

# DESIGN AND MANUFACTURE OF A TITANIUM TIBIAL REINFORCEMENT CAGE USING ELECTRON BEAM MELTING

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# Agenda

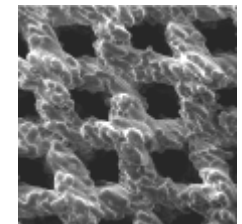
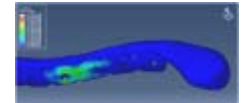
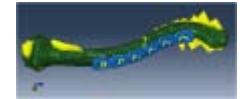
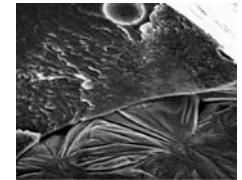
- Mid Sweden University and the Additive Manufacturing Laboratory
- Case study – Tibial Cage
- Other examples of R&D in the area
- Questions

# MID SWEDEN UNIVERSITY

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Östersund



Young and dynamic University  
in the heart of Sweden

# THE RESEARCHERS

- > Additive Manufacturing Laboratory initiated 2003 (EBM A2, Stratasys, Objet, BfB, etc)
- > Equipment for material characterization and reverse engineering
- > Project funding as for today:
  - > 1 regional
  - > 3 national
  - > 1 international



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Assoc. Prof.  
Andrey Koptioug  
andrei.koptioug@miun.se



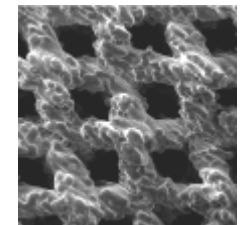
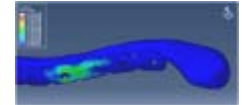
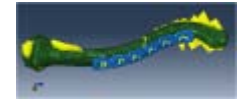
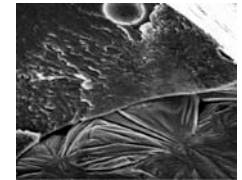
Prof.  
Mikael Bäckström  
mikael.backstrom@miun.se



M.Sc. Rebecca Klingvall  
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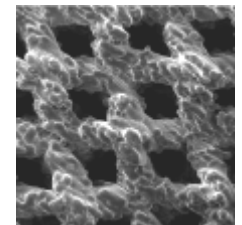
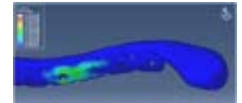
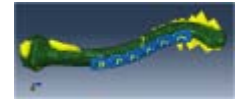
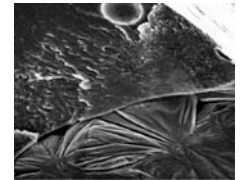


Ass. Prof.  
PhD. Marie Cronskär  
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# FUNDING

- > National:
  - > ***“Innovative components manufacturing technology through powder technology”***
  - > ***“ADDING – New generation tools using additive manufacturing”***
- > Regional:
  - > ***“Additive manufacturing as a competitive advantage”***
- > International:
  - > ***“Feasibility study of electron beam melting and laser sintering of 316L of in-vessel components”***



# HYPE?

**INDEED! BUT LET'S USE THAT  
FOR MARKETING PURPOSES!**



My colleague

The king!





The Queen!

Me

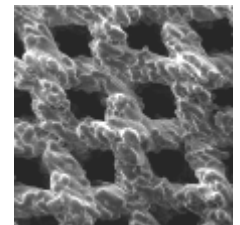
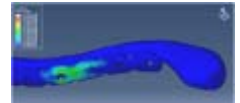
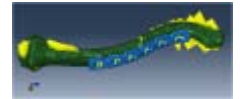
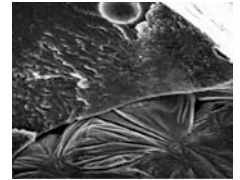
Swedish



