

5. Please choose a material for a lathe-cutting tool! A turning lathe is used for the machining (slotting, facing) of a mild steel part. Dimensions: 20 × 20 × 150 mm. The tool is subjected to high dynamic mechanical and high thermal loads and is produced in large series. 5.1 What is the purpose of a lathe-cutting tool? (2 points) 5.2 What are the main loads? (2 points) 5.3 Which material group do you select and why? (2 points) 5.4 Which specific material grade(s) do you recommend? (2 points) 5.5 Please sketch the temperature (T) - time (t) diagram of the proposed heat treatment. (5 points) 5.6 Please outline the manufacturing process of the part. (2 points) Choice of materials: C45U, C70U, C80U, C90U, C105U, C120U, 105V, 50WCrV8, 60WCrV8, 102Cr6, 21MnCr5, 70MnMoCr8, 90MnCrV8, 95MnWCr5, X100CrMoV5, X153CrMoV12, X210CM2, X210CrW12, 35CrMo7, 40CrMnNiMo8-6-4, 45NiCrMo16, X40Cr14, X38CrMo16-9; 55NiCrMoV7, 32CrMoV12-28, X37CrMoV5-1, X38CrMoV5-3, X40CrMoV5-1, 50CrMoV13-15, X30WCrV9-3, X35CWMoV5, 38CrCoWV18-17-17;HS10-4-1, HS18-0-1, HS3-3-2, HS6-5-3-8, HS10-4-3-10.	Name:		Neptun code:	
	1. General questions. Answer the following questions in a couple of sentences each.			
	1.1 Please describe how CO reduces iron oxide in the blast furnace (reaction equation). (4 points)			
	1.2 Which methods can be used to determine the hardenability diameter ? (4 points)			
	1.3 Please interpret the material designation P 275 Q . (4 points)			
	1.4 Please list the stainless steel groups (4 points)			
	1.5 Please describe nitriding structural steels (main alloys, expected properties, applications) (4 points)			
	1.6 Please describe martensitic stainless steels (main alloys, expected properties, applications) (4 points)			
	1.7 Please interpret the cast iron designation Grade 120-90-02 . (4 points)			
	1.8 Please interpret the material designation Al7075 ! (4 points)			
	1.9 Please briefly describe the role of the core in sand moulding (4 points)			
	1. 10 Please list the processes of pressure die casting . (4 points)			
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2. Technology. Give an outline of the direct extrusion technology, naming the elements of the process. 2.1 Sketch, description of the elements of the procedure (9 points) 2.2 Please sketch how seamless tubes can be made by extrusion. (3 points) 2.3 What is a spider die? (3 points) 3. Welding. Gas metal arc welding. 3.1 Sketch, elements of the procedure (9 points) 3.2 Please list the shielding gases you know and their main properties (4 points) 3.2 Please list the parameters that can influence the welding process and the quality of the weld. (4 points)		4. Please select a material for a connecting rod! Dimension: 500 × 100 × 30 mm. The connecting rod is operated in an internal combustion engine, subject to medium dynamic stress, with a surface hardness of min. 50 HRc, manufactured in large series. 4.1 What is the purpose of a connecting rod? (2 points) 4.2 What are the main loads? (2 points) 4.3 Which material group do you select and why? (2 points) 4.4 Which specific material grade(s) do you recommend? (2 points) 4.5 Please sketch the temperature (T) - time (t) diagram of the proposed heat treatment. (5 points) 5.6 Please outline the manufacturing process of the part. (2 points) Choice of materials: C25, C35, C60, 28Mn6, 38Cr2, 41Cr4, 41CrMo4, 50CrMo4, 34CrNiMo6, 36NiCrMo16, 51CrV4; 24CrMo13-4, 31CrMo12, 41CrAlMo7-10, 40CrMoV13-9; C10E, C15E, 17Cr3, 10NiCr5-4, 20MnCr5, 17NiCrMo6-4; X10CrNi18-8, X2CrNi19-11, X5CrNi18-10, X8CrNiS18-9; X2CrNi12, X6Cr13, X6Cr17, X2CrTi17; X30Cr13, X29CrS13, X39Cr13, X46Cr13; C120U, 105V, 50WCrV8, 60WCrV8, 102Cr6; 55NiCrMoV7, 32CrMoV12-28, X37CrMoV5-1; HS10-4-1, HS18-0-1, HS3-3-2; EN-GJL-200, EN-GJL-250, EN-GJL-300; EN-GJS-450-10U, EN-GJS-500-7U, EN-GJS-600-3U; EN-GJMW-450-7U, EN-GJMB-350-10U, EN-GJMP-450-6U.		
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