



Tools for data recovery experts

Guide for using HddSurgery™ tool:

- ***HDDS Spindle Replacement Tool
Seagate 7200.10/.11***

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1. Introduction

This guide is intended as a short course in handling of our tools for professionals in data recovery. It is assumed that the user is experienced in data recovery and familiar with "traditional" ways of saving data. This manual should not be taken as a guide for training.

Using these tools without adequate software support is not recommended. It is recommended to use some of the proven systems for cloning, such as Ace Lab, Salvation Data, Copy-r and other products.

The general idea behind HddSurgery™ tools was to make sure that the process of data recovery from damaged hard drives goes with no errors. With some basic procedures and short training it is possible to let junior data recovery technicians handle complex tasks. With the development of these tools, we are trying to eliminate the element of luck that usually accompanies the process of data recovery.

Experienced data recovery technicians or engineers can have great success even without our tools, but they can have absolute security only by using HddSurgery™ tools.

If you have questions about compatibility, you can send them to HddSurgery™ support team on support@hddsurgery.com

HddSurgery™ is not responsible for any eventual damage caused by usage of our tools. HddSurgery™ is not responsible for the data stored on the patient or donor hard drives.

2. HddSurgery™ spindle replacement tool

The process of data recovery from hard drives with jammed motors is usually done by transplanting the platters into another hard drive with a motor that's working, and then transplanting the heads and electronics.

On older hard drives, only problems were how to keep the synchronization between the platters and how to transplant the heads. But on new hard drives there is another problem. On new drives we must notice two types of synchronization: one is vertical, one is horizontal. The vertical one is responsible for synchronization between platters like on the older drives. Now we have a horizontal problem as well because the inner diameter of the platter and the platter carrier (the hat) outer diameter have a big tolerance during production. Those two diameters are not the same so the platter can't always be centered right. That leads to impossibility of putting the platter in the same place after once it has been taken off the platter carrier. That is why platter fixation lid needs to keep synchronization at all times. Many of new hard drives also have spacers between the platters made of metal or plastic. In process of platter transplantation, you must move these spacers along with the platters and make sure that they don't touch each other. If these spacers touch the platters, they could damage them and make data recovery impossible.

HddSurgery™ Spindle Replacement Tool uses the whole new approach to hard drives with jammed motors. Instead of transplanting the platters to a new hard drive, only the bearing is replaced on a patient hard drive. This way of functioning implies that the heads, spacers and platters remain in place, while only the bearing is being replaced, which eliminates almost all of the difficulties that go with the platter transplantation process.

New Seagate hard drives belong in the category of disks that "park heads" above the magnetic platters and that have spacers between the platters. This implies that all of the above mentioned problems with platter transplantation are present on these hard drives.

With **HddSurgery™ Spindle Replacement Tool** for Seagate hard drives we can eliminate all of the problems mentioned. This tool can be used to replace the bearing on Seagate 7200.10 and Seagate 7200.11 hard drives.

Parts of the tool



Spindle-pushing screw



Bottom cylinder



Platter holder



Clamping nut



"The puller"



Cocoon



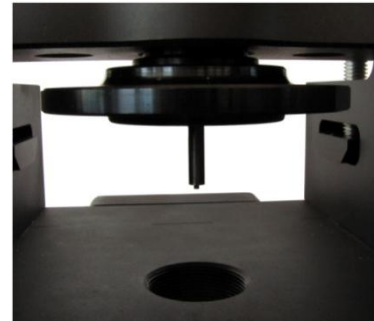
Piston



Needle-screw



Upper cylinder



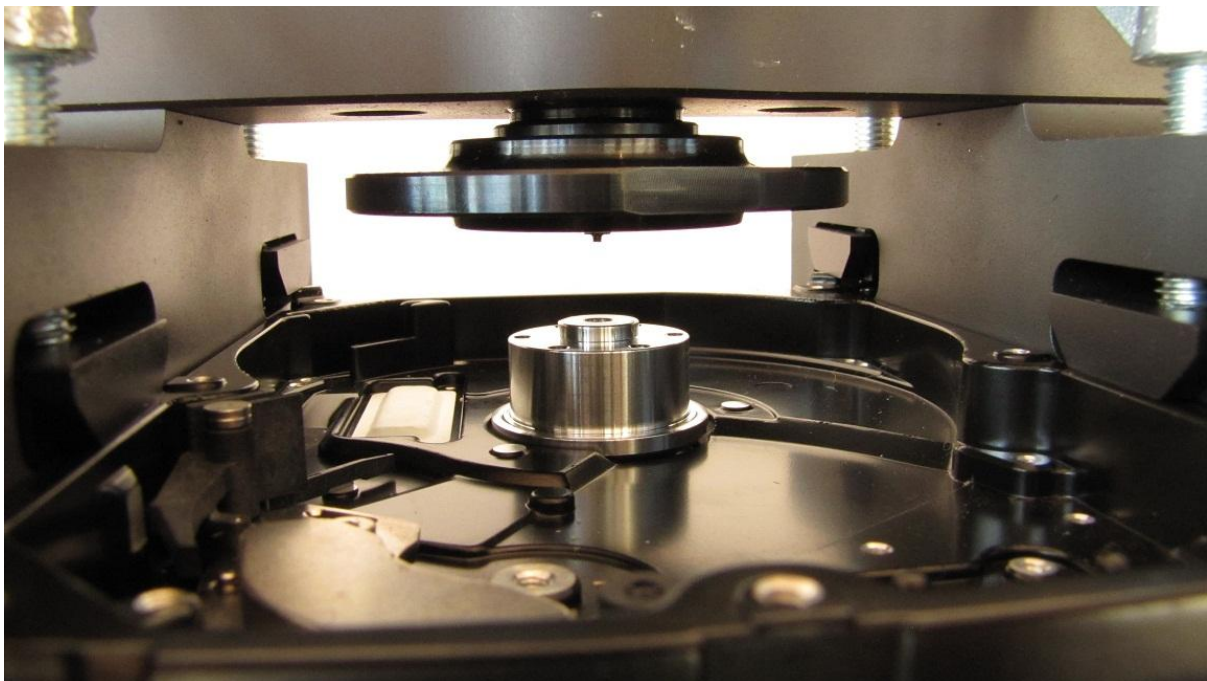
Needle

3. Spindle replacement process

Extracting the donor bearing

To prepare the bearing that will be used in the spindle replacement process, the whole working bearing must be first removed from a donor hard drive.

1. Best way to remove the bearing from donor hard drive is to first remove the heads from a donor, then remove the platters along with spacers between the platters. This means to remove all internal parts of the hard drive except the platter carrier – “the hat” and the bearing on which it stands.
2. When the hard drive is prepared in this way, place it in the tool so that the bottom hole of the tool is precisely under the bottom side of the hard drive spindle. To place the drive correctly, use the **needle** on the upper side of the tool. Push the needle down and place the drive so that the needle points to the top side of the spindle.



Placing the donor drive in the tool

3. When the hard drive is positioned correctly, use 6 butterfly-screws to fix the hard drive in place. Pull the needle up by unscrewing the **needle-screw**.

