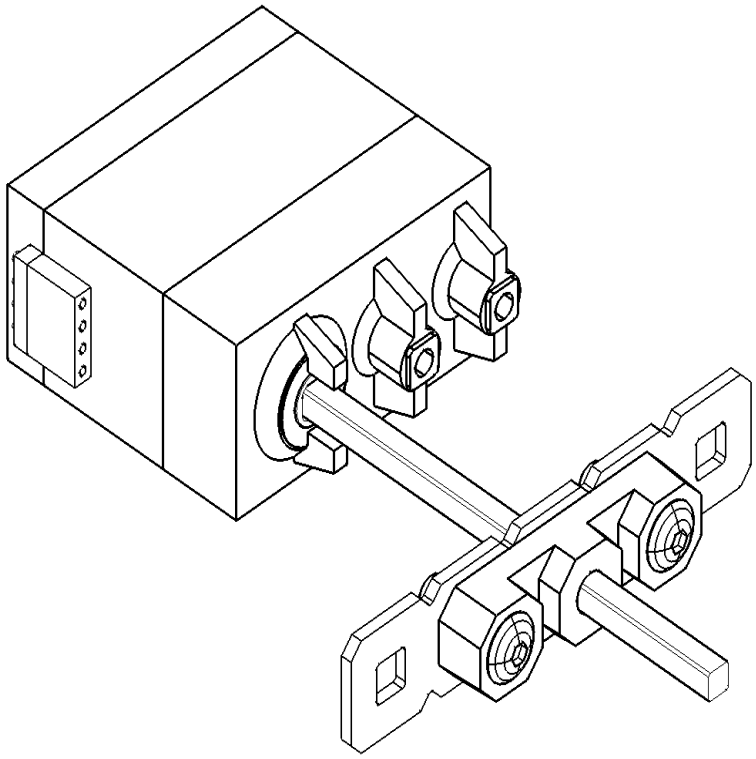
Innovation First, Inc.

EDU Mechanical Guide



FIRST SM
EDUrobotics Kit

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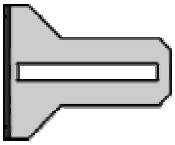
Locking Bar (P/N: BAR-LOCK)

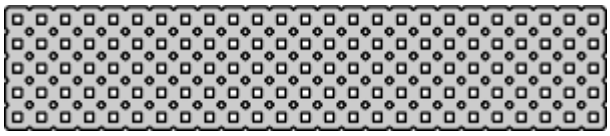
Bearing Bar (P/N: BAR-BEARING)

Plus Gusset (P/N: GUSSET-PLUS)

Angle Gusset (P/N: GUSSET-ANGLE)



Angle Pivot (P/N: PIVOT)



25x5-Hole Plate (P/N: PLATE-25-5)

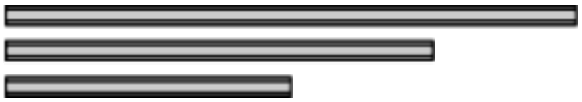
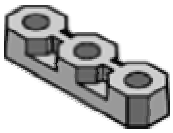
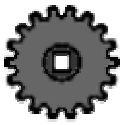
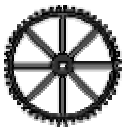
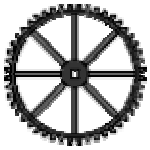
30-Hole Angle (P/N: ANGLE-30)

25-Hole Bar (P/N: BAR-25)

Threaded Beam 0.5" (P/N: BEAM-05)
Threaded Beam 1.0" (P/N: BEAM-10)
Threaded Beam 2.0" (P/N: BEAM-20)

Threaded Beam 3.0" (P/N: BEAM-30)