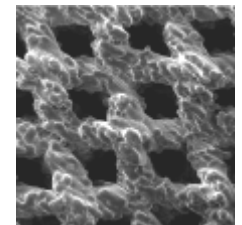
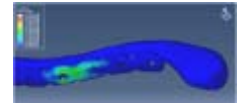
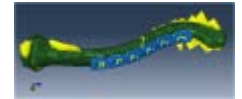
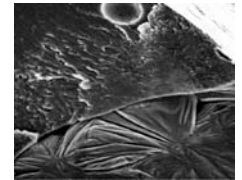
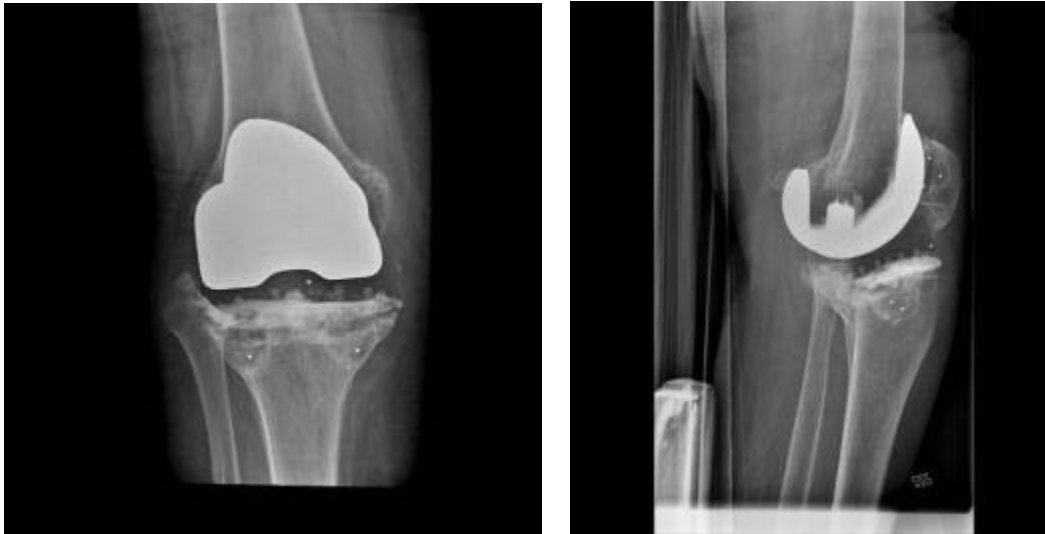


# DESIGN AND MANUFACTURING OF A TIBIAL REINFORCEMENT CAGE USING EBM

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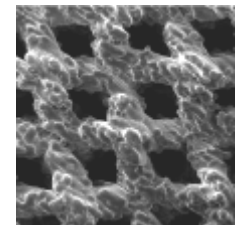
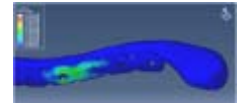
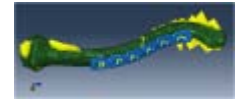
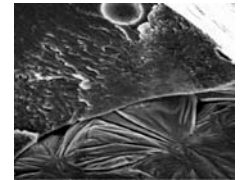


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- > The cage was manufactured in Ti64, sterilized and then used for the revision surgery.
- > The 15 and 52 week post-surgery follow-up showed satisfactory results with no signs of radiolucency or loosening.

