

WORKSHEET /ACTIVITY №4/

The calculation of standard spur gears

Figure 1. Shows the meshing of standard spur gears. The meshing of standard spur gears means reference circles of two gears contact and roll with each other. The calculation formulas are in Table 1.

Figure 1

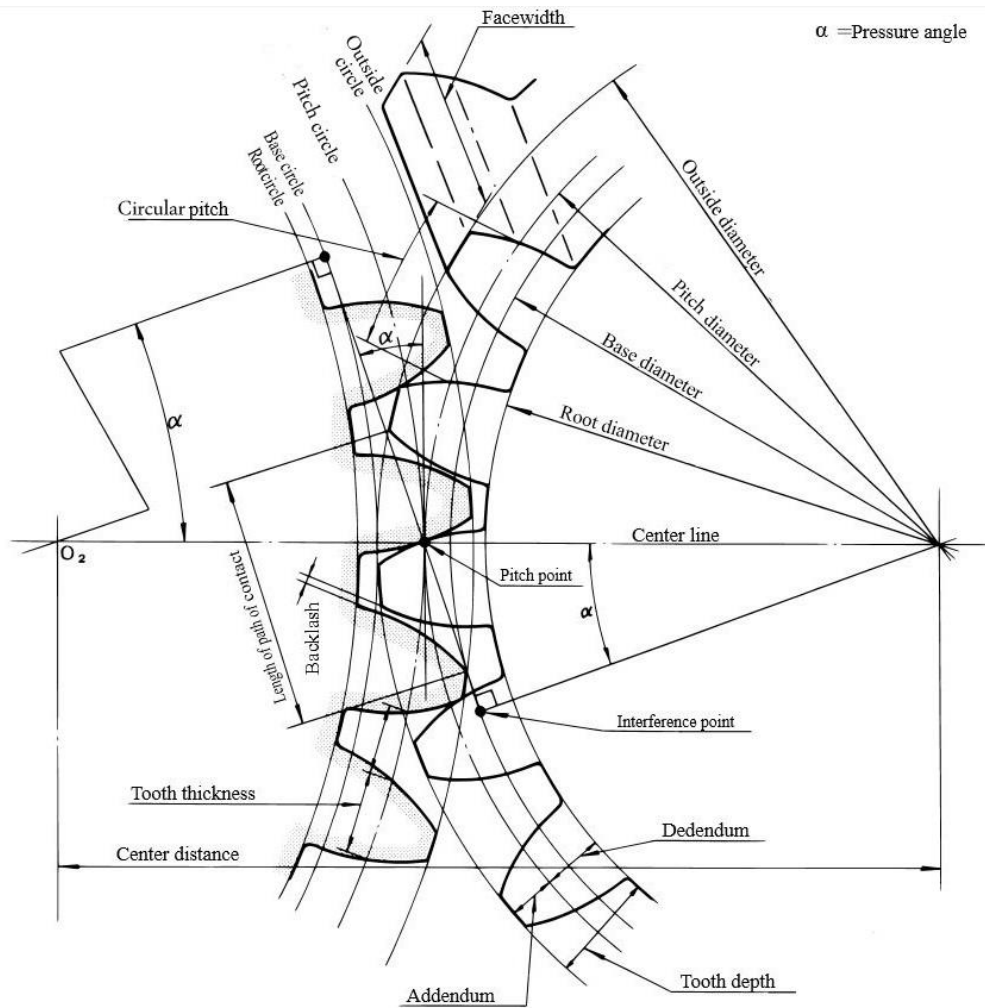


Table 1 The calculation of standard spur gears

№	Item	Symbol	Formula	Example	
				Pinion	Gear
1	Module	m		3	
2	Reference pressure angle	α		20°	
3	Number of teeth	z		12	24
4	Center distance	a	$\frac{(z_1 + z_2)m}{2}$	54.000	
5	Pitch diameter	d	$z.m$	36.000	72.000
6	Base diameter	d_b	$d.\cos\alpha$	33.829	67.658
7	Addendum	h_a	$1.00m$	3.000	3.000
8	Tooth depth	h	$2.25m$	6.750	6.750
9	Outside diameter	d_a	$d + 2m$	42.000	78.000
10	Root diameter	d_f	$d - 2.5m$	28.500	64.500

