

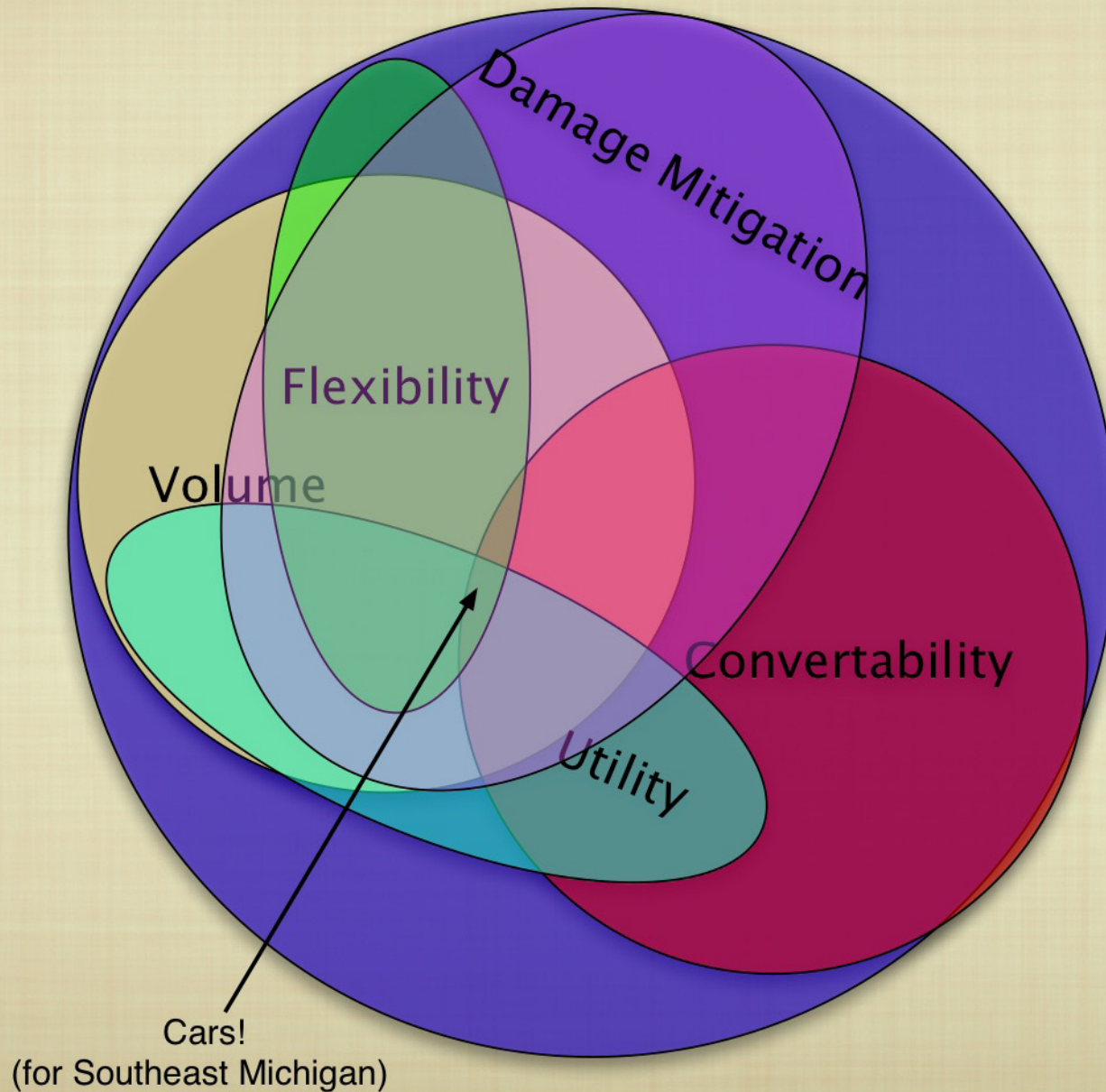
MATERIALS FLOW ANALYSIS

Zeroing in on a Waste to use as a Material

1. **Availability**—What waste flows exist?
2. **Volume**—Pick wastes high in volume
3. **Convertibility**—Pick wastes that require low conversion inputs
 - Hierarchy of reprocessing:
 - *Reuse*
 - *Remanufacture*
 - **Refabrication—This is our cutoff**
 - *Recycling*
 - *Downcycling*
4. **Resource Utility**—Pick wastes that have a high *resource value*
5. **Resource Flexibility**—Pick wastes that become a *range of resource-forms*
6. **Damage Mitigation**— Pick *Active Wastes before Passive Wastes*

MFA FOR SOUTH EASTERN MICHIGAN

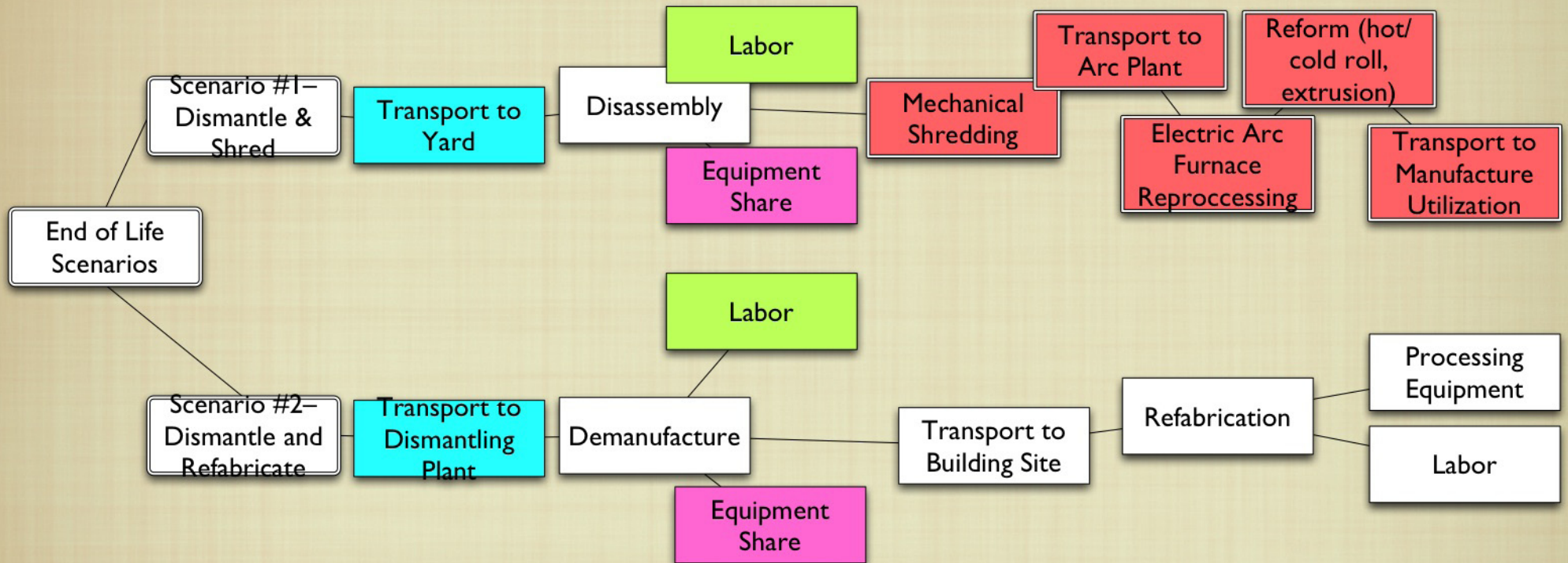
Available Materials Flows



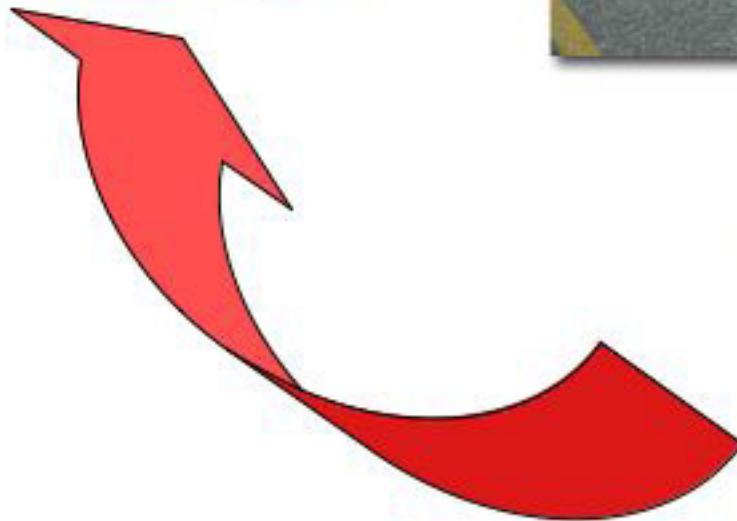
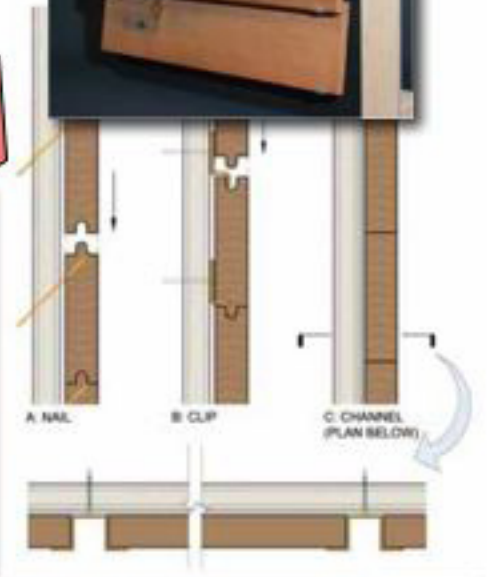
CAR HOODS AS WASTE STREAM

- 156,000 Cars and light Trucks are retired in the Detroit Area each year
- At an average area of 1.4 sq/m per hood
- with 80% utilization
- ...this covers 134,000 sq/m

CAR HOOD END OF LIFE SCENARIOS



Model of Repurposing to Manufacture Pushback:



Identified Waste Streams:

Automotive Waste

- * Town & Country
- * The Autofarm



Energy Infrastructural Waste

- * DTE & Goodwill
- * GM & Goodwill























Town & Country Scrap Yard



John's Auto Farm



Town & Country Scrap Yard



2GTEK19KXR1580241

















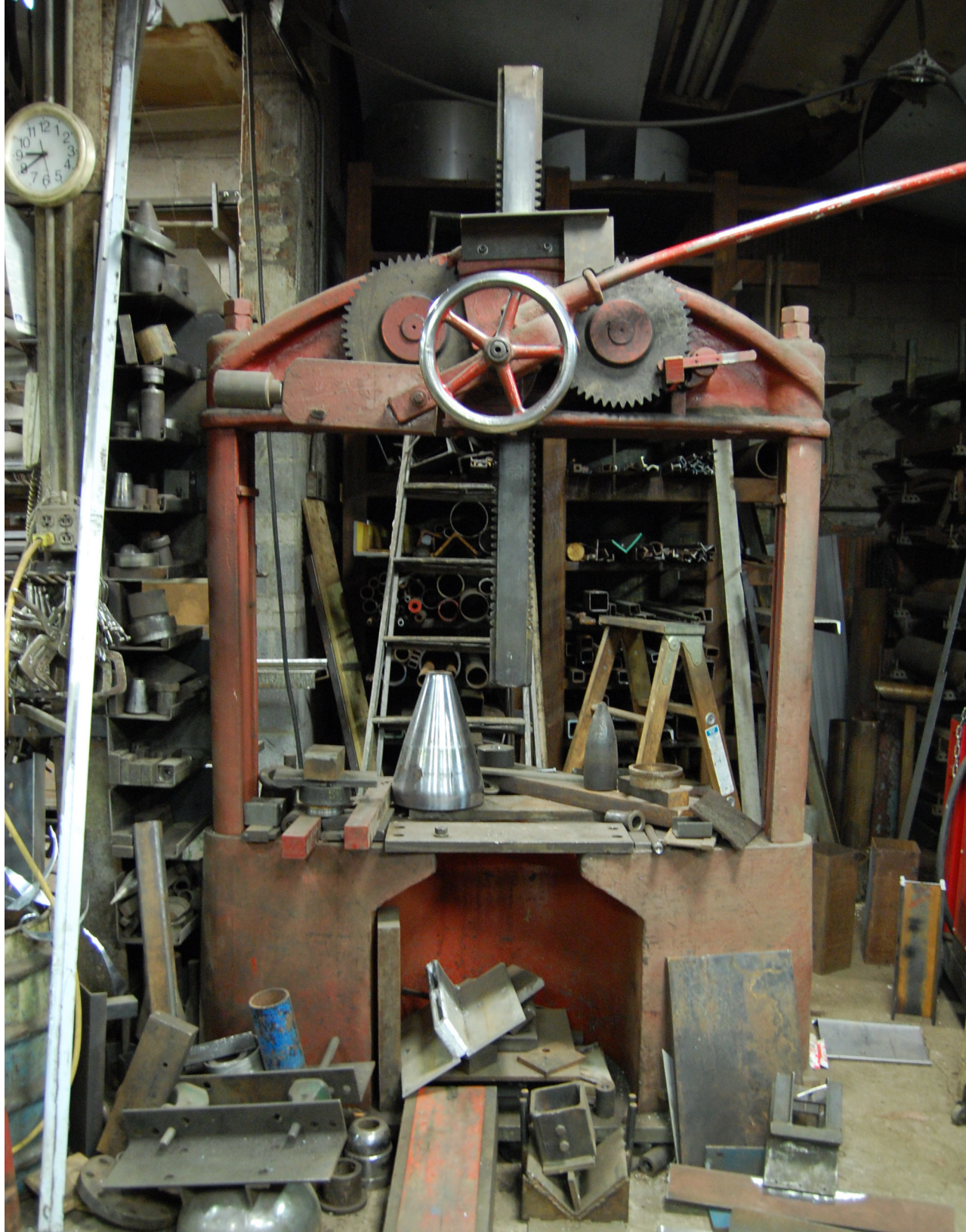


Tools & Manipulation

Hosford Metal Works

Fair Metal Boats









Di-Acro
PROHECM

AUTOGUIDE
CNC 99

SAFETY INSTRUCTIONS

DANGER

DANGER

SAFETY INSTRUCTIONS

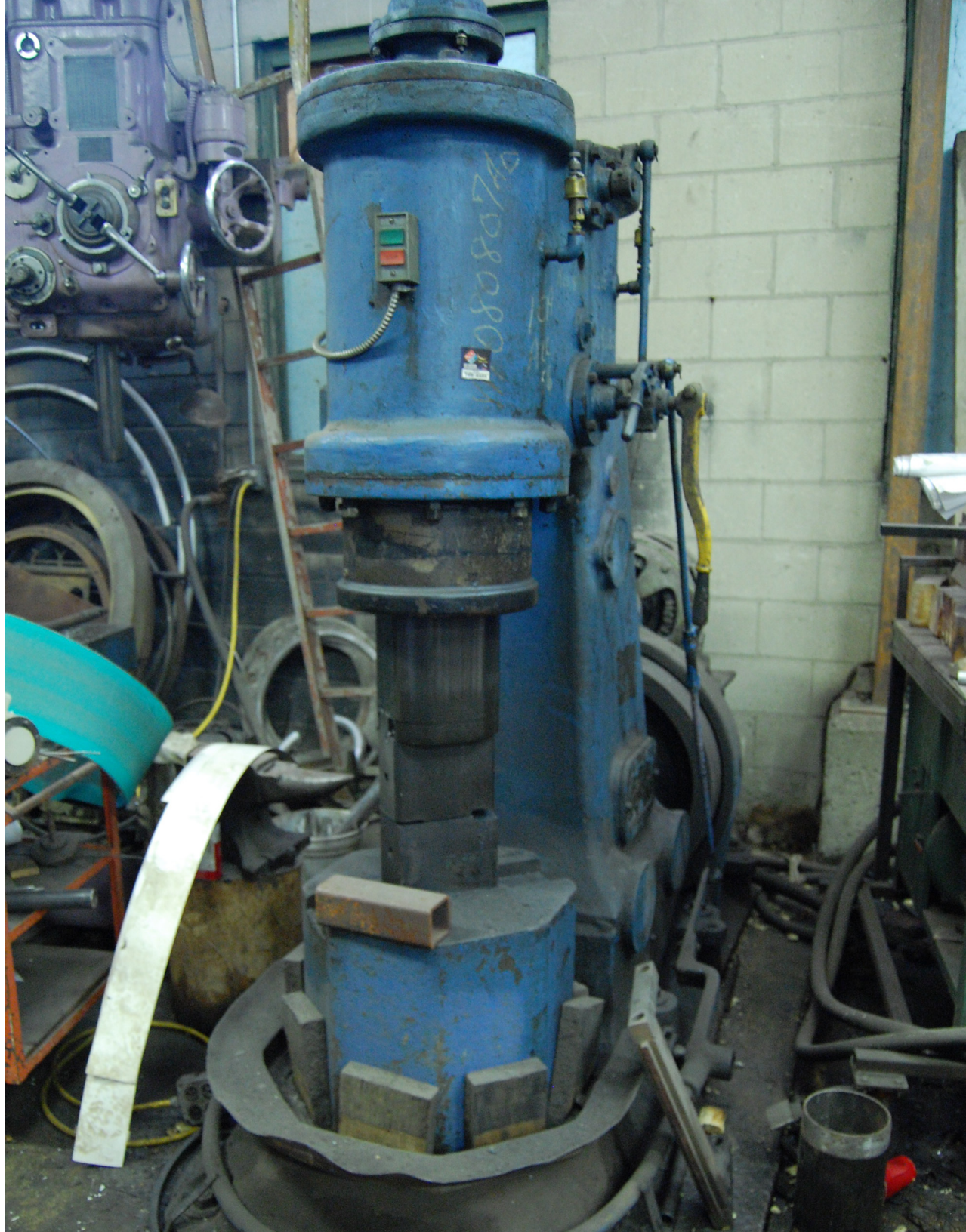
DANGER

CNC

1111

Auto del...

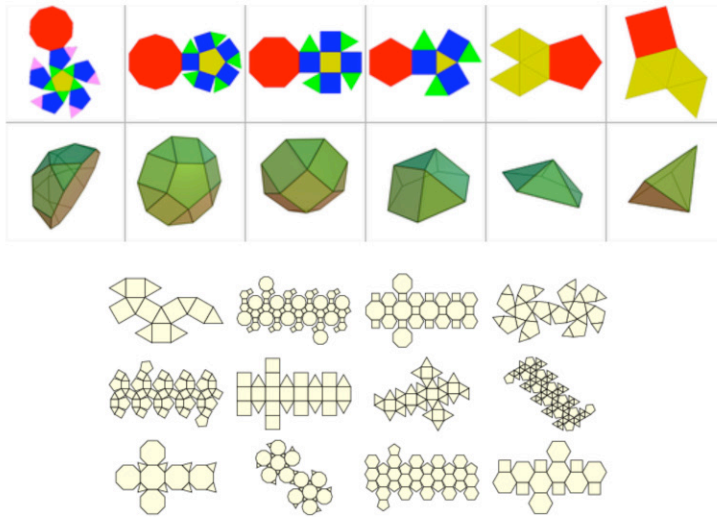
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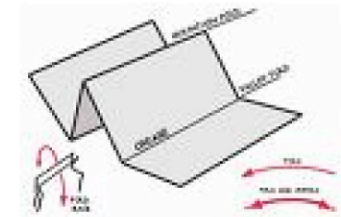
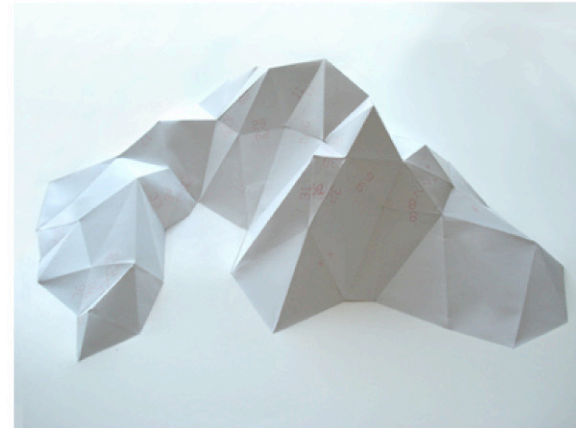


Strategies for ReFabrication:

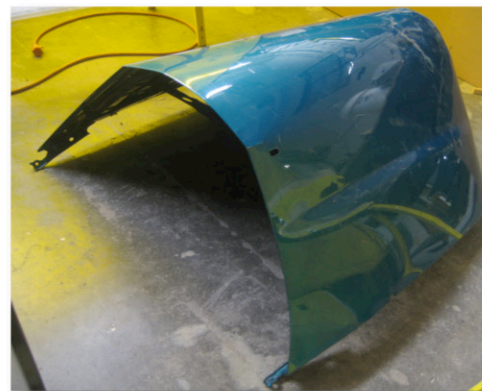
Tessellation



Paper Folding



Material Testing & Experimentation



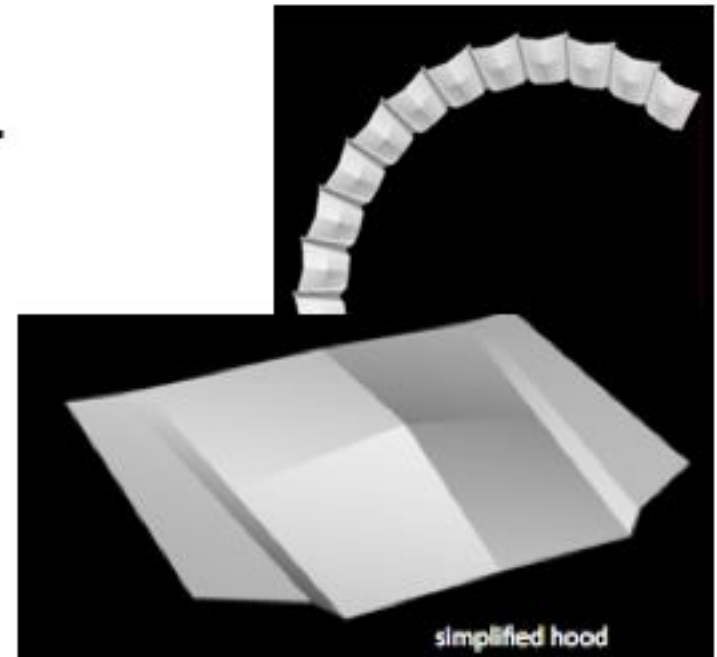
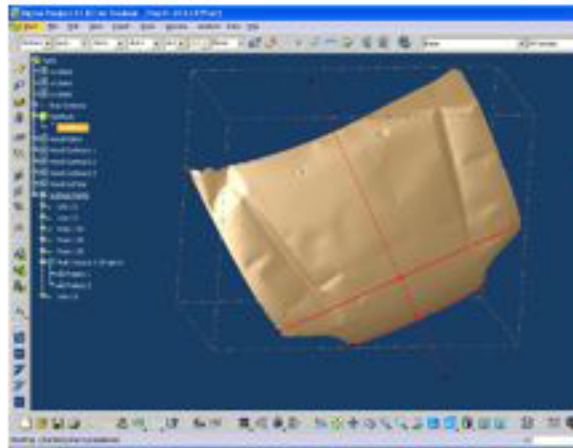
Computer Modeling:

Parametric Design Software

Digital Project

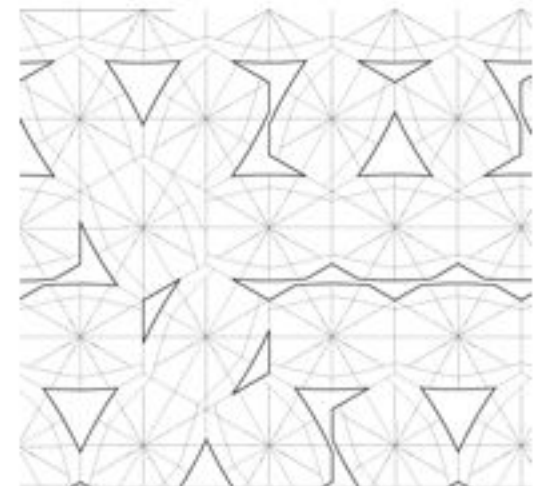
3D Manipulation Software

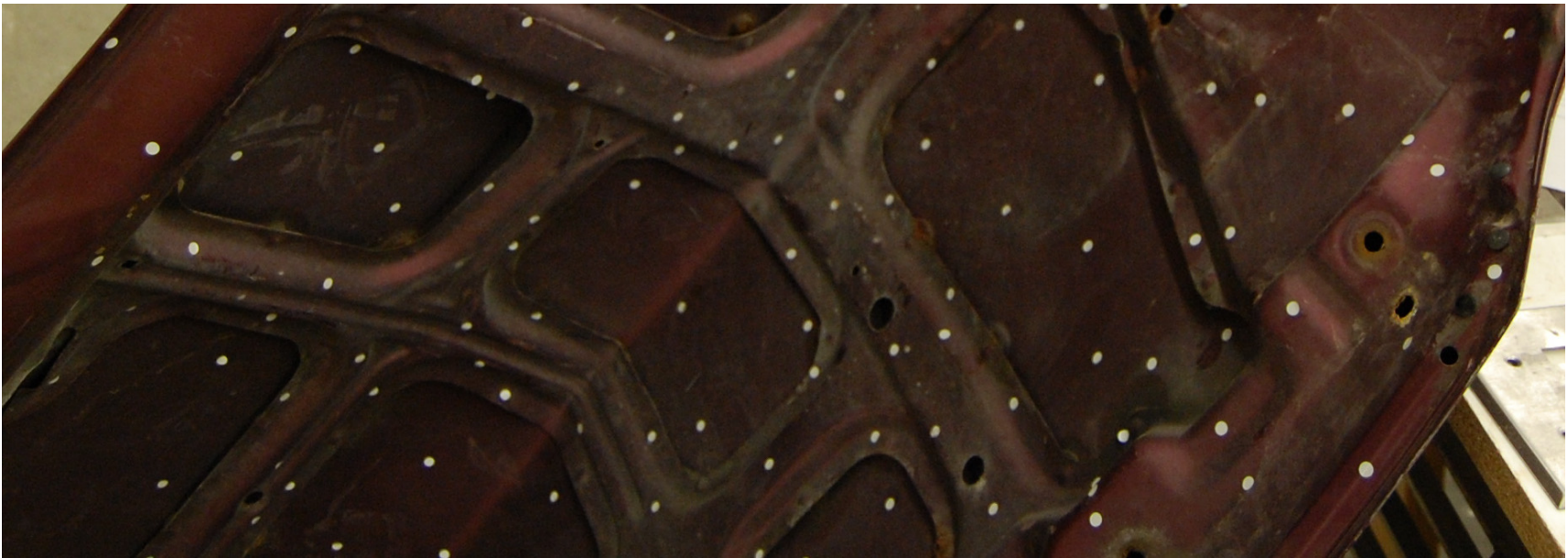
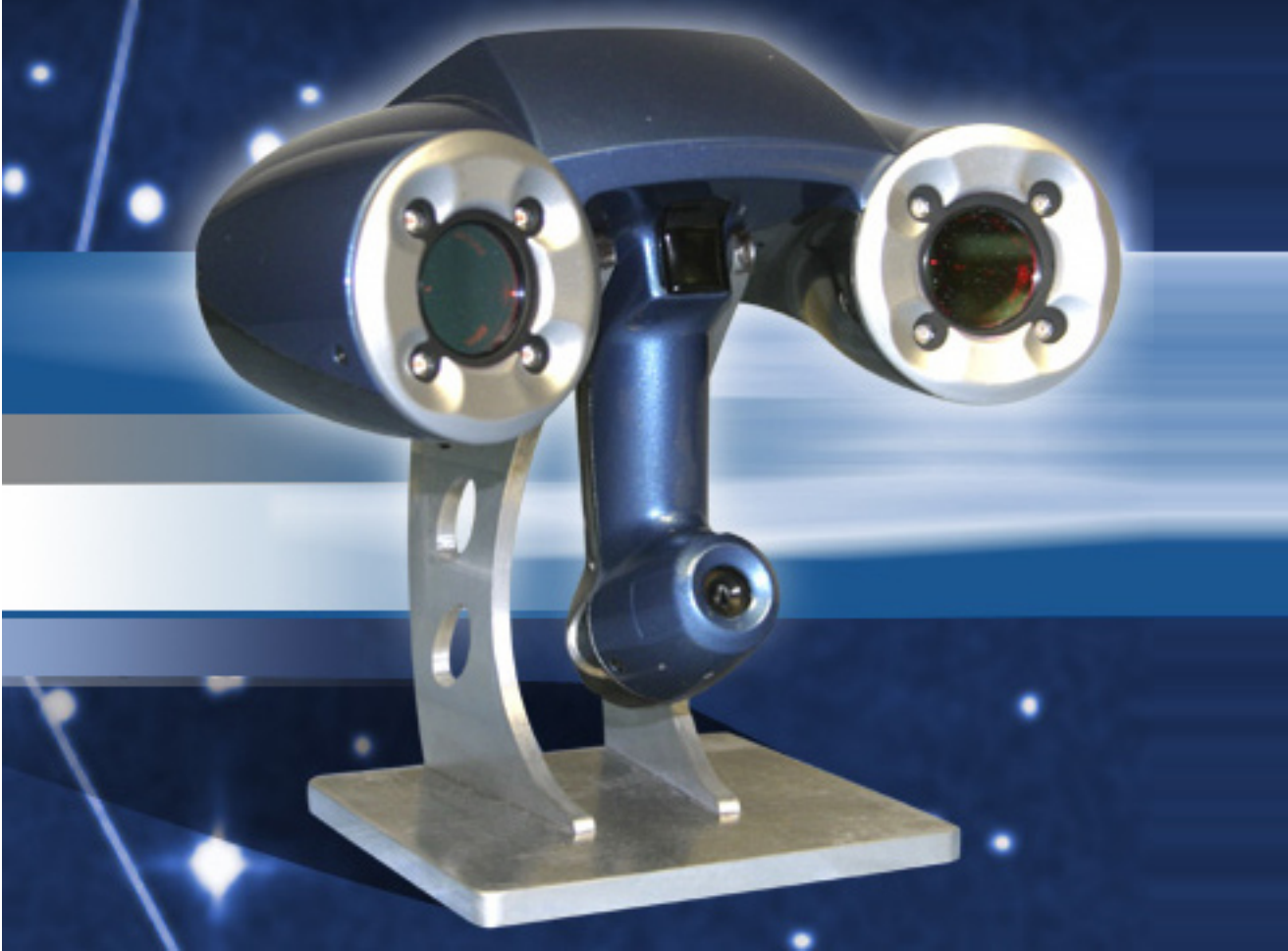
Rhinoceros



