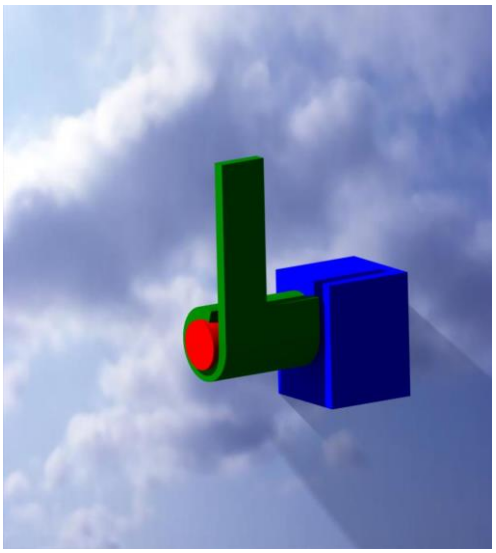
[HowTo] eliminate mechanical backlash in ThinkPad Hinges *(all classic Series)*

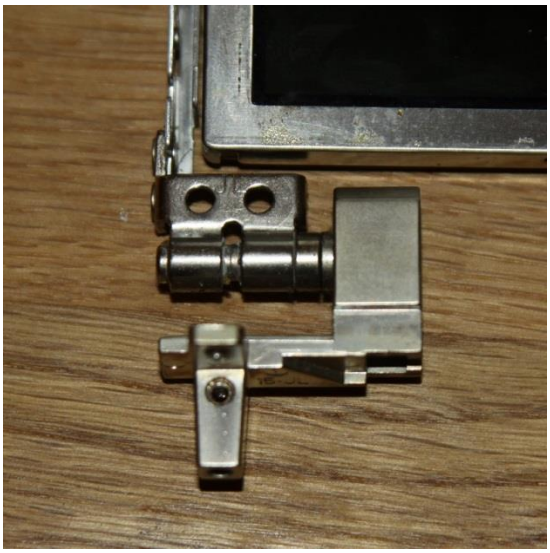
I started thinking about this problem a long time ago; I think buying a new pair of hinges to fix the backlash should not be the only possible solution.

Today I got the key idea to finding a solution after taking apart and reverse engineering a few different ThinkPad hinges.

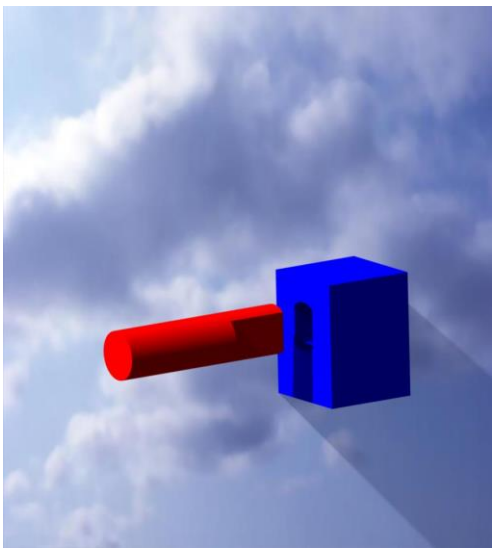
Basically all the hinges (in ThinkPads) I got my hands on consist of three basic functional parts (simplified CAD model given):

1. Lower bearing (blue)
2. One side flattened shaft (red)
3. Upper bearing with friction generator (green)





Relevant for our project are only the shaft and lower bearing.



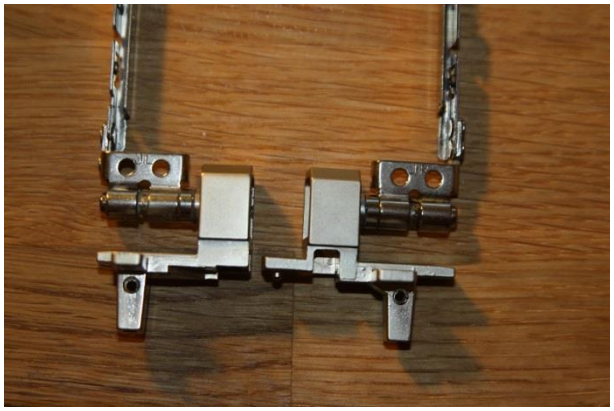
These two get joined through pressing in the knurled flat end of the shaft into the lower bearing.

And this is the point where we get our backlash after a few hundred load cycles. This is due to the non-perfect fitting between the shaft and the lower bearing, where the entire load is hold only by the knurling. As soon as there is a little bit of backlash it starts to increase very fast before it reaches the maximum backlash, only limited by the flattened edge turning inside the lower bearing. Due to the long lever the backlash can reach up to 30mm at the upper edge of the LCD cover.

