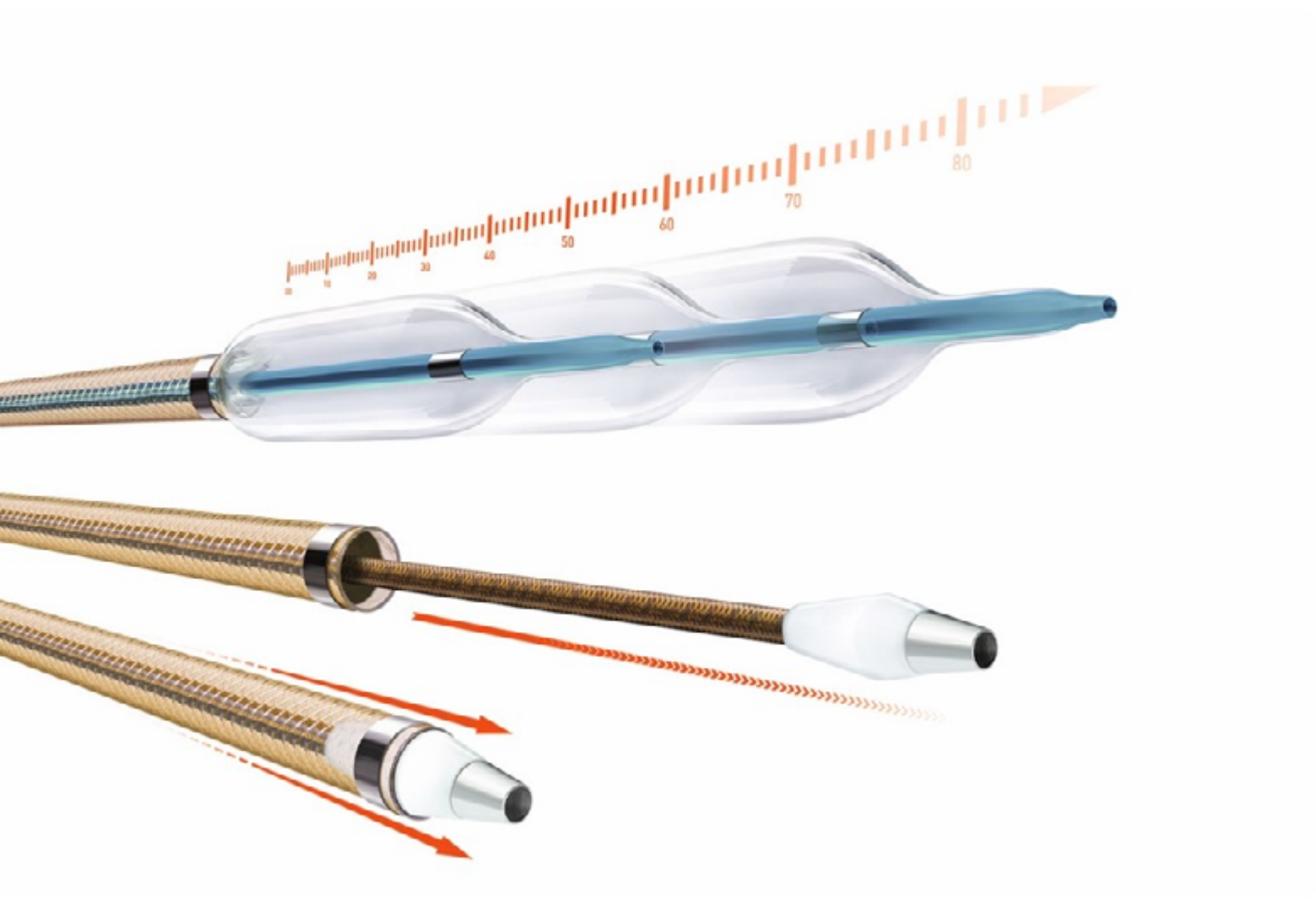
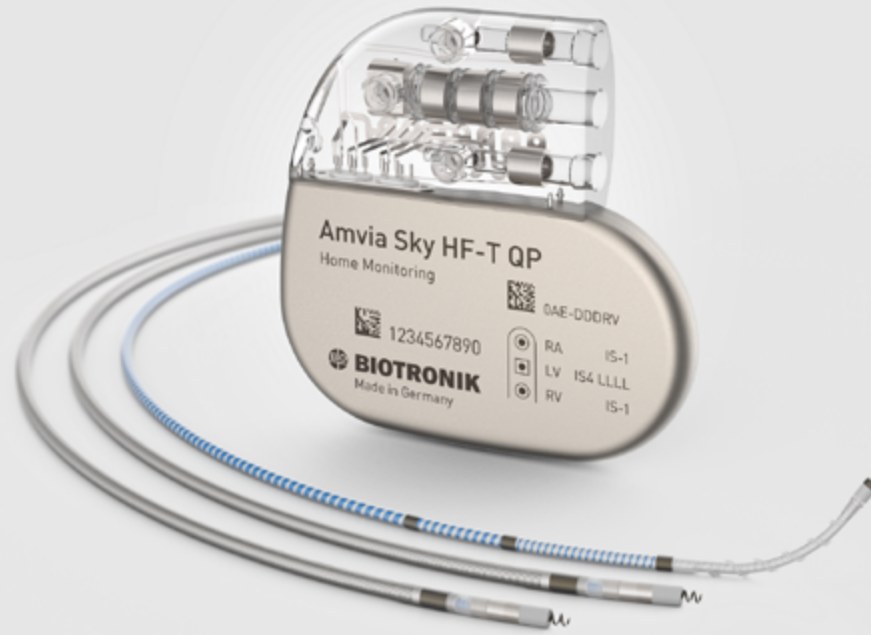