Tessellation Simulation

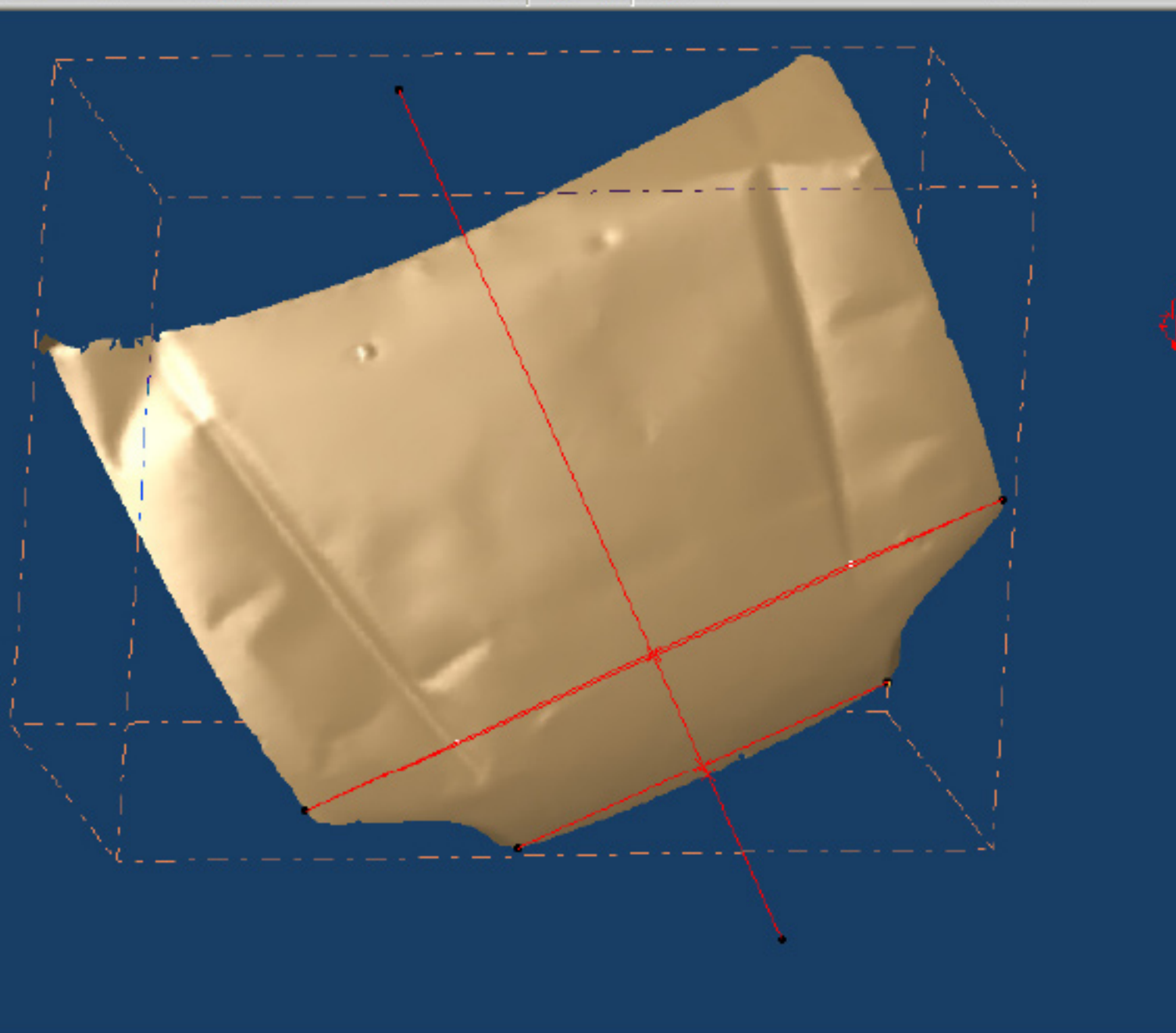
Anna Siano (University of Michigan Math Dept.)







- Part3
 - xy plane
 - yz plane
 - zx plane
 - Axis Systems
 - PartBody
 - HoodTop.1**
 - Hood Points
 - Hood Contours 1
 - Hood Contours 2
 - Hood Contours 3
 - Hood Surface
 - Surface Points
 - Line.11
 - Line.12
 - Point.103
 - Point.104
 - Point.105
 - Multi Output.1 (Project)
 - Project.1
 - Project.2
 - Line.13

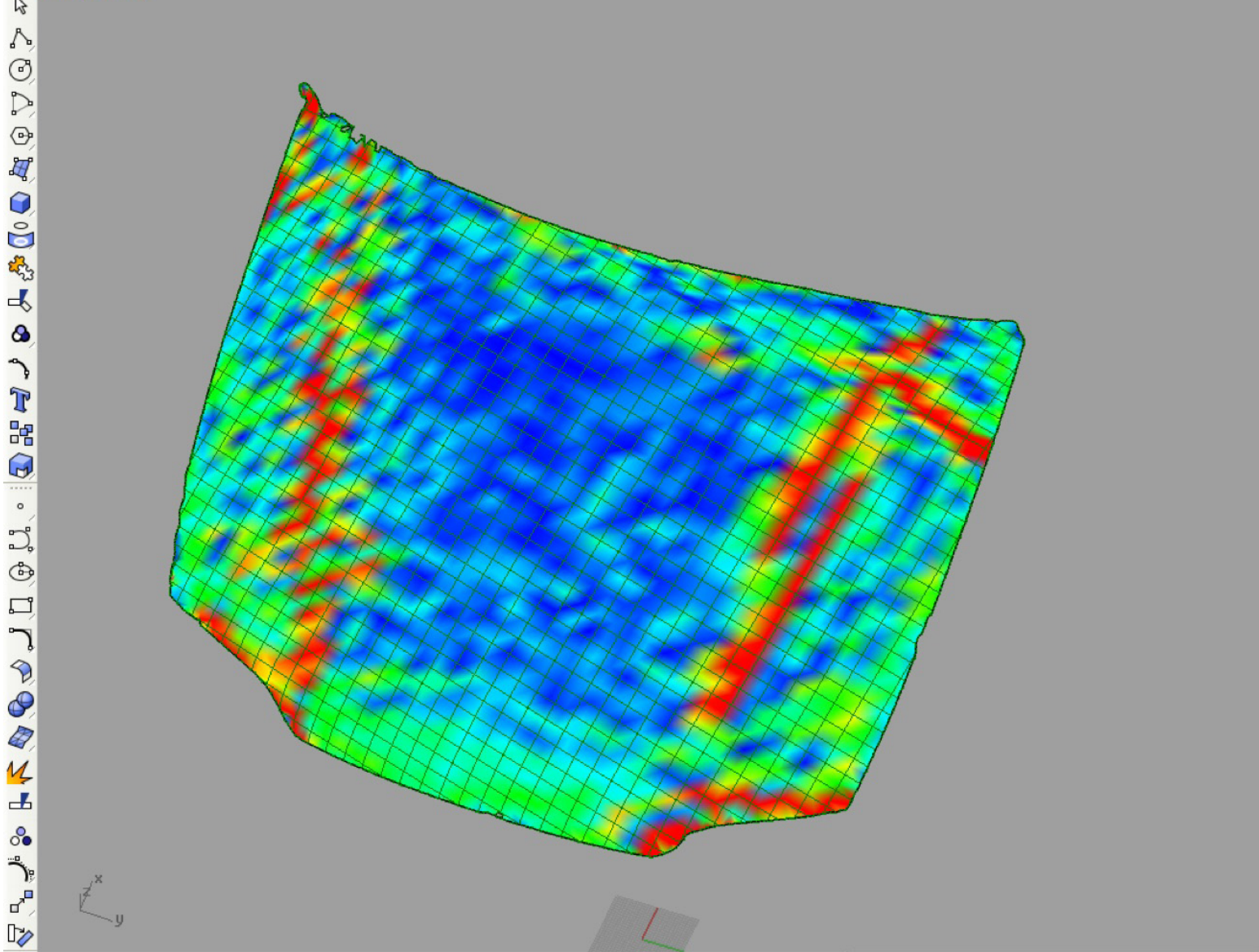


Updating meshes... Press Esc to cancel

Command:



Perspective



Curvature

Style: Mean

Curvature range: 0.0041654992 to 5.964190097e-07

Buttons: Auto Range, Max Range, Show isocurve, Adjust Mesh, Add Objects, Remove Objects

Layers - All Layers

Name	Color	Icon	Material
Default	Light Blue	Light Blue	Black
pulled ...	Black	Black	Black
contours	Light Blue	Light Blue	Red
Hood Pat...	Light Blue	Light Blue	Green
Backups	Light Blue	Light Blue	Black
Hood ...	Light Blue	Light Blue	Green

End Near Point Mid Cen Int Perp Tan Quad Knot Project STrack Disable

CPlane x 1458.111 y -502.132 z 0.000

pulled contours Snap Ortho Planar Osnap Record History

Zebra Options | Curvature2.3dm - Rhinoceros (Educational Lab License) - [Perspective]

File Surface Solid Mesh Dimension Transform Tools Analyze Render Help
Zebra stripe analysis. Press Enter when done:

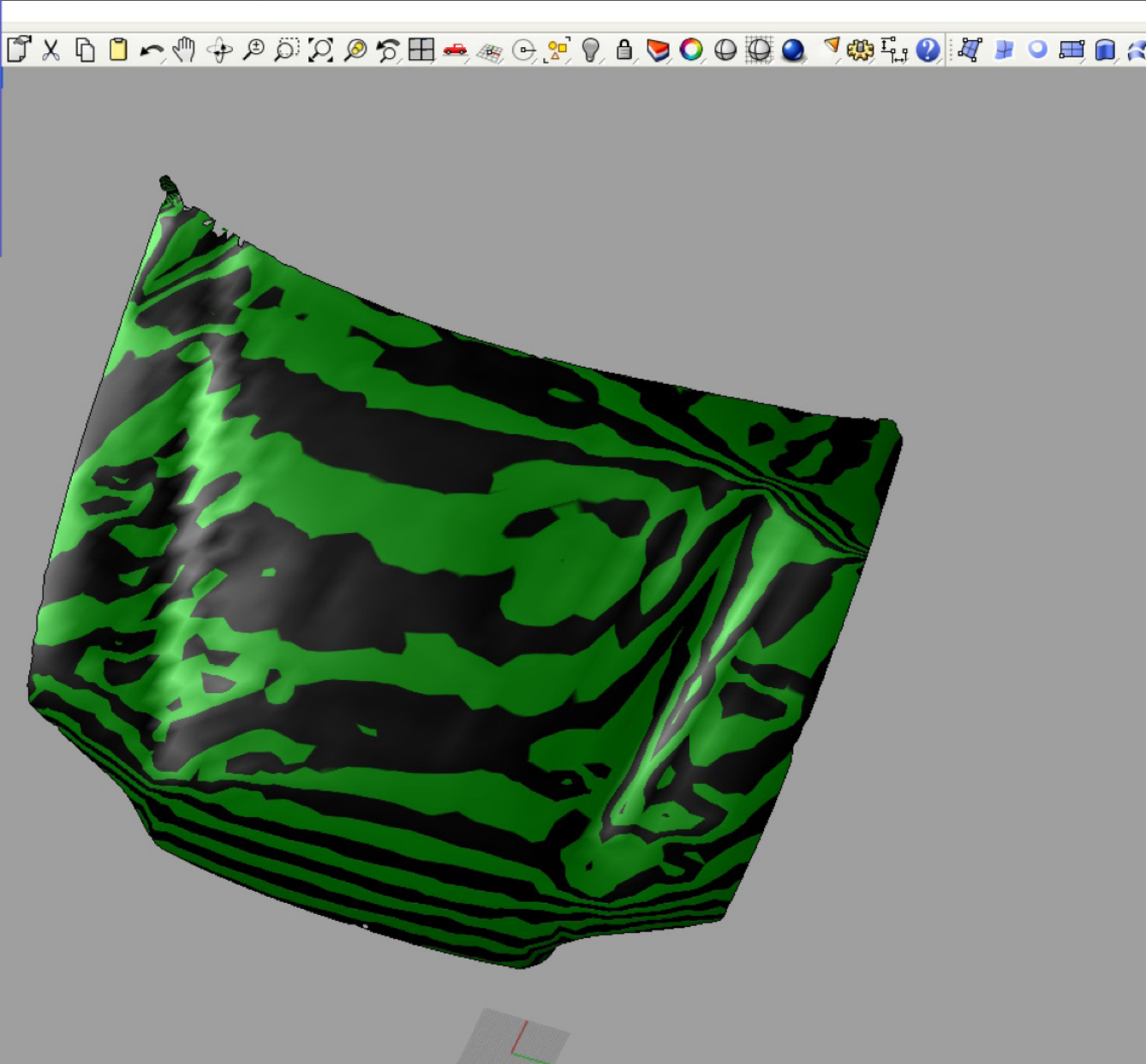
Stripe direction
 Horizontal
 Vertical

Stripe size
Thin

Stripe color
[Black swatch]