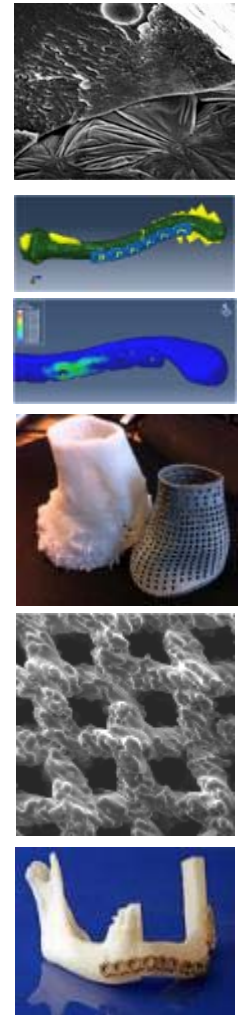
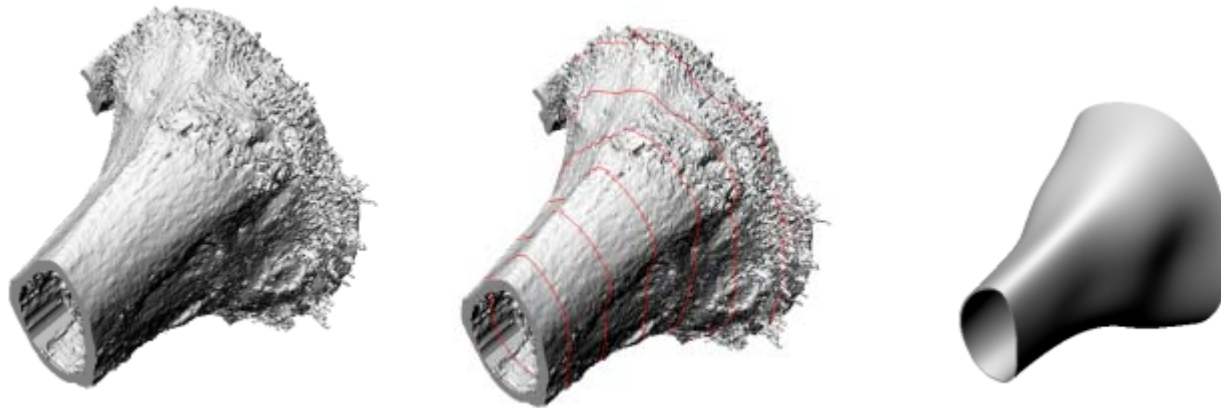
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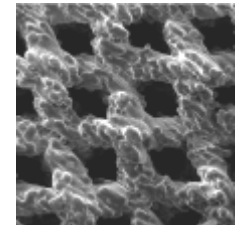
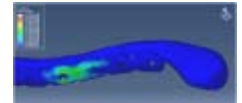
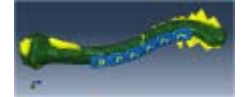
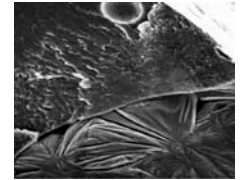
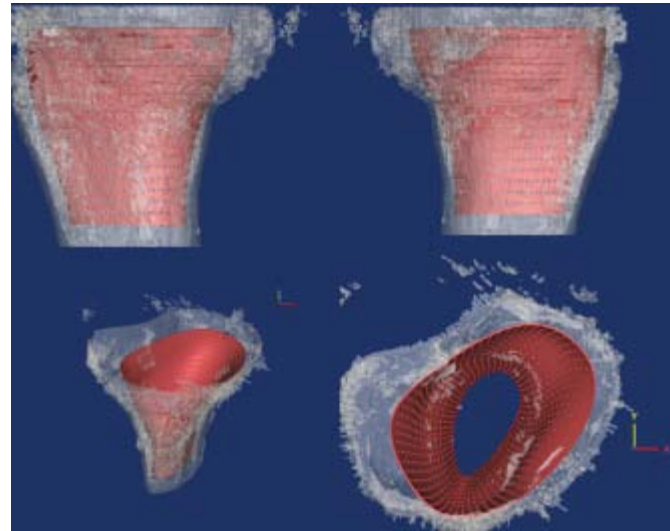