2. Identifying Motion Parts

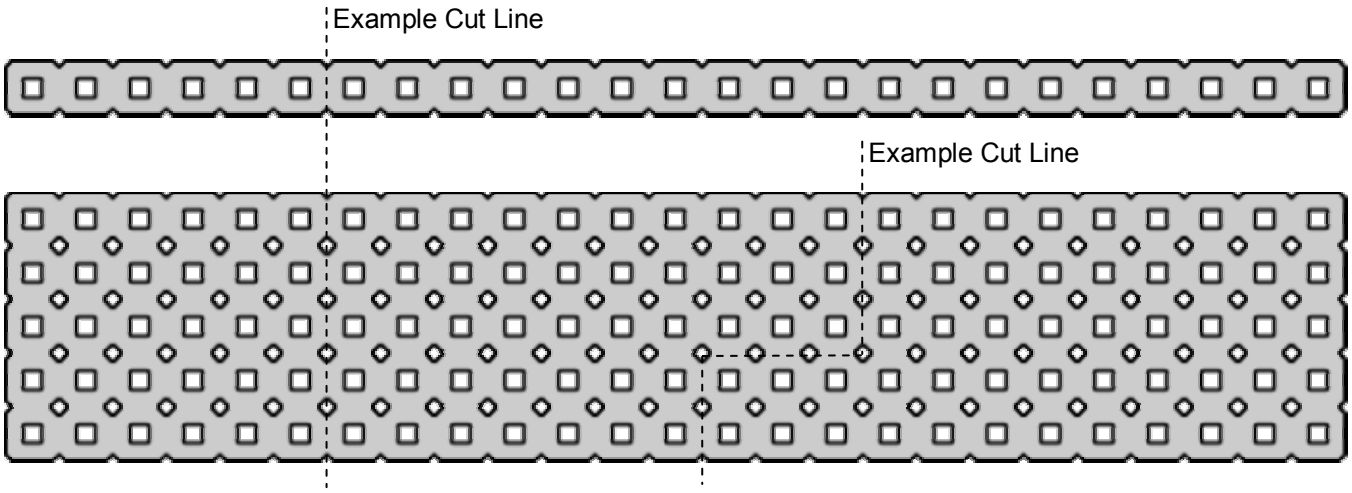
	Description	Part Number
 Scale 1:1	Square Drive Shaft 2" Square Drive Shaft 3" Square Drive Shaft 4"	SHAFT-2 SHAFT-3 SHAFT-4
Scale 1:3	Square Drive Shaft 12"	SHAFT-12
 Scale 1:1	Shaft Collar	COLLAR
 Scale 3:4	Bearing Block, Delrin	BEARING-DELRIN
 Scale 1:1	10-Tooth Sprocket, 0.1227 Pitch	SPROCKET-10-1227
 Scale 1:1	15-Tooth Sprocket, 0.1227 Pitch	SPROCKET-15-1227
 Scale 1:1	24-Tooth Sprocket, 0.1227 Pitch	SPROCKET-24-1227
 Scale 1:2	40-Tooth Sprocket, 0.1227 Pitch	SPROCKET-40-1227
 Scale 1:2	48-Tooth Sprocket, 0.1227 Pitch	SPROCKET-48-1227
	Wheel, 1.5" Wheel, 2.5" Wheel, 4.0" Wheel, 6.0"	WHEEL-FOAM-15 WHEEL-FOAM-25 WHEEL-FOAM-40 WHEEL-FOAM-60

