Calculation of shaped couplings of shafts with hubs

i Calculation: A = OK; B = Error; C = OK; D = Error

ii ☐ Project information

1.0 ☑ Common input data

1.1	Calculation units		SI Units (N, mm, kW...)		1.16	**Shaft material (min. tensile strength) [hardness]**		
1.2	Transferred power	P	9.60	[kW]	1.17	C...Refined and Alloyed Steel (600) [HB 300-350 HRC 33-38] ☑		
1.3	Shaft speed	n	116.5	[/min]	1.18	Ultimate tensile strength	S_{Umin}	600 [MPa]
1.4	Torque	T	786.96	[Nm]	1.19	Permissible pressure	p_A	200 [MPa]
1.5	**Loading conditions, operational parameters**				1.20	Permitted stress in shear	τ_A	275 [MPa]
1.6	Power source		Light shock		1.21	**Hub material (min. tensile strength) [hardness]**		
1.7	Loading conditions		Light shock		1.22	B...Carbon steel (500) [HB 220-270] ☑		
1.8	Character of operation		Unidirectional		1.23	Ultimate tensile strength	S_{Umin}	500 [MPa]
1.9	Number of start-ups in thousands		100		1.24	Permissible pressure	p_A	130 [MPa]
1.10	Desired service life of the coupling		20000	[h]	1.25	Permitted stress in shear	τ_A	200 [MPa]
1.11	**Coupling type, preliminary design of the shaft diameter**				1.26	**Operational coefficients**		
1.12	Coupling design		Fixed connection		1.27	Coupling design factor	K_d	1.0
1.13	Hollow shaft inner diameter	d_h	0.000	[mm]	1.28	Application factor	K_a	1.3
1.14	Desired safety	s_f	1.70		1.29	Fatigue-life factor	K_f	0.5
1.15	Shaft minimum diameter	d_{min}	40.1	[mm]	1.30	Wear life factor	K_w	1.0

A Parallel side keys

2.0 ☐ Coupling parameters, key material, dimensional design

3.0 ☐ Strength checks of the coupling

B Woodruff's keys

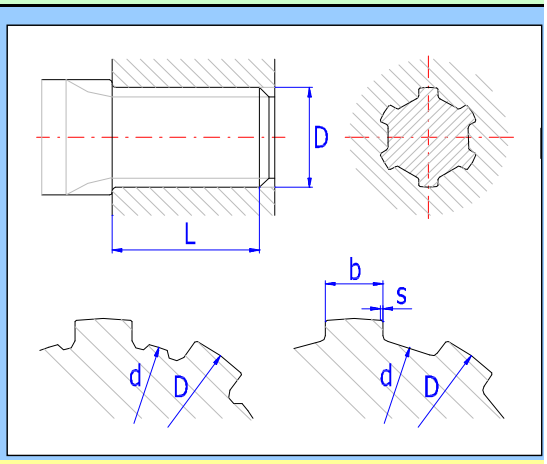
4.0 ☐ Coupling parameters, key material, dimensional design

5.0 ☐ Strength checks of the coupling

C Straight-sided splines

6.0 ☑ Coupling parameters, dimensional design

6.1	**Coupling parameters**				
6.2	Splines type		E ... ISO 14 - Medium series		
6.3	Load distribution factor	K_L	0.75		
6.4	Total service factor	K_S	2.60		☑
6.5	**Design of coupling dimensions**				
6.6	Splines for diameters		14 ~ 125	[mm]	
6.7	Min. shaft diameter	d_{min}	40.1	[mm]	
6.8	Spline		60 - 8x52x60		
6.9	Spline outer diameter	D	60	[mm]	
6.10	Spline inner diameter	d	52	[mm]	
6.11	Number of grooves	n	8		
6.12	Tooth width	b	10	[mm]	
6.13	Chamfer (radius)	s	0.5	[mm]	
6.14	Min. functional spline length	L_{min}	53.1	[mm]	
6.15	Chosen spline length	L	68.000	[mm]	☐



7.0 ☑ Strength checks of the coupling

7.1	**Check of shaft for torsion**				7.5	**Check of deformation of grooving sides**		
7.2	Permitted stress in shear	τ_A	275	[MPa]	7.6	Permissible pressure	p_A	130 [MPa]
7.3	Comparative stress	τ	74.1	[MPa]	7.7	Comparative pressure	p	59.7 [MPa]
7.4	Safety		3.71		7.8	Safety		2.18

D Involute splines

8.0 ☐ Coupling parameters, dimensional design

9.0 ☐ Strength checks of the coupling

Additions section

10.0 ☐ Comparative table

11.0 ☐ Graphical output, CAD systems