Case Study

Hitachi's SEM and Ion Beam Milling Systems Aid BIOTRONIK's Biomedical Technology Research





Background

At BIOTRONIK, patient well-being is our top priority and has been for over 60 years. BIOTRONIK is a leading global medical technology company with products and offerings that save and improve the lives of millions suffering from heart and blood vessel diseases as well as chronic pain. Driven by a purpose to perfectly match technology with the human body, we are dedicated innovators who develop trusted cardiovascular, endovascular and neuromodulation therapies. BIOTRONIK is headquartered in Berlin, Germany, and is represented in over 100 countries across the Americas, EMEA (Europe, the Middle East, and Africa), and Asia-Pacific.

Objectives

- Prepare and image complex, challenging medical samples.
- Elevating the quality control of BIOTRONIK's products by integrating advanced, cutting-edge analytical tools.
- Powerful analysis results in the shortest possible time, providing precise and valuable insights.

Understanding the Complex Nature of the Materials and Their Structure-Property Relationship in the Cardiac Rhythm Management Industry



Imaging
Hitachi's SU7000 SEM



Sample Preparation
ArBlade 5000 Broad Ion Milling system

When looking for new equipment to improve the preparation and analysis of various specimens in their company's R&D department, BIOTRONIK carried out a very thorough tender process, benchmarking options and testing them against various highly challenging Cardiac Rythm Management sample types.

The company had a number of objectives when choosing new sample preparation and specimen analysis equipment, which led them, after this tender process, to choose Hitachi's ArBlade 5000 Broad Ion Beam Milling system and SU7000 Field Emission Scanning Electron Microscope (SEM).

BIOTRONIK already relied on SEM for analytical tasks, and

switching to a latest-generation device with a Schottky emitter really was a game changer. Furthermore, the versatile applicability and flexibility of Hitachi's microscope regarding samples and sample size, especially for non-conductive samples, was a particular advantage for the company.

Combining the imaging power of Hitachi's SU7000 SEM with the sample preparation capabilities of the ArBlade 5000 Broad Ion Beam Milling system made particularly challenging preparatory tasks solvable. Medical device components could be easily readied and sectioned, which would have been difficult to address with other techniques under consideration by the company.

Technology that Innovates and Inspires

As a BIOTRONIK employee explained: "The decision in favour of a new system had to be soundly based as this was an important investment. We carried out a thorough market analysis in which the integration of the Argon Ion Polisher with the specific features of the microscope proved to be decisive for a purchase.

They further added: "The process unfolded seamlessly. Aligning room planning for optimal machine performance and meeting technical requirements posed challenges, but close collaboration ensured successful execution.



Rostislaw Olejnik (left) Eric Ortel (Right)
BIOTRONIK employees

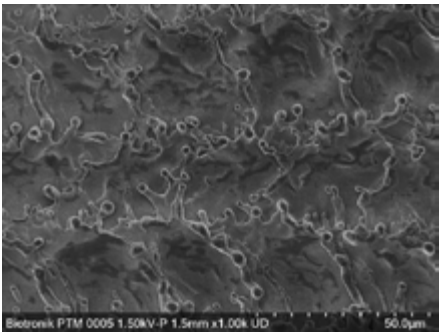
"I would definitely recommend Hitachi.
The guidance and the option to acquire complementary systems from a single manufacturer are definitely worth mentioning here."

