ANALYSIS OF HELICAL GEAR TEETH IN POWER FLOATER CUM TROWEL MACHINE

Guided By:

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Submitted By:

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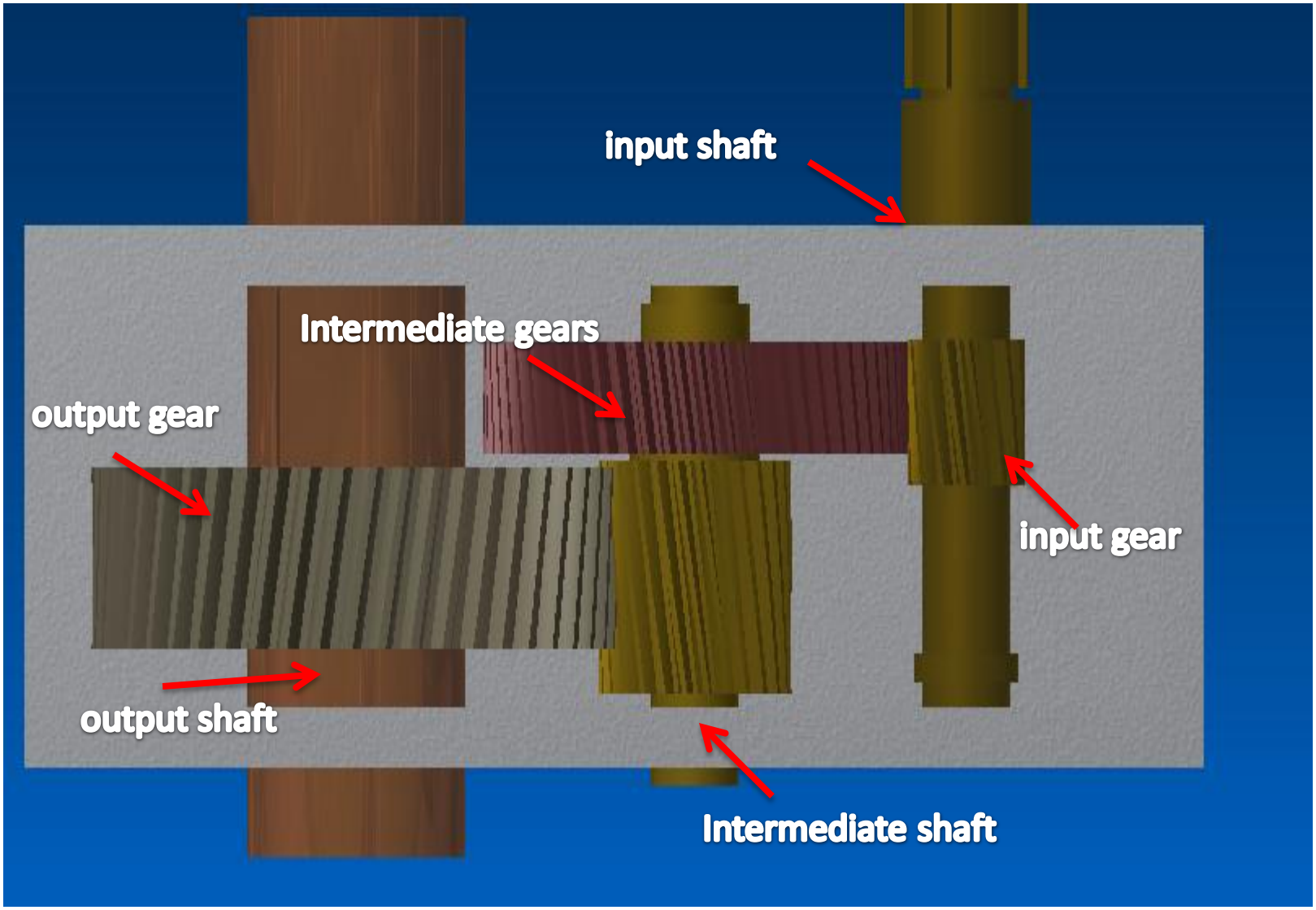
POWER FLOATER CUM TROWEL MACHINE

