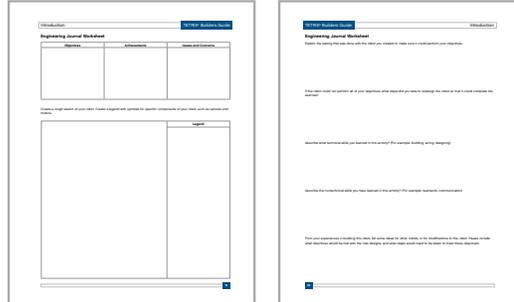


## General Best Practices

### Engineering Notebook

1. Use the Engineering Journal Worksheet throughout the building process to document the working process, challenges faced, and how they were managed. By compiling these worksheets, a detailed account of the entire project can be created, including lessons learned and problems solved.



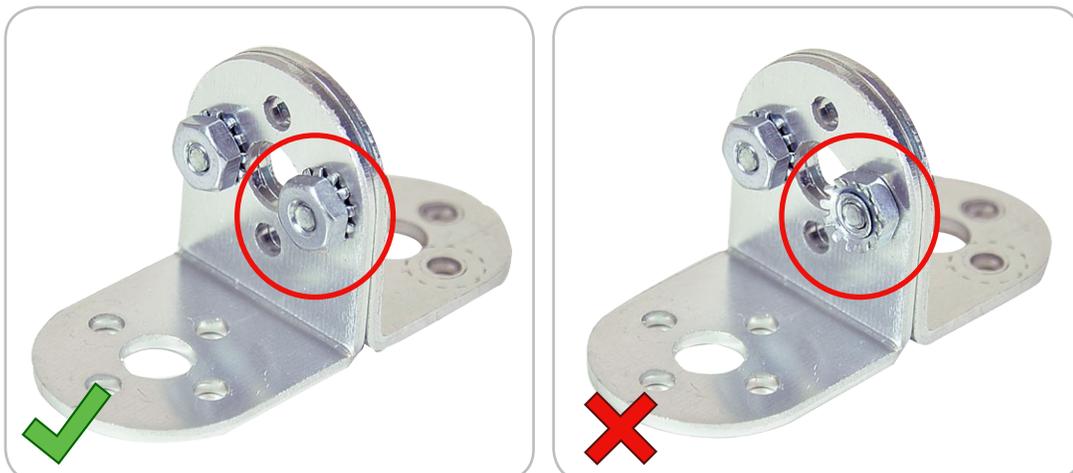
### Organization

2. For speed of assembly and to become familiar with the different types of elements, sort the contents of the TETRIX® base set carefully before beginning construction. Use the illustrated top card, included in the base set, as a guide when organizing TETRIX elements. This ensures that the elements in the box are grouped with other elements that are similar in size or purpose. This organizational process also makes it easy to locate elements. If there are elements missing from the box, this step helps to identify them before they are needed.



### Keyp Nut Orientation

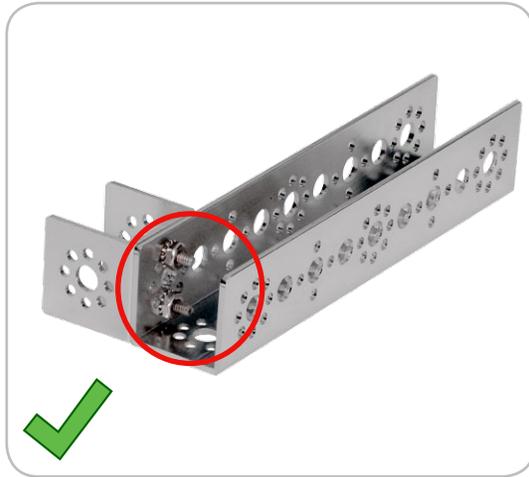
3. When working with key nuts, orient them so the teeth are facing inward, toward the TETRIX part they are attaching. The key nut is much more secure in this position, and as a result the robot will be more stable.



## General Best Practices

### Selecting Screws

4. Use the best-fitting screw for the given task. This saves space and keeps the robot more organized and accessible for further modifications. It also saves the large screws for when they are needed, such as when the motor mount is secured.



### Using Multiple Screws

5. When using two screws in combination for a task, such as securing a bracket to a hard point connector, make sure to use the same size screw at both points. This is important because it prevents the screw from obstructing other elements.