Results

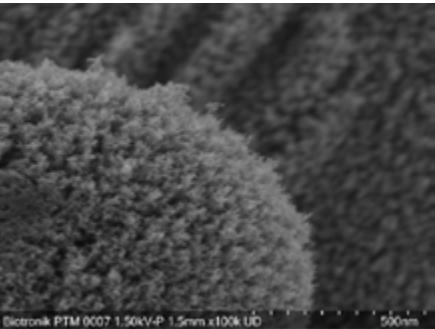
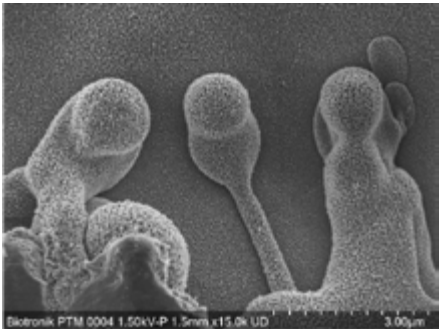
- Artefact free sample preparation.
- Outstanding visualisation of cross sections, even at the highest magnifications.
- Combining sample preparation with the ArBlade5000 and the imaging power of the SU7000 made it easier and faster to get the best results possible.
- The acquisition of the Hitachi machine has enabled our analytics department to expand its service portfolio, setting a new benchmark in precision and excellence at BIOTRONIK.

Biotronik Use-Case 1

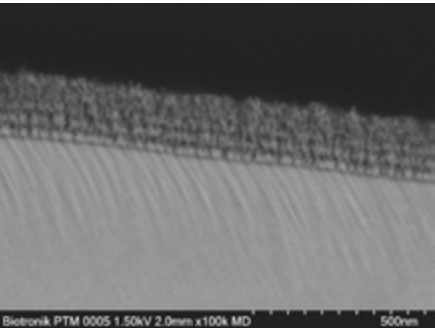
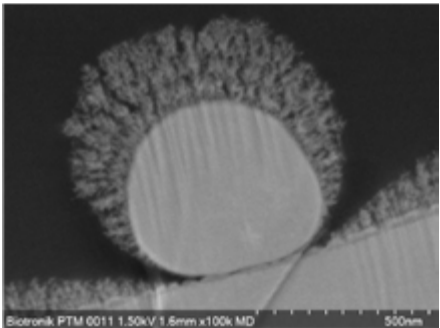
Characterisation of the bond between a laser-structured surface and a synthetic resin with the use of a primer.



Typical metallic surface after laser structuring to improve the mechanical clarification of the synthetic resin.



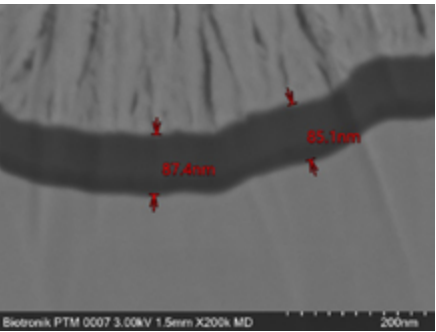
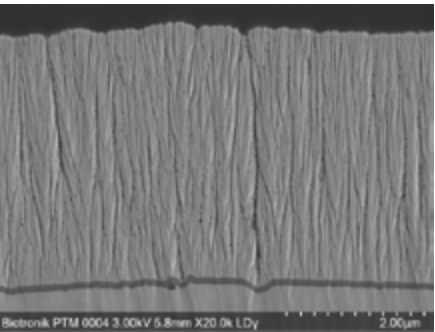
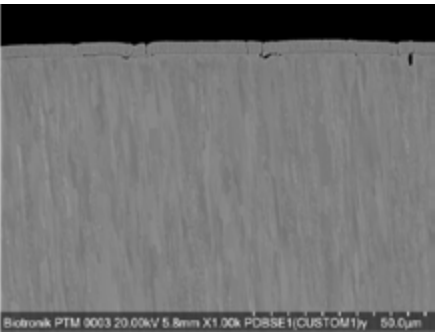
At high magnifications, a nanostructure becomes visible on the surface and is subsequently mainly responsible for the adhesive properties between the metallic surface, the primer and the resin.



The cross section with the ArBlade 5000 using the metal-primer-resin system reveals a gap-free and perfect bond between the materials involved.

Biotronik Use-Case 2

Characterisation of the functional fractal Iridium coating.



The sample preparation with the ArBlade 5000 reveals an artefact free cross section of the Iridium Coating. In addition, adhesion layer between the substrate and the coating in the range of 80nm to 90nm is visible.



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