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[MrMhor](#)
Member

Registered:
12/16/06
Posts: 1059
Loc: Rockford, IL

How I Fixed my TS Arbor Flange Runout
#3395953 - 12/10/07 06:49 PM

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Hopefully this might be of use to some of you looking to reduce the arbor flange runout on your table saw. You don't need fancy tools, honing jigs, and you certainly don't need to send your arbor to a machine shop. You will need some patience, a fine touch with your hands, and some basic tools shown below (plus masking tape, and minus the lamp). I'll say up front that I don't trust jigs or hand held stones/files to be rigid enough to perform a live touchup to the flange - I find they hop or just follow the existing contour, removing material but leaving the same runout on the flange.

Before we get too far along, a brief overview of what I'm going to accomplish today. My table saw arbor flange has excessive runout at a hair over .0015 inches FIM - remember that runout at the flange needs to be multiplied by ~4.5 to predict the runout at the blade rim. This causes my blade to wobble at the rim by over .014 inches, and generates rough cuts, or rougher than I would like. Some of the wobble is due to the blade, some is due to the arbor flange. I can't fix blade runout, so I will do my best to reduce the arbor flange runout to minimize the problem.

The basic idea is to find the hi and low zones on the arbor flange, file the hi zones in progressive steps, finally honing the flange with a stone to less than .0005 inches. This is part of the reason why I feel >.0005 runout is excessive - because I'm going to hand file my arbor to less, and the manufacturer should be using a side grinder capable of better than .0002 runout all day every day.

Tools (minus masking tape) are shown below. Nothing fancy. A sharpie (or machinists' blue), dial indicator with magnetic stand, fine file about 6" long (I use a double cut file, single would work too), and a honing stone (I use a brown india stone).



Next step, I jack the motor or remove the belt...whatever it takes to unload the arbor. This is so I can easily rotate the arbor shaft while taking measurements, as I'm going to be measuring down into the tenths of thousandths of runout on the flange.



That done, I stone the arbor flange to remove any burrs, clean the arbor flange with mineral spirits, and tape off the arbor where the blade mounts (in order to protect it).



I mount the dial indicator to the mag stand and snake the arms down beneath the table. Leaving the arm above the table will get in the way when filing and runout magnitudes will not be accurate if the dial indicator is at an angle - I need magnitudes to know when it's OK to stop (i.e. when runout is $< .0005$, you may have your own goal).



I slowly rotate the arbor while watching the dial indicator and get a feel for the runout pattern. First check is to make sure it repeats. If it does not, then the flange might be dirty. I then mark the hi and low zones with a sharpie marker. Typically, the flange does not have a single sharp peak causing runout. The proud material is typically spread over a significant portion of the flange, and the dial indicator needle stays pegged high over a zone of the flange circumference. This is what I call the hi zone. The very first time you mark the flange, you may find a single defined hi point instead of a zone. In addition to the hi and low zones, I mark the half way points between them. This gives me a rework map for the flange.

Note that a single mark at the hi spot (center of the hi zone) is very difficult starting point for rework. It

would be like someone handing you a belt sander and a cutting board with a pencil dot marking the highest point and saying "sand it flat." You need to know the contour in order to file the proud flange material only, and feather it into the low zone.

My hi zone is solid black, between the intermediate points and the hi zone is cross hatched, low zone is unmarked.



I hold the file against the arbor flange, spanning the as wide a gap as possible (for stability). I use finger pressure from the index finger to apply cutting pressure to the far edge of the flange on the forward stroke. Make sure to hold the file against the flange - if it rocks, you'll crown the face of the flange (not a good thing).



I work around the flange by rotating it slightly with each stroke. The sharpie marks are my guide - when the sharpie mark is removed, I move on to the next section. I hog out the solid marks first (the hi zone) and feather it from the hi zone to the intermediate zone. The action is a bit more continuous than it sounds, as I take overlapping passes and rotate the arbor.

The following photos are a mid way progress shot, followed by the finished progress shot (for this iteration at least).

