



i Calculation without errors.

ii Project information

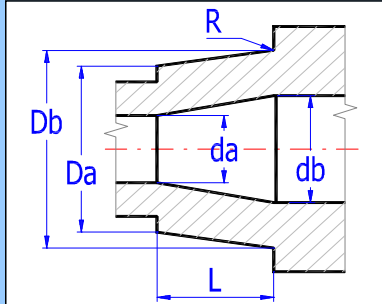
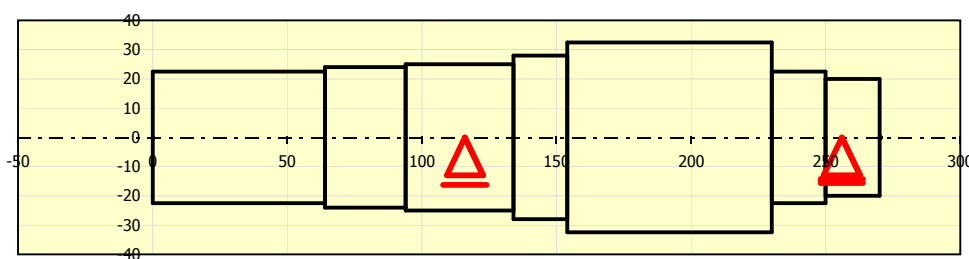
? Input section

1.0 Preliminary shaft diameter design

1.1 Calculation units	SI Units (N, mm, kW...)		1.6 Type of shaft load
1.2 Transmitted power	9.67	[kW]	C...Repeated torsion + bending
1.3 Shaft speed	479.8338309	[/min]	1.7 Material of the shaft
1.4 Torsion moment	192.46	[Nm]	B...Structural steel with increased strength (850)
1.5 Preliminary min. diameter	42.12	[mm]	

2.0 Shaft shape and dimensions

2.1 The scale of the displayed shaft diameter. Calculation units SI Units (N, mm, kW...)



2.2 Table	1	2	3	4	5	6	7	8	9	10
Origin	0.00	64.00	94.00	134.00	154.00	230.00	250.00	270.00	270.00	270.00
L	64.000	30.000	40.000	20.000	76.000	20.000	20.000	0.000		
∅ Da	45.000	48.000	50.000	56.000	65.002	45.000	40.000	0.000		
∅ Db	45.000	48.000	50.000	56.000	65.002	45.000	40.000	0.000		
∅ da	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		
∅ db	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000		
R	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000		

2.3 Total length of the shaft	270.00	[mm]	2.6 The shaft surface (Roughness Ra)
2.4 X-coordinate of the left support (bearing)	Free	116.00	○ [mm]
2.5 X-coordinate of the right support (bearing)	Fixed	256.00	● [mm]
			D...Turned (1.6)

5.0 Rotating masses

6.0 Material and the type of loading

6.1 Shaft material (Ultimate tensile strength min-max)		6.17 Dead load		Yes
B...Refined and alloyed steel (500 - 1400)	▼ 635	[MPa]	6.18 Max. displayed coefficient of safety	20
6.2 Ultimate tensile strength	S _u /R _m	635	[MPa]	<input checked="" type="checkbox"/>
6.3 Yield strength in tension	S _y /R _e	413	[MPa]	
6.4 Yield strength in bending	S _{yb} /R _{eb}	495	[MPa]	
6.5 Yield strength in shear	S _{ys} /R _{es}	289	[MPa]	
6.6 For reversed loading				
6.7 Fatigue limit - tension-pressure	σ _c	229	[MPa]	
6.8 Fatigue limit - bending	σ _{ec}	305	[MPa]	
6.9 Fatigue limit - torsion	τ _c	191	[MPa]	
6.10 For cyclic loading				
6.11 Fatigue limit - tension-pressure	σ _{hc}	343	[MPa]	
6.12 Fatigue limit - bending	σ _{ehc}	457	[MPa]	
6.13 Fatigue limit - torsion	τ _{hc}	267	[MPa]	
6.14 Specific mass	R _o	7850.0	[kg/m ³]	
6.15 Modulus of elasticity in tension	E	210000	[MPa]	
6.16 Modulus of elasticity in shear	G	80000	[MPa]	
		6.20 Coefficient of maximum loading		
		6.21 Bending	1.70	
		6.22 Radial load	1.70	
		6.23 Torsion	1.70	
		6.24 Tension/Compression	1.70	
		6.25 Loading conditions		
		6.26 Loading from bending moment	C...Reversed	▼
		6.27 Loading from radial force	C...Reversed	▼
		6.28 Load from torsional moment	B...Repeated	▼
		6.29 Loading from tension/pressure force	B...Repeated	▼
		6.30 Dynamic strength check		
		6.31 Impact from shaft surface	Yes	▼
		6.32 Impact from shaft size	Yes	▼
		6.33 Impact from stress concentration (note)	Yes	▼

Results section

7.0 Results - summary

	x	y	z	Σ y+z	
7.1 Reaction in the support R1	0	4265.74304	335.515714	4278.91744	[N]
7.2 Reaction in the support R2	-1016.4917	-96.828239	-290.04321	305.778962	[N]
7.3 Total shaft weight	m	4.66			[kg]
7.4 Maximum deflection	γ	0.0185			[mm]
7.5 Maximum angular deflection	φ	0.0354			[°]
7.6 Angular deflection in R1	ϑ	0.0037			[°]
7.7 Angular deflection in R2	ϑ	0.0007			[°]
7.8 Max. bending stress	σ _e	13.9			[MPa]
7.9 Max. stress in shear	τ _s	1.3			[MPa]
7.10 Max. stress in torsion	τ _t	11.7			[MPa]
7.11 Max. stress in tension/pressure	σ _g	0.8			[MPa]
7.12 Max. equivalent stress	σ _r	20.4			[MPa]
7.13 Min. static safety	SF _{st}	12.44			
7.14 Min. dynamic safety	SF _D	9.91			
7.15 Critical speed (A)	n _c	0.0			[/min]
Critical speed (B)	n _c	145637.6			[/min]
Critical speed (C)	n _c	112011.5			[/min]

7.17 Graph

41...Safety coefficient (static) [Blue line]

42...Safety coefficient (dynamic) [Green line]

Shaft freely rotating in bearings, rotating disc between the bearings (K=1)

7.16 Results for X co-ordinate	174.63	1371.60	1397.00	2095.50	2127.25	2127.25	2127.25	2127.25
04...Z - Deflection [mm]	▼ -5.348E-05	-3.071E-05	-3.071E-05	-3.071E-05	-3.071E-05	-3.071E-05	-3.071E-05	-3.071E-05
42...Safety coefficient (dynamic)	▼ 20	20	20	20	20	20	20	20
31...Total coefficient - bending	▼ 1.70502984	1.47058824	1.47058824	1.47058824	1.47058824	1.47058824	1.47058824	1.47058824
42...Safety coefficient (dynamic)	▼ 20	20	20	20	20	20	20	20
43...Empty graph	▼ 0	0	0	0	0	0	0	0

8.0 Graph - Deflection, Bending angle

9.0 Graph - Bending moment, Bending stress

10.0 Graph - Radial force, Stress in shear

11.0 Graph - Axial force, Torsional moment

12.0 Graph - Torsional angle, Reduced stress, Safety coefficient