Cavendish Farms Culinary Creations – Spiralized Wedge Cutter

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Client

- The client that the team was working with for this project was Cavendish Culinary Creations. They are the research and testing facility of new potato products for Cavendish farms.
- The team was tasked with creating a new cutting block that would make spiralized french fry.

- **Requirements and Constraints**
- The cutting blade assembly must fit into the current production line. The dimensions of the assembly are $5\frac{1}{8}$" x $\frac{1}{8}$" x 14" with a 3" - 3 $\frac{1}{2}$" bore size, and it must fit into a housing that measures 7" x 7" x 14".
- The cutting tool design needs to allow for easy cleaning and maintenance. (housing should be disassemble with hand tools, and blades must be removable from housing).
- The shape of the new potato cut should hold more condiments than a straight-cut french fry.

Idea Refinement

- **Spiralized Wedge Cutter**
- The blade inside runs the length of the block with a spiralized fashion. The blade is entirely one piece composed of 6 intersections that connect to the walls of the block.
- The client was pleased with this design but required modifications, this idea would move forward.

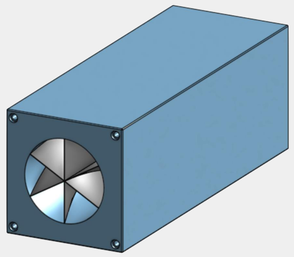

Fig 1: Spiralized Wedge Cutter

- **Spinning Water Design**
- Focused on creating a rotating force in the water. The rotational force is caused by helical ribs that line the bore of the block. As the water passed through it would spin in turn causing the potato to spin then hit a set of blades.
- The Spinning Water design scored low on the decision matrix as the design would be hard to remove/replace blades. The client agreed not to move forward with this idea

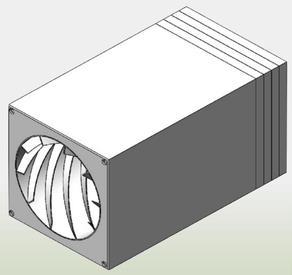

Fig 2: Spinning Water Design

- **Riffled Barrel Design**
- This idea is inspired by the rifling that is implemented in projectile weaponry. spiralized grooves that line the inner surface of the main barrel that would spin the potato. On the outside would be space for offcuts.
- The client had concerns about yield since a significant amount of the potato would be waste due to the offcuts. This idea did not move forward.

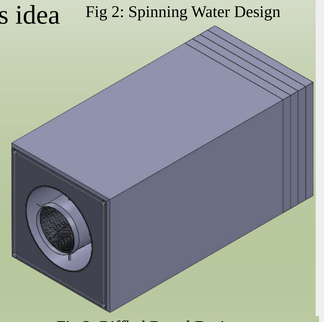

Fig 3: Riffled Barrel Design

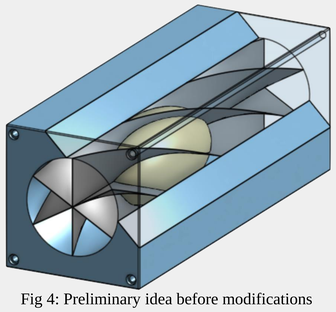

Fig 4: Preliminary idea before modifications

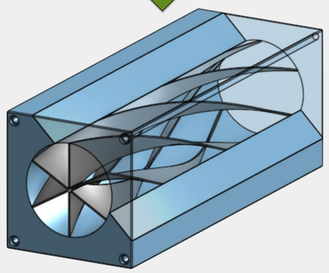

Fig 5: Prototype after initial modifications

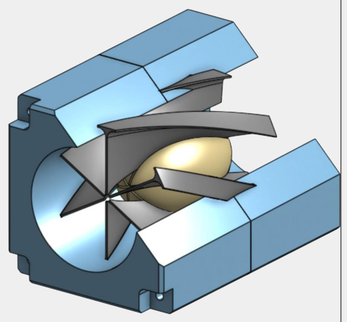

Fig 6: Prototype after additional modifications

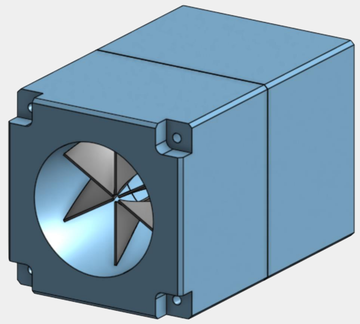

Fig 7: Final prototype set into manufacturing

Analysis/ Decision

- The team made a series of modifications during the analysis stage. First each blade was made into separate sections and having the blades taper as they traveled down the bore in order to reduce drag. Second was that "T's" were added to the blades to fix them in place then the whole block was shorted as the full length was not needed and spacers could be added to fit in the production line. This shortening also made the sliding of the blades in theatrically easier during assembly. These changes resulted in final design.
- There was a strength test performed on the blades themselves using a simulation on the CAD software solidworks. The test used a 100 N force applied to the blade and it focused on the potential deflection and warping of the blade through extended use. Warping was found in free edge of the blade as expected.

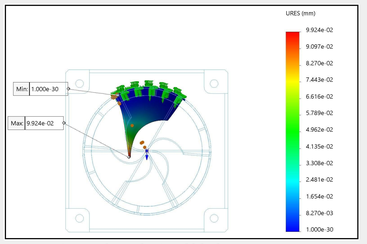

Fig 7: Strength analysis of blades

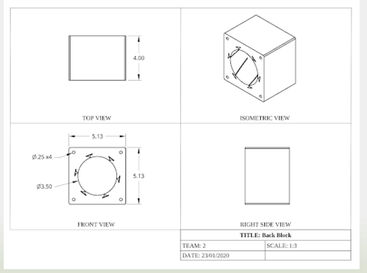

Fig 8: Dimensions of half of plastic block

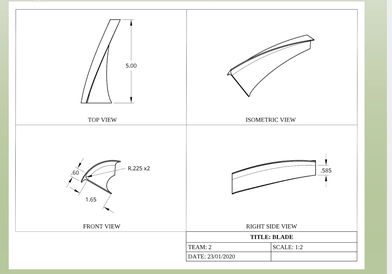

Fig 9: Dimensions of individual blades

Implementation

- The prototype was moved into manufacturing using 3D printers for both the plastic block and the metal blades.
- Unfortunately the school was shut down due to COVID-19 so testing could not be performed.
- If testing was performed and the results were positive were there was no mechanical failure and the cut of fry was what was desired. Cavendish would order more blocks and blades and start to gradually implement them into their full scale production line.
- If tests were negative modifications would be made and the test would be conducted again. This prosses would continue until the test were positive.

Acknowledgments

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