

N20 Motor - Printed Coupling Module

Background of Designing

During the design process of the A1 mini Wireless Charger, the clearance between the D hole of the lead screw and the motor shaft has always been an issue that needed to be solved. Very tight dimensions can make it difficult or even impossible to insert the lead screw into the motor shaft when using certain printers and filaments, while loose dimensions can lead to slipping of the shaft hole from the motor shaft's torque. Therefore, we designed a printed coupling for use with the N20 motor after completing the design of the A1 mini Wireless Charger, which helps to balance compatibility with different printers and filaments, torque transmission capability, and concentricity, reducing the time and filament used in printing tests. This also helps designers apply it to their own motor drive designs.

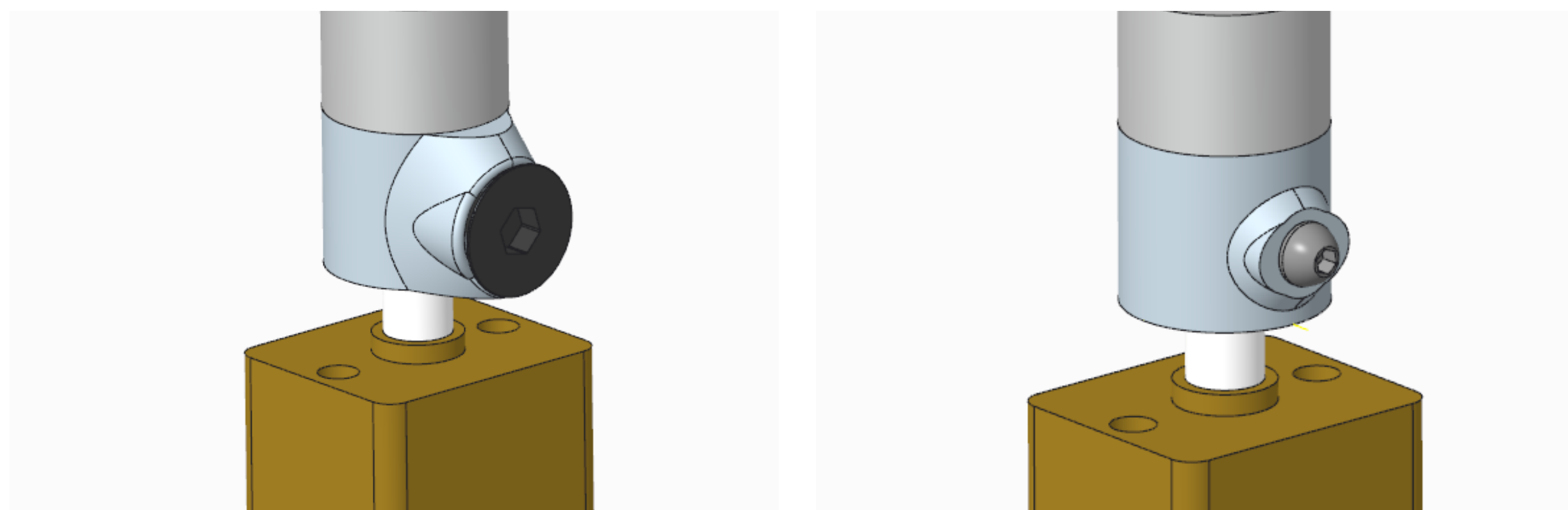
Structure of All Printed Coupling Module

The printed coupling module consists of two parts: the coupling and the shaft hole. One end of the coupling is a D-hole that matches the motor shaft. There are two schemes to enable it to transmit larger torque:

1. Using a screw to press against the motor shaft plane.
2. Printing multiple couplings and selecting the tightest fit.

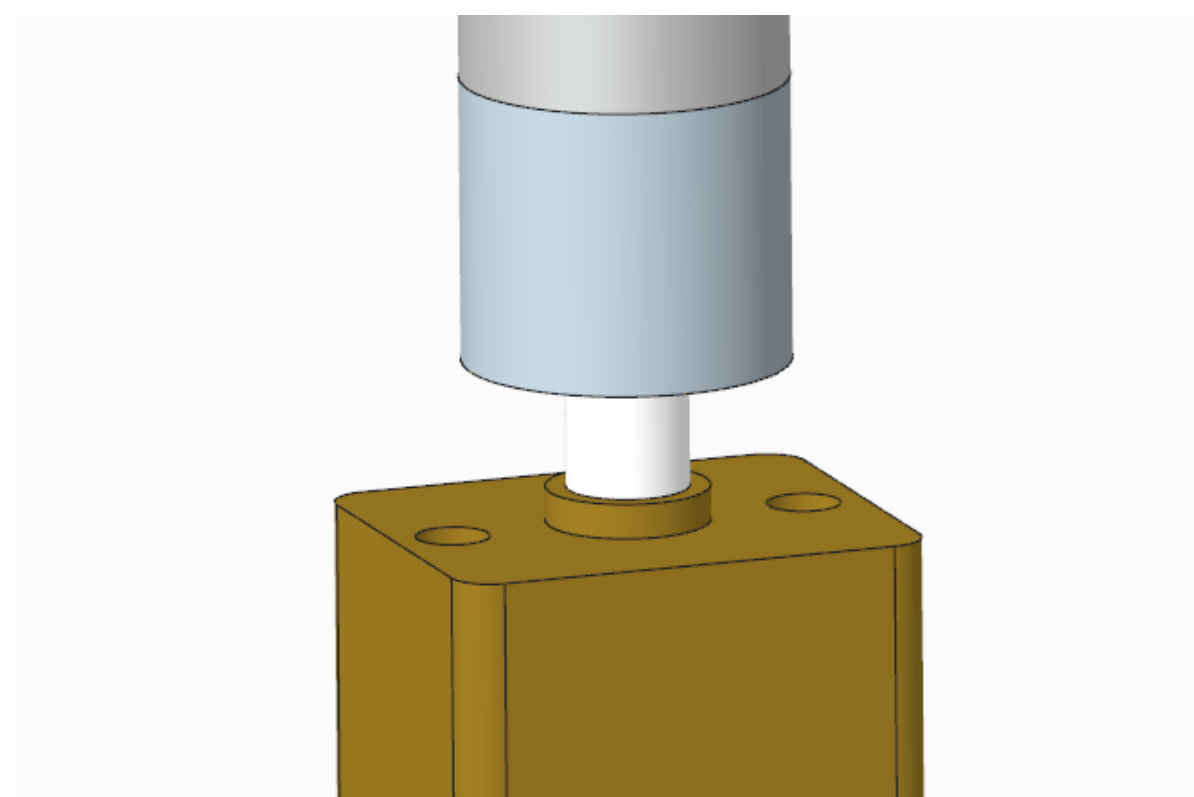
Screw Solution

The screw solution requires an M2*6 or a M3*6 screw. After inserting the coupling into the N20 motor, twist the screw into the side hole and tighten it (without exerting too much force) against the motor shaft. This solution does not require printing tests and can transmit a torque of over 2.5 Kgfc_m (N20 motor stall torque \leq 1Kgfc_m). However, it requires a certain turning radius and installation space on the side for screw insertion.



Trial Fitting Solution

In the trial fitting solution, the numerical size of the coupling reflects the size of the aperture. From large to small apertures, it can test the fitting that is just tight and has a damping feel when inserted into the N20 motor shaft. This solution requires printing multiple small-sized couplings at once, which can transmit about 4 Kgfc_m of torque and occupies less space. It requires a simple trial fitting on the model.



How to Connect with the Driven Component

The other end of both solutions is a hexastar-shaped shaft, which can match with the hexastar-shaped hole in the shaft hole part. There is a certain gap between them, ensuring the coaxiality of the transmission while providing better torque transmission compared to ordinary polygons.

The shaft hole is a port that connects to the component designed for transmission. It should be designed and printed together with one end of parts, such as lead screws or gears. By assembling the hexastar hole of the shaft hole with the hexastar shaft of the coupling, transmission can be achieved.