Myford Engineering Update

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From Myford Technical Support 01/004
Dec 2010

Better Beds and Saddles.

We explain the changes to the Myford bed and saddle re-conditioning service

The full service is very popular and we have no plans to stop it, however we ceased the Bed only regrind service at the beginning of October. We have found that the lower cost option of regrinding the bed alone has unwittingly misled some buyers inspecting pre-owned Myford Lathes offered by used equipment suppliers. To many a smooth, clean lathe bed is a sign that the lathe has been cared for and not subjected to heavy wear.

This, as any engineer will know, is not necessarily the case, a bed regrind can hide a lot of wear indeed. Whilst superficially making things look better it can actually worsen the lathe's standards of accuracy.

The nominal thickness of the shears (bedways) on a finished new Myford bed is approximately 0.5" (12.70mm). The maximum that may be removed from the top of the bed is 0.025" (0.635mm) before complications occur in aligning the apron with the rack and leadscrew.

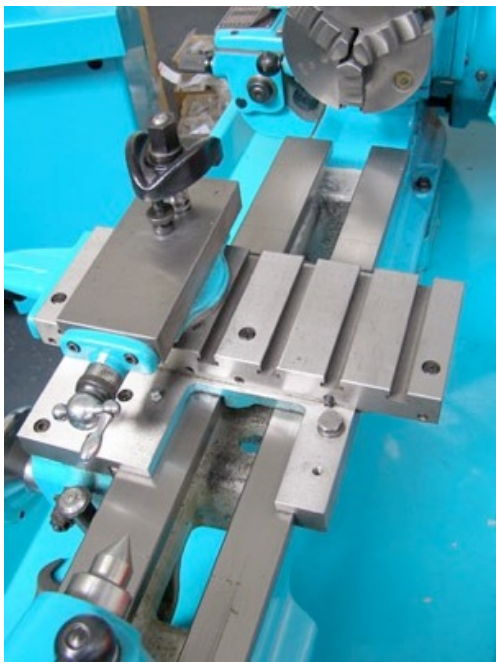
During a Myford factory bed and saddle regrind metal removal is kept to a minimum, however it may be necessary to reduce the thickness of the shears between 0.005 (0.127mm) and 0.010 (0.254mm) to get back to a sound top surface. In theory it's possible to regrind a bed between 2 and 5 times. Indeed, as our records show, this has been done for a number of customer owned lathes.

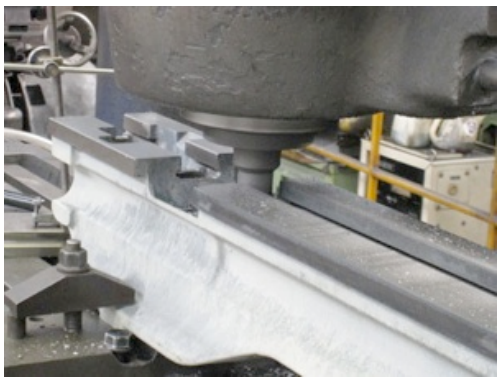
At Myford we have long considered it essential that if a bed regrind is to be carried out then the saddle must be also be ground and the fast edge scraped to give correct alignment. A worn saddle on a newly ground bed offers poor contact and it is not practical to improve this to the required standard simply by scraping.

To complete these grinding operations the various gib strips are re-worked to remove the effects of wear and the front and rear strips stepped to compensate for the reduction in thickness of the bed shears.

We will no longer take orders for regrinding beds only - believing it to be in the best interests of Myford owners and future Myford owners.

Every regrind of bed and saddle we undertake is thoroughly checked and inspected at refit. We offer a certificate to that effect and hold a record of all Serial Numbers, dates and reports should future owners wish to check the history of their lathes with us. Full details including scheduled dates for this service **Click here**.





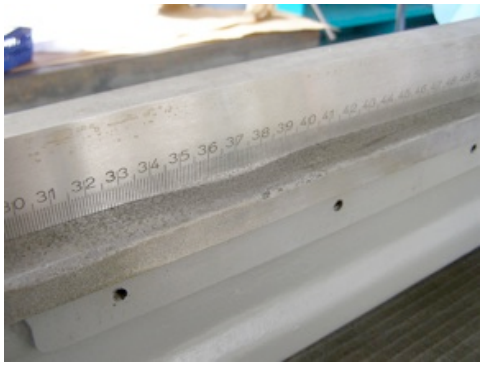
The bed that didn't make it

This involved an early Super 7 bed which was originally despatched, as a new lathe, from our works in late 1953. It was returned to us in 2007, after 50 odd years of continuous use. In came the bed with saddle and all associated parts. The owner earnestly requested a bed and saddle regrind but unfortunately we were unable to help.

What caused the problem with this particular request was a dent in the bed approximately 0.075" (1.9050mm) deep and, of course, outside of the limits. All was not lost we were able to source a pre-owned bed which we reground and matched to the existing saddle. This lathe is still performing well today.

Many Bed and Saddle regrinds, and re-regrinds are carried out every year and nearly all fall within limits. The saddle also has its limits inasmuch as lubrication can become ineffective when the oil grooves become narrowed by heavy wear of the slide faces, something to be aware of if regrinding yourself.