GEAR BOX ASSEMBLY



Torque Calculation

Input power and speed to the shaft

P=2.20kw

N_A=1400rpm

Torque for input gear

Now,

$P=2\prod N_A T_A/60000$

$2.20 =2 \prod *1400*T_A/60000$

T_A = 15.006 N.m

speed for intermediate gear

$T_A/T_B = N_B/N_A$

$16/62 = N_B/1400$

$N_B = 361.29$ rpm

Now, Torque for intermediate gear

$P=2 \prod N_B T_B/60000$

$2.2=2* \prod *361.29*T_B/60000$

$T_B=58.15$N.m

speed for output gear

$T_C/T_D=N_D/N_B$

$16/50=N_D/361.29$

$N_D=115.61$ rpm

Torque for output gear

$P=2 \prod N_D T_D/60000$

$2.2=2* \prod *115.61*T_D/60000$

T_D=181.71 N.m

Part’s geometry

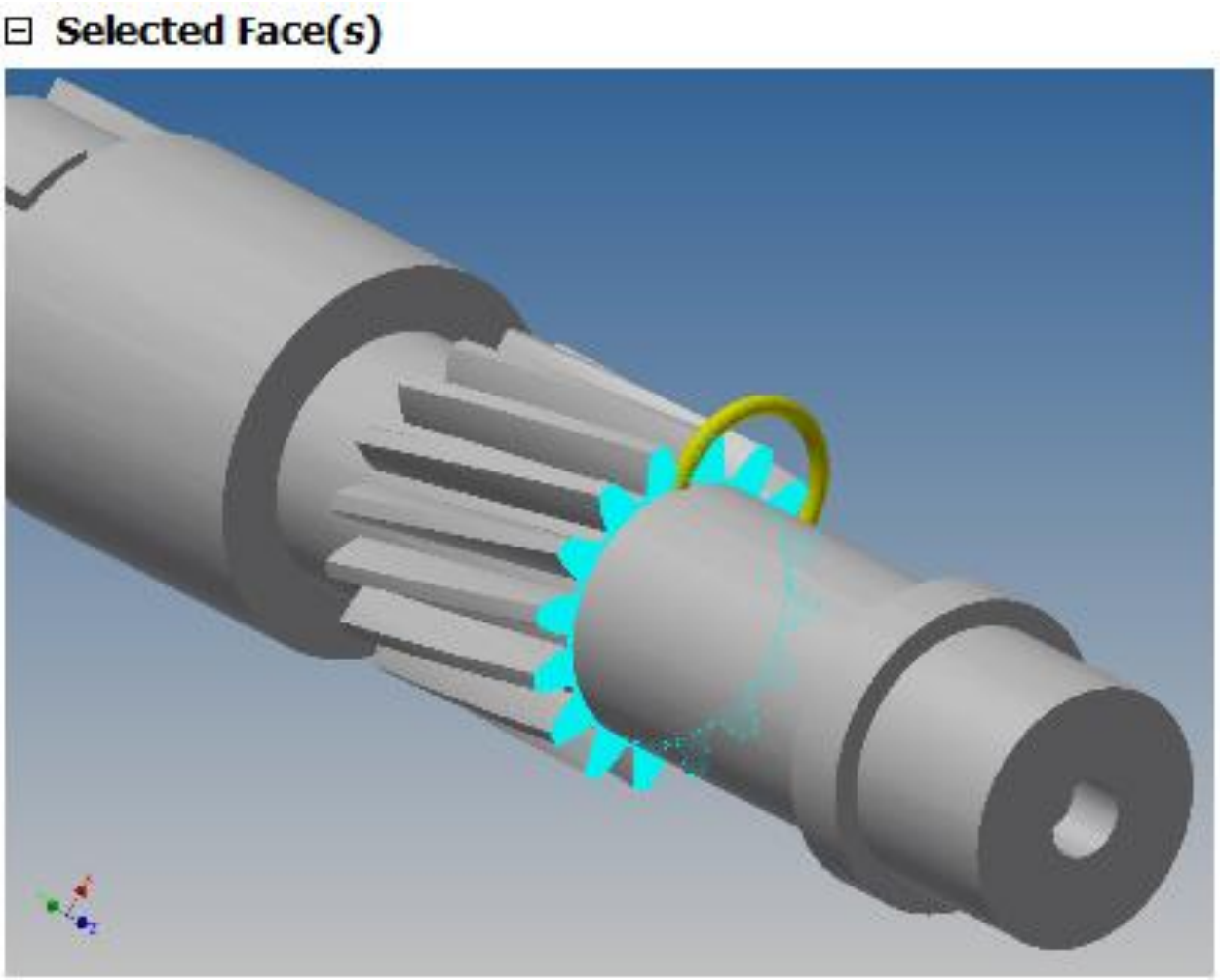
Parameter definition:

Component Name	Feature Name	Parameter Name	Values	Current Value	Unit
Spur Gear1	Spur Gear	da_b	24,25	24	mm

⊟ Material(s)

Name	en353	
General	Mass Density	7.85 g/cm^3
	Yield Strength	207 MPa
	Ultimate Tensile Strength	345 MPa
Stress	Young's Modulus	210 GPa
	Poisson's Ratio	0.3 ul
	Shear Modulus	80.7692 GPa
Stress Thermal	Expansion Coefficient	0.000012 ul/c
	Thermal Conductivity	56 W/(m K)
	Specific Heat	460 J/(kg c)
Part Name(s)	Spur Gear1	

Part’s geometry



Results

Parametric Configuration:1

Parameter(s)

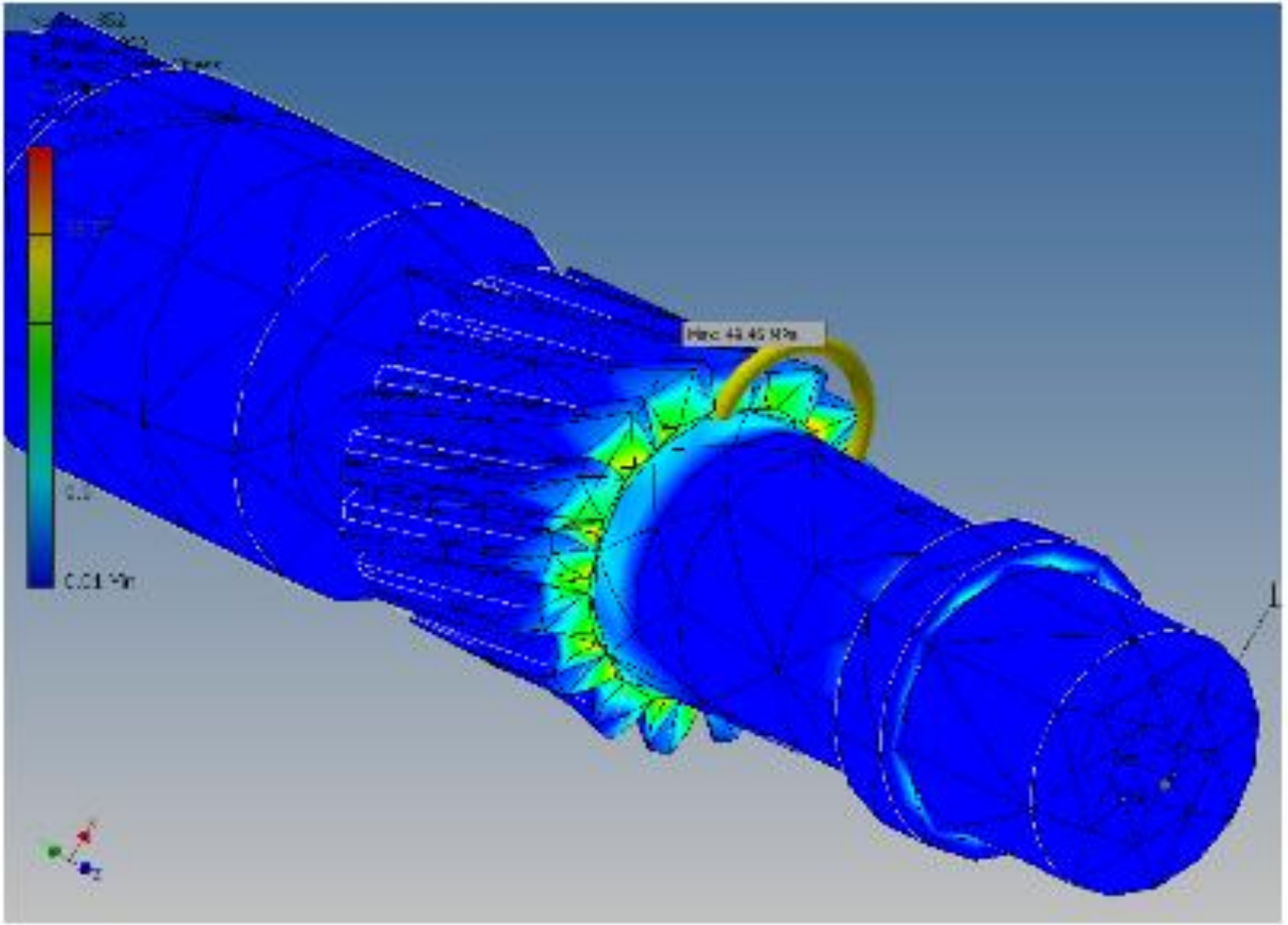
Component Name	Feature Name	Parameter Name	Current Value	Unit
Spur Gear1	Spur Gear	da_b	24	mm

