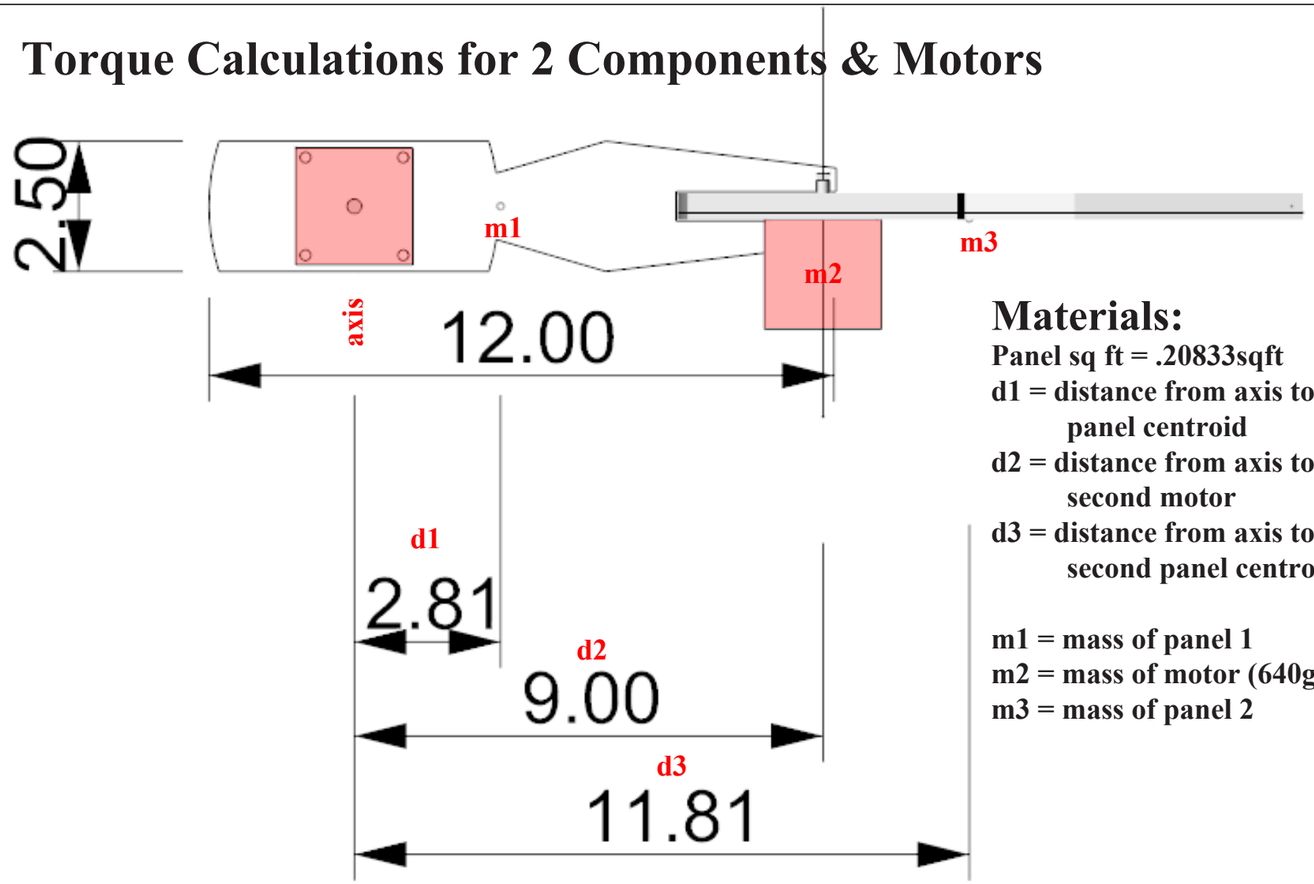
Torque Calculations for 2 Components & Motors



Materials:

Panel sq ft = .20833sqft
d1 = distance from axis to panel centroid
d2 = distance from axis to second motor
d3 = distance from axis to second panel centroid

m1 = mass of panel 1
m2 = mass of motor (640g)?
m3 = mass of panel 2

Torque: d1*m1+d2*m2+d3*m3

1/4” Aluminum: (3.4 lb/ft2)
T = 26,769gcm

1/8” Aluminum: (1.75 lb/ft2)
T = 20,848gcm

1/4” Plastic: (1.56 lb/ft2)
T = 19,993gcm

1/2” Plywood: (1.56 lb/ft2)
T = 19,993gcm

1/4” Plywood: (.78 lb/ft2)
T = 17,466gcm

Torque @ Max. Efficiency (g-cm)	4500
Operating Range (VDC)	4.5-12
Current @ Max. Efficiency (mA)	220
Gear Case Size (Diameter x Length) (inch)	1.3 x 0.9
Gear Ratio	1000:1
Motor Size (Diameter x Length) (inch)	1.5 x 1.0
Shaft Size (Diameter x Length) (inch)	0.23 x 0.90
Rated Voltage (VDC)	12
Terminal Type	Solder
Speed @ Max. Efficiency (RPM)	4.5

Torque @ Max. Efficiency (g-cm)	6000
Operating Range (VDC)	12-24
Current @ Max. Efficiency (mA)	340
Gear Case Size (Diameter x Length) (inch)	1.3 x 0.9
Gear Ratio	3000:1
Motor Size (Diameter x Length) (inch)	1.5 x 1.1
Shaft Size (Diameter x Length) (inch)	0.23 x 0.90
Rated Voltage (VDC)	24
Terminal Type	Solder
Speed @ Max. Efficiency (RPM)	1.8

ACTIVE ELEMENTS
MIT : How to Make Something that Makes (Almost) Anything

BOARD TITLE:
Protein Strand Form Growth
2 Motor Rotation

BOARD #:
1/1

GROUP/DESIGNER'S NAME:
Skylar Tibbits

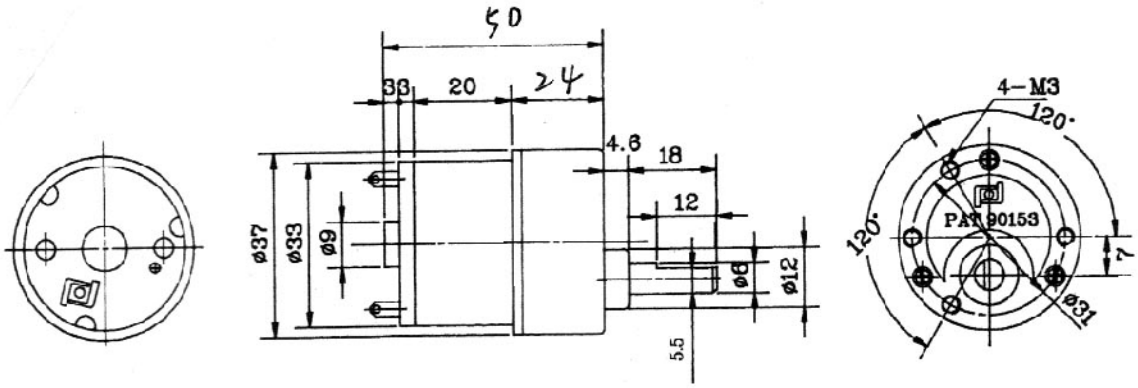
TOPIC :

Date	Rev.	Description

SPECIFICATION SHEET

TYPE: HN-GH35GMB TYPE
MODEL: HN-GH12-1830Y-P-R
CUSTOMER PART NO.: 155821

I. OUTER DIMENSIONS :



DCC. NO.	MATERIAL	GOLDSUN ELECTRONICS CO., LTD.		
A4 DRAWING NO.	DRWN: Kiki Chen	JAMECO NO. 155821	GOLDSUN NO.	
	VERIFY PEOPLE:	Description SPECIFICATION SHEET		Rev. 1
		UNIT: mm	SCALE:	SHEET 1 OF 1 CAS No: ERN No:

Date	Rev.	Description

SPECIFICATION SHEET

TYPE: HN-GH35GMB TYPE
MODEL: HN-GH12-1830Y-P-R
CUSTOMER'S PART NO.: 155821

II. SPECIFICATIONS :

1. TESTING CONDITIONS:
   ENVIRONMENT TEMPERATURE: 25 DEGREES CELSIUS.
   RELATED HUMIDITY: 60%.
   TESTING POSITION: THE GEARMOTOR LIES IN HORIZONTAL POSITION.
2. RATED VOLTAGE(POWER SUPPLY): DC12V.
   THE POWER SUPPLY MUST BE PURE DC(DIRECT CURRENT) AND CAN NOT CARRY ANY AC(ALTERNATING CURRENT).
3. GEAR RATIO: 1000:1
4. RATED LOAD AT DC12V : 4.5Kg-cm.
   DON'T EXCEED RATED LOAD. OVERLOADING CAN CAUSE DAMAGE TO GEARMOTOR.
5. NO LOAD SPEED AT DC12V: 4RPM+/-2RPM.
6. SPEED AT DC12V & RATED LOAD(4.5Kg-cm): 3RPM+/-2RPM
7. NO LOAD CURRENT AT DC12V: LOWER TIIAN 41mA.
8. CURRENT AT DC12V & RATED LOAD(4.5Kg-cm): LOWER THAN 76mA.
9. SHAFT END PLAY: MAXIMUM 0.8m/m.
10. INSULATION RESISTANCE: 10M ohm AT DC300V.
11. WITHSTAND VOLTAGE: DC300V FOR ONE SECOND.
12. THE GEARMOTOR IS NOT INTENDED FOR INSTANT REVERSE. BE SURE THE GEARMOTOR IS STOPPED BEFORE REVERSING.
13. THE GEARMOTOR DOESN'T HAVE ANY PROTECTIVE MEASURES LIKE WATER-PROOF, DUST- PROOF, ETC..... PLEASE USE IT IN THE NORMAL ENVIRONMENT AND TEMPERATURE.
14. IF YOU HAVE ANY QUESTIONS ABOUT THE SPECIFICATIONS AND DIMENSIONS, KINDLY PLEASE FEEL FREE TO CONTACT US.

