ALL THINGS BURGESS BK3

The Burgess BK3 Bandsaw and its earlier manifestations are versatile bandsaws for cutting all manner of materials. Their manufacture dates back many years but they remain a very popular item for the hobbyist workshop and sell quickly on EBay at relatively high prices. Their key attributes are dual speed operation and a cutting table with a deep throat (no connection to 'All the Presidents Men' …). Here is an image of my model with various modifications fitted – replacement cover fasteners, table fence, angle fence and replacement top guide assembly. The dust extract is fitted but not visible.

Given their vintage and probable heavy life time usage, it is rare to find a previously loved BK3 that does not have some problem needing addressing. What follows is a compendium of information accumulated by the author in fixing the problems on my BK3 together with links to some third-party fixes that have appeared on the internet. A ZIP file is available from my blog with all the files as described.

Cover Fastenings

The outer cover fastenings (3 off) are quite often missing with the cover having alternate fixing mechanisms such as tape or cable ties. A simple solution is to turn or 3D print some 21mm diameter bosses with a central M6 tapped hole to fit inside the cover fastening body channels. These can be retained in position with hot glued. The cover can then be held in place with M6 x 20 hex head bolts and a 25mm disc washer.

A more refined method is published by DIY Tinkerer on YouTube where he describes some 3D printed versions that match the other knob fittings.

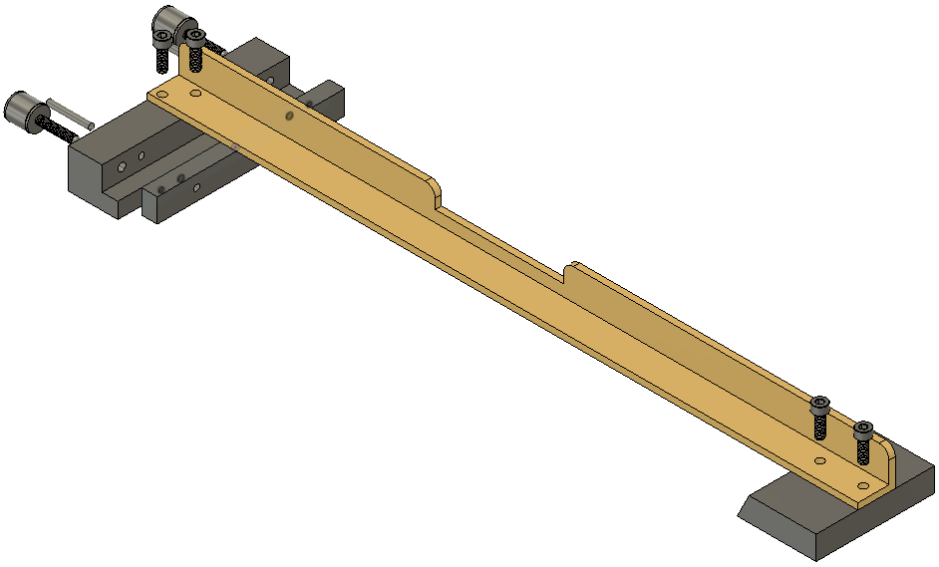
https://www.youtube.com/watch?v=tFmqQ_f6s_w&list=PL3WIBjRzYExfJxmEYO5OPSOPfDxlBd1a6&index=1&ab_channel=DIYTinkerer

Feet

The bandsaw will benefit from some rubber feet and there are 4 holes already in place on the base to accommodate these. There are various sources of feet on EBay. See the later note about a rotating base plate.

