Assembly Review

2.009 Pink

3 Ideas
Sketch Model
Assembly Review
Mockup
Technical Review
Final Presentation

sep  oct  nov  dec  2022
user

CONFORM
Persona | Use Case

Mike works at the MIT forge and foundry. He works with little metal figurines every day and needs to chisel and polish them. Mike uses conform to hold onto these figurines in different orientations for polishing and finishing.
Persona | Interacting with Conform

TO REORIENT AN OBJECT, MIKE RELEASES THE VACUUM.

ONCE HE ADJUSTS THE VICE AND FIGURINE, HE REACTIVATES THE VACUUM.

SINCE CONFORM IS MODULAR, MIKE CAN ATTACH THE VICE JAW ATTACHMENTS TO ANOTHER VICE HE Owns.
form factor

CONFORM
Form Factor | Overview

- Vise
- Bladders
- Control Box
- Pump
Form Factor | Vise

- Holds Objects
- Enables Reconfiguration
- Patent Search
Form Factor | Bladders

- Replaceable Jaws with Bladder
- Modular Design
- Magnetic Attachment
Form Factor | Control Box & Pump

Control Box
- Allows users to activate and release the vacuum
- Measures vacuum pressure

Pump
- Preference on electric pumps
- Tests to be continued
Form Factor | Pump Integration
integration

CONFORM
Vacuum Control | Flow Diagram

A benchtop system relying on shop pump enables user to comfortably pull & release vacuum on bladders.

Requirements
- Create negative pressure differential in bladders
- Simplify user experience
- Compatible with any (shop) pump
- Adequate in shop environment
Vacuum Control | Control Box

Next Steps
- on/off valve for extended use cases
- tube management outside control box
- Determine need for accumulator
- Determine need for independent control of bladders (valve/gauge)
- Integrate foot pedal actuation
- Structural integration of enclosure
Bladders | Overview

The bladder lives on the vice and hosts the sample work part.

Requirements

- Minimize module thickness
- Modular design to mount on any vise
- Bladder seal is air-tight
- Connection to control box
Bladders | Sub-Components & Cost

bladder + granules
seal washer
seal screws
magnets
mount plate
tube adapter

Module thickness impacts vice opening capacity.

Price vs Opening Capacity

Vise Market Price (USD)

Vise Opening Capacity (in)
**Bladders | Air Flow & Sealing**

- Test/validate sealing design and explore streamlined opportunities
- Test/validate vice attachment
- Test pressure distribution with single port

**Next Steps**
research

CONFORM
Material Research | Granule

- Size
- Friction of surface
- Shape
- Elastic deformation
- ...
Material Research | Bladder & Coating

- Melting Point
- Thermal Conductivity
- Normal Strain
- Elasticity
Material Research | Bladder & Coating

- Melting Point
- Thermal Conductivity
- Normal Strain
- Elasticity
<table>
<thead>
<tr>
<th>Product Name</th>
<th>Mixed Viscosity</th>
<th>Pot Life</th>
<th>Cure Time</th>
<th>Shore A Hardness</th>
<th>Specific Gravity</th>
<th>Specific Volume</th>
<th>Die B Tear</th>
<th>Tensile Strength</th>
<th>Shrinkage</th>
<th>Elongation at Break</th>
<th>Useful Temperature Range</th>
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</thead>
<tbody>
<tr>
<td>Dragon Skin® FX Pro</td>
<td>18,000 cps</td>
<td>12 min.</td>
<td>40 min.</td>
<td>2A</td>
<td>1.062</td>
<td>25.0</td>
<td>61 pli</td>
<td>288 psi</td>
<td>&lt;0.001</td>
<td>763%</td>
<td>-65°F/-53°C to 450°F/232°C</td>
</tr>
<tr>
<td>Dragon Skin® 10 NV</td>
<td>6,000 cps</td>
<td>15 min.</td>
<td>75 min.</td>
<td>10A</td>
<td>1.07</td>
<td>25.8</td>
<td>90 pli</td>
<td>400 psi</td>
<td>&lt;0.001</td>
<td>663%</td>
<td>-65°F/-53°C to 450°F/232°C</td>
</tr>
<tr>
<td>Dragon Skin® 10 Very Fast</td>
<td>23,000 cps</td>
<td>4 min.</td>
<td>30 min.</td>
<td>10A</td>
<td>1.07</td>
<td>25.8</td>
<td>102 pli</td>
<td>475 psi</td>
<td>&lt;0.001</td>
<td>1,000%</td>
<td>-65°F/-53°C to 450°F/232°C</td>
</tr>
<tr>
<td>Dragon Skin® 10 East</td>
<td>23,000 cps</td>
<td>8 min.</td>
<td>75 min.</td>
<td>10A</td>
<td>1.07</td>
<td>25.8</td>
<td>102 pli</td>
<td>475 psi</td>
<td>&lt;0.001</td>
<td>1,000%</td>
<td>-65°F/-53°C to 450°F/232°C</td>
</tr>
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<td>Dragon Skin® 10 Medium</td>
<td>23,000 cps</td>
<td>20 min.</td>
<td>5 hrs.</td>
<td>10A</td>
<td>1.07</td>
<td>25.8</td>
<td>102 pli</td>
<td>475 psi</td>
<td>&lt;0.001</td>
<td>1,000%</td>
<td>-65°F/-53°C to 450°F/232°C</td>
</tr>
<tr>
<td>Dragon Skin® 10 Slow</td>
<td>23,000 cps</td>
<td>45 min.</td>
<td>7 hrs.</td>
<td>10A</td>
<td>1.07</td>
<td>25.8</td>
<td>102 pli</td>
<td>475 psi</td>
<td>&lt;0.001</td>
<td>1,000%</td>
<td>-65°F/-53°C to 450°F/232°C</td>
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<tr>
<td>Dragon Skin® 20</td>
<td>20,000 cps</td>
<td>25 min.</td>
<td>4 hrs.</td>
<td>20A</td>
<td>1.08</td>
<td>25.6</td>
<td>120 pli</td>
<td>550 psi</td>
<td>&lt;0.001</td>
<td>620%</td>
<td>-65°F/-53°C to 450°F/232°C</td>
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<td>Dragon Skin® 30</td>
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<td>30A</td>
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<td>25.7</td>
<td>108 pli</td>
<td>500 psi</td>
<td>&lt;0.001</td>
<td>364%</td>
<td>-65°F/-53°C to 450°F/232°C</td>
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</tbody>
</table>
- fiber-reinforced film or chainmail-like material: woven fiberglass cloth
- Kevlar:
Material Research | Next Steps

- Determine the size of granule/bladder/coating according to different user group.
- Test the granule/bladder/coating to find out optimal combination
- Find out the performance range for the combination
- ...

- User
- Form Factor
- Integration
- Research