Modeling a Rack / Spur Gear

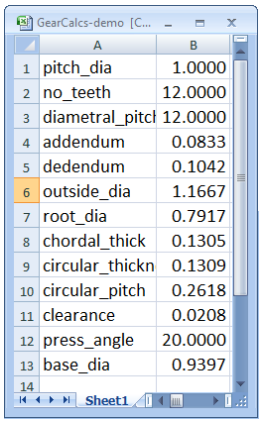
Jcs-6/4/2013

The Spur Gear

Given / Required Gear Specs:

Diametral Pitch= 12
Number of Teeth = 12
Pressure Angle= 20

Calculations / Excel spread sheet (Re. Madsen Pgs 629-632)

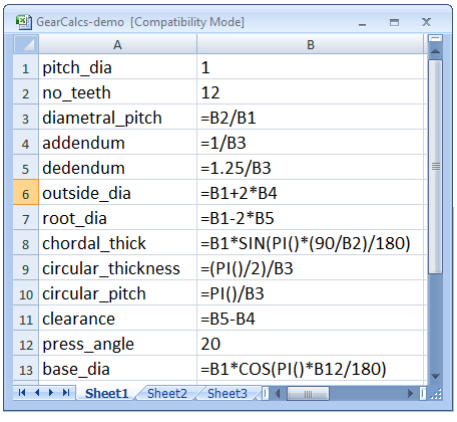


GearCalcs-demo [C...

	A	B
1	pitch_dia	1.0000
2	no_teeth	12.0000
3	diametral_pitcl	12.0000
4	addendum	0.0833
5	dedendum	0.1042
6	outside_dia	1.1667
7	root_dia	0.7917
8	chordal_thick	0.1305
9	circular_thickn	0.1309
10	circular_pitch	0.2618
11	clearance	0.0208
12	press_angle	20.0000
13	base_dia	0.9397
14		

Sheet1

Fourmulas



GearCalcs-demo [Compatibility Mode]

	A	B
1	pitch_dia	1
2	no_teeth	12
3	diametral_pitch	=B2/B1
4	addendum	=1/B3
5	dedendum	=1.25/B3
6	outside_dia	=B1+2*B4
7	root_dia	=B1-2*B5
8	chordal_thick	=B1*SIN(PI()*(90/B2)/180)
9	circular_thickness	=(PI()/2)/B3
10	circular_pitch	=PI()/B3
11	clearance	=B5-B4
12	press_angle	20
13	base_dia	=B1*COS(PI()*B12/180)

Sheet1 Sheet2 Sheet3

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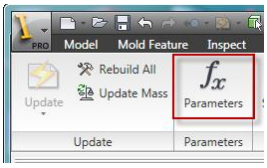
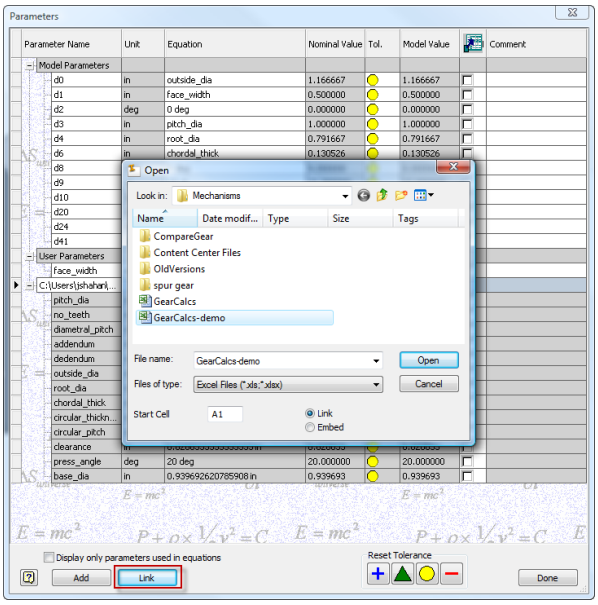
Inventor: Parameters



Inventor: Parameters – Link to spreadsheet



Inventor: Parameters – User Parameters

Parameter Name	Unit	Equation	Nominal Value	Tol.	Model Value	Comment
Model Parameters						
d0	in	outside_dia	1.166667		1.166667	
d1	in	face_width	0.500000		0.500000	
d2	deg	0 deg	0.000000		0.000000	
d3	in	pitch_dia	1.000000		1.000000	
d4	in	root_dia	0.791667		0.791667	
d6	in	chordal_thick	0.130526		0.130526	
d8	deg	0 deg	0.000000		0.000000	
d9	ul	12 ul	12.000000		12.000000	
d10	deg	360 deg	360.000000		360.000000	
d20	in	0.016 in	0.016000		0.016000	
d24	in	base_dia	0.939693		0.939693	
d41	deg	20 deg	20.000000		20.000000	
User Parameters						
face_width	in	0.5 in	0.500000		0.500000	
C:\Users\jshahan\...						
pitch_dia	in	1 in	1.000000		1.000000	
no_teeth	in	12 in	12.000000		12.000000	
diametral_pitch	in	12 in	12.000000		12.000000	
addendum	in	0.0833333333333333 in	0.083333		0.083333	
dedendum	in	0.104166666666667 in	0.104167		0.104167	
outside_dia	in	1.16666666666667 in	1.166667		1.166667	
root_dia	in	0.791666666666667 in	0.791667		0.791667	
chordal_thick	in	0.130526192220052 in	0.130526		0.130526	
circular_thickn...	in	0.130899693899575 in	0.130900		0.130900	
circular_pitch	in	0.261799387799149 in	0.261799		0.261799	
clearance	in	0.0208333333333333 in	0.020833		0.020833	
press_angle	deg	20 deg	20.000000		20.000000	
base_dia	in	0.939692620785908 in	0.939693		0.939693	

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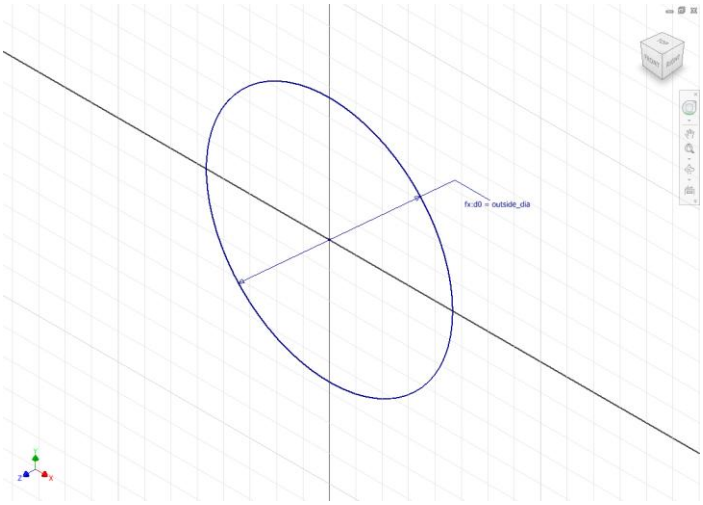
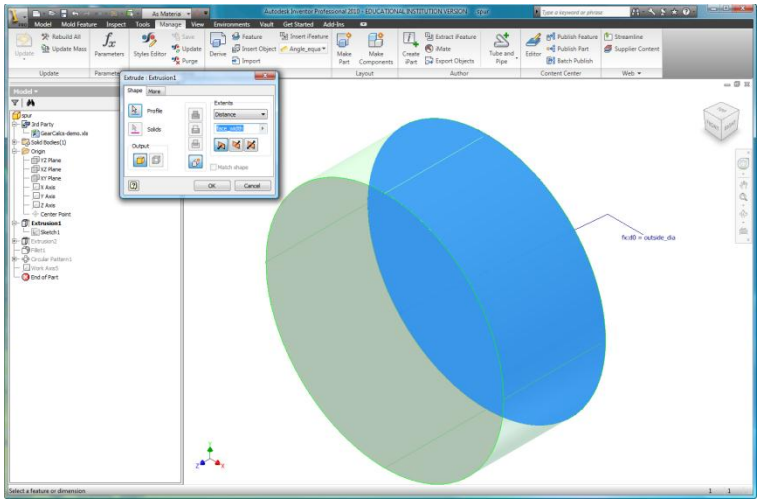
Inventor Sketch: Base Feature



Extrude



Inventor Sketch: Cut

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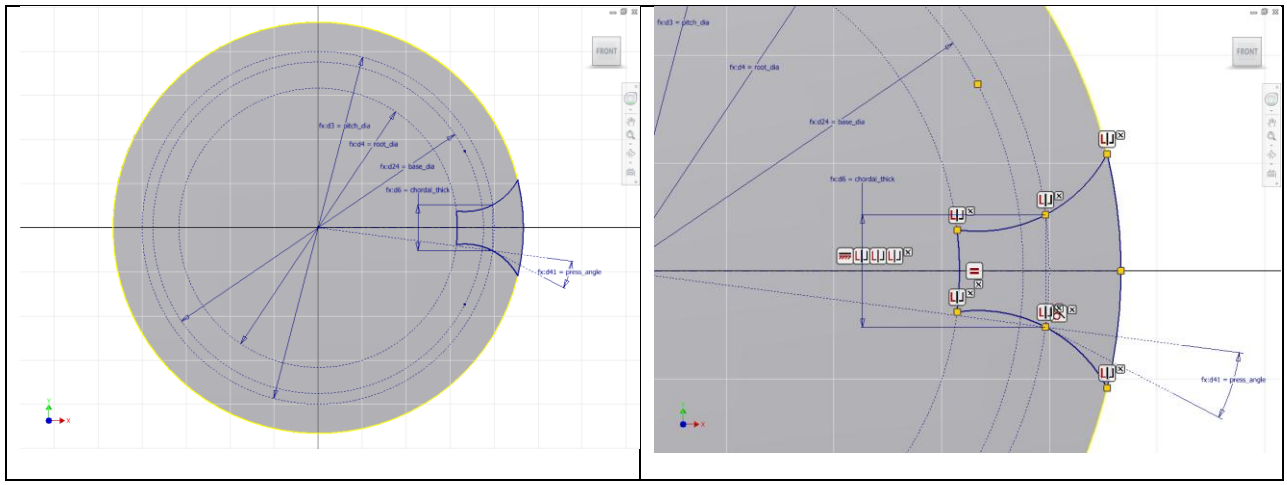
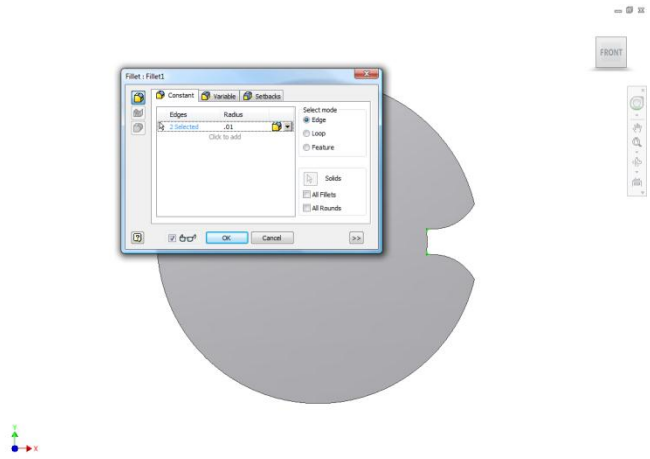


Add Fillet



Pattern

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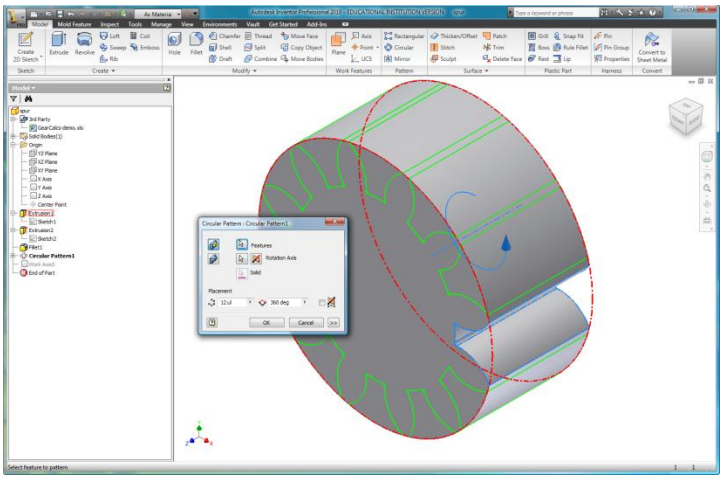
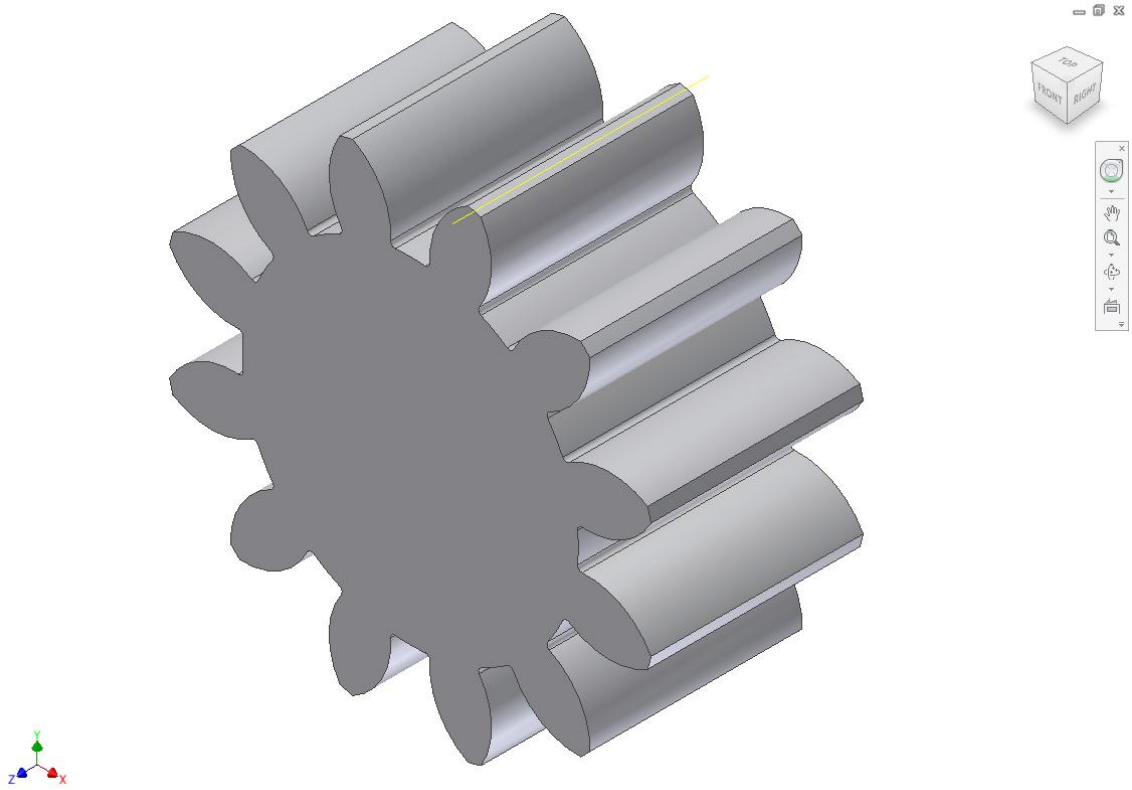


Final Gear



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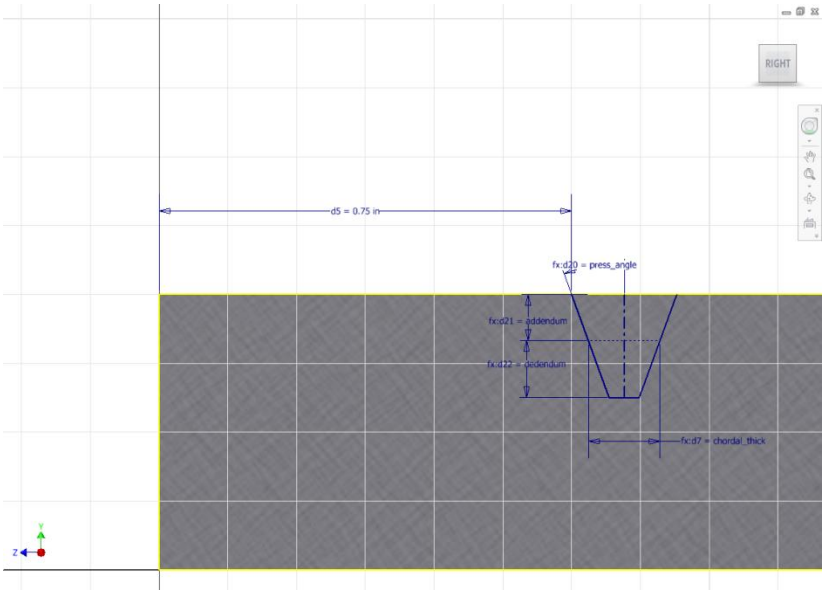
The Rack

Same Spread sheet

The Cut



Rectangular pattern

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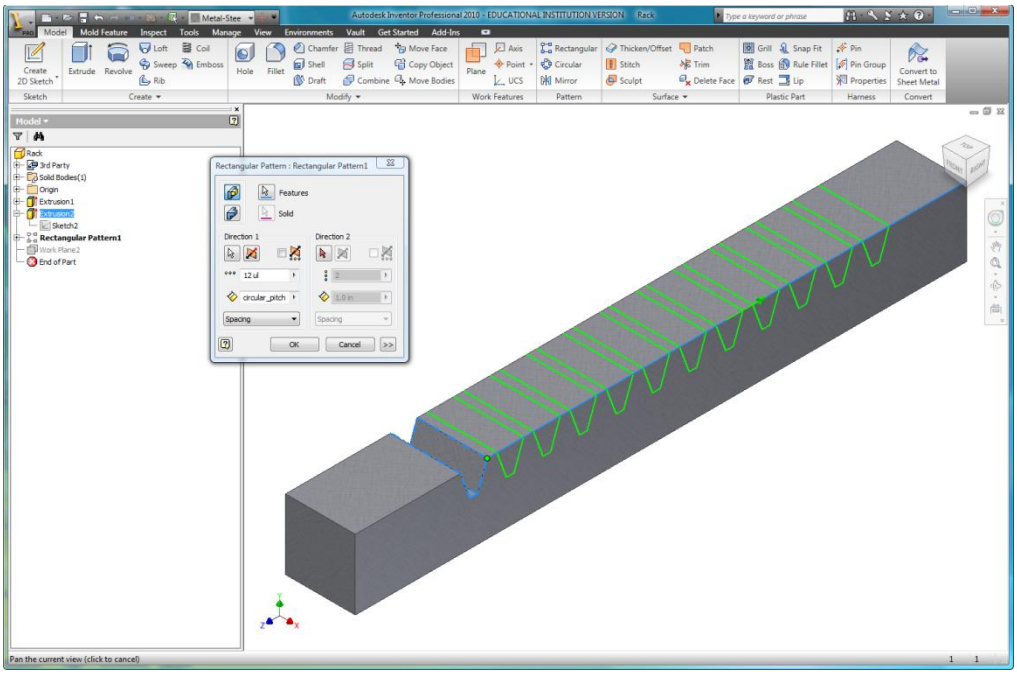
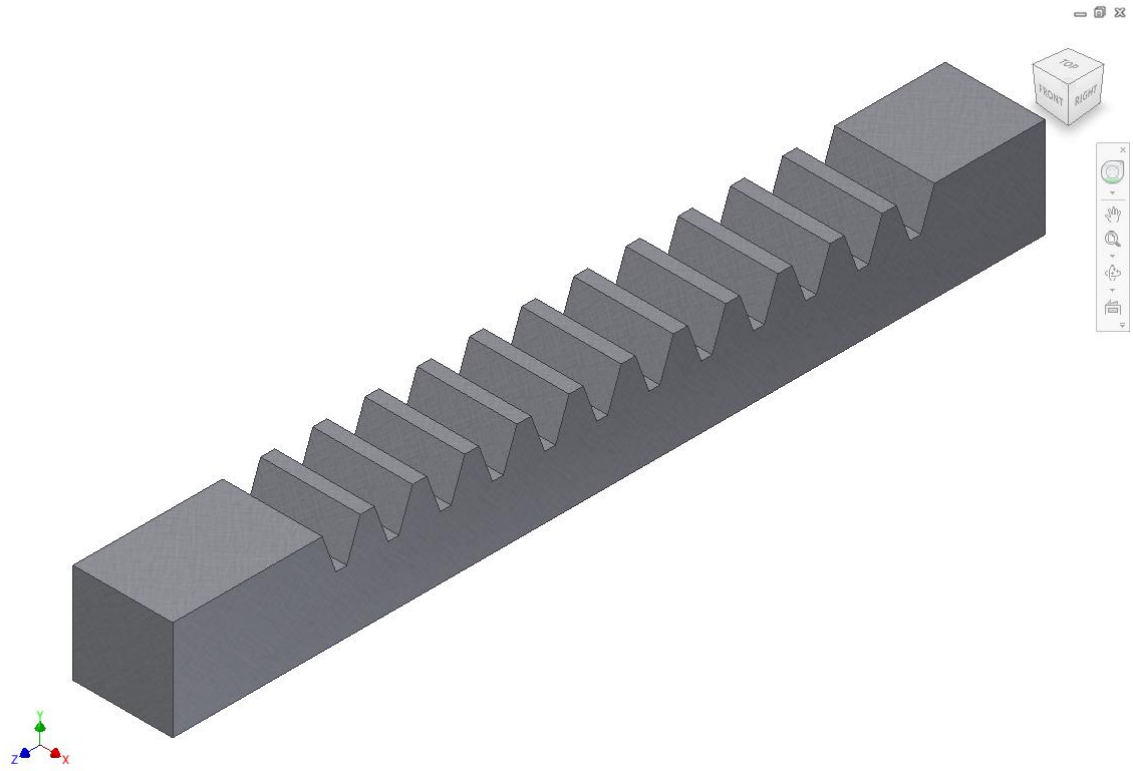


Final



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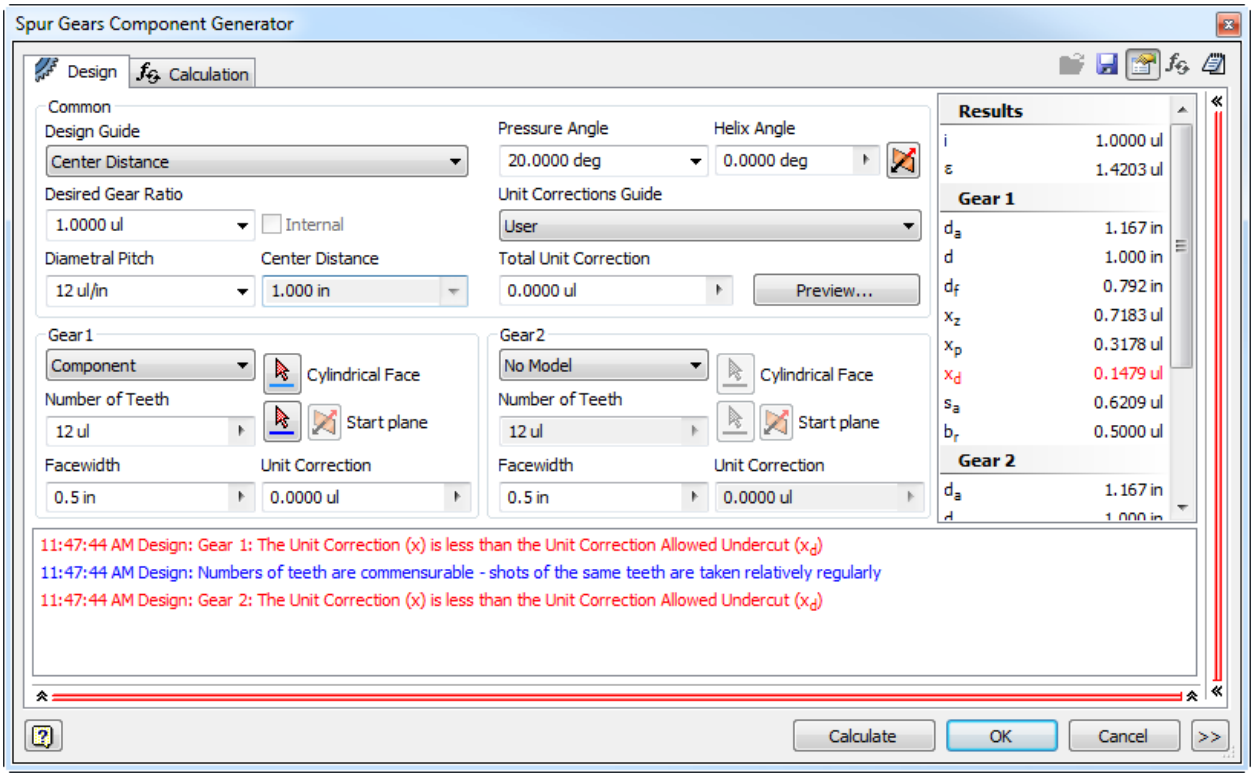
Using the Spur Gear Generator



Note: Errors related to gear recommendations

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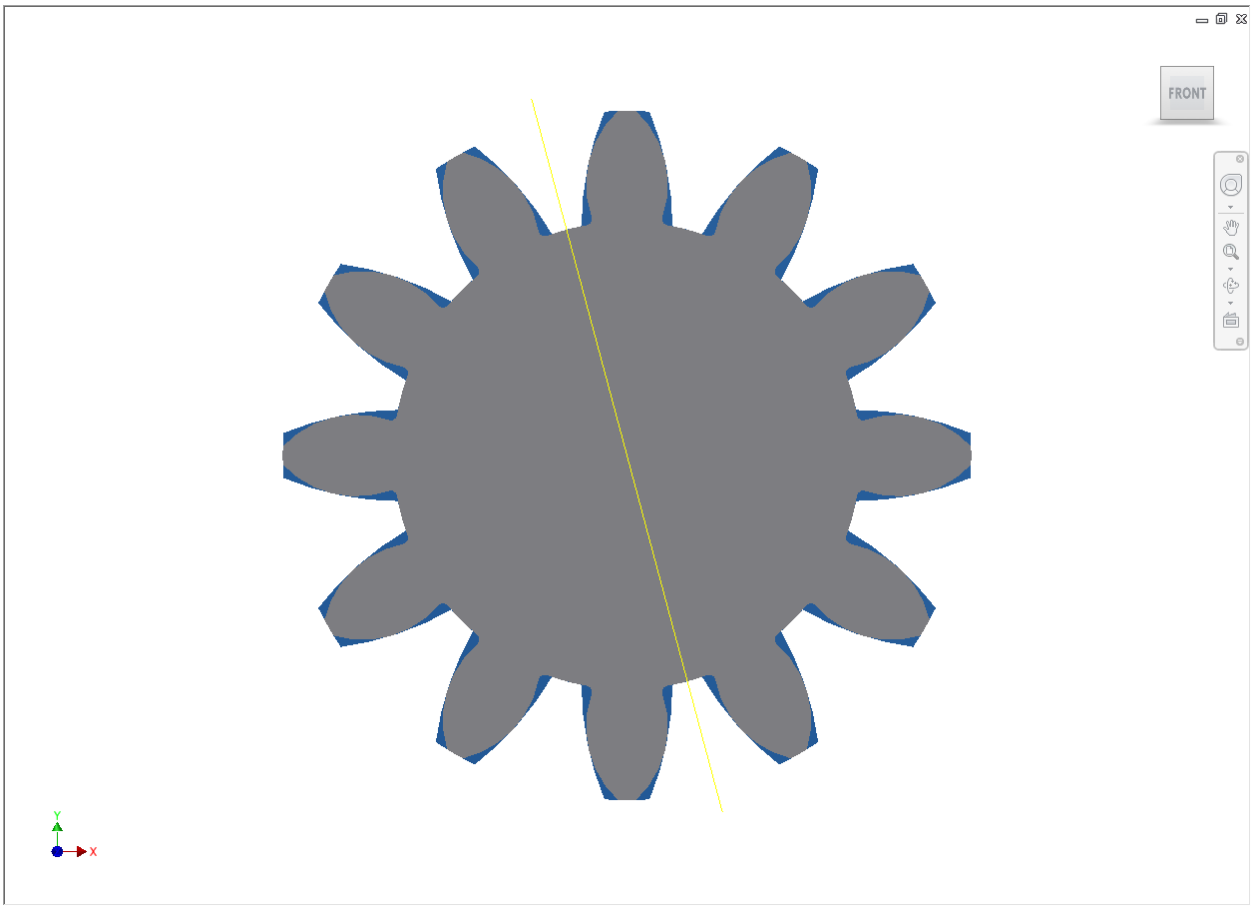
Comparing the Gears



Note: Blue gear generated by the gear generator. Gray Gear Generated using standard dimensions