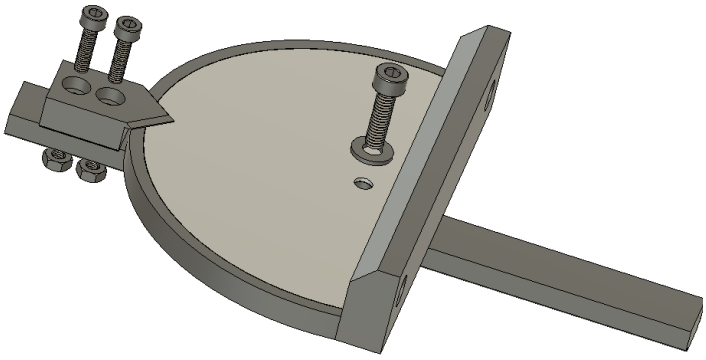
Table Fence

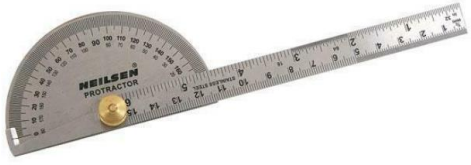
The cross-table fence as sold with this range of bandsaws is not the most rigid. A replacement design is shown below that is made from aluminium. This utilises the bevelled left hand side edge of the table to create a 'pull in' grip. This angle is measured at 63 degrees. The design, other than the width across the table, is not critical and the dimensions can be tweaked to suit material available. The drawings for this are included in my ZIP file linked at the end of this article.



Angle/Mitre Fence

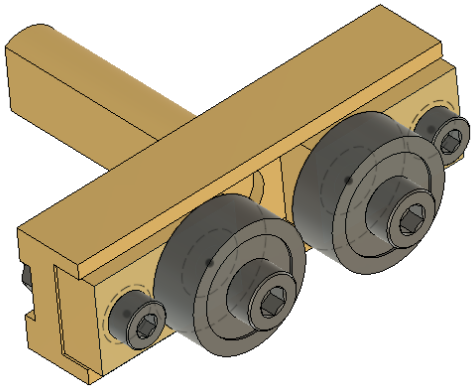
The original angle or mitre fence is one of the most likely parts to have gone missing. A simple 3D printed version is shown below that has four components - the sliding locating bar, the main body, the pointer block and a standard EBay metalworkers protractor (light grey) as shown below. The protractor as bought is stripped down to just leave the protractor plate and this is inset into the main body and held with double sided tape. There is no gripping mechanism to hold the sliding bar in place but that aside the assembly works well. The 3D STL files are contained in the download ZIP file.





Blade Guides

The upper and lower blade guides on the BK3 are somewhat crude being two sets of brass rods that bear on either side of the blade above and below the table. Cutting a straight line is not easy with this simple arrangement. Based on an articles by Peter Wilton and by J.M. Service in Model Engineering the top pair of guides can be replaced with a twin ball bearing based guide mechanism similar to more modern bandsaws. This dramatically improves the cutting path control.



The ZIP file contains the original articles from Model Engineer and a drawing of my version. (Apologies on the drawing for all the weird dimensions … a case of making it and then back annotating a mix of Imperial and Metric dimensions).

My lower blade guide replacement uses the same principle of two ball bearings. Here is a stylised Fusion 360 image of the lower guide assembly. Full drawings are in the ZIP file.

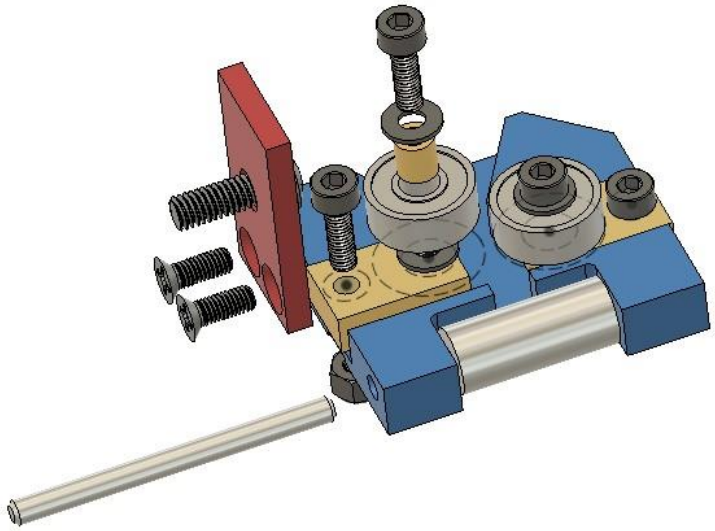
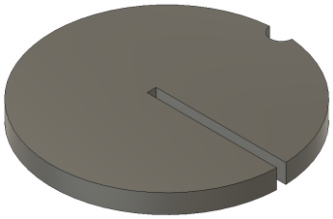


