

COMPUTER AIDED DESIGN

THE MIDKNIGHT INVENTORS

Sam F., CAD Director





OVERVIEW

- ❑ What is CAD?
- ❑ Software
- ❑ How we use CAD
- ❑ Process
- ❑ Logistics
- ❑ 2016-17 Season



WHAT IS CAD?

CAD stands for Computer Aided Design. We design parts or systems, also called Assemblies, in a 3D environment. This ranges anywhere from creating the base geometry of our robot, to running stress tests on an individual part to see how they would hold up in a competition environment. This relies on the technical know-how of the user, which is why we teach a full suite of CAD courses in the fall as a part of joining Team 1923.

SOFTWARE: SOLIDWORKS

- ❑ Extremely powerful
- ❑ Requires detailed user input
- ❑ Precise modeling
- ❑ Easy to modify in late-stage design



WHAT INSPIRES US



TEAM 1114: SIMBOTICCS

- ❑ A fantastic team to model our FRC process after:
 - ❑ efficient, effective, useful

USING THEIR PROCESS TO GUIDE OUR OWN:

- ❑ Keep time pressures of build season in mind when using CAD
- ❑ Only CAD enough to manufacture from
 - ❑ No fasteners
 - ❑ Boost performance by reducing part/detail count



HOW WE USE CAD



DETAILED MODEL FOR DESIGN ANALYSIS:

- Create part lists to minimize wasting our budget
- Create drawings for our build process
- Renders for Engineering Notebook
- Use our 3D printers to print out unique parts/prototypes
 - MidKnight FRC even uses 3D printing for working end effectors!



OUR CAD PROCESS

On our team, we use CAD to help early-on with prototyping and definition of the basic ways our robot will interact with the field or game objects. After that point, we start creating a rough sketch of what our robot will look like, and as the season progresses we refine the parts for final manufacturing. We work closely with the build subteams to make sure that we are documenting the most effective robot our team can build and iterating appropriately on its mechanisms.

OUR OVERALL PROCESS:

- ❑ Step 1: Define basic geometry & part constraints
- ❑ Step 2: Rough/Crayola CAD
- ❑ Step 3: Refine parts
- ❑ Step 4: Create subassemblies from individual parts
- ❑ Step 5: Iterate



CAD LOGISTICS

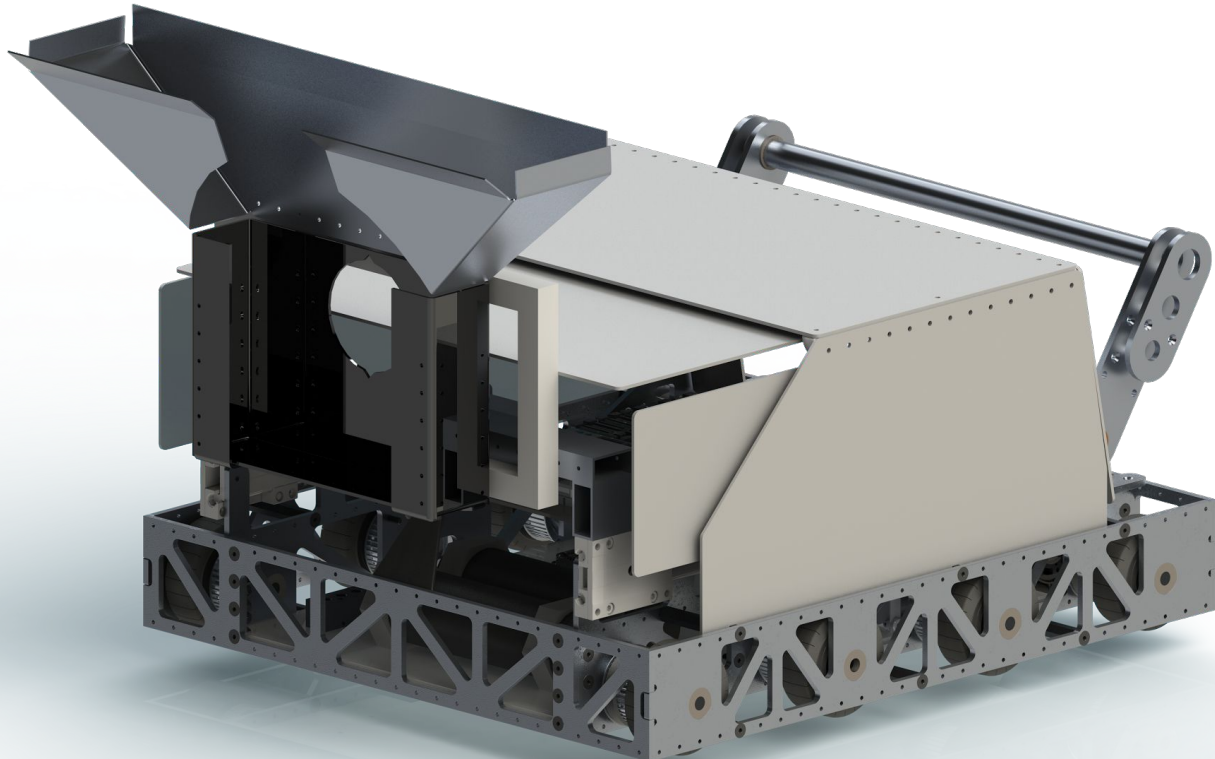


HOW DO WE WORK?