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PROJECT DESIGNS

The calculation of standard spur gears					
No	Item	Symbol	Formula	Example	
				Pinion	Gear
1	Module	m		<input type="text" value="3.00"/>	
2	Reference pressure angle	α		<input type="text" value="20"/>	
3	Number of teeth	z		<input type="text" value="12"/>	<input type="text" value="24"/>
<input type="button" value="Button 1"/>					
4	Center distance	a	$\frac{(z_1 + z_2)m}{2}$	<input type="text" value="label1"/>	
5	Pitch diameter	d	$z.m$	<input type="text" value="label2"/>	<input type="text" value="label8"/>
6	Base diameter	d_b	$d.\cos\alpha$	<input type="text" value="label3"/>	<input type="text" value="label9"/>
7	Addendum	h_a	1.00m	<input type="text" value="label4"/>	<input type="text" value="label10"/>
8	Tooth depth	h	2.25m	<input type="text" value="label5"/>	<input type="text" value="label11"/>
9	Outside diameter	d_a	$d + 2m$	<input type="text" value="label6"/>	<input type="text" value="label12"/>
10	Root diameter	d_f	$d - 2.5m$	<input type="text" value="label7"/>	<input type="text" value="label13"/>

NumericUpDown

INPUT: m, alfa, z1,z2

RESULT: a, d₁, d₂, d_{b1}, d_{b2}, h_a, h, d_{a1}, d_{a2}, d_{f1}, d_{f2}

The calculation of standard spur gears					
No	Item	Symbol	Formula	Example	
				Pinion	Gear
1	Module	m		<input type="text" value="3.00"/>	
2	Reference pressure angle	α		<input type="text" value="20"/>	
3	Number of teeth	z		<input type="text" value="12"/>	<input type="text" value="24"/>
<input type="button" value="CALCULATE"/>					
4	Center distance	a	$\frac{(z_1 + z_2)m}{2}$	<input type="text" value="54"/>	
5	Pitch diameter	d	$z.m$	<input type="text" value="36"/>	<input type="text" value="72"/>
6	Base diameter	d_b	$d.\cos\alpha$	<input type="text" value="33,83"/>	<input type="text" value="67,66"/>
7	Addendum	h_a	1.00m	<input type="text" value="3"/>	<input type="text" value="3"/>
8	Tooth depth	h	2.25m	<input type="text" value="6,75"/>	<input type="text" value="6,75"/>
9	Outside diameter	d_a	$d + 2m$	<input type="text" value="42"/>	<input type="text" value="78"/>
10	Root diameter	d_f	$d - 2.5m$	<input type="text" value="28,5"/>	<input type="text" value="64,5"/>

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CODE

```
Private Sub Button1_Click(sender As Object, e As EventArgs) Handles Button1.Click
    m = NumericUpDown1.Value
    alfa = NumericUpDown2.Value
    z1 = NumericUpDown3.Value
    z2 = NumericUpDown4.Value
    Label11.Text = (z1 + z2) * m / 2
    d1 = m * z1
    Label12.Text = d1
    Label13.Text = Round(d1 * Cos(alfa * PI / 180), 2)
    Label14.Text = m
    Label15.Text = 2.25 * m
    Label16.Text = d1 + 2 * m
    Label17.Text = d1 - 2.5 * m
    d2 = m * z2
    Label18.Text = d2
    Label19.Text = Round(d2 * Cos(alfa * PI / 180), 2)
    Label110.Text = m
    Label111.Text = 2.25 * m
    Label112.Text = d2 + 2 * m
    Label113.Text = d2 - 2.5 * m

End Sub
```