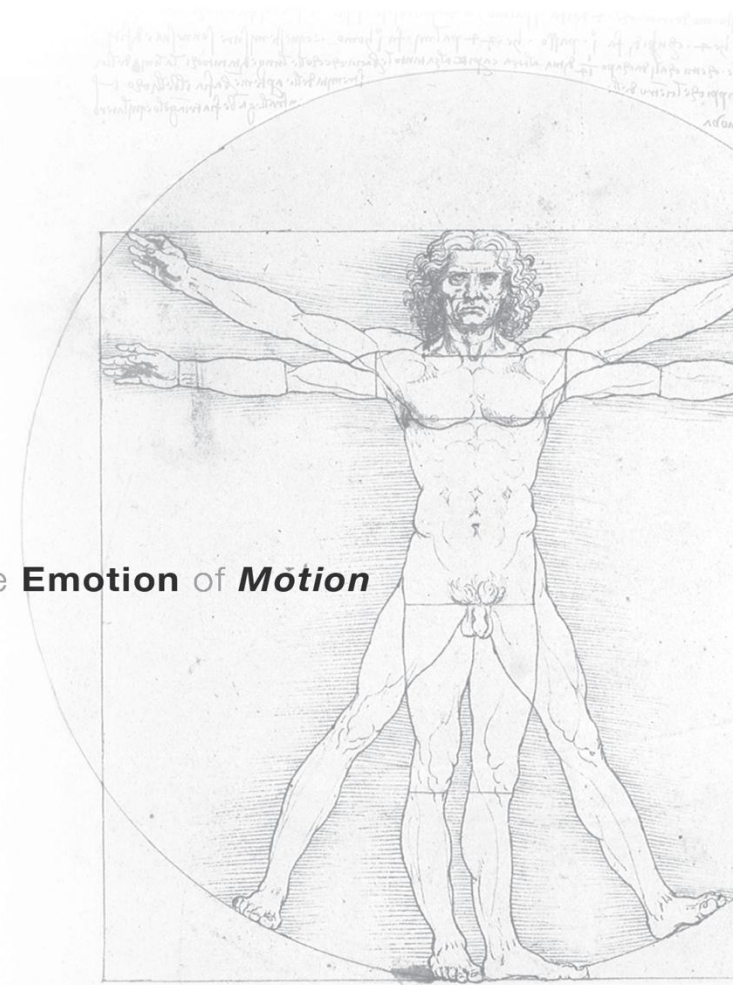


Restoring the **Emotion** of *Motion*



ADDITIVE MANUFACTURING
Technology Innovation in Medical Devices Industries

Summary

- About us: Who we are, what we do
- Segment Overview
- Product Overview
- Global Thinking : our current footprint
- AM - Additive Manufacturing Key Features
- EBM - Electron Beam Melting Key Features
- Leading Technology
- EBM Process Overview and Insight
- EBM Products

About us: Who we are, what we do

- ▶ Lima Corporate is a global medical device company providing reconstructive and fixation orthopaedic solutions to surgeons who face the challenges of improving their patient's quality of life.
- ▶ Based in Italy, Lima Corporate designs, develops, manufactures and markets joint replacement and repair products to enable surgeons to select ideal solutions for every individual patient.



Segments Overview

► Lima Corporate's product range includes large joint primary and revision implants for hip and knee, extremities and fixation solutions and a dedicated patient-specific prosthesis division with exclusive custom made implants.



LARGE JOINT
Primary



LARGE JOINT
Revision



**EXTREMITIES
& FIXATION**



PROMADE
Exclusive implants

Product overview

➤ The company portfolio includes a mix of product with more than 2000 different items. Besides the main 3 product families of prosthesis for hip, shoulder, and knee, there are many versions and different solution for any pathology, for primary or revision orthopedic surgery.