Table Centre Cover

There are Fusion and STL format files in the ZIP to create a new table centre cover.



Dust Extraction

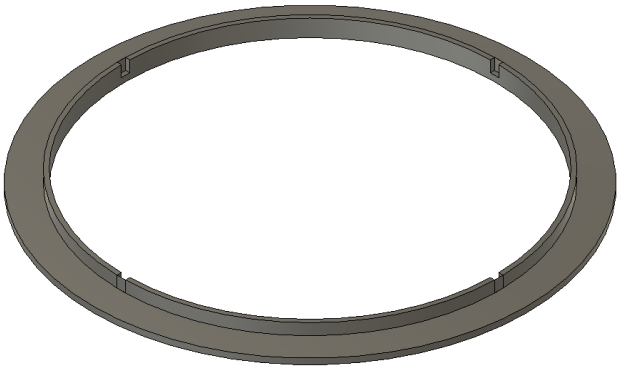
There is no mechanism for dust extraction on the Burgess saws but DIY Tinkerer's YouTube channel details a very effective adapter for connection to a standard vacuum cleaner hose. The results shown in his video are impressive.

https://www.youtube.com/watch?v=Ea82dfBRyJY&list=PL3WIBjRzYExfJxmEYO5OPSOPfDxlBd1a6&index=2&t=6s&ab_channel=DIYTinkerer

As an alternative there is a 3D printed design I created in the ZIP file. This mounts on the lower guide bracket. This image below also shows the new lower guide assembly.

Main Driving Wheel Flange Repairs

The main driving wheel carries the blade on its circumference. In low-speed mode the blade sits on top of the drive belt and in high-speed mode sits directly against the outer edge of the wheel. The inner edge of the wheel has a side wall to help retain the belt in place. Quite often this retaining flange is worn away. A 3D printed replacement edge can be glued in place to replace this. Note that the drive wheel size does appear to change slightly from model to model.



A side comment - if you get blade slippage on the perimeter of the main drive wheel in high speed mode, Amazon have elastic bands (160mm x 10mm) which fit nicely over the wheel edge and give the extra grip needed.

Drive Wheel Repair

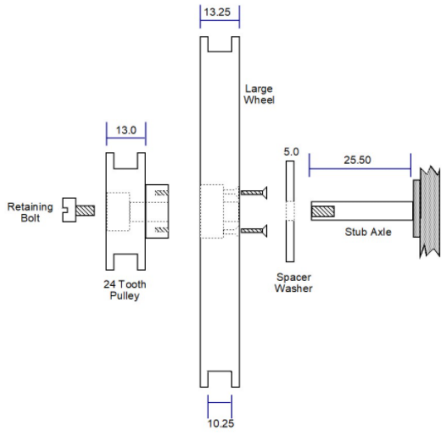
In high-speed mode the motor belt drives a 24 tooth pulley which is integral to the side of the main driving wheel. The teeth on this moulded wheel will degrade with time and may need replacing. It is possible to buy in a 24 tooth pulley from Bearing Boys to replace this. I have done this for a client but it is a tricky thing to do.

The alternative route to solving both the worn retaining edge and a damaged high speed pulley is to make a new main driving wheel. There are various options for this. Note that if blades wider than 6mm are used, the front retaining edge should not be included.