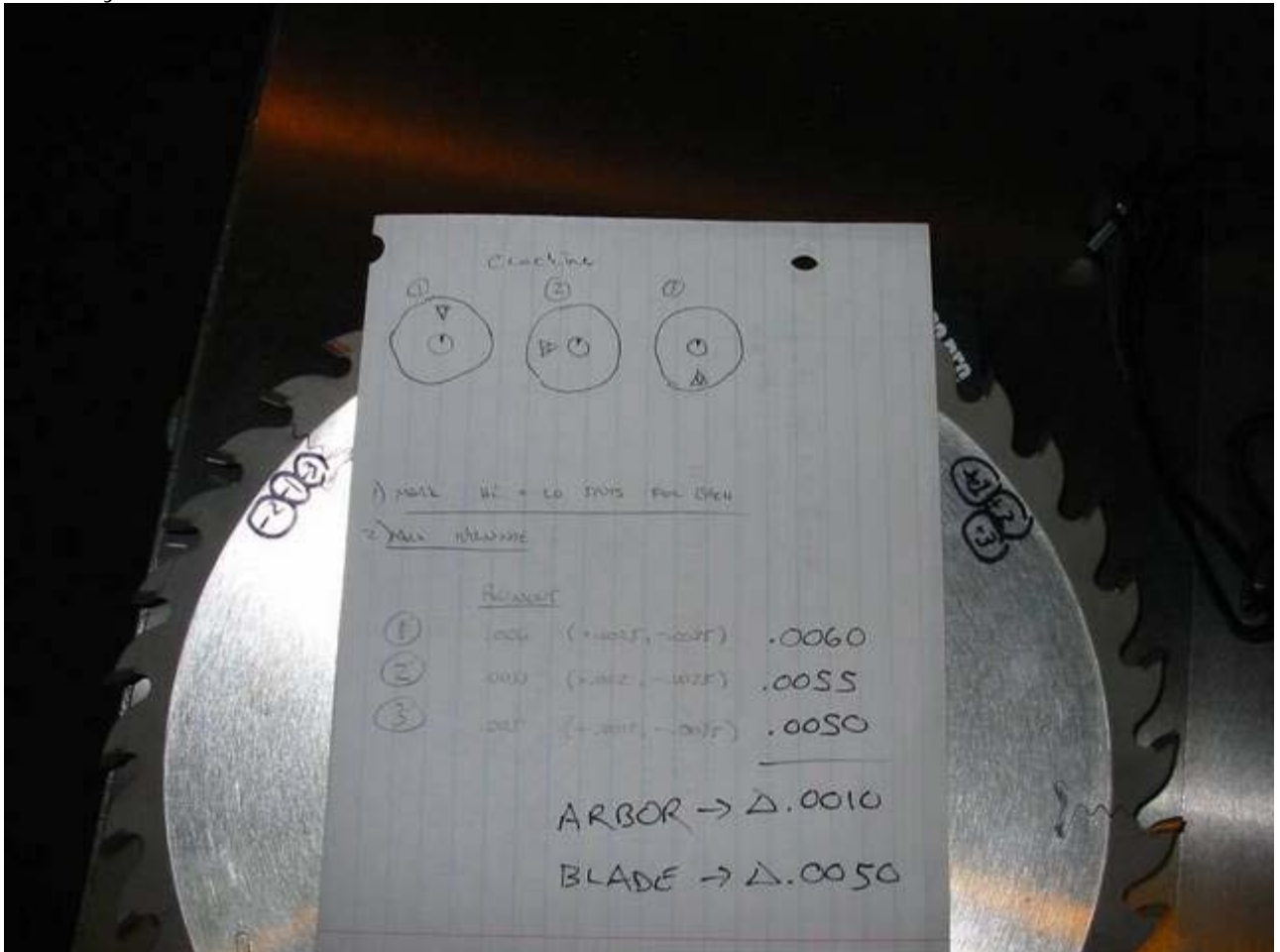


I stone the face, clean with a blast of air, then measure runout. You should see about .0001 to .0003 difference with light file pressure and just barely removing the sharp mark. Re-marking the hi zone over successive iterations should show the zone increasing in size, and harder to define. At some point, you'll find the runout is below your acceptance limit, and it's time to move on to the blade runout check. Ideally, the runout will be noise, and hi and low spots won't be 180 degrees out when you're done.

This is the stopping point. If you find blade runout (i.e. runout at the blade rim) isn't acceptable, you need to re-check your flange measurements and use some standard clocking methods to determine if it's the blade runout that is excessive. How to tell? If I've achieved my goal, the contribution from flange runout is much, much less than the blade runout itself. If this is the case, then I should see the hi and low spots on the blade rim runout traces clustered in the same locations no matter how it's clocked on the arbor.