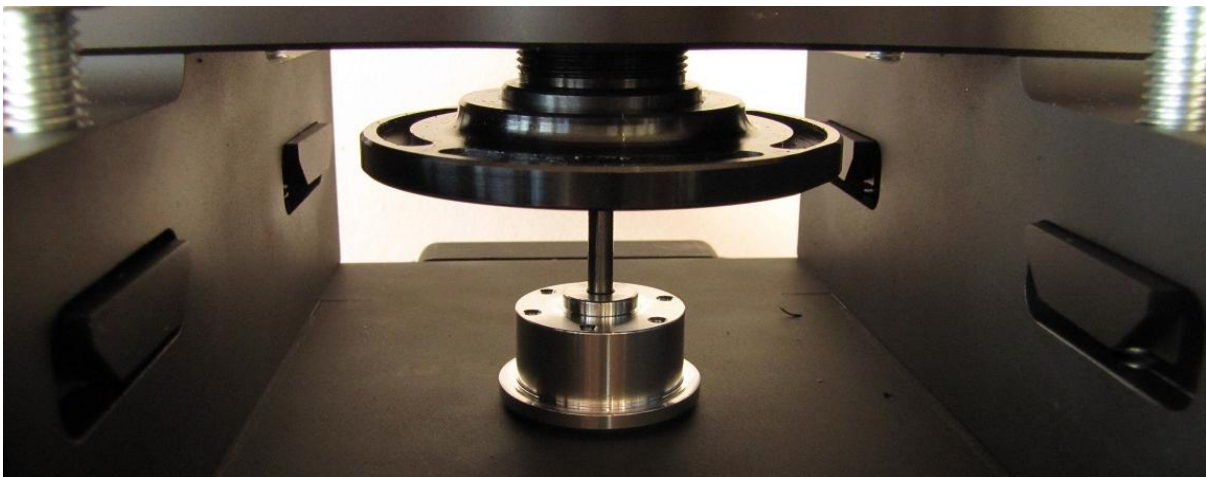
4. Turn the tool upside-down and screw the **bottom cylinder** in the hole on the bottom side until it hits the drive itself.
5. Through the bottom cylinder, screw the **spindle-pushing screw** to start pushing out the bearing from the hard drive case. Since this screw is not long enough to push out the bearing completely, we must use the **piston**.
6. Remove the spindle-pushing screw, place the **piston** inside the bottom cylinder, and then screw the spindle-pushing screw again to push out the bearing completely.



Pushing out the bearing from hard drive casing

After pushing out the bearing, it comes out along with the platter carrier - "the hat".

7. Turn the tool upside-down again and remove the hard drive casing.
8. Position "the hat" with bearing above the bottom hole on the tool the same way like when placing the hard drive (using the needle).



Pushing out the bearing from "the hat"

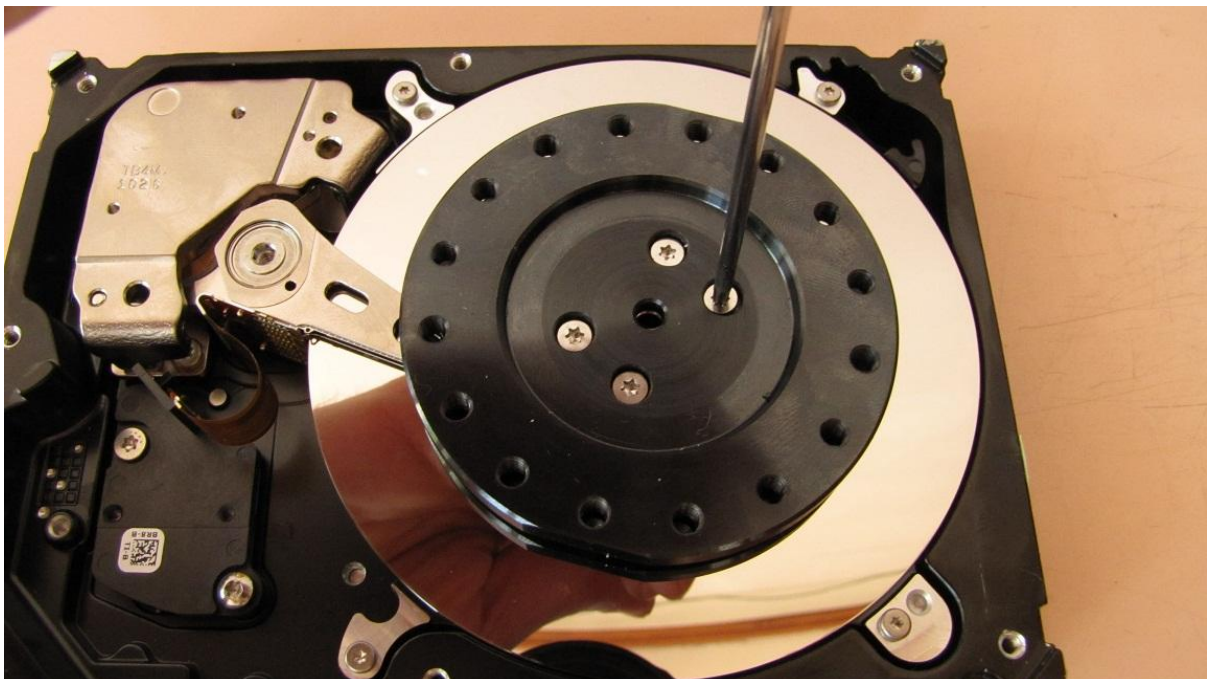
9. Screw the **needle-screw** to push out the bearing from “the hat”. After this, the donor bearing is extracted and prepared.



The whole donor bearing

Preparing the patient hard drive

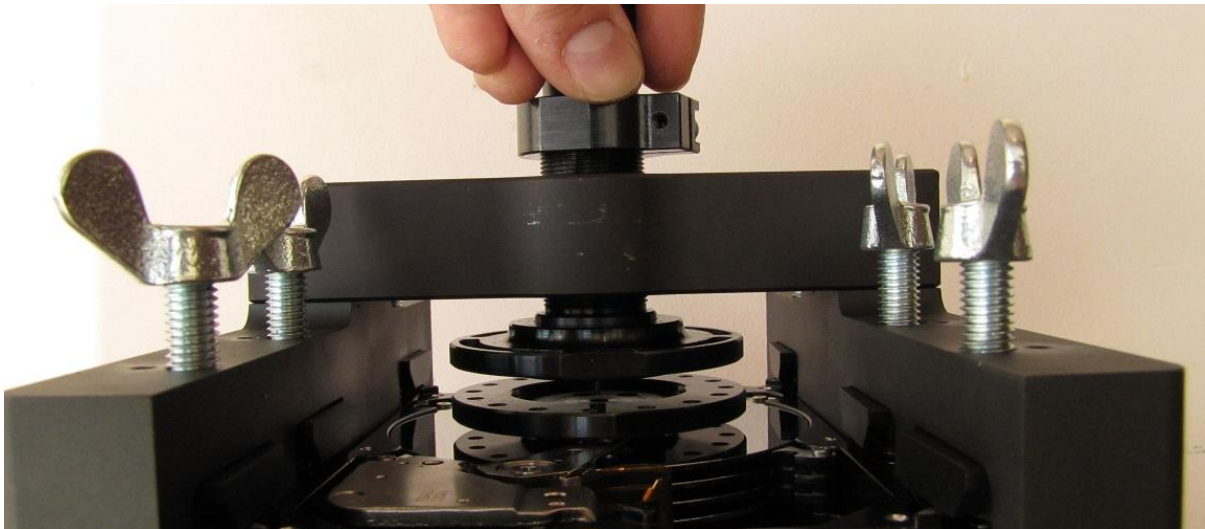
10. Remove the lid on a patient hard drive.
11. Place the provided hard drive lid with a hole on a patient hard drive and tighten it with the screws previously removed from the original lid.
12. Remove 4 screws from the platter fixation lid that's holding the platters in place. Be sure to remove screws two by two from opposite sides so that the two screws on the opposite sides remain.
13. Use 4 screws previously removed to screw the **platter holder** to the platter fixation lid. Make sure to screw these screws tightly because these screws will suffer a great amount of pressure when pushing out the bearing.