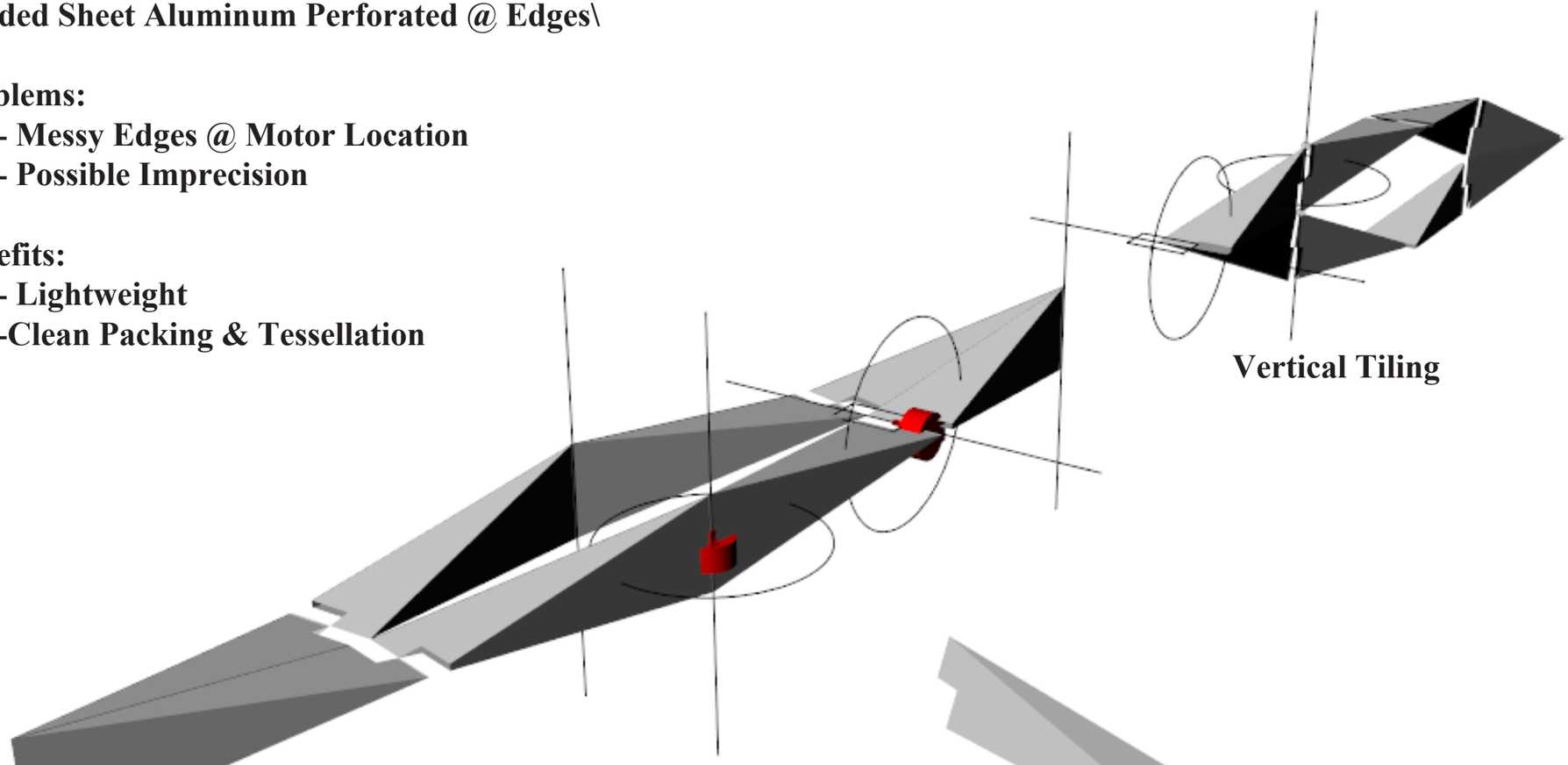
DCC. NO.	MATERIAL	**GOLDSUN ELECTRONICS CO., LTD.**		
A4 DRAWING NO.	DRWN: Kiki Chen	JAMECO NO. **155821**	GOLDSUN NO.	
	VERIFY PEOPLE:	Description SPECIFICATION SHEET		Rev. 2
		UNIT: mm	SCALE:	SHEET 1 OF 1 CAS No: ERN No:

Component Type A: Polyhedron

-Folded Sheet Aluminum Perforated @ Edges

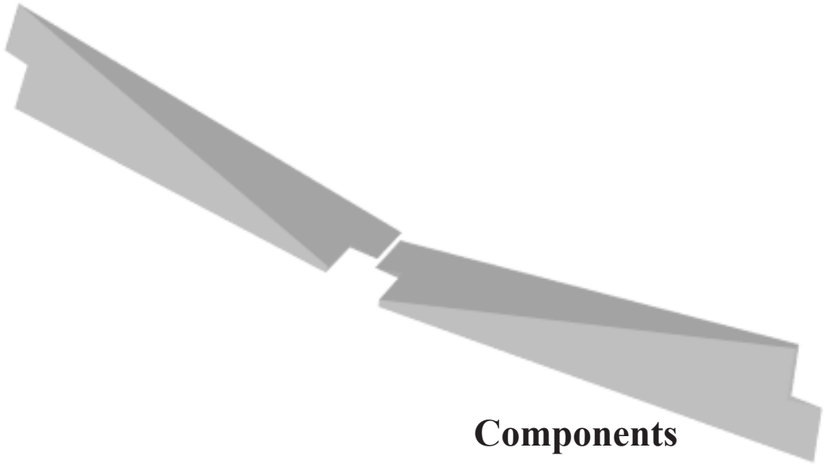
Problems:
- **Messy Edges @ Motor Location**
- **Possible Imprecision**

