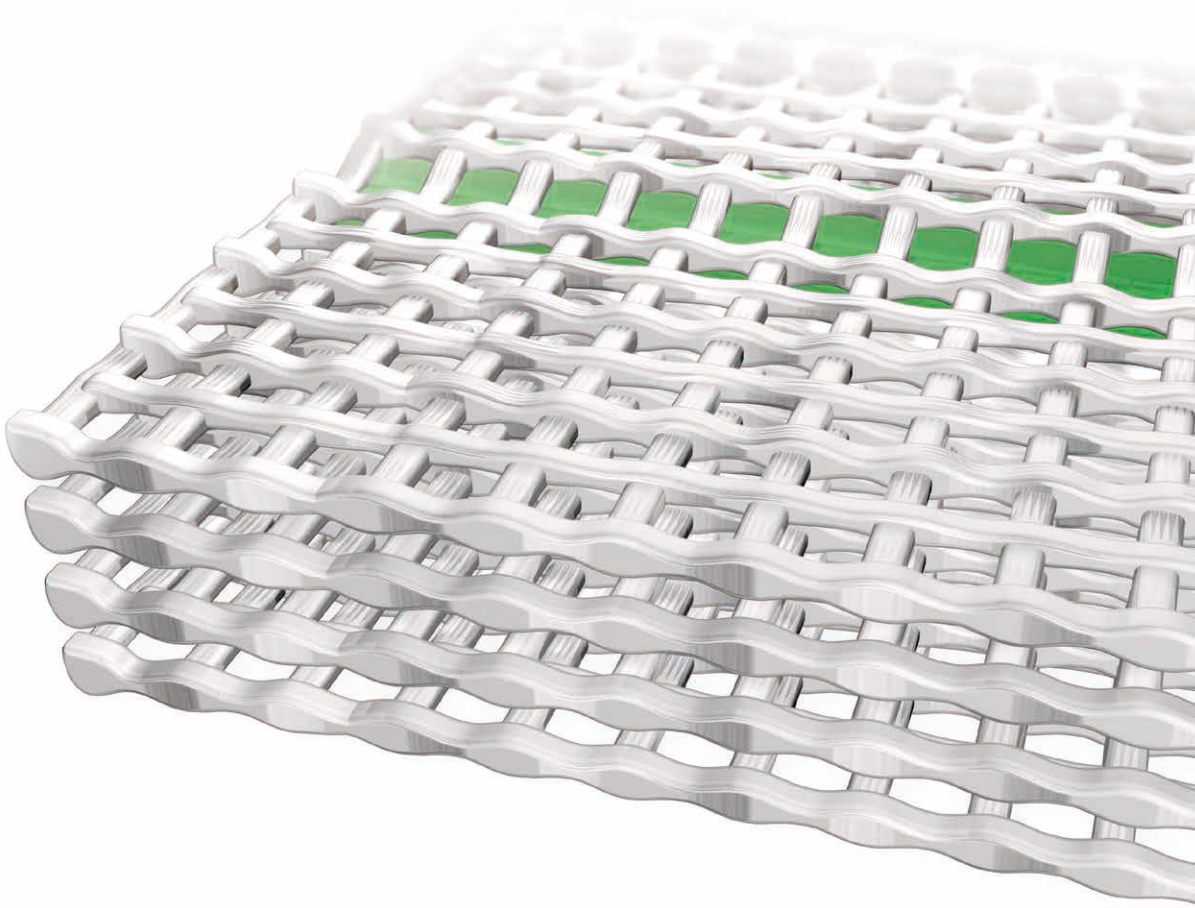
BioScaffolder 3.1

3D Prototyping, Cell Printing and More

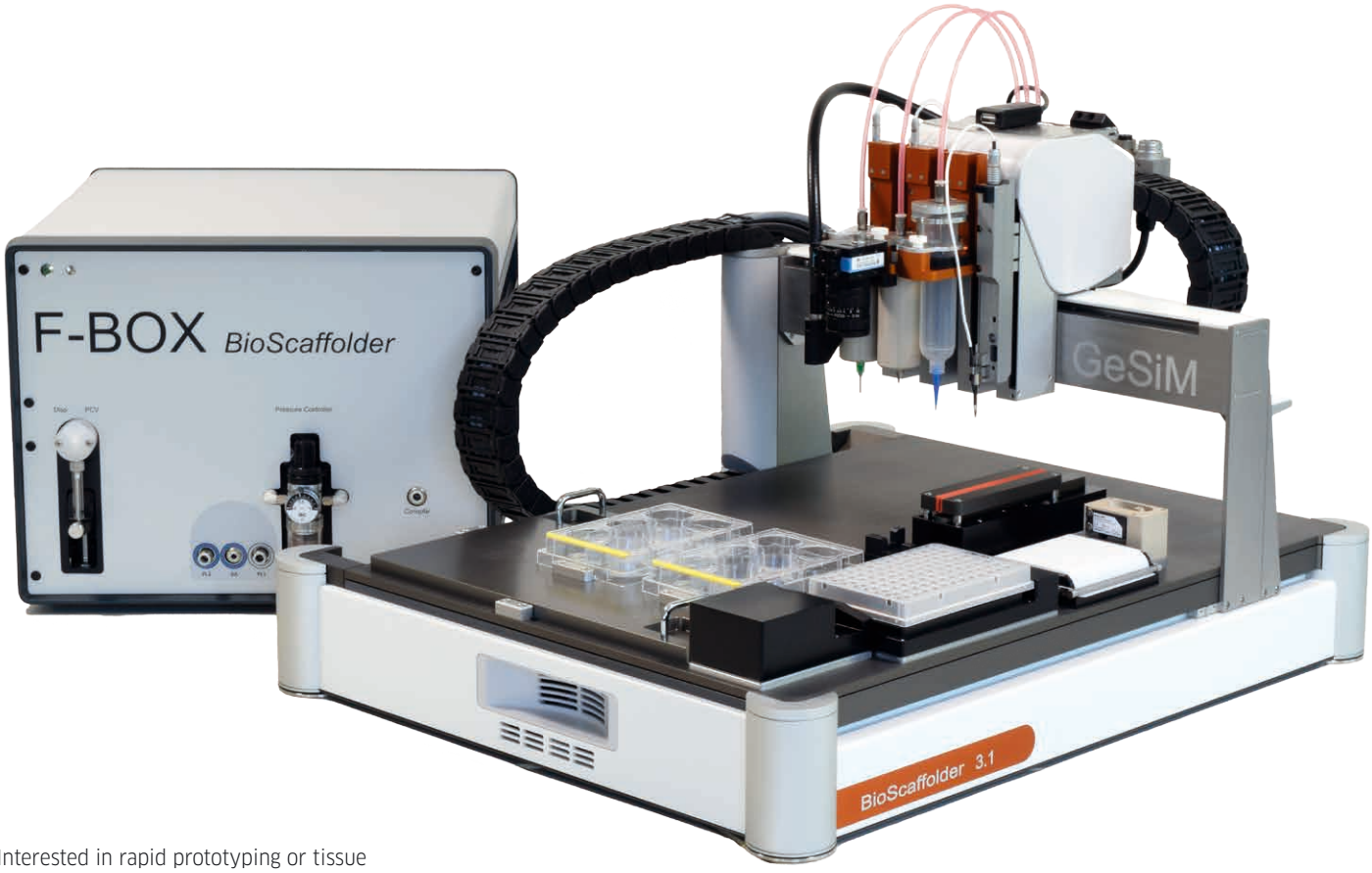


GESIM

GESIM BioScaffolder 3.1

3D Prototyping, Cell Printing and More

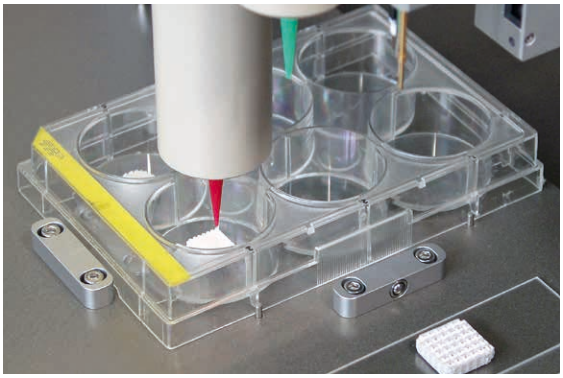
- **Independent Z-axes for maximum flexibility**
- **Pressure-controlled 3D printing with heatable cartridges**
- **Piezoelectric microdispensing, e.g. for cell suspensions**
- **Numerous options: CAD import, UV curing, melt electrospinning writing, etc.**



