

# DESIGN COMPETITION IN METAL 3D-PRINTING



The winning contribution will be awarded  
5000SEK from Mekinor Metall AB and three  
printed samples (worth 300-1000SEK each)  
Send in your contribution latest 21 may 2021



Organised by project I2P (Idea to print of metal products)  
Collaborating organisations:

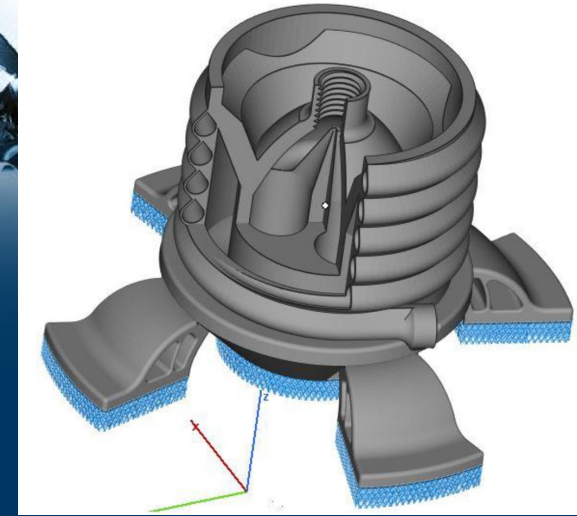


# ABOUT THE COMPETITION

- 3D-printing is a part of industry 4.0 and is a rapidly increasing manufacturing method that will become a complement to manufacturing techniques of today, but also has the potential to reshape manufacturing ecosystems due to its inherent flexibility and high quality in its manufactured components (compared to cast materials)
- At LTU there is a system for 3D-printing in metals (Aconity mini), that is a powder bed- and laser based system for material and process development. Mostly components in stainless steel (316L) and aluminium will be produced. Manufacturing of components is unfortunately not very cheap and therefore needs to be adapted for the manufacturing method. In addition, the method allows for increased flexibility and possibilities that further adds value if used accordingly



- In the project I2P (Idea to print of metal products) we have as a mission to reach out to the society and manufacturing industries about this new modern manufacturing technique. Within the project we will print out components that will be distributed to companies and organisations to increase awareness. These components shall demonstrate some advantages that can be achieved when using the manufacturing method, e.g. moving parts, complex shapes, part consolidation, lightweight etc.
- The competition is about creating a contribution that shows advantages of metal 3d-printing and pulls the mind towards the university and the project (through shape or text). The winning contribution will be printed and distributed throughout the region to collaborative partners, companies and other organisations (arctic parts of Norway, Finland and Sweden)
- It is preferred if the component contribution has some kind of function, e.g. a tool or puzzle and that is has a proper shape to attach on a keyring



# CRITERIA FOR THE DESIGN COMPETITION

## - 3D-PRINTED DEMONSTRATION DETAIL IN STAINLESS STEEL

- Maximum volume: 30 mm x 30 mm x 65 mm
- Geometry adapted for 3D-printing:
  - Minimum wall thickness: 0.3 mm
  - Minimum rod diameter: 0.3 mm
  - Minimum overhang angle: 60°
  - Use support structures that needs removal to a minimum (in forged metal that is challenging and time consuming to remove)
  - It is an advantage if the component is designed standing so that several can be easily fit on the build platform so that more can be built at the same time (productivity and economy aspects)
  - Also see guidelines for printing with L-PBF systems (see links to free guidelines)



# CRITERIA FOR DESIGN COMPETITION- 3D-PRINTED DEMONSTRATION DETAIL IN STAINLESS STEEL

- Will include two logotypes/names:
  - LTU, either as:
    - TEXT with minimal font size 2.5 mm high
      - Either as LTU or Luleå university of technology
    - LOGOTYPE (Logotype can also be part of the component design)



- I2P:
  - TEXT with minimal font size 2.5 mm high (reserv space for seven characters)
  - LOGOTYPE



