



# INTRODUCTION TO TOPOLOGY OPTIMIZATION



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# R2P2 project

The strategic objective is to step up the development of the excellent research in the field of interactive, sensible autonomous robotic systems based on additive manufacturing and using smart materials based on nanopolymers.

- The competitiveness of research in this area through staff and student exchanges, expert visits and participation at conferences.
- The implementation of international scientific projects or contacts, to lead to the creation of new project ideas.
- The organization of expert seminars, workshops, PhD forums and international conferences.
- The transfer of knowledge from leading research centers to the specialist workplaces at TUL.



# R2P2 project – members and contacts



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<http://r2p2.eu/>



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# Laboratory of prototype technologies and processes at TUL



**lab3d.eu**



# Agenda

- Additive design
  - Additive vs. subtractive manufacturing approach
- nTop Platform software introduction
  - Practical examples
- Topology optimization process in nTop Platform
  - Practical examples

# Additive vs. subtractive design

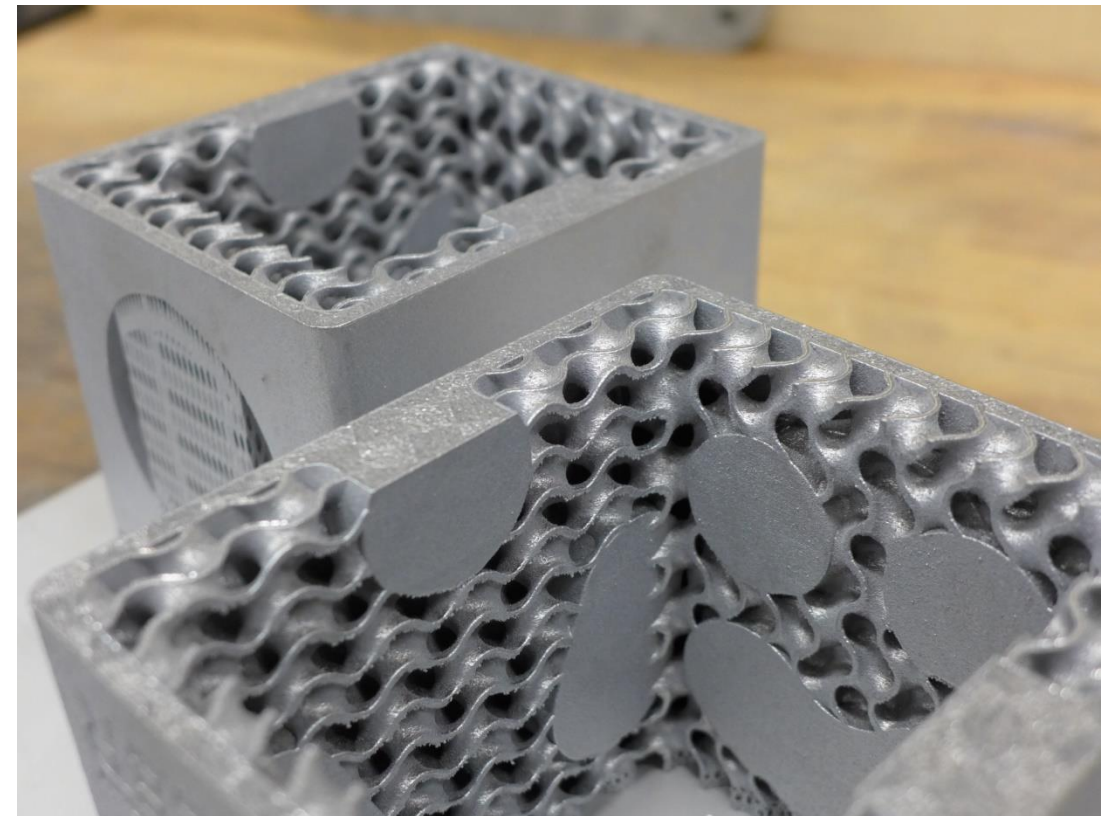


Source: <https://environmentalengineering.org.uk/news/3d-printing-adds-up-for-aviation-3748/>