Interested in rapid prototyping or tissue printing for 3D cell culture and regenerative medicine? Look no further. The GESIM BioScaffolder, version 3.1, prints 3D scaffolds and also seeds cells using the well-known GESIM piezoelectric pipettes.

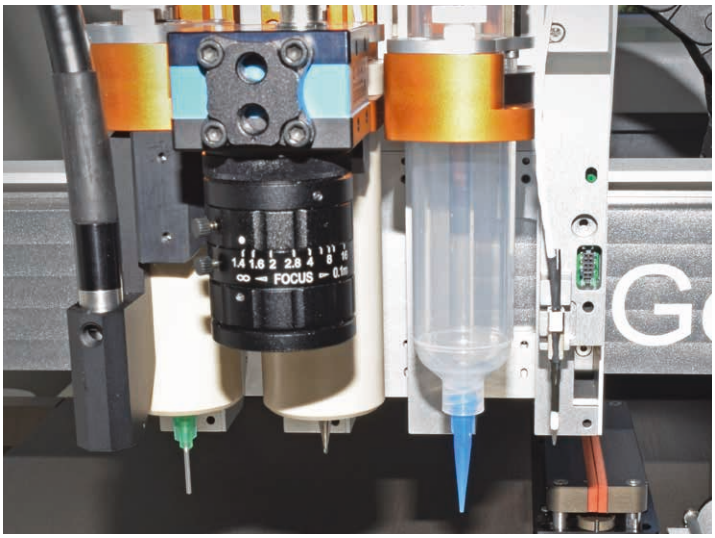
Scaffolds can replace cartilage and bone tissue or act as mesh-like support on which cells grow in culture. Or conductive material is printed onto elastic polymers to create sensors employed for surgery. Larger channels can be kept open by sugar paste that is washed away afterwards. The printer is designed for work in a sterile environment.

