



Computer Aided Design

Team 7203

KNO3

Zachary Brown





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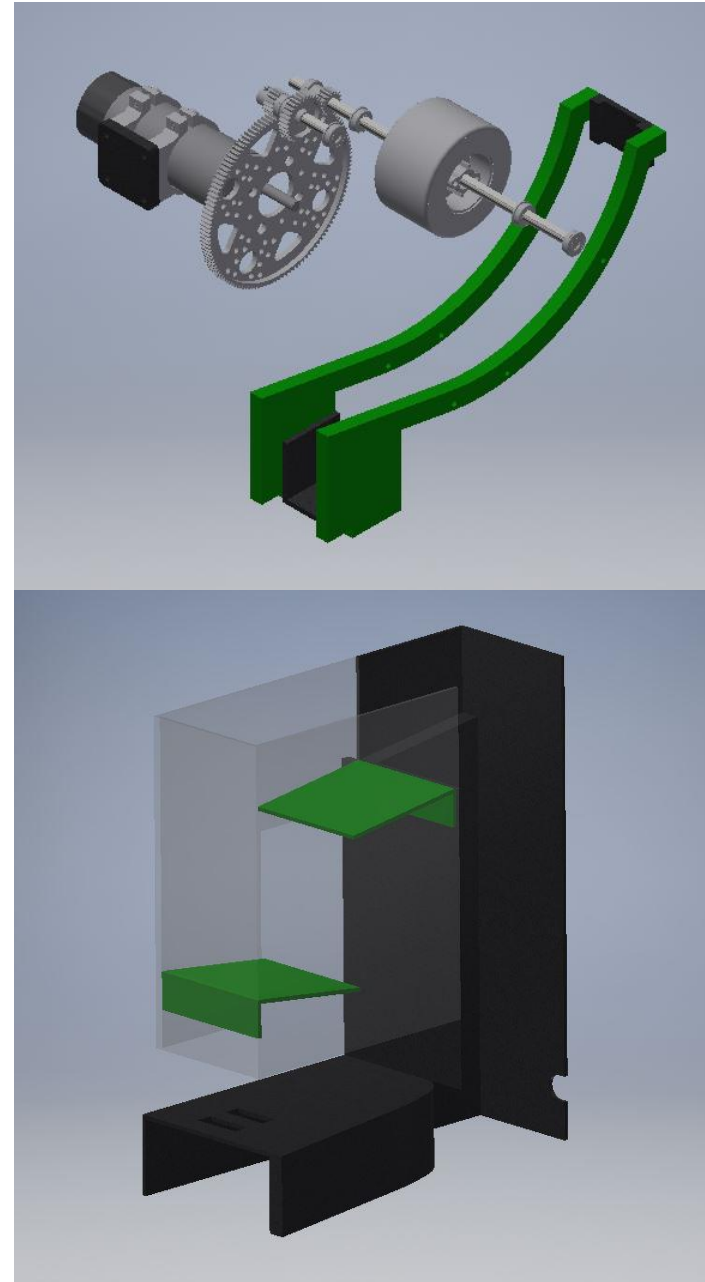
What is CAD?

By allowing you to build every part virtually ahead of time, CAD can be used to develop your robot, find and correct design flaws providing for a more efficient build season.

- ▶ **Computer-Aided Design** involves creating computer models defined by geometry and parameters.
- ▶ A three-dimensional representation of a part or a system of parts, which can be readily altered by changing relevant variables.
- ▶ Unlike two dimensional (2D), 3D modeling technology provides a lifelike representation of a design, from structural composition and the way parts fit and move together, to the performance impact of characteristics such as size, thickness, and weight.
- ▶ CAD systems enable Teams to view objects and to test these objects by simulating real-world conditions.