Mount the blade and dial indicator above the table. Make a match mark between the flange and blade. Measure blade rim runout and mark a "+1" at the high spot on the blade and a "-1" at the low spot.

Next, turn the blade 90 degrees and re-tighten. Perform the same runout measurement and place "+2" and "-2" marks on the blade. Rotate the blade 90 degrees and take measurements / place marks twice more. My results are shown below.



My + and - marks clearly follow the blade and not the arbor. This means the contribution from arbor flange runout is much less than the blade runout. I stopped after 3 marks because it was clear they were clustered. Note my measurements on the paper show ~.001 flange runout contribution AT THE BLADE which means less than ~.0003 at the flange...pretty good for a quick filing. Notice my blade runout is ~.005...I wish it was a bit better, but beggars can't be choosers.

If your + and - marks are 90 degrees apart, then it's the arbor flange runout that is causing the blade runout, and it's time to try filing again.

I wrote this in the hope that it might help someone correct TS arbor flange runout without the need to spend money at a machine shop or wait for replacement parts from the manufacturer. It's a relatively simple process, and I think even a novice can master the technique after a few passes with the file. If all goes wrong, you remove the arbor and have it machined, or call the manufacturer.

If anyone has any suggestions for improvement, please feel free to share them.

Edited slightly for clarity and spelling.

Post Extras:   

[Unisaw A100](#)
Member

 **Re: How I Fixed my TS Arbor Flange Runout** NEW [Re: [MrMhor](#)]

#3396118 - 12/10/07 08:10 PM

 Edit  Reply  Quote

Registered:
03/05/04
Posts: 4442
Loc: South End of
The Tamarack
Swam...

If there was a Best of WoodNet this should be there.



Unisaw A-100, who has done something similar with a piece of Baltic birch, some AIZ paper, a clamp, the saw fence and the saw under power...

Post Extras:   

[t5volvov70](#)

Member

Registered:
05/22/06
Posts: 417
Loc: Camas, WA

 **Re: How I Fixed my TS Arbor Flange Runout**  [Re: [MrMhor](#)]

#3396158 - 12/10/07 08:29 PM

 Edit  Reply  Quote

Great right up!



Thanks - I'm marking this as a favorite

Post Extras:   

[Jonny Rocket](#)

Member

Registered:
09/01/06
Posts: 831
Loc: Indianapolis, IN

 **Re: How I Fixed my TS Arbor Flange Runout**  [Re: [Unisaw A100](#)]

#3396783 - 12/11/07 09:01 AM

 Edit  Reply  Quote

Unisaw A100 said:

If there was a Best of WoodNet this should be there.

Unisaw A-100, who has done something similar with a piece of Baltic birch, some AIZ paper, a clamp, the saw fence and the saw under power...



I am thinking of creating something just like that to archive some extremely useful threads, such as this.

Post Extras:   

[mattsworld](#)

Member

Registered:
11/15/06
Posts: 706
Loc: Warwick, RI

 **Re: How I Fixed my TS Arbor Flange Runout**  [Re: [MrMhor](#)]

#3396908 - 12/11/07 10:00 AM

 Edit  Reply  Quote

MrMhor...thank you. Impressive indeed.

Matt
<http://thesawblog.wordpress.com/>

Post Extras:   

[MrMhor](#)

Member

Registered:
12/16/06
Posts: 1059
Loc: Rockford, IL

 **Re: How I Fixed my TS Arbor Flange Runout**  [Re: [MrMhor](#)]

#3397902 - 12/11/07 05:39 PM

 Edit  Reply  Quote

Thanks for the compliments. I figure some people might try honing jigs with poor results, or just think it's too complicated/expensive to remove the arbor and have it machined, but at the same time have fears about hand filing the arbor. It's amazing how accurate and quick a bit of good old hand tuning can be. No one should have to live with arbor flange runout, at least not runout >.0005 inches.

Cheers
Andrew

Post Extras:   

[bigdubz](#)

Member

Registered:
10/24/07
Posts: 16

 **Re: How I Fixed my TS Arbor Flange Runout**  [Re: [MrMhor](#)]

#3491163 - 01/30/08 10:56 PM

 Edit  Reply  Quote

Kind of bringing back an older thread, but this one should be required reading. I finally got time to do this on my 53 unisaw, reducing the arbor run-out from 3 thou., to less than 1.