- ❑ File transfer facilitated through GrabCAD
- ❑ Workflow split by assemblies:
 - ❑ Drivetrain
 - ❑ End Effector(s) - Shooter, Climber, etc
- ❑ Naming convention helps keep consistency
- ❑ CAD workstation in the Engineering Lab
- ❑ Laptops for those without another option
- ❑ Please check the system requirements before you use up a team's CAD key on your personal laptop!

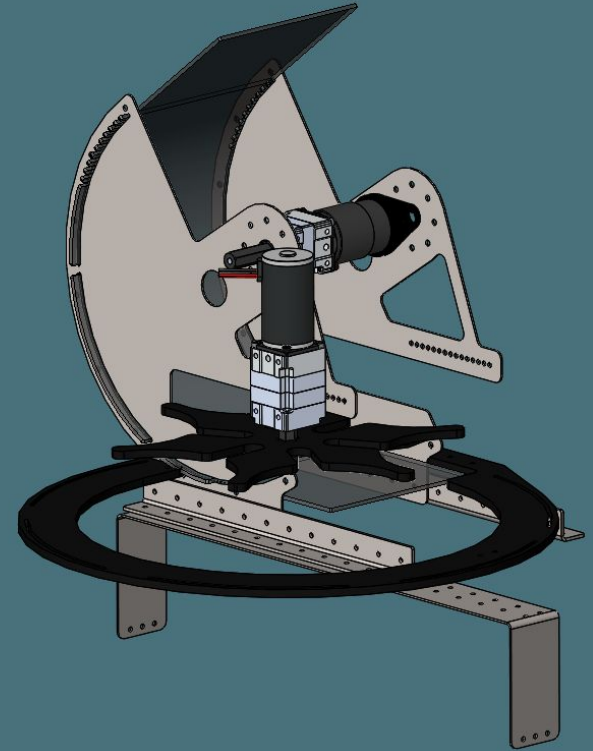
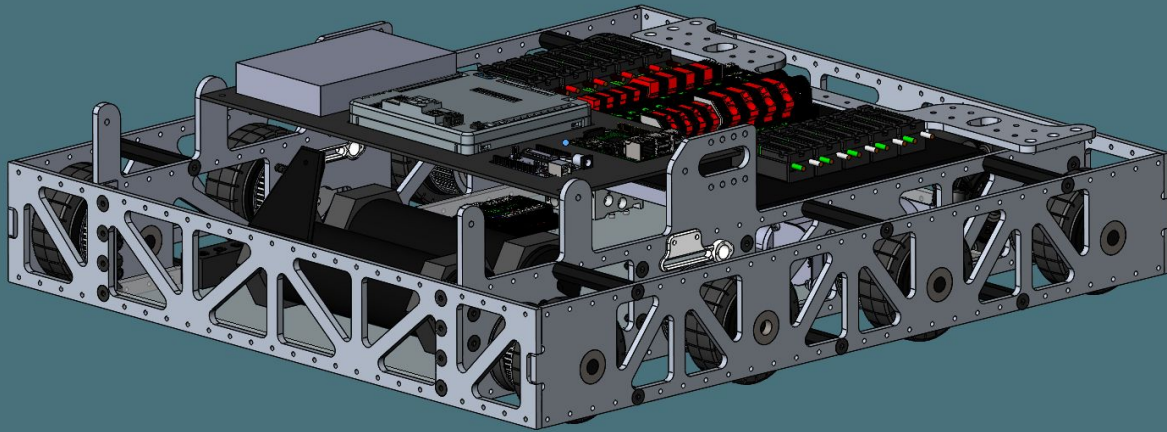
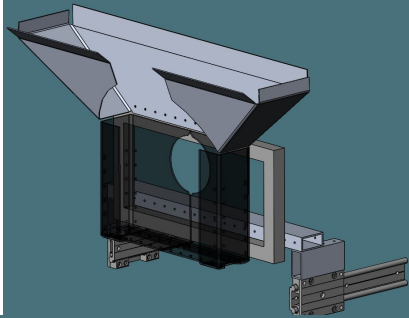


LAST YEAR'S CAD: THE 2017 ROBOT





LAST YEAR'S CAD: SUBASSEMBLIES



QUESTIONS?

CONTACT US:

The MidKnight Inventors
www.FIRSTrobotics1923.org