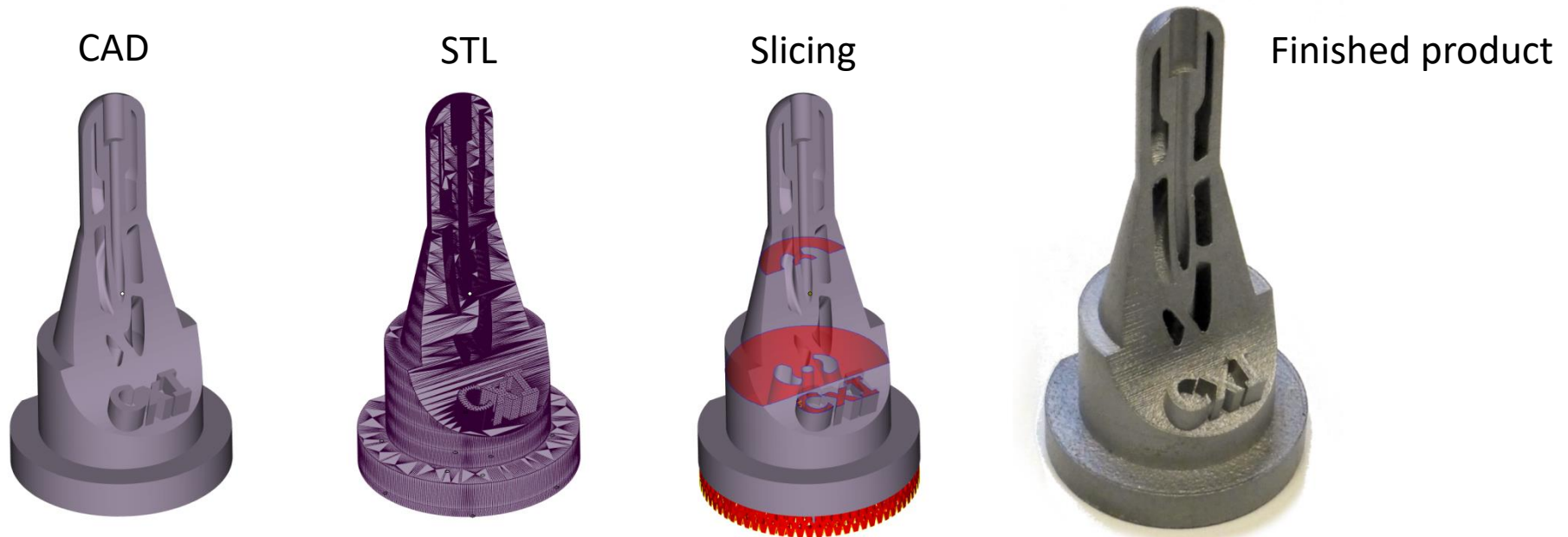
# Additive design

- Set of rules for design of new part with regard to additive manufacturing methods
- Main aims:
  - Reduction of part volume
  - Minimization of support structures needed to build the part
  - Avoiding deflections



# Challenges of additive design

- In standard CAD tools, the design for additive manufacturing is demanding process.
- Need of data transfer between many specialized software products







# nTop Platform

- Fill the gap in effective design for additive manufacturing
- Covers following areas:
  - Lattice structure modelling
  - Finite element method
  - Topology optimization
  - Direct slicing of the data for selected machines



# nTop Platform (<https://ntopology.com/ntop-platform/>)

nTopology

Platform

Applications

Resources

Partnerships

Company

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## Engineering software built for digital manufacturing

The way we build parts has changed. Your engineering software  
needs to change too.

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# Upcoming seminars



Online seminar

# Virtual Hands on training on Maxon motors

**doc. Ing. Josef Černohorský, Ph.D.** - Institute of Mechatronics and Computer Engineering (MTI),  
Technical University of Liberec

**Date:** 18.12.2020

**Time:** 12:30 CET

**Registration:** [info@r2p2.eu](mailto:info@r2p2.eu) until 17.12.2020

**FREE PARTICIPATION**

- Getting started (short HW description, motor+encoder combination, etc.)
- Drive commissioning (what about limit switches)
- Debugging and drive monitoring (build-in oscilloscope)
- Regulation tuning
- Controlling via external controller thru (USB, UART, CANOpen)



# Thank you for your attention.



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