Excellent instructions, only took 30 minutes total, and it was surprising easy for clumsy handed people like myself 🙏

The only deviation I made was to tilt the blade all the way to 45 degrees to avoid snaking the dial indicator under the table. this made it much easier to repeat the cycle of measuring, marking and filing.


Thanks for a great how-to!

Andrew

Post Extras:   

[rarebear](#)
Member

Registered:
10/31/02
Posts: 6793
Loc: Rex, Georgia
USA

 **Re: How I Fixed my TS Arbor Flange Runout**  [Re: [MrMhor](#)]

#3491240 - 01/31/08 01:28 AM

 Edit  Reply  Quote

Thats a start but have you checked the run out near your saw teeth?

The washer type adjuster with set screws is best for getting zero run out at teeth IMHO

I just checked and cant find anyone still selling them but I have one and can zero almost every blade out near the teeth.. (when I use it)

Any way I find that if you check you blades run out and index your blade 30°-45° and re-tightening and checking the run out till you find the sweet spot works pretty well even if you have no run out or some...

Doing the arbor tune up is a help I'm sure and thanks for sharing

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Post Extras:   

[MrMhor](#)
Member

Registered:
12/16/06
Posts: 1059
Loc: Rockford, IL

 **Re: How I Fixed my TS Arbor Flange Runout**  [Re: [rarebear](#)]

#3491535 - 01/31/08 08:22 AM

 Edit  Reply  Quote

rarebear, thanks for the comments, I'll try to answer your questions.

Quote:

Thats a start but have you checked the run out near your saw teeth?

All my runout measurements are taken at the saw rim, just inside the gullets. I've gone out past the gullets before, but it's too hard (for me) to watch the indicator needle skipping all over the place and keep track of the runout. Arbor flange runout was measured during the rework as a guide to find high/low spots. But the ultimate test is always the runout at the rim, compensated for blade runout which I can't fix (see the last picture of my original post).

Quote:

The washer type adjuster with set screws is best for getting zero run out at teeth IMHO

I just checked and cant find anyone still selling them but I have one and can zero almost every blade out near the teeth.. (when I use it)

This sounds very interesting, and I can honestly say I've never heard of such a device before. If you come across a link or picture, please stop back and share.

The one benefit I can think of for filing the arbor flange, though, is to not have to use aftermarket additions to tweak blade runout. After filing, you can be sure that if your blade isn't warped, you'll always have minimal runout at the teeth. Of course, even good blades sometimes have runout, and...I think I might have just talked myself in a circle 😊

Quote:

Any way I find that if you check you blades run out and index your blade 30°-45° and re-tightening and checking the run out till you find the sweet spot works pretty well even if you have no run out or some...

I agree this is a viable alternative to arbor flange rework. In fact, I used to use this method. I had a punch mark on the arbor flange and a scribe mark on my good blade, indexed for minimal runout.

Quote:

Doing the arbor tune up is a help I'm sure and thanks for sharing

It's my pleasure to share. And in my case, the rework was a huge help, almost a lifesaver. But (big but here) it's clear from your comments and experience that this rework is not always necessary to achieve minimal blade runout. And I'm very glad you posted alternatives, because now users reading this thread will understand there *are* options besides rework.

Perhaps my original post was a bit too one-sided. I come from an engineering/machinist background, and the mantra that's always chiming through my head is "take out any and all variation that you can, get your baseline perfect if possible."


Thanks again for sharing!

Cheers,
Andrew

Post Extras:   

[*Chris*](#)
Un-Zipped

Registered:
12/31/04
Posts: 10353
Loc:
Massachusetts

 **Re: How I Fixed my TS Arbor Flange Runout** NEW [Re: [MrMhor](#)]
#3491576 - 01/31/08 08:40 AM

 Edit  Reply  Quote

Andrew:

Great tutorial! In the future, tilt your arbor to 45 degrees, it makes it easier to work on and the dial indicator can sit above the table surface and still be perpendicular to the flange.


Chris

"GGaippe, Lemmeesee, You joined 04/24/00 and have 50 posts, Joe joined 07/11/03 and has 5058, quite a bit of which has been useful information. Sounds like you are a lurker without too much USEFUL to say, so GO AWAY. " T-Man 😊

Post Extras:   

[illegalsmile](#)
Member

Registered:
02/20/08

 **Re: How I Fixed my TS Arbor Flange Runout** NEW [Re: [MrMhor](#)]
#3750145 - 07/07/08 08:51 PM

 Edit  Reply  Quote

Posts: 737
Loc: Richmond VA

I am bumping this thread back up for two reasons.