Reaction Force and Moment on Constraints

Constraint Name	Reaction Force		Reaction Moment	
	Magnitude	Component (X,Y,Z)	Magnitude	Component (X,Y,Z)
Fixed Constraint:1	0 N	0 N	15.8386 N m	0 N m
		0 N		0 N m
		0 N		15.8386 N m

Result Summary

Name	Minimum	Maximum
Volume	58965.1 mm^3	
Mass	0.462876 kg	
Von Mises Stress	0.00554398 MPa	49.462 MPa
Safety Factor	4.18503 ul	15 ul



Dimension tuned

Parameter(s)

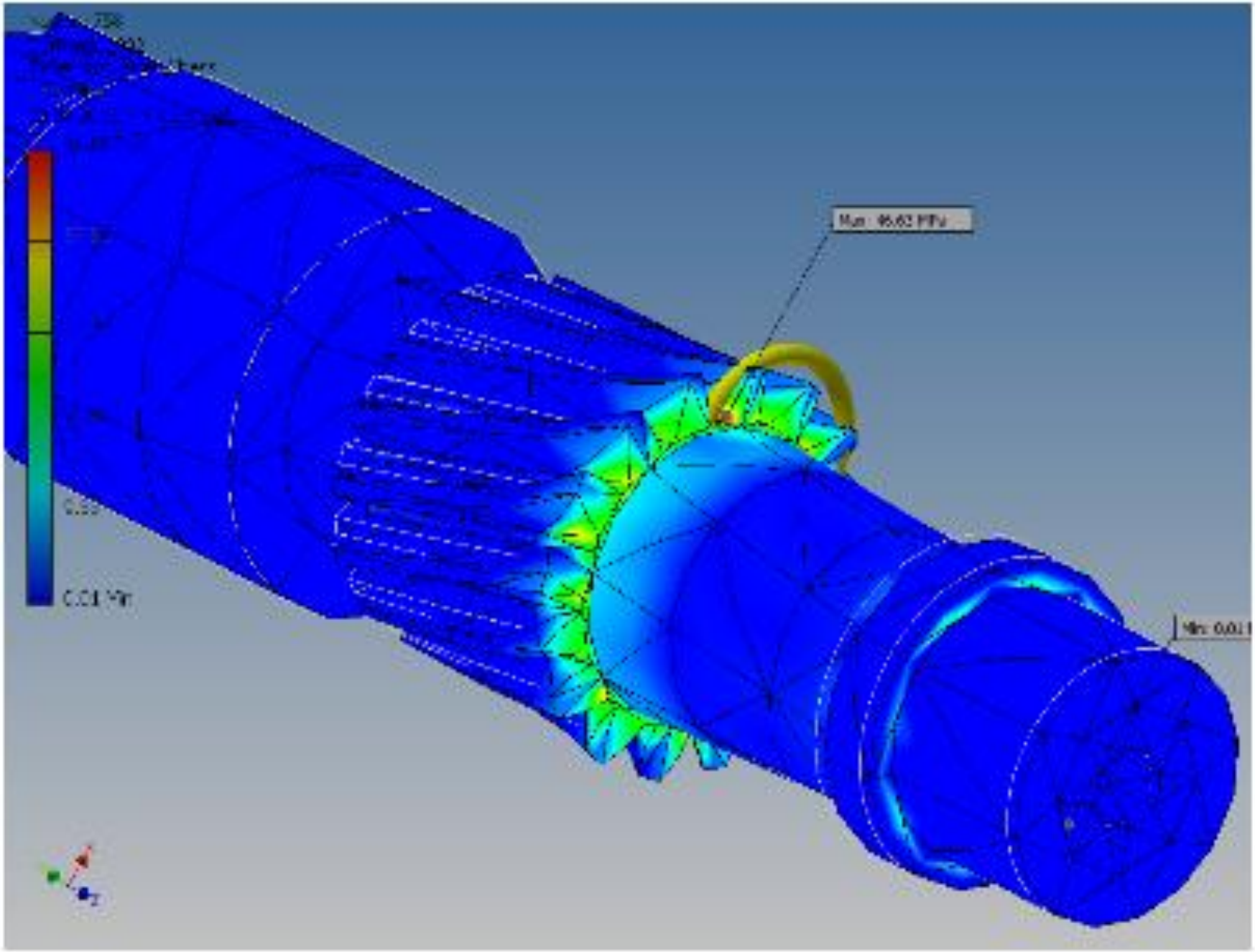
Component Name	Feature Name	Parameter Name	Current Value	Unit
Spur Gear1	Spur Gear	da_b	25	mm