Mounting the platter holder on a patient hard drive

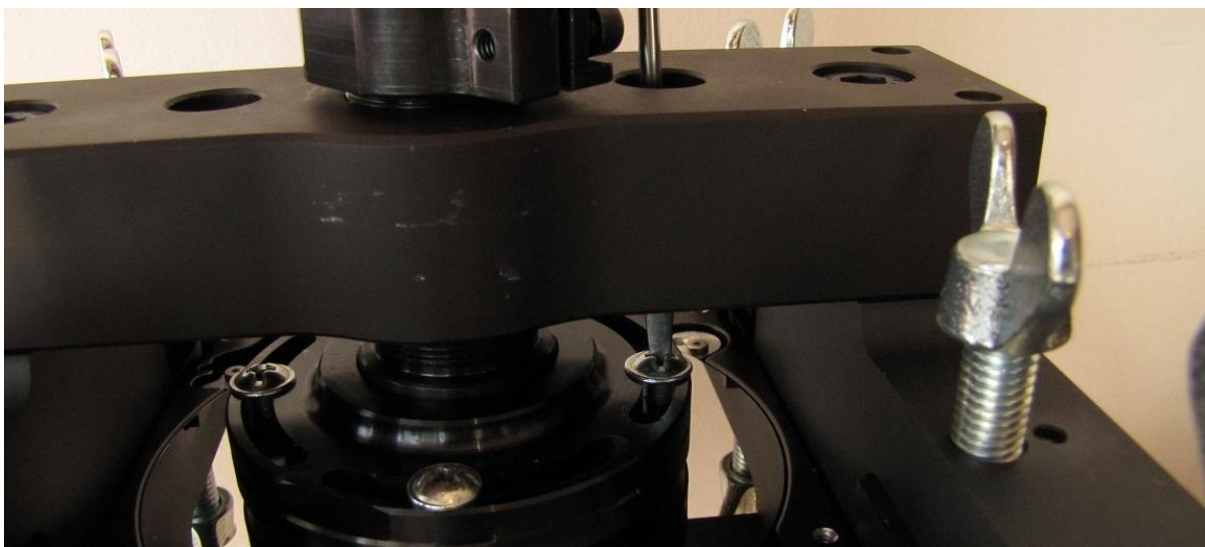
Placing the patient hard drive on the tool

14. Place the patient drive on the tool so that the **platter holder** coincides with the **upper cylinder** of the tool. The **needle** in the upper cylinder must also coincide with the central hole in the platter holder.



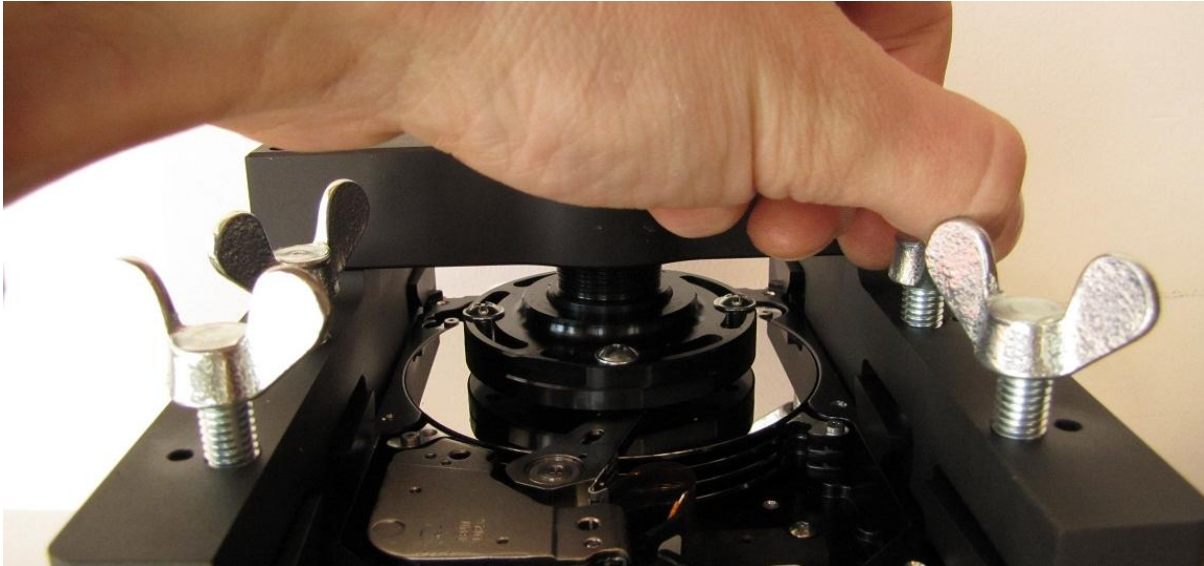
Screwing the upper cylinder

15. Pull the needle all the way up (unscrew the needle-screw) and then screw the upper cylinder (by hand) until it touches the platter holder.



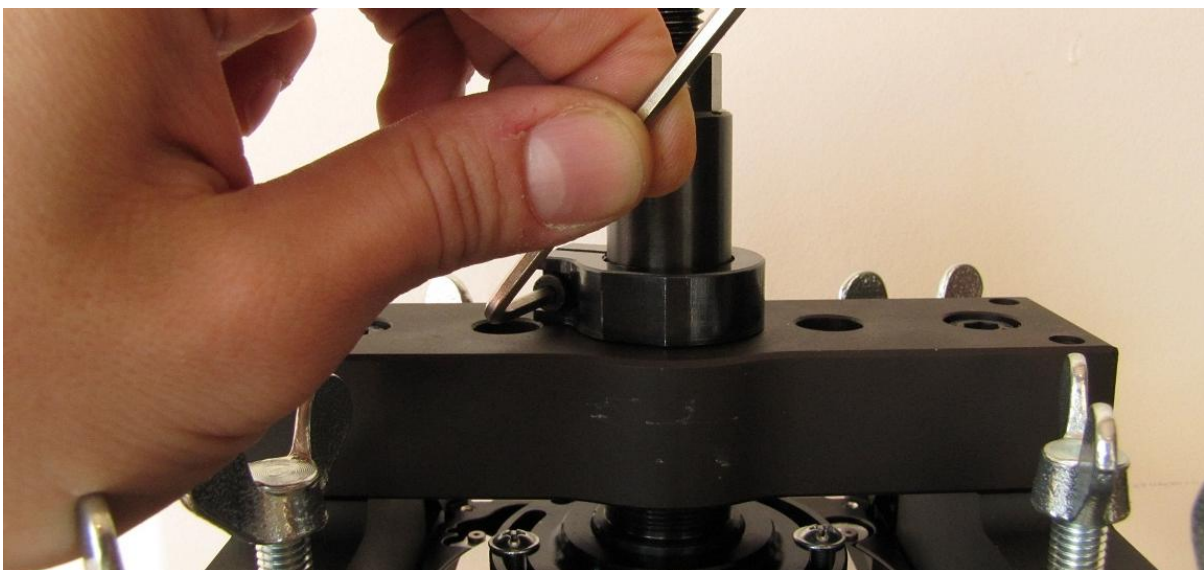
Affixing the upper cylinder to the platter holder

16. Use 4 or more evenly distributed screws to affix the upper cylinder to the platter holder.
17. Tighten the casing of the hard drive using 6 butterfly-screws on the sides of the tool.
Tighten 2 butterfly-screws in the middle first.