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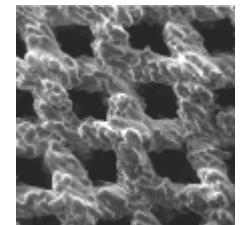
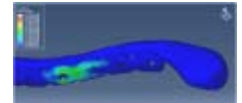
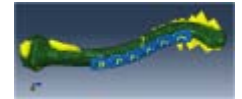
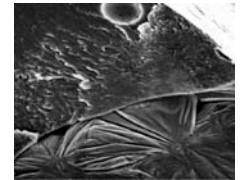
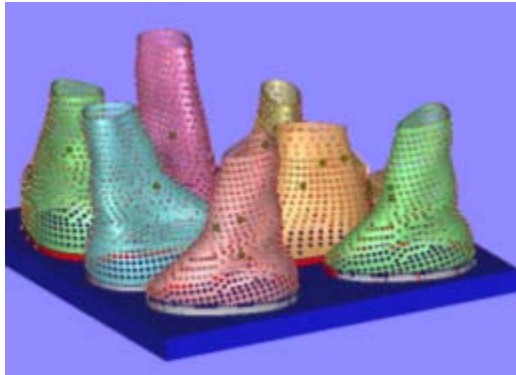
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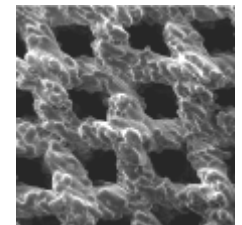
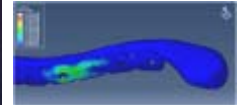
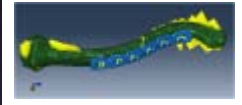
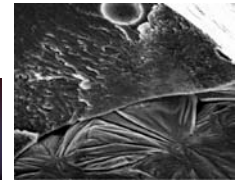
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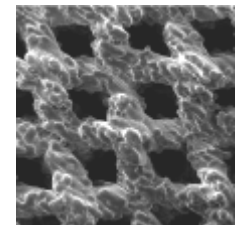
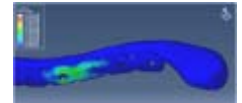
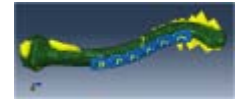
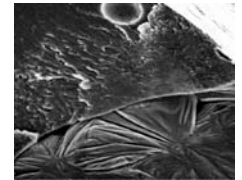
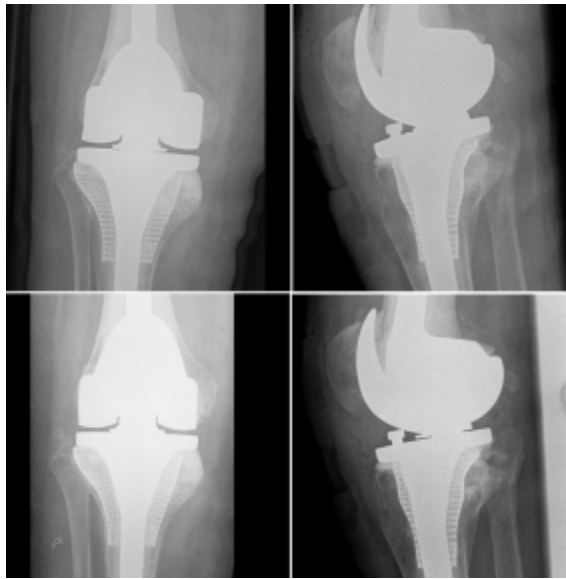
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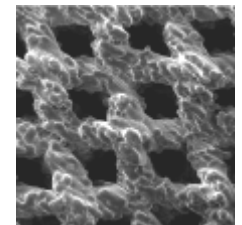
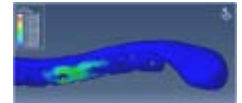
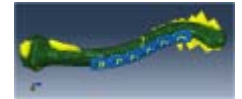
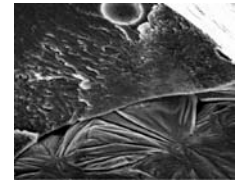
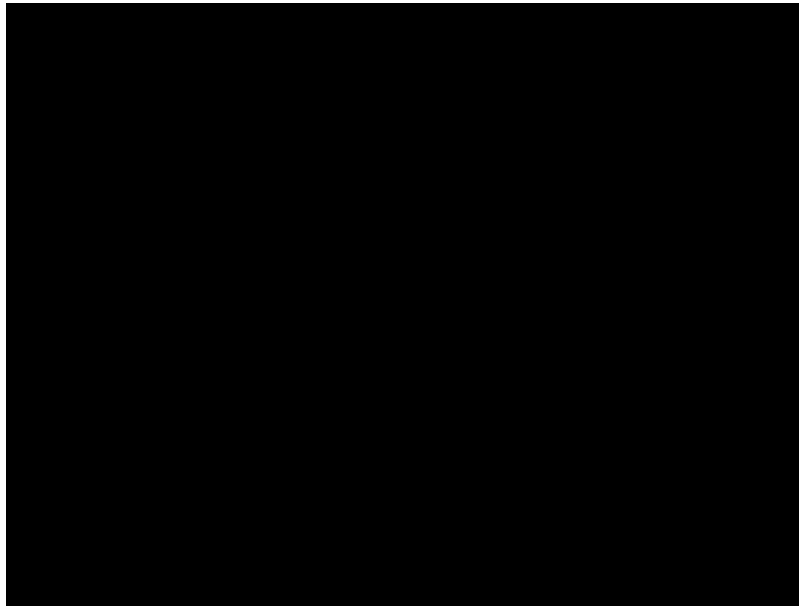


