Team 14556

Creating Custom Parts: Thinking Outside Your Kit

Tactical Tech Tomato Turtles
2022 Kickoff Breakout Session

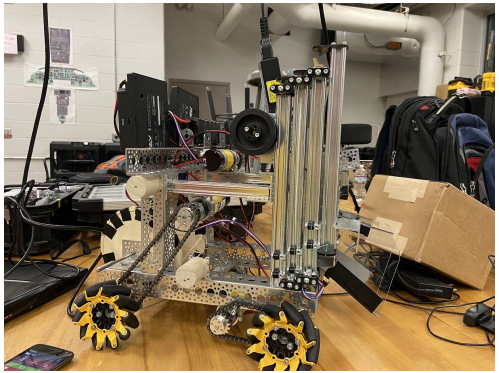
POWER PLAY℠

PRESENTED BY Raytheon Technologies

Agenda

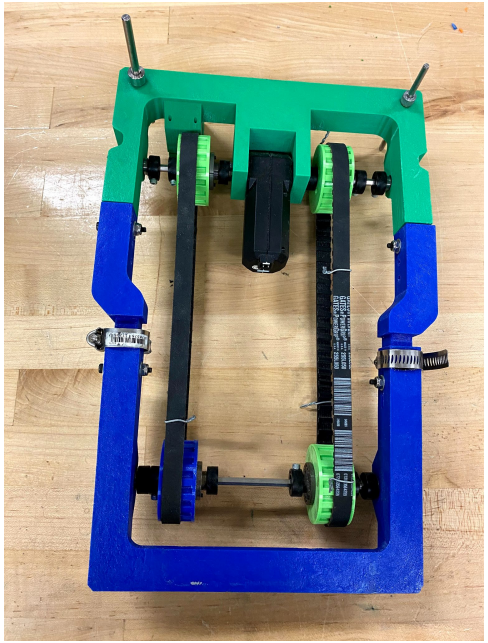
- Welcome and introductions
- Why go outside your kit?
- Plastic Signs
- Polycarbonate
- Silicone molding
- Grippy pads
- 3D Printing
- Wood
- Springs
- Attachment methods
- Questions

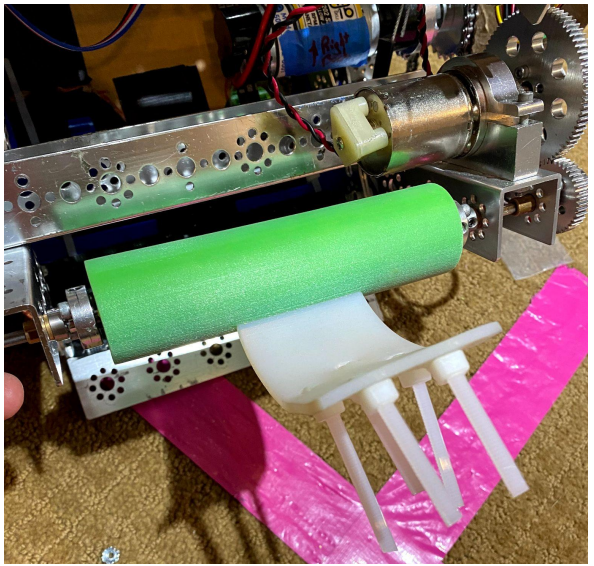
Welcome!



Why think outside your kit?

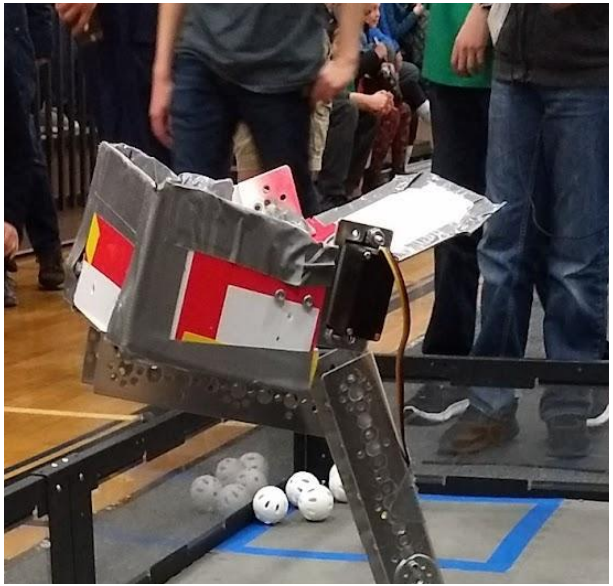
- Prototype
- Innovate
- Perform
- Learn

