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Wanted to make a [Delrin 120 tooth idler gear for my PM14x40 lathe](#). A few years back i made a small 24 tooth spur gear for a 3-1 multi-machine (Mill/Drill/Lathe) so i could add a thread dial, that gear was made by a single point cutter ground to the correct angle and looked kind of like a fly cutter... For this 120 tooth project i wanted to make a multi-edge cutter that would create an Involute Gear. Did alittle research found the radius which i needed and did the following:

Sorry, dont have alot of pictures for this project.

- Chucked up a piece of 2.5" O-1 tool steel, faced, skimmed the OD, drilled and bored.
- Took the O-1 stock out (1/2 finished) and tossed it in the horizontal band-saw and cut it off 1/16 heaver then the final thickness that i wanted (i would have cut it off on the lathe, but i didnt want to take the chance in wrecking a cut-off tool)
- While the saw was cutting i made a straight shank arbor which will hold the gear cutter.
- Put the O-1 blank back in the lathe and faced the second side
- Ground a piece of HSS with the correct radius on it
- Chucked up the arbor and locked the blank to it and started to form the cutter, one side at a time, flipping the blank.
- Test fitted the blank cutter with two gears, one a 30 tooth and the second a 60 tooth (the two main change gears i use) needed to regrind the HSS bit to get the fit i was looking for (holding the cutter blank up to a light while meshed to each gear (one gear showed alittle light at the bottom of the mesh the other gear showed alittle light at the top of the mesh - which is what i wanted)).
- Took the blank and arbor out of the lathe and chuck it up in a "Spin Indexer" over at the Mill/Drill - got every thing aligned and centred and milled six notches which will create the cutting edges.
- Ground relief on the trailing edge with a dermal (should have used an off-set arbor or four jaw chuck for this, would have been able to cut the blank and create the relief all in one shot).
- Heated the blank and dropped it in some oil.

HSS cutter i used to form the gear cutter.



Before relief was ground (in the last image you can see the form of the cutter in the shadow it casts just to the right of the blank)





After relief and hardening





Things which i will do different next time:

- Instead of grinding the HSS bit by hand i will take a piece of tool steel and turn it to the correct diameter for the radius needed and drill it out for a screw, cut it off and bolt that to a piece of square stock and use that as my form cutter (didnt have a piece of tool steel big enough this time).
- Will use an off set holder/arbtor so the relief will be generated while cutting the blank.

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