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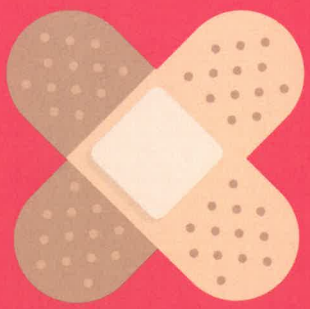
MEDICAL PLASTICS news

LET'S STICK TOGETHER

HOW SOFT-SKIN ADHESIVES ARE SUPPORTING THE WEARABLES TREND



+ SECURING MEDICAL DEVICES

KEEPING UP WITH REGULATORY REQUIREMENTS

FITNESS TRACKERS

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ADVANCING MEDICAL PLASTICS

HOW TO REDUCE TIME, ERROR AND COSTS FOR SURGEONS

RUI SOARES, SENIOR RESEARCHER AND MANAGER OF INNOVATION AND INTELLIGENCE AREA AT CENTIMFE FROM ENGINEERING & TOOLING CLUSTER IN PORTUGAL, PRESENTS A CASE STUDY ON THE ADVANCED TECHNOLOGICAL APPROACHES FOR THE DEVELOPMENT OF MEDICAL DEVICES.

The technologies related with product development and advanced manufacturing have experienced a huge evolution in recent years and these technological advances are changing the healthcare industry. Tooling and plastics industries are globally recognized as being technologically very advanced, both in terms of the equipment used and people skills. Therefore, it is no surprise that the adoption of these technologies has been a norm in its companies for many years.

The integration of technologies for the acquisition and manipulation of medical images like Computed Tomography (CT) and Magnetic Resonance (MR), Computer Aided Design and Simulation (CAD/CAE) with 3D Printing (3DP) and Advanced High Speed Milling (HSM) systems makes it possible to build physical models that reproduce anatomical structures which can leverage many advantages for medical applications. Such models are useful, for example, at the educational level, helping in the elaboration of complex surgical procedures, treatment planning, visualization of some specific anatomical structure, diagnostics, implant design, design of medical instruments and other applications.

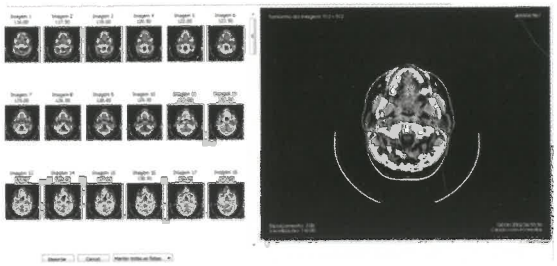

Figure 2: Importing of DICOM files from skull. CENTIMFE ©

Figure 4: Mold for production of customized implant. CENTIMFE ©

These technologies can also be applied to the manufacturing of medical devices and customized implants that can be used in surgery and various pathological situations such as the repair of bone defects (such as those caused by bone loss) or the anatomical correction of bone structures being highly advantageous, as it can enable medicine to restore not only the function but also the shape of a damaged bone structure.

CASE STUDY

Figure 1 represents a case study developed within the Portuguese Engineering and Tooling Cluster involving a physical model of a fractured skull manufactured by 3D printing and a customized pre-surgical implant that allows the surgeon to plan surgery and reduce time, error and costs. The personalization contributes to the aesthetic and functional outcome of the implant, since it considers the anatomy of the patient.

Virtual 3D models were produced from 2D DICOM images (Figure 2) generated by CT and/or MR of the defective skull. Both defective part and the model for repairment were reconstructed digitally in CAD (Figure 3), converted to STL format and afterwards manufactured using 3D printing technology.

The manufacture of the repairment implant was made using an aluminum mold (Figure 4) produced by HSM from the related 3D model geometry. This mold was then used during the chirurgical repairing procedure for injecting bone cement to quickly produce the repairing implant. This approach allows the surgeons to have control on the manufacture of the final customized implant and the use of a commonly known material in the medical field. The final dimensions of the implant and its assembly achieved very good results, indicating the efficiency of the technologies and methodology used.

All medical devices and models are unique, and the characteristics of each one should be carefully considered when selecting the manufacturing system.

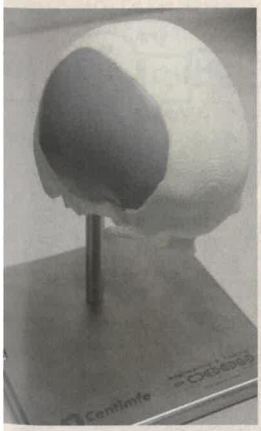

Figure 1: 3D printed physical model of a fractured skull and customized pre-surgical implant. CENTIMFE ©

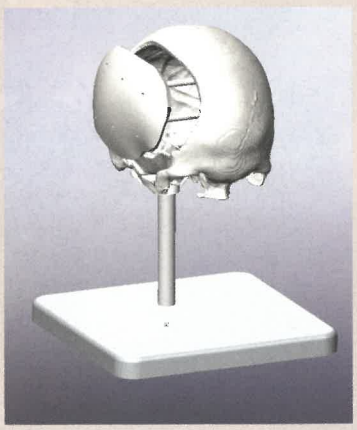

Figure 3: CAD geometries from skull, mold and implant. CENTIMFE ©