CVS system:

CVS system is a coaxial video image solution to help users in high precision marking, engraving, cutting and part inspection. The system acquires images of the whole laser working field through the optical path of the laser, with high accuracy and resolution.

User interface is completely integrated into Prisma, it shows a detailed preview image of the real object, before and after marking, for inspection and control.

User, through Prisma software, can process the file directly on the preview image of the part. File can be placed, edited, re-adjusted directly on the piece through the software. CVS will take care of marking according to user settings and preview image.

Beside accuracy and future development of the system (automatic detection of position and orientation, data matrix reading, OCR, part measurement …), the visual approach to marking applications discloses new opportunities in the laser manufacturing, like the possibility of part reworking or post-processing even after they have been removed from the working area.

Working area illumination

To capture an image as accurate and full of information as possible and to work on the full F-theta marking field, it is necessary to use the proper illumination, provided with CVS.

The system has been developed and designed to work properly in all external light condition, by this it is not sensitive to environment lightening changes.

Vision Accuracy and reconstruction:

With the acquisition of multiple images of the area (single acquisition image is 10x10mm) user can extend the high definition camera feature to the whole working field, achieving a resolution of 130Mpx on a 100x100mm working field.

The final image of the acquired area is a mosaic of the single acquisitions, rebuild and processed by CVS which, if properly calibrated, corrects all optical distorsion and aberrations of the optical elements.
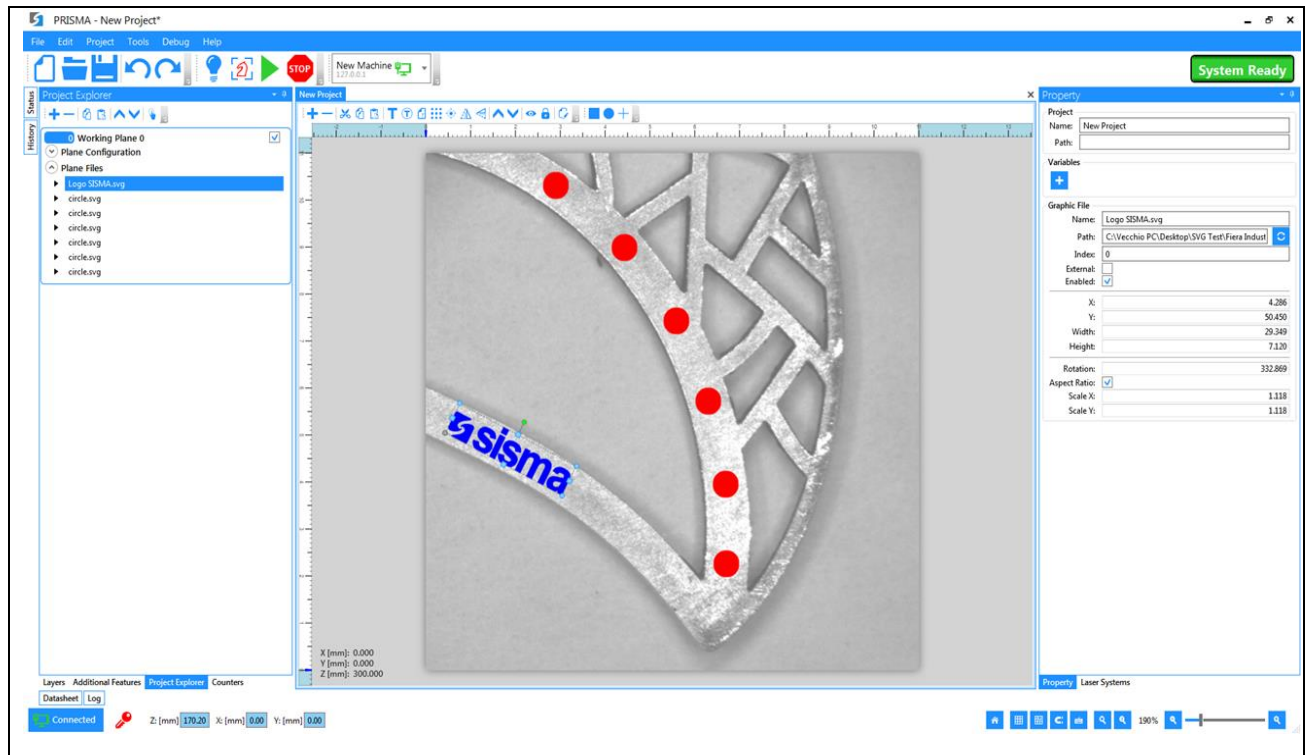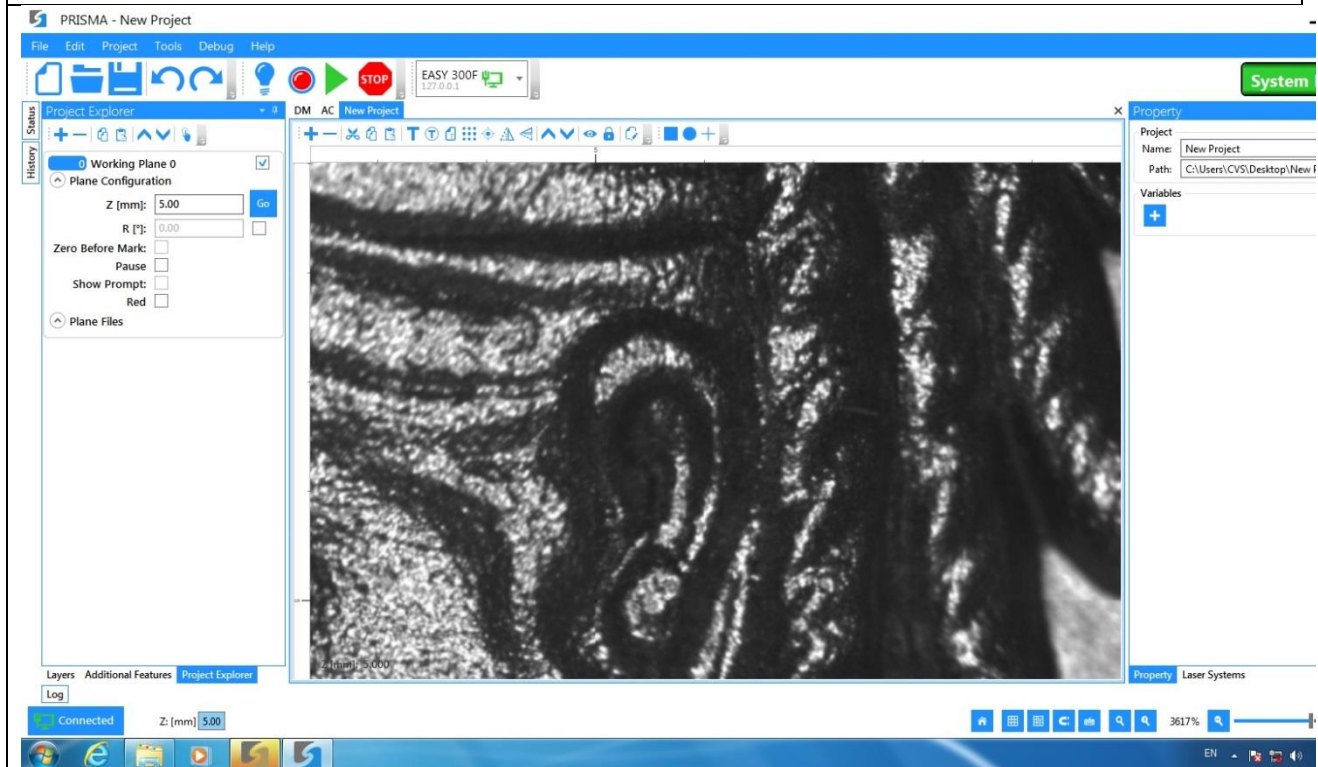
Image recontruction of a 30mm diam. mould

Zoom into acquired image

Visual "drag&drop" marking:

User can pick-up any file he wants, stretch, rotate and adjust it to desired dimensions and then place it directly on the image. CVS will take care of marking the file, according to user grey setting, exactly in the position chosen.

