

# TETRIX™ Hardware Primer

## Motors, Gears & Wheels

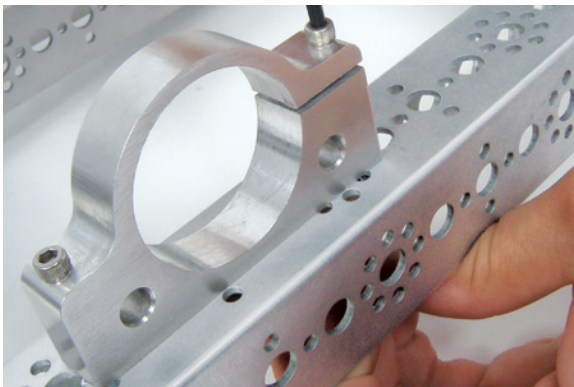
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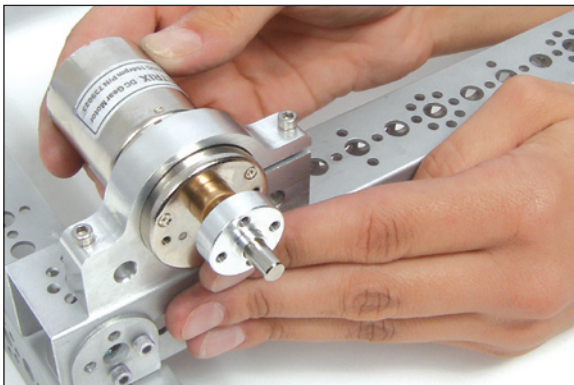


### 1. Motor Mounting

The TETRIX DC Motors provide powerful, continuous rotation, capable of driving a TETRIX-based robot.



First, loosely secure the motor mount to the desired location on the chassis using two 1-1/2" screws and kep nuts.



Then, insert the DC motor into the motor mount and finish tightening the two 1-1/2" screws.

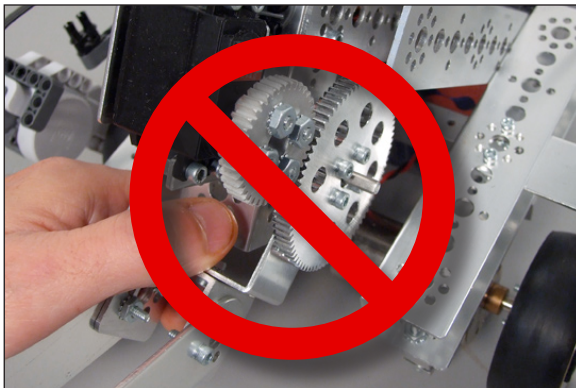
Note that the rotating shaft of the DC motor is purposely offset from the center to provide more ground clearance where necessary. Make sure all motors on your robot are rotated in their mounts equally to avoid unevenness.

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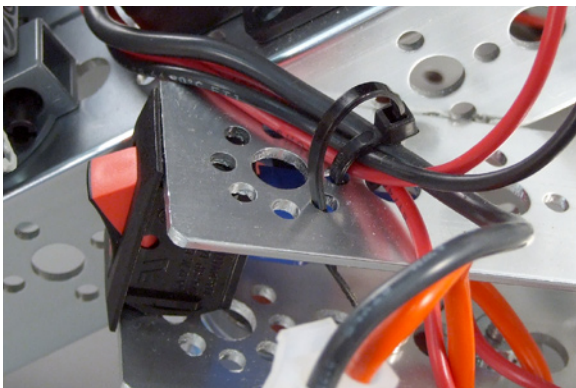
### 2. Safety

The TETRIX DC motors have a very powerful torque rating of 300 oz/inches. Proper care must be taken to protect you as well as your assembly.

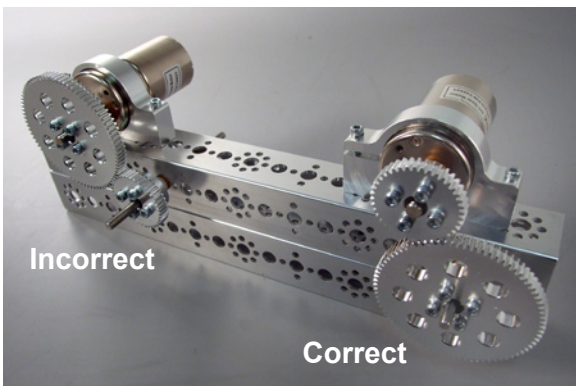


Keep hair, clothing, and all parts of your body away from the moving components on the robot while it is turned on. This includes (but is not limited to) any motors, wheels and gears that could start spinning.

The robot should **always** be powered down before operating on any section of it.

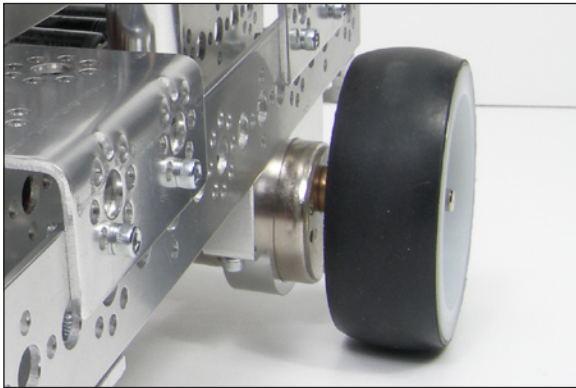


Be sure to secure all wires away from the moving components. Wires caught in a drivetrain cause damage to the robot and a potential electrical hazard.



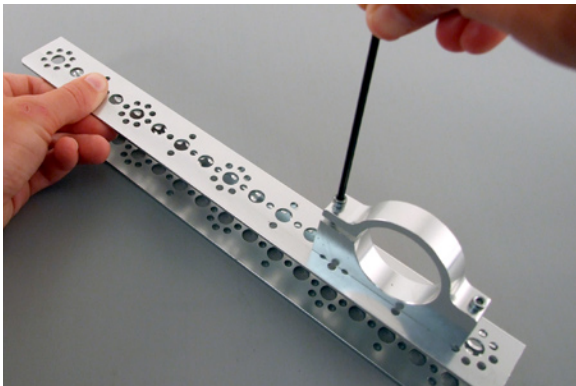
Never drive a smaller gear with a larger gear. Doing so risks exceeding the DC motors torque rating and damaging the inner gearbox.

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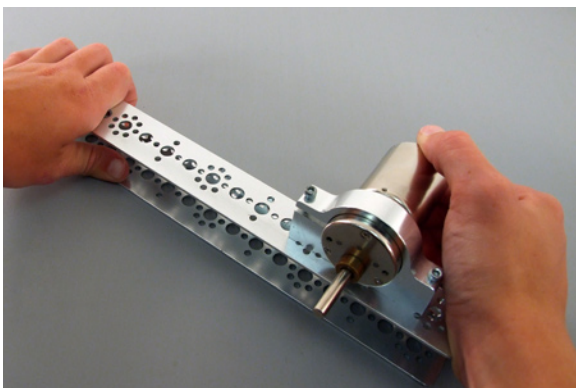


### 3. Direct Drive

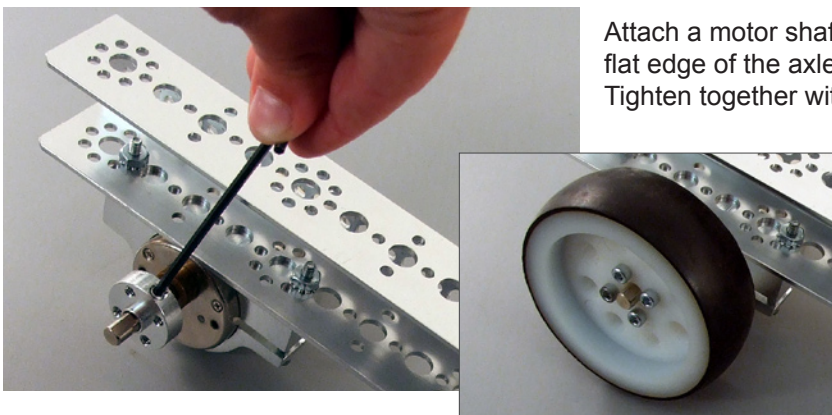
The TETRIX wheels can be directly driven by the DC motors by securing them on the motor's shaft. In this configuration, called direct drive, there are no speed or torque changes between the motor and the wheel.



Attach the motor bracket to the channel.



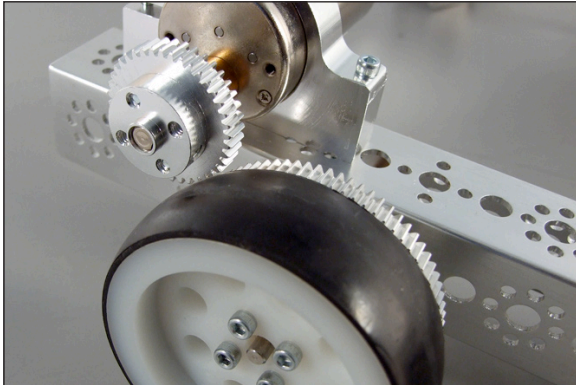
Slide the motor into the motor bracket and tighten down.