# CRITERIA FOR DESIGN COMPETITION- 3D-PRINTED DEMONSTRATION DETAIL IN STAINLESS STEEL

- Extra points for:
  - Ear to attach to keychain
  - Not "only" a capsule opener
  - Can be able to be used somehow
  - Be fun to play with (e.g. an advanced puzzle)
  - Does not or only need little post work (e.g. removal of support structures)
- To be sent in to [jan.frostevarg@itu.se](mailto:jan.frostevarg@itu.se) latest 21st May 2021:
  - CAD file in neutral format (.step, .stl, .3mf)
  - Rendered image of the designed component
  - Short description of designed component



# FREE GUIDELINES FOR METAL L-PBF (LASER POWDER BED FUSION)

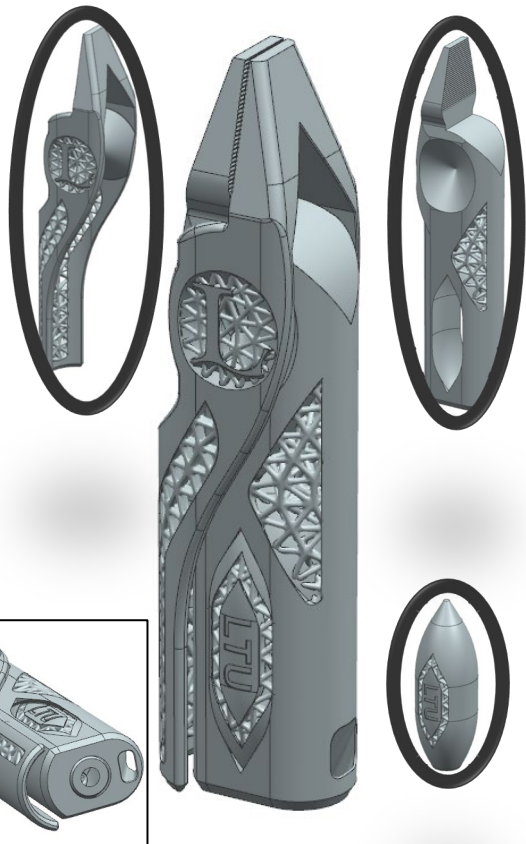
(NOTE! DMLS ≈ SLM = L-PBF)

- Fraunhofer IWU: DESIGN FOR ADDITIVE MANUFACTURING – Guidelines and Case Studies for Metal Applications
- Renishaw: Design for metal AM – a beginner's guide
- Materialise: Design guidelines
- VTT (Erin Komi): Design for Additive Manufacturing
- VTT: Design guide for additive manufacturing of metal components by SLM process
- European Additive Manufacturing Group (EuroAM)



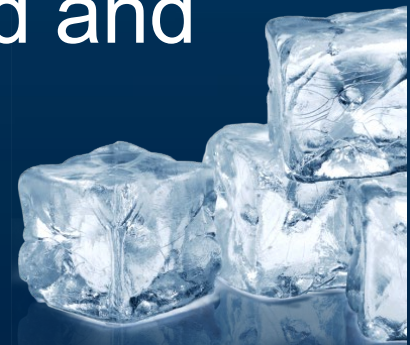
THE WINNER OF LTU'S DESIGN COMPETITION FOR  
DEMONSTRATION COMPONENT MADE BY METAL 3D-PRINTING IS:  
DR. JONAS NÄSSTRÖM!

*PLIERS WITH COMPLEX, MOVING PARTS MANUFACTURED  
INSIDE EACH OTHER*



The winning contribution of  
5000SEK is sponsored and  
awarded by

**MEKINOR  
METALLAB**





# MOTIVATION

- The winning contribution shows well the advantages of metal 3d-printing. It shows possibilities of :
  - Light weight structures
  - Part consolidation
  - Parts manufactured inside each other
    - Can only be manufactured by other methods if several parts are joined after mounting
      - can be very complex and also here without any joints!
  - Moving parts
  - Can be used as a tool
  - Has features on the surface for decoration, which does not add any extra cost during manufacturing

