Plastic Working - opis przedmiotu

Informacje ogólne

Nazwa przedmiotu	Plastic Working
Kod przedmiotu	06.1-WM-ER-MiBM-04_18
Wydział	Wydział Nauk Inżynieryjno-Technicznych
Kierunek	WM - oferta ERASMUS
Profil	-
Rodzaj studiów	Program Erasmus
Semestr rozpoczęcia	semestr zimowy 2023/2024

Informacje o przedmiocie

Semestr	2
Liczba punktów ECTS do zdobycia	4
Typ przedmiotu	obowiązkowy
Język nauczania	angielski
Sylabus opracował	• dr inż. Joanna Cyganiuk

Formy zajęć

Forma zajęć	Liczba godzin w semestrze (stacjonarne)	Liczba godzin w tygodniu (stacjonarne)	Liczba godzin w semestrze (niestacjonarne)	Liczba godzin w tygodniu (niestacjonarne)	Forma zaliczenia
Wykład	30	2	-	-	Egzamin
Laboratorium	30	2	-	-	Zaliczenie na ocenę

Cel przedmiotu

The aim of the course is to familiarize students with mechanisms of plastic deformation, with types of metal forming, with features of materials, semi-finished products and products made with the use of metal forming methods, with machines and appliances used for shaping products as well as with practical examples of using of metal forming.

Wymagania wstępne

Strength of Materials, Technical mechanics, Engineering Graphics and Fundamentals of Engineering Design, Mechanics and Strength of Materials,

Zakres tematyczny

The content of the lecture:

Fundamentals of plastic flowing of isotropic bodies. Mechanism of plastic deformation. Phenomena accompanying plastic deformations. Factors affected on the value of yield stress. Separation of deforming material. Cold working. Hot working. Semi-hot working. Rolling: shaping metal sheets and flat materials. Methods of sheet metal forming: cutting, blending, shaping products with non-developable shape. Processes of drawing down solids: broaching, upsetting, hobbing, shaping in dies, burnishing and die forging. Examples of correct and incorrect structure of elements shaped with metal forming methods. Mechanical properties of deformed materials. Calculations: forces, stresses, deformations, etc., Machines and appliances used in metal forming.

The content of the laboratory:

Mechanical presses construction. Mechanism of changing stroke of eccentric presses. Setting and fastening of tools on presses and hammers. Deformation of metals and alloys – changing of crystallographic structure and mechanical features of deformed materials. Cutting in machines on presses – determining basic technological cutting parameters. Assessment of metal sheets usability for pressing process. Bending processes - determining of springing angle. Rolling – rolling reduction. Upsetting – determining of limiting deformation factor during upsetting, influence of heat treatment on upsetting. Structure of forging hammers – determining of impact energy of drop forging hammer. Open die forging – determining of temperature range of hot working. Direct extrusion of sleeves in cold working.

Metody kształcenia

The student has knowledge of the proper design of finished product, shaped with metal forming methods.

Efekty uczenia się i metody weryfikacji osiągania efektów uczenia się

Opis efektu	Symbole efektów	Metody weryfikacji	Forma zajęć
The student can make critical evaluate of the selection methods of metal forming and of shaped objects structure.		• wykonanie sprawozdań laboratoryjnych	• Laboratorium
The student has knowledge of the proper design of finished product, shaped with metal forming methods.		• egzamin - ustny, opisowy, testowy i inne	• Wykład

Opis efektu	Symbole efektów	Metody weryfikacji	Forma zajęć
The student has detailed knowledge in metal forming including types, shaping methods and appliances.		• egzamin - ustny, opisowy, testowy i inne	• Wykład
The student is able to identify and formulate specification of simple practical engineering tasks in correctly design of elements shaped with metal forming methods and in selection of metal forming technology.		• wykonanie sprawozdań laboratoryjnych	• Laboratorium
The student is able to appropriately prioritize tasks and targets.		• wykonanie sprawozdań laboratoryjnych	• Laboratorium
The student can use analytical methods for formulate and solve engineering tasks.		• wykonanie sprawozdań laboratoryjnych	• Laboratorium
The student can assess of usefulness of metal forming methods, tools and appliances for making products with determined shapes, and chose correct methods, tools and appliances.		• wykonanie sprawozdań laboratoryjnych	• Laboratorium

Warunki zaliczenia

To get a credit the student has to pass all course forms.

The final grade received by the student is the arithmetic mean of the above grades.

Literatura podstawowa

1. Nielsen C., Metal forming, elsevier Science&Technology, UK, 2021,
2. Hosford W. F., Caddell R. M., Metal Forming: Mechanics and Metallurgy, Cambridge University Press, Cambridge 2011,
3. Edwards, L. and Endean, M., Manufacturing with materials, Butterworth Heinemann, USA 1990,
4. Tekkaya E., Altan T., Sheet metal forming: processes and aplications, ASM International, 2012,
5. Bowman M., Sheet metal work, United Kingdom, 2015,
6. Altan T., Tekkayac A. E., Sheet Metal Forming: Fundamentals, ASM International, 2012,

Literatura uzupełniająca

1. Lange, K., Handbook of metal forming, R.R Donnelly & Sons Company, Chicago 1985,A.

Uwagi

Zmodyfikowane przez dr Katarzyna Skrzypek (ostatnia modyfikacja: 31-05-2023 14:15)