Global Thinking : our current footprint



➡ LimaCorporate has established direct subsidiaries in 23 countries in 4 of the world's top orthopaedic markets (Europe, Asia-Pacific, US, Latin America). Combined with a network of distributors, LimaCorporate covers over 43 countries

Global Thinking : our current footprint

 
Manufacturing Plants

San Daniele (UD) - Italy




San Marino - RSM



Segesta (TP) - Italy

AM - Additive Manufacturing Key Features

 Additive Manufacturing, is a new paradigm for industrial manufacturing, and is giving real benefit to the production value chain:

- Parts are built by melting thin layers of powder, adding layer to layers
- Freedom in design, parts are built to the exact geometry, even very complex, defined by a CAD model
- No manufacturing constraints (toolings, fixtures, waste material), without the need to keep stock of castings or forgings
- Energy-efficient and environmentally friendly manufacturing process thanks to the very high material utilization
- High productivity
- Excellent material properties



EBM - Electron Beam Melting Key Features

EBM – Electron Beam Melting technology, is an Additive Manufacturing technique, which overcome the technological limitations of traditional orthopedics production processes

In the EBM process a high-energy focused electron beam is used to locally melt metallic powders, layer upon layer in a one step manufacturing process, obtaining the final 3D shape exactly as defined by a CAD model.

Electron beam is managed by electromagnetic coils providing extremely fast and accurate beam control enabling optimization of surface finish, precision and build speed simultaneously.

The EBM process takes place in vacuum and at high temperature, resulting in stress relieved components with excellent material properties, both chemical and mechanical characteristics



EBM - Electron Beam Melting Key Features

EBM technology for Orthopedic Implants, allows to manufacture innovative products and at the same time reduce production costs and lead times.

It is a cost-efficient production process for both press-fit and cemented implants. Particularly for volume production of press-fit implants with Trabecular structures, where solid and porous sections of the implant are built in the same process step, eliminating the need to apply plasma sprayed coating through expensive secondary processes.

It offers a direct CAD to Metal process that allows production of patient-specific implants using data derived from Computer Tomography (CT) to design an exact CAD model of the desired implant.



Leading Technologies

➡ Trabecular*Titanium* is an advanced cellular solid structure representing the next generation in additive manufacturing technology designed to resemble natural bone

Trabecular*Titanium*TM



➡ Conceived, produced and patented by Lima Corporate, Trabecular*Titanium* is made entirely of Titanium alloy or commercially pure Titanium.

Since 2007, our Trabecular*Titanium* technology has been available on the market. Lima Corporate is the world's largest producer of additive manufacturing implants in the healthcare sector.

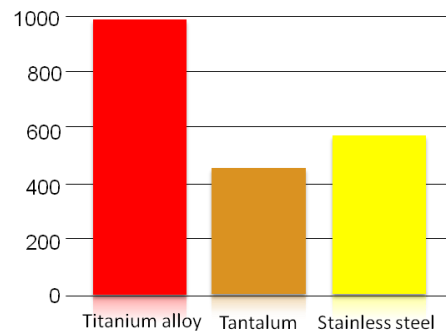
Leading Technology

Trabecular *Titanium*TM

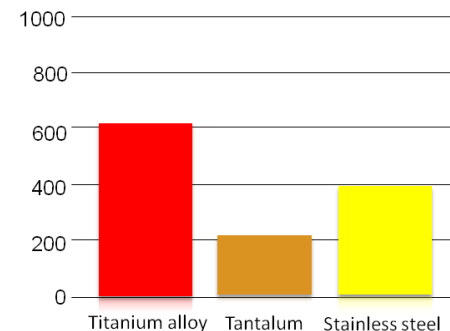
MATERIAL

This innovative material is made from Titanium alloy (Ti6Al4V), the most extensively used material in reconstructive orthopaedics thanks to its unique properties, like light weight, corrosion resistance, excellent biocompatibility and high mechanical performance, especially in terms of resistance to fracture and fatigue.

Tensile strenght [Mpa]