3. Identifying Hardware Parts

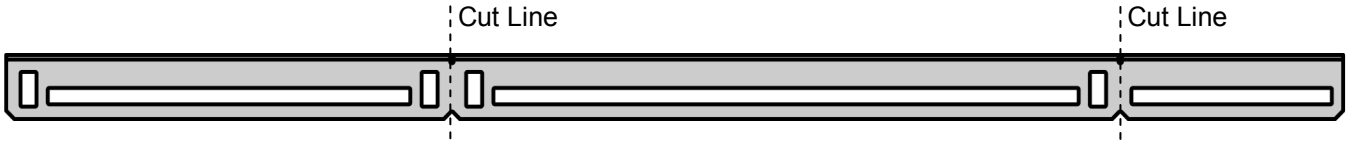
	Description	Part Number
 Scale 1:1	Screw 8-32x1/4"	SCREW-250
 Scale 1:1	Screw 8-32x3/8"	SCREW-375
 Scale 1:1	Screw 8-32x1/2"	SCREW-500
 Scale 1:1	Screw 8-32x3/4"	SCREW-750
 Scale 2:1	Nut, Lock 8-32	NUT-LW-832
 Scale 1:1	Nut, Nylon Lock	NUT-NYLON-832
 Scale 1:1	Washer, Steel #8	WASHER-STEEL
 Scale 1:1	Washer, Teflon	WASHER-TEFLON
 Scale 2:1	Motor Screw 1/4"	SCREW-619-250
 Scale 2:1	Motor Screw 1/2"	SCREW-619-500

4. Cutting and Bending Metal Parts

The **25-Hole Bar** and **25x5-Hole Plate** are designed to be cut and bent into various shapes. The **Bars** and **Plates** have notches that locate the preferred cutting locations.

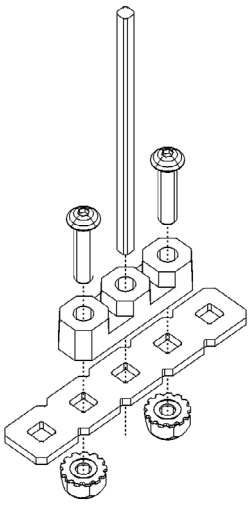


The **30-Hole Angle** is designed to be cut in two specific locations. By cutting this part, you can make **Angles** that are 5, 10, 15, 20, or 25 holes long.

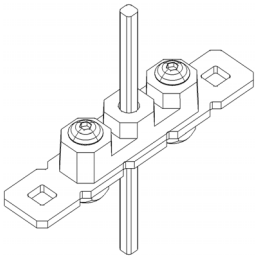


5. Using Bearings

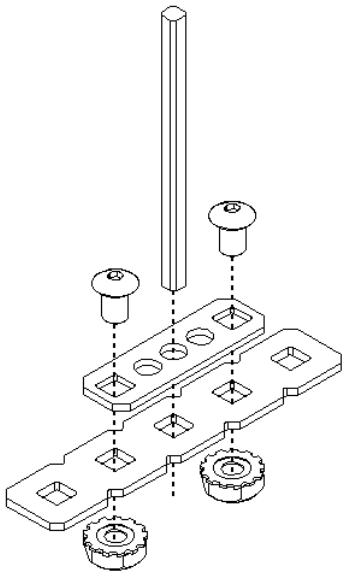
The EDUrobotics kit has two bearings, the **Delrin Bearing** and the **Bearing Bar**. The **Delrin Bearing** is designed for continuous high speed rotation from a **Multi-Speed Motor**. The **Bearing Bar** is designed for pivots and other joints that rotate slowly.



