

Name	The simulation of machining processes and techniques of rapid prototyping (SolidWorks, SolidCam, RP) - Tutorial		
Code	CTC-RI-01		
ECTS	4		
Location	CTC – Center for Cooperation and Training, University of Rijeka Faculty of Engineering, Vukovarska 58, 51000 Rijeka, Croatia		
Trainer/s	Assistant Hrvoje Radelja mag.ing.mech., assistant Sven Maričić mag.ing.mech. (CV enclosed)		
Purpose	New market demands in terms of cost, short period of product development and product quality necessitate the application of more efficient ways of designing the products and tools, which includes the use of new CAD / CAM technology for modeling and simulation, and rapid prototyping. The study and analysis of the process, its visualization through virtual simulation models obtained is a proofed way to increase the efficiency of design and quality of the finished product. Rapid prototyping provides a quick and effective means for testing and optimization of the product.		
Recommended entry level	University (master) degree, engineering studies		
Special requirements	Computer skills in Windows environment		
Duration	40 hours		
General objectives	Trainees should be able to: <ul style="list-style-type: none"> explain the importance of modeling and simulation in designing products and processes use of modern tools for product modeling and simulation of machining processes define the technological process of machining the work piece, simulate and optimize process prepare a model for export to standard formats for printing on any of the Rapid Prototyping Machine define the parameters of the model conversion pre-print the model 		
Topics	<ol style="list-style-type: none"> SolidWorks - creating sketches SolidWorks - modeling 3D parts SolidWorks - modeling assemblies SolidWorks - drafting SolidWorks – weldments SolidCAM - CAM model definition SolidCAM - define the processing technology of turning and milling SolidCAM - simulation, parameter selection and process optimization SolidCAM - 4 axis milling Rapid prototyping 		
Specific learning outcomes in topics	Topic 1: SolidWorks - creating sketches	Number of hours	2
	Trainees should be able to: <ul style="list-style-type: none"> use software package SolidWorks create model sketches 		
	Topic 2: SolidWorks - modeling 3D parts	Number of hours	4
	Trainees should be able to: <ul style="list-style-type: none"> create a 3D model of the individual parts using the Part Design module use an integrated library of standard elements 		
Specific learning outcomes in topics	Topic 3: SolidWorks - modeling assemblies	Number of hours	4
	Trainees should be able to: <ul style="list-style-type: none"> assemble complex products and components built from several individual parts modeling of individual parts, bearing in mind their function in the assembly (Design Intent) 		

Topic 4: SolidWorks - drafting	Number of hours	2
Trainees should be able to: <ul style="list-style-type: none"> • make, edit, and automatically generate drafts 		
Topic 5: SolidWorks - weldments	Number of hours	3
Trainees should be able to: <ul style="list-style-type: none"> • design structures using the profile module SolidWorks Weldments • model stiffeners and weld on profile structures • preparing documentation for the profile construction 		
Topic 6: SolidCAM - CAM model definition	Number of hours	2
Trainees should be able to: <ul style="list-style-type: none"> • define CAM model • understand the role of postprocessor for the application of the simulated model to the CNC machine • define the geometry and coordinate systems of processing • define workpiece clamping 		
Topic 7: SolidCAM - turning and milling	Number of hours	8
Trainees should be able to: <ul style="list-style-type: none"> • choose the correct procedure of turning or milling according to the desired geometry of the workpiece • define operations • define the geometry, tools and technological parameters of processing 		
Topic 8: SolidCAM - simulation, parameter selection and process optimization	Number of hours	2
Trainees should be able to: <ul style="list-style-type: none"> • verify the model geometry and the production process using simulation • test process for tool collisions • select and adjust the process parameters 		
Topic 9: SolidCAM - 4 axis milling	Number of hours	3
Trainees should be able to: <ul style="list-style-type: none"> • model simultaneous and indexial 4-axis milling 		
Topic 10: Rapid prototyping	Number of hours	10
Trainees should be able to: <ul style="list-style-type: none"> • export CAD / CAM models in various formats for 3D printing • create and analyse .STL models • analyse the geometry • correct common errors during the model conversion • choose among different printing parameters for print on a 3D printer 		

Portfolio assessment

Acquired knowledge and skills will be checked by evaluation exercises and exams.
Exercises: trainers will define exercises by which can evaluate the degree of acquired knowledge. Tasks can be carried out individually or as a team, in groups of 2-5 students.
Exams: Acquired knowledge and skills will be checked by written and oral exams.
 The final grade is obtained on the basis of collected points. The final grade is derived as follows:

- 80-100% of the collected points - EXCELLENT
- 65-79% of collected points - GOOD
- 50-64% of collected points - PASSED

Criteria and the percentage share of certain topics of the module will be defined later.