

ZPRÁVA ŠKOLITELE O VĚDECKÉ ČINNOSTI STUDENTA

Supervisor's report on the student's scientific activities

Titul, jméno a příjmení studenta:

Title, name, surname of student

Daniel MELZER

Osobní číslo:

Personal number

S21P0062K

Doktorský studijní program:

Doctoral study programme

P0715D270027 Manufacturing and Materials

Název disertační práce:

Topic of the dissertation thesis

**Fracture behaviour of heterogeneous materials
manufactured using additive technology**

Školitel:

Supervisor

prof. Ing. Ján Džugan, Ph.D.

Vyjádření školitele:

Supervisor's statement

Ing. Daniel Melzer graduated in specialization: "Materials Engineering and Mechanical Metallurgy" at the University of West Bohemia in Pilsen, Faculty of Mechanical Engineering, Department of Materials and Mechanical Metallurgy in 2019. After graduation, he joined COMTES FHT a.s. in 2019 as a researcher at the Department of Mechanical Testing and Thermophysical Measurements. Since the beginning of his professional activity, he has been involved in the field of Additive manufacturing of multi material components deposition by Powder Blown Laser Directed Energy Deposition process. His doctoral thesis deals with the assessment of Fracture behaviour of heterogeneous materials manufactured using additive technology.

In the case of his thesis, the defined area of interest is the investigation of deposition parameters and specifically the effect of the interface orientation and its quality and material deposition order on fracture behaviour assessed in terms of uniaxial tensile tests and fracture mechanics tests. Investigations of fracture behaviour are supported by a detailed analysis of the structures with an emphasis on the area of the connection of the two basic materials. All the results found have an impact on the applicability of the material produced in this way in technical practice. Additively manufactured materials are known for their very complex thermal history, which defines their unique structural and material properties. In the case of depositing material layers on an existing component or repairing a damaged component, it is thus necessary to guarantee that the resulting material connection will have the quality and properties corresponding to the operating conditions of the given component. Due to the assumed wide scope of the work, there is extensive amount of material research techniques in which the student had to specialize during his studies and manage all these activities by himself as part of his workload. Namely, these are the additive manufacturing of the above-mentioned materials and the choice of deposition parameters, the design and production of test samples for mechanical tests, the implementation of mechanical tests and the metallographic analysis of structures. The topic of the doctoral thesis is closely related to the workload of the student, who solves all activities within the framework of research projects. His main project related to Ph.D thesis was:

EF17_048/0007350 Pre-Application Research of Functionally Graduated Materials by Additive Technologies 2019-2022.

The doctoral student was very active throughout his studies with a creative approach solving the given problem. He generated unique results that he appropriately processed and interpreted that made it possible to publish his work in top scientific journals. In the course of his Ph.D studies he published 18 papers (5x as a first author out of which 5xQ1) in highly ranked international scientific Jimp journals (10xQ1 and 4xQ2). Currently he has 146 citations and H-index=7 according to Scopus.

Throughout his doctoral studies and the preparation of his dissertation, he had a very responsible approach, and the presented results are a valuable contribution to the development of additive manufacturing of multiple materials components by L-DED process. The dissertation of Ing. Daniel Melzer I assess very positively and recommend it for defence.

Datum
Date

21/02-
2024

Podpis školitele:
Signature of supervisor