Summary of Doctoral Dissertation

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entitled. "Assessment of the rheological properties of components manufactured with 3D printing technology using multiparameter models of ideal bodies".

prepared under the supervision of

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The main goal of the thesis was to determine the rheological properties of components manufactured using SLS and FDM (MEX) additive technologies with the application of ideal body models.

In order to realise the main objective of the thesis, auxiliary objectives had to be formulated. These include:

- Development of a multiparameter model (n>5) for the assessment of rheological properties.
- Assess the use of ideal body models to describe rheological properties.
- Determination of approximation uncertainty in rheological model selection for material relaxation and creep curve.
- Determination of technological parameters influencing rheological properties of parts made with SLS and FDM (MEX) additive technologies.

The main goal of the study presented above allowed the formulation of the following research hypothesis: The phenomena of stress relaxation and creep occurring in materials manufactured with additive technologies at the assumed technological parameters, especially with FDM (MEX) and SLS technologies, can be described with the use of multiparameter rheological models, whose elastic modulus and dynamic viscosity coefficients can be determined with an accuracy enabling their use in engineering calculations.

The dissertation consists of eight chapters.

Chapter I provides a historical overview and types of additive technologies. This part of the thesis also describes the roles of testing the mechanical properties of additively manufactured models.

Chapter II is a discussion of predictions for the development of the 3D printing industry and a survey of the literature on the study of rheological properties.

Chapter III describes the additive technologies used in the thesis and the safety principles of working with them.

Chapter IV presents issues related to solid rheology. This chapter discusses selected rheological models and the two phenomena of stress relaxation and creep.

Chapter V presents the aims of the thesis, the research hypothesis and how the dissertation was carried out.

Chapter VI contains a programme of internal research, taking into account the technological parameters of 3D printing.

Chapter VII presents the results of the study of rheological properties. In this chapter, elastic moduli and dynamic viscosity coefficients were calculated for materials produced by 3D printing.

The last chapter VIII is the final summary of the work with general conclusions. In addition, the chapter presents directions for further internal research.