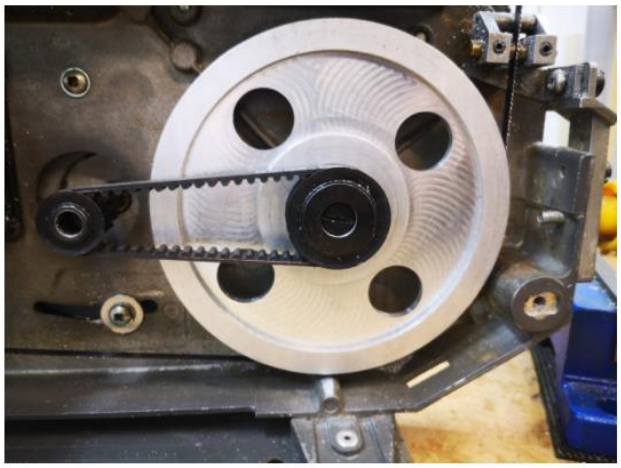
A complete wheel could be 3D printed to include the high speed pulley. The problem with this route is the quality of the high speed pulley print. Not having the front retaining lip makes the printing easier.

The wheel could be cut on a lathe in aluminium or in Acetal/Delrin. Some form or mounting arbor will be needed for this. The finished turned wheel will need the 24 tooth pulley integrating.

The third option is to CNC mill a new wheel in aluminium or in Acetal/Delrin. This will not allow the double edge blade retaining walls to be created under CNC control unless you have a fourth axis but this operation can be done on a lathe as a finishing process. The wheel can be held with external jaws 'pushing out' against the lip shown in the Fusion image below. Alternately a single rear flange should be adequate. Three M3 centre holes retain the high speed pulley.



Here is an early CNC created version in aluminium fitted in place with the old original lower blade guide just visible.



The ZIP file contains a number of relevant files for making the replacement.

Motor Drive Pulley

The original motor drive pulley is made from red plastic and is wide enough to accommodate the drive belt position in low speed or high speed. The original pulley has a twist off diagonal slot which engages with a 3.5mm diameter cross pin in the motor shaft. The red plastic wears with usage.

The replacement solution is a standard 5mm pitch transmission pulley from Bearing Boys which only needs slight modification in the lathe as detailed below.

Mount the pulley boss end in a collet chuck on the lathe leaving enough of the boss exposed to allow a parting tool access. Use a travelling centre to centralise and stabilise the pulley in the collet as it is will not be fully gripped by the collet with the available grip length.

Turn back the pulley inner flange to the same diameter as the boss and to leave 25mm of tooth width. This is tricky because the flange is a compressed fit onto the pulley body. As you turn it down it will start to free itself from the body of the pulley and stick to the parting tool while freely rotating on the pulley boss. The solution to this is to initially cut a small section of the flange down to the boss diameter and then with the parting tool 'knock' the remaining flange sideways off the pulley body. You will then have to take the pulley out of the collet to remove the flange remains.

Once the teeth are 25mm wide and the boss turned down to match the original boss diameter, loosen the collet and push the pulley firmly home and fasten tight after ensuring it is running central using the revolving centre. Drill out the centre bore of the pulley to 3/8" diameter. I suggest doing this progressively, 9mm, 9.4mm and then finish with a 3/8"reamer.

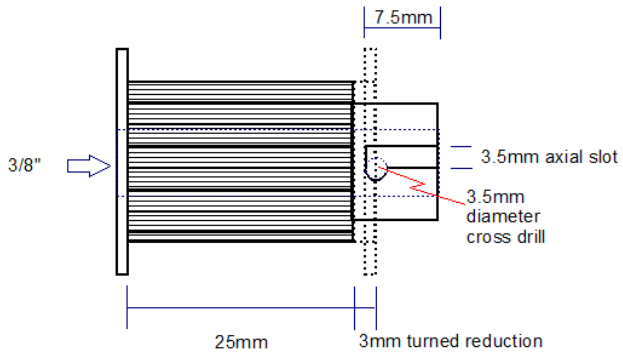
Mount the pulley horizontally in a milling vice and find the diametric centre and lock the axis. It might be prudent to support the pulley in this position. Using a centre drill mark a starting pip on the boss at the point. This will be where the witness mark of the newly cut material meets the original anodised boss. Cross drill to 3.5mm diameter.

