

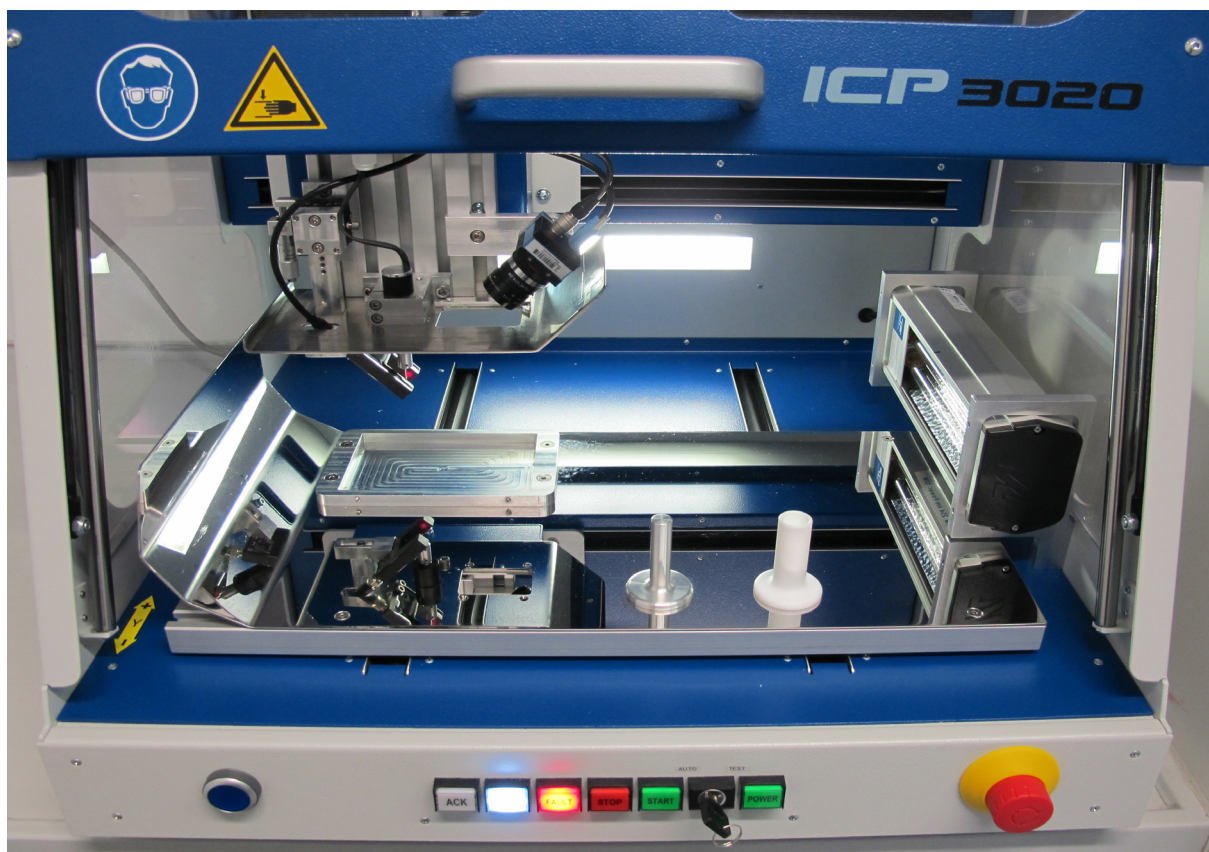
FRAUNHOFER INSTITUTE FOR SILICATE RESEARCH ISC

ARTcut®

STANDARDIZED INJURING OF IN-VITRO SKIN MODELS FOR THE FIELD OF TISSUE ENGINEERING

An increasing life expectancy raises the incidence of age-related diseases such as cardio-vascular diseases, dementia, cancer and diabetes. Often, the so-called maturity-onset diabetes (type 2 diabetes mellitus) leads to a diabetic foot syndrome which is the third most common chronic wound besides »decubitus« and »ulcus cruris«.

In-vitro wound models gain increasing importance in wound healing research. Here, correspondingly structured skin models are being injured in order to evaluate novel therapy forms in the bioreactor. The reproducibility of the placed wounds is essential for comparative wound healing studies.



Challenge: Repeatable wound placement

At the Fraunhofer ISC an automatic process for the repeatable wound placement was developed in collaboration with the Fraunhofer IGB-Project Group Würzburg and the Chair of Tissue Engineering and Regenerative Medicine at the Würzburg University (Prof. Dr. Heike Walles).

Solution: ARTcut®

The approach to the solution is an automatic wound placement under sterile conditions in which a hollow cylinder drill bit controlled by a corresponding software places reproducible wounds into 3D in-vitro models at high spin speed. Both rate of advance and depth of penetration are adjustable via light barrier sensors.

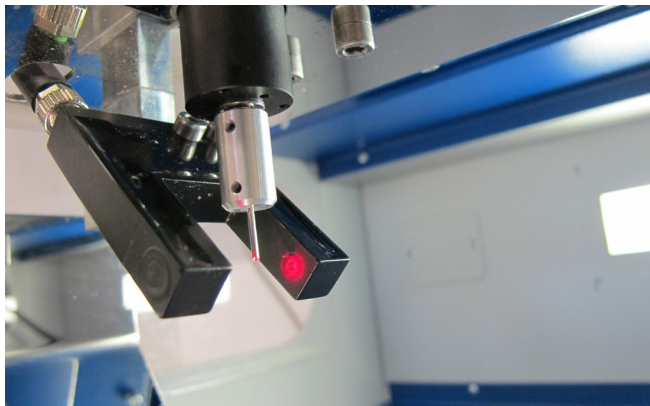
ARTcut®

The high spin speed leads to a reduction of a possible shift of the gel matrix during the injuring process and the adhesion of gel material on the drill bit. At the same time, the repeatable wound placement is possible in several samples within one titer plate and results in a significantly increased performance during the sample manufacture. For additional quality control, images of the respective drilling are taken and saved via camera system. Moreover, the system is capable of sterilizing the working space in a defined and adjustable period by means of a UV-C lamp.

The new device is of modular design which offer high flexibility and easy adjustment to individual customer requirements. Additional functions are easy to integrate.

Fields of application

- Medical products
- ATMPs
- Tissue Engineering
- ...



Specifications

- Camera-controlled wound drilling machine
- Sensor-controlled penetration depth
- CAD-controlled wound shape
- 24 tissue samples in one working step
- Travel range 300 mm x 150 mm, lifting of 100 mm (maximum)
- Wound depth approx. 1mm (minimum)
- Drilling speed variable up to 20000 rpm
- Sterilization through UV-C

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