Two points are clear, there are times when wear is beyond recovery – and one bad component doesn't write off a lathe provided the work of repair is correctly carried out and inspected to reaffirm original standards have been restored.



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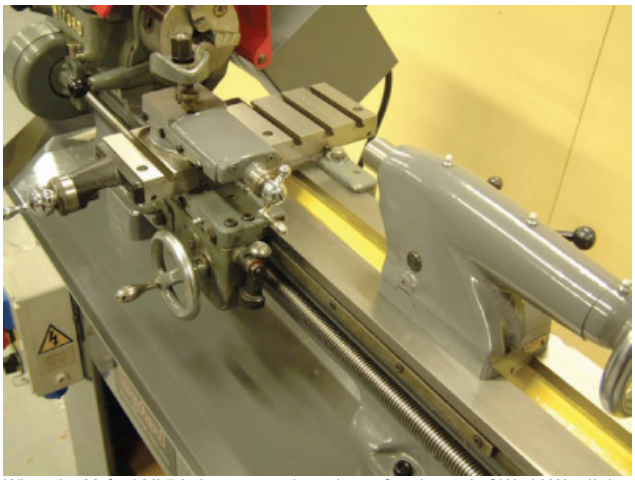
New Lathes For Old

From its first appearance in the late 1940s, the Myford Series 7 lathe has been popular with the owners of home workshops. The Company now operates a factory re-conditioning service and also offers re-worked machines for sale. Geoff Sheppard was given the freedom to tour the works with notebook and camera to see what was involved in restoring a particularly roughly used example to a state where it would meet new production acceptance standards.



When the Myford ML7 lathe appeared, not long after the end of World War II, it set new standards for equipment for the model engineer's workshop. It also found a ready application in industry, particularly for instrument work and similar light engineering tasks. Over subsequent years, many thousands of them have been produced and there has been a steady product development programme, with many refinements added, as well as the major upgrades introduced in the Super 7 and now the Connoisseur.

Indications are that, of all the Series 7 lathes produced, a very high proportion still exists, relatively few of them having been totally scrapped. The condition of these survivors varies immensely. Those installed in private workshops are often cosseted as prized possessions, many having seen very little use. Indeed, one owner has volunteered the information that he has a very early model that has never been used. Conversely, others have had a very hard life, particularly when they have had to earn their keep in industry. A particularly harsh environment, where the machines often suffered more misuse than use, was the school workshop, where machines sometimes suffered damage as a result of practical 'jokes'. I have had recent personal experience of two lathes recovered from these latter environments, the condition of which made me wince when I envisaged the mis-treatment they must have received.

Myford Limited have always operated an excellent spares support service, with, in my experience, replacement components arriving within a few days of placing an order. They have also offered a bed regrinding service, restoring worn slideways and the mating saddle surfaces to standards, which match those of the new machine. Over recent years this has been extended to the point where it is possible to have a well-used machine reworked so that it meets the acceptance standards required of a new production unit. The logical development has been to offer factory-reconditioned machines, supported by a warranty similar to that provided with a new lathe. Myford are now prepared to buy back lathes, restore them and then list them at prices which reflect the standard and age of the model and the level of equipment with which it is offered.

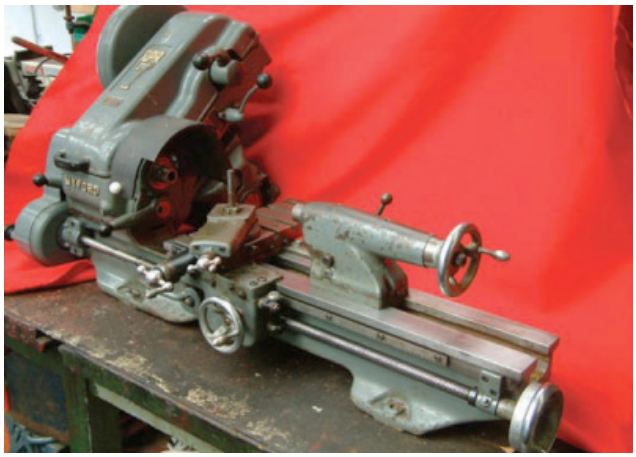


Photo 1
The Myford Super 7 lathe selected for refurbishment.
It appeared to have suffered more from mis-use than wear

As a Super 7 user for the best part of thirty years now, I was recently invited to visit the Myford factory in Nottingham to see this reconditioning activity in progress. Managing Director, Christopher Moore suggested that I should follow one particular machine through the workshops, observing each operation, making notes and photographing as I wished. Having nominated and examined a particularly poor example ***(Photo 1)***, I arranged to travel to Nottingham and call in at the works on a Monday afternoon, then to spend all of Tuesday and most of Wednesday following the component parts through the re-working process and, hopefully see the machine reassembled to working condition. As it happened, this did not prove quite to be possible due to the motor of a large slideway grinding machine deciding to expire at the crucial moment. Some time was lost while a second machine, currently set up for other work, was re-configured to carry out the task. I therefore had to leave for another appointment while the chosen lathe was in the final stages of re-assembly, but I had witnessed all the vital remachining and hand fitting operations and the inspection checks, which determine the accuracy of the finished product.