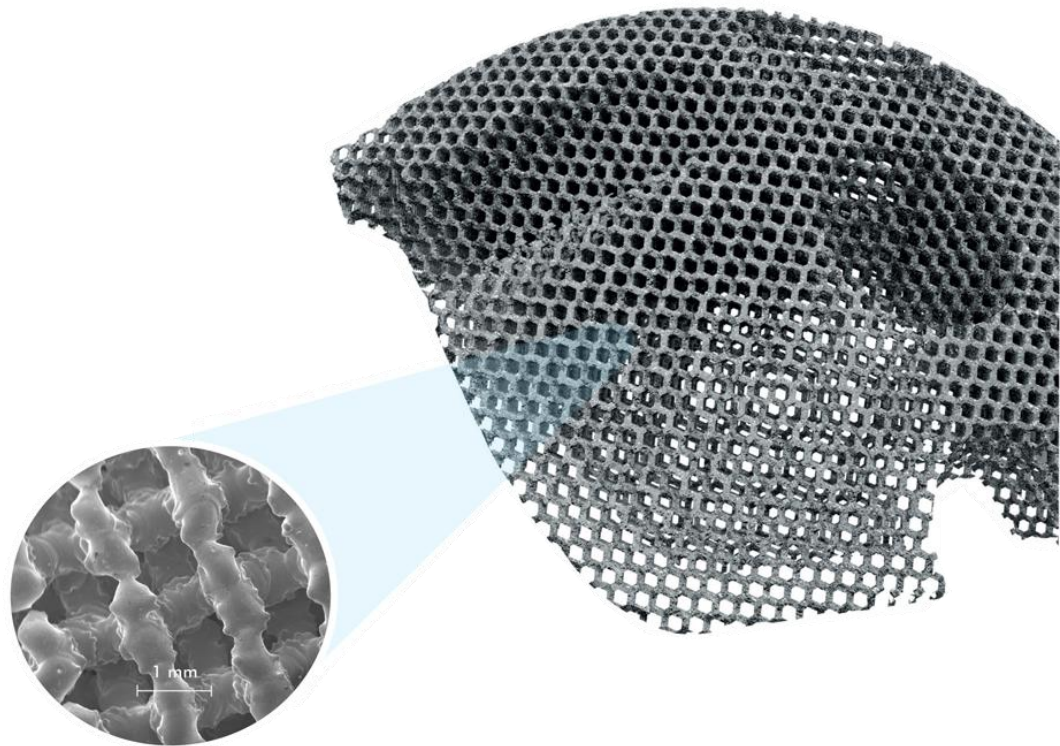
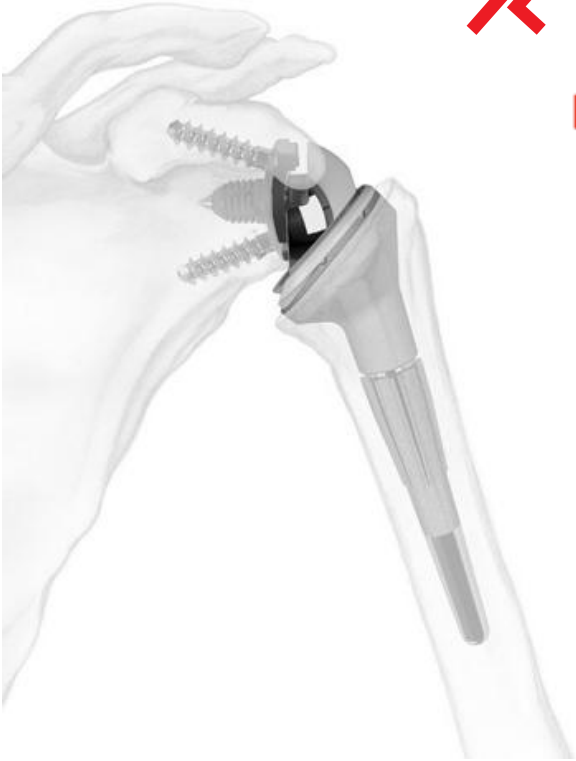
Fatigue resistance [Mpa]



Trabecular *Titanium*TM

STRUCTURE

Regular, three-dimensional, hexagonal cell structure that imitates the morphology of the trabecular bone. It has a high open porosity (>65%) and a mean pore diameter of 640 μm .



Leading Technology

Trabecular *Titanium*TM

KEY FEATURES

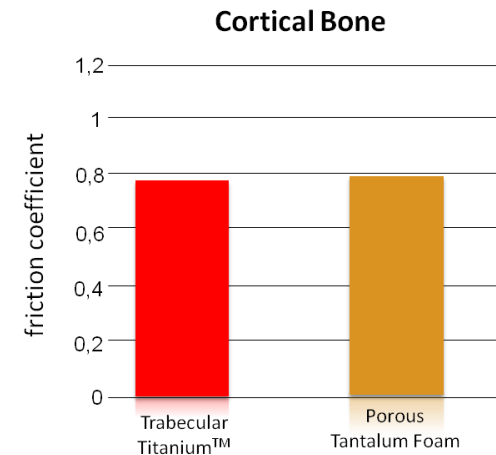
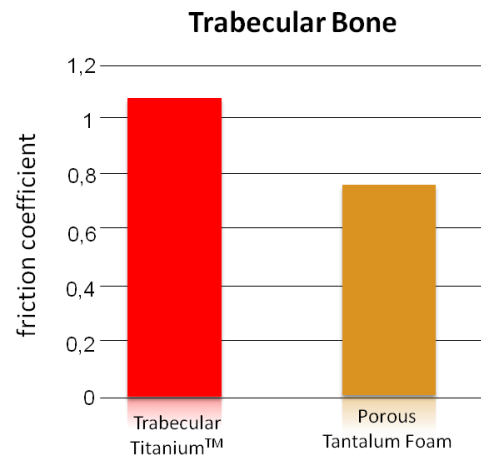
The geometric repetition of the Trabecular Titanium base cell produces a uniform and highly porous external surface that is responsible for a very high friction coefficient on bone.



