

## Por\_Ti\_Stuct-Porous Titanium structures for bone reconstructions and regeneration

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**B**one defect reconstruction provides several interesting opportunities in Orthopedic, Spine and CMF surgery. The need for reconstructing missing bone arises from a variety of causes as diverse as: Tumors, severe trauma, prosthetic failures, congenital malformations and lack-of-stimulus. Electron beam Melting is a flexible additive manufacturing technique that can built up freeform Titanium Structures in short time and at reasonable prices fitting with a 3D CT reconstruction of the bone defect selecting the right porous geometry and mechanical performance according to any applications. This kind of new high-porous implants for bone reconstruction can state a primary stability with just 20% of metal (Ti6Al4V) while 80% of the volume is an interconnected macropore network targeted to bone regeneration. Factors and MSCs can be seeded to accelerate bone regeneration. We have already implanted full-porous custom made implants in human CMF tumor reconstructions as well as standard porous edges for different kinds of osteotomies. The main goal of this strategy is to introduce a “patient demand driven” trend instead of the “technology-pushed” model in use during the last 40 years in which it is the patient-anatomy to be adapted to standard implants. In summary, the following new paradigms have been set:

1. Forecast new implant generation whose geometry fit to the patient’s anatomy
2. Minimize the metal volume to the necessary for primary stability and living free functionalized space for seeding with autologous cells
3. Transform a standard product generally produced abroad in a local personalized service

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