Master thesis project: Automatic design implementing machine learning strategies for satellite components. (30 credits)

Background

Additive manufacturing (AM) is a technology promising increased design freedom, which has the potential to reduce lead-times and manufacturing costs, enabled by weight reduction achieved through efficient material allocation. The use and development of AM is growing rapidly within the aerospace industry. However, AM also comes with challenges, and one of paramount challenges of this technology is the generation of problematic support structures.

Support structures are required for supporting overhanging features, since the AM process builds the product adding a layer of material onto the precedent layer. Such support structures are necessary but increase building time and cost and can have an adverse effect on part quality (e.g., surface finishing and useful life). There is extensive research presented about printing orientation for support reduction. These types of strategies are applied after the design stages, when the part is already designed. To further reduce support structures, other alternative is to include design for support reduction early in design phases.

This thesis project looks into implementing neural networks as a machine learning strategy for automatically modifying a part (or product) geometry to reduce the support structures generated when 3D printed.

Thesis questions and expected outcome

This thesis requires to study the geometry of the different components of a satellite antenna to understand how the design can be modified to reduce the use of support structures. A script has to be designed and written for automatically changing the antenna components geometry and to be applied to other similar products. The script should implement machine learning strategies for achieving this automation.

Student profile and application

Strong interest in combining programing with applied mechanical engineering design. Desired programing experience in C++, Matlab or Phyton. Application open to any master program. Start in January or per agreement.

Contact information

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