1) its great info that can be very useful to us newbie/amature types that want / need to take on a tune up of the ole TS ourselves



and

2) cause I wanna say thanks to MrMhor for his excellent step by step write up. I just completed "your" method on my Griz 1023. While my run out numbers are not in the same league with yours it did make a HUGE improvement and that Bear is purrin like a kitten now ! 🐾

Plus I feel pretty darned good cause I took on something I was not real comfy with and whipped it !

Post Extras:   

[speckledpig](#)
The King

 **Re: How I Fixed my TS Arbor Flange Runout**  [Re: [illegalsmile](#)]

#4095876 - 01/15/09 05:07 PM

 Edit  Reply  Quote

Registered:
04/28/03
Posts: 17803
Loc: My Office

Bump



You are not your postcount.

"Even Chuck Norris is afraid of bevel rips on a RAS." - Sub-Doooood 8/10/09

[WN Flockdraw](#)

Post Extras:   

[RobDingnagian](#)

 **Re: How I Fixed my TS Arbor Flange Runout**  [Re: [Jonny Rocket](#)]

#4203793 - 03/10/09 11:05 AM

 Edit  Reply  Quote

member

Registered:
12/08/04
Posts: 12045
Loc: MN

Jonny Rocket said:

Unisaw A100 said:

If there was a Best of WoodNet this should be there.

Unisaw A-100, who has done something similar with a piece of Baltic birch, some AIZ paper, a clamp, the saw fence and the saw under power...

I am thinking of creating something just like that to archive some extremely useful threads, such as this.

Is this completed yet?

Post Extras:   

[Anak](#)
Bitter Clinger

 **Re: How I Fixed my TS Arbor Flange Runout**  [Re: [RobDingnagian](#)]

#4203962 - 03/10/09 12:15 PM

 Edit  Reply  Quote

Registered:
08/06/06

Posts: 2191
Loc: Under a
snug rock

robdingnagian said:

Jonny Rocket said:

Unisaw A100 said:

If there was a Best of WoodNet this should be there.

Unisaw A-100, who has done something similar with a piece of Baltic birch, some AIZ paper, a clamp, the saw fence and the saw under power...

I am thinking of creating something just like that to archive some extremely useful threads, such as this.

Is this completed yet?


Well, there is Cian's [Pwer Tool Index](#) , but I don't see this on it. I will PM him and see if he will add it.

Every decision you make can be viewed as a choice between comfort and opportunity.

Honk if U love Jesus
Text while driving if U wanna meet Him

Post Extras:   

[Cian](#)
Maxed out
Honored Member

 **Re: How I Fixed my TS Arbor Flange Runout NEW [Re: Anak]**
#4204091 - 03/10/09 01:11 PM

 Edit  Reply  Quote


Registered:
12/17/02
Posts: 19878
Loc: The Windy
City, USA

Thanks for the tip. I'll put it in queue to add it. Thanks!

[The Neanderthal Braintrust](#) and [The Power Index](#)

Post Extras:   

[utbigrod](#)
Member

 **Re: How I Fixed my TS Arbor Flange Runout NEW [Re: MrMhor]**
#4770404 - 03/01/10 08:37 PM

 Edit  Reply  Quote

Registered:
06/17/07
Posts: 244

Renewing an old, but great thread. So what do you do if when you spin your arbor you can actually see the runout between the bearings? It measure about .00075 runout on the shaft where the blade rests, but if I look at the shaft between the pulley and the flange I can SEE it way out of whack.

Any way to address this other than replacement?

Post Extras:   

[MrMhor](#)
Member
Registered:
12/16/06
Posts: 1059
Loc: Rockford, IL

Re: How I Fixed my TS Arbor Flange Runout [Re: [utbigrod](#)]
#4771849 - 03/02/10 06:41 PM

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Holy cow, I thought this thread was long gone. I tried to find it a couple of weeks ago when a similar question was asked but no luck.

If there is visible runout on the shaft between bearings, I'd check the bearings and make sure they aren't worn out. If they aren't, and the saw is working just fine, then I might be tempted to leave it until some performance issue does crop up...but I'd probably pull the shaft to inspect it.