Trabecular *Titanium*TM

KEY FEATURES

The very high friction coefficient on bone, enhances primary stability and, by reducing the risk of micromotion, promotes secondary stability.

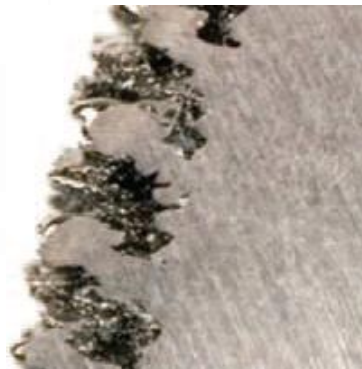


Leading Technology

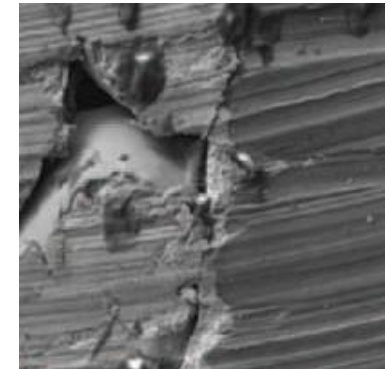
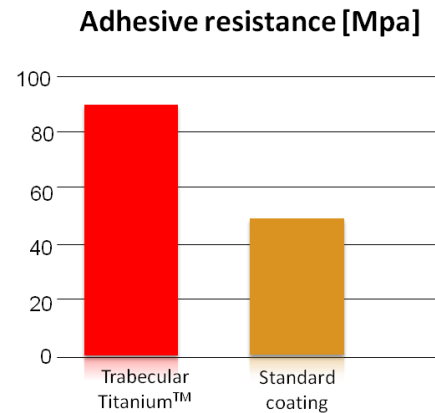
✕ Trabecular *Titanium*TM

KEY FEATURES

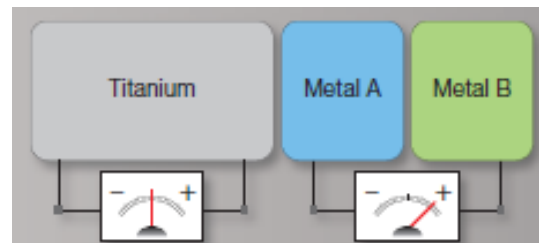
Trabecular Titanium is not a coating. The absence of an interface between the external trabecular structure and the bulk provides higher structural solidity and tensile resistance, reducing the risk of delamination, shedding and galvanic effects that are typical of macro-rough coatings.