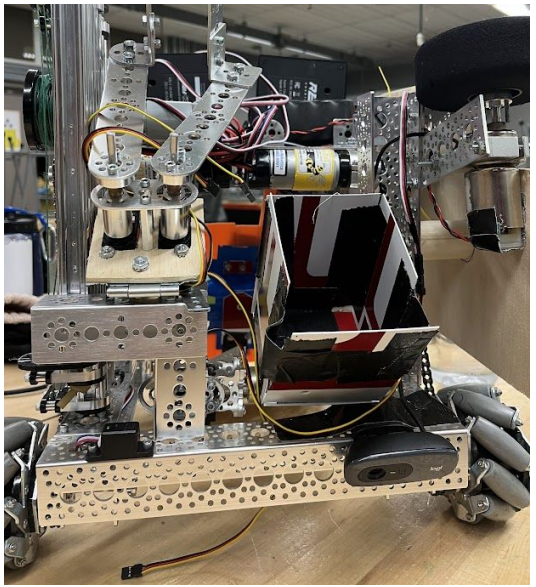




Plastic Signs

- Key Use
  - Next step from cardboard prototyping
- Advantages
  - Quick tool for tournament-worthy prototyping
  - Light, strong, and flexible material
- Disadvantages
  - Connection points can be easily malleable and breakable

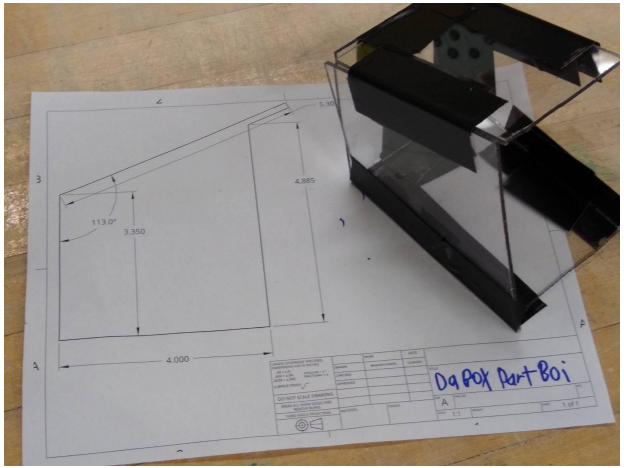




Polycarbonate

Uses:

- Side panels
- Small custom parts
- Places you need to see through
- Prototypes

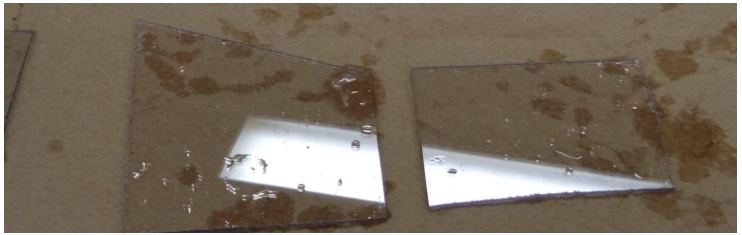


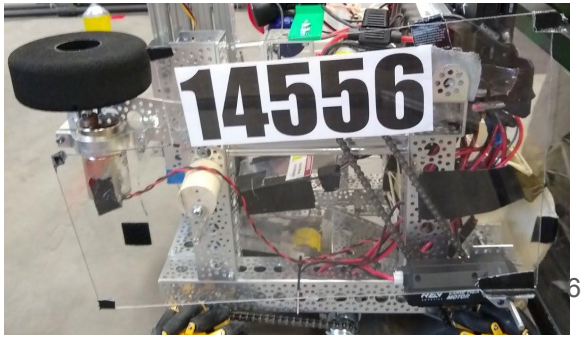
Pros:

- Easy to use
- Customizable
- See-through
- Cheap and accessible

Cons:

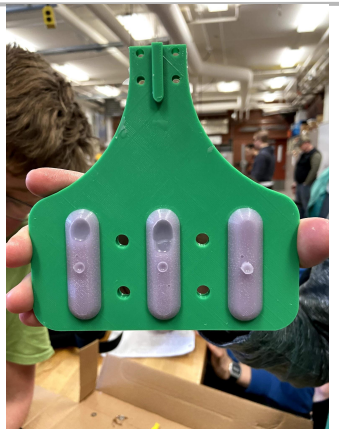
- Easy to crack with a saw
- Tricky or messy to bond--doesn't always look nice
- Requires custom mounting
- Not for the main structure

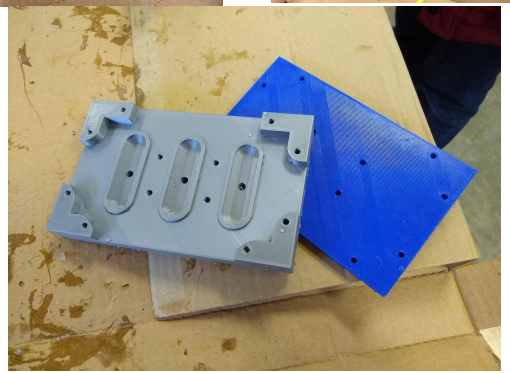




Silicone Molding

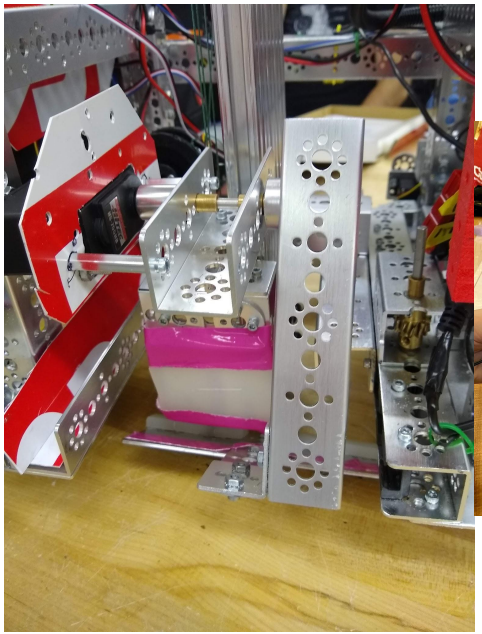
- Use for claws and grippers
- Advantages
  - Great for claws and grabbers that need to be very grippy
  - Other parts that need grip such as wheels or spinners
  - A great way to expand your CAD knowledge with the mold
  - Making a grip that requires a certain shape
- Disadvantages
  - Can be a bit challenging to get the measurements right for the silicone
  - Can be messy
  - Mold has to be very precise in order to work

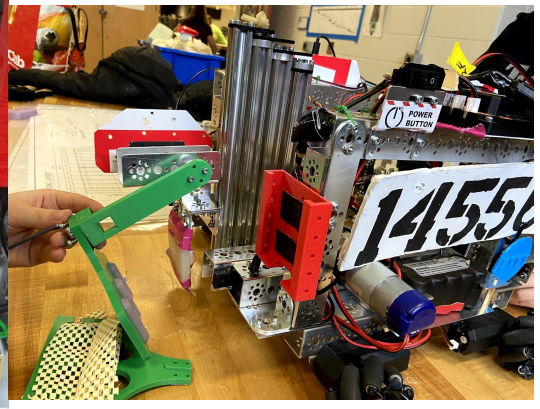




Grippy Pads

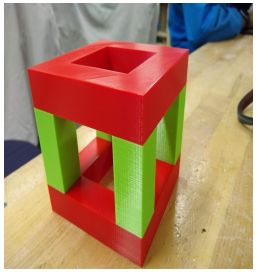
- Use for claws and grippers
- Advantages
  - Easier than silicone molding
  - Readily available in many forms (furniture felt pads, anti-slip mats, rubber, etc)
- Disadvantages
  - The grippiness may wear off over time
  - May easily fall off--hard to attach

