

Assessment or Evaluation of the Doctoral Thesis

- from the aspect of the topicality of the problem

This is another impressive work that continues the former investigations of the supervisor's research group (prof. Ing. Ondrej Jirousek, Ph.D) how to absorb energy using auxetic structures in a micro-scale-level. This is the first doctoral thesis that deals with dynamic behaviour at moderate strain rates (drop-tests) and high strain rates (split hopkinson bar) instead of static behaviour.

- from the aspect of work for the scientific field

As every experimental research work the value of this thesis is the planning, execution, documentation and analysis of complex structural problems. Many researchers are dealing with numerical modelling but few deliver experimental values to verify or calibrate their theoretical assumptions. Well done.

- from the aspect of the problem-solving process

The thesis starts with well-known procedures to collect specimen's mechanical properties under quasi-static behaviour. The further experimental testing deals with dynamic properties, moderate strain conditions using drop tower and high strain rates using Split Hopkinson Bar. The specimen were cellular metals, interpenetrating phase composites (IPCs) and other fillings (polyurethane foam, ordnance gelatine). The experimental setups were well documented and the results were presented and discussed at a high-quality level.

- the evaluation of author's publications in relation to the topic of work

There are 17 published articles, whereof 10 are published in journals with impact factor or papers listed by SOPUS and/or Web of Science. There are numerous citations, the Hirsch factor is 5. This is an outstanding result of a phd-study-program.

- from the aspect of the formal arrangement of the thesis

The formal appearance of the thesis is at an high level. This includes graphic processing, formal and grammatical editing as well as tables and graphs. The latter are well presented and give appropriately information regarding to quality and quantity.

- from the aspect of the overall level of the doctoral thesis

The doctoral thesis shows that the candidate is able to use scientific approaches and tools to solve recent problems at a high-quality level. He researched the state of the art and was able to extend scientific knowledge by own experimental work. His documentation and analysis of the obtained data is best scientific practise and his conclusions shows that he is full aware of the chosen topic. To summarize, **I evaluate the submitted doctoral thesis in a positive way and propose to accept this thesis by Ing. Tomas DOKTOR for dissertation defence.**

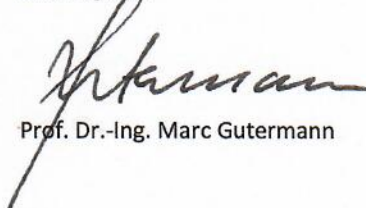
I am looking forward to a very interesting defence, when the candidate may answer briefly the following questions

- The quasi static loading test calculates the stress using a constant specimen's cross-section A_0 . Is this assumption suitable for auxetic structures? (p. 40 ff)
- The drop tests of fillers and foam show a smooth non-linear stress-strain-relationship overlain by waves (p. 47 ff). What's the reason for this effect?
- Do you think that it is possible to find numerical models that are able to fit your experimental results?
- Auxetic structures are suitable for any protection layer, i. e. helmets or vests. Which further research work is to do to bring these structures to application?

After successful defence of the dissertation thesis I **propose to award to Ing. Tomas DOKTOR the title Ph.D. ("doctor") in the Technology and Technics of Transport and Communications study program.**

I am looking forward to meet you virtually at the defence. Please don't hesitate if you might have any question according to my review.

Best regards



Prof. Dr.-Ing. Marc Gutermann