Continuous Trabecular Titanium trabecular structure



Material discontinuity in a standard coating

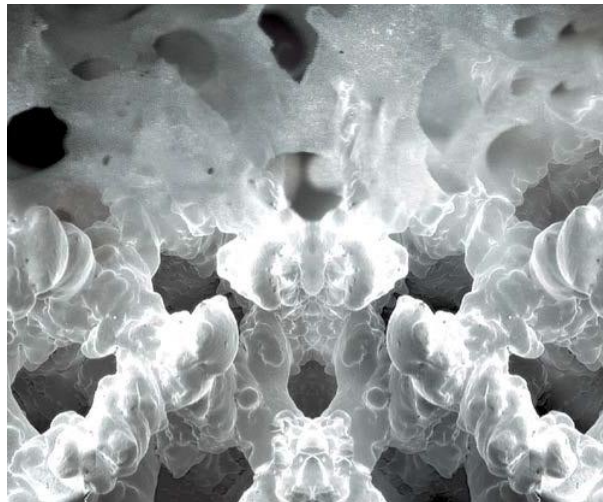
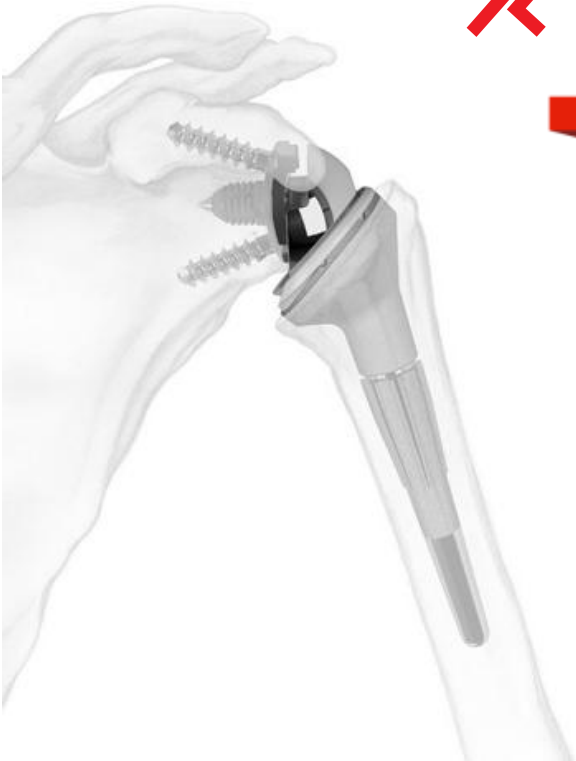


Volta effect in coupling between metals with differing electronegative potencial

Trabecular *Titanium*TM

KEY FEATURES

High and consistent open porosity and cell design with adequate pore size are expected to enhance cell migration and vascularization, facilitating the transport of oxygen, nutrients, ions and bone inducing factors, ensuring bone ingrowth and biological fixation (osteointegration)



Pore size is important for bone ingrowth

<10µm	Inhibition of tissue ingrowth ¹
10-75 µm	Fibrous tissue ingrowth
75 -100 µm	Unmineralized bone ingrowth
> 150 µm	Mineralized bone ingrowth ¹
150-300 µm	Haversian system ingrowth ¹
~ 600 µm	Fastest bone ingrowth²
> 1000 µm	Slower bone ingrowth ²

Increasing pore size

Leading Technology

Trabecular *Titanium*TM

KEY FEATURES

The 3D hexagonal cells structure has high strength and its elastic modulus is more similar to that of trabecular bone with respect of the other materials currently used in clinical orthopaedics.

ELASTIC MODULUS

Trabecular bone 0.63 GPa

Trabecular Titanium 1.12 GPa

Porous Tantalum 3 GPa

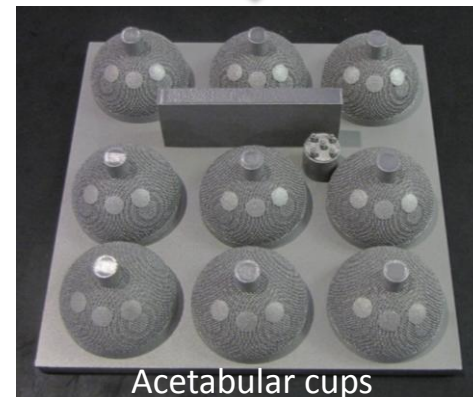
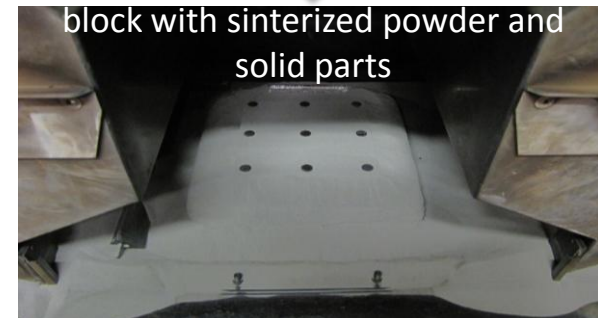
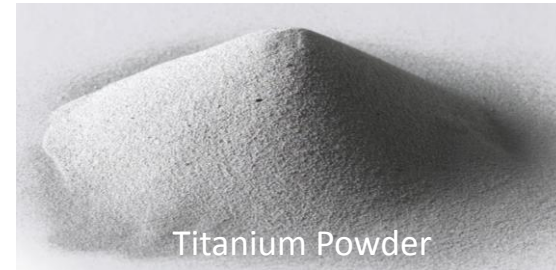
Titanium 108 GPa

