SkillsUSA 2023 Additive Manufacturing State Challenge

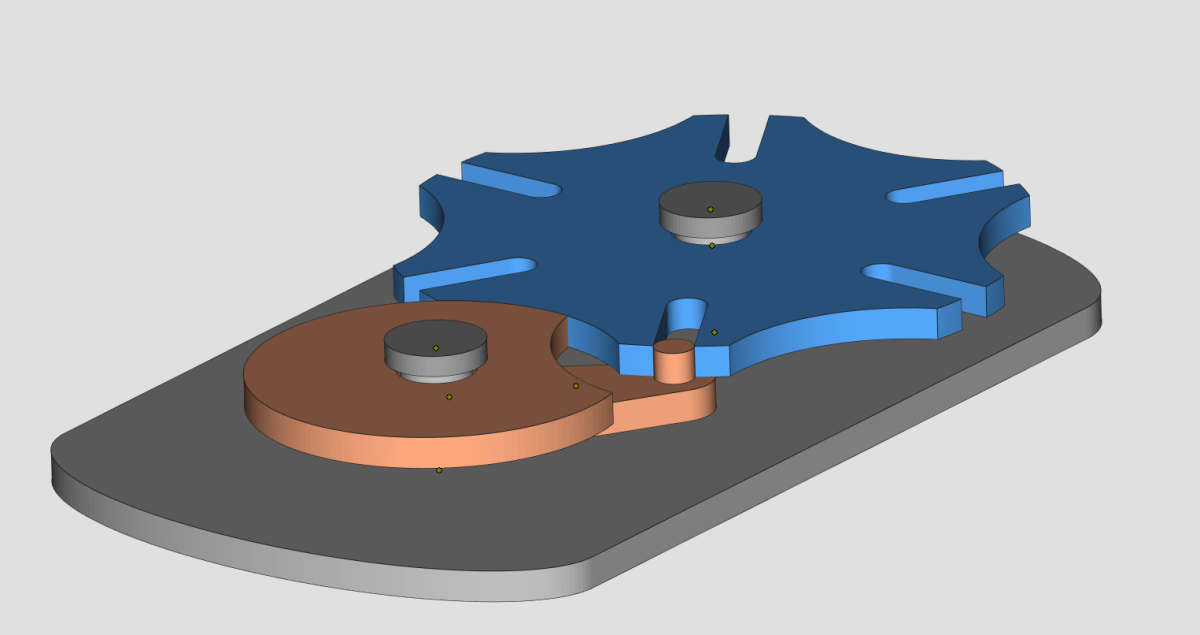
Kinematic Assembly Models

Welcome to the “Kinematic Assembly Models” challenge!

The task at hand is to design a functional/movable assembly, also known as a gear system, or kinematic model.

Examples of this type if system are below, this should help get you started on an idea:

- Peristaltic Pump
- Geneva Gear
- Rack and Pinion
- Differential
- Planetary Gear
- Bearing



Example of a functional assembly for reference only

Competition Requirements

1. The design **must** contain at least 3 individual bodies to be printed assembled or to be assembled after printing.
2. Printed parts **must** be able to mate and stay together during operation by design.
3. The design **must** contain at least two printed moving parts in the assembly.
4. One printed part's motion **must** be directly driven by another printed parts motion.
5. The printed parts **must** be able to mate together as an assembly, as designed, without major post-processing.
6. The design **must** be able to rotate/move as designed and should not have excessive backlash.
7. 3D Printed Design - Students **must** create a design that:
    - Is original and designed by contestant
    - Prints all parts in less than **8** hours
    - Uses less than **5** cubic inches of model and/or support combined for all parts

8. Students **must** submit files to be printed via State designated file share site no later than [5pm cst] on [March 27]. Final prints will be delivered the day of the contest so that students can test, assemble/modify and be evaluated.

Tips for Competitors

Here are some tips to maximize the points awarded to you:

- Be sure to design using the correct tolerance between printed parts to allow motion of assembly.
- Be creative by incorporating an end-use for the design.
- Additional moving parts may add to your score but can produce more points of failure on the final assembly.
- Try to leverage design for 3D technology.
- Use online resources (YouTube, GrabCAD Tutorials, Cornell's Kinematic Models for Design)
- Whenever intellectual property (IP) deters you from a project, try using approximate geometries to communicate the design intent
- Solve a problem that impacts multiple people

- Optional design for additive manufacturing learning resources:
    - Stratasys Think Additively™ Masterclass:
        - https://youtube.com/playlist?list=PLUYaY5EIPtNBdU-s-7l9rl05lBHHlTarI

State Competition Procedure

Before or on contest day:

1. Students submit Engineering Notebook on day of competition to the judges.
2. Students submit print files in both CAD (.step) and mesh (STL) format to (childebrand@southeast.edu) before 5pm CST 03/27/2022.
3. Students submit their Presentation on day of Competition to the Judges.
4. Students submit a complete resume on day of competition to the judges.