Show isocurve

Adjust Mesh...
Add Objects
Remove Objects



Curvature

Style
Mean

Curvature range
0.0041654992
5.964190097e-07

Auto Range
Max Range

Show isocurve

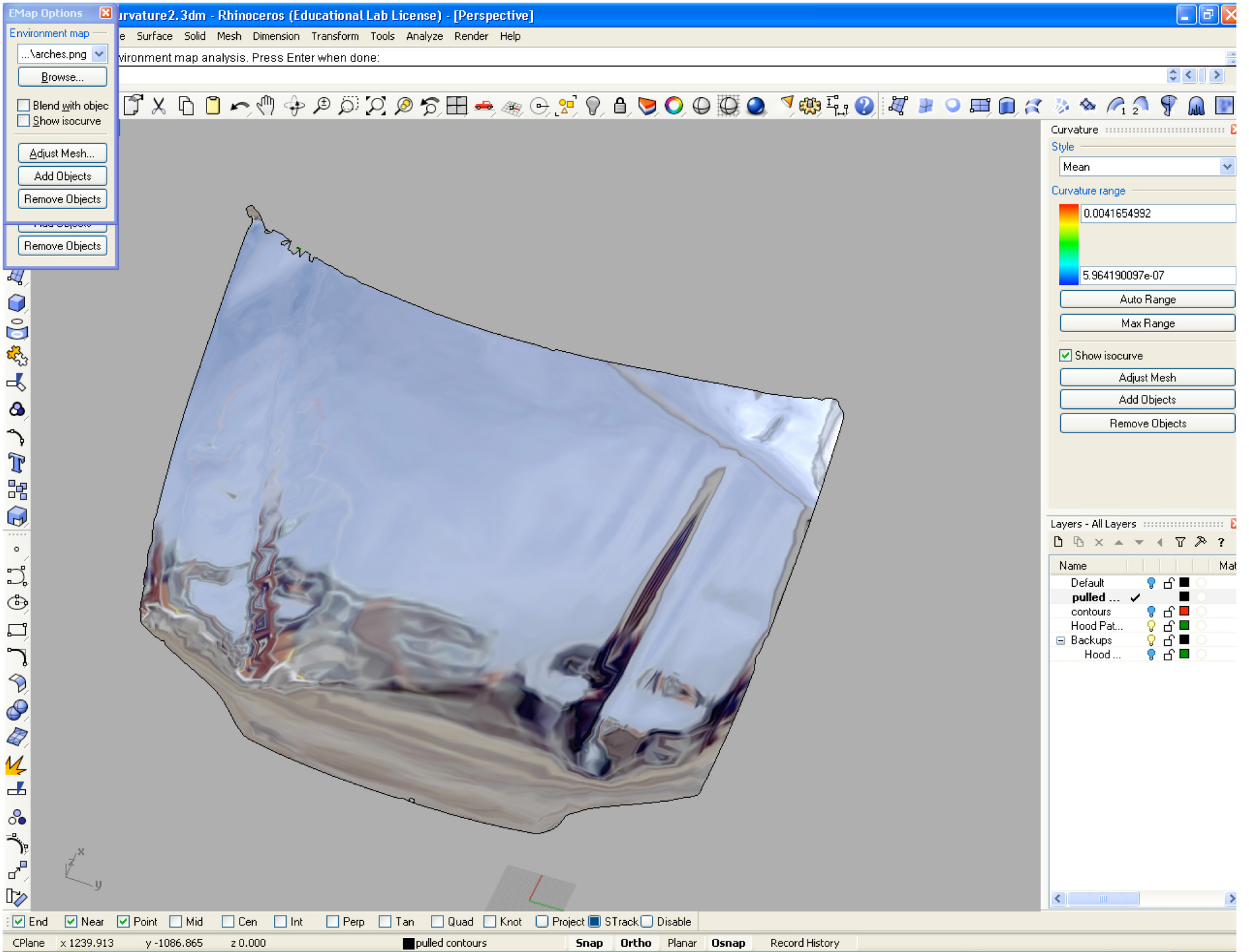
Adjust Mesh
Add Objects
Remove Objects

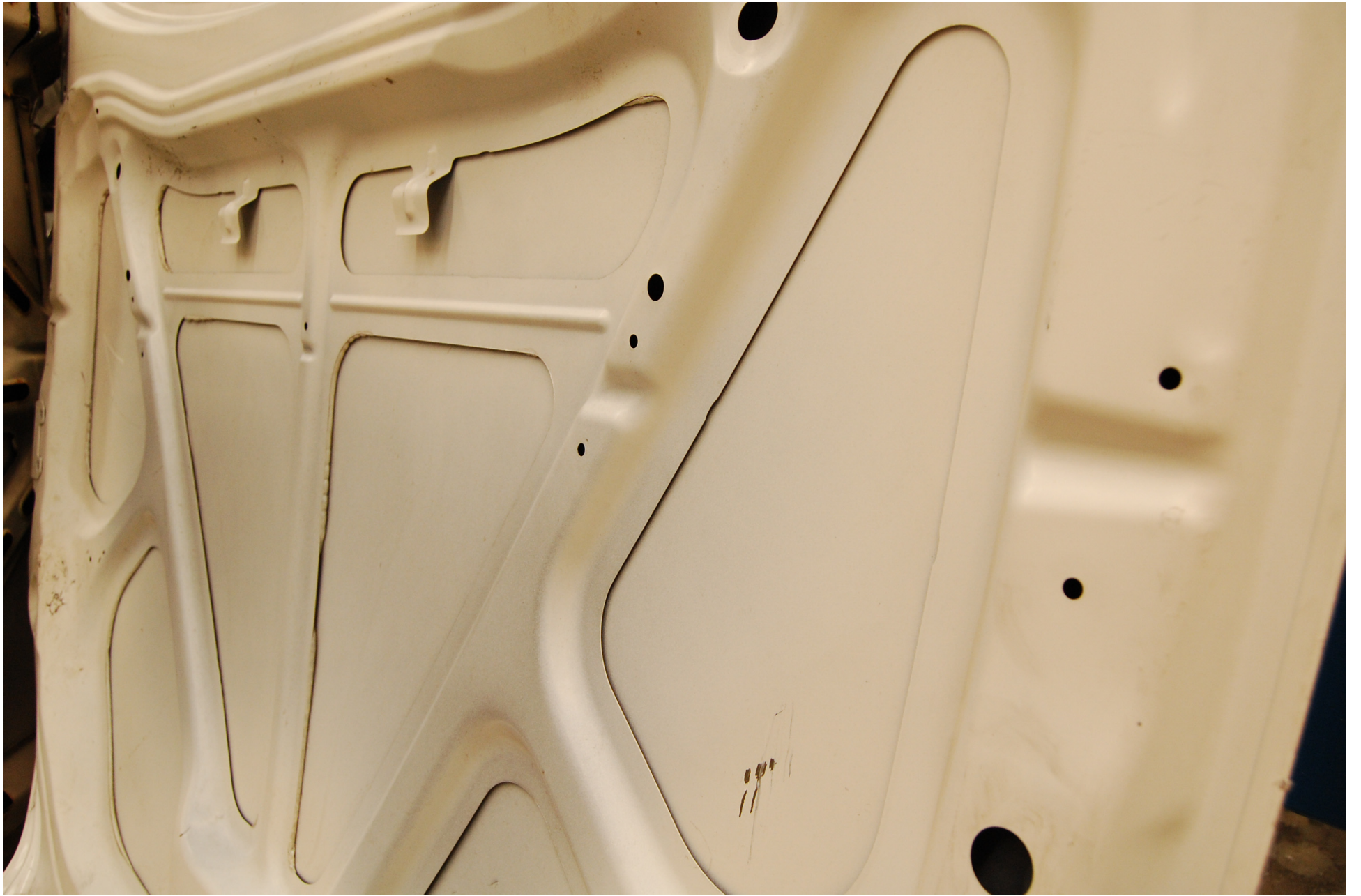
Layers - All Layers

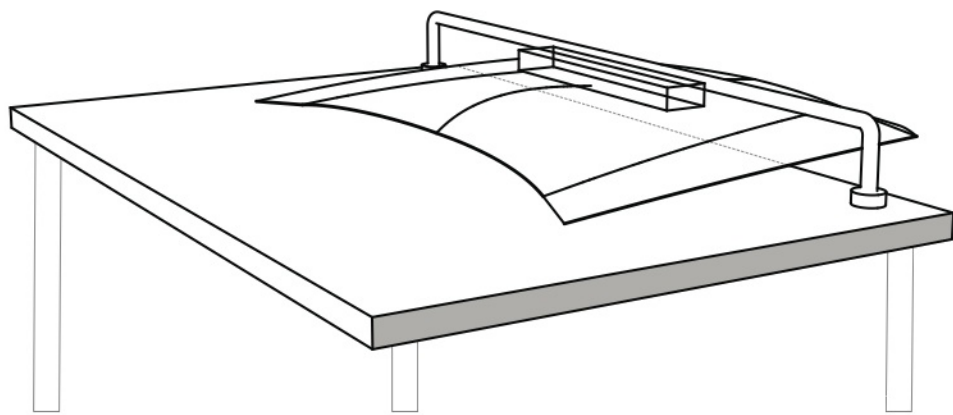
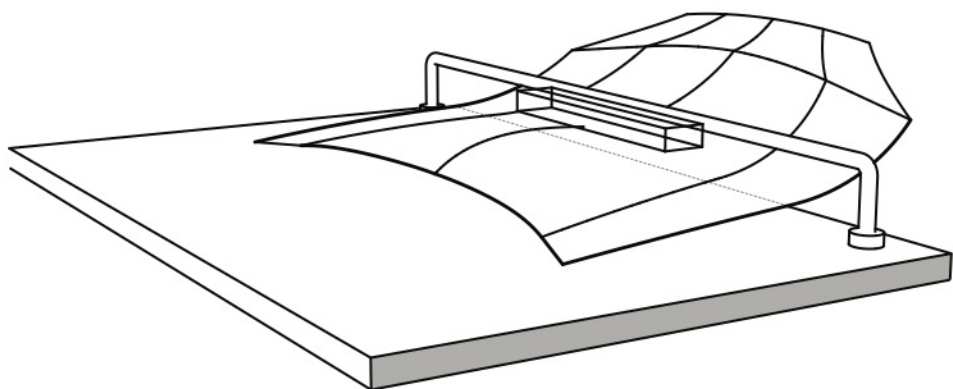
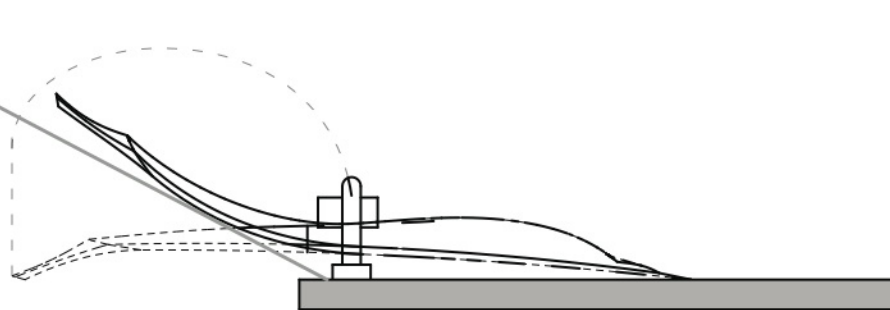
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Default	<input type="checkbox"/>	<input type="checkbox"/>	[Black]	[None]
pulled ...	<input checked="" type="checkbox"/>	<input type="checkbox"/>	[Black]	[None]
contours	<input type="checkbox"/>	<input type="checkbox"/>	[Red]	[None]
Hood Pat...	<input type="checkbox"/>	<input type="checkbox"/>	[Green]	[None]
Backups	<input type="checkbox"/>	<input type="checkbox"/>	[Black]	[None]
Hood ...	<input type="checkbox"/>	<input type="checkbox"/>	[Green]	[None]

End Near Point Mid Cen Int Perp Tan Quad Knot Project STrack Disable

CPlane x 1553.286 y -25.929 z 0.000 [Black swatch] pulled contours Snap Ortho Planar Osnap Record History