Screwing the butterfly-screws

18. When the upper cylinder and the platter holder are firmly attached, make sure that the cylinder doesn't move anymore. Do this by screwing the **clamping nut** (by hand) on the upper cylinder until it touches the ramp. At this position, tighten the screw on the clamping nut so it wouldn't move.



Affixing the clamping nut on the upper cylinder

19. When the hard drive is in place and firmly attached to the tool from the upper side, turn the tool upside-down and screw the **bottom cylinder** until it touches the bottom side of hard drive.



Screwing the bottom cylinder

20. Screw the **clamping nut** on the bottom cylinder until it touches bottom side of the tool. Tighten the screw on the clamping nut. Place another clamping nut on the cylinder also.



Affixing the clamping nut on the bottom cylinder

21. In order to know the height on which the bearing is on a patient hard drive, screw the **spindle-pushing screw** in the bottom cylinder until it hits the bottom of the bearing on hard drive.



Screwing the spindle-pushing screw

22. Unscrew the second **clamping nut** (that was previously placed on the bottom cylinder) until it hits the spindle-pushing screw. At this point, tighten the screw on this clamping nut to fix it in that place. These two clamping nuts on the bottom cylinder mark the position of the bearing and they must stay in place where they are fixed until we finish the whole process of bearing replacement.

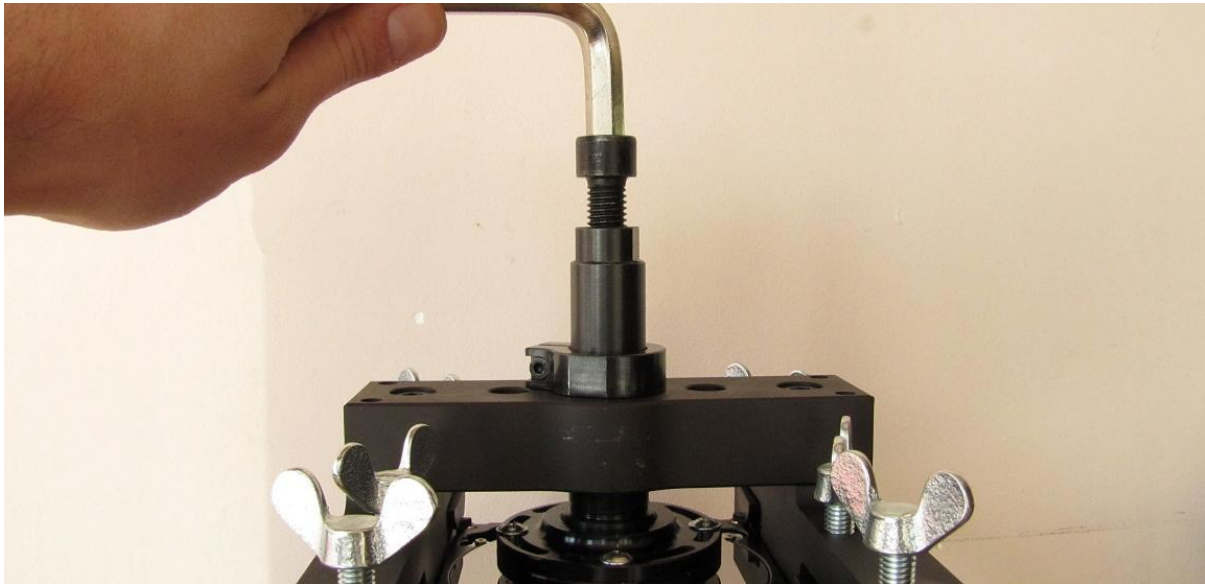


Marking the position of the bearing with clamping nut

23. Remove the spindle-pushing screw (but not the bottom cylinder or the clamping nuts on it) and turn the tool upside-down again.

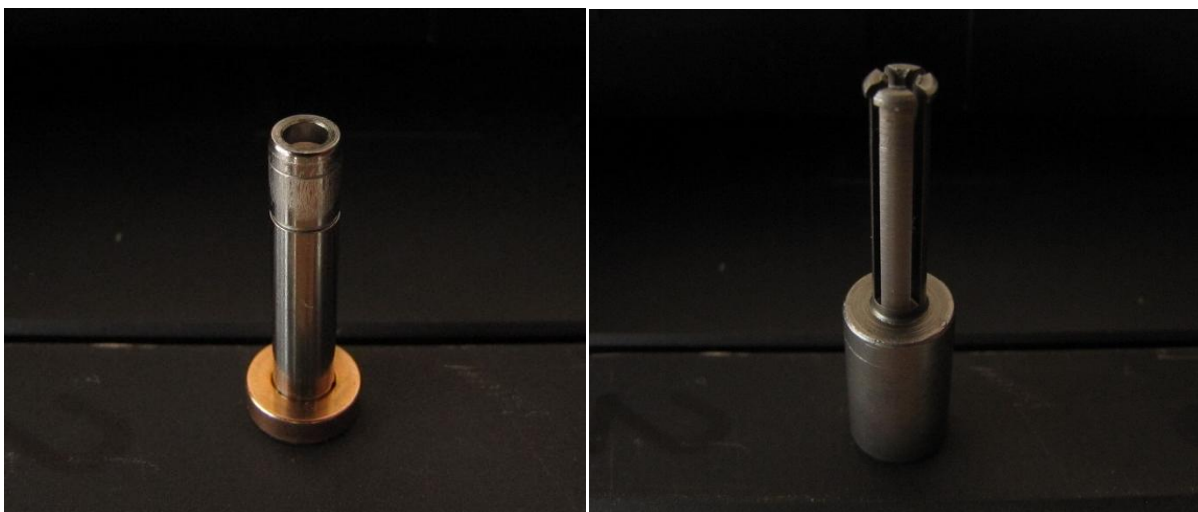
Pushing out the bearing from a patient hard drive

24. Use the **needle-screw** on the upper cylinder to push out the bearing from a patient hard drive. Turn the needle-screw slowly.



Screwing the needle-screw

In most of the cases, only the spindle comes out and not the whole bearing. If only the spindle comes out, use **“the puller”** to pull out the bearing casing.



Spindle

“The puller”

Using “the puller”

- a) Pull out the **needle** from the bearing by unscrewing the **needle-screw** in the upper cylinder. Also, remove the bottom cylinder (be sure that the clamping nuts on it don't move).
- b) Place “**the puller**” in the bearing casing through the bottom hole on the tool. Push “the puller” all the way through.



Placing “the puller” in the bearing casing



“The puller” with bearing casing

- c) Screw the **needle-screw** again but slowly by hand. The needle will start pushing “**the puller**” until it gets to its position and starts gripping the bearing casing.
- d) When “the puller” had gripped the bearing casing, screw the **bottom cylinder** again, and then screw the **needle-screw** to push out the bearing casing. After this, unscrew the needle-screw to pull the needle out, and unscrew the bottom cylinder along with clamping nuts (make sure not to move the clamping nuts).