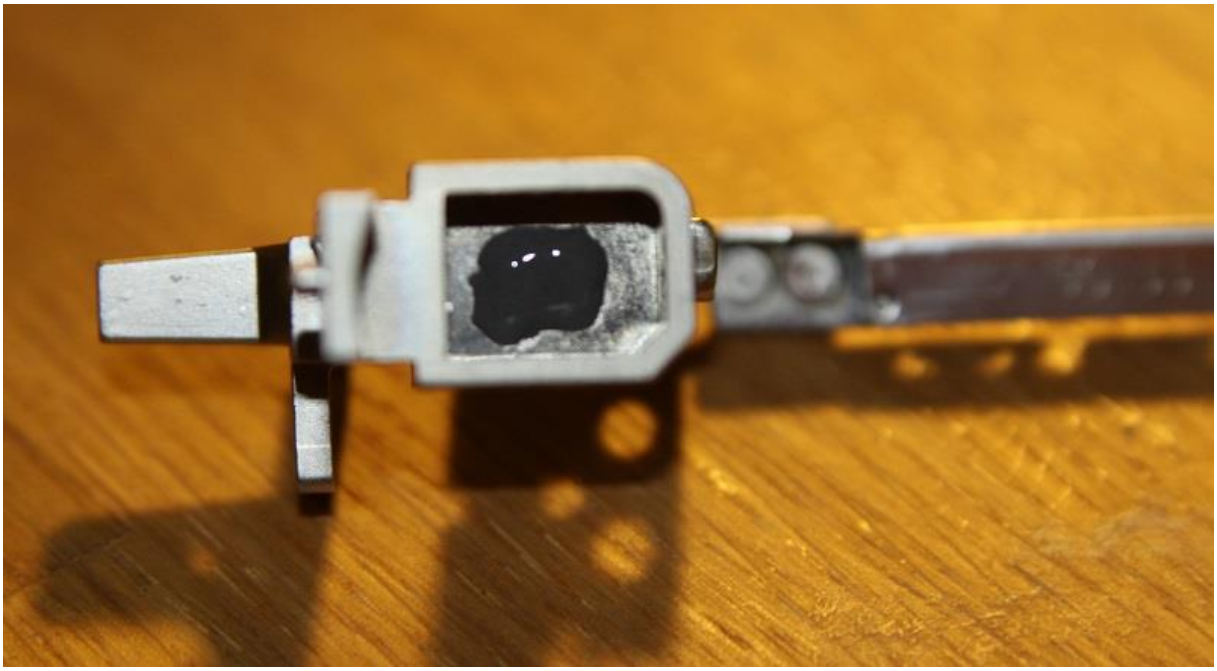
Then your hinges are pretty worn out, you should be able to disassemble them with ease. Just pull the shaft out of the lower bearing.

I cleaned these with brake cleaner to prepare an ideal surface for the glue to stick on. You need to make sure to only clean the part that goes inside the lower bearing! Otherwise your friction generator will lose all of its grease and will start to get stiffer until it finally breaks or rips the bolts out of their sockets in the case (for what I also have a great repair guide!).

After cleaning the lower bearing and the shaft I decided to use jb-weld, because it has a very good compressive strength, fills gaps easily and nearly doesn't shrink at all while curing. So it seems to me as the ideal glue to fix our problem.



I just applied a little bit of the glue inside the lower fitting with a tooth pick, just enough to fill the gap and not so much that it glues the friction generator (which will make your hinges useless). The excess glue comes out at the other end and can be formed in the shape of a mushroom so it has an additional surface to stick to.



You should also make sure to glue the right upper part of your hinge in the right lower bearing, because otherwise they will not fit in your ThinkPad and you cannot separate them anymore. At least at my R60 they are clearly labeled right and left.

As soon as the glue cured completely (I put my jb-weld glued parts on the heater for 24h) you can put your ThinkPad back together and enjoy hinges which are like brand new out of the factory.

This fix should last for a very long time, because the glue is not there to glue something, it is needed to fill up the space between shaft and lower bearing. To break it again the glue would have to be compressed or displaced in any way which is nearly impossible.

For taking apart and putting together your ThinkPad I strongly recommend reading the specific hardware maintenance manual which is provided by Lenovo for each individual model (google it!).

I shall not be held liable for any damages or other consequences (for example losing your warranty) which may go along with taking apart your ThinkPad and/or following the above described procedure.

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