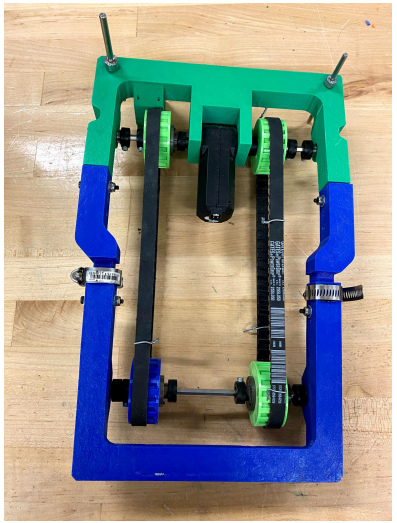


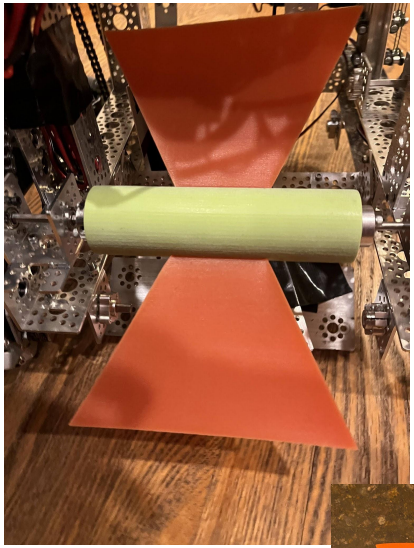


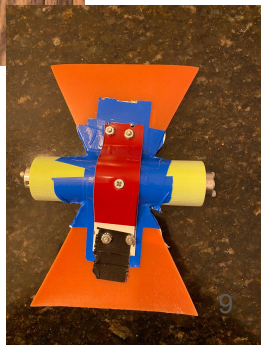
3D Printing

- Key Use
  - Creating custom/intricate parts
  - Can be hard or flexible
- Advantages
  - Allows for complex shapes
  - Variety of materials
  - Easy to reproduce and make extras
- Disadvantages
  - Can be easy to break
  - Slow to produce
  - Need access to a 3D printer
    - Stratasys and library



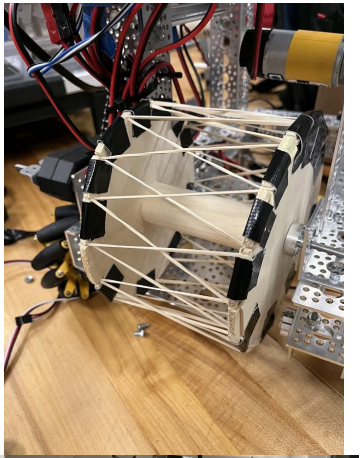


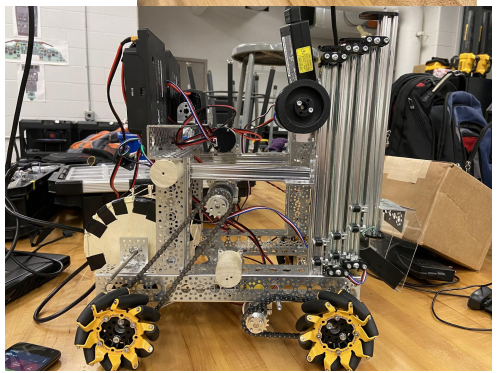




Wood Overview

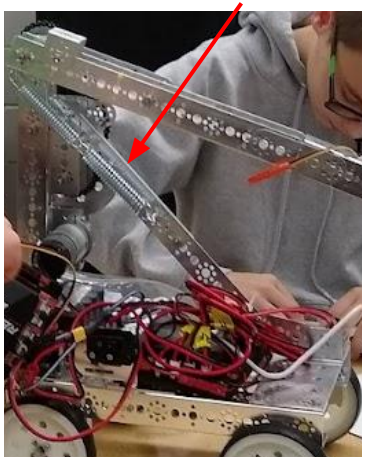
- Uses
  - Rigid parts (w/some give)
  - Structural elements
  - Panels
  - Prototyping
- Advantages
  - Versatile and customizable
    - Laser cut
    - Add holes anywhere
  - Inexpensive
  - Easy to access
  - Does not require expensive equipment
- Disadvantages
  - Prone to damage
    - Wear
    - Heat
    - Water
  - May not be as visually appealing as metal or 3D printing
  - Not transparent
  - Depending on tools used to cut, details may not be as accurate as 3D printed pieces.

