

EZ JD Shoulder Joint Fix

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EZ JD Shoulder Joint Fix

This is a fix for the broken shoulder joint mount in the EZ robot JD model, requested by Tyler from RAPL.



Problem

The arm falls off :)

Why?

The first arm servo is attached to the shoulder by clipping into a mount.



The mount is attached to the shoulder with an internal gear that fits over a spur gear.

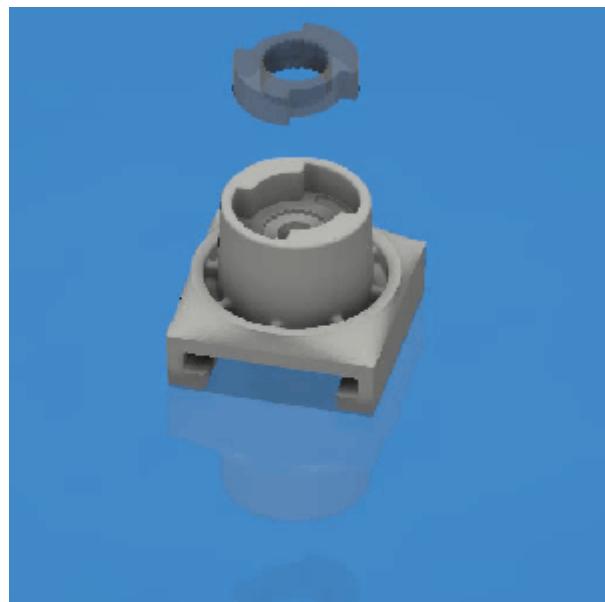


The spur is made of brass and the internal gear is plastic. This means the brass gear grinds the plastic until the arm servo falls off, requiring a replacement shoulder mount.

EZ robot makes available 3D printable models on [thingiverse](#). The part we want is [P6_A-01.STL](#). However the space width of the gears is below the resolution of the UP! minis, and most other filament printers. And the ABS or PLA part would eventually be ground down anyway.

Solution

I've come up with a design that modifies the 3D print to inset a laser-cut acrylic internal gear. The acrylic gear is hard enough to mesh with the brass, and the laser cutter has the required precision.



Parts

You will need to 3D print the shoulder joint. It will take about 20min on an UP mini. Here is the STL file.

[ex_jd_shoulder_joint_3d_print.stl](#)

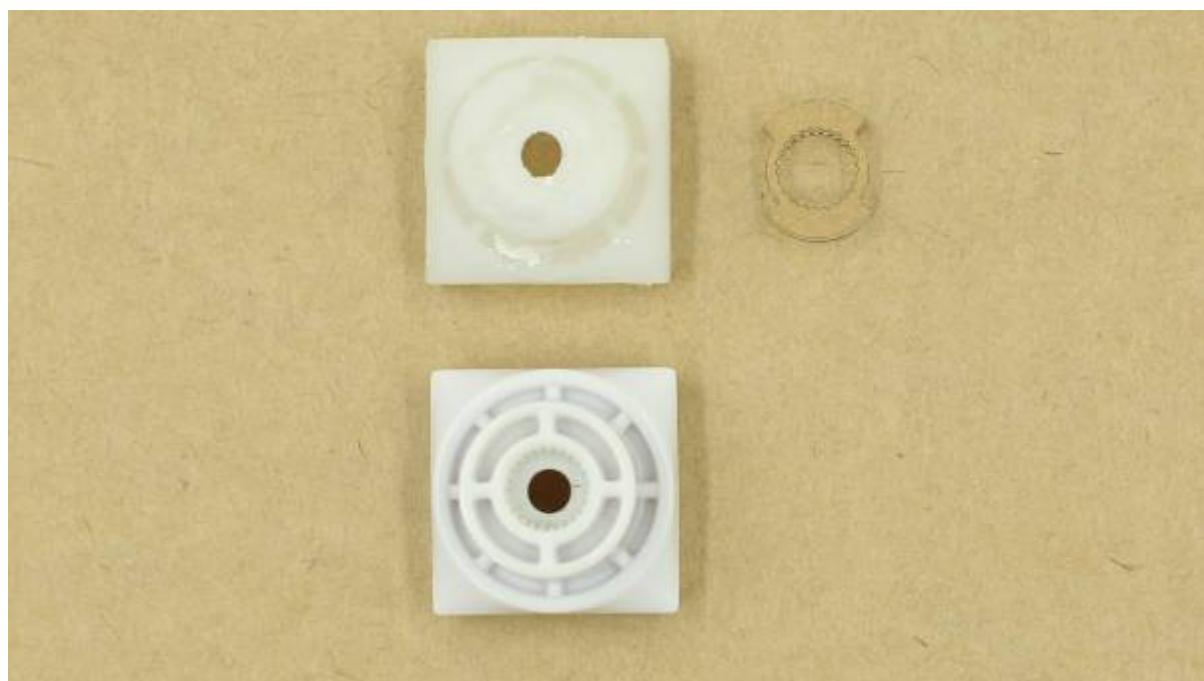
This is the DXF for laser-cutting.

[ex_jd_internalgear_3mm_acrylic.dxf](#)

Or you can use the corel file to cut out an entire A4 sheet.

[ez_jd_internal_gear_a4.cdr](#)

Here is the 3D print and the acrylic gear compared to the original part.



And here is how the acrylic gear meshes with the spur gear.



Design

This is the Fusion 360 file used to generate these parts.

[ez_jd_shoulderjoint_final_v0.f3d](#)

The steps were;

- Download the original shoulder mount STL file,
- converted it to an OBJ to imported it into Fusion 360
- convert the Mesh to a B-Rep
- use a plane to slice through the top of the mount to expose the teeth of the gear in a face.
- make a sketch from the exposed face.
- edit the sketch to create a locking nut profile around the internal gear teeth.
- extrude the sketch 3mm to create a locking nut.
- use the locking nut shape to cut back into the shoulder.
- Create a sketch on the top face of the locking nut, then export it as a DXF.
- Export the shoulder mount as an STL.