On arrival at the factory on Wilmot Lane I was greeted by Christopher Moore and his Purchasing and Production Manager, David Wheat, who then introduced me to Brian McKechnie, the Works Inspector, who was to be my guide through the various stages of the operation. A longstanding and experienced member of the team, Brian was previously a fitter and would, on this occasion, carry out the majority of the hand fitting and assembly tasks involved in the refurbishment. Machines would normally go through the works in batches of eight, ten or twelve, but to meet the required timescale, this machine would be treated as a single unit.

History

One of the first tasks was to check the history of the machine in question. Extensive records are kept in the Inspection Foreman's office, and it was possible to ascertain that it had been supplied new through an agent in Gloucester in March 1966, on a cabinet, complete with motor. The customer was the local Education Authority, the final destination being a comprehensive school. At some stage a quick-change gearbox had been fitted, but this had subsequently been removed.

Photo 2
A selection of the components laid out for examination prior to rework

Initial examination

Examination and initial dismantling of the machine revealed where reworking would be possible and where replacement parts would obviously be required ***(Photo 2)***. Subsequent checks at the re-assembly stage could also result in the need for new components. The initial list of replacements was:-

Bull wheel
Back-gear cluster
Rear spindle bearings
Sleeve gear

Feed nuts
Feed screws
Top slide base and gib strip
Top slide tool clamp (stud)
Tailstock cam and eye bolt
Drive belts
Felt wiper for saddle
Lubricating wick for spindle bearing

Re-machining

Prior to my arrival, a number of items had been sent for cleaning and repainting, a process which is carried out on an 'on-condition' basis. These included the bed, tailstock body and belt guards. Painter Alec. Jaworski had matched the colour to the original grey, colours having been changed to green and blue for various models over the years. As soon as the paint on the bed was dry, machinist Chris. Musson set the bed up on a fixture on a large horizontal milling machine in order to re-face the sides of the shears. On a new bed, all four faces are gang-milled at one setting, using ceramic inserts in the cutters. When reconditioning, however, each face is treated individually, removing up to a maximum of 0.005in. from each. In this case, around 0.002 to 0.004in was sufficient to clean up, the ceramic cutters creating an excellent surface ***(Photo 3)***.

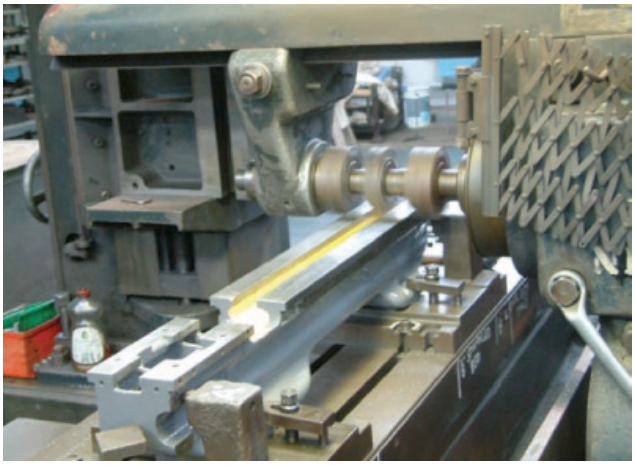


Photo 3
Milling the first bed shear side using a cutter with an inserted ceramic tip. (Note that the machine guard has been retracted temporarily to allow a clearer view)

In order for me to be able to see as many of the processes as possible in the time available, a number of the required operations were being carried out concurrently in different parts of the factory. I was given complete freedom to travel between the various locations, making notes and taking photographs as I wished. I was made most welcome wherever I went and detailed information was freely available. It made for a most pleasurable experience, and reminded me of my days in industry when I always enjoyed the opportunity to visit the machine and fitting shops to discuss problems first-hand with skilled operators.

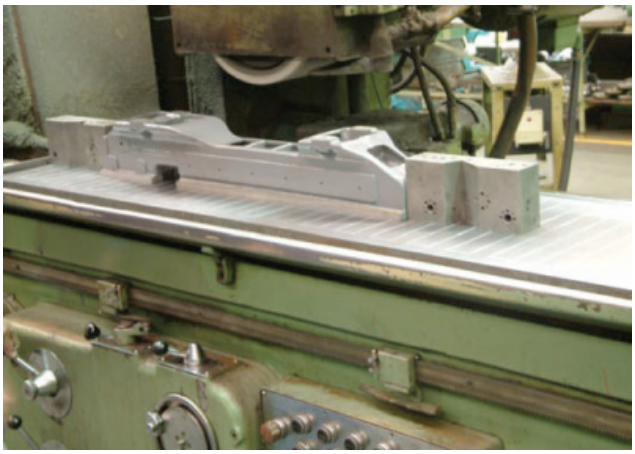


Photo 4
Grinding the bed mounting feet faces

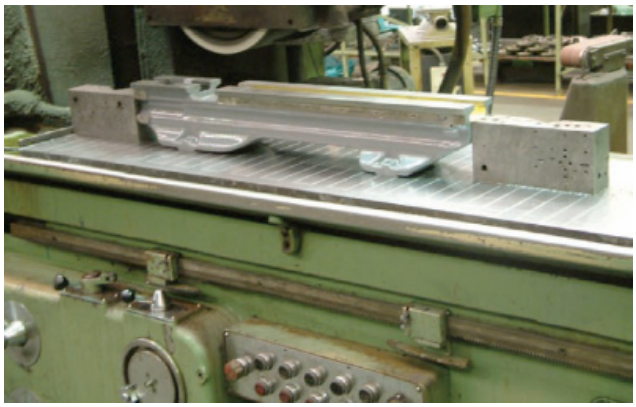


Photo 5
Inverting the bed on the same machine allowed the top surface to be ground

