

## ABSTRACT

### **Title:**

Analysis of the torsion results of the machine parts produced incrementally from polymeric materials

The subject matter of the work concerns research and analysis of torsional strength of machine elements manufactured from spring materials from polymeric materials. The main aim of the work is to develop methodology guidelines for the design and production of machine elements subjected to load torque. These elements include shafts, couplings, gear hubs and other components of propulsion systems in which torque is transferred and which can be produced using incremental technologies.

The first part of the paper presents the analysis of the state of the issue connected with incremental technologies and their application to the manufacture of products, especially elements used in the construction of machines, which enabled to formulate the main objective and the scope of work.

The second part of the work concerns the testing of normative samples, samples specially designed for testing and selected components of manufactured machines using incremental processes. The research part analyzed the results of aging tests of normative samples made of polymeric materials using selected incremental methods: extrusion of layered thermoplastic polymers (FDM / MEM / FFF), selective sintering of polymer powders (SLS) and laminar printing of a photo-curable resin (JS - PolyJet). In the first stage, aging tests of normative samples under static load for bending were performed. An attempt of long-term aging and aging accelerated in a climatic chamber was made. To carry out the main purpose of the work - tests for screwing Samales and machine elements, a special test stand has been developed, designed and made to allow for static tests of components made of polymeric materials. The results of the study were analyzed, on the basis of which the conclusions were developed.