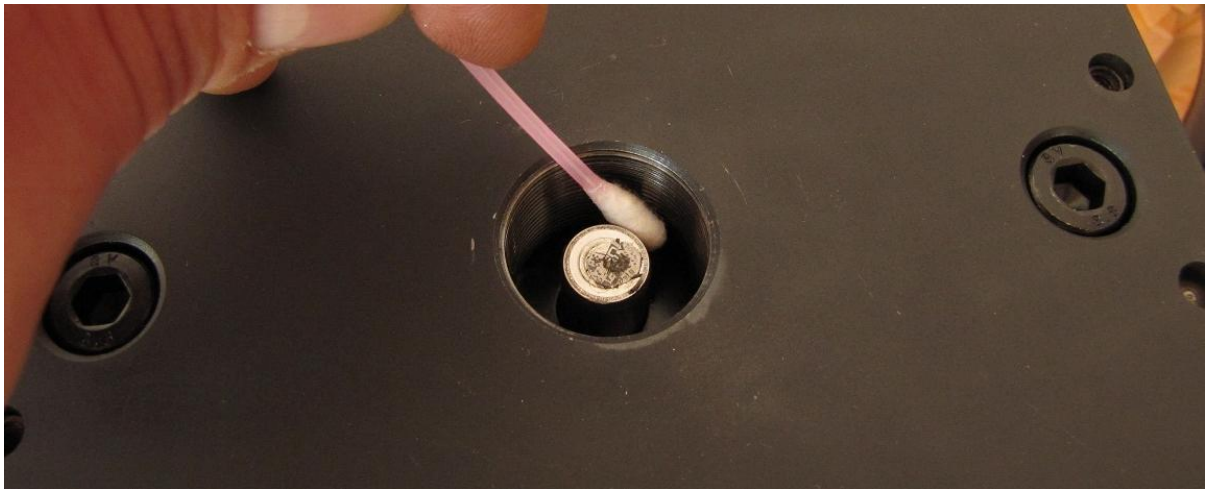
Placing the donor bearing in a patient hard drive

25. Pull out the **needle** from the bearing by unscrewing the **needle-screw** in the upper cylinder. Remove the screw from the **cocoon**, place the donor bearing in it, and then place the cocoon with bearing in the bottom cylinder.
26. Screw the bottom cylinder with cocoon and bearing by hand to ensure that the bearing goes straight. Push the bearing this way until the cocoon hits the bottom of the hard drive. When this happens, unscrew the bottom cylinder and remove the cocoon from it.



Screwing the bottom cylinder with cocoon and bearing

27. If the cocoon stays on the bearing, use the screw to remove it from the bearing. Screw this screw in the hole on the cocoon and pull it to remove the cocoon from the bearing.
28. Turn the tool upside down and apply super glue to the visible part of the bearing.



Applying super glue to the bearing

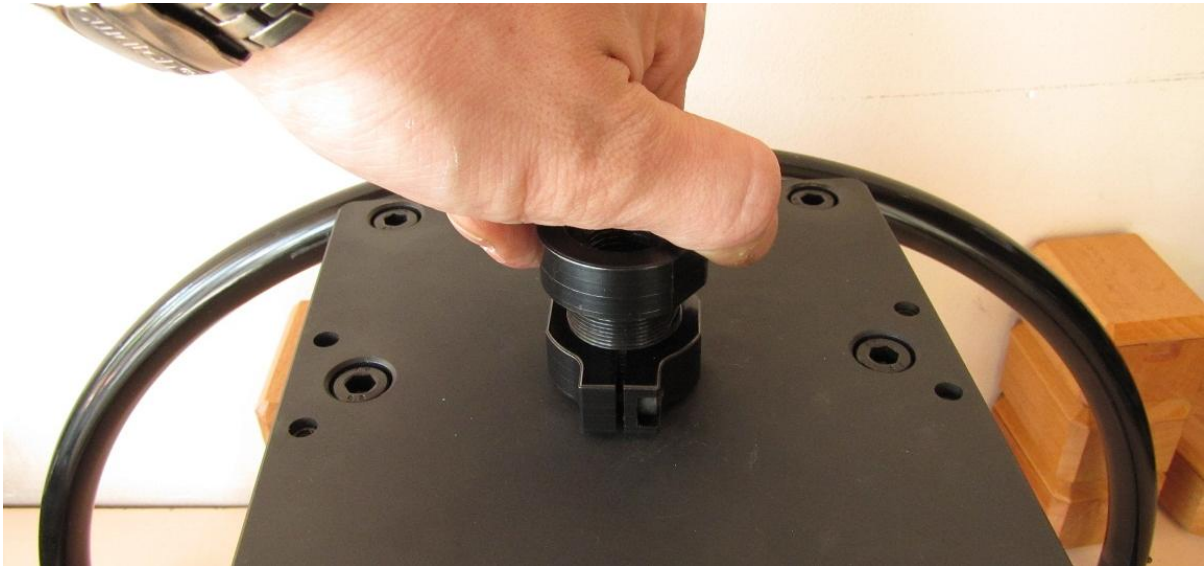
29. Screw the bottom cylinder again (without the cocoon) until it hits the bottom of the tool with its fixed clamping nut.
30. Screw the spindle-pushing screw to push the bearing to its place. Screw this screw until it hits the clamping nut that marks the height of the previously removed bearing. This way we will place the donor bearing at the same position where the patient bearing was.



Placing the donor bearing in a patient hard drive

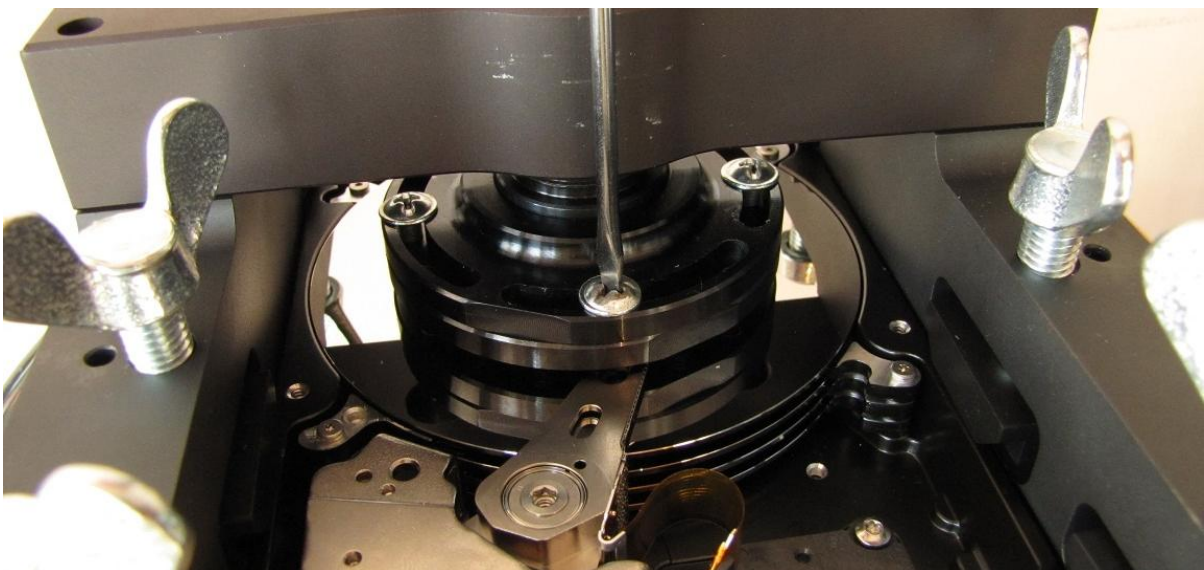
Dismounting patient hard drive from the tool

31. Wait some time needed for the glue to affix the bearing to the hard drive casing and then remove the spindle-pushing screw and remove the bottom cylinder.



