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Student design groups update kitchen appliances

PLATTEVILLE, Wis. – In today's fast-paced world, many people are looking for convenient and innovative appliances that have a variety of uses. In order to adhere to this demand, two groups of University of Wisconsin-Platteville mechanical engineering seniors have partnered with Spectrum Brands, a lawn and garden, battery and home appliance manufacturer, to modernize kitchen appliances.

Carson Doney, a Mukwonago, Wisconsin native; Bo Bertolini, an Eau Claire, Wisconsin native; and Matthew Osgood, a Campbellsport, Wisconsin native, are three students who have worked this semester to update a standard griddle. Since griddles are often considered breakfast-only appliances, the group worked to create additional attachments to make the machine more user-friendly and accommodate a variety of cooking methods. The students were tasked with designing these attachments without surpassing one quarter of the original griddle's production cost.

After discussing different possibilities with Spectrum Brands, the group decided to retrofit the standard griddle with four different attachments. These add-ons include a foldable leg design, tilt mechanism to help with grease flow, splatter guard and four separate cooking surfaces to allow for an assortment of uses.

"We really had our own creative freedom with this project," Doney said. "Spectrum told us that they wanted folding legs for the griddle, but let us take it from there. They let us explore our own solution possibilities while giving feedback along the way."

Since it's difficult for heat to escape out from under a grounded griddle, the

students designed two pairs of folding legs that attach to the device. The group also added a simple, pin-like mechanism that prevents the griddle from turning on while the legs are still folded. A guard and tilt mechanism were designed to assist with grease flow and to protect users from any unwanted grease splatters. The four newly-designed cooking surfaces include a flat top, a bowl-shaped top, a top with raised ridges similar to a grill, and a hybrid top – half flat, half with raised ridges. These four different, washable surfaces can be retrofitted onto the current griddle surface.

“Unlike other projects we’ve worked on in the past, this is something we could see on a store shelf one day,” Bertolini said. “We’ll be able to look at it and say, ‘Hey, we did that.’”

By using a variety of methods from previous UW-Platteville engineering courses, the group was able to design practical solutions while staying under the proposed production cost.

“It’s cool to see a project come together like this,” said Osgood. “We were able to get hands-on, practical experience while networking with professionals in the industry.”

Matthew Tranberg from Ettrick, Wisconsin; Jeremiah Rivera from Geneseo, Illinois; and Joshua Hay from Crystal Lake, Illinois are three additional UW-Platteville mechanical engineering students who have worked with Spectrum Brands to update a cold brew coffee design. Since cold brew coffee traditionally takes between 12 and 14 hours to make, the students were tasked with designing an appliance that speeds up the cold brew process to under an hour and makes it easy for consumers to make at home.

Spectrum supplied the group with competitors’ models of cold brewers so that they were able to compare their results. The company also provided the students with a standard operating procedure to test the quality of coffee.

The group began their project by testing a few identified methods for extracting coffee from the grounds and seeing which method worked best. The students have presented their findings, as well as a prototype design of their suggested solution to the employees at Spectrum.

“We used knowledge gained in our chemistry classes to complete our benchmark and prototype testing,” Hay said. “This testing allowed us to quantify the quality of coffee that we were producing. We also used fundamentals learned in Fluid Dynamics to guide our design, while conducting computