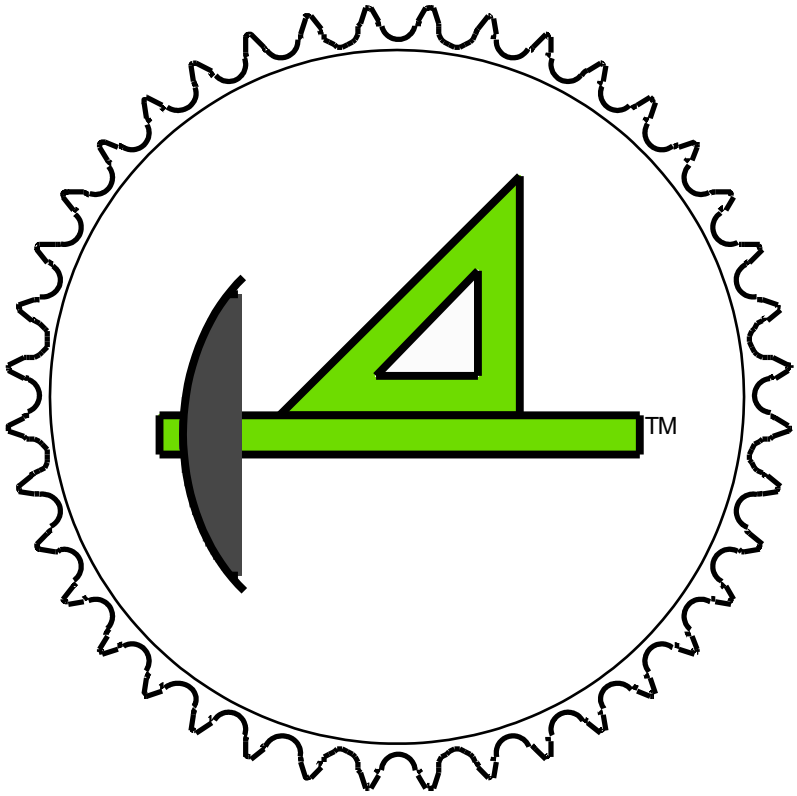
Drawing a SPROCKET

in

DeltaCad®



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In searching the internet for directions on drawing a roller chain sprocket you find things like -

Pitch Diameter =P/sin [180deg/N) or Outside Diameter =P*(0.6+cot (180deg/N))

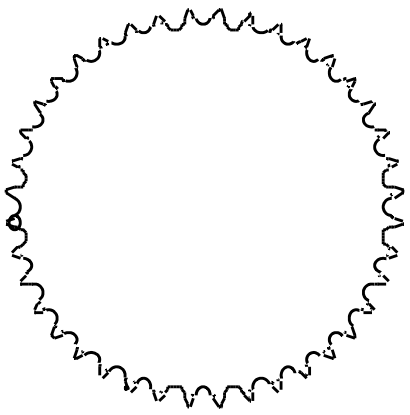
I'm a firm believer in "there's gotta be an easier way to make things more difficult".
And I was right, there is.

One Pitch (P) (the center to center distance between the center points on the two pins in a single link in a roller chain) spans one tooth on any sprocket. Multiplying P by the Number of Teeth (Tn) on the sprocket we get a very close approximation of the Pitch Circumference (Pc).

With the Pc, and one other piece of information, we can derive all the necessary information required to draw a roller chain sprocket. However, this drawing will not be precise enough for precision machining or fabrication, but for illustration purposes it's a win. The other piece of information required is the Roller Diameter (Rd) of the roller chain that the sprocket is for. Utilizing this information, the formulas stated above and the prerequisite scientific calculator are not required.

Ultimately what is required to draw a sprocket in DeltaCad is the Pitch Radius (Pr). Deriving the Pr is explained in the following section "Do the Math".

The sprocket that will be drawn here is for a #40 ANSI roller chain and will have 40 teeth.



Do the MATH

#40 ANSI roller chain sprocket

P = 0.5"

Rd = 0.3125"

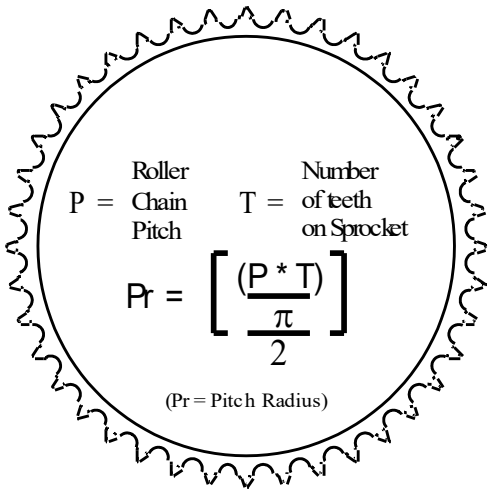
Tn = 40

Pitch Circumference (Pc)	***Pitch Diameter (Pd)***	***Pitch Radius (Pr)***
Pc = P * Tn	Pd = Pc/π	Pr = Pd / 2
Pc = 0.5" * 40	Pd = 20"/3.1415	Pr = 6.3664" / 2
Pc = 20"	Pd = 6.3664"	Pr = 3.1832"

Combining the above charted information we get...

$$Pr = [(P * Tn) / \pi] / 2$$

(I just use the charted information and do it one step at a time.)

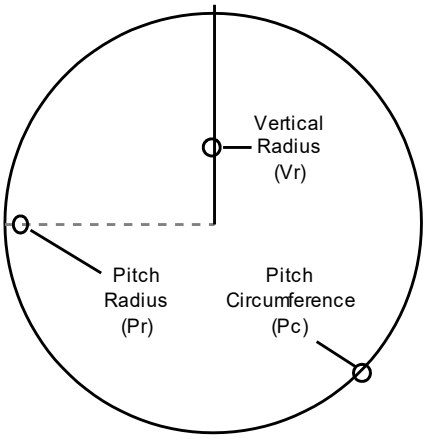


Information needed
Roller Chain Pitch
Roller Chain Roller Diameter
Number of Teeth required for Sprocket

Calculate dimension of Pitch Radius

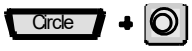
Do the DRAWING

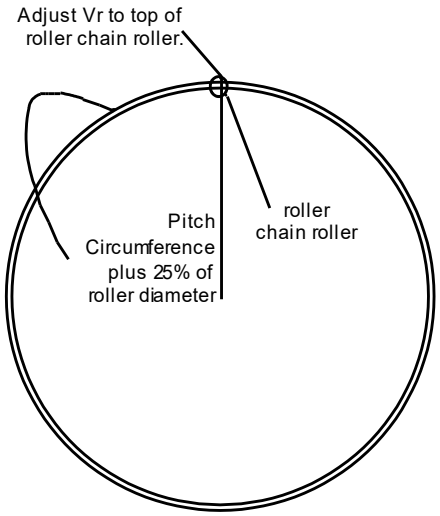
In DeltaCad, in a new work sheet establish the Pr and draw a circle with that radius. This circle is the Pitch Circumference (Pc). Draw a Vertical Radius (Rv) line as shown.



Draw Pitch Circumference at Pitch Radius dimension. Draw radius (Vertical Radius) line from center to just past Pitch Circumference.

At the intersection of Rv and Pc draw a small circle the diameter of the roller. Extend Vr to the top of the roller circle.

Select-  click Pc and increase Pc circle by 50% of roller diameter.



Draw circle at Roller Diameter dimension as shown.
Increase Pitch Circumference 25% of Roller Diameter.
Extend Vertical Radius to top of of Roller.

Select - Select click Vr then add temporary base point to base of Vr.

click Copy key in 4.5 and key in "Enter"

Select - Select click Vr then add temporary base point to base of Vr.

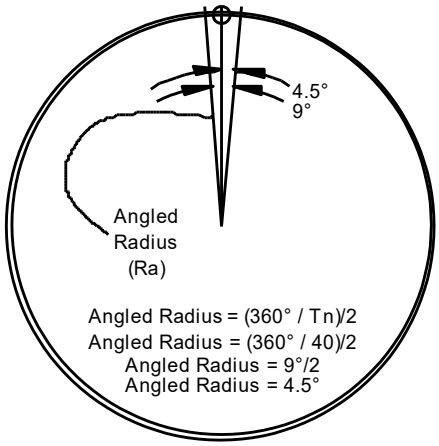
click Copy key in -4.5 and key in "Enter"

Radius Angle (Ra) = 360° / Tn

Ra = 360° / 40

Ra = 9°

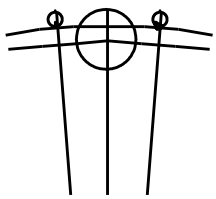
Ra is centered on Vr



Draw Pitch Angles as indicated.

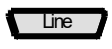
Zoom on roller, Vr and Ra

Select - Circle Locate a circle on each Ra from the extended Pc to the top of each Ra as shown.

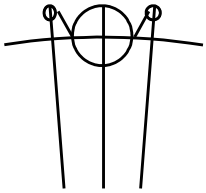


Draw two small circles representing the apex of the teeth on each side of the roller.

Delete extended Pc

Select - 

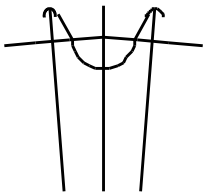
draw line from roller / Pc and extend line to adjacent smaller circle (as shown), repeat for other side.



Now draw two lines conneting the two smaller circles with the roller as shown.

Select - 

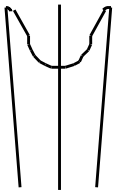
split all three circles at the point where both lines intersect, split roller only once. Delete bottom portion of smaller circles and top portion of roller as shown.



Split the "roller" circle at the Pc and the two "apex" circles at the Rv as shown.

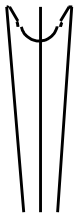
Select - 

merge both small circle portions to Ra and both connecting lines to both small circle portions and both small cirle portion to both connecting lines and delete Pc as shown.



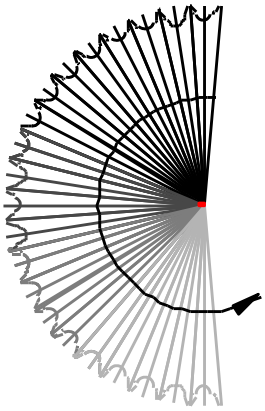
Merged lines and circle portions.

Select - Select + Gr group all lines and circle portions into a single Pitch Arc Segment (Pas) as shown.

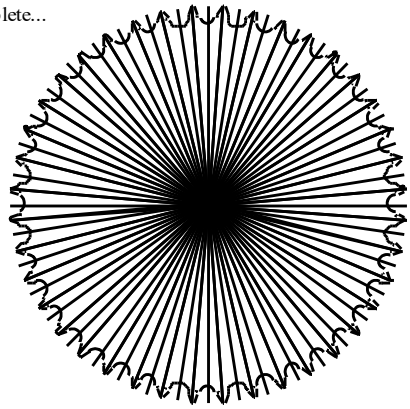


Group everything together
to form the Pitch Arc Segment (Pas).

Select - Select + - place endpoint a bottom of Pas Copy + and rotate Pas 9° 39 times to complete sprocket form.

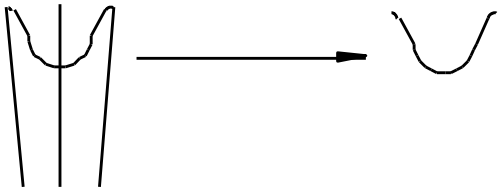


With sprocket form complete...



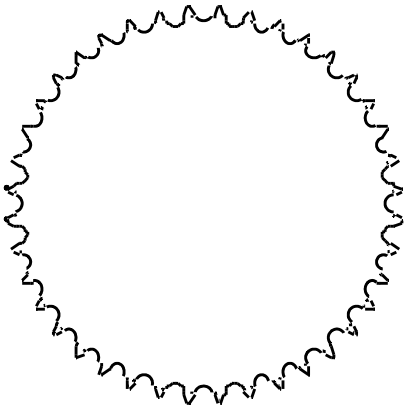
Select - Edit + E Select one P as and choose "Edit P icture" from the drop d own menu.

In the "Edi t Picture" window de lete Va and both Ra as shown.



Close "Edit Pic ture" window.

With "Edit Picture" wind ow closed the s procket form is n ow the sprocket outline.



Selec t - Select + Gr select the entire sprocket o utline and group together.
The sprocket is now co mplete.