Removing the bottom cylinder

32. Turn the tool upside-down and unscrew the screws connecting the upper cylinder with the platter holder.



Removing the screws from platter holder

33. Unscrew the upper cylinder and then unscrew the butterfly-screws holding the hard drive in place.



Unscrewing the upper cylinder

34. Pull out the hard drive from the tool, unscrew the 4 screws holding the **platter holder** and remove the platter holder. Screw those 4 screws back in place. Place the lid back on the hard drive and start cloning the drive.

For a more detailed instruction on how to use this tool, check the video guide and animation which can be found on our website:

[Animation](#)

[Video guide](#)

You can find more information about this tool and many other tools used for data recovery on our website.

<http://www.hddsurgery.com/>

4. Appendix

After 3 years of intensive use and a large number of successful spindle replacements, we have decided to present you some additional guidelines in using the Spindle Replacement Tool.

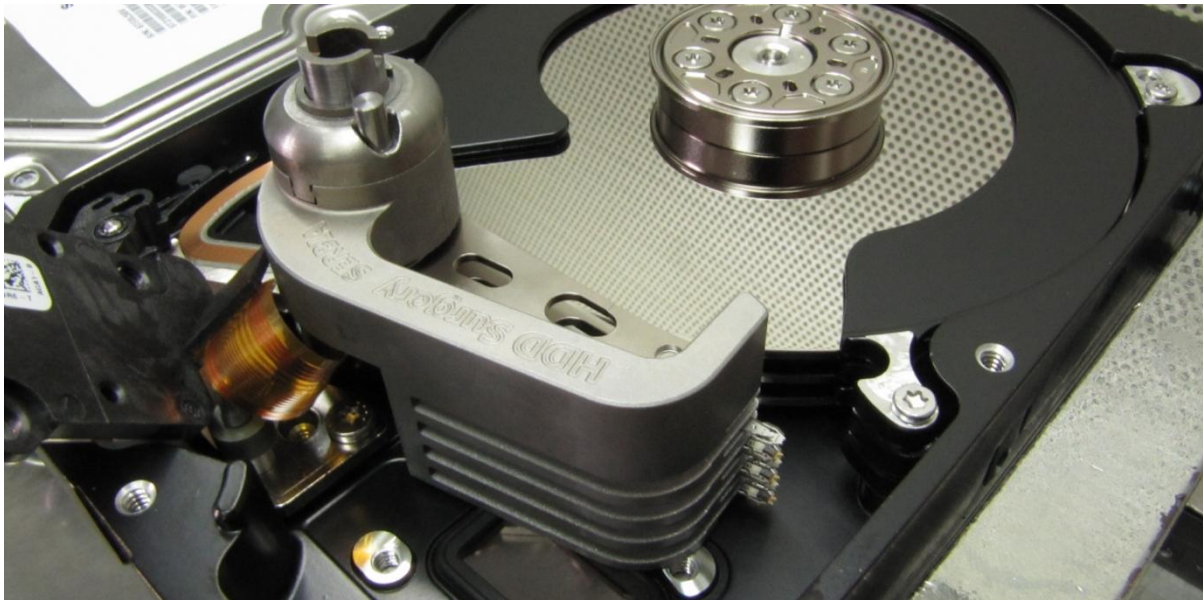


These additional guidelines are based on our experience with spindle replacement so far, and they represent some best practices which should help achieve a success rate that is close to 100%.

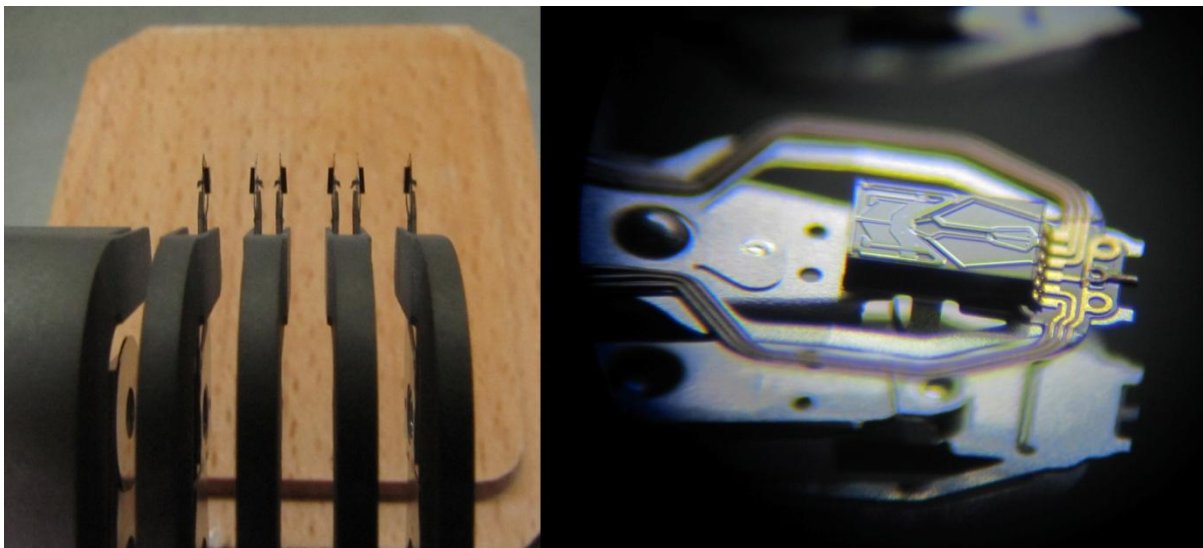


4.1. Check the patient heads

When preparing the patient hard drive (after **step 10.** in the manual), before starting the spindle replacement procedure, take its heads out and check them for dirt and damage.

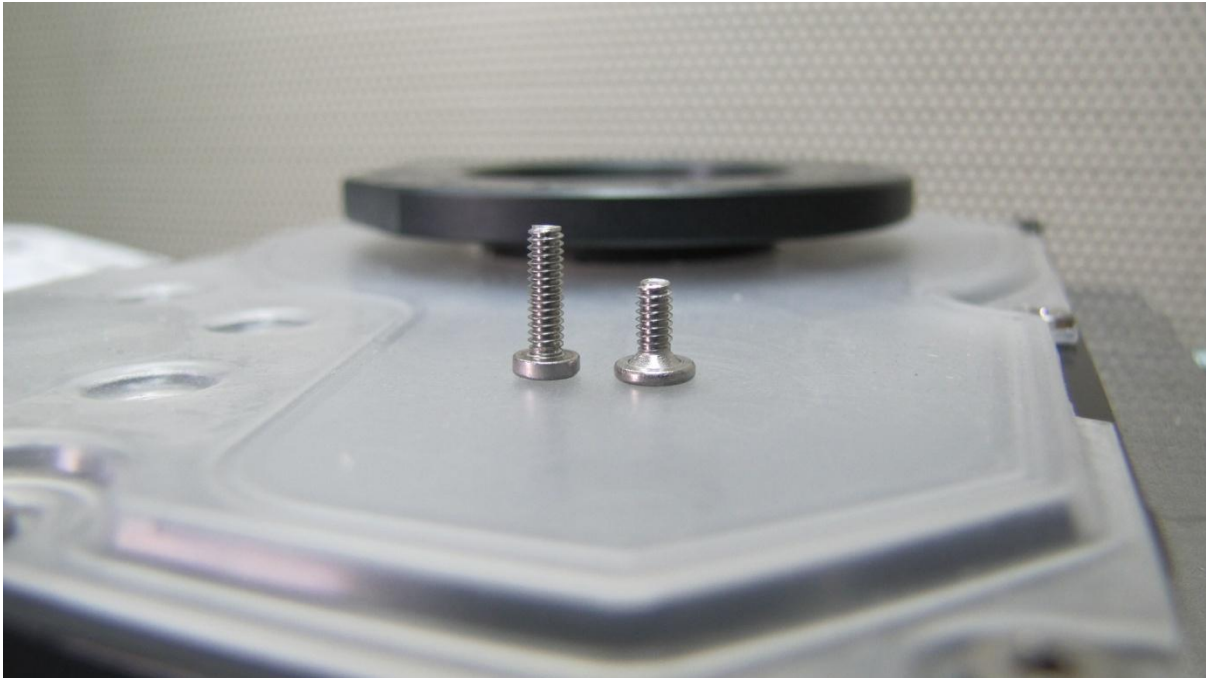


Heads should be checked for physical damage and for dirt under the microscope. If heads are damaged or dirty, they should be replaced. Either way, leave the heads out during the bearing replacement, and put them back afterwards.