The next areas of the bed to be tackled were the top and bottom surfaces. The cleaned top face of the casting was mounted face-down on the table of a large Snow surface grinder in order to take about 0.003in. off the mounting feet ***(Photo 4)***. After dressing the wheel, Chris. set the bed the right way up for grinding the top surface ***(Photo 5)***. This is where one of the 'tricks of the trade' came in. Experience has shown that accuracy of the assembled machine can be improved by pulling down the centre of the casting just a few tenths of a thou. before grinding, various means being used depending upon the modification standard of the component. This is just one of the areas where the expertise of the original manufacturer results in a high quality refurbishment.

To complete the bed rework it was now passed to Garry Alton who would grind the under faces of the shears, using a slideway grinder equipped with a vertical spindle. At this point gremlins appeared, it being evident that the machine was not operating correctly. Returning from witnessing another operation, we found that the problem had been pinpointed to a main drive motor, the only solution being a complete re-wind. Garry therefore had to set up another machine (a Thompson/Matrix grinder) and prepare a grinding wheel to suit. The result can be seen in ***Photo 6***.

Photo 6
Grinding the underside of the bed shear

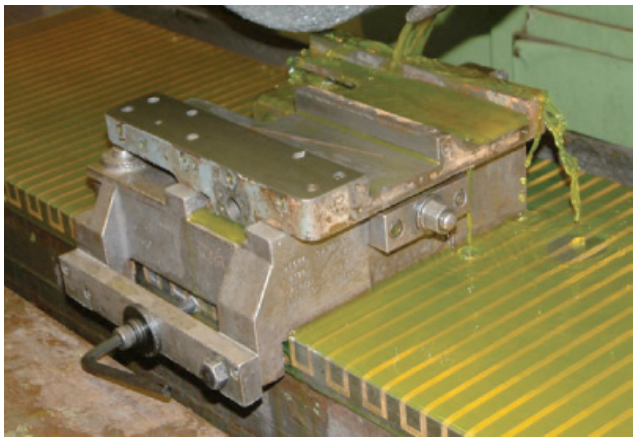


Photo 7
The saddle is mounted off the cross-slide dovetail to re-grind the under surfaces

Photo 8
Brian McKechnie scrapes the underside of the saddle to produce a good bearing surface

The saddle

The next component to be reworked was the saddle. The fixture mounted on a Magerle surface grinder locates the crossslide dovetail ***(Photo 7)***, allowing the faces which bear on the top and side surfaces of the bed shears to be restored, ready for scraping at the fitting stage ***(Photo 8)***. This is, perhaps, an appropriate point to emphasize that Myford consider it essential that, if a bed re-grind is carried out, then the saddle must also be ground and scraped to fit. Although the problems with the slideway grinder had caused the saddle to be ground before finishing the bed, it was possible to illustrate this need by trying another worn saddle on the newly ground bed. The minimal contact can be clearly seen ***(Photo 9)*** and it is not practical to improve this to the required level simply by scraping. The large area of contact achieved after grinding and scraping can be seen in ***Photo 10***.