Benefits:
- **Lightweight**
-**Clean Packing & Tessellation**

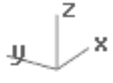


Vertical Tiling

Horizontal Tiling



Components



ACTIVE ELEMENTS

MIT : How to Make Something that Makes (Almost) Anything

BOARD TITLE:
Component Study

2 Motor Rotation

BOARD #:
1/1

GROUP/DESIGNER'S NAME:
Skylar Tibbits

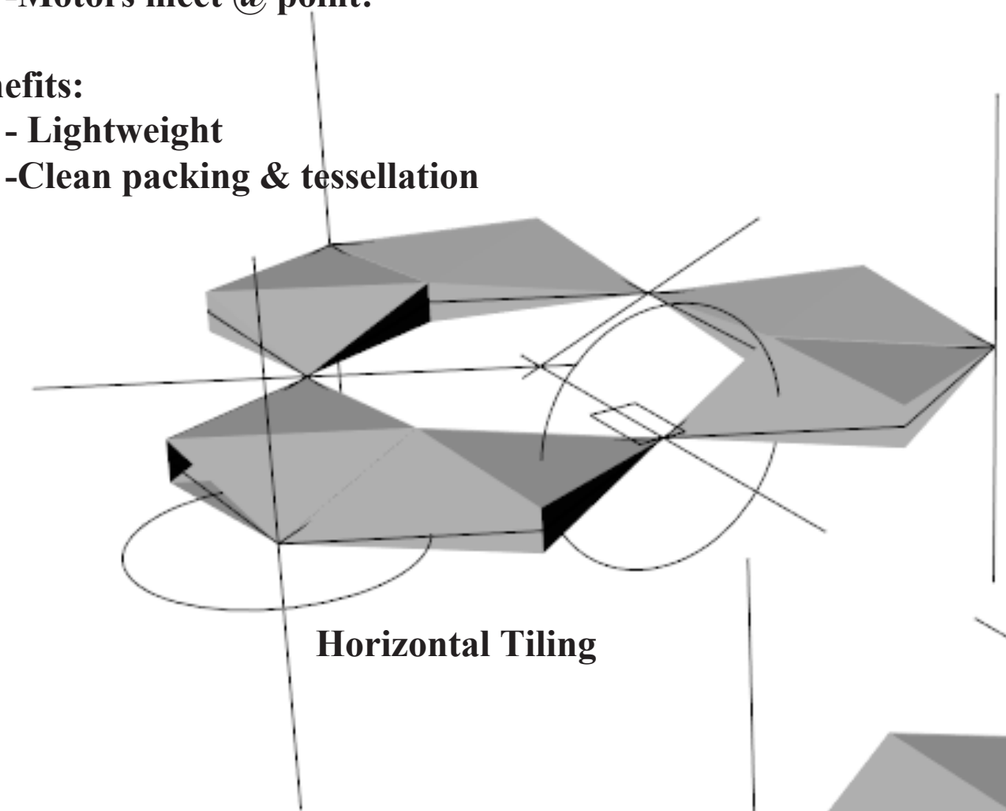
TOPIC :