Tantalum 186 GPa

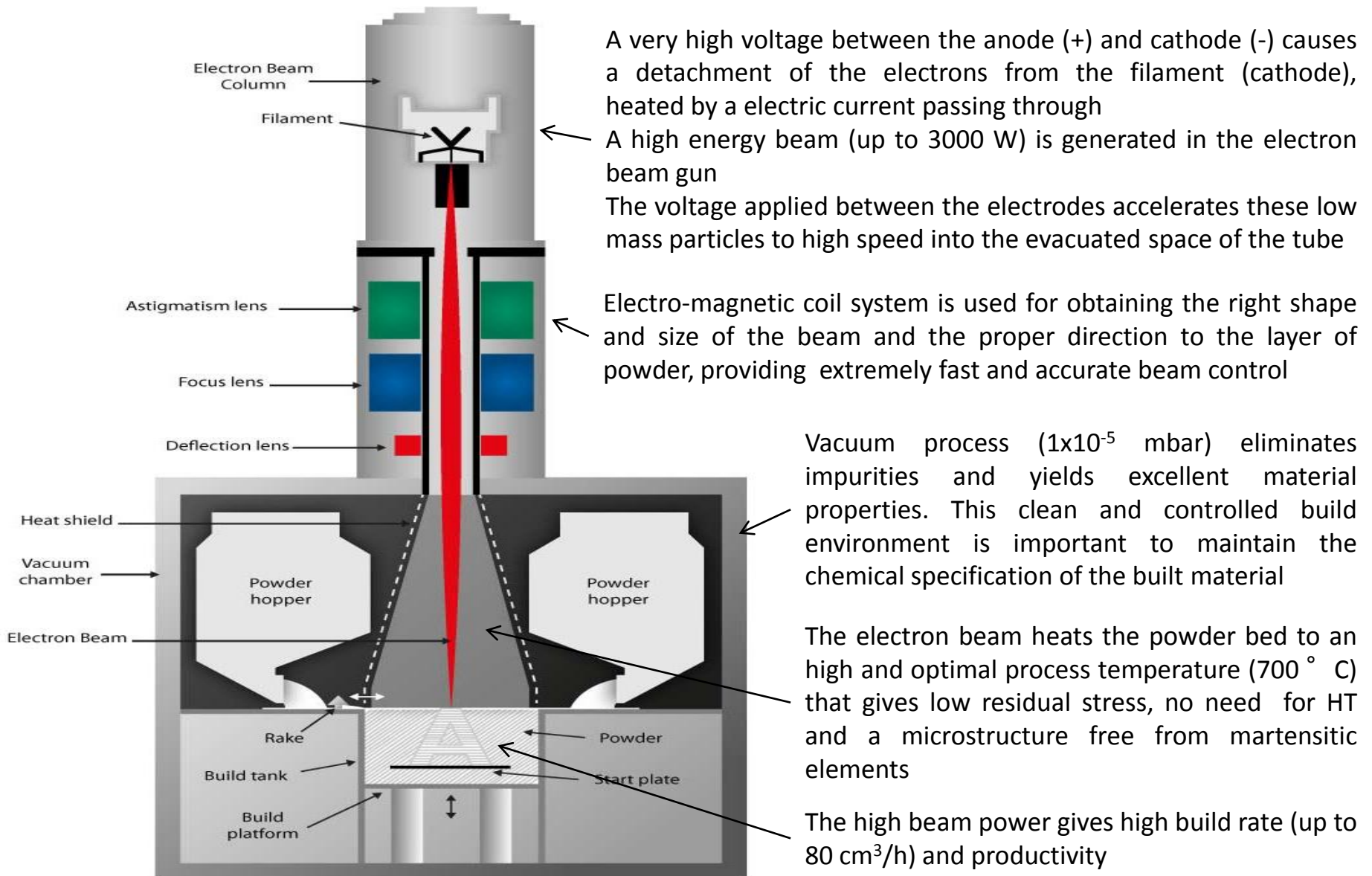
Trabecular Titanium has shown to promote a more physiological load transfer from implant to bone while reducing stress shielding and the associated bone resorption



