

MUNICH AEROSPACE – NEW HORIZONS IN AVIATION AND SPACE

In 2010, through Munich Aerospace and its pooling of research, graduate programs and teaching an alliance has been formed between the **Technical University Munich (TUM)**, the **Bundeswehr University Munich (UniBwM)**, the **German Aerospace Center (DLR)**, as well as **Bauhaus Luftfahrt (BHL)**.

To promote excellent, scientific young academics, Munich Aerospace awards a PhD scholarship on

Hybrid lightweight structures by using of additive manufacturing

The Chair of "Materials Technology of Additive Manufacturing" is part of the Department of Mechanical Engineering at the Technical University of Munich (TUM) and is headed by Prof. Peter Mayr. The scientific focus of the chair is reflected in its group structure, which concentrates on the areas of "Materials Science", "Materials Processing", "Materials Performance" and "Materials Computation". This scientific portfolio is complemented by the two overarching groups "Digital Innovation" and "Frugal Innovation", which deal specifically with the topics of digitalization and sustainability and support the other groups in this regard. The research group "Materials Processing", which is involved in this project, is mainly concerned with the development of joining and build-up strategies for complex metallic materials and dissimilar joints. In the field of additive manufacturing, the group develops, among other things, concepts for building multi-material components. So-called directed-energy deposition processes using electric arc, plasma and laser, as well as layer-laminated manufacturing in the form of diffusion joining, are used. The use of state-of-the-art microscopic methods and complex testing technology completes the holistic approach to joining and additive manufacturing tasks. In this Munich Aerospace research group, we collaborate closely with Prof. Jägles chair of "Materials for Additive Manufacturing" of the University of the Bundeswehr Munich (UniBwM).

Your tasks and qualifications

Additively manufactured metallic components are being used more and more frequently in the aerospace industry, where lightweight construction and efficient use of resources are of central importance. Therefore, a hybrid form of additive manufacturing will increasingly establish itself in the future. In this process, only individual, possibly very complex structures are additively applied to conventionally manufactured semi-finished products. This can be done either in the process itself, when a semi-finished product is used instead of a conventional substrate plate, or in a subsequent step, where two components, one conventionally and one additively manufactured, are joined together.

The given topic relates both to the additive manufacturing of large-volume multi-material components and to the joining of conventionally manufactured components with additively manufactured components. The focus of your research will be the development of suitable build-up strategies for additive manufacturing, especially with regard to the resulting property profile of the component, and the systematic development of joining strategies taking into account the weldability of the additively and conventionally manufactured structures.

In order to ensure a smooth entry into the topic, you should already have previous **experience** in the field of **additive manufacturing or welding engineering of metallic materials**. This includes, in particular, **experience** with the **manufacturing and joining processes** used in the project (**WAAM, Plasma-DED, Laser-DED**), as well as **knowledge** of the **process-structure-property relationships**. In addition, initial **experience** with common **CAD and data processing software** as well as knowledge of **robot control** is advantageous.

The Chair of Materials Engineering of Additive Manufacturing offers an excellent research environment with up to date laboratory equipment to realize your ideas. The group consists of a highly motivated and interdisciplinary team that will support you during your personal and scientific development.

Munich Aerospace scholarship is awarded for a period of three years. The monthly scholarship according to the Munich Aerospace scholarship directives is € 1,575 per month (tax free upon § 3 no. 44 EStG). Munich Aerospace scholarship holders are entitled to attend the Munich Aerospace Graduate School, formed by the TUM Graduate School and the DLR Graduate_Program, and have access to special events and trainings. An additional grant of up to € 6,100 per year will be available to cover expenses that are directly related to the PhD project (e.g. textbooks, laptop, conference travels, public transport, housing subsidy). The scholarship holder is part of a Munich Aerospace research group and receives additional technical support from the research group head. The PhD can be obtained at TUM under the supervision of Prof. Mayr and the completion of the university degree should not be more than three years prior to the application for the scholarship.

Interested?

Please send us your application including relevant documents (cover letter, CV, diplomas, transcript of records) in PDF format to tom.adams@tum.de

Application deadline: 12.07.2021

We are looking forward to your application!