Study program / course: Mechanical engineering

Type and level of study: Master academic studies

Course: Advanced processes in plastic forming

Lecturers: Milentije C Stefanovic, Srbislav M Aleksandrovic, Vesna M Mandic

Status of course: Obligatory for module M1, I semester

Number of ECTS: 6

Precondition: Passed Production technology examination

The objective of course

Acquiring basic knowledge in fields of new, advanced technologies such as: super-plastic forming, high strain rate forming, thixo forming, new materials forming, tailored welded blanks, tube forming, net-shape forming, closed die forging without flash, hydro forming, profile extrusion, rolling, drawing etc.

The outcome of course

After the course finishing student can be able to: recognize and make difference between appropriate technological processes and equipments, determine basic process properties, design simpler dies, design forming technology, apply advanced forming processes, clarify concurrent engineering principles etc.

Syllabus

Theoretical study

Processes classification. Work hardening. Strengthening curves. Forming homogeneity. Forming limit diagram. Friction laws in plastic forming. Superplasticity. High strain rate forming. Explosive forming. Ultrasonic deep drawing. Electromagnetic and electrohydraulic forming. Laser sheet metal forming. New materials forming (high strength steel sheets, tailored welded blanks, laminate sheets, Al sheets etc.). Fine blanking. Hydroforming. Hydrostatic forming. Thixo forming. Rotary forging. Microforming. Surface rolling. Shot peening. Spinning and flow forming. Forming processes control. Wire and tube drawing. Defects in drawing process. Extrusion. Bar, tube and profile extrusion. Closed die forging without flash. Net shape forming. FE process and die stress analysis. Tube forming. Application of concurrent engineering principles.

Practical Studies

In laboratory practical classes students are enabling for practical knowledge and skills from selected fields of advanced plastic forming processes.

Recommended reading

1. M. Stefanovic, S. Aleksandrovic: Technology of plastic forming, selected chapters, auxiliary book, Faculty of Mech. Eng., Kragujevac, 1998.(in Serbian).
2. M. Plancak, D. Vilotic: Technology of plastic forming, FTN, Novi Sad, 2003.(in Serbian).
3. Kalpakjian S.: Manufacturing processes for Engineering Materials, Addison-Wesley, 1997.
4. Wagoner R.H., Chenot J.L.: Metal Forming Analysis, Cambridge University Press, 2001.

The number of hours of active teaching:				Other classes:
Theory: 2	Practical classes: 1.6	Other forms of teaching: 0.4	Research study: 0	1

Methods of teaching

Classic, beam projector presentations etc.

Evaluation of knowledge

Pre-final exam obligations	**points 70**	**Final exam**	**points 30**
Activities during the classes:	**5**	written	**-**
Practical classes:	**25**	verbal	**30**
Colloquiums(s) :	**40**	**-**	**-**
Seminar(s) :	**-**	**-**	**-**