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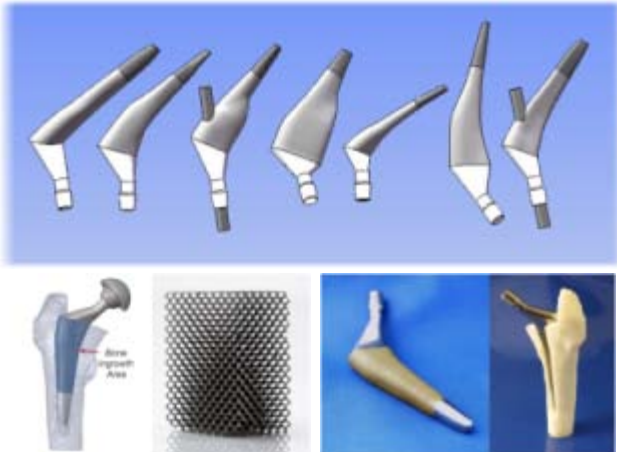
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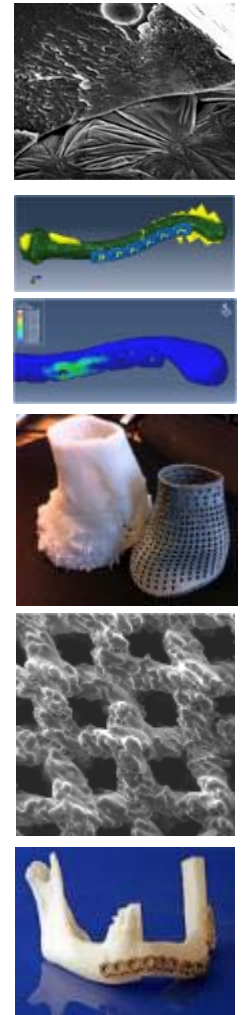
# OTHER MEDICAL APPLICATIONS



Jan Hirsch,  
Uppsala university hospital  
Per Dérand,  
Skåne university hospital



Börje Samuelsson,  
Östersund hospital



- > Patient-specific hip prosthesis
- > Customized maxillofacial implants
- > Customized orthopedic plates
- > Optimization of surfaces for bone ingrowth

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