



# Bio-Based Rice Straw Particle Board Development

## Polymer Manufacturing

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### PROJECT OVERVIEW

#### Purpose:

- To create a machine to produce particleboards consisting of rice straw and a bio-based resin. Rice straw is an abundant rice byproduct with limited and expensive disposal options.

#### Constraints:

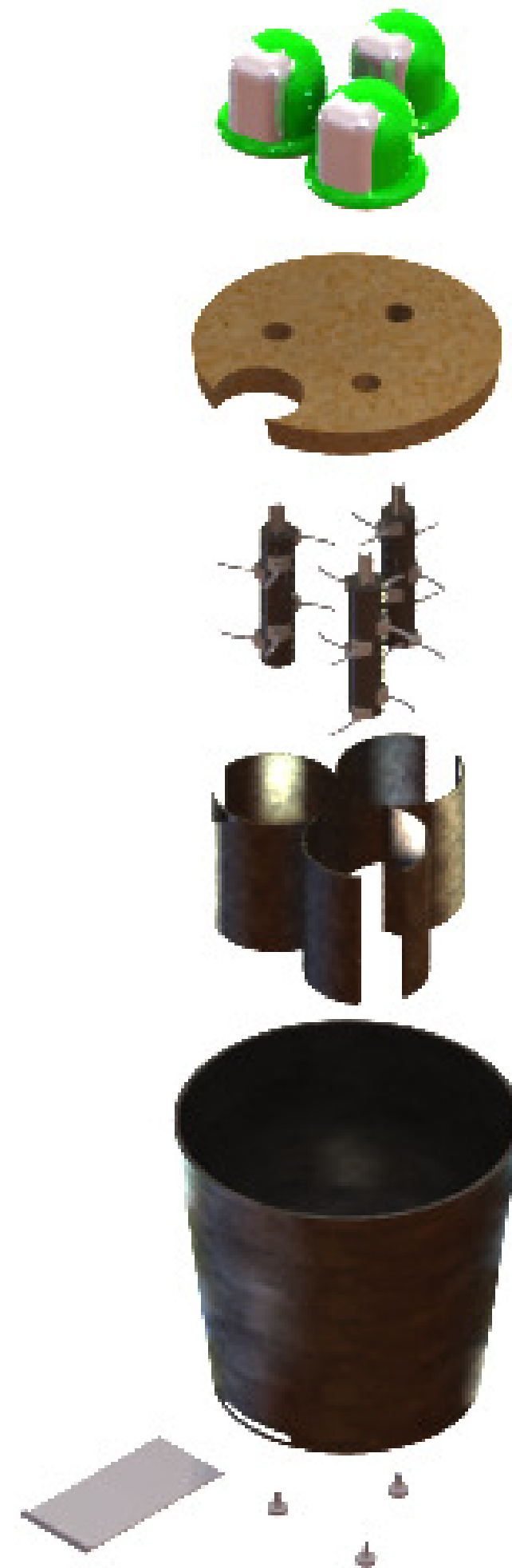
- Design must interface with Pasadena Hydraulics Inc. Precision Pneumatic press provided by Polymer Manufacturing

#### Objectives:

- Creating boards with mechanical properties comparable to particleboard currently on the market
- Making at least 5 boards per hour



### HOW IT WORKS



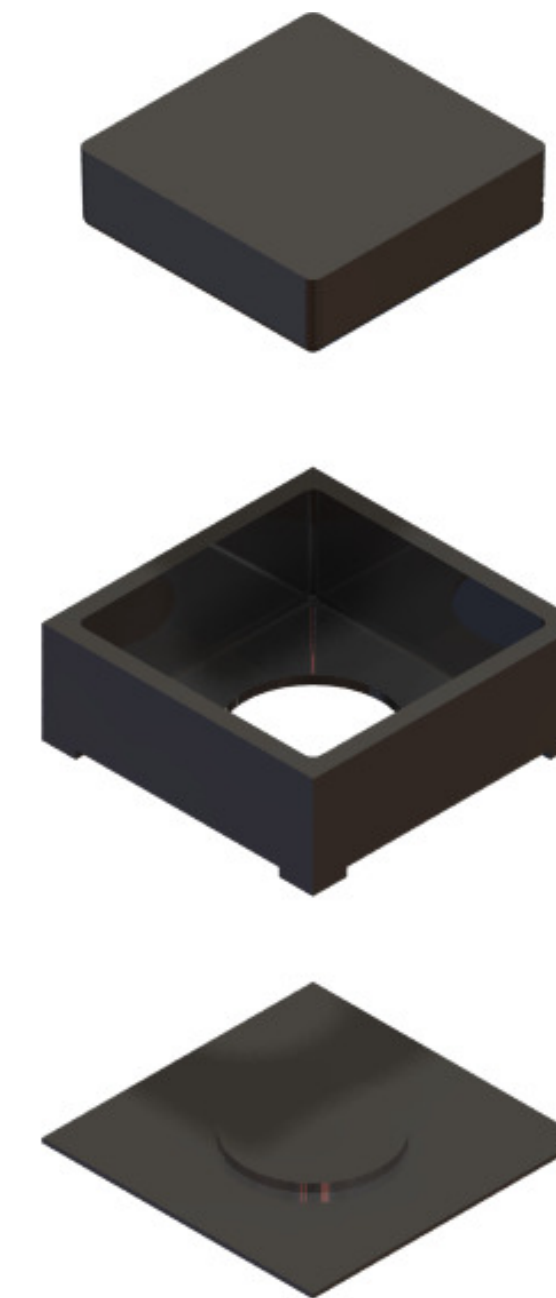
The dry rice straw is processed by 3 sets of rotating blades which also mix the chopped particles with the resin. The mixture is then dispersed into a mold which controls the board's dimensions. The mold is placed into a heated press where the temperature is increased to the melting temperature of the resin. It is simultaneously placed under pressure until the desired thickness and density of the board is reached.

### BENEFITS

- Avoiding use of toxic chemicals
- Eliminating rice straw disposal costs
- Qualifying contractors for L.E.E.D. credits when used in construction applications resulting in less expensive construction costs.

### INDUSTRY STANDARD

- The current particle boards used in construction contain formaldehyde or other toxic adhesives that give off Volatile Organic Compounds.
- Existing boards use chipped wood, a valuable resource, as the filler.



### DESIGN SELECTION

#### The Mold:

- 3/4" void for target thickness
- 1 degree draft angle in recessed cut
- Ejection hole at the bottom of the mold for greater contact area to ease board removal
- Dimensioned for board specimens to be tested under ASTM conditions

#### The Straw Processor:

- Cutting blades operating in multiple planes
- Capability of dispersing the rice straw and resin mixture into a control volume mold evenly
- Resulting dimensions of the rice straw particles are consistent and of optimal size

### PROJECT OUTLOOK

Rice straw particle boards have already received global attention. A board made from sustainable materials that requires minimal work to produce would be a significant step toward a safe, environmentally conscious world.

