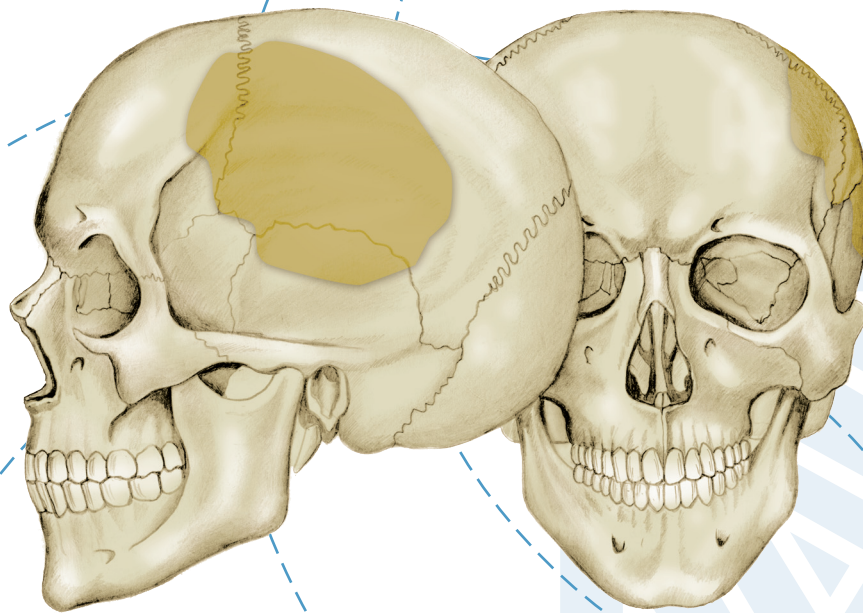


*neurosurgery*

**CRANIOS**<sup>®</sup>



**PMMA custom-made implant**

**A Special Service for  
serious cranial disconformities.**

**TECRES**<sup>®</sup>  
MEDICAL

*Advancing High Technology*



[www.tecres.it](http://www.tecres.it)



# Tecres S.p.A

A Special Service for serious cranial disconformities.

Tecres researchers are able to continually identify problems and needs for the improvement of their patients' health, even for particularly serious cases. This is due to their great cultural commitment in research and the continuous meetings and interaction with operators from all over the world. Our technicians are provided with the necessary inputs, research and experimentation and can count on the support of advanced studies in ICT applied to the medical sector. This is why they have been able to create an actual "custom" prosthesis for the reconstruction of large cranial parts.

**CRANOS is a Special Service that represents a fundamental progress in the solution of difficult problems related to neurosurgery.**



# CUSTOM-MADE

## A Special Service

By means of the **acquisition of the patient's CT scan** at a pitch of no more than 2 mm, it is possible to make a computerised 3D model of the bone problem.

Thanks to a **sophisticated "mirroring" technique**, the curvature of the implant is then constructed, thus obtaining a three dimensional replica of the prosthesis to be applied.

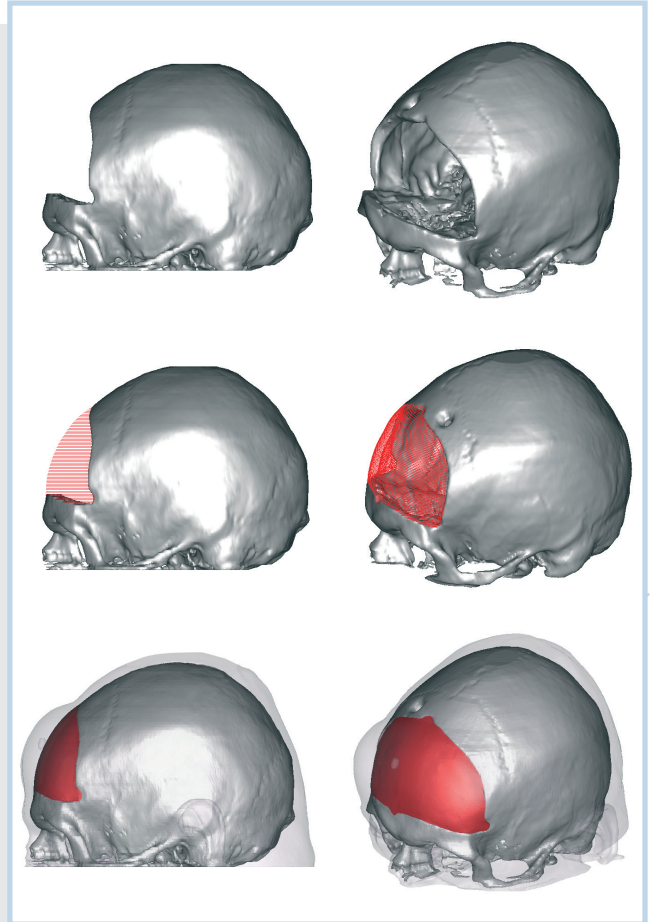
The special product engineering software used allows not only for **perfect reconstruction** giving excellent aesthetic results, but also for the simulation of the adaptation of the prosthesis in vivo.

The computer model is then used to obtain a stereolithography, i.e. a prototype of the final prosthesis, which can then be assessed by the surgeon before the surgery.