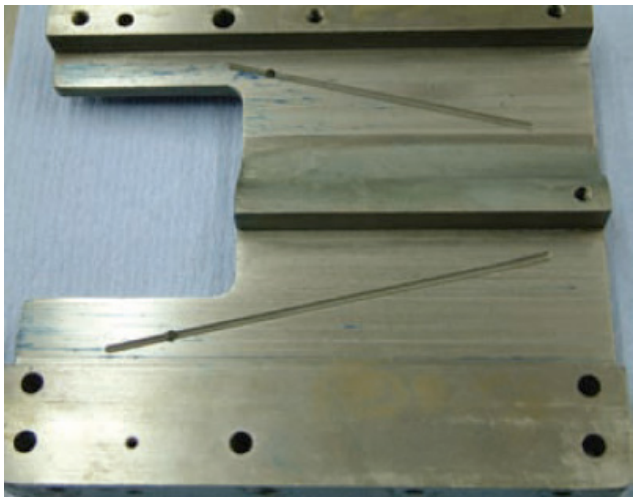


Photo 9
A worn and un-ground saddle has minimal contact with a newly ground bed

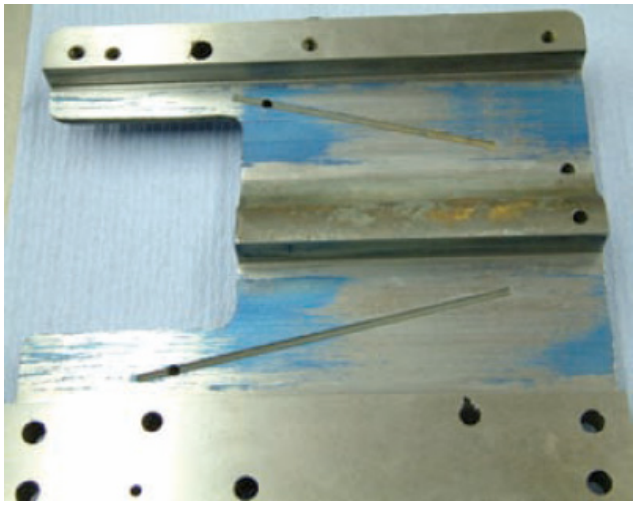


Photo 10
The re-ground saddle has been scraped to give a good bearing surface, the oilways allowing lubricating oil to reach the areas of contact. It is essential to keep these oilways clear

To complete these grinding operations, the various gib strips were re-worked to remove the effects of wear and the front and rear saddle strips stepped to compensate for the reduction in thickness of the bed shears.

After grinding the top faces of the crossslide and top slide, these items were fitted to their mating components by scraping ***(Photos 11, 12 and 13)***. This now made it possible to fit the saddle to the bed. With a jig clamped to the bed and the saddle secured so that the 'fast' edge was located against its mating bed shear, the movement of the cross-slide could now be checked ***(Photo 14)***. The requirement is that the movement towards the headstock should be 0.001in. in 12in., ensuring that facing cuts will produce a slightly concave surface. This requirement was met by scraping the fast edge of the saddle to suit.

Photo 11
The dovetail on which the cross-slide runs is checked against a master

gauge and scraped to fit as necessary

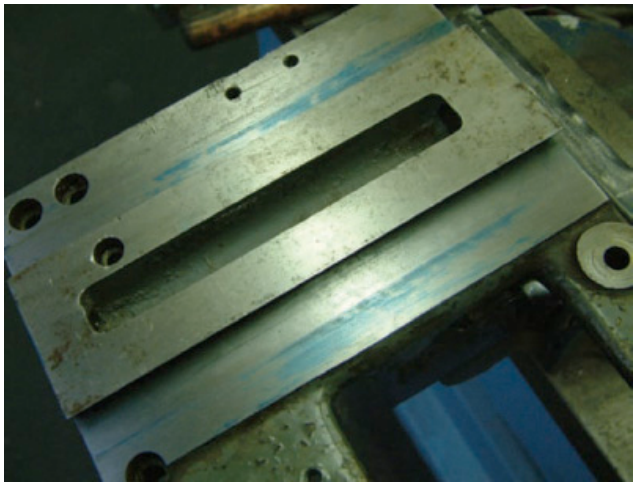


Photo 12
The bearing face before scraping

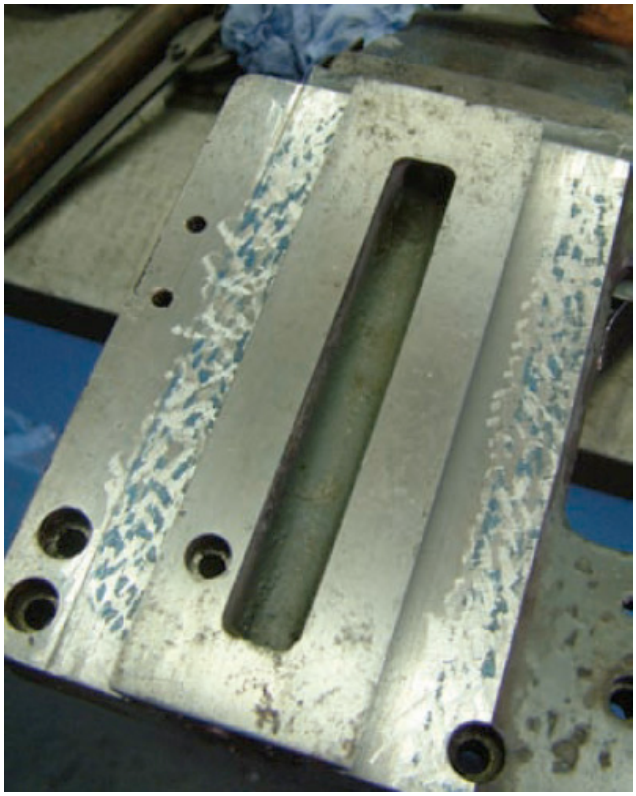


Photo 13
A scraped surface provides pockets for the lubricating oil

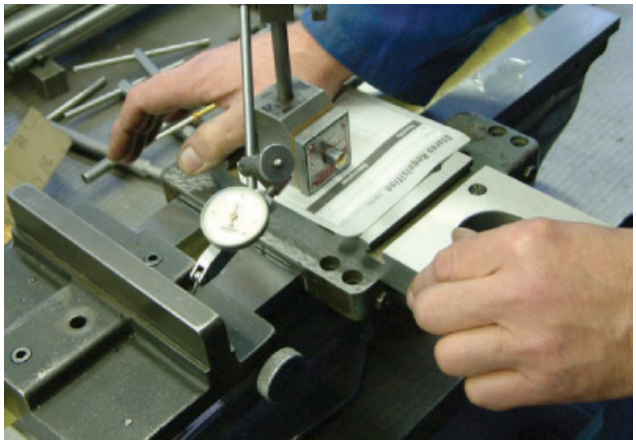


Photo 14
Movement of the cross-slide is checked against a master gauge. The slide

should "look in" by 0.001in. over 12in., ensuring that facing cuts produce a concave surface at all times