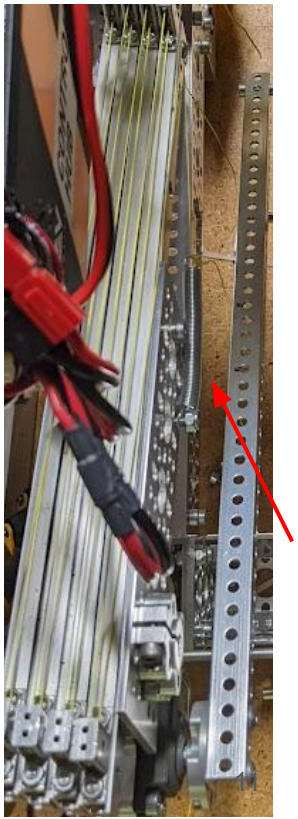


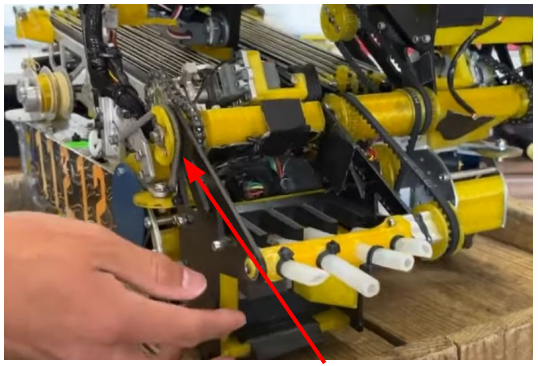


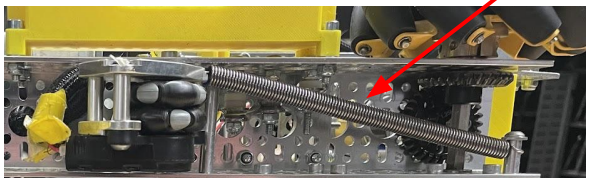
Springs

- Common Uses
  - Providing tension (odometry wheels)
  - Tensioning string (linear slides)
  - Counter-sprung pivots (arms, intakes, drive suspension)
- Advantages
  - Easy to find, inexpensive, lots of variety
  - Allows for faster, smoother motion
  - Provides tension force without electronics
- Disadvantages
  - Can be challenging to mount
  - Too much tension could damage parts









Attachment Methods

- Screws
  - Pros: Sturdy, rigid, and secure
  - Cons: Requires hole and precision
- Zip Ties
  - Pros: Great for securing cables
  - Cons: Not very rigid
- Duct Tape
  - Pros: Strong, quick, and easy
  - Cons: Takes up surface area, not rigid
- Hot Glue
  - Pros: Strong and rigid
  - Cons: Takes time and a glue gun

- Epoxy
  - Pros: Very strong, rigid
  - Cons: Takes time and effort
- Masking/Other Tape
  - Pros: Quick and even easier than duct tape
  - Cons: Not rigid or as strong as duct tape
- Velcro
  - Pros: Secure, removable
  - Cons: Hard to remove velcro strips, not rigid

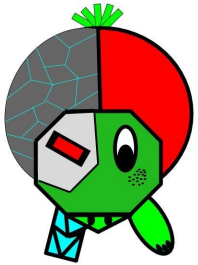
Thank You!

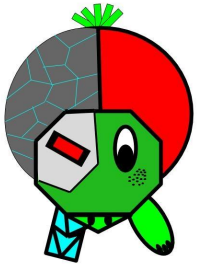
If you'd like a copy of these slides or to see our portfolio or notebook, please contact us!

Gmail: TacticalTechTurtles@gmail.com

Twitter: ftctech_turtles

Instagram: tomatoturtles





Questions?