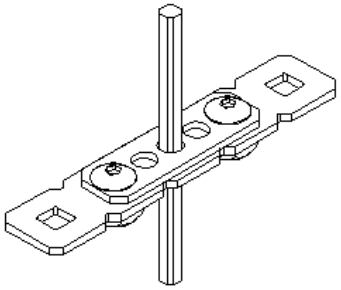
Delrin Bearing Exploded Assembly



Delrin Bearing Assembly

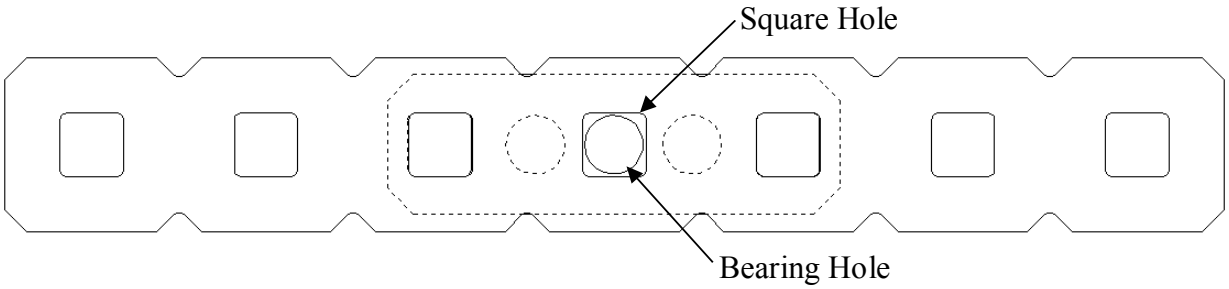


Bearing Bar Exploded Assembly



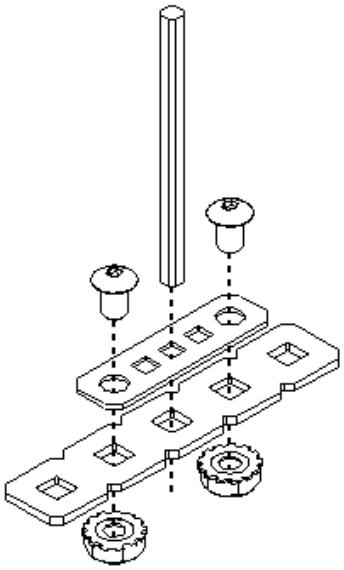
Bearing Bar Assembly

Bearing Bars must be carefully aligned with **Bars** and **Angles**. Be sure that the bearing hole is in the center of the bar's square hole. Misalignment may keep the shaft from turning.

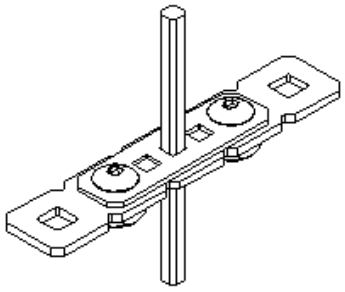


6. Using the Locking Bar

Square Shafts can be kept from rotating by using **Locking Bars**. **Locking Bars** can be attached to **Bars**, **Plates**, **Angles**, and **Gussets**.



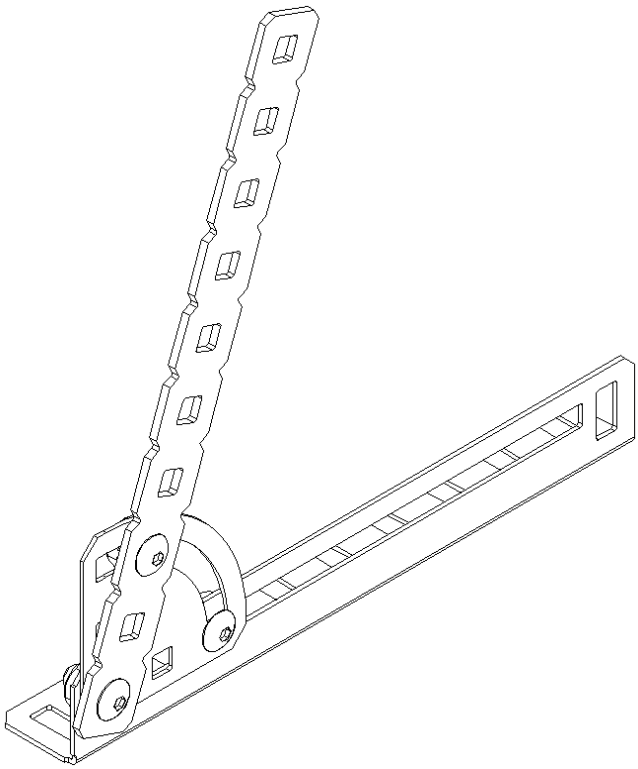
Locking Bar Exploded Assembly



Bearing Bar Assembly

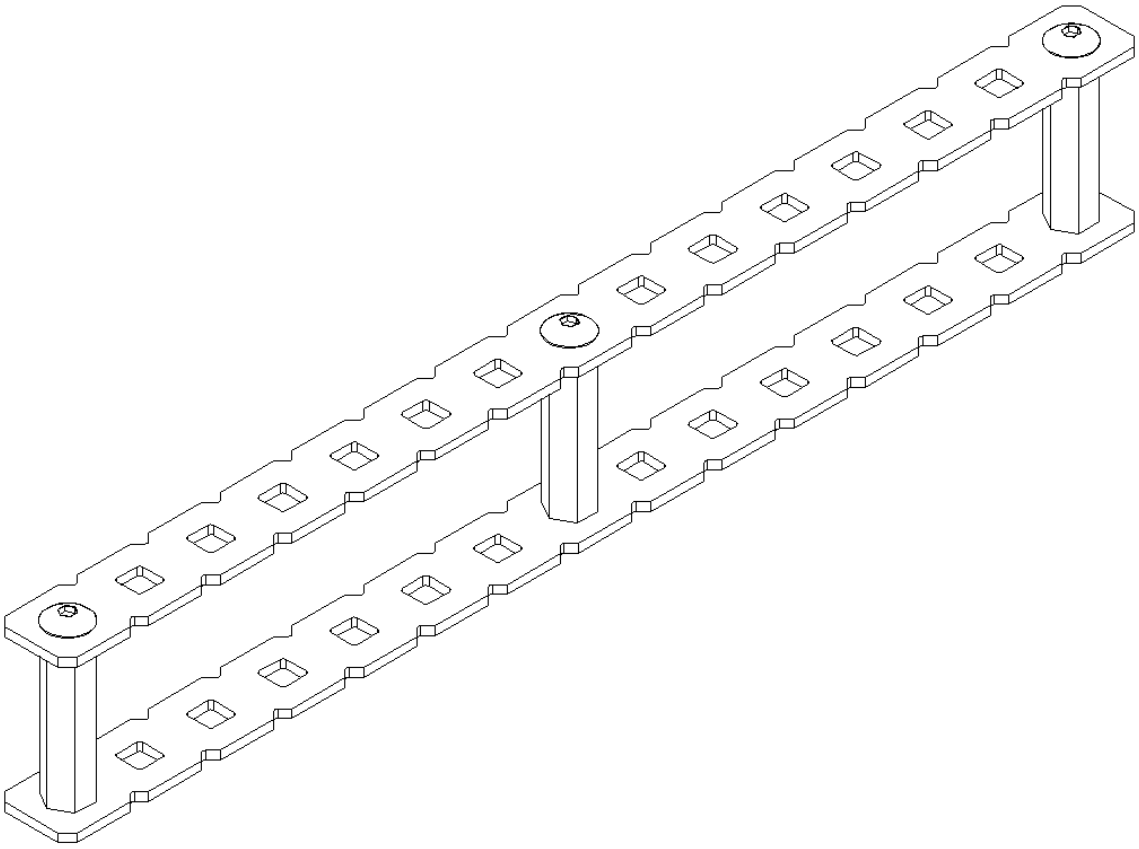
7. Pivots Allow Unlimited Angle Anjustment

Pivots can be used to make joints at any angle.



8. Using the Threaded Beams for Structure

Threaded Beams can be used to make strong structural members. The **Threaded Beams** can be used with **Bars**, **Plates**, and **Angles** to increase rigidity. Longer **Threaded Beams** increase the strength.

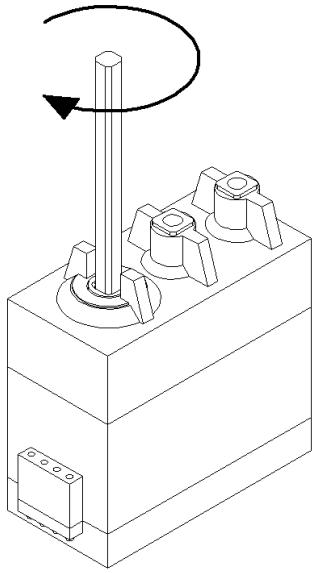


9. Multi-Speed Motors

Motors are used to create motion. Motors can rotate clockwise (shown below) or counter-clockwise. The motors are variable speed when connected to a PWM port. Motors are full speed only when connected to RLY a port.

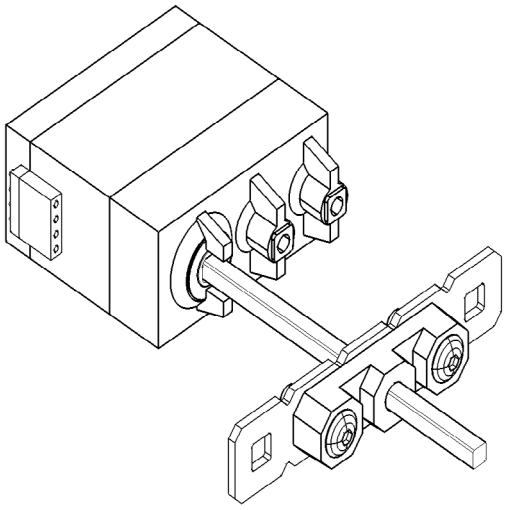
Notes:

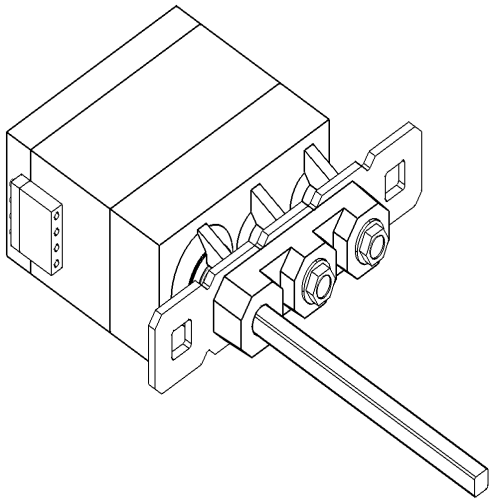
1. Securely mount motors to structural members.
2. Always support the shaft with a least one bearing.
3. Be cautious when moving heavy loads. Without gear reduction, the internal gears can be damaged.
4. Do not manually rotate the motor output. The internal gears may be damaged.



10. Shaft Support for Motors

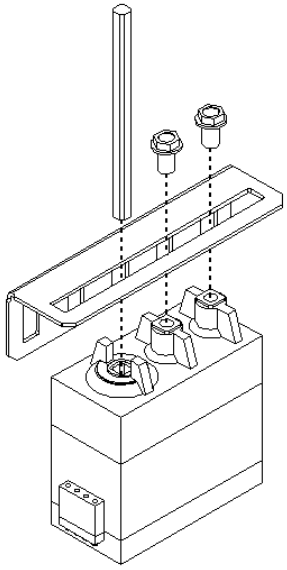
Square Drive Shafts must have at least one additional **Delrin Bearing** for support.



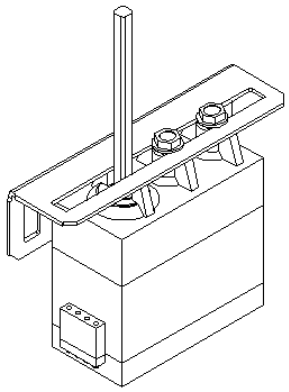


11. Multi-Speed Motor Mounting

Motors can be attached to **Bars**, **Plates**, **Angles**, and **Gussets**. Use the small **Hex Head Screws** to attach the motors. Motors attached in slots (as shown below) can be moved to adjust chain tension. Always ensure that the **Motor Drive Shafts** have at least one additional **Bearing Bar** for support.



Multi-Speed Motor Exploded Assembly



Multi-Speed Motor Assembly