4.2. Use longer screws

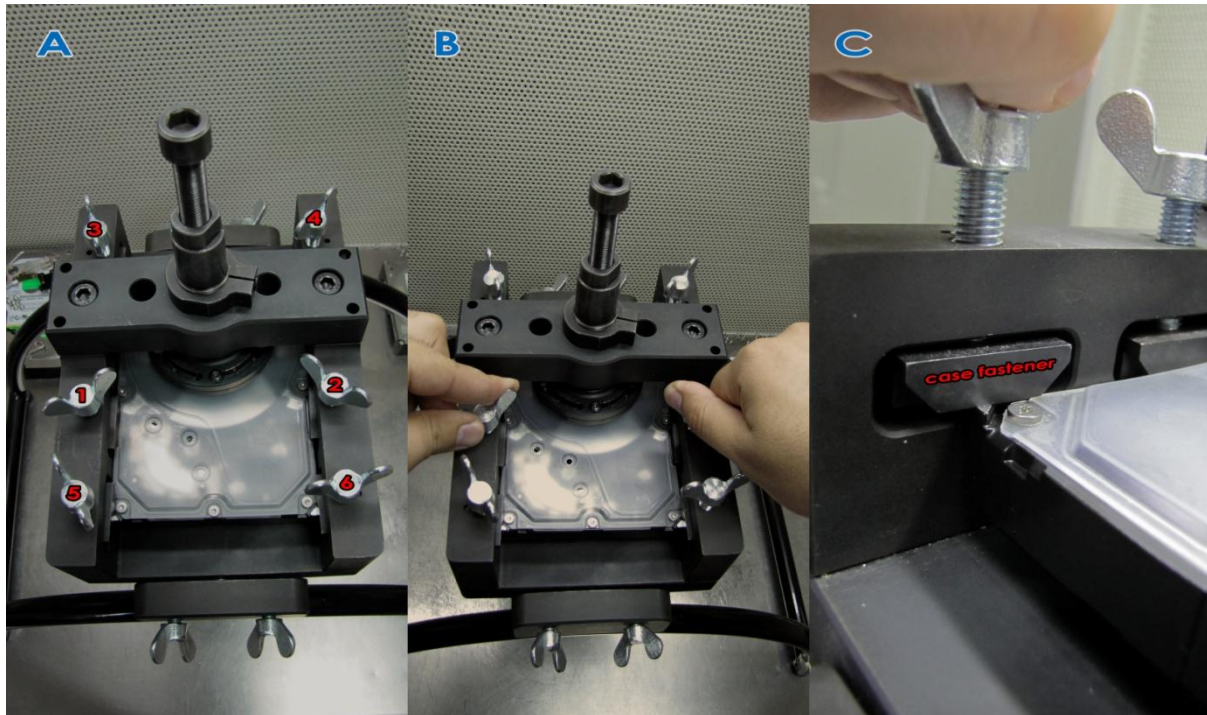
While preparing the patient hard drive (**step 13.**), instead of using the screws previously removed, use longer screws to mount the **platter holder**.



Longer screws (shown left on the picture) will ensure a tighter connection between the platter holder and the platter carrier. These longer screws could be easily found in Maxtor DiamondMax 9 and 10 hard drives – the ones holding the head connector in them.

4.3. Tighten the hard drive casing

We have noticed that some hard drive casings are not lying perfectly flat on a flat surface. Because of this, when tightening the hard drive casing (**step 17.**), tighten only the middle two screws firmly (screws 1 and 2 on the picture).



Rest of the butterfly screws (screws 3, 4, 5 and 6) should only be tightened until the “case fastener” touches the hard drive casing (as shown in part “C” of the picture).

4.4. Clean the donor bearing

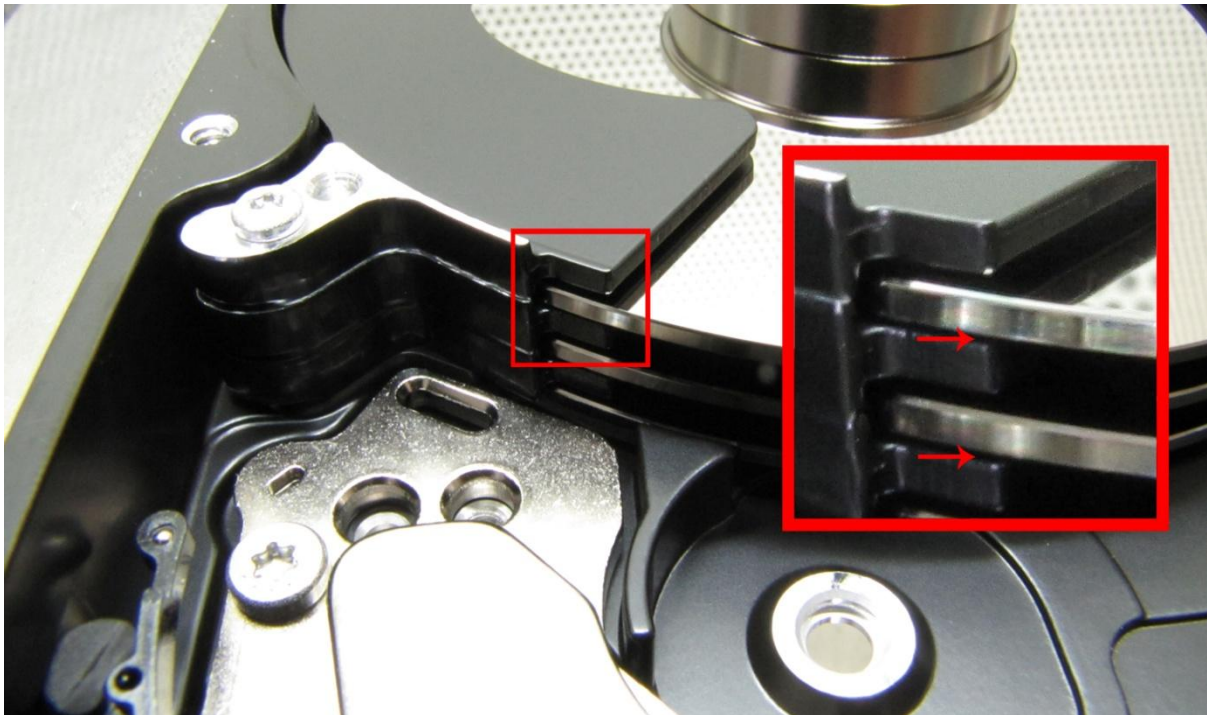
When the donor bearing is extracted (**step 9.**), it still has traces of glue on it. This is the factory glue that was used to affix the bearing to the hard drive case.



