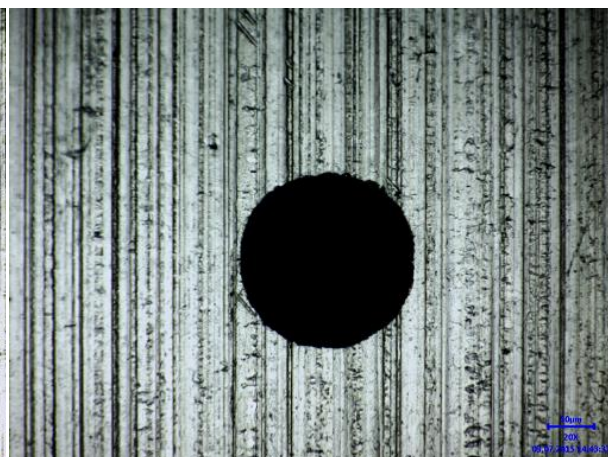
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PICTURE 1: Macroscopic view of the sample (frontside)



PICTURE 2: Microscope image of the frontside
(dark field illumination)



PICTURE 3: Microscope image of the backside
(dark field illumination)

5. CONCLUSION

The cutting of aluminium material has been performed with a SYNOVA LCS 300. 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 preventing the sample from particle contamination, advantages that are essential for cutting with a high quality.

These tests show that:

- The quality of the cut is very good with limited heat affected zone
- Drilling holes of ~200 µm is feasible

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