- Production of 3D scaffolds as support for cell culture and organoids

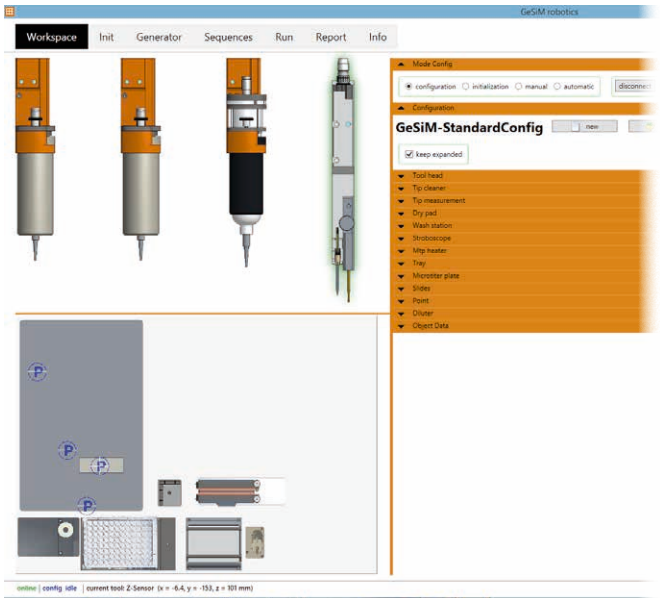


- Piezoelectric (ink-jet) microdispensing to coat scaffolds by e.g. matrix proteins
- Printing of live cells (“organ printing”), either embedded in scaffold material or seeded by piezo spotting
- Plotting of conductive polymers as sensor material or as coating for medical devices
- Dispensing of photosensitive material and UV curing (option)
- Option: Directed melt-electrospinning (MES) to produce fine polymer meshes

The new **multi-Z-drives** can print different materials at various pressures and temperatures, without exchanging cartridges. Many additional tools can be mounted.



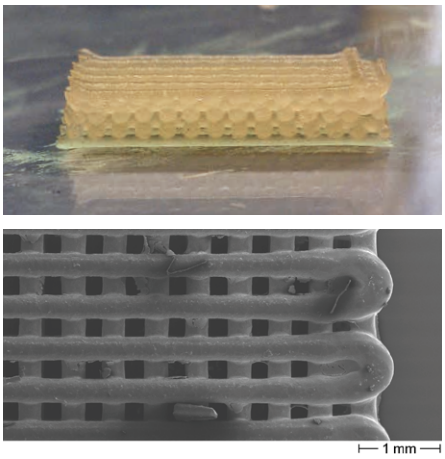
Head tools on Z-drives. From left to right: heated cartridge + UV optical fibre, heated cartridge + camera, normal cartridge (30 ml), piezo pipette.



Control app with print head and workspace configuration (left), and tabs for tool definition (right). The Generator button is to create simple geometric forms.

Features

- GUI-based Windows software, including an intuitive generator for cylinders, prisms, pyramids, etc.
- Import of STL (CAD) data (extra)
- Up to three independent Z-drives (spindle) for cartridges, plus one for piezo dispenser and Z-sensor
- Holders for different cartridges, heatable to either 120 or over 200 °C
- Tip cleaner for wiping off excess paste
- *Z*-sensor for the measurement of substrate heights *and XYZ* tip measuring tool for automatic alignment of dispensers. So only a few mouse clicks are required to start a successful scaffold print.
- Piezoelectric GESIM nanolitre pipettor (heatable and non-heatable), picks samples from a (heatable) microtitre plate, including wash and dry station
- External electronic control unit (“F-Box”) with embedded computer, connects to sensor cables, compressed air and system liquid (water)
- Dosage pressure: 100 – 700 kPa (1 – 7 bar); slight vacuum possible
- Step width: 2 µm in X/Y, 10 µm in Z, encoder-controlled
- Target holder size: 31 cm x 20 cm, can hold two microtitre plates
- Options (selection): object camera, UV lamp + optical fibre for UV crosslinking, dispenser for adhesives, high-voltage unit for MES, dispenser for core-shell strands
- Printable materials include hydrogels, biopolymers (e.g. collagen, alginate), bone cement paste, biocompatible silicones and melting polymers (polycaprolactone, polylactic acid)
- Requirements: filtered compressed air, (max. 1 MPa), 115 – 240 V AC, computer (provided), enclosure or biological safety cabinet



Top row: alginate scaffold, PCL cylinders, printed microchannel. Bottom row: scanning electron micrographs of a bone cement scaffold (InnoTERE, Radebeul), after setting, and of an example of melt electrospinning writing

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