

Checking the integrity of encapsulated electronics in surgical tool

CareTag Surgical develops full solutions for the efficient management of surgical and other hospital equipment, based on the use of new technologies such as RFID.

THE PROBLEM TO SOLVE:

During the development phase of a connected surgical clamp, CareTag's R&D team needed to assess the integrity of the encapsulation surrounding the electronic device (Fig. 1). The company used x-ray imaging to investigate their product. However, a complete assessment of gluing integrity between the polymer and steel parts was not possible.

A STEP TOWARDS THE SOLUTION

The Danish Technological Institute suggested CareTag use neutron tomography to complement the information provided by x-ray imaging. A surgical clamp made of steel was scanned using the CONRAD **neutron imaging** beamline at the Helmholtz-Zentrum Berlin. **Bubble-like structures were identified on the neutron radiographic and tomographic images** obtained (Fig. 2).

THE RESULT

This series of measurements confirmed that a quantitative evaluation of the number and size of the pores is feasible despite the presence of a high x-ray and neutron-absorbing material within the electronics.

"The information provided by the neutron scan gave significant insight into the glue of the RFID-tag. We are pleased to see that there are no defects or irregularities between the metal and the chip, suggesting that the current adhesive procedure is satisfactory. We were delighted to be given the opportunity to use this advanced characterization technique, and we hope we can return to perform a comparative test of another process."

Søren Bilsøe, co-founder of CareTag Surgical

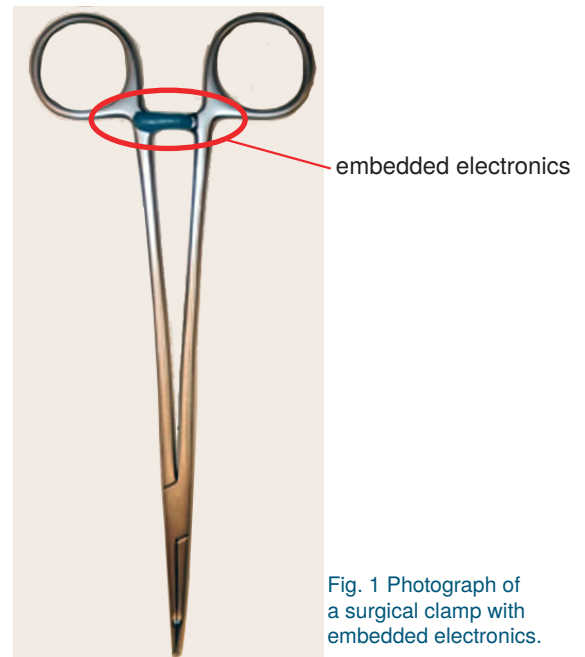


Fig. 1 Photograph of a surgical clamp with embedded electronics.

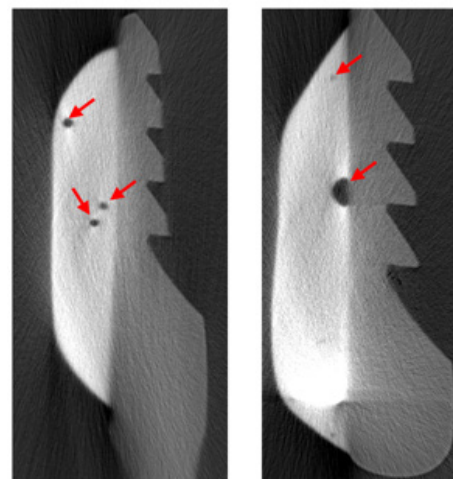


Fig.2 Selected slices of the tomographic reconstruction from neutron measurements. Red arrows indicate bubble-like structures within the encapsulation.

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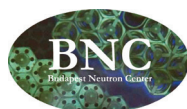
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