The final operation in fitting the saddle to the bed was to adjust the thickness of the shims between the saddle and its retaining strips. Each shim lamination measures 0.002in. and the aim is to achieve no more than a 1½thou. running clearance with a shim thickness of 0.008in., hence the need to grind the step in the saddle strips. Often all that is needed is to rub a shim on a file to achieve the required fit. A further consequence of the reduction in bed shear thickness is that the size of the saddle clamp may need to be adjusted.

With the saddle oilers and a new wiper fitted, the gib screws were adjusted to give a silky-smooth movement of the saddle on the bed. A new cross-slide nut and leadscrew completed the assembly, allowing the cross-slide to be fitted in a similar manner. Before fitting the apron, the rack was attached and tapped upward as far as possible. The rack is a hardened item and the pinion is left soft, but it had been judged that there was insufficient wear on the pinion to require a new one to be fitted. However, re-examination of the leadscrew nuts suggested that renewal was worthwhile. With the apron bolted in place, the rack was tapped back down to adjust the backlash on the pinion. With the leadscrew re-installed, this assembly was complete.

Photo 15
Brian McKechnie re-fits the front bronze taper bearing by scraping

Headstock

While other components were being remachined, Brian McKechnie had made a start on the headstock. With a dummy rear bearing in place, the front bearing taper was scraped to the required fit ***(Photo 15)***. Examination of the spindle indicated that both the nose thread and the Morse taper socket were in an acceptable condition. It is possible to correct minor imperfections in both areas. The thread can be re-chased to bring it back to original tolerances and the taper can be lightly reamed to improve the surface. There was, however, some marking on the shaft in the area of the bull wheel location that gave cause for concern. As soon as the bed assembly was available, the headstock was fitted and checks carried out on the concentricity of the nose spigot and the bore of the taper and the swash on the location face. These proved to be unacceptable, indicating that the spindle was bent – a somewhat rare occurrence, I was assured. This resulted in the decision to fit a new spindle. This damage, coupled with the fact that there were no teeth left on the smaller gear of the back-gear cluster ***(Photo 16)*** and quite a few missing from the bull wheel, suggested to me that the back-gear had been engaged while the lathe was running – an old schoolboy prank!

Photo 16
The old with the new. The back gear cluster had suffered badly, with no teeth left on the small pinion. The bull wheel was also short of its full complement, as can be seen in *Photo 2*

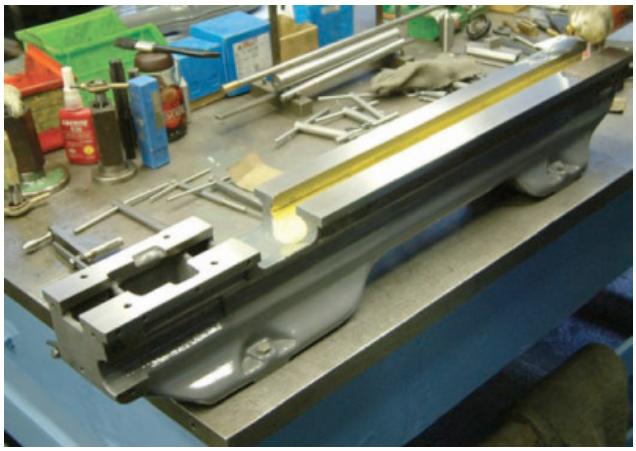


Photo 17
The bed seen set up on a flat surface for assembly checks to be carried out

Once this problem had been eliminated and with the bed set level ***(Photo 17)***, it was possible to carry out the remainder of the setting checks, using

a. a test bar located in the headstock taper
b. a dummy faceplate
c. a test bar gripped in a 3-jaw chuck, and
d. a standard 7in. faceplate
(Photos 18 to 21)

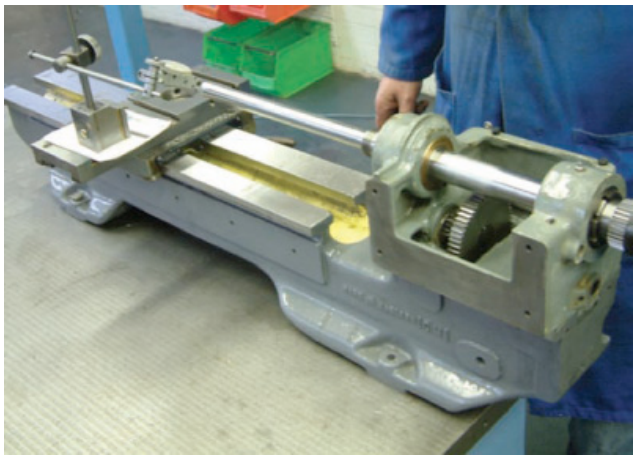


Photo 18
The first alignment checks with a Morse taper test bar set in the spindle