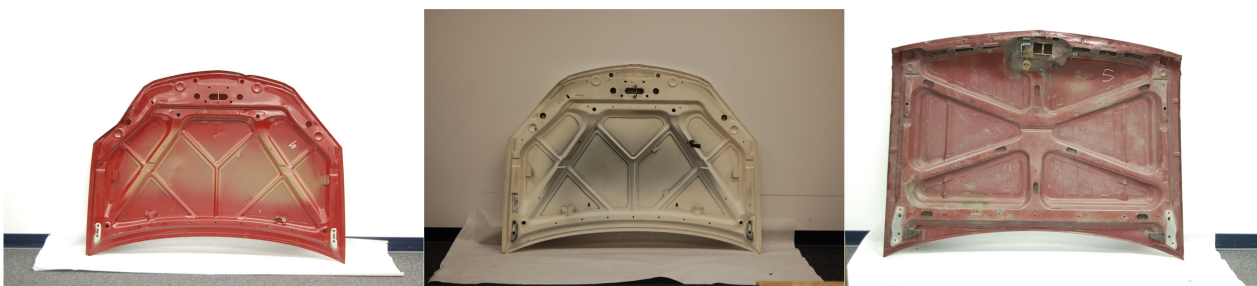


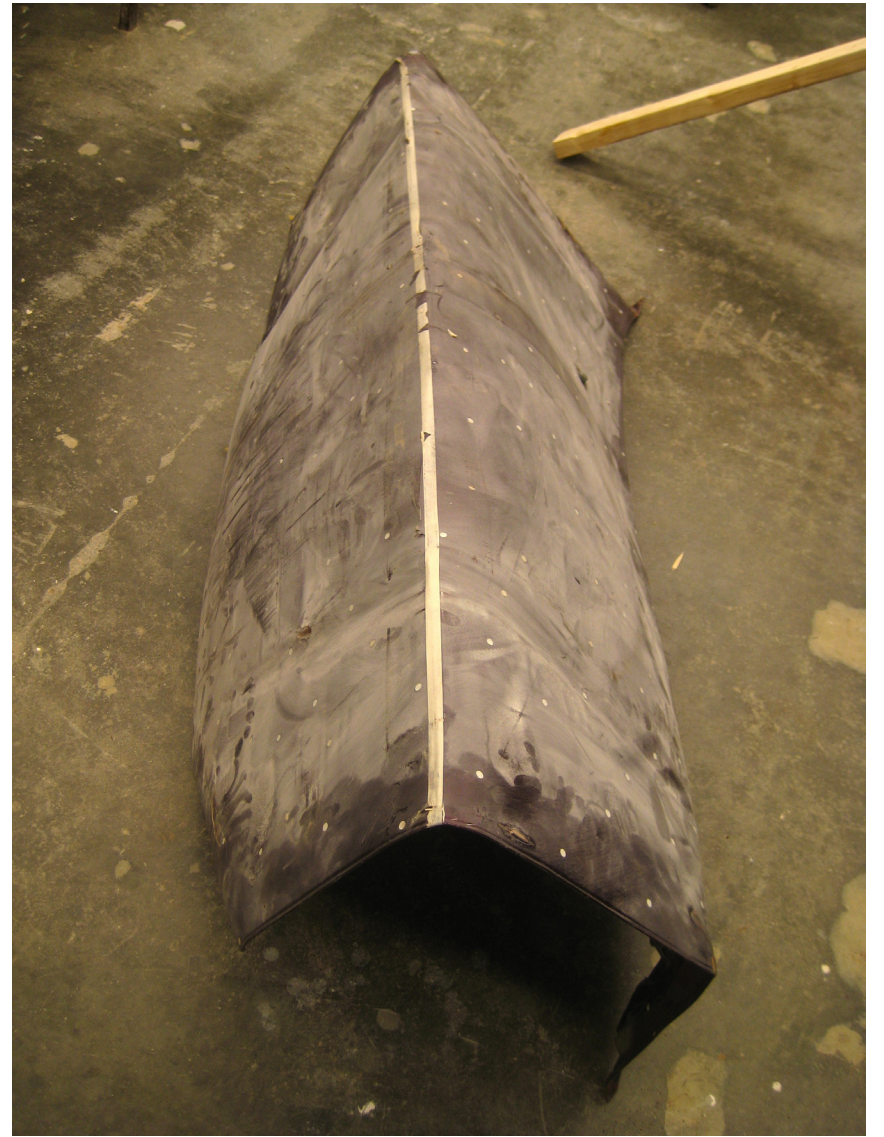
























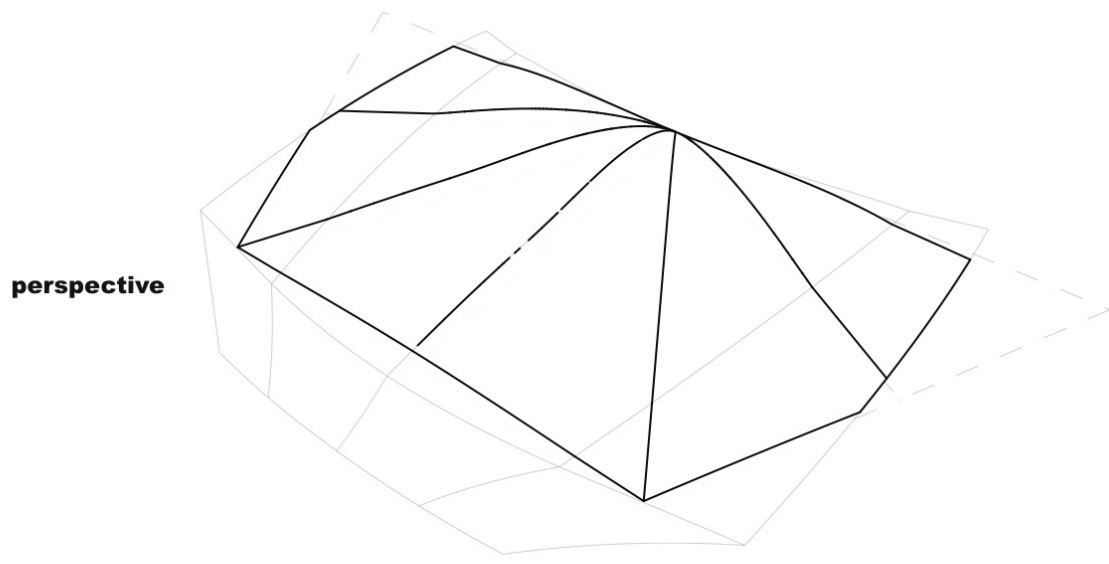
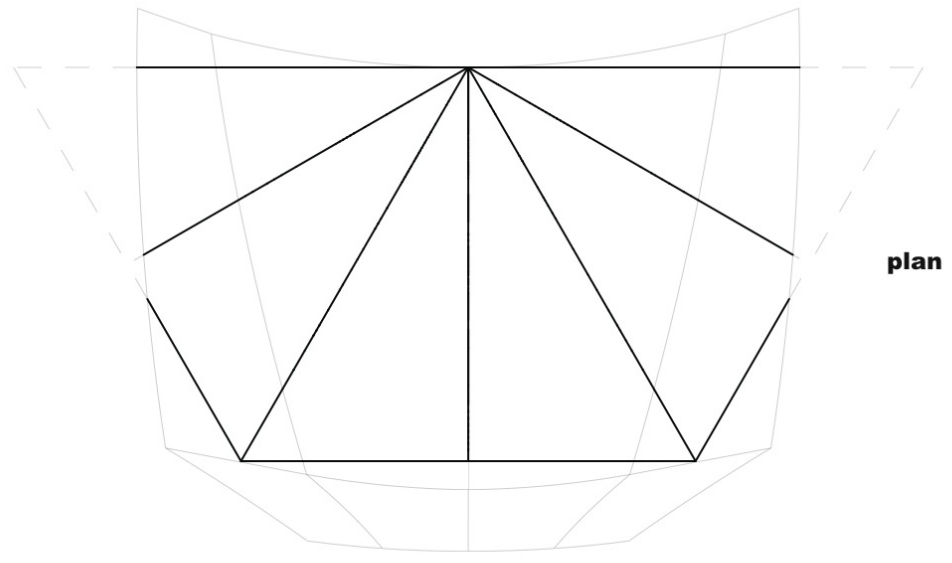


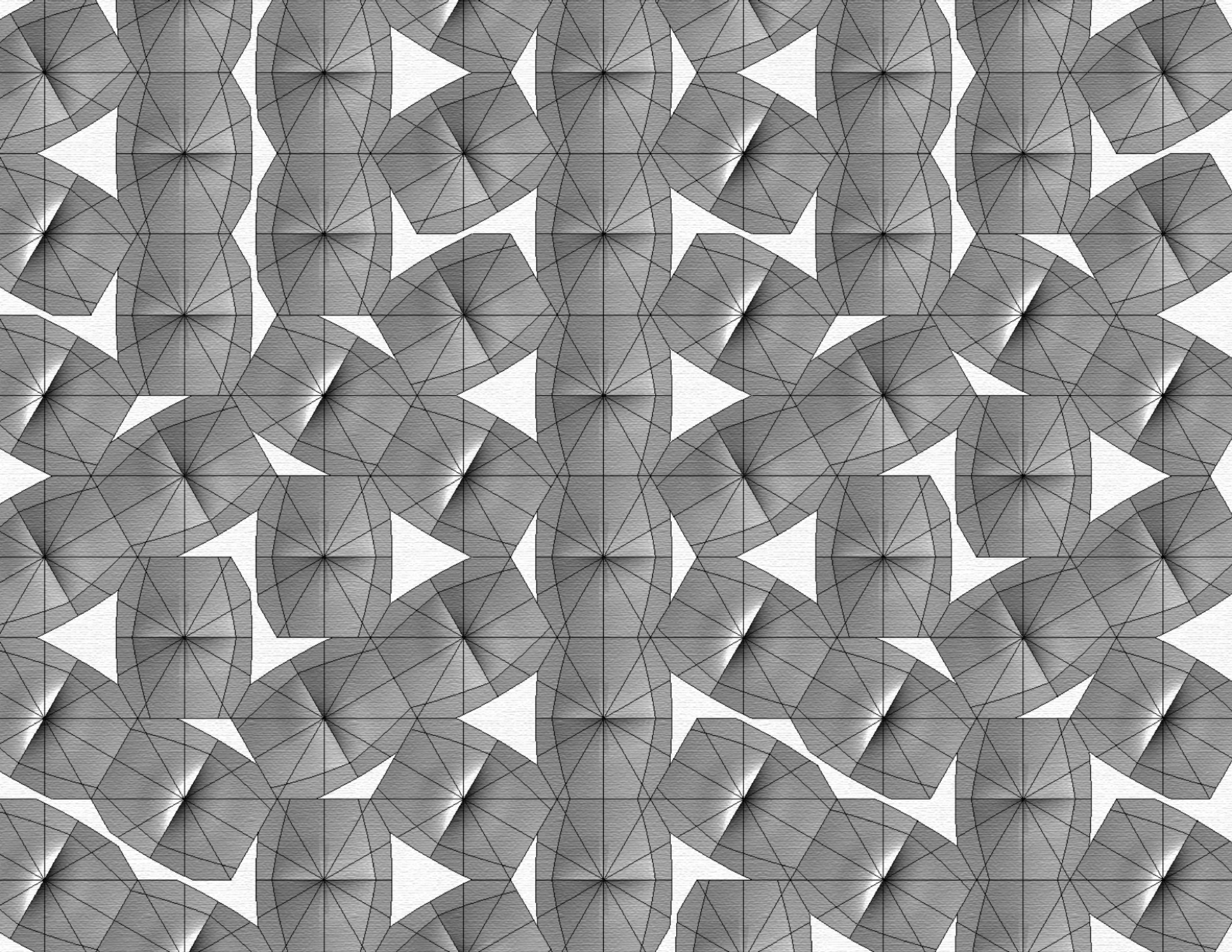


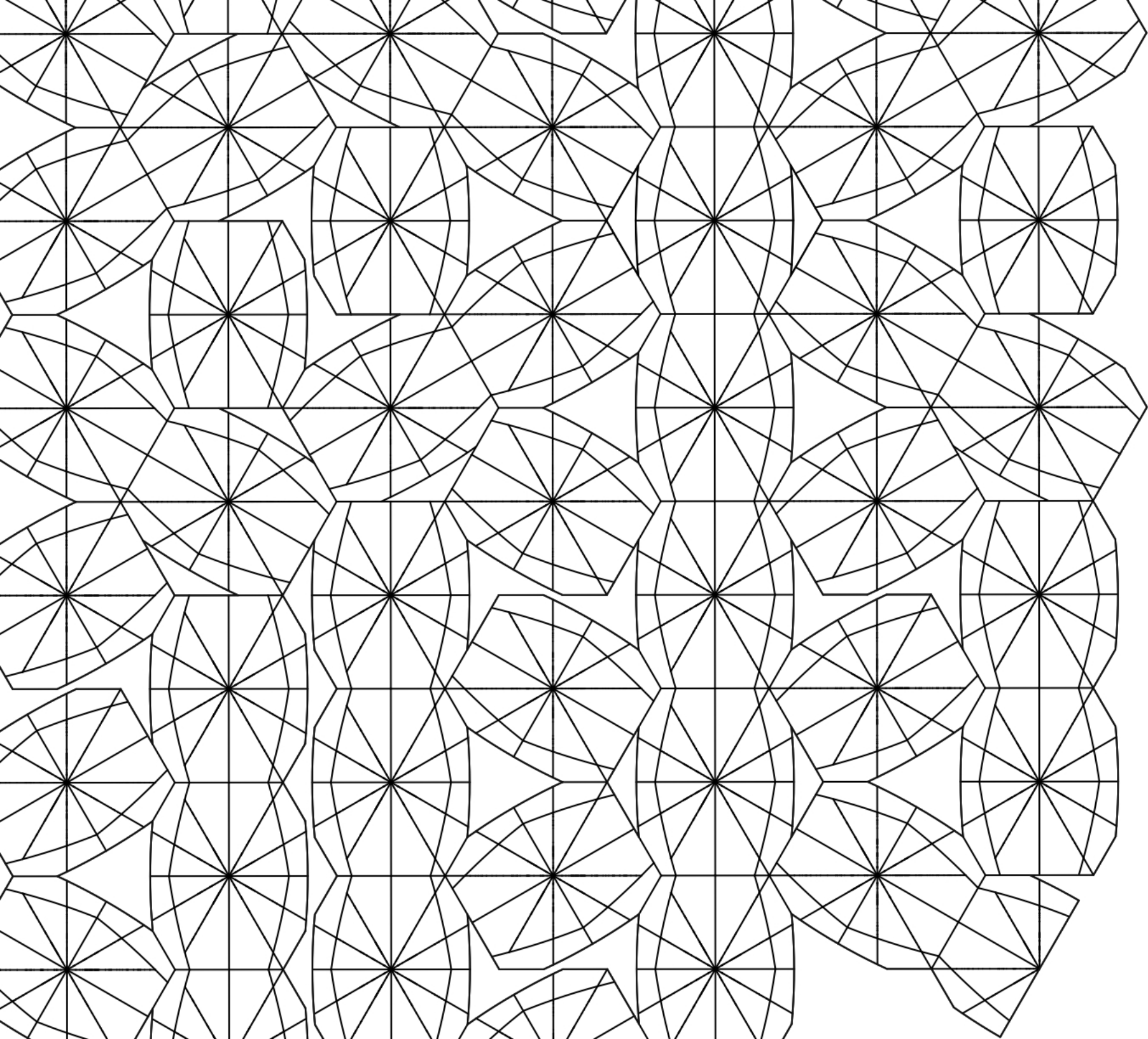


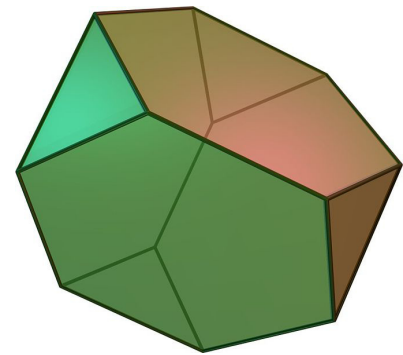
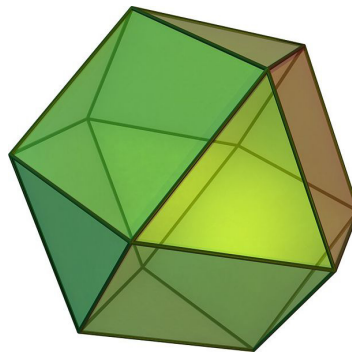
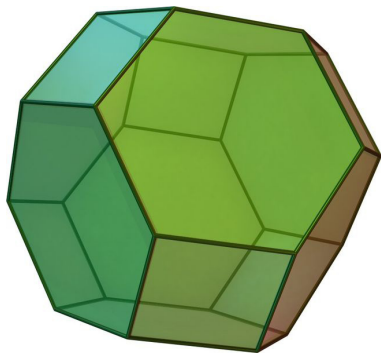
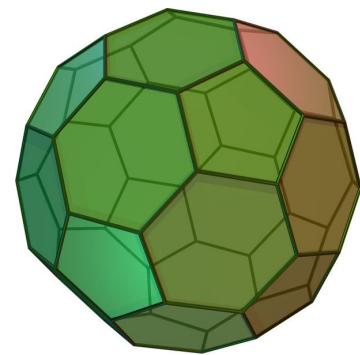
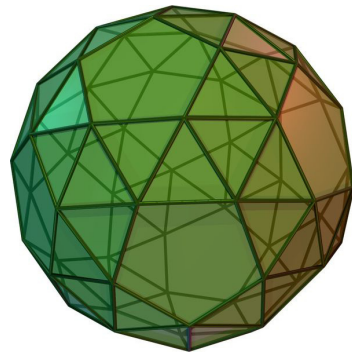
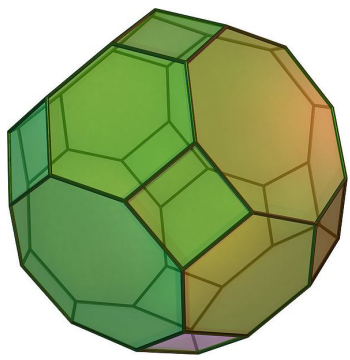