Cheers,
Andrew

Post Extras:

[utbigrod](#)
Member
Registered:
06/17/07
Posts: 244

Re: How I Fixed my TS Arbor Flange Runout [Re: [MrMhor](#)]
#4771923 - 03/02/10 07:32 PM

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Any tips on pulling the arbor shaft? I saw the nut on the end of it, but will i need any special equipment or can I just tap it out with a deadblow and large dowel?

thanks

Post Extras:

[MrMhor](#)
Member
Registered:
12/16/06
Posts: 1059
Loc: Rockford, IL

Re: How I Fixed my TS Arbor Flange Runout [Re: [utbigrod](#)]
#4771929 - 03/02/10 07:38 PM

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It really depends on the saw, both type and brand. Some need to be pounded/pressed out, others are retained by snap rings or set screws and slip right out.

If you start a new thread with appropriate title, I think you'll get some good responses. I'm not sure how many people are going to read down to the bottom of this one.

Sometimes, a google search, and a browse through owwm.org can get you 99% of the information you need.

Cheers,
Andrew

Post Extras:

[utbigrod](#)
Member
Registered:
06/17/07
Posts: 244

Re: How I Fixed my TS Arbor Flange Runout [Re: [MrMhor](#)]
#4771999 - 03/02/10 08:32 PM

Edit Reply Quote

thanks for the input!

Post Extras:

[goredsus](#)
Member
Registered:
04/24/09
Posts: 9
Loc: Fairfield, OH

Re: How I Fixed my TS Arbor Flange Runout [Re: [utbigrod](#)]
#5304647 - 02/25/11 06:49 PM

Edit Reply Quote

Just stumbled across, this and thanks for this plus the link to Cian's site...first time I looked at and it's been bookmarked so I can read through it all.
Thanks.

Post Extras:

[Noah](#)
Member
Registered:

Re: How I Fixed my TS Arbor Flange Runout [Re: [MrMhor](#)]
#5304716 - 02/25/11 07:35 PM

Edit Reply Quote



07/10/06
Posts: 784

How long did all that take?

Why not a jig holding a metal lathe bit that you run along the miter gauge slot to true it up?

Post Extras:   

[Bill Mains](#)
Member

 **Re: How I Fixed my TS Arbor Flange Runout**  [Re: [utbigrod](#)]
#5305065 - 02/26/11 06:38 AM



 Edit  Reply  Quote

Registered:
10/24/03
Posts: 192
Loc: Yankton,
South Dakota

Great inf..thanks..Bill

Post Extras:   

[MrMhor](#)
Member

 **Re: How I Fixed my TS Arbor Flange Runout**  [Re: [Noah](#)]
#5305579 - 02/26/11 02:46 PM

 Edit  Reply  Quote

Registered:
12/16/06
Posts: 1059
Loc: Rockford, IL

If memory serves, the process took about two hours for the contractor saw (including taking pictures), and about 1/2 an hour on my more recent cabinet saw. It's going to be dependant upon your abilities with the file and indicator.



As far as using a jig and lathe bit, I don't have any jig stiff enough to support a metal working bit and the tool pressures produced. Same goes for a stone held in a jig, or similar concepts - if the jig isn't stiff enough, I found it just chased the runout on the arbor, and the end result was better than it was before, but not as good as the hand filing technique.

And Chris' suggestion to tilt the arbor to 45 is a good one.

Cheers,
Andrew

Post Extras:   

[Bøb](#)
Member

 **Re: How I Fixed my TS Arbor Flange Runout**  [Re: [MrMhor](#)]
#5305840 - 02/26/11 07:36 PM

 Edit  Reply  Quote



Registered:
10/13/06
Posts: 687
Loc: S.E.
Tennessee

I used this procedure a few years ago on my Griz 1023 and the runout is so slight, I had to switch to a dial indicator that read in 1/10th of a thousandth of an inch to detect the travel.

As long as I can remember, I've had amnesia!

Post Extras:   

[flink](#)
Member

 **Re: How I Fixed my TS Arbor Flange Runout**  [Re: [Anak](#)]
#5307416 - 02/28/11 05:57 AM

 Edit  Reply  Quote

Registered:
04/11/08
Posts: 1061
Loc: N. NJ

Anak said:

robdingnagian said:

Jonny Rocket said:

Unisaw A100 said:

If there was a Best of WoodNet this should be there.

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Is this completed yet?

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I've started saving good threads here:

[Woodworking thread archive](#)

flink

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