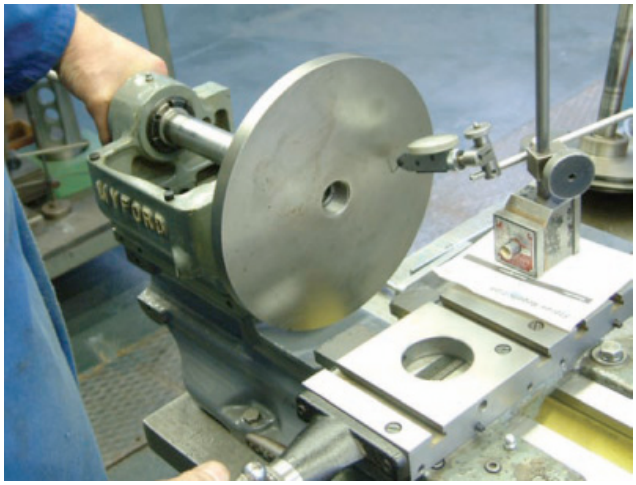


Photo 19
A master dummy faceplate confirms cross-slide alignment

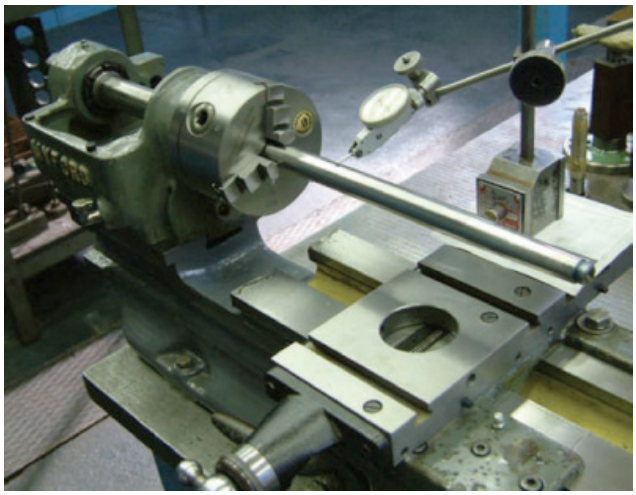


Photo 20
With a 3-jaw self-centring chuck fitted to the spindle nose, a long test bar confirms the lathe's ability to turn parallel

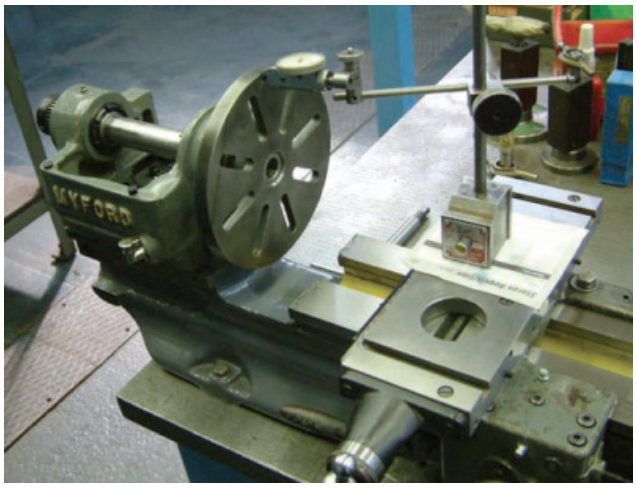


Photo 21
A final check is made on the periphery of a standard 7 inch faceplate

In each case the measurements were within, or close to, the errors permitted by the new-build Inspection Report. Where there were minor discrepancies, these were corrected by scraping the bottom face and/or tenon of the headstock casting.

Tailstock

Basic checks had been carried out on the tailstock at an early stage and it appeared to be generally good. Possible corrective action here includes reaming the Morse taper socket, but if wear between the body casting and the barrel is excessive, then there are two over-size versions available, the bore being honed to suit. With the tailstock fitted to the bed, similar checks to those carried out on the headstock were undertaken, plus checks on a test bar located between centres ***(Photo 22)***.

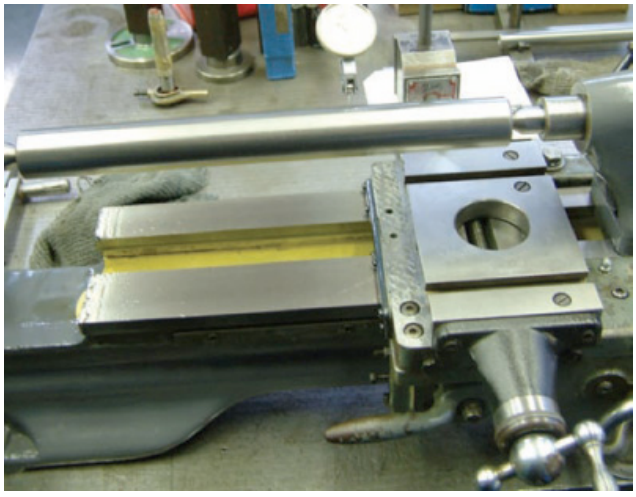


Photo 22
With the re-worked tailstock fitted, a between-centres test bar checks the alignment between headstock and tailstock

Again, corrective action involved scraping the bottom face and tenon until satisfactory results were obtained. An additional check involved measuring barrel lift when the barrel lock was operated ***(Photo 23)***. Excessive movement here would have necessitated the fitment of one of the over-size barrels mentioned above, but the lift was well within limits.