EBM Process Overview



EBM Process Insight



EBM Products: Hip implants



DELTA-TT

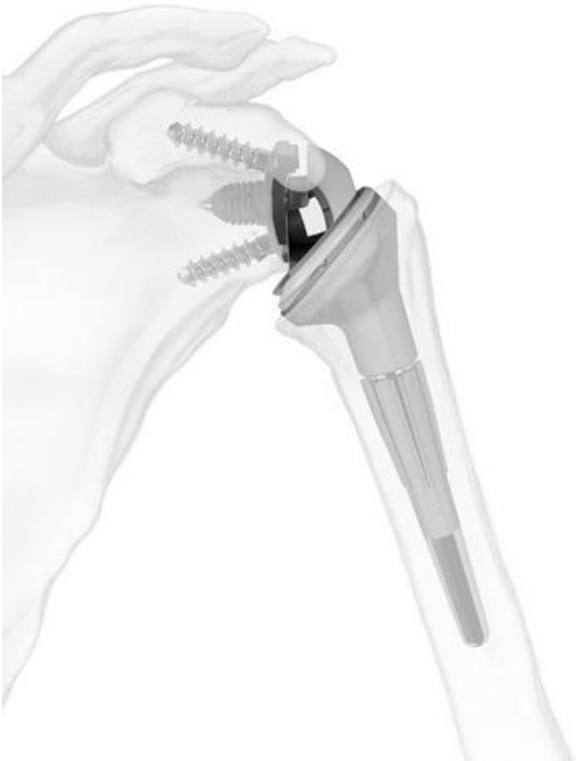


DELTA ONE TT



DELTA-REVISION TT

EBM Products: Shoulder implants

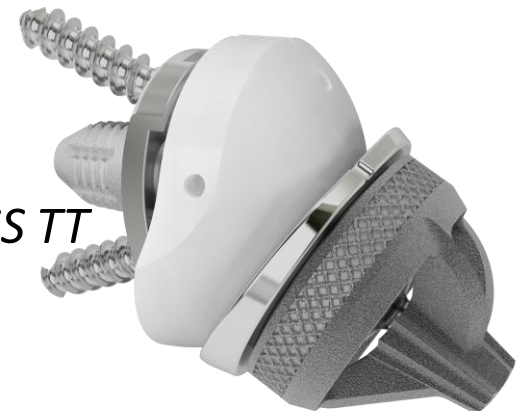


*ANATOMIC
STEMLESS TT*

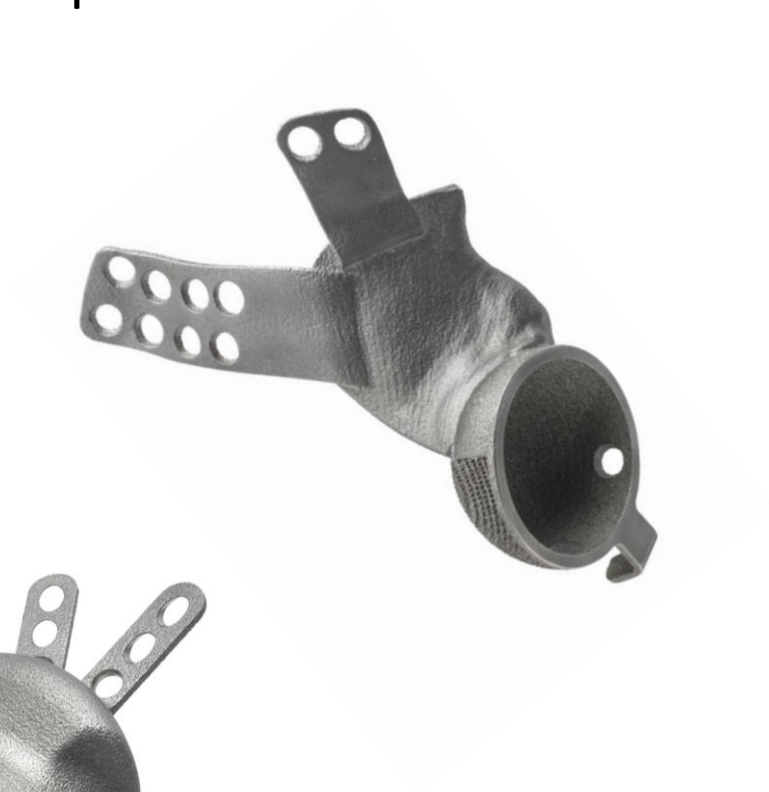
METAL BACK TT



*REVERSE
STEMLESS TT*



EBM Products: Custom Made Implants



Thank you!

Restoring the **Emotion** of *Motion*