Be sure to clean the traces of glue on the donor bearing before placing it in a patient hard drive (**step 25.**).

4.5. Check the height of the platters

When the bearing replacement is done (**step 34.**) check the height of the platters by checking the distance between the platters and the spacers. Rotate the platters and check if they are passing close to the spacers or touch them in some position.



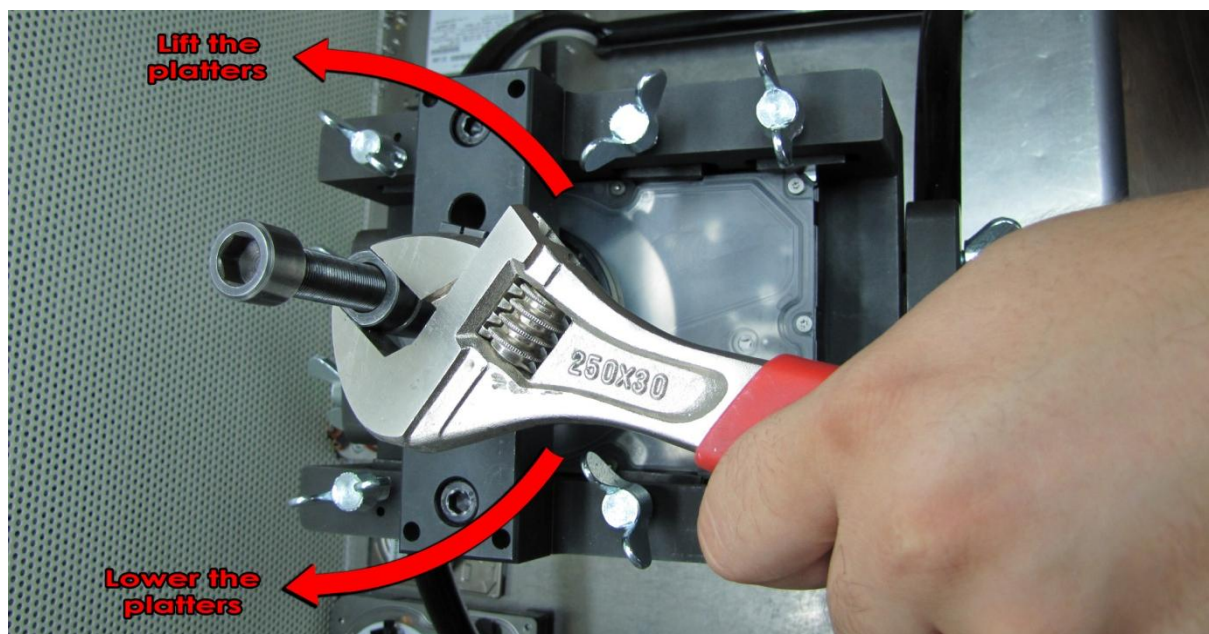
If the platters are too close to the spacers or touch them, they should be lifted (if they are too low), or lowered (if they are too high).

4.6. Adjust the height of the platters

To move the platters (lift them or lower them), **steps 10 – 17** need to be done again.

4.6.1. Lifting the platters

Screw the **needle-screw** until the needle touches the top of the spindle. Use Allen wrench to hold the **needle-screw** in this place while unscrewing the **upper cylinder** counter-clockwise using the adjustable wrench. Do not rotate the needle-screw, just hold it in the same position. This will assure that the spindle stays in place while the platter carrier (“the hat”) gets lifted. Since usually only slight adjustments are needed, a quarter of turn (1/4) should be enough to lift the platters from the spacers.

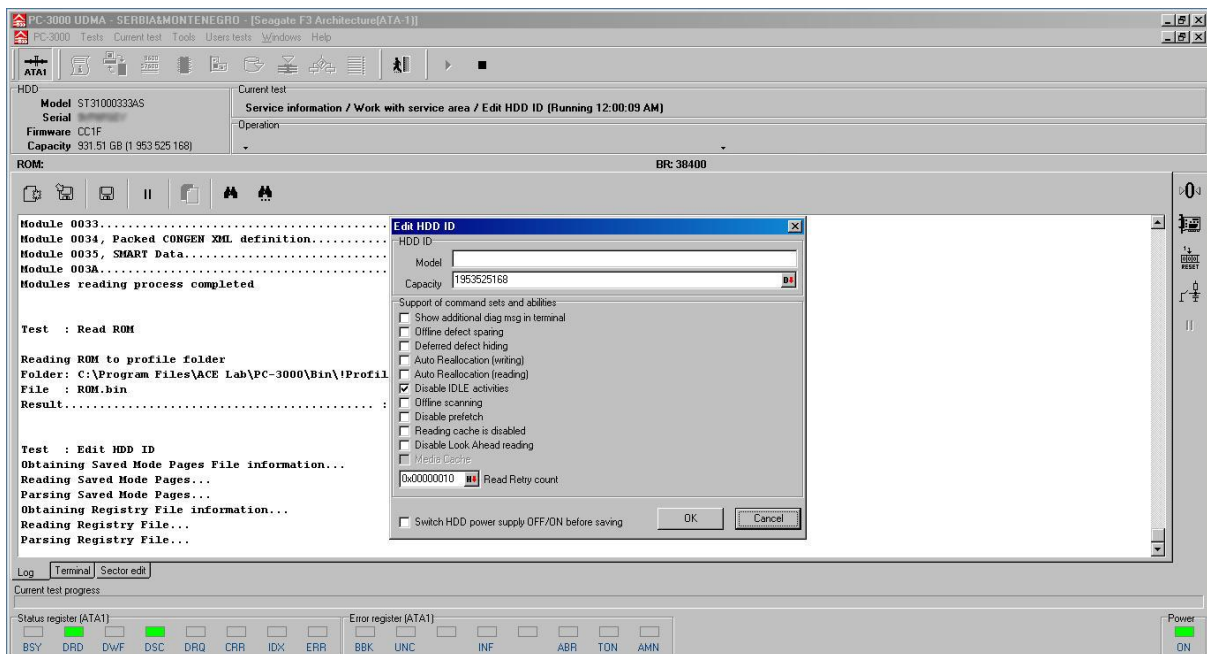


4.6.2. Lowering the platters

Screw the bottom cylinder until it touches the hard drive from the bottom (same as in **step 19.**). After this, screw the **spindle-pushing screw** in the bottom cylinder until it hits the bottom of the bearing on hard drive. This will assure that the bearing stays in place while the platter carrier (“the hat”) gets lowered. Using the adjustable wrench, screw the upper cylinder (turn it clockwise) to lower the platters. A quarter of turn (1/4) should be enough for slight adjustment.

4.7. Use “Edit HDD ID” function

Hard drives with a replaced bearing sometimes become a bit “wobbly” so they should be put on a workbench before they are plugged in. Workbench will keep them steady and help them stabilize.



When the hard drive is plugged in, it will usually click for a while until it calibrates. If you are using the **PC3000 UDMA** kit, let the drive calibrate, start the Seagate utility and then use the “Edit HDD ID” option which can be found in **Tests/Service information/Work with service area**. In the “Edit HDD ID” window, uncheck all the checkboxes except the “Disable IDLE activities” checkbox, and then click “OK”. After this, the drive should stop clicking and it should calibrate easily.