

 SYNOVA Ch. Dent-d'Oche CH-1024 Ecublens Switzerland www.synova.ch	<h2>APPLICATION REPORT</h2>	Report No: 121-13
		Sample No: 2.2.1045
		CONFIDENTIAL

REPORT: Durnico functional watch part cutting by Laser-MicroJet®

for Anonymous

by Mr Stephane Delahaye; Synova SA

TASK

The Laser-MicroJet® technology has been tested for cutting of 1 functional part of watch: “un sautoir de tirette Unitas 6498” (see drawing below).

SAMPLE DESCRIPTION AND PREPARATION

SAMPLE	Material	Durnico stripes
	Dimension	~10 cm
	Thickness	410 µm
	Quantity	10 pcs



Sautoir de tirette Unitas 6498

Release of application report			
Project Leader		Responsible Application Group	
Name:	Stéphane Delahaye	Name:	D' Benjamin Carron
Date:	06.02.2012	Date:	06.02.2012
Visum:		Visum:	

- Formatted: French (Switzerland)
- Field Code Changed
- Formatted: French (Switzerland)
- Field Code Changed
- Formatted: French (Switzerland)

 <div>SYNOVA Ch. Dent-d'Oche CH-1024 Ecublens Switzerland www.synova.ch</div>	APPLICATION REPORT	Report No: 121-13
		Sample No: 2.2.1045
		CONFIDENTIAL


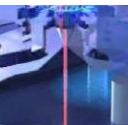

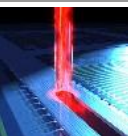
PROCESS: INSTRUMENT & TEST PARAMETERS

For these experiments, the LCS 300 equipped with a frequency-double Q-switched Nd:YAG laser has been used as the machine configuration in our lab.

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

- Cutting of arbitrary shapes
- Negligible heat damage to the material
- Negligible slag/burr formation
- Limited chipping
- Very good wall surface quality

In the table below, the optimized processing parameters used in the experiments are summarized:

	SYSTEM	Machine type	LCS 300
	MICROJET® PARAMETER	Nozzle diameter	30 μm
		MicroJet® diameter	25 μm
		Water pressure	450 <i>bar</i>
		Assist gas	He
	LASER PARAMETER	Laser type	L101G
		Wavelength	532 <i>nm</i>
		Pulse frequency	10 <i>kHz</i>
		Average power	~19.5 <i>W</i>
	CUTTING PARAMETER	Cutting speed	0.7 <i>mm/s</i>
		Number of passes	1
		Process time	2.3 <i>min</i>
		handling	Clamps

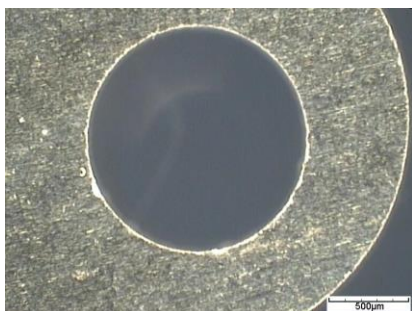
 SYNOVA Ch. Dent-d'Oche CH-1024 Ecublens Switzerland www.synova.ch	<h1>APPLICATION REPORT</h1>	Report No: 121-13 Sample No: 2.2.1045
		CONFIDENTIAL

RESULTS

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



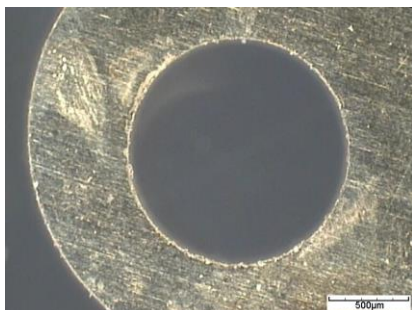
PICTURE 1: General view of the piece



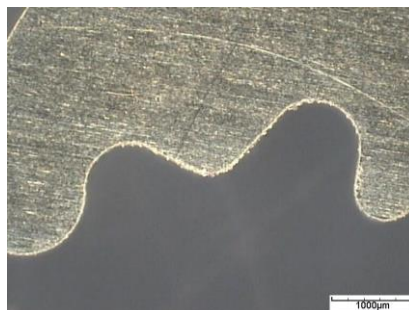
PICTURE 2: Microscope image of the piece (dark field illumination; front side)



PICTURE 3: Microscope image of the piece (dark field illumination; front side)



PICTURE 4: Microscope image of the piece (dark field illumination; back side)



PICTURE 5: Microscope image of the piece (dark field illumination; back side)

 SYNOVA Ch. Dent-d'Oche CH-1024 Ecublens Switzerland www.synova.ch	APPLICATION REPORT	Report No: 121-13
		Sample No: 2.2.1045
		CONFIDENTIAL

	What are your priorities? (please put a cross)	Quantified expectations or improvements
Burr-free:	X	No burrs observed
Heat-damage free:	X	No heat-damage observed
Chipping/Cracks:	X	Limited
Edge Roughness:	X	Good

The cutting quality for Durnico is good on both sides.

CONCLUSION

The cutting of Durnico samples was investigated on 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 Durnico with high quality.

These tests show that:

- It is possible to cut Durnico with various and complex shape.
- There is a good repeatability of the process for this material.
- The quality is good on both sides.

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