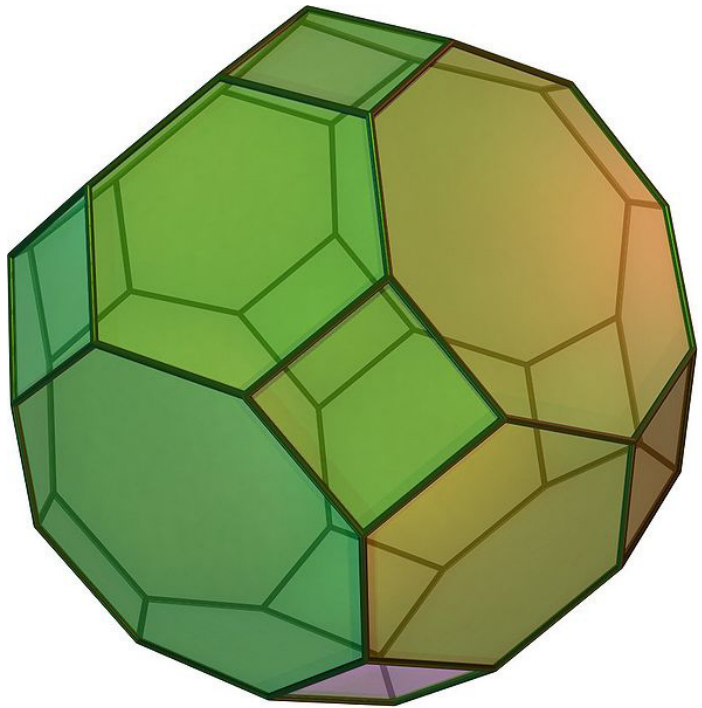
hood + projected tessellation pattern



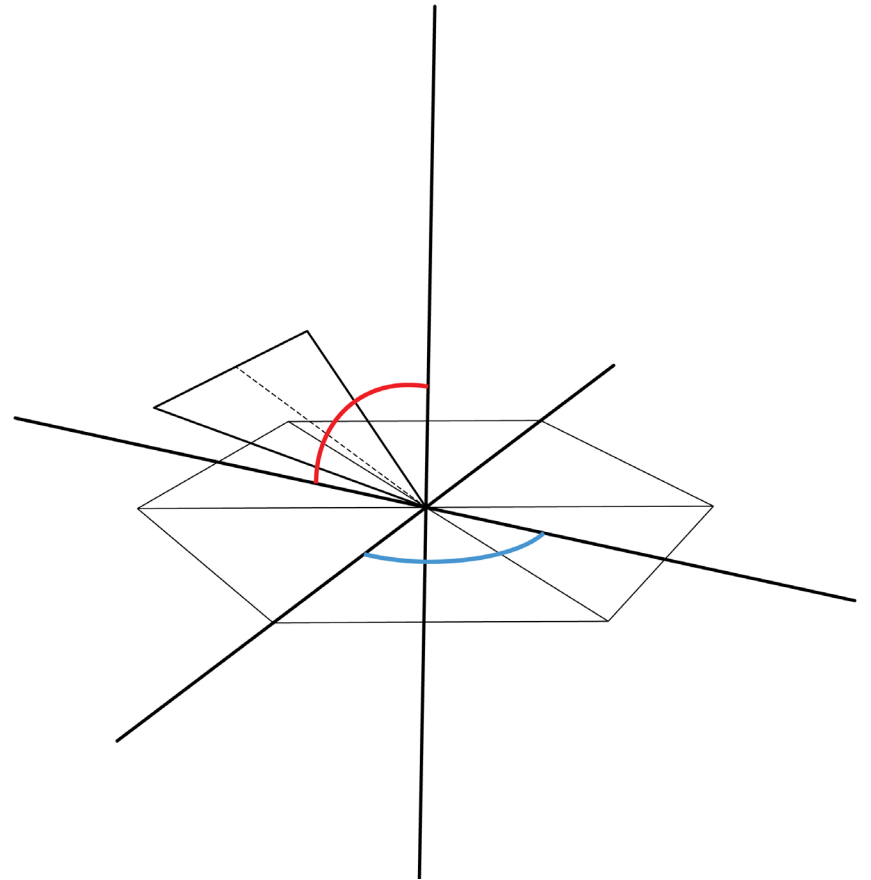
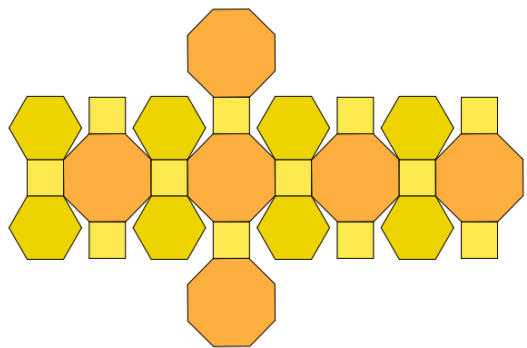


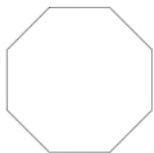
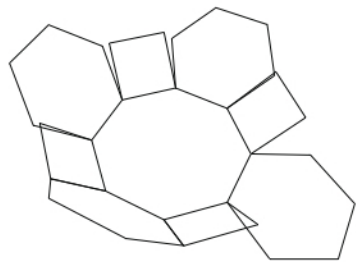
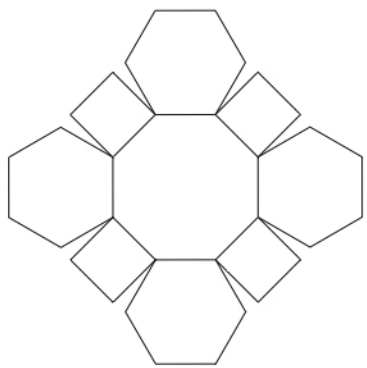




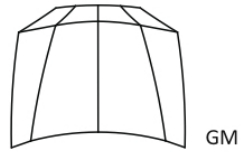
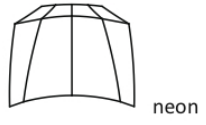


truncated cuboctahedron
or great rhombicuboctahedron
(4.6.8)

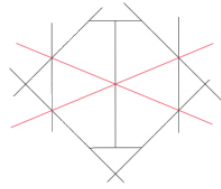
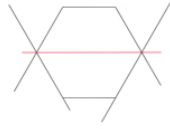




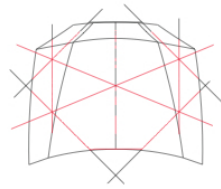
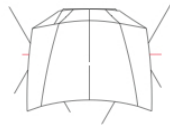
trunk



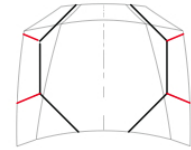
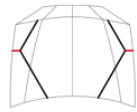
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trunk



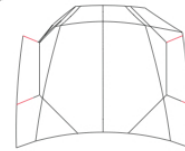
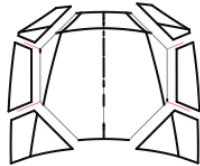
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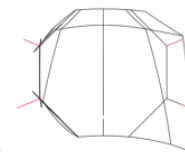
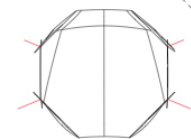
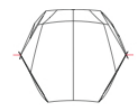
fold lines

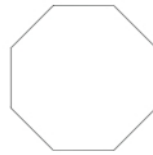
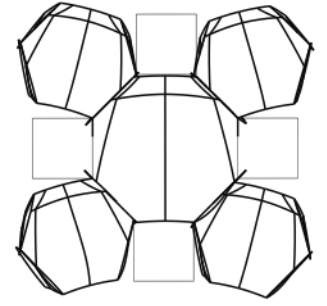
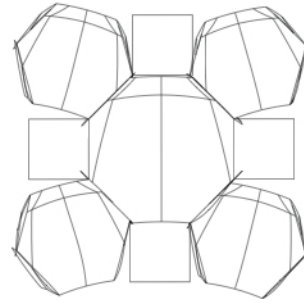
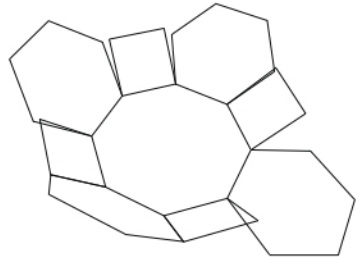
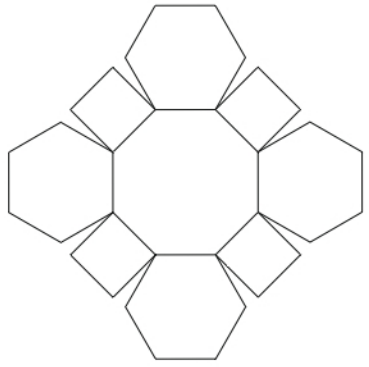
cut lines