Component Type B: Rhombus

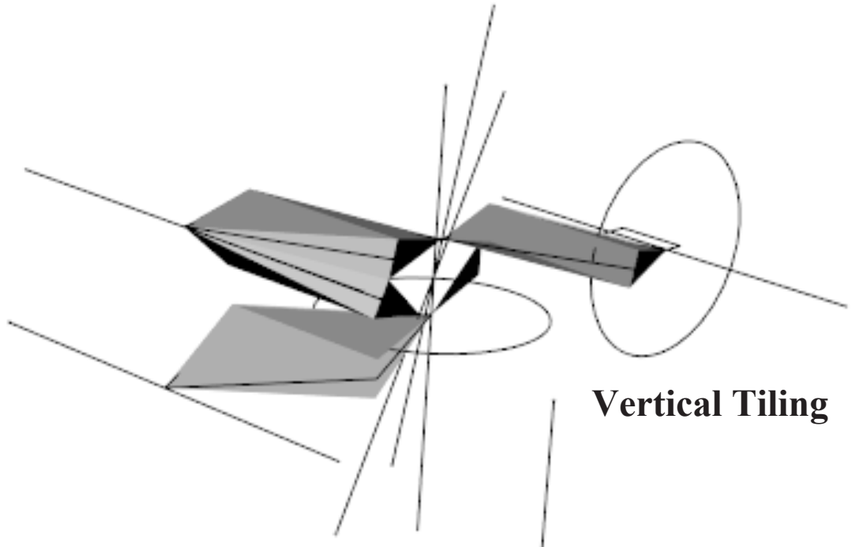
-Folded Sheet Aluminum Perforated @ Edges

Problems:
- **Messy edges @ motor location**
- **Possible imprecision**
- **-Larger aperture for packing**
- **-Motors meet @ point!**

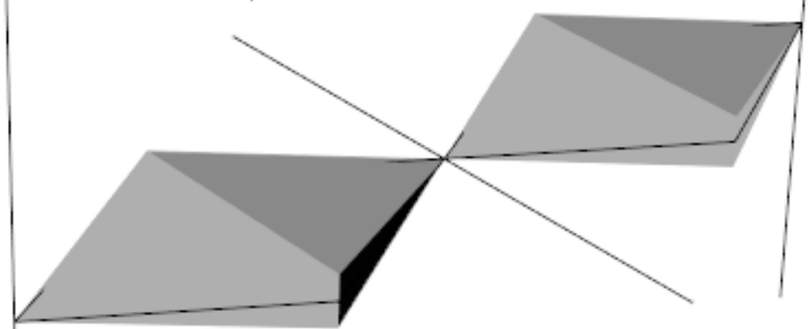
Benefits:
- **Lightweight**
- **-Clean packing & tessellation**



Horizontal Tiling



Vertical Tiling



Components

ACTIVE ELEMENTS

MIT : How to Make (Almost) Anything

BOARD TITLE:
Component Study

2 Motor Rotation

BOARD #:
1/1

GROUP/DESIGNER'S NAME:
Skylar Tibbits

TOPIC :

Component Type C: Sticks

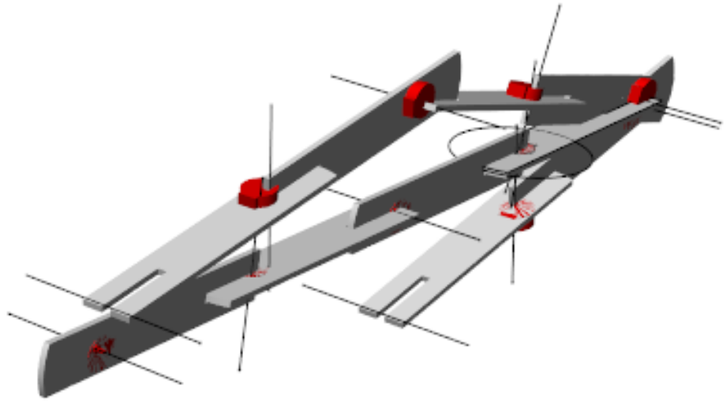
-CNC routed/waterjet Sheet Materials (Aluminum, Plastic, Wood)

Problems:

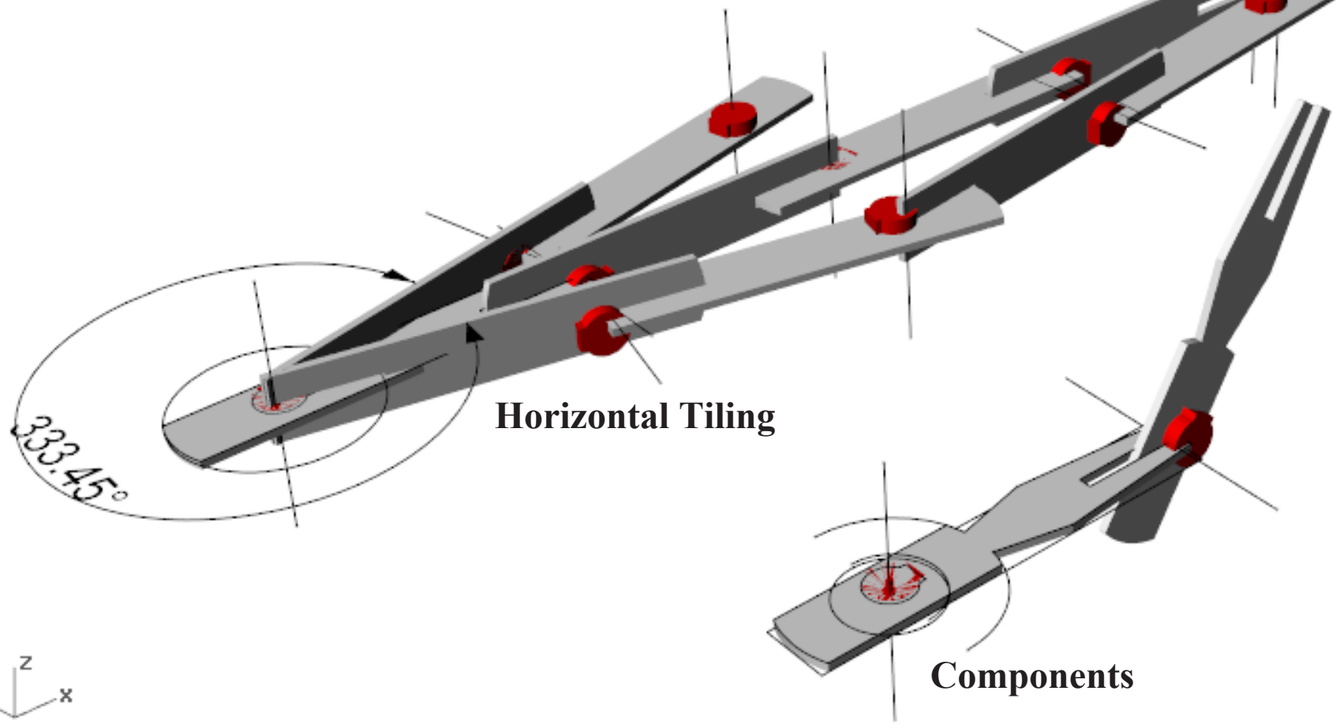
- **- Non-tight packing**
- **-Less geometric possibilities**

Benefits:

- **- Lightweight**
- **-Quick fabrication**
- **-Cleaner motor location & pivot**
- **-Larger possible rotation angle - 330 degrees**



Vertical Tiling



Horizontal Tiling

Components

ACTIVE ELEMENTS

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BOARD TITLE:
Component Study
2 Motor Rotation

BOARD #:
1/1

GROUP/DESIGNER'S NAME:
Skylar Tibbits

TOPIC :