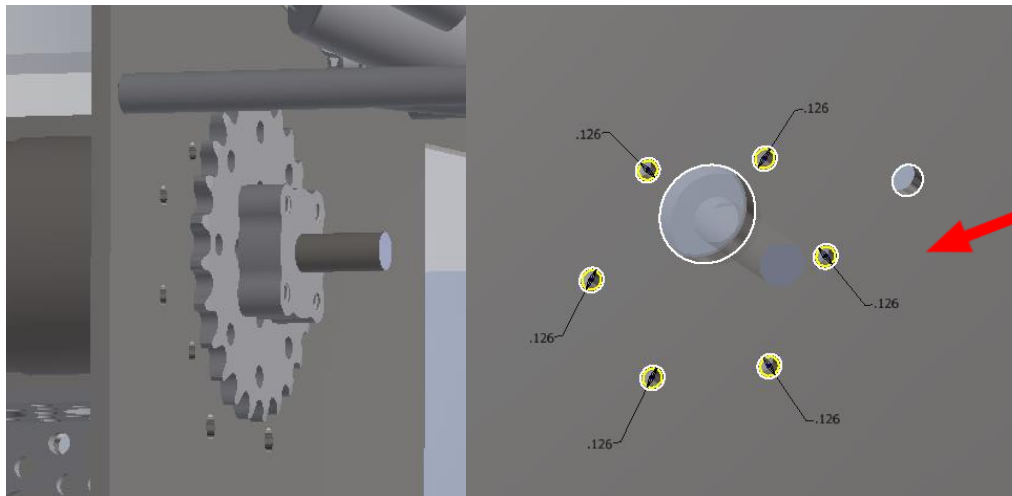
Benefits of CAD

- ▶ **Increases Your Team's Productivity**
 - ▶ The CAD software helps your team visualize the final product that is to be made.
 - ▶ Allows you to create subassemblies and constituent parts.
 - ▶ Ability to understand the way things interface with one another.
 - ▶ Your robot can be animated to see how the actual product will work.



Benefits of CAD, con't.

- ▶ **Improves the Quality and Accuracy**
 - ▶ 3D assemblies can be scanned to check for interferences, clearances and fit.
 - ▶ Easily and immediately make necessary modifications.
 - ▶ With greater accuracy, the errors are reduced leading to a better design of your robot.
 - ▶ Reduces wasted time and money because of a faulty design.

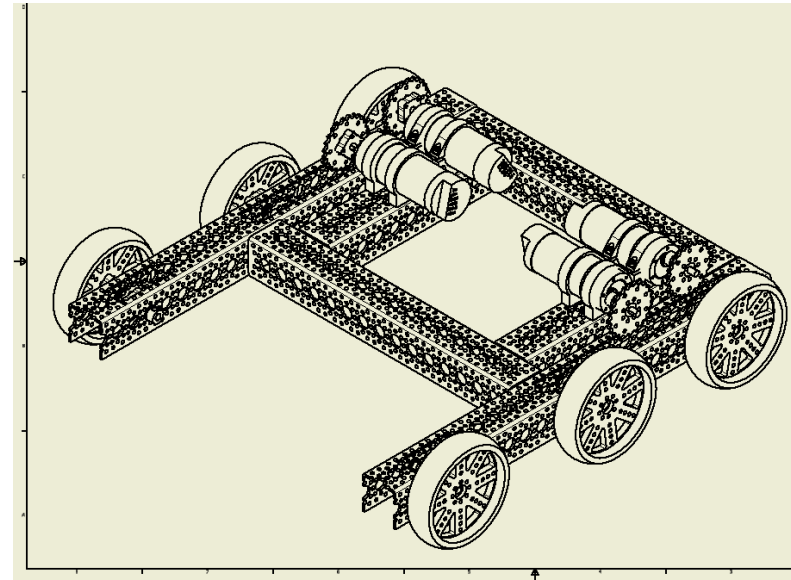
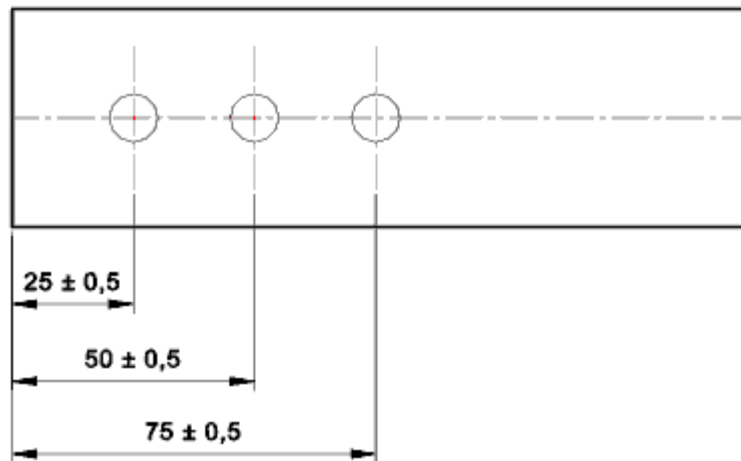


Use previous geometry to make sure parts and holes are exactly where you want them.