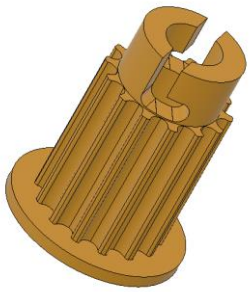
Mount the pulley vertically in the milling vice and clamp with a parallel on either side to space and grip the pulley beyond the limits of the remaining flange. The pulley should be rotated slightly on the diametric hole and then milled down with a suitable tool to give a 3.5mm slot that creates a 'B' shape with the diametric hole.

Note that providing you can remove the cross pin through the motor shaft, you can ignore the milling of the 'B' slot and just drill the 3.5mm cross hole and fit the cross pin directly though the pulley and the motor shaft.

Run the reamer through the central hole once again to clear any burrs and offer the pulley to the bandsaw stub and check that the pulley slides into place and then locks on rotation. File to fit if needed.

Here is a pictorial view of the details and the result.





Metric and Imperial Standards

The pulleys and belts from Bearing Boys are metric standard, that is the pitch is 5mm. I believe the original BK3 red motor drive pulley would have probably been Imperial 5.08mm pitch as would the high speed pulley embedded on the main drive wheel. I could not find a suitable Imperial part to replace these. Because the motor drive pulley only has limited contact area with the drive belt, I have found this not to be an issue if only the drive pulley is replaced. If the high speed pulley is also replaced this does not become an issue as the new pulley will match the metric standard and suitable matching belts will be needed.

Bearing Boys Part Numbers

Motor Drive Pulley	14-5M-25 (#BB-21209)
Drive Wheel High Speed Pulley	24-5M-09 (# BB-21216)
High Speed Belt	300-5M-09 (#BB-5132)
Low Speed Belt	525-5M-09 (#BB-6063)
Guide Bearings	KLNJ3/16-2RS (R3-2RS) (#BB-76306)

Handbook

A copy of the handbook can be obtained from Tony at https://store.lathes.co.uk/print/mb915b

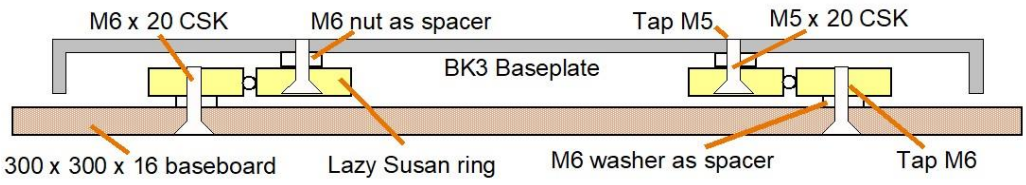
The handbook details the motor speed as 1475 RPM. With the standard pulleys as fitted, the two operational speeds are 350 ft/min (106m/min) and 1300 ft/min (396m/min). The handbook recommends 6/10/14 TPI blades for high-speed mode and 14/24/32 TPI in low-speed mode. These are ¼" wide (6mm) and should be 56" in length (1.42m).

Blades

A search on EBay will lead to lots of possible sources for replacement blades. I tend to use Starrett blades and these are available in the UK from RS and from Screwfix. To date I have not found a source of variable pitch blades in these sizes.

Rotating Baseplate

An 8" diameter Lazy Susan coaxial bearing ring can be fitted inside the BK3 base plate. This in turn can then be mounted on a wooden baseboard. Fitting this bearing ring allows flexibility when cutting tricky geometry materials.



Conclusion

I hope this compendium of fixes and modifications can give a few more neglected BK3 bandsaws a new lease of life. If the article or drawings are missing information let me know so edits can be put in place.