**Adding a file to the working session (image already acquired)**

**Zoom into the image, file adjusting and marking**
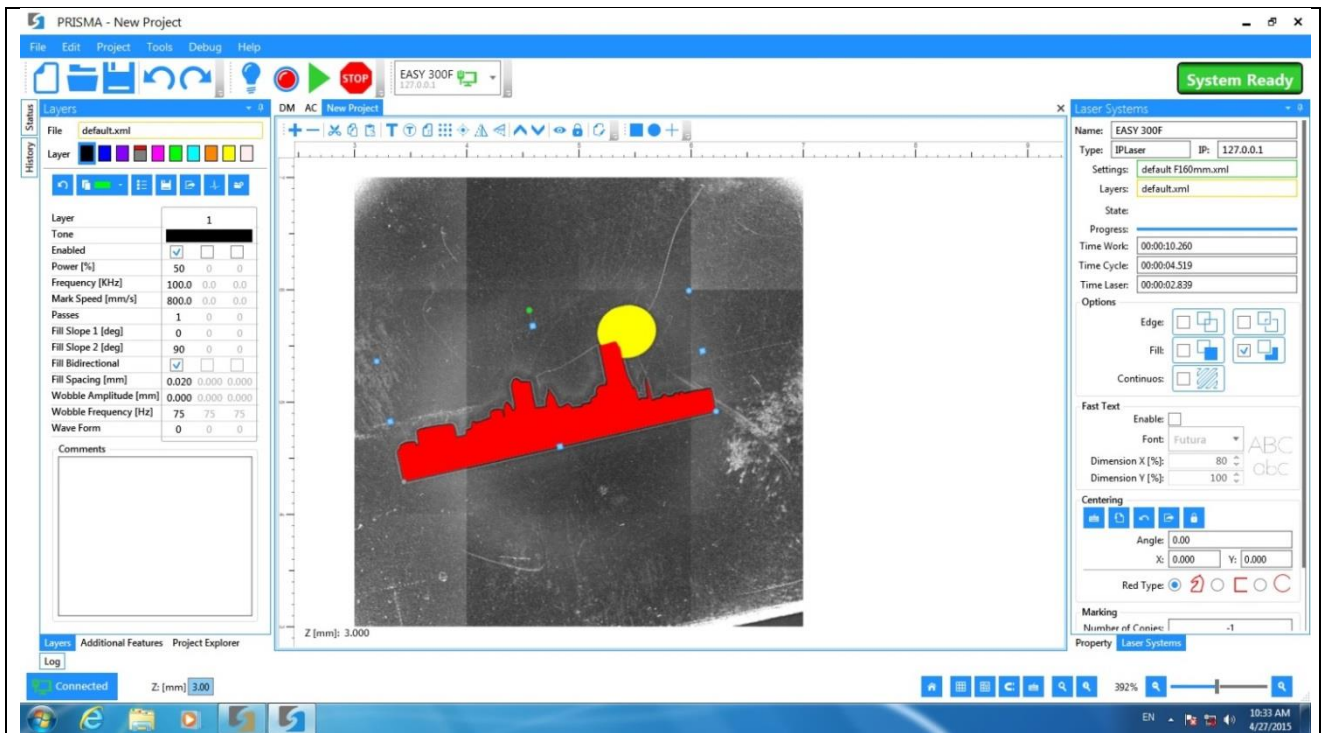
Marking result

Reworking marked objects:

Thanks to its high accuracy in image reconstruction and file positioning, user can mark a file, remove the marked/engraved piece from working area (for inspection, cleaning etc…), place it once again under the camera and remark it on the previous marked area, to correct or change it.
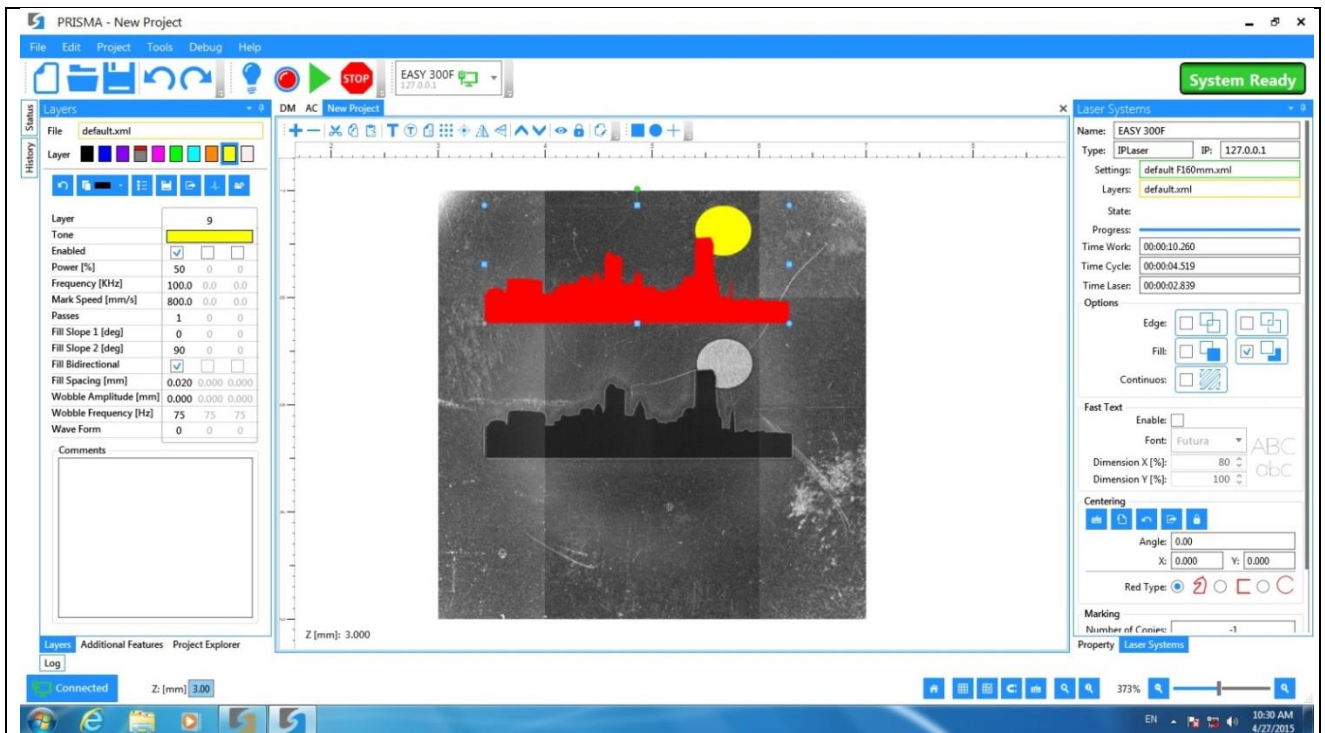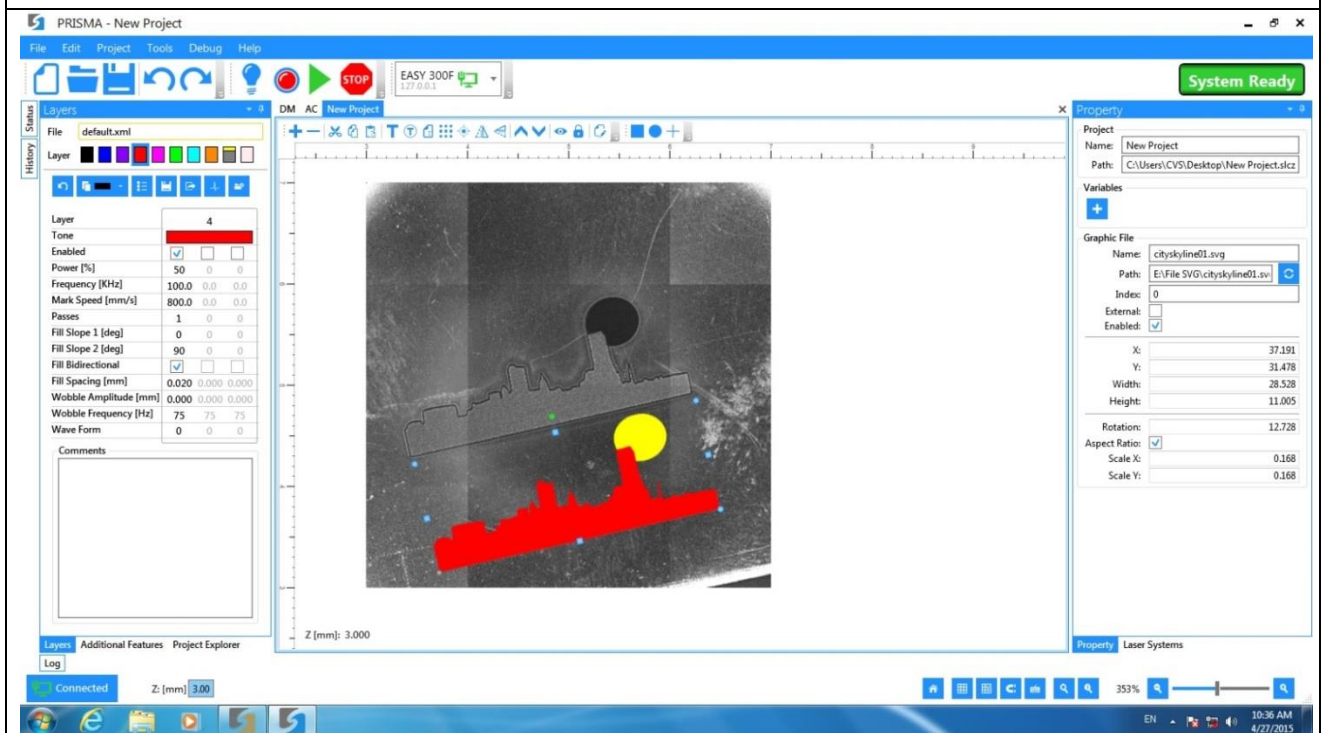
Engraving and marking of a generic file
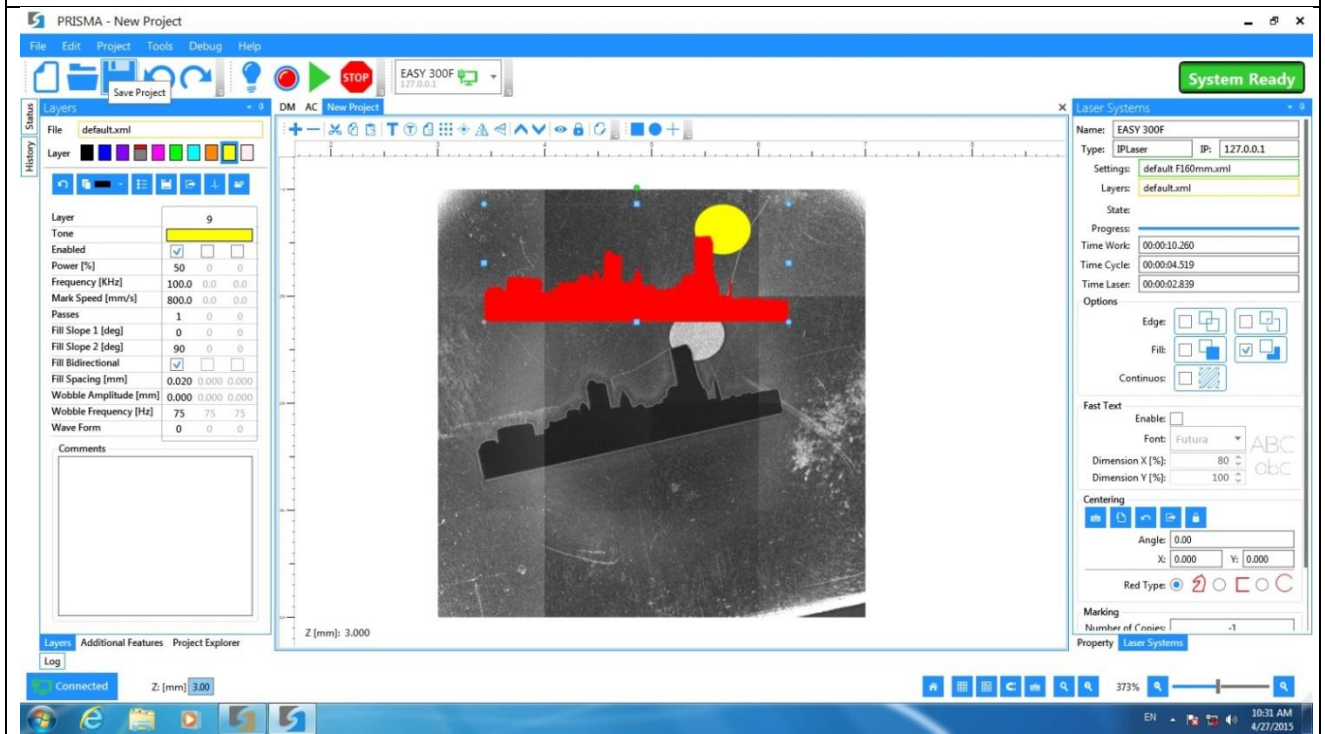
Placing of the engraved part in the working field after it has been removed

Put on top the file and change marking parameters

Mark the same area with different parameters

CVS Features:

- Visual "drag&drop" object marking

- Re-work and post processing of already marked objects

- High resolution object image for inspection and small files marking

- Visual control of laser focus position (i.e. laser is focused when the image is in focus)

- Adjustable image area reconstruction

- Can be installed in Fiber Laser Systems already delivered to the customer (since March 2015). Other Laser Systems need mechanical upgrade.

Under development:
- Edge detection and pattern matching
- Data matrix reading
- OCR reading and matching
- Measuring functions

Hardware Minimum Requirements

The vision system software involves a significant amount of calculations to rebuild properly the acquired images. Even if specific computer hardware is not required, there are minimum requirements to properly work with CVS and run it smoothly.
Here are the minimum requirements for computer:

- Windows 7, 64 bit OS, min. "i3" processor ("i7" processor strongly recommended)

- 4GB of RAM memory

- 8 USB ports (to be used with laser system) of which at least one USB 3.0 type (for camera connection)

- One RS 232 serial port, otherwise a RS232-USB converter (FTDI version)

- Monitor with a 1600x1200 resolution, better if Full-HD compatible

Coaxial Vision System Specifications

CVS specifications can change according to the laser system (scanning head, F-Theta lens, camera etc...).

F-Theta focal length	160mm
Camera Resolution	1.3 MPixel @10x10mm (pixel size 3.75 x 3.75 μm)
Field of live view	12x10 mm
Working field size	100x100 mm
Max image size	100x100 mm (130 Mpixel resolution image)
Working field illumination	Red led ring structure
Image processing speed	0,5s each 10x10mm image (50s for the whole 100x100mm working field, 8s for 40x40mm area)
Marking positioning accuracy	+/- 20 μm
System repeatability	< 5 μm (scanning head related)

All the specs above are given as reference. They may vary according to application, system lightning setup, calibration and material.