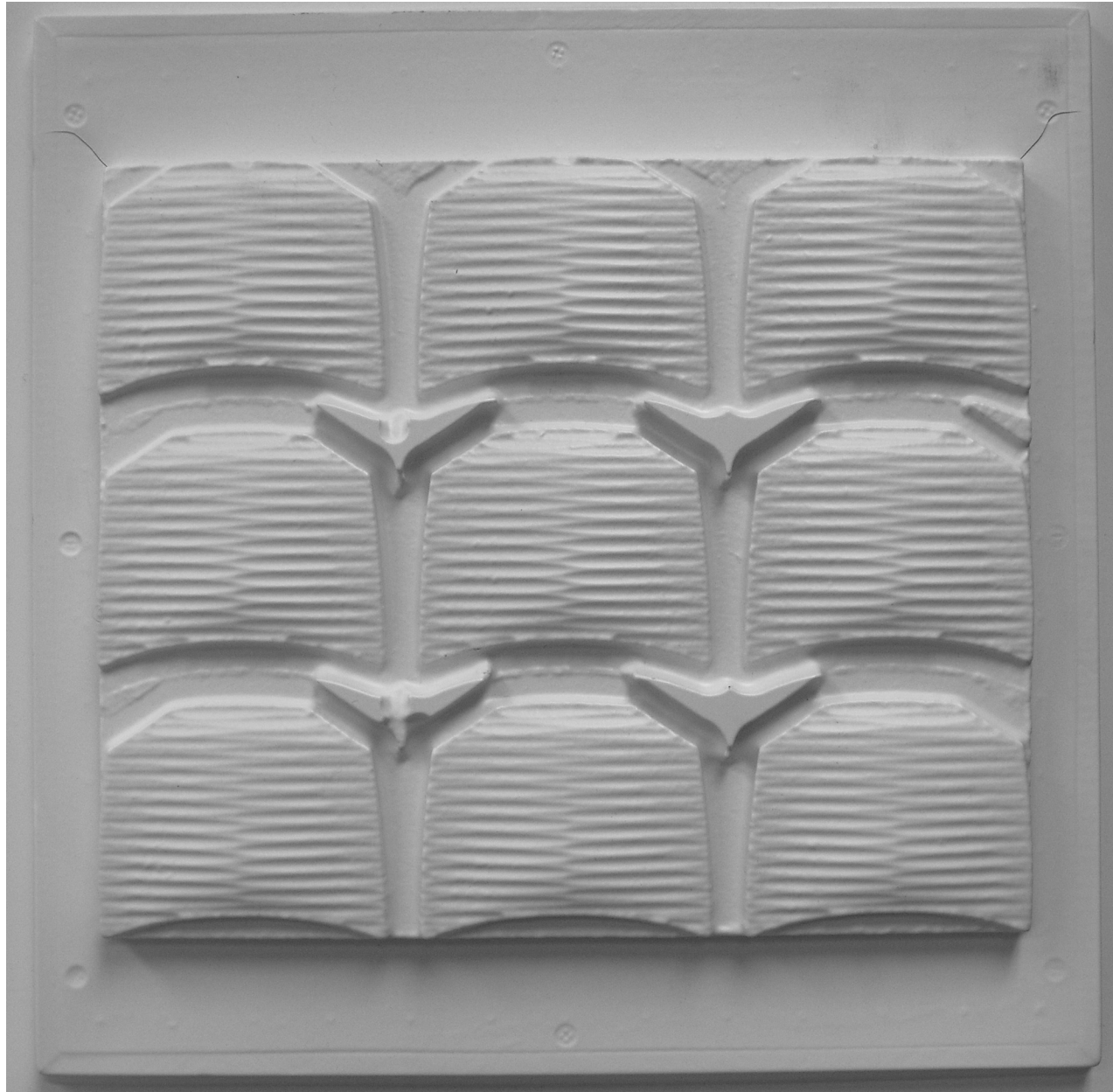
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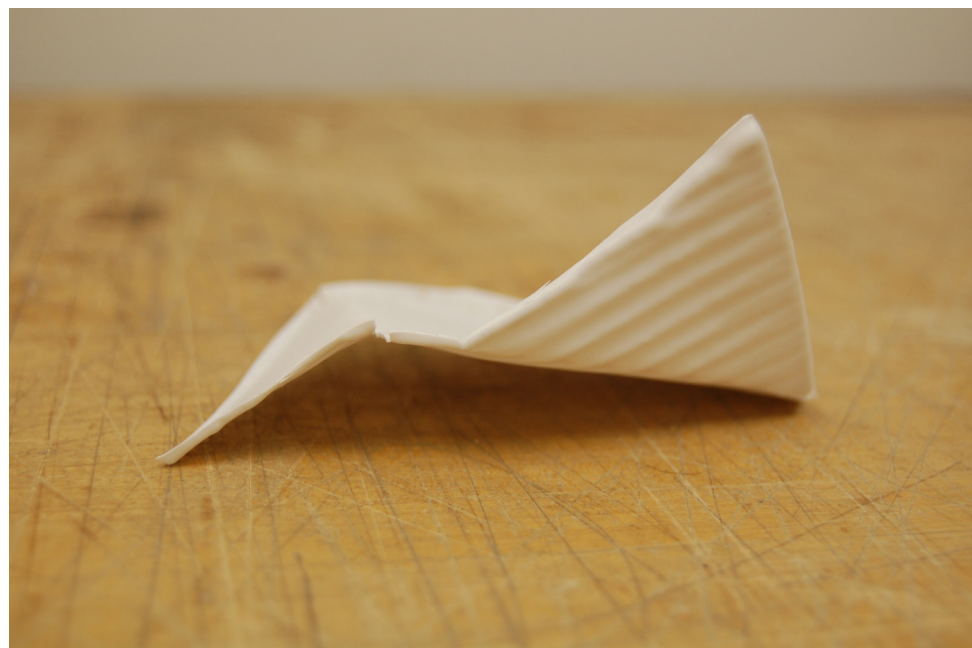
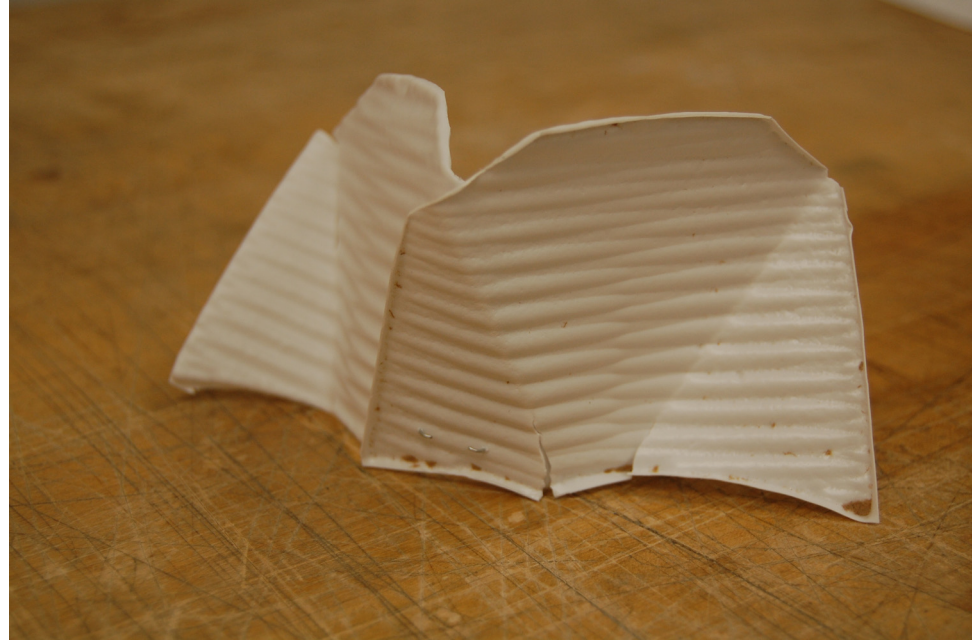
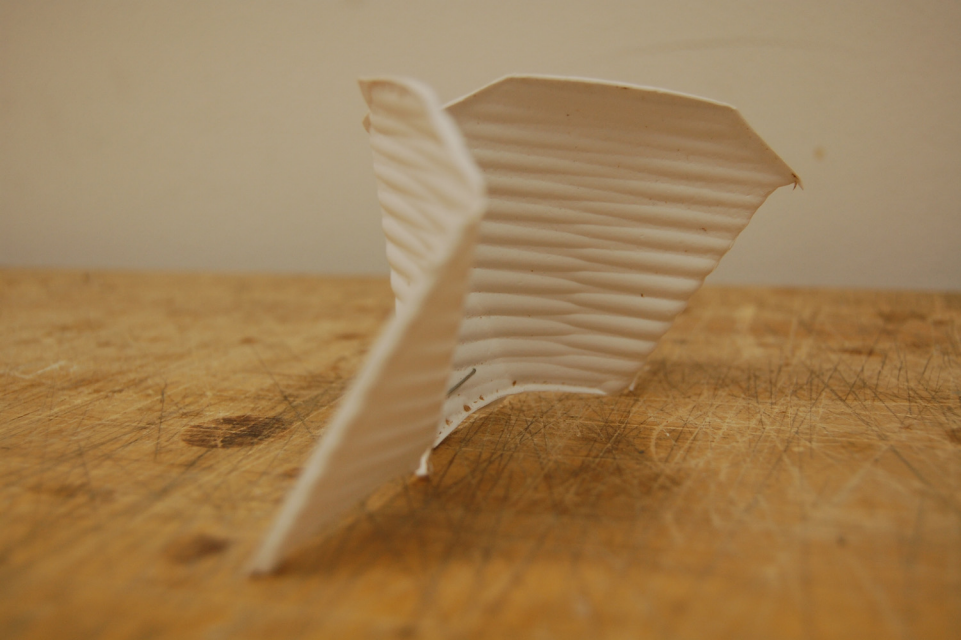


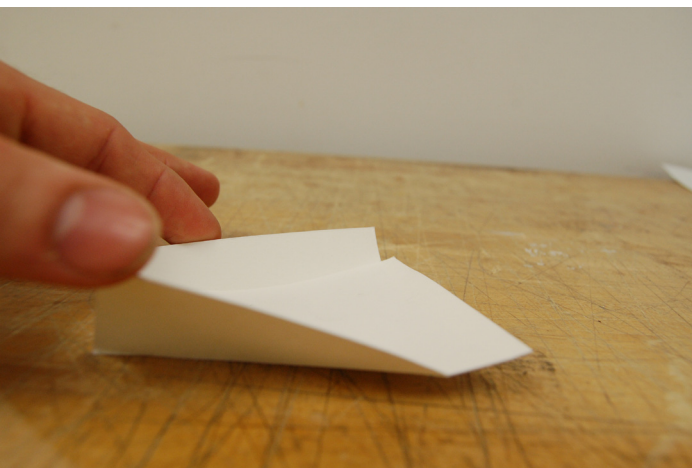
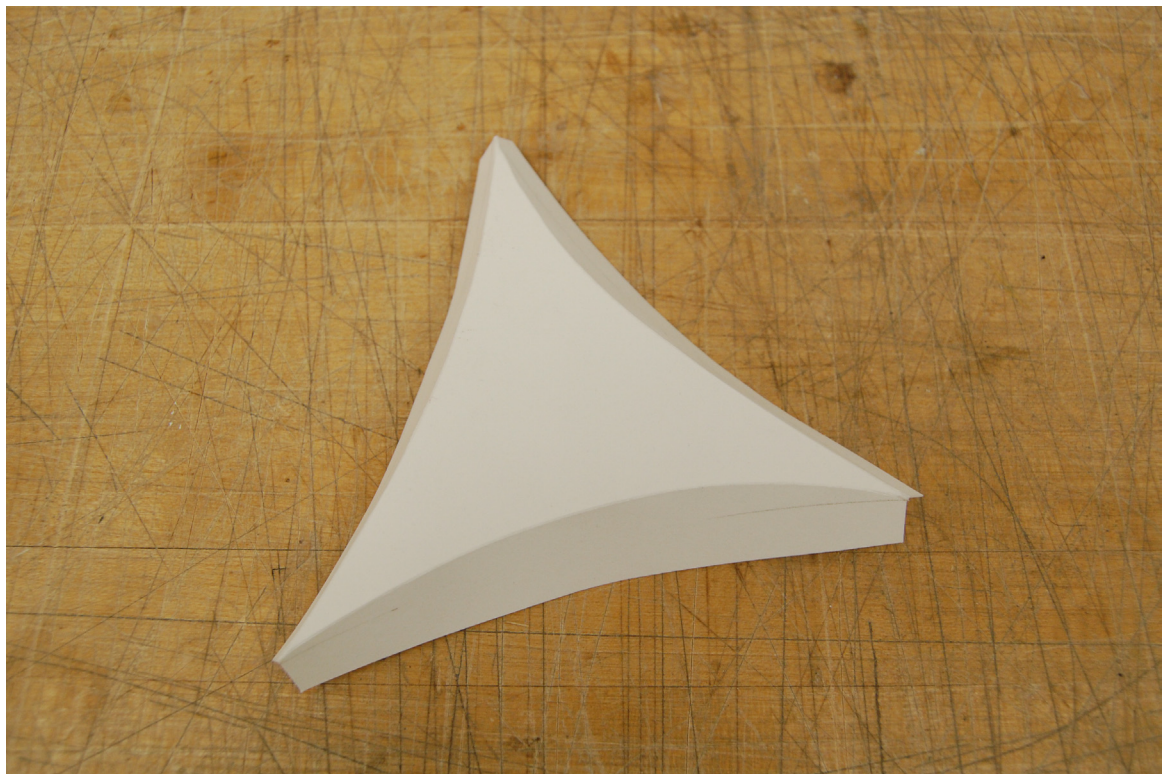
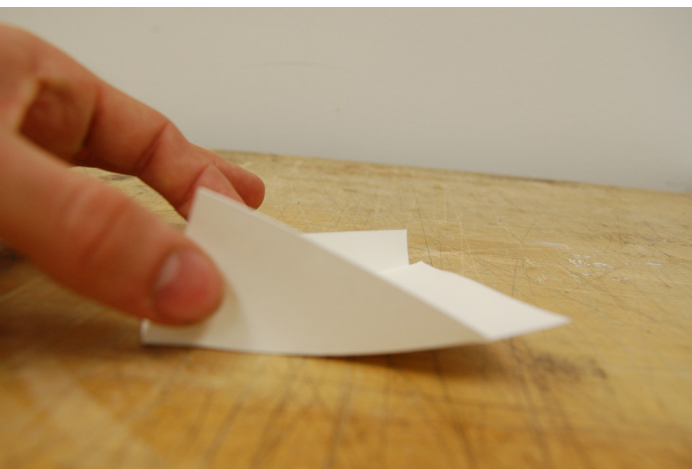
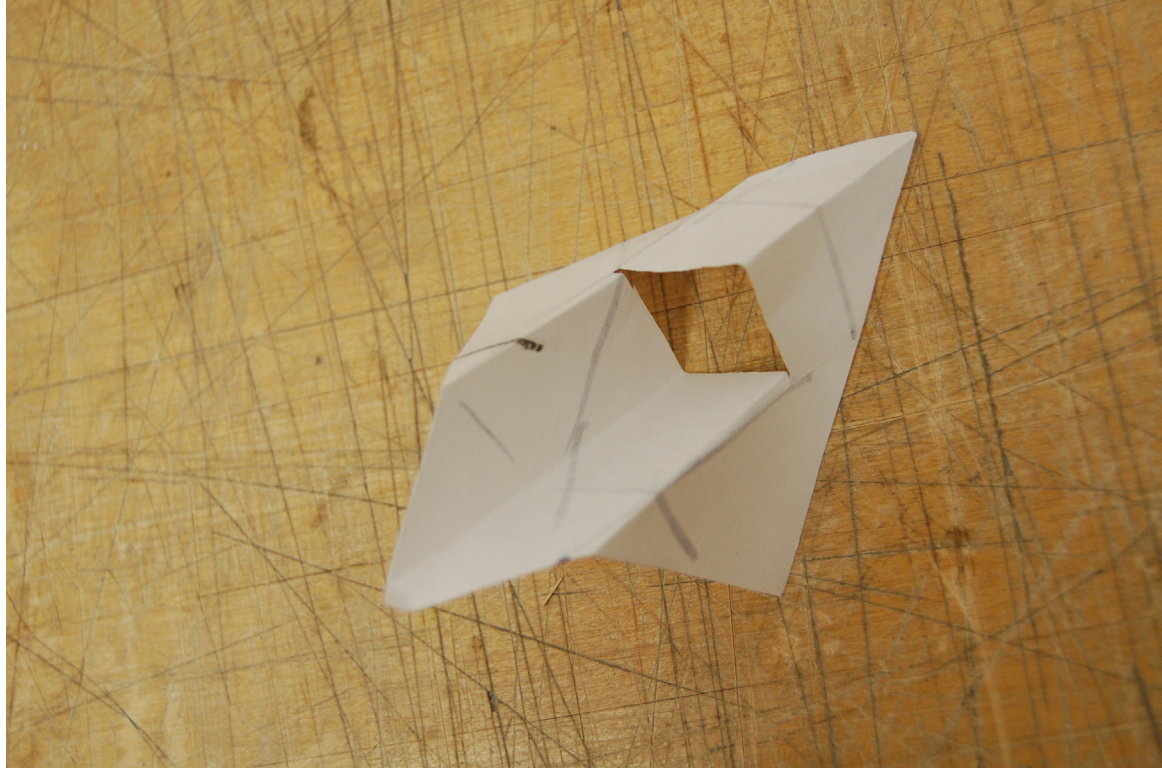
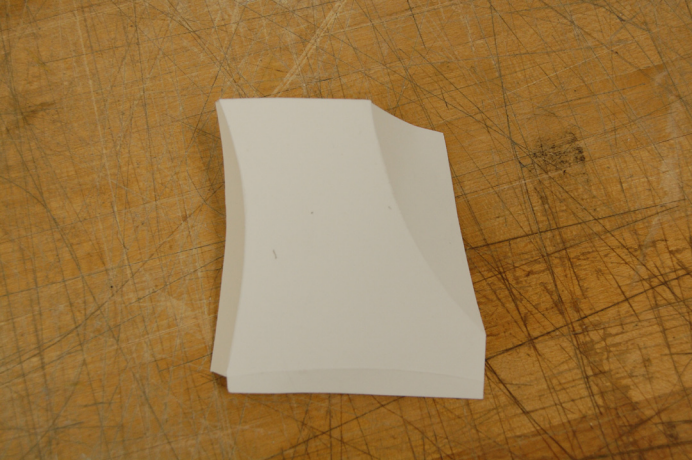
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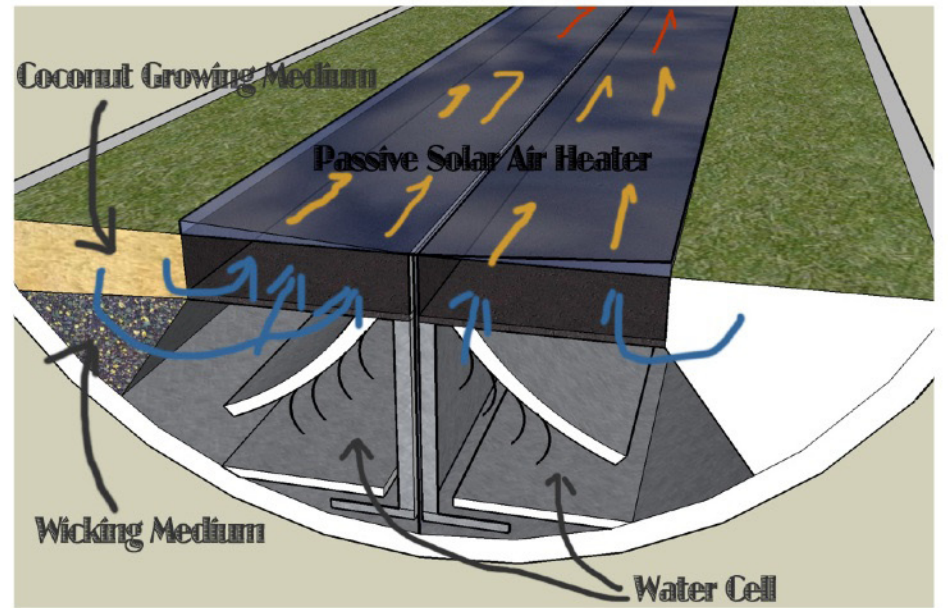
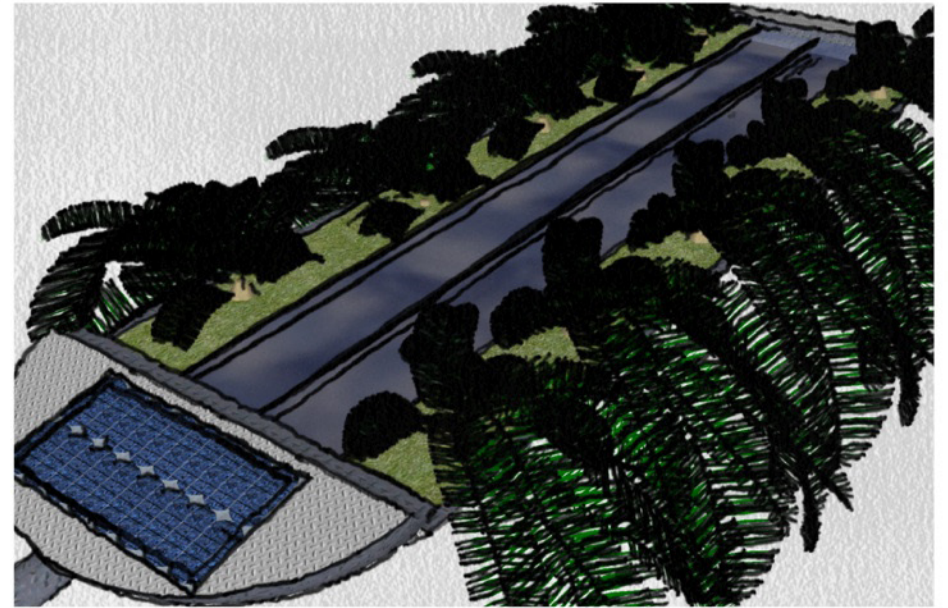
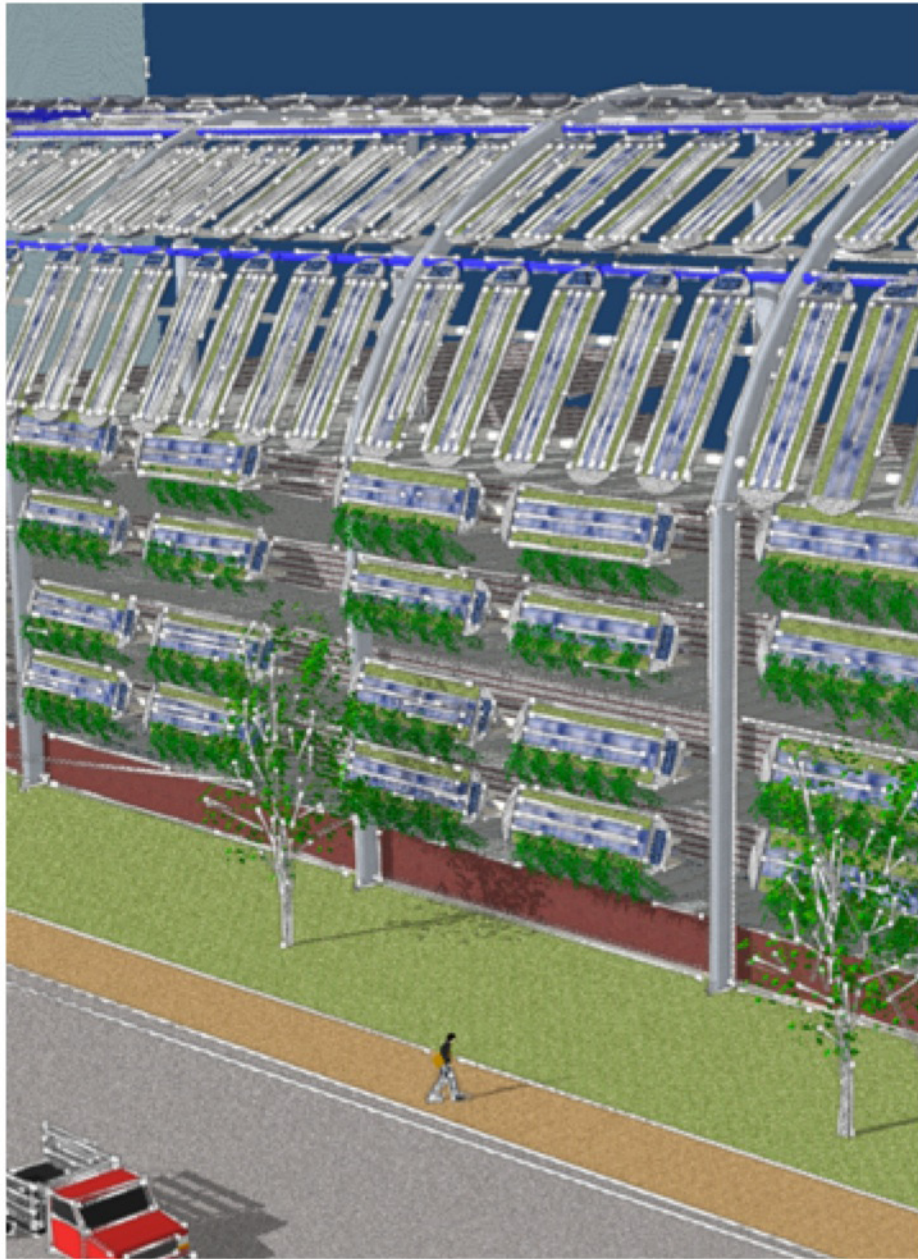






