

MRI

Composite structures for components of the patient-positioning system in MRI scanners

IMAST members involved:

- **ESAOTE S.p.A.**
- **CNR - Institute for Composite and Biomedical Materials (IMCB)**

The research activities performed in the frame of the project MRI were focused on the development of new composite materials and processes to realize components for the patient positioning system in MRI (Magnetic Resonance Imaging) scanners. The introduction of innovative materials is expected to improve the efficiency and market competitiveness of these diagnostic devices.

The innovative components needed to be optimized in order to obtain specific structural (to hold the weight of the patient) and the magnetic properties (compatibility with the equipment operating conditions) of the final element.

Various configurations of composite materials were developed, in order to meet the expected requirements of magnetic compatibility, structural resistance, ergonomic and aesthetics functionality. To this purpose, new design methodologies were implemented. They were based on the use of numerical methods to predict the physical parameters related to the operating conditions and the structural configuration of the apparatus. Consequently, a very important goal of the project was the identification and development of an integrated Platform for Multi-Objective and Multi-Disciplinary Design Optimization.

The validity of the new composite solution for the two selected prototypes (patient scanning bed and structural support for the upright position) was verified through their assembly in an open MRI scanner. In particular, an open full-body MRI scanner was used, that is, a device that allows for scanning the patients in the upright (or standing) position, i.e., in the fully weight-loaded posture.

Achievements

A MRI scanner with a 20% thickness reduction and 40% cost reduction was realized. The overall reduction in thickness allowed an 8% increase of checkable population percentile with respect to conventional configuration.