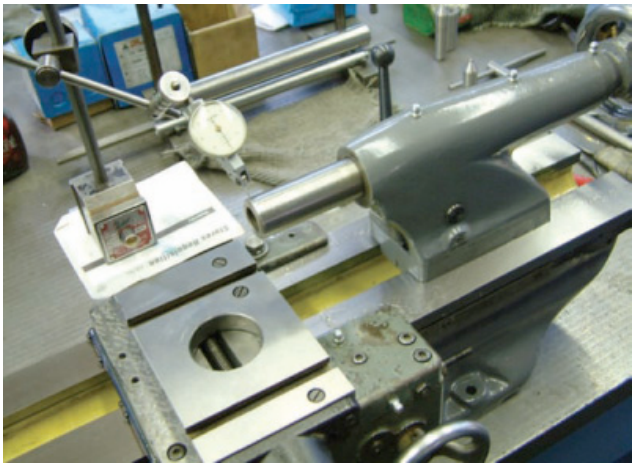


Photo 23
Operation of the tailstock barrel clamp must cause the barrel to lift no more than 0.001in. at a distance of 3in. from the body. Further checks are carried out with a test bar located in the Morse taper socket

Top slide
With the top slide fitted to its new base (the old one having been run into the chuck on many occasions, it seems) one check was to set the movement parallel to the test bar between centres, then to mark a new fiducial line on the top surface of the cross-slide, the old one having been removed when the surface was re-ground ***(Photo 24)***.

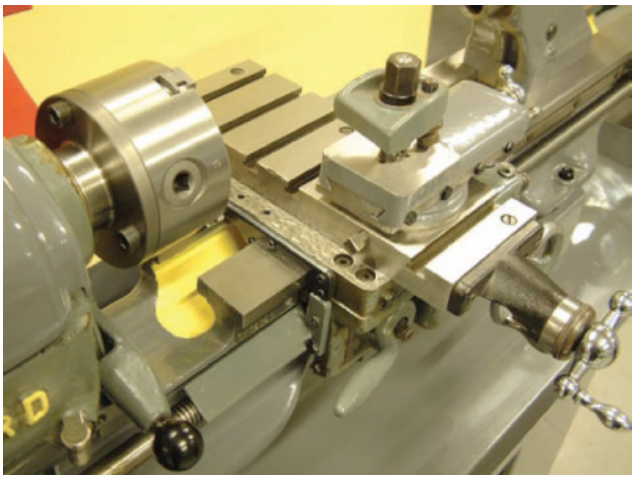


Photo 24
The refurbished saddle and slide assembly differs little in appearance from that of a new lathe

Re-assembly
On completion of the checks, the remaining work consisted of straightforward re-assembly, fitting the motorising assembly and screwcutting gear train components ***(Photo 25)***.

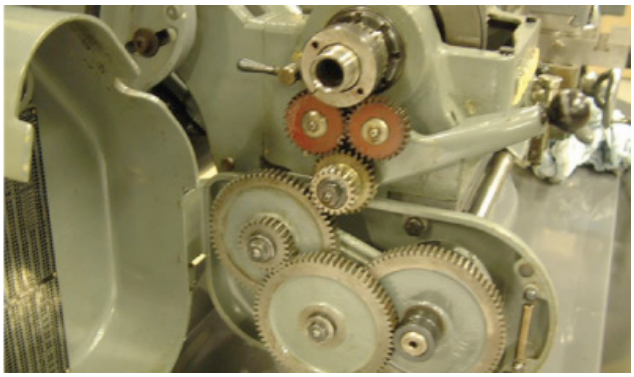


Photo 25
The re-assembled screwcutting gear train assembly

Refitted to its newly refurbished cabinet stand and with modern switchgear ***(Photo 26)***, this rather sad example of this famous machine has been rejuvenated and is now ready for a new career in someone's workshop. Backed up by full factory guarantees, it will give many more years of good service.

Photo 26
Back on its repainted cabinet stand, with new switchgear fitted, our reconditioned lathe awaits a new owner

Conclusion

I greatly enjoyed the opportunity to get to know the Myford works and its small but enthusiastic team. It has always been evident that the Company's products are of the highest quality and I have been able to see first-hand that this factory reconditioning service operates to the same standards. Anyone acquiring a machine that has been processed in this way can be confident that it will give good service and will be backed by the same support arrangements as a new machine. Myford 7 Series lathes are going to be producing first class work for a long time yet. It says much for the original design of the machine that, by the simplest of machining and hand fitting processes, even quite badly worn examples can be restored without the need to replace a large number of major components. Myford machines deserve their excellent reputation.

Print view