GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Efficiency and quality of machining processes, PG_00059500		
Field of study	Management and Production Engineering		
Date of commencement of studies	February 2023	Academic year of realisation of subject	2023/2024
Education level	second-cycle studies	Subject group	Optional subject group Subject group related to scientific research in the field of study
Mode of study	Full-time studies	Mode of delivery	at the university
Year of study	1	Language of instruction	Polish
Semester of study	2	ECTS credits	4.0
Learning profile	general academic profile	Assessment form	exam
Conducting unit	Zakład Technologii Maszyn i Automatyzacji Produkcji -> Institute of Manufacturing and Materials Technology -> Faculty of Mechanical Engineering and Ship Technology		
Name and surname of lecturer (lecturers)	Subject supervisor	prof. dr hab. inż. Kazimierz Orłowski	
	Teachers	prof. dr hab. inż. Kazimierz Orłowski dr hab. inż. Daniel Chuchała dr inż. Aleksandra Suchta	

Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	0.0	15.0	15.0	0.0	60
	E-learning hours included: 0.0						

Learning activity and number of study hours	Learning activity	Participation in didactic classes included in study plan	Participation in consultation hours	Self-study	SUM
	Number of study hours	60	6.0	34.0	100

Subject objectives	
	The aim of the course is to get acquainted with issues of process modeling and operation of cutting tools in manufacturing processes. Learn about the construction and application of various tool systems and their influence on the quality and efficiency of processes. Methods and means of selection and analysis of the implementation of processes on machine tools.

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K7_U04] is able to plan and carry out experiments, including measurements and computer simulations, interpret the obtained results and extract conclusions; can use analytical, simulation and experimental methods to formulate and solve engineering tasks	The student is able to analyse the results of tests carried out during the preparation and/or execution of treatment processes.	[SU1] Assessment of task fulfilment [SU2] Assessment of ability to analyse information
[K7_K02] is aware of the importance and understanding of non-technical aspects and effects of engineering activities, including its impact on the environment, and the related responsibility for decisions made demonstrates knowledge of actions to reduce risk and anticipate the social impact of engineering and manufacturing activities	The student is able to identify environmental risks and select appropriate process conditions to reduce them.	[SK5] Assessment of ability to solve problems that arise in practice [SK3] Assessment of ability to organize work
[K7_W03] has an orderly, theoretically founded knowledge related to selected areas of production engineering.	The student is able to select the appropriate machining process to achieve the expected product quality.	[SW3] Assessment of knowledge contained in written work and projects [SW1] Assessment of factual knowledge
[K7_U03] can use information and communication techniques appropriate for acquiring and processing information and performing tasks typical for engineering activities	The student is able to obtain information on the parameters of machining processes using web and mobile tools.	[SU4] Assessment of ability to use methods and tools

Subject contents

LECTURE:General characteristics and classification of materials for cutting edges of tools withdefinedcutting edge. Causes of wear, geometrical factors of wear, physical and technological bluntnessfactors of ablade. Wear in time (tool life, wear of cutting tool blades in interrupted machining). Principles ofblademateriał selection. Tool loading - energy properties of machining process. Cutting forces - methods offorceestimation based on model taking into account specific cutting resistance and elements of modernfracturemechanics (Atkins's model). Models for determining shear angle in cutting zone. Tooling systemoverview(ISO, HSK, CAPTO, etc.). Principles of tool and insert selection. Methods of measuring cuttingedge wear.Vibrations in cutting process. Dynamic stiffness of tools with low inherent stiffness. Economicefficiency andoptimization of machining process.

LABORATORY: Geometry of cutting edge. Construction ofmodern cutting tools. Study of influence of cuttingedge geometry on surface roughness in turning. Wear andtear of cutting edges. Computer aided selectionof cutting tools. Static stiffness. Determination of criticalspeeds of tools with low inherent stiffness. Tool costanalysis.

PROJECT:

Prediction of energy conditions for a selected machining process

Prerequisites and co-requisites

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Laboratory exercises	100.0%	10.0%
Project exercises	100.0%	10.0%
Final test	56.0%	80.0%

Recommended reading

Basic literature

1. Grzesik W.: Advanced machining processes of metallic materials. Theory, modelling and applications. Elsevier, 2017.

	Supplementary literature	1. Markopoulos A.P.: Finite element method in machining processes. Springer, London, 2013. 2. Training handbook. Metal cutting technology. C-2920:40 en-GB © AB Sandvik Coromant 2017.11
	eResources addresses	Adresy na platformie eNauczanie: Wydajność i jakość procesów obróbki, W/L, ZiIP, II stop., 2 sem., zima 2023/24, (PG_00059500) - Moodle ID: 34099 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=34099
Example issues/ example questions/ tasks being completed	List and describe measures of tool cutting edge wear according to PN-ISO standard.The effect ofcuttingparameters on cutting edge life.	
Work placement	Not applicable	