

## INTERNSHIP PROPOSAL

### Morphing Voxelizations for Digital Manufacturing

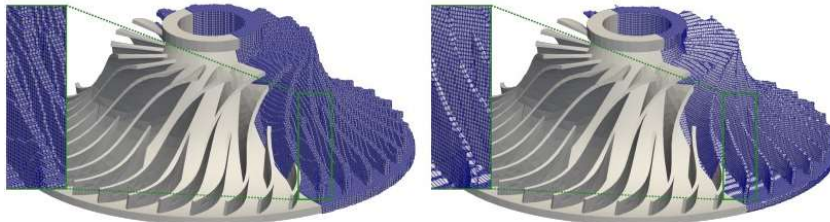


Figure 1: Geometry of a compressor depicted in gray. Left: Raw voxelization. Right: Morphed voxelization.

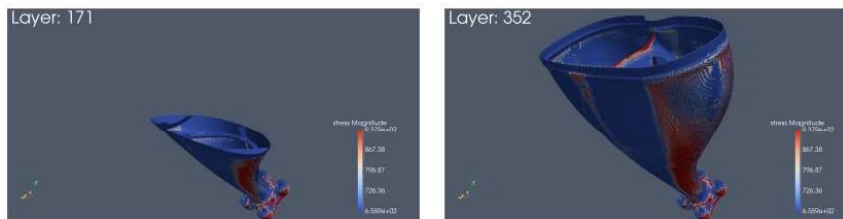


Figure 2: Numerical simulation of a reservoir printing using Morfeo – Cenaero ©

Voxelizing a design robustly and rapidly provides an off-the-shelf discretization for numerical simulation, even for poorly defined geometries where reliable mesh generation is unavailable. However, voxelization may introduce aliasing of some features due to the pixelation of the geometry.

Morphing the voxelization into a valid hexahedral mesh that better fits the geometry significantly reduces the pixelation effect, enhancing the fidelity of the representation and potentially improving the accuracy of subsequent simulations.

#### Objectives

The objective is to explore the benefits of utilizing a morphed voxelization approach in digital manufacturing methods such as additive manufacturing. This investigation aims to enhance the morphing algorithm to more accurately capture the geometry and topology of the design.

#### Profile

- **Required: Bachelor + ongoing Master's studies in Mechanical, Electromechanical, or Aeronautical Engineering or data science.**
- *Languages: English and/or French.*
- *Pre-requisites: notions of mesh generation, numerical simulations-magnetic simulations + programming (Python, C++).*
- *Motivation, creativity and team spirit!*

#### Duration

The length of the internship can vary from 4 months to 6 months, depending on your university or school regulations.

#### Contact

Interested candidates should send a cover letter, quoting reference number of the offer (BE-IP-2024-005), and a resume to [rh\\_be-ip-2024-005@cenaero.be](mailto:rh_be-ip-2024-005@cenaero.be)