Benefits of CAD, con't.

► Flexibility

- Most dimensions and relations are associative, meaning if you change one dimension, the remaining dimensions and mating parts will move accordingly
- Creates geometries and dimensions of the product, its subassemblies and its components which allows for accurate cutting, drilling, CNC specifications



Benefits of CAD, con't.

- ▶ **Better communications**
 - ▶ CAD allows for standardized drawings.
 - ▶ Ease of explaining to teammates how the robot is to be built
- ▶ **Documentation of your robot**
 - ▶ CAD documents your robot design
 - ▶ Bill of materials for the robot components to place parts orders
 - ▶ Great Engineering Notebook Documentation!
- ▶ **Hardware Libraries**
 - ▶ Standard parts libraries that can be used year to year

Software Programs



Finding Part Models

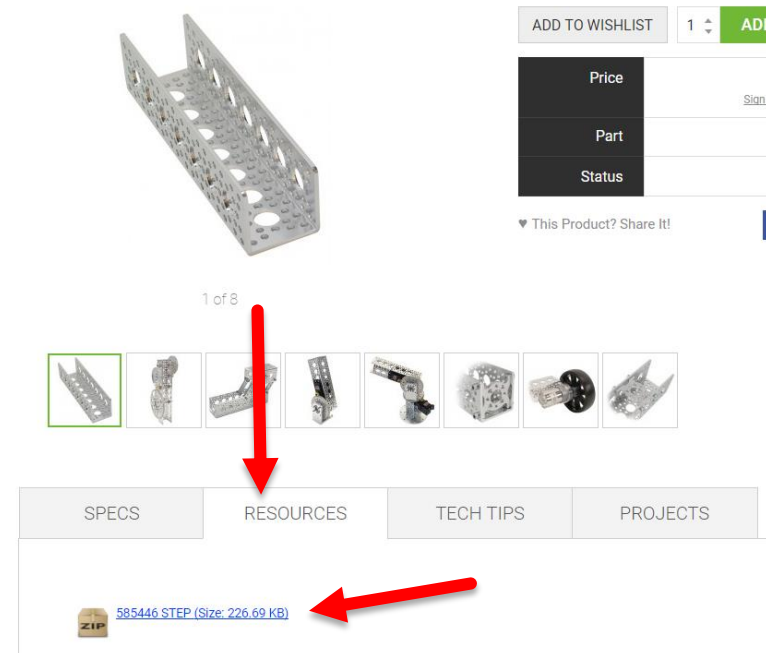
▶ PTC Creo

Complete TETRIX kit of parts on-line <https://www.ptc.com/en/academic-program/k-12-program/students/first/software>

▶ Servo City

Downloadable STEP files come with many parts

6.00" Aluminum Channel



ADD TO WISHLIST 1 ADD

Price
Part
Status

▼ This Product? Share It!

1 of 8

SPECS RESOURCES TECH TIPS PROJECTS

ZIP [585446 STEP \(Size: 226.69 KB\)](#)

Our Recommendation

- ▶ 7203 uses AutoDesk Inventor and GrabCAD to allow for cooperation on large projects. GrabCAD offers an online place to store your CAD models and part libraries; this way a project can be accessed by multiple members of a team.



GrabCAD > Part Library > Structure > Actobotics Channel

Name	Date modified	Type	Size
1.50in Aluminum Channel - (SC)585440	6/22/2017 8:52 PM	Autodesk Inventor ...	243 KB
3.00in Aluminum Channel - (SC)585442	6/22/2017 8:52 PM	Autodesk Inventor ...	433 KB
3.75in Aluminum Channel - (SC)585443	6/22/2017 8:52 PM	Autodesk Inventor ...	389 KB
4.50in Aluminum Channel - (SC)585444	6/22/2017 8:52 PM	Autodesk Inventor ...	437 KB
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Tutorials

- ▶ **Tutorials: some videos used by our team**

http://students.autodesk.com/?nd=first_inventor - official step by step guide personalized for FRC participants.

<http://wikihelp.autodesk.com/Inventor/enu/2012> - Wikipedia for Inventor

<http://www.usfirst.org/roboticsprograms/frc/cad-design-and-animation> - the official FIRST