



**Innovation Center of  
Faculty of Mechanical  
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**Faculty of Mechanical  
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# **„International Conference of Experimental and Numerical Investigations and New Technologies“**

**Sponsored by:**

**MINISTRY OF EDUCATION, SCIENCE AND TECHNICAL DEVELOPMENT  
OF THE REPUBLIC OF SERBIA**

# **Programme and The Book of Abstracts**

**05 – 08 July 2022**

**Zlatibor, Serbia**

**„International Conference of Experimental and Numerical  
Investigations and New Technologies“**

# **CNN TECH 2022**

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## DESIGN AND DEVELOPMENT OF STATIC LOAD TEST STAND FOR VARIOUS SIZES OF MULTICOPTER ARMS

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### Abstract

*The constant advance in the usage of unmanned aerial vehicles (UAVs) of all types, including electric multicopters (rotary-wing drones), requests further advancement on all project levels in order to create a competitive final product. With the usage of composite materials, mainly carbon fiber in epoxy resin, it is possible to have a very lightweight structure that is strong enough to sustain all anticipated loads. Arms are a crucial part of multicopter structures that are often made entirely of composite materials. Each multicopter arm has at least one electric motor and propeller on one and a connection with the body on the other end. A static load test stand for various sizes of arms is designed and developed in order to test prototypes within the design process and to be able to test the mechanical characteristics of each produced final part that will be later assembled with other parts. The test stand consists of a robust steel frame, part mounting clamps, a movable low-speed hydraulic cylinder with an appropriate hydraulic power pack powered by an electric motor which is controlled by a variable frequency drive, a load cell for force measurement, and a linear displacement transducer for displacement. A custom digital electronic circuit with a microcontroller is developed in order to control the actuator and obtain data from sensors. Also, custom user-friendly software with a graphical user interface is designed to control experiments and process measurements.*

### Keywords

Static load test stand, test stand design, experimental testing, multicopter arm, rotary-wing drone arm