Lastly, in the production of the final implant, PMMA is injected at controlled pressure into the **"custom made"** mould in order to obtain reduced macroporosity.

This procedure results in **high mechanical strength** and a reduced risk of bacterial adhesion, with consequent **decreased probabilities of infection** of the implant.

At this point, two perfectly identical prostheses are made sterilized by EtO.



*Acquisition CT and 3D computer model*

**Date required:** coaxial CT in DICOM format with pitch  $\geq$  2 mm

**For sequential CT:**

2 mm thickness

2 mm pitch

**For spiral CT:**

2 - 3 mm acquisition thickness

2 mm reconstruction thickness

PITCH = 1

Time required: 20 working days  
(from delivery of the CT to Tecres)



*Two perfectly identical prostheses  
(one of them is a "safety copy")*

made entirely in PMMA  
(polymethylmethacrylate)

## MECHANICAL PROPERTIES COMPARISON

	COMPRESSION (MPa)	Bending (MPa)	Elastic modulus (GPa)	Porosity (Vol. %)
CRANOS-PMMA	100	60	3	5
HA POROUS PROSTHESIS	15	2	8	60

### Advantages

CRANOS is made entirely in PMMA (polymethylmethacrylate), a material that has been used for over 40 years in the medical field, the **mechanical** and **biocompatible** characteristics of which are perfectly well known.

The prosthesis has a **radiopacity** such as to allow for excellent control of the success of the operation using RX or CT.

PMMA offers considerable advantages over other materials, such as Porous HA (hydroxyapatite) (see above the comparative table)

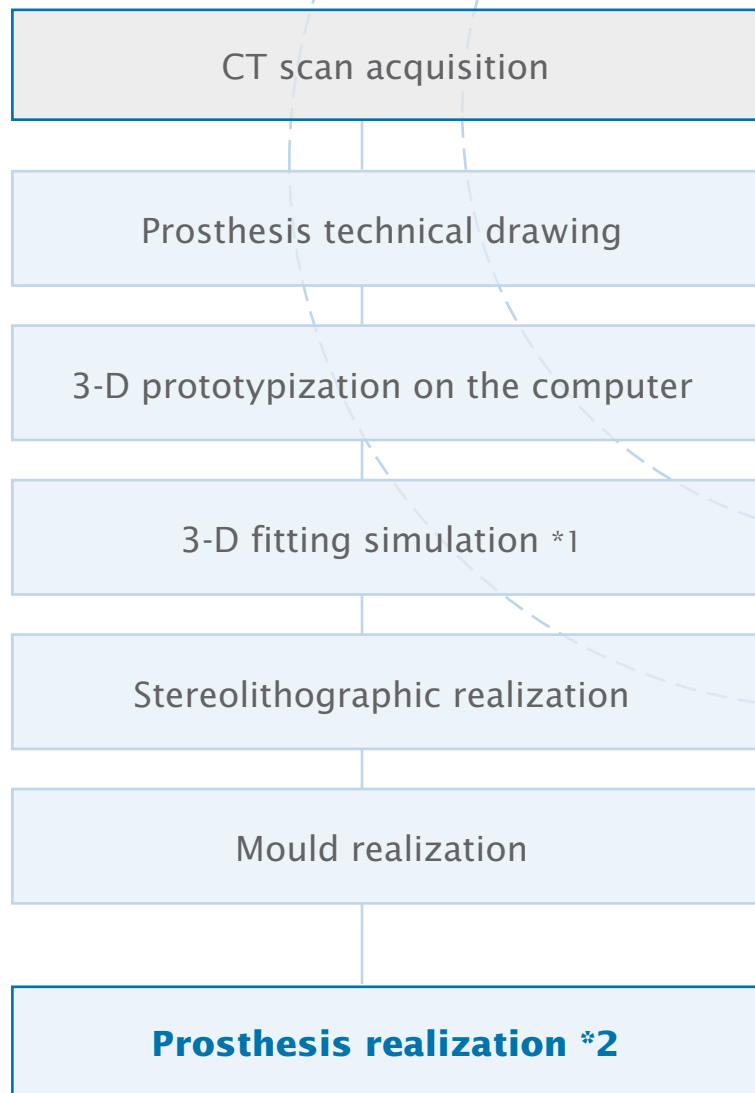
The material used complies with the **European directive** on medical devices (dir.93/42/CEE) and the manufacturing process complies with **ISO standards**.



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# about CRANOS



*\*1 during this phase the doctor is asked for a letter approving the project.*

*\*2 during this phase two sterile copies of the same custom are created. Only one of them will be implanted. The second one will be used as a security copy, in case the prosthesis's sterility or integrity is jeopardized.*

## Service feature

- Using the patient's data, Tecres can offer a tailor-made prosthesis in a very short time. No more than one month must elapse between the defect's evaluation by CT scan and the CRANOS prosthesis application. Possible bone growth may determine a reduced fitting of the prosthesis with respect to the gap.
- CRANOS is a ready-to-use cranial prosthesis, which arrives in the O.R. already sterile.
- There are no counter indications to the use of the commonly available screws or plates for fixing. The only recommendation is to place these at least 4 mm from the edge.
- Holes can be made in CRANOS. However, such holes, according to number and size, will influence the general mechanical strength and must not be such as to compromise the overall integrity of the prosthesis.



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