Attach a motor shaft hub to the motor axle. Tighten on the flat edge of the axle. Align a wheel to the motor shaft hub. Tighten together with four .5 SHCS screws.



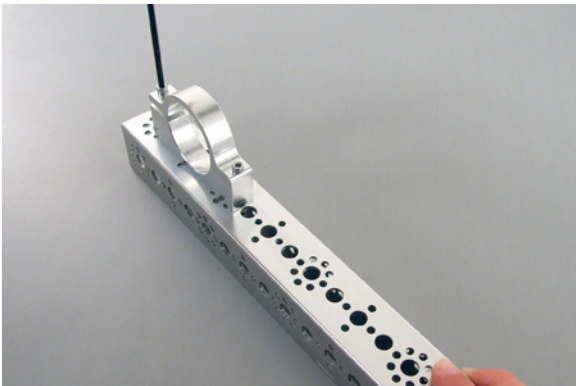
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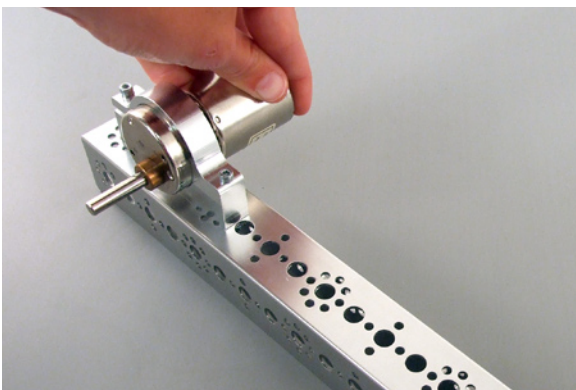
### 4. Indirect Drive

The TETRIX wheels can also be driven by the DC motors through a series of gears. In this configuration, called indirect drive, torque can be increased by driving, or spinning, a large gear with a smaller gear. Note that in this configuration, overall speed is lost.

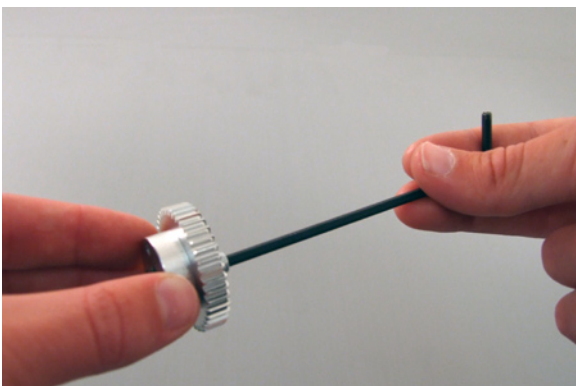
While a small gear can drive a larger gear to increase speed and decrease torque, doing so risks damaging the DC motor's internal gearbox.



Attach the motor bracket to the channel.

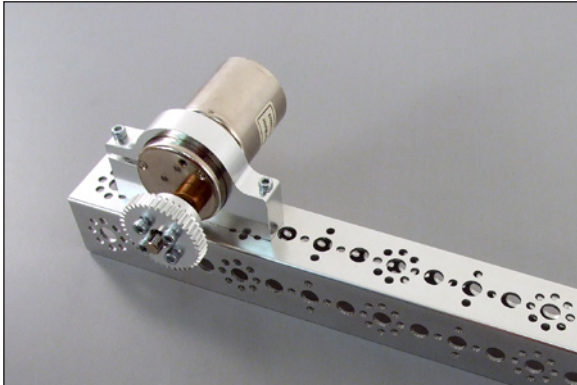


Slide the motor into the motor bracket and tighten it down.

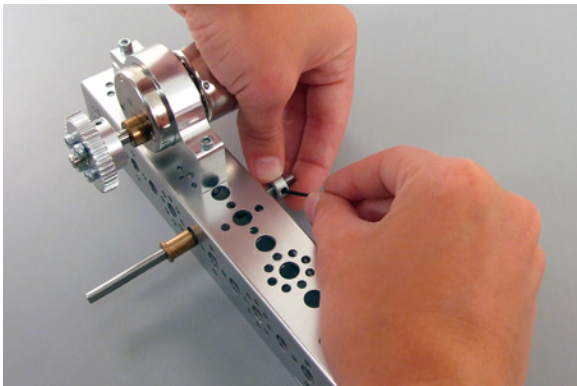


Align a motor shaft hub and a 40 tooth gear and attach using four .5 SHSC screws.

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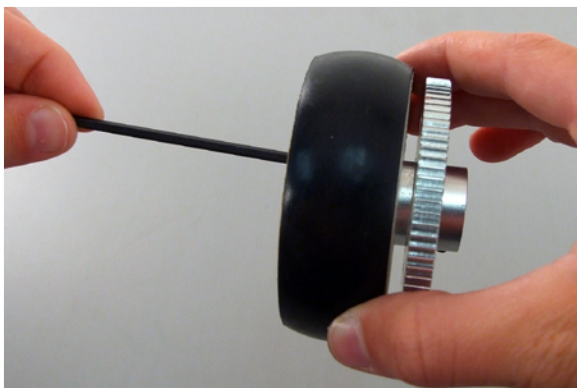


Attach the motor shaft hub and the gear to the motor axle, making sure to tighten on the flat side of the axle.

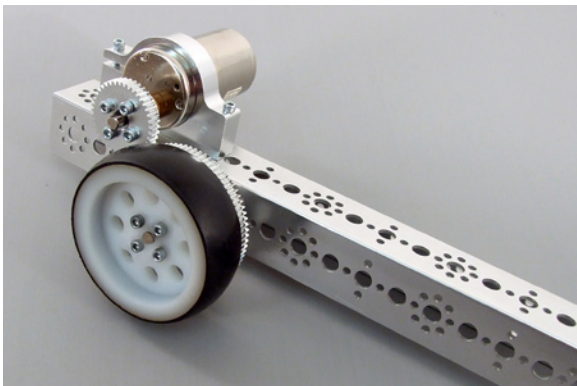


Insert an axle through the channel and slide a copper bushing onto both sides.

On the side behind the motor, place & tighten a lock collar.

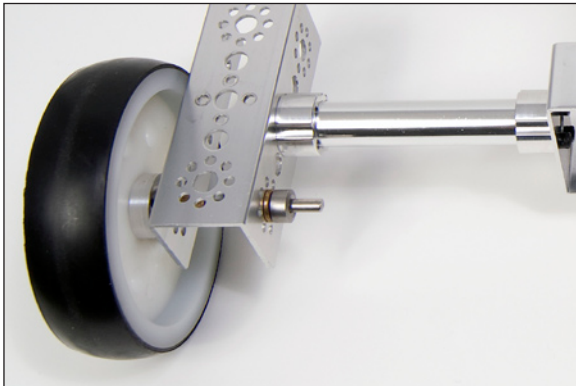


Align a 3 inch wheel, spacer hub, 80 tooth gear, and hub. Connect them using four 1.25 SHCH screws. Close the split clamp hub with a .5 SHCH screw.



Slide the wheel onto the axle.

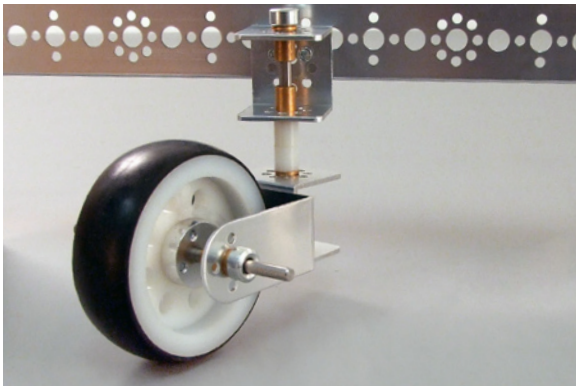
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### 5. Driven Wheels

Weight-bearing wheels not driven by motors, directly or indirectly, are considered driven wheels.

Driven wheels unable to swivel left and right can cause excess friction when the robot turns.

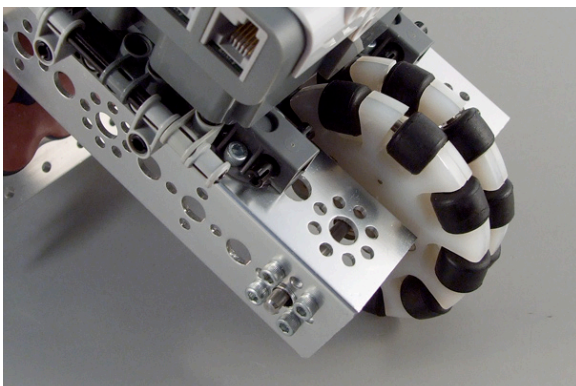


Caster wheels are a special kind of driven wheel that allow the wheels to swivel left and right, eliminating unnecessary friction when the robot turns.



### 6. Omni-Directional Wheels

The TETRIX omni-directional wheels, or omni-wheels, are comprised of one large wheel with many smaller wheels along its circumference.



The smaller wheels are perpendicular to the main wheel, allowing it to roll both forward and backward, and side-to-side, naturally.