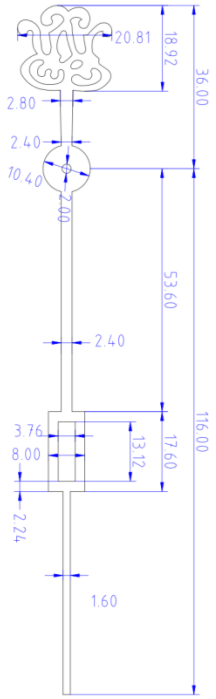
# REPORT: Watch hands made of Brass cutting by laser MicroJet®

*for* Anonymous

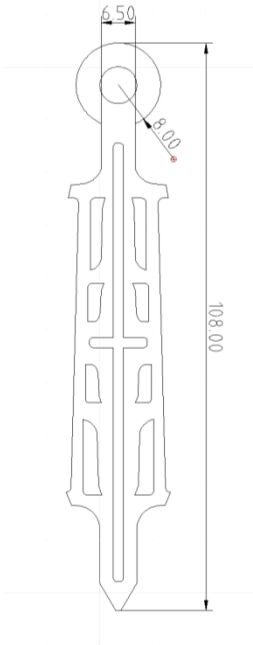
*by* Florent Bruckert, Synova SA

**OBJECTIVE**

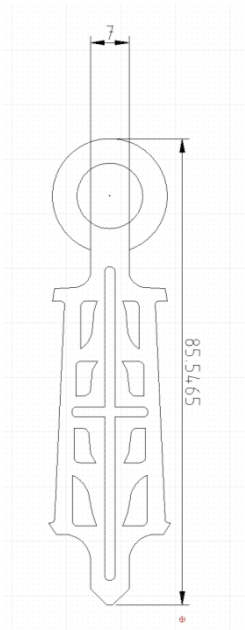
The Laser-MicroJet® technology has been tested for cutting 3 different watch hands in 0.15 mm and 0.19 mm brass strips. The aim was to estimate the process repeatability.