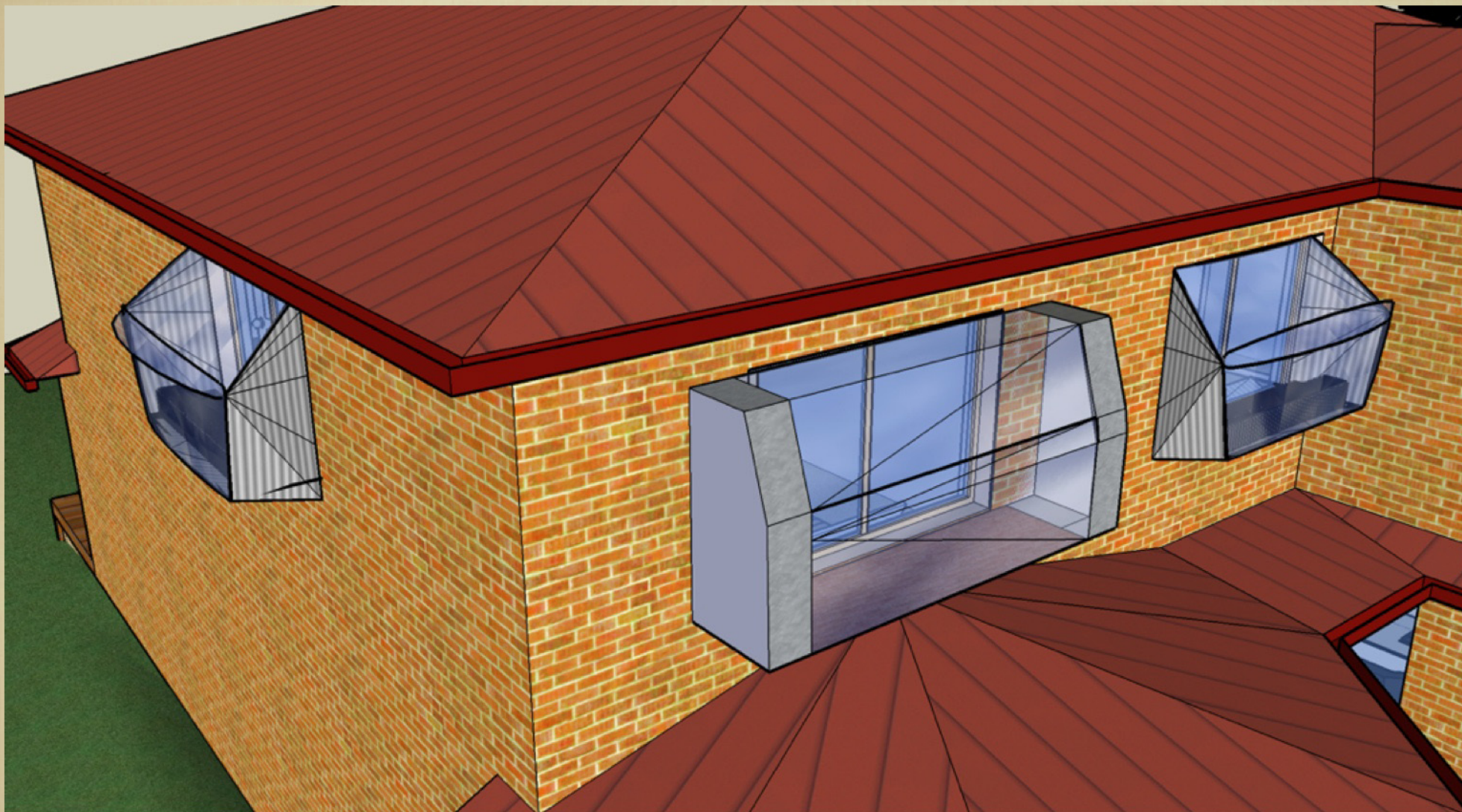


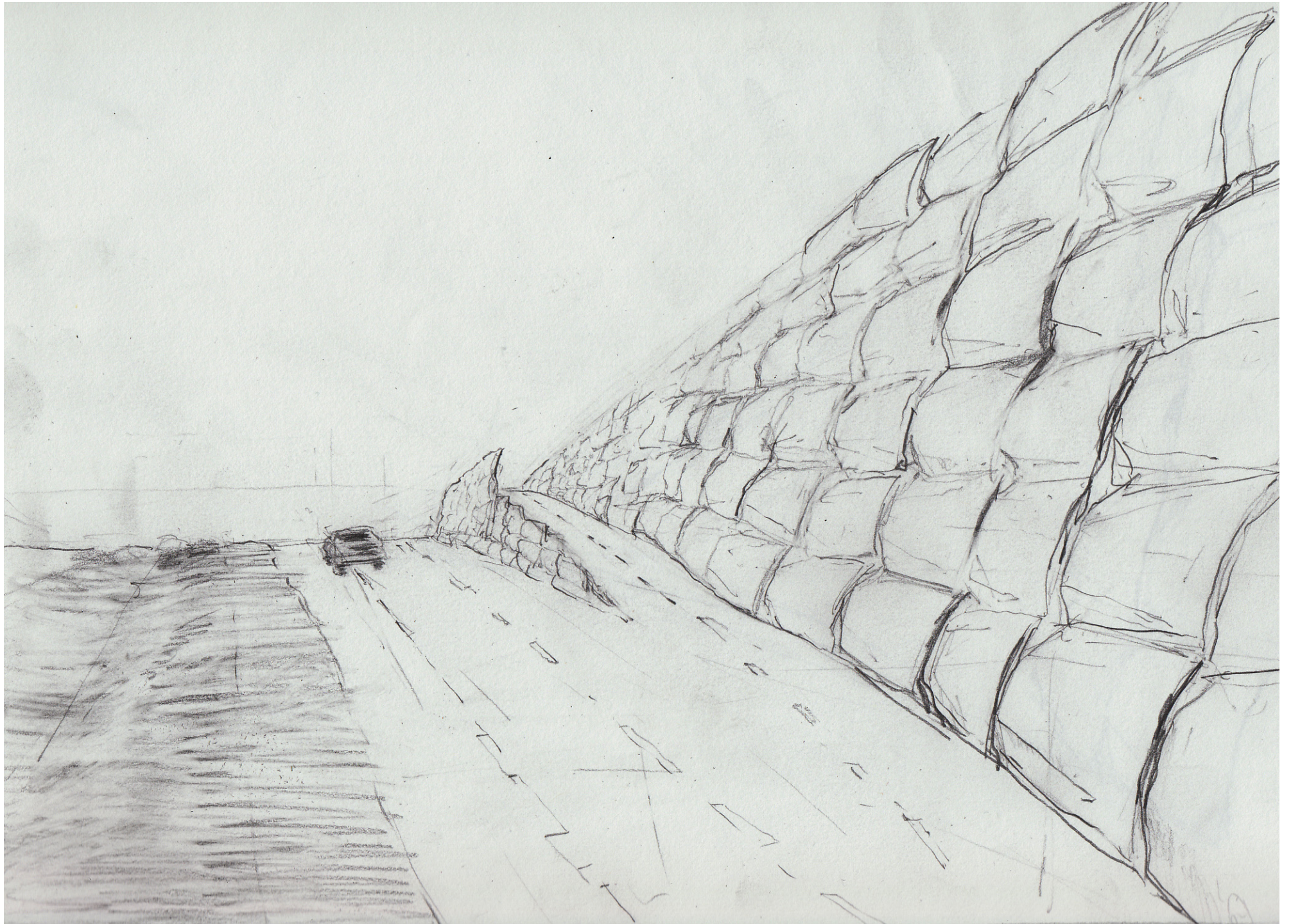




Green Facade Solar Siphon

PASSIVE THERMAL WINDOW BOX





QUESTIONS:

1 . For the wrap, we want to *inspire the audience to explore the possibilities for the form and function* of repurposed waste.

If we want the audience to make the connection between repurposed waste and solving functional design problems, is this best done with:

- Something functional that is also kinda pretty
- Something beautiful that inspires you to think of what functional ways it could be employed

2. What "charismatic product" might best sell our process and the idea of waste recapture and re-fabrication?

3. If you were going to try to replicate this process with another material **and a specific design problem**, what parts of this process do you think are critical to have documented and explained?