Component Type D: Cast Foam

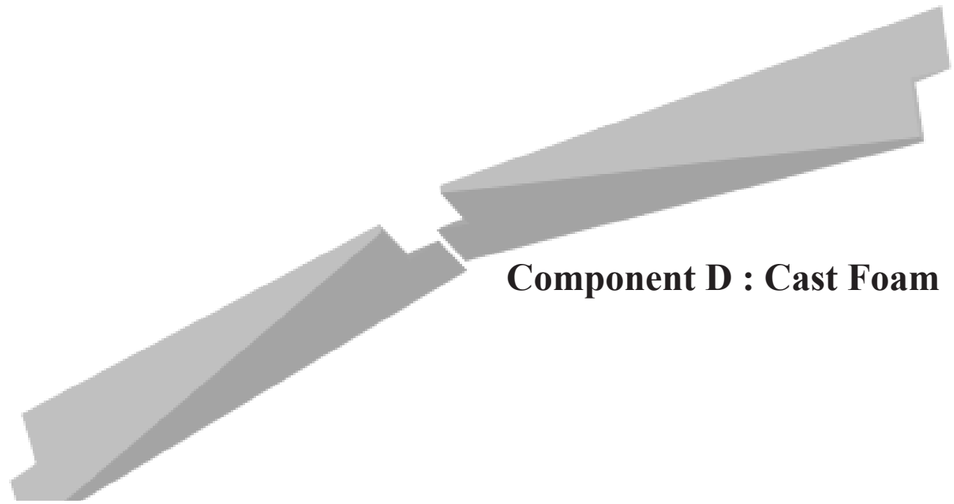
-Molded & cast foam

Problems:

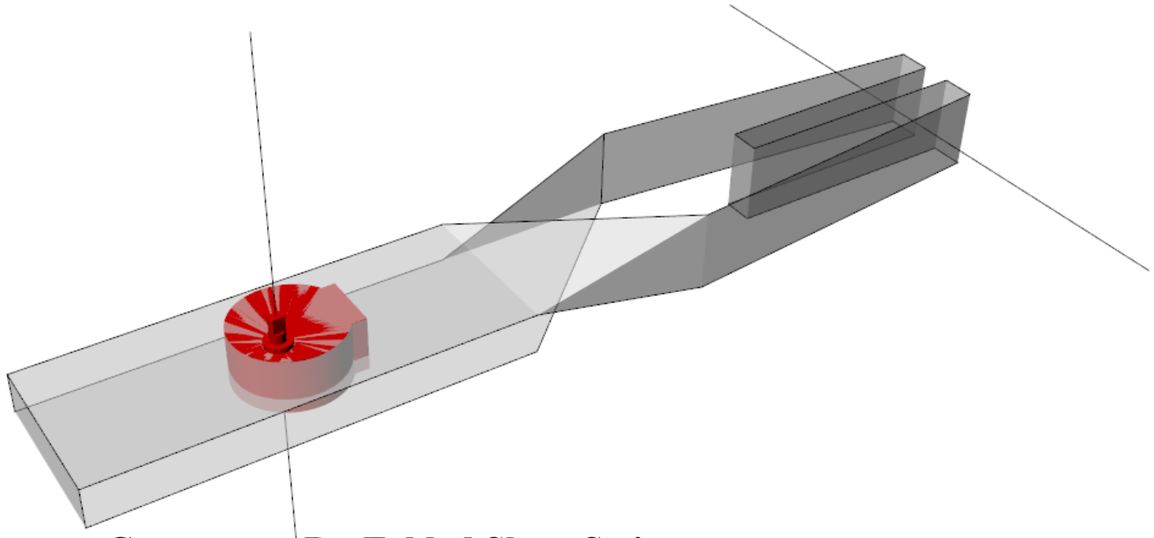
- Placement of motors/electronics in foam

Benefits:

- Lightweight
-Quick installation
-Easy 3D geometry
-Cheap & easy to replace



Component D : Cast Foam



Component D : Folded Sheet Strip

Component Type E: Folded Sheet Strip

-Folded strip of sheet aluminum

Problems:

- Messy Edges @ Motor Location
- Possible Imprecision

Benefits:

- Lightweight
- Easy Construction

ACTIVE ELEMENTS

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BOARD TITLE:
Component Study
2 Motor Rotation

BOARD #:
1/1

GROUP/DESIGNER'S NAME:
Skylar Tibbits

TOPIC :