**PICTURE 1:** Drawing A: #DS01252




**PICTURE 2:** Drawing B: #BC2288-1



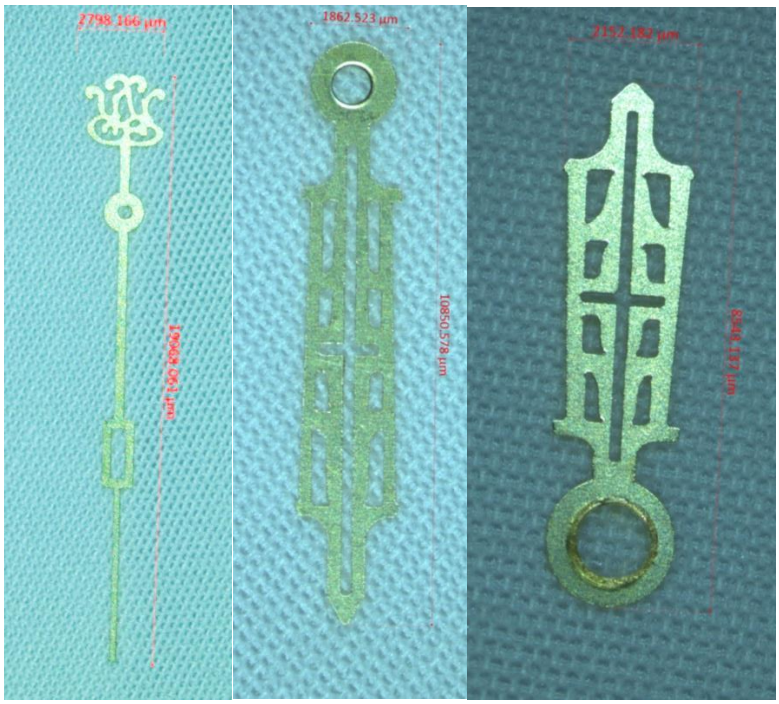

**PICTURE 3:** Drawing C: #BC2288-2

Scale for Picture 1 to Picture 3: 10:1

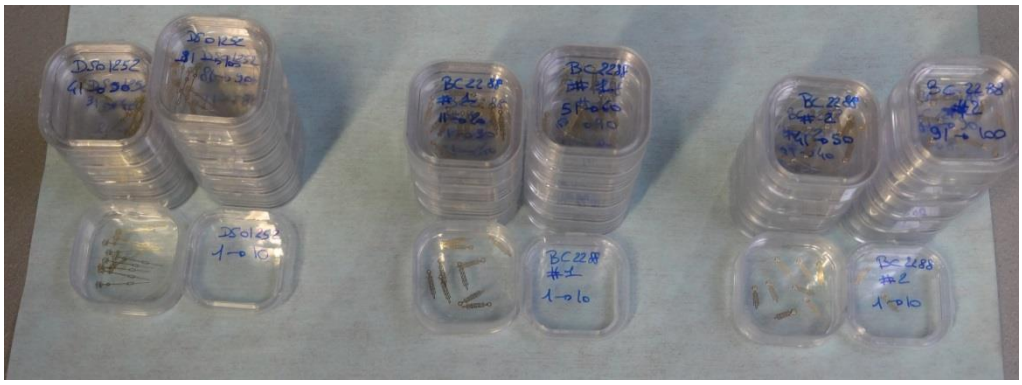
| Release of application report | | | |
|---|---|---|---|
| Project Leader | | Responsible Application Group | |
| Name: | Florent Bruckert | Name: | Benjamin Carron |
| Date: | 11.01.2016 | Date: | 11.01.2016 |
| Visum: | FBR | Visum: | BC |

## SAMPLE DESCRIPTION

| SAMPLE | Drawing | Drawing A #DS01252 | Drawing B #BC2288-1 | Drawing C #BC2288-2 |
|---|---|---|---|---|
| | Material | Brass | | |
| | Thickness (mm) | 0.15 | 0.19 | 0.19 |
| | Quantity (strip) | 1 | 1 | 1 |



**PICTURE 4:** Macroscopic views of the 3 shapes after processing, Drawing A at the left, Drawing B at the center and Drawing C at the right



**PICTURE 5:** Overview of the production: 3 X 100 pces for each design.

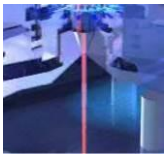


**PICTURE 5:** Overview of the two sample shapes

**PROCESS: INSTRUMENT & TEST PARAMETERS**

For these experiments, the LCS300, Nd:YAG laser, has been selected as the most suitable machine configuration available in the lab.

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

| | | | |
|---|---|---|---|
|  | **SYSTEM** | Machine | LCS300 |
| | | Fixing type | Clamped |
|  | **PARAMETERS FOR MICROJET®** | Nozzle diameter | 50 *µm* |
| | | Protect gas | He |
| | | Rate of flow | 0.9 *L/min* |
| | | Waterjet pressure | 350 *bar* |
| | | Working distance | 10 *mm* |
|  | **LASER PARAMETERS** | Laser type | L51G |
| | | Wavelength | 532 *nm* |
| | **Laser Setting 1** | Laser frequency | 12 *kHz* |
| | | Pulse width | 130 *ns* |
| | | Power in water Jet | 11.3 *W* |
| | **Laser Setting 2** | Laser frequency | 12 *kHz* |
| | | Pulse width | 130 *ns* |
| | | Power in water Jet | 16.1 *W* |

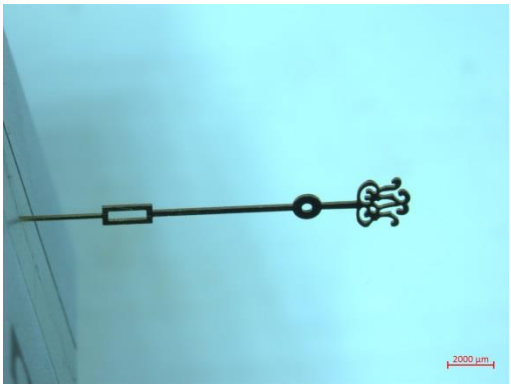
The following table lists the cutting parameters used for the production:

| Drawing number | A | B | C |
|---|---|---|---|
| | DS01252 | BC2288-1 | BC2288-2 |
| Laser setting: internal contours | 1 | | |
| # passes: internal contours | 6 | | |
| Cutting speed: internal contours [mm/s ] | 5 | | |
| Laser setting: external contour | 2 | | |
| # passes: external contour | 2 | | |
| Cutting speed: external contour [mm/s ] | 5 | | |
| Cutting time (machine)/pce | 43 s | 1 min 04s | 56 s |
| Cutting time (without inherent load-unload running time)/pce | 36 s | 55 s | 49 s |

