

mech 6040 report

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1 Formatting

- 10-15 page limit
- title page
- 8-12 body pages
- 1 ref page

2 Title Page

- Course
- Project Title
- Figure
- Student Name
- Date & Signature?

3 Main Body

- walk reader through
- dos and donts - present within each component blurb
- problems and solutions - present wihtin each component blurb

3.1 Formatting

- 10-13 pages
- 1000-2000 word
- 10-12 FIgures

3.2 How to

3.2.1 Assembly

- great place for exploded diagram idenifying components
- lego axel lengths!

1. Rotating Assembly

- assemble one flap wheel ot lego shaft
- assemble second flap wheel and ensure both flap wheel holes align by temprarily mating both components
- remove one flap wheel, noting its orientation on the lego axis
- insert large spacer between both flap wheels and replace second flap wheel

- insert individual flaps by exploiting flap compliance, flaps should snap into place with low applied force
- assemble the 11mm spacer outside the flap wheel assembly, followed by the worm follower gear
- assemble a 1mm spacer on the opposing side of the flap wheel assembly
- to complete the rotating assembly, assemble a 2mm spacer outside the worm follower gear

2. Shell

- assemble the round bevel gear mount and worm gear mounts by pressing into the right shell half
- where are they pressed in!
- assemble the worm, straddled by two 1mm spacers between both worm mounts and piece with a lego axle
- stack the remaining bevel gear, 1mm spacer, c-bevel mount and handle, ensuring that the c-bevel mount ends curl towards the bevel gear
- piece the stacked components with a lego axle
- press the bevel gear assembly into the holes above and below the round bevel gear mount
- assemble the 4mm spacer and one bevel gear respectively to the worm axle end nearest the bevel gear mount, ensuring bevel gear meshes with other

3. Final

- insert axle end or rotating assembly with worm follower gear into the centre hole in right side shell, careful to mate worm with worm follower gear
- assemble left shell half to opposing end of rotating assembly shaft
- insert connectors into top and bottom, mating shell halves
- insert top (long) and bottom (short) stops into shell cutouts near top and bottom

3.3 Build Steps

- make small and expandable
- note lego axis fits for each lego compatible component
- define different fits/offsets in one place, concerning lego axle and typical components, to be referenced later in component blurbs

3.3.1 Roating Flap Assembly

1. Flaps/Flap Wheels
 - fittment in holes
 - interactions with other flaps
 - flap wheel spacing vs extrusion width
 - more flaps, smoother action
 - flap number origin (30 LCD with 12 and 6)
 - flap layering
 - thicknesses, too thick, too thin
 - font aspect driving flap shape
2. Spacer
 - trailing for flap falling
3. Worm Gear
 - 30 teeth, 30 flaps
 - clearances iterated to acheive minimal backlash/good feel

3.3.2 Drivetrain

1. Worm
 - overhang performance, teeth bias, did not affect performance
 - some cleanup required
 - taller/longer worms failed
 - video ref
 - loose lego fit for easy sliding

- interated gear instead of worm as printing worm was challenging/did not always succeed

2. Thrust bearings/spacers

- run on smaller surface = reduced friction
- gap is smaller for worm than total length of worm and spacers to limit looseness

3. Bevels

- failed initially due to lack of support outside
- video ref
- sizing minimal to round corner

4. Handle

- simple lego compatible handle
- designed for tight fit

3.3.3 Shell

- designed for viewing, adequate rigidity and easy assembly

1. Connectors

- shell connectors are a little shorter to keep them from coming out
- tension the rotating assembly eliminating wobble

2. Stops

- initally designed to be adjustable
- measured and installed in shell slots

3. Sides

- sides are fenestrated for easy viewing of assembly/motion
- cutouts for connectors are offset slightly, non-interference fit

4. Bevel holder and nub

- initally did not work as planned with single support

- added small support, interference press fit both components into side

5. Worm Mounts

- reduce complexity of shell sides
- did not want to print rotational interfacing holes vertically due to warping
- press fit/interference fit but still can be disassembled

3.4 Technical Drawings

3.5 Exploded Diagrams

3.6 Photos

3.7 Performance