## General Best Practices

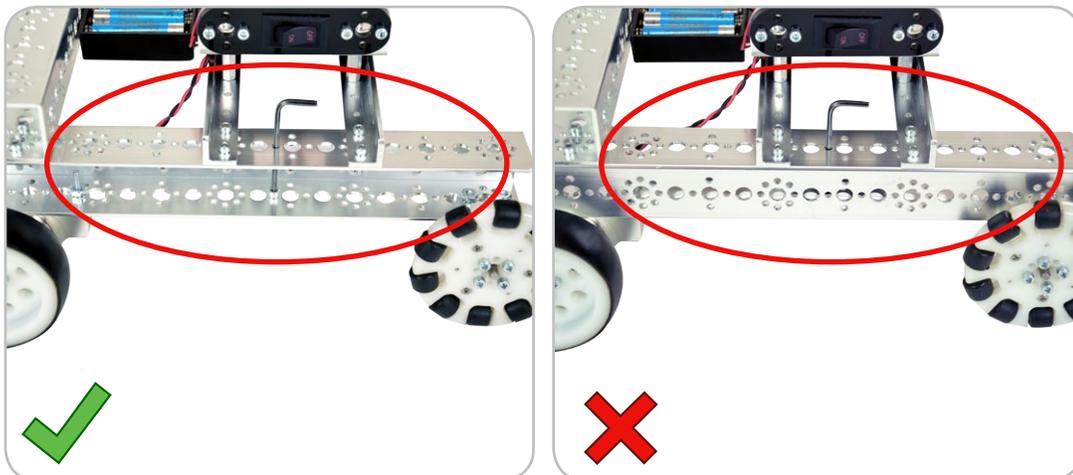
### Accessing Screws

6. When using a hex key, use the holes built into the TETRIX® channels to access screws on other levels. This will often be more effective than trying to access the screw directly. The holes in the TETRIX system have been created for this purpose, because sometimes other elements may be in the way. Accessing the screw directly would be cumbersome and less effective.



### Channel Orientation

7. Ensure that each channel is oriented so that the open end of it is facing outward. This makes it easier to access the inside of the channel if modifications are necessary. If the channels are facing inward, they might obstruct vision and make it difficult to see any nuts or bolts that are attached. With the open side of the channels facing outward, the inside is completely visible and modifications can be made quickly and easily.



### Tightening Screws Effectively

8. Use care when choosing whether to turn the nut or the screw, depending on which one is more accessible. If the screw is in an awkward position to be turned and the nut is easier to reach by using the holes built in to the TETRIX system, then turn the nut. If, however, the screw can be accessed easily with the hex key, then turn the screw instead.

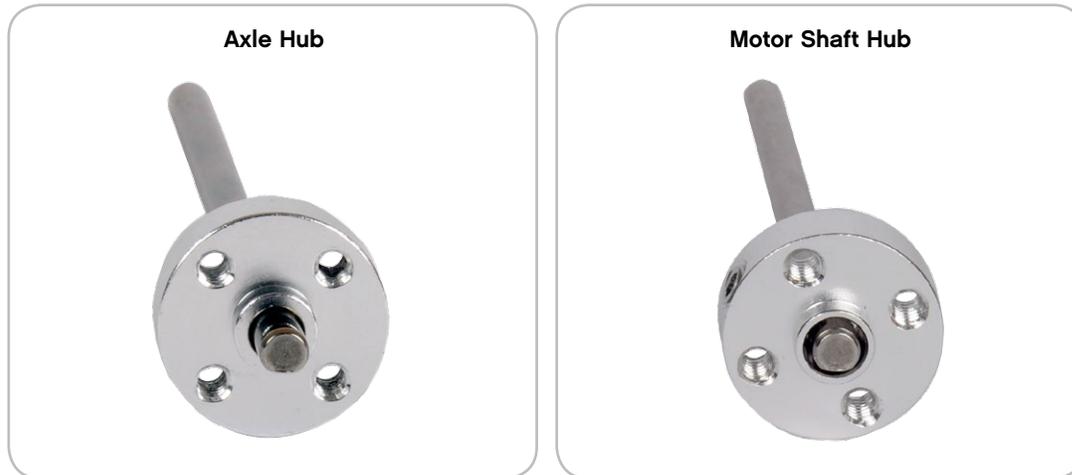
### Balancing the Robot

9. To ensure stability when building and designing TETRIX robots, it is important to be aware of the robot's center-of-mass. If the robot is overloaded on one side, it will become unbalanced when in motion, and it will not function to its full potential. In extreme cases, the robot will be unable to function because of asymmetry and/or awkward positioning. The center of mass should be kept low, and the robot should be stable in all states of normal operation. If one of the robot's natural operating states is unstable, then the design should be altered.

## General Best Practices

### Hub Selection

10. Be careful not to mix up the motor shaft hub and the axle hub, since both look very similar but have important differences.
  - The motor shaft hub has larger holes and a longer shaft. There are only two of these (corresponding to the two motors) in the base set.
  - The axle hub has smaller holes and a shorter, thicker shaft. There are six axle hubs in the base set.
  - The set screw of each hub should connect with the D-flat side of the motor shaft or axle.



### Tightening Screws

11. During assembly, only moderately tighten the screws until the entire subassembly has been completed. This makes it easier to make adjustments to angles and alignment throughout a project. It also keeps the robot more accessible, because screws can be easily undone if needed.

### Selecting Tools

12. Keep in mind that there are several different hex keys for the different types of screws. Match the size of the screw to the size of the hex key when deciding which to use. If a hex key is not properly turning a screw or does not fit in the screw tightly, then it is not the correct hex key to use. For additional direction on the proper hex key to use for each screw, refer to the Hand-Tools Guide.

### Safety

13. Use extreme caution when working with mechanical parts. Keep all hair, clothes, and body parts clear of moving parts such as gears. Safety glasses should be worn at all times when building and operating machinery. Consult the Safety Guide for additional cautions and safe practices.