**TABLE 1**: Process parameters

**RESULTS**

The following pictures show an overview of the cutting quality obtained with the LaserMicroJet®:

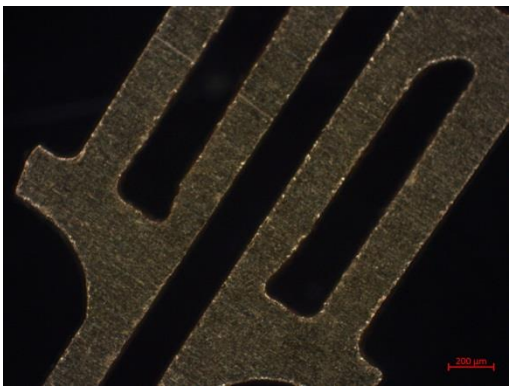


**PICTURE 6:** Macroscopic image of one of the part DS01252

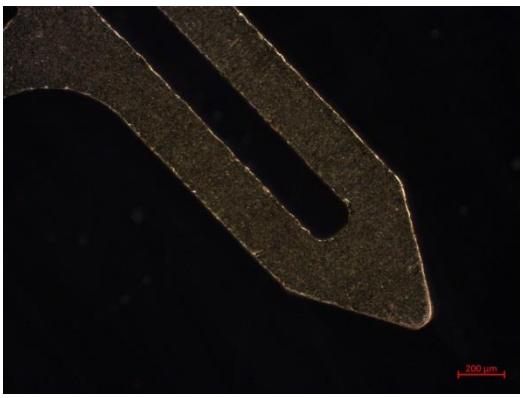
**PICTURE 7:** Microscope image of one of the part DS01252 (frontside)

**PICTURE 8:** Microscope image of one of the part DS01252 (frontside)

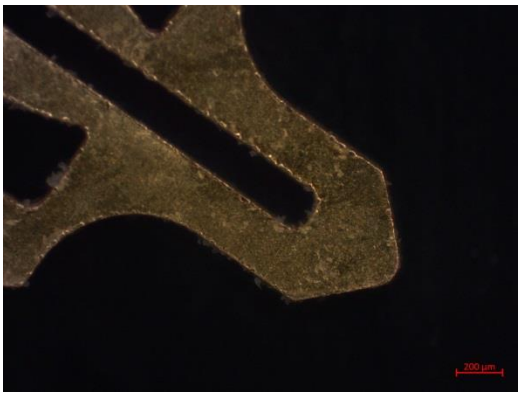
**PICTURE 9:** Microscope image of one of the part DS01252 (backside)



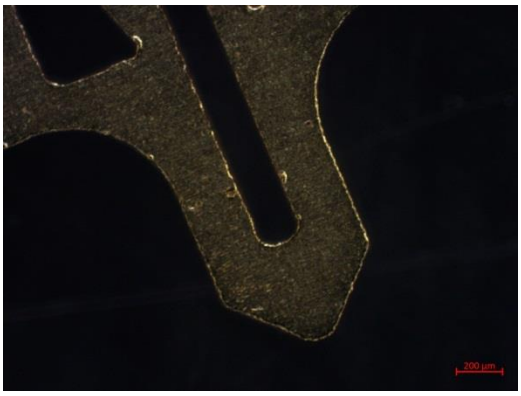
**PICTURE 10:** Microscope image of one of the part DSC2288-1 (frontside)



**PICTURE 11:** Microscope image of one of the part DSC2288-1 (backside)



**PICTURE 12:** Microscope image of one of the part DSC2288-2 (frontside)



**PICTURE 13:** Microscope image of one of the part DSC2288-2 (backside)

## CONCLUSION

Three different watch hands made of brass were investigated on SYNOVA LCS 300.
This machine is based on the MicroJet® technology and combines the advantages of a high energy pulsed fiber 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 particle contamination, advantages that are essential for metals cutting with high quality.

The tests show that:

- These 3 watch-hand shapes made of brass can be cut less than 55 seconds.
- The DS01252 cutting time lasts 36 s.
- The DC2288-1 cutting time lasts 55 s.
- The DC2288-2 cutting time lasts 49 s.

We are open to further discuss your needs regarding:

- The use of a specific bridge can lead to a general better cutting quality and process time.
- Further tests are needed to reach a better quality according to your needs.

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.