

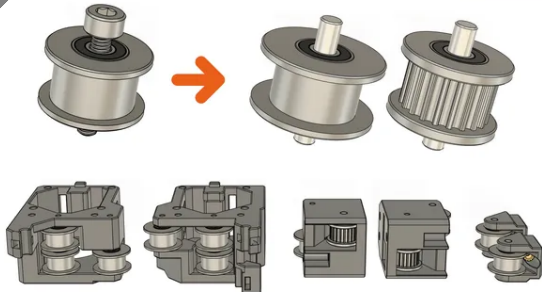
Pins Mod
With 3mm Idlers for the XY Gantry
...with Toothed Option
3D MODEL ONLY



CORE One Pins Mod (Gen 1, Gen 2)



DET-Man



[VIEW IN BROWSER](#)

updated 18. 9. 2026 | published 18. 9. 2026

Summary

Upgrade the XY gantry of the CORE One by replacing the M3 bolts for idler mounting with 3mm steel pins.

[3D Printers](#) > [Prusa Parts & Upgrades](#)

Tags: [belt](#) [tensioner](#) [idler](#) [pulley](#) [corexy](#) [gantry](#)

While the **CORE One** is an excellent printer with a well-designed stock system, this modification offers mechanical improvements for enthusiasts seeking enhanced precision and reliability. The **Pins Mod** inspired by the Voron community upgrades the XY gantry system by replacing the standard M3 bolts used for idler mounting with 3mm steel axles (pins).

Key Improvements

- **Eliminated Idler Play** on the M3 bolts
- **Smoother Operation** that reduces potential vibration and mechanical noise
- **Corrected Gen2 Motor Pulley Clearance:** Restores the original GT2-style pulley clearance to prevent rubbing on the stock motor mount parts

- **Toothed Idler Integration:** Optimizes belt engagement using purpose-built toothed idlers (optional); reposition the idler to account for the different pitch-circle diameter and keep the belt path parallel
- **Improved Reliability** for the Belt Tensioner mechanism by using a heat set insert (optional)

GT 1.5 and the Gen 2 Upgrade: Do I still need this mod?

Yes 😊 and with the GT 1.5 / Gen 2 belt change, this mod is even more valuable. The GT 1.5 / Gen 2 upgrade improves the belt system, but it does not eliminate the radial play introduced by the stock M3 idler mounting bolts. The Pins Mod addresses that remaining weakness by replacing the bolts with precision steel pins, making the idler assembly more rigid, smoother, and more consistent.

There is also a Gen2-specific fix: The new motor pulleys included in the Gen2 upgrade kit have a slightly larger outer diameter and can rub on the stock motor mount printed parts. This is corrected by restoring the same pulley clearance that was present with the GT2 pulleys. Thanks **Dave** for identifying and fixing this first. **Give his model a like as well!**

Toothed Idler - How Many Teeth?

GT1.5 (Gen 2):

- **1.5 GT 27T - Preferred choice**
- **1.5 GT 26T** - also a good choice
- **1.5 GT 21T - Not supported**
- **Requirements:** 3mm inner bore (ID), max outer flange diameter (FD) $\leq 18\text{mm}$

GT2 (Gen 1):

- **GT2 20T** toothed idler with 3mm bore
- **Requirements:** 3mm inner bore (ID), max outer flange diameter (FD) $\leq 17\text{mm}$

None of these choices change the belt path, because the pin positions in the XY carriage parts were adjusted to account for the different idler and belt geometry.

Idler Width & XY Carriage Compatibility

With the **CORE One Gen 2** upgrade, things became much simpler: the commonly used **POWGE** toothed idlers come in the same **9mm** width as the stock Prusa smooth idlers. To avoid confusion about which part to print, the 10mm variants of the XY Carriage were removed from the files section for Gen2.

For the **CORE One Gen 1**, the XY Carriage is still available in two variants: **9mm** for the stock Prusa smooth idlers, and **10mm** for the **Mellow** toothed idler (see BOM).



I hesitated for quite some time whether to publish this model at all - not because it doesn't work, but because the build process requires time, patience, and the willingness to understand what you're doing rather than just following pictures. It's not overly difficult, but it is possible to mess it up!

Personally, I would never build a CORE One without this modification, so I can only encourage you to consider going this route.

I'll do my best to describe every detail of what you need to do and help you understand the reasoning behind each step. This will be somewhat lengthy, but it will help you get it done successfully.

- If at any point you find a way that works better for you - do it your way!
- If you want to spend the time designing tools to help with idler alignment, please do so and share it with us! I've provided all the CAD resources to give you a quick start.

That being said, here's a time estimate: **Plan around 90 minutes** for reading, understanding, and building.

You'll be rewarded with a beautifully play-free gantry system at virtually no extra cost - it's truly worth the effort 😊.

CORE One L user?

The **XY Motor Mounts** for the **Core One L** require slightly different parts. Find these adapted mounts in the companion model: **Core One L Pins Mod**. All other parts and instructions are exactly the same, just print those two replacement parts.

Printed Parts

XY Motor Mounts

Modified to accept steel pins instead of M3 bolts for idler mounting, providing enhanced precision and reduced play.

XY Carriage

Updated design to work with the new pin-based idler system. Available in two versions:

- **Standard version (9mm):** Compatible with **9mm smooth idlers** (stock configuration). Also to be used with toothed idlers with 9mm width for superior belt engagement.
- **Modified version (10mm):** Designed for **10mm toothed idlers** for superior belt engagement

Belt Tensioner Pulley

Redesigned to utilize steel pins with two variants available:

- **Standard version** using M3 **square nut**
- **Enhanced version** with **heat set insert** for improved reliability

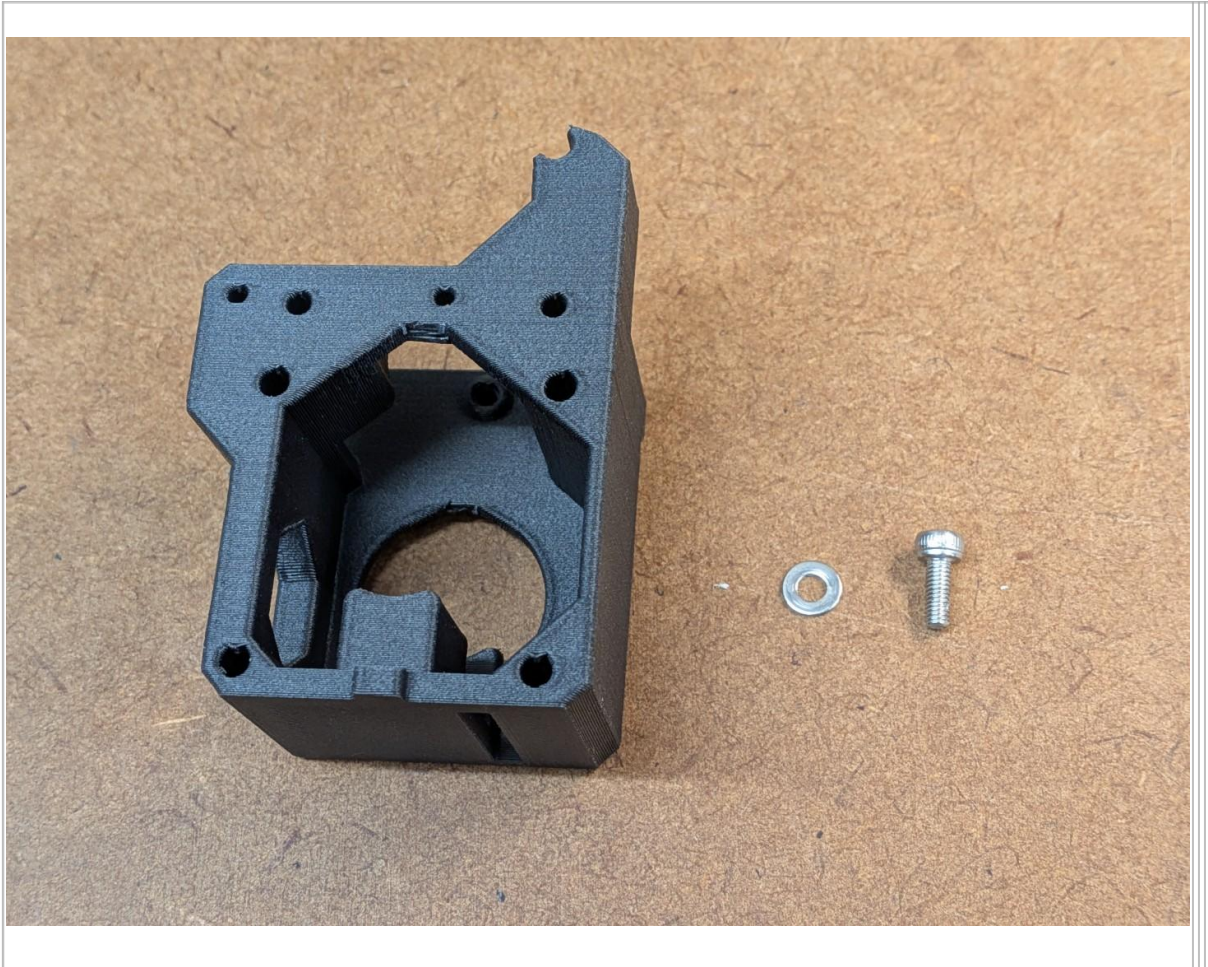
Press-In Tools

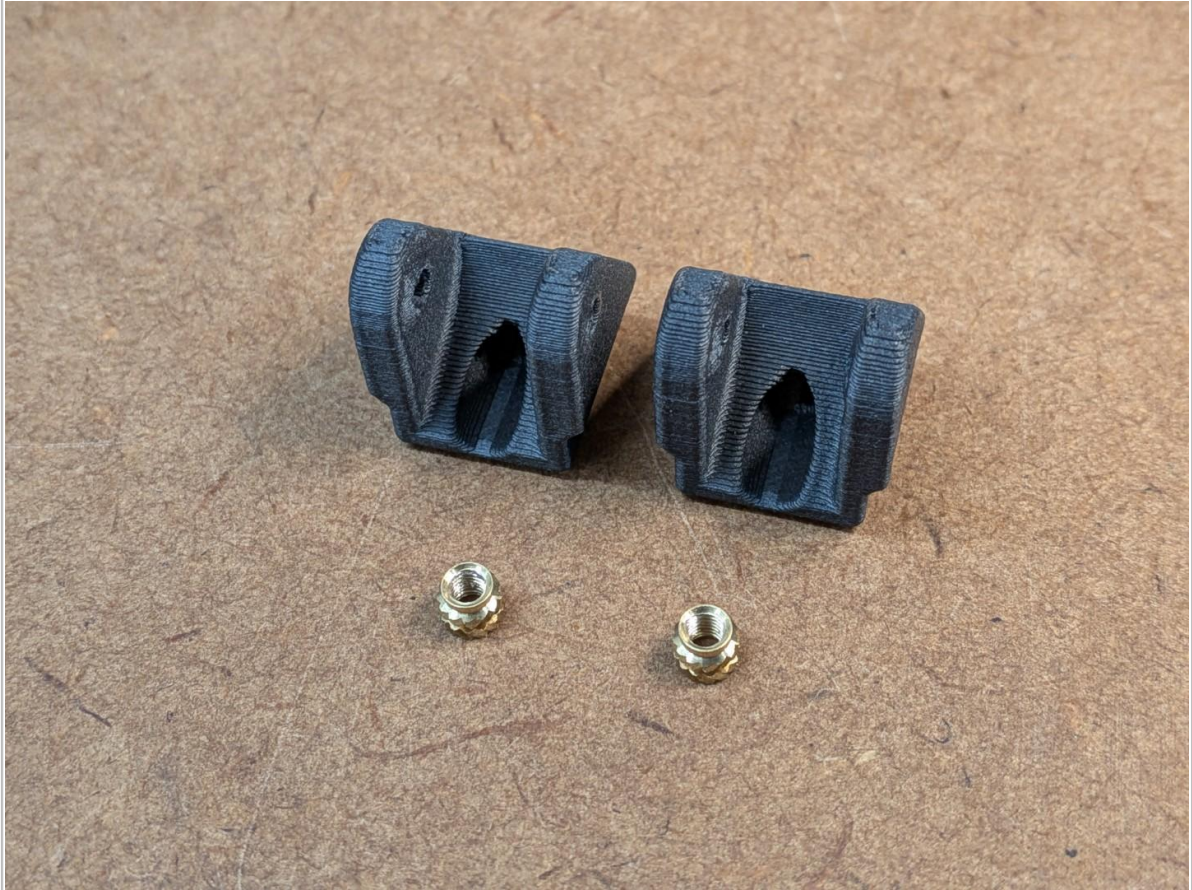
Small tools to help you press in the pins without damaging the bearings or the printed parts. The tools are provided in 2 variants:

- **Smooth:** Match the diameter of the stock smooth idlers
- **Toothed:** A variant that match the toothed idlers

Assembly

Printed-Parts Preparation





Hole Preparation

1. The 3mm pins require a press-fit into the 2.9mm sized holes
2. To ease insertion and reduce stress on printed parts:
 - Use an M3 bolt with washer to carefully enlarge the holes
 - The M3 bolt acts as a drill to create a smooth surface that is also perfectly dimensioned to
 - Hold the pin securely in place
 - ... without putting too much stress on the printed parts
 - For the pins that go all the way through the printed part: Perform this process for both holes
 - For the pins that go in from the one side but do not go all the way through (there is only a smaller opening on the opposite side to allow to insert a tool to remove the pin)
 - First do this process as described for the hole on the outside of the part (the one where you will insert the pin; this is the one easily accessible)
 - Then use a longer M3 bolt, enter it through the hole you just prepared, and enlarge the inner hole exactly the same way (sorry, no photo for that)

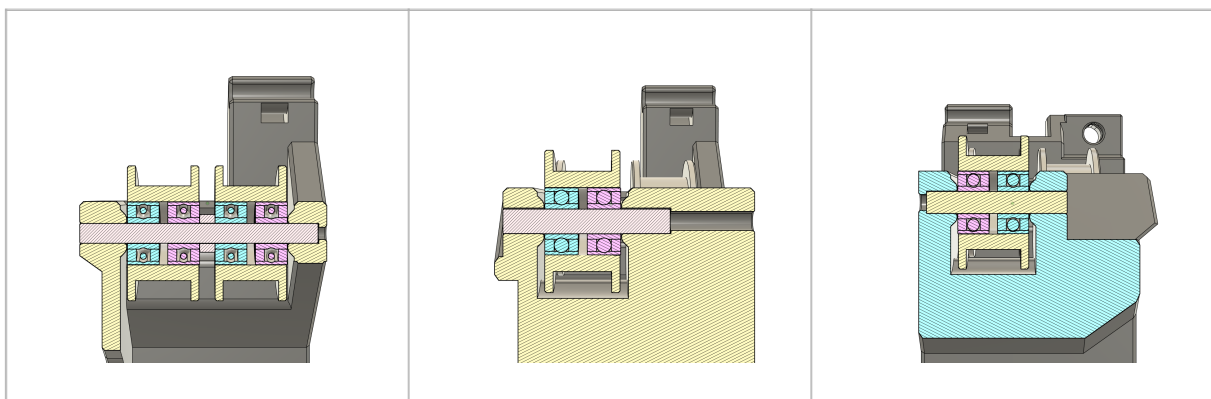
Make sure you prepare all holes as described. Otherwise you will risk to split the parts if there is too much stress especially along the layers.

Heat Set Insert Installation

- If using the enhanced belt tensioner variant: Install heat set inserts

Details: Pins placement and drill-open option

Motor Mount:



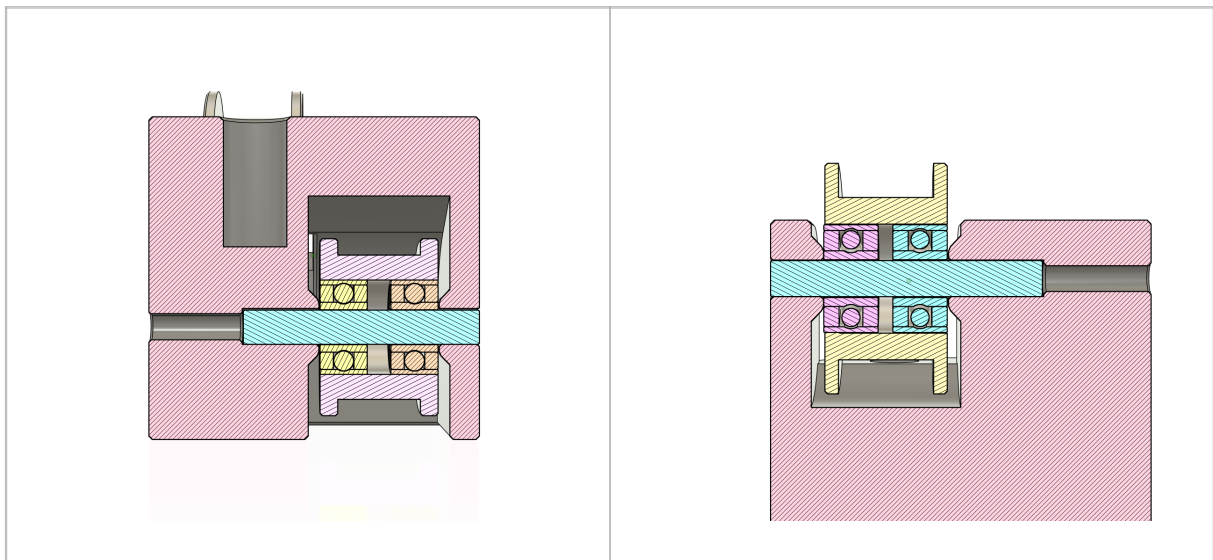
The pins in the Motor Mount parts do **not** go all the way through. Follow the instructions and drill out the “inner” hole from the inside using a longer bolt. Alternatively, use a 2.5mm drill to open the 1mm endstop and you can then use the M3 bolt technique from the outside of the part.

The idea of this design decision with the tiny 1mm end-stop:

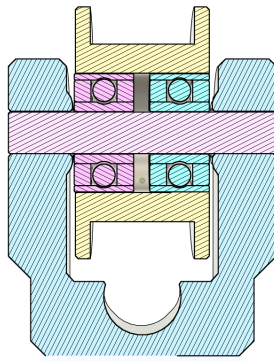
- Have an end-stop for the pin
- Make it clear from what side the pin should be inserted.

After having assembled the parts, I think the decision to have this 1mm endstop just made the process more complicated with no real benefit. But I did not want to change the design but get the project finished. And you do have the option to just drill open the last 1mm as described with no downside.

XY Carriage:



Belt Tensioner:



Pin Preparation

Standard 3mm steel pins may require sizing to achieve proper bearing tolerance. This process ensures optimal fit without bearing damage.

⚠ **Critical Safety Note:** Never force pins through bearings - any stress on the inner bearing race can cause permanent damage



Initial Preparation

1. Ensure pins have slight chamfers on both ends
2. Test-fit each pin through idler bearings completely

Sizing Process (if pins are oversized)

1. Secure pin in cordless drill chuck
2. Use 180-grit sandpaper to uniformly reduce diameter
3. Rotate drill while applying light, even pressure with sandpaper
4. Work the entire shaft length for consistent sizing
5. Reverse the pin the the drill and repeat the steps on the now accessible areas
6. Clean pin thoroughly and retest bearing fit
7. Repeat process until pin slides freely through bearings
 - Typical sizing time: 1-2 minutes per pin

Quality Check: Final pins should insert smoothly into bearings with no resistance or binding

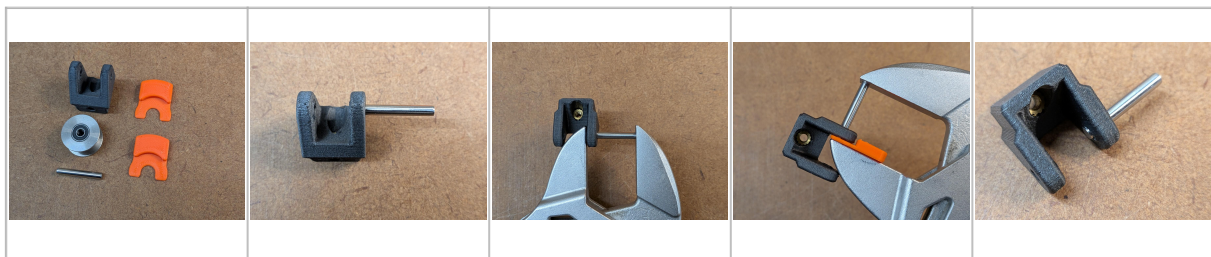
Idler Assembly

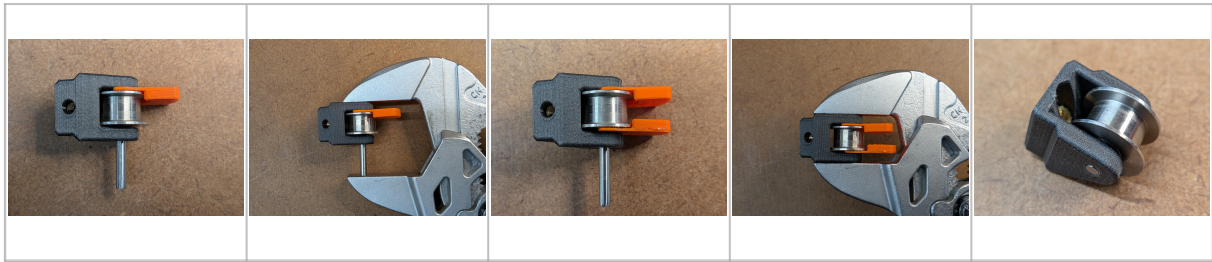
Required Tool: Parallel-press tool or vise to ensure straight pin insertion for all components.

Required Pin Length:

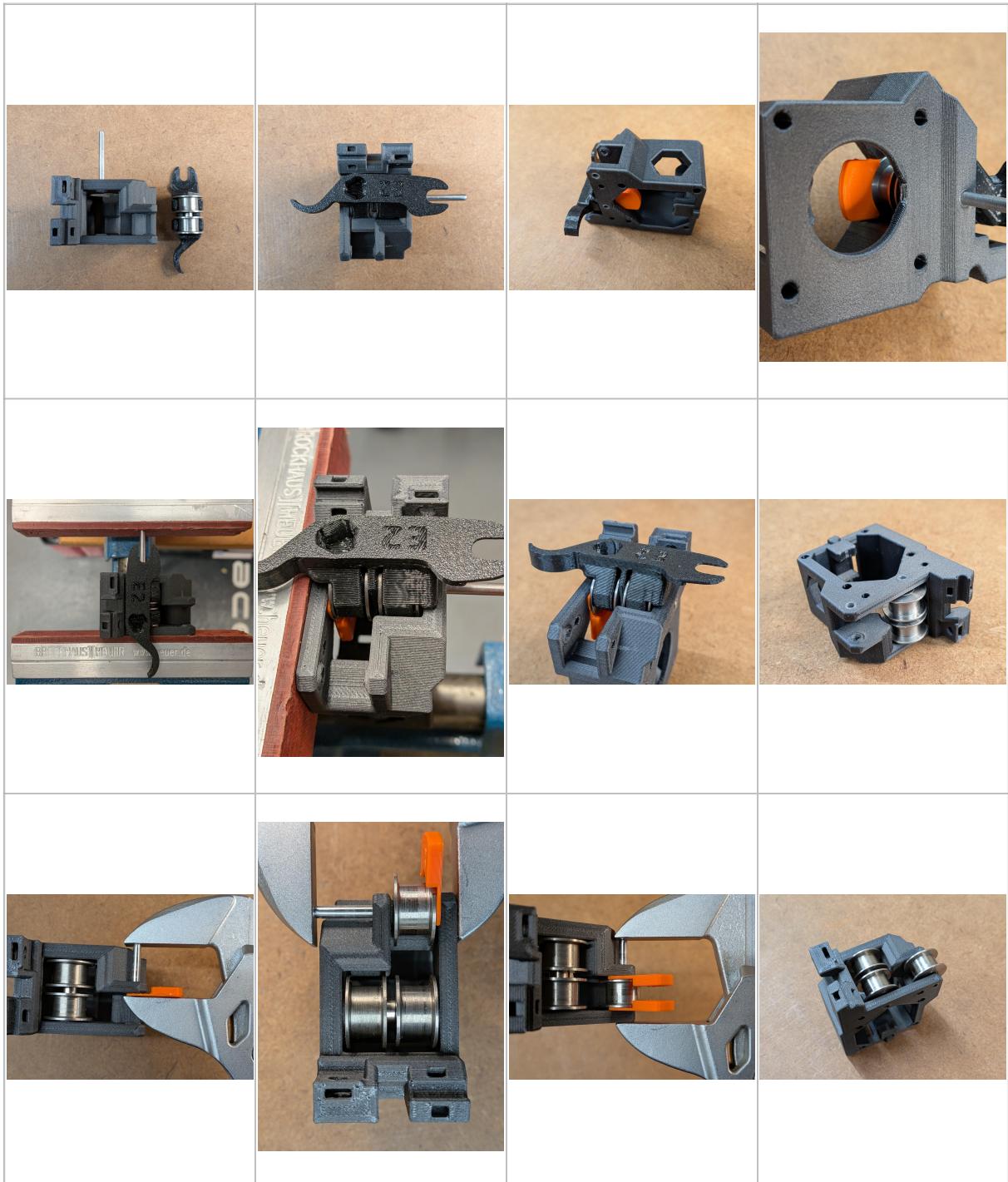
- Belt Tensioner: 18mm
- XY Carriage: 2x 20mm
- Motor Mount Right: 18mm and 30mm
- Motor Mount Left: 20mm and 30mm

Example: Belt Tensioner





Example: Motor Mount Stack Assembly



Assembly Process

Initial Pin Insertion

- Insert pin from the side where you would insert the bolt on the original part
- Press pin until it slightly protrudes on the interior side
 - E.g. use provided spacer tools for this step
 - The pin must protrude **approx. 0.2mm** to help you with alignment while still allowing you to insert the idler into the part
- You can use the provided press-in spacer tools for this step

Idler Installation

- For single idler: Align appropriate idler (9mm smooth or 10mm toothed) onto protruding pin; use e.g. a small Allen key entered from the opposite site to help align the idler
- For idler stack: Use Prusa-provided idler stack installation tool
- ⚠ Make sure the idler is aligned perfectly. Then carefully press in the pin in only half a mm, ensuring the idler is still aligned correctly.
 - If you feel any resistance, stop pressing and check the alignment.
 - If you feel the part bending under the pressure (e.g. for the belt tensioner part), use the provided spacer tools already for this step. That will make alignment a bit more tricky but it's doable.

⚠ If the alignment is not correct and you apply too much force **you will push the bearing into the idler**. This **must** be avoided. If it happens, replace the idler and if you are like me: Just order a spare one right upfront and chances are good that you won't mess it up.

- Check again the alignment and that you did not press in the bearing into the housing of the idler.
- When you are sure everything is aligned, install spacers to create proper fit and prevent part flexing in the next steps

Final Pin Installation

- Press pin completely through the assembly
- **Critical:** Maintain parallel pressure throughout insertion and keep the alignment of the idler
- Avoid any side forces that could damage bearings or deform parts

For all pins:

- You inserted the pin from the side where the bolt goes in in the original part
- Press the pin in until it is flush to the surface where you entered the pin

Be aware:

- Some pins will be flush on both sides of the part.
- Some pins will have an end-stop of 1mm to the outer surface
- Some pins will end inside the part

Quality Checks

Verify that the pins are flush with the outer surface.	Confirm idlers rotate freely without binding. Check for proper alignment and smooth operation.	Check that the bearings are flush with the idlers. They must not be pushed inward.	Make sure the layers haven't separated. There should be no visible stress marks on the printed parts.
			

Print Settings

Recommended print settings:

- **Filament:** PC-CF
- **Layer Height:** 0.2mm
- **Infill:** 40%

- **Perimeters:** 4
- **Top/Bottom Layers:** 5
- **Support:** No

BOM

- **3mm Steel a Pins:**
 - 18mm: 3 pcs
 - 20mm: 5 pcs
 - 30mm: 2 pcs
- **Toothed Idler** (Optional, 2pcs):
 - Core ONE/+: 2GT-20T: 2 pcs (e.g. [these](#) idlers by Mellow, option **"20T with T"**)
 - Core ONE+ Gen 2: **1.5 GT, 26 Teeth / 27 Teeth (max diameter 18mm!), 3mm Bore (for 6mm belt), 9mm width**
- **Heat Set Insert** (Optional):
 - M3x5x4 Heat Set Insert (Voron Spec): 2 pcs

CAD Files and Customization

Parametric CAD files are provided for this modification. All components have been modeled from scratch (no mesh remixes) to ensure optimal precision, fit, and performance.

File Formats Available

- Autodesk Fusion 360 (.f3d) - Full parametric model with design history
- STEP files for universal CAD compatibility
- STL files ready for printing

Customization Capabilities The Fusion 360 files include custom parameters that allow easy modification:

- **Pin Diameter Adjustment:** Fine-tune inner diameters for perfect pin fit
- **Bearing Clearances:** Modify tolerances for different bearing brands
- **Dimensional Scaling:** Adapt for different printer tolerances
- **Design Variations:** Create your own variants and improvements

This remix is based on



Prusa Core One XY Carriage Toothed Idler

by Blue



CORE One/+ /Gen 2 printable parts

by Prusa Research



CORE One belt-tensioner-pulley to take a threaded insert instead of the original square nut

by Chris Hill



Motor Mounts with Clearance for 1.5GT Pulleys on Upgraded CORE One/+ /L

by Dave G.



Pin centre shifted for 9mm 26T 1.5GT toothed idler pulley

by -Matt-

Model files



STL - CORE One Gen 2

13 files



xy-motor-mount-left.stl

☐ Additional clearance for 1.5GT motor pulley



xy-motor-mount-right.stl

☐ Additional clearance for 1.5GT motor pulley



xy-carriage-9mm-15gt-smooth-fd17.stl



xy-carriage-9mm-15gt-27t-fd18.stl



xy-carriage-9mm-15gt-26t-fd18.stl



belt-tensioner-pulley-2x.stl

☐ Print 2x



belt-tensioner-pulley-hsi-2x.stl

☐ Heat set insert variant; print 2x



press-in-tool-smooth-06-2x.stl

☐ Fits smooth idlers; print 2x



press-in-tool-smooth-08-2x.stl

☐ Fits smooth idlers; print 2x



press-in-tool-smooth-10-2x.stl

☐ Fits smooth idlers; print 2x



press-in-tool-gt15-toothed-06.stl

☐ Fits toothed idlers; print 2x



press-in-tool-gt15-toothed-08.stl

☐ Fits toothed idlers; print 2x



press-in-tool-gt15-toothed-10.stl

☐ Fits toothed idlers; print 2x



STL - CORE One Gen 1

11 files



xy-carriage-10mm-2gt-20t-fd17.stl

☐ For 10mm idlers with max flange diameter (FD) of 17mm; print 2x



xy-carriage-9mm-2gt-s-fd17.stl

☐ For 9mm idlers with max flange diameter (FD) of 17mm; print 2x



xy-motor-mount-left-gen-1.stl



xy-motor-mount-right-gen-1.stl



belt-tensioner-pulley-hsi.stl

☐ Heat set insert variant; print 2x



belt-tensioner-pulley.stl

☐ print 2x



press-in-tool-smooth-06.stl



press-in-tool-smooth-08.stl



press-in-tool-smooth-10.stl



press-in-tool-gt2-20t-08-2x.stl

☐ Fits toothed idlers; print 2x



press-in-tool-gt2-20t-10-2x.stl

☐ Fits toothed idlers; print 2x



CAD

2 files



core-xy-pins-mod.f3z



core-one-pins-mod-prusa-gt15-pin-offset-calculation.f3d

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