# New micro-stereolithography machine "ACCULAS" powered by Magics and custom Materialise software

**The Japanese RP machine retailer D-MEC released a micro-stereolithography machine called "ACCULAS" in fall 2004. Considering that the typical building resolution for a conventional stereolithography machine is in the order of 100-200 microns, ACCULAS's resolution of 2microns (0.002mm) is astonishing. Several universities have published research on micro-stereolithography, but ACCULAS is the first practical machine released in the world. It is expected to play an important role in prototyping and manufacturing of micro devices such as micro-electro-mechanical systems (MEMS*). The new machine is powered by Magics and custom Materialise software, developed according to the specific needs of these machines and their users.**

Laser Solutions Co., Ltd manufactures ACCULAS, while JSR develops and provides the special resin used for this machine. This system is the result of effectively integrating Laser Solutions' light exposure technology with JSR's stereolithography resin technology and D-MEC's stereolithography building techniques and experience. D-MEC provides marketing and sales support.

Conventional stereolithography machines use galvano-mirrors to facilitate precise and rapid control of the laser beam. The resolution of the laser beam is limited, however, to 100-200 microns. To overcome the limitation, the ACCULAS uses a DMD (digital micro-mirror device) to "flash" an image onto the photo-polymerising resin. About 2 x 2cm in size, a DMD device is composed of about 1 million mirrors, each of which can be controlled individually. Although the size of each mirror is about 14 x 14 microns, the image projected can be scaled down further, allowing for a **resolution of up to 1.7 x 1.7 microns**.

Data preparation follows a process similar to conventional rapid prototyping. The part is designed in 3D CAD, exported as an STL, and sliced by Magics RP software. For the ACCULAS machine, Materialise developed **purpose-made software** called VIOLA that can automatically convert the contour data of the slice files into bitmap data. These bitmap files are used to manipulate the mirrors on the DMD and to produce the desired layered image. A special technique is used to control the curing depth of the photo-polymerising resin used for ACCULAS, and allows a slice thickness of 2-10 microns.

D-MEC's collaboration with Materialise dates back several years. They bundle Magics with their machines to provide their customers with a total solution for 3D modelling and printing. That's why D-MEC involved Materialise in the project: *"Materialise software has proven to be tailored to the RP industry's needs. We couldn't have chosen a better partner to equip the new machine with powerful, reliable and easy-to-use software."*

The emergence of a micro-stereolithography machine in the market has expanded the use of stereolithography technology from mere prototyping to R&D, prototyping, and even manufacturing of micro-devices. Possible applications include biochips, healthcare chips, and medical MEMS in the biomedical field; micro-TAS (analytical chips) and micro-channels in the chemistry field; photonic crystals and micro-lens arrays in the photo-electronic field; and micro-gears and micro-machinery.

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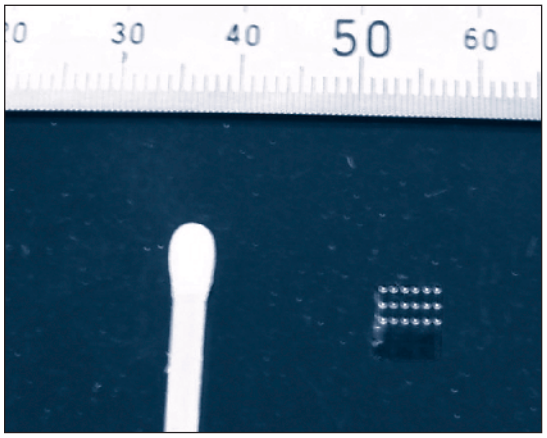
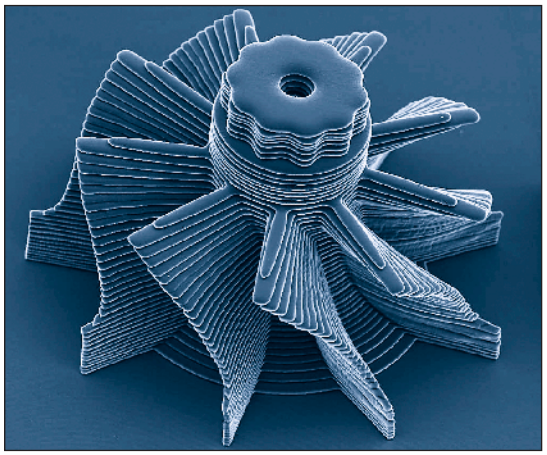
** Micro-electro-mechanical systems is the integration of mechanical elements, sensors, actuators, and electronics on a common silicon substrate through micro-fabrication technology.*


*The 18 dots on the object next to the matchstick are parts built with ACCULAS : each dot is a micro-turbine of 400 microns ø and 250 microns H - slice pitch of 5 microns.*



*SEM (Scanning Electron Microscope) image of 1 micro-turbine part.*