Reaction Force and Moment on Constraints

Constraint Name	Reaction Force		Reaction Moment	
	Magnitude	Component (X,Y,Z)	Magnitude	Component (X,Y,Z)
Fixed Constraint:1	0 N	0 N	15.8992 N m	0 N m
		0 N		0 N m
		0 N		15.8992 N m

Result Summary

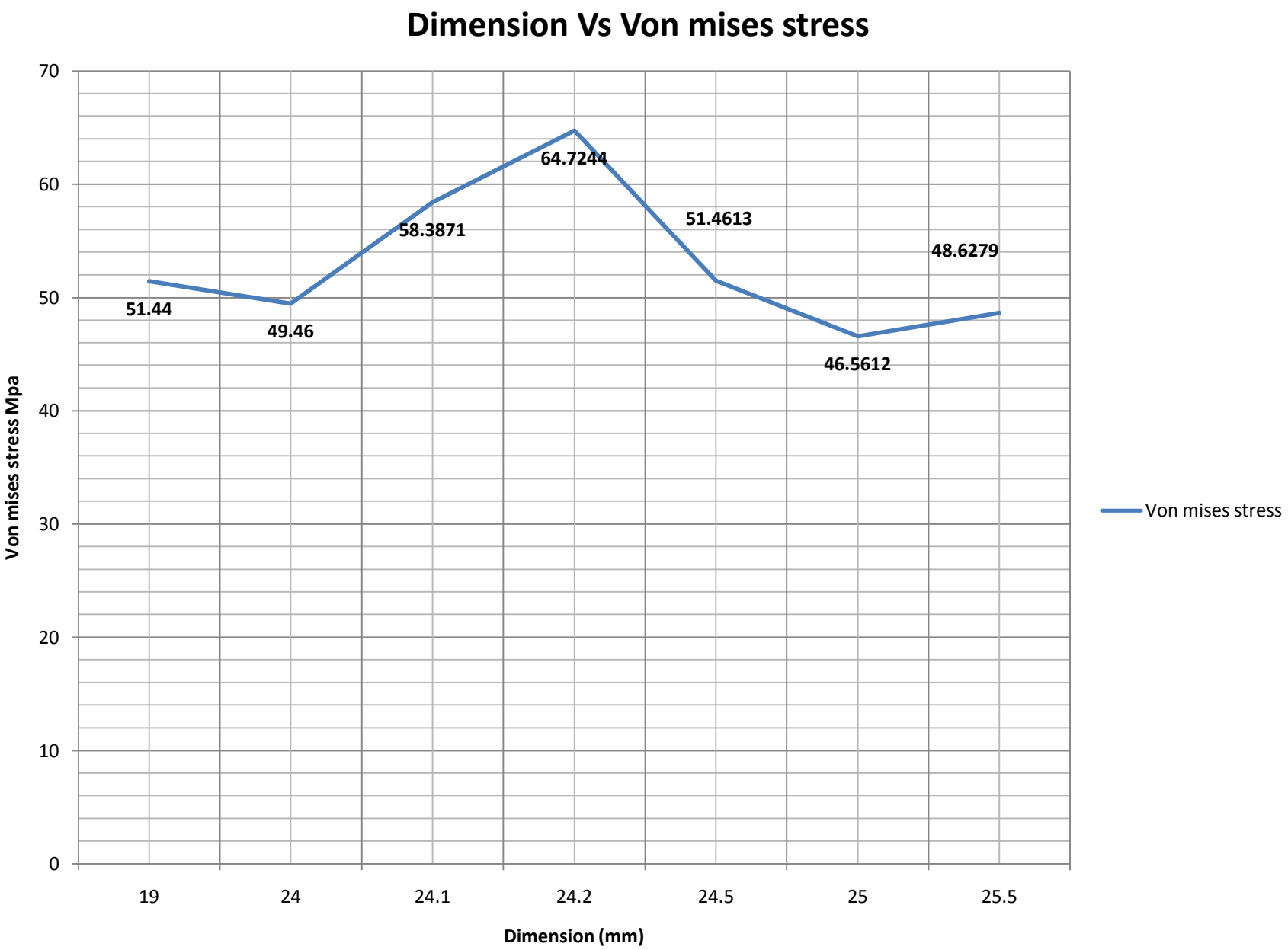
Name	Minimum	Maximum
Volume	59417.1 mm^3	
Mass	0.466424 kg	
Von Mises Stress	0.0068128 MPa	46.632 MPa
Safety Factor	4.43901 ul	15 ul



Parameter definition:

Component Name	Feature Name	Parameter Name	Values	Current Value	Unit
Spur Gear1	Spur Gear	da_b	19,24,24.1,24.2,24.5,25,25.5	24	mm

Dimension (mm)	Von mises stress (Mpa)
24.0	49.4620
19.0	51.4396
24.1	58.3871
24.2	64.7244
24.5	51.4613
25.0	46.5612
25.5	48.6279


Dimension Vs Von mises stress
70
60
50
40
30
20
10
0
Von mises stress Mpa
51.44
49.46
58.3871
64.7244
51.4613
46.5612
48.6279
19
24
24.1
24.2
24.5
25
25.5
Dimension (mm)
Von mises stress

Dimension	Stress in XX	Stress in XY	Stress in XZ	Stress in YY	Stress in YZ	Stress in ZZ
19.0	31.9973	23.9885	16.1352	33.5879	15.3810	13.9078
24.0	40.7395	20.4740	16.5940	39.3902	14.9773	12.4604
24.1	38.5167	25.1254	15.1614	39.5282	13.8239	9.7683
24.2	39.2773	26.1266	20.8050	37.6020	15.1394	9.7138
24.5	32.8629	18.9586	20.8340	38.5613	13.3511	8.9099
25.0	41.2990	18.0537	12.9423	34.1740	13.6759	9.3259
25.5	34.6589	18.4056	17.2822	35.3518	13.6483	9.3067

Result

- In our project consider that Stress inversely proportional to life of component.
- As per analysis found that, stress produced in actual component is 49.462 Mpa and life of component 2400 hours.
- After tuning dimensions of input gear and shaft. Stress value found 46.632 Mpa and life of component is 2545 hours as per relation given below.
- Stress x life= constant.

Conclusion

- If dimensions change in shaft and gear then life of component is increase in 145 hours.
- If material change to shaft and gear then negligible change found in stress.
- If dimension of gear is incerased from 25mm to 26mm then there is increase stress after 26mm.