

Dissertation Topics for Academic Year 2026/2027

Study Programme: Technologies and Materials

	Dissertation Topic	Supervisor	Department
1.	Research of measurement accuracy of contactless 3D scanners Abstract: The dissertation will focus on the research of measurement accuracy of systems for contactless 3D digitization of machine parts (optical or laser 3D scanners). These devices are now increasingly used for the purpose of dimensional and shape inspection of parts. Although much research has been done in this area, there are still many unanswered questions in view of the dynamically evolving field. It is necessary to focus on the whole chain of inspection, ie digitization - data processing - control. The subject of the research will be, among other things, determining the influence of the scanning process strategy on the accuracy of digitization using 3D scanners or verifying the properties of a new generation of sublimation preparations, which are beginning to be used in the field of optical metrology for treatment of optically unsuitable surfaces.	doc. Ing. Radomír Mendřický, Ph.D.	KSA
2.	Assessment of the possibility of using machine learning tools for structural analysis of welds from Cr-Mo-V steels Abstract: The dissertation is focused on assessing the possibility of using AI tools in the characterization of the structure in TOO welds from selected Cr-Mo-V steel. The work will be solved in cooperation with the ÚPT of the Academy of Sciences of the Czech Republic. The goal will be to create a proven technology for structural evaluation and mapping of the weld joint, based on which AI tools will design an appropriate PWHT (temperature, holding time, multiple cycle) procedure. The result will be a verified procedure, on the basis of which it will be possible to qualify and obtain WPQR.	doc. Ing. Jaromír Moravec, Ph.D.	KSP
3.	The use of starch to modify the properties of biodegradable bioplastic blends Annotation: The dissertation will analyse the influence of starch on the mechanical, thermal and structural properties, and the kinetics of biodegradation, of biodegradable plastics. The focus will be on evaluating the interactions between starch and the polymer	Ing. Pavel Brdlík, Ph.D.	KSP

	matrix, particularly considering the influence of the starch's raw material origin, physicochemical treatment, and incorporation methods into the polymer system. The research will also evaluate the impact of added starch on the processability of materials using conventional film production technologies. The results should help to optimise formulations and develop sustainable, biodegradable films with controlled degradation and useful properties.		
4.	<p>Dynamic production scheduling in small and medium-sized enterprises</p> <p>Abstract: The dissertation will deal with the complex problem of production scheduling in the dynamically changing environment of small and medium-sized enterprises. Its aim is to propose a scheduling methodology that uses both classical approaches and elements of artificial intelligence, starting from the modelling of the production system to the search for the optimal schedule.</p> <p>In the design of the solution, the essential steps will include the consideration of both the customer requirement (quantity; deadline; functional specification of the product) and the technological preparation of the production (estimation of time consumption; constraints imposed by the type of technology) and the design of the production (lines; cells; centres), but also the dynamics of the real state of the production system (e.g. order delays, machine breakdowns and maintenance).</p> <p>The design of solutions will need to address the principles of algorithmization (e.g., Parameter Tuning and Control, benchmarking) of individual optimization problems.</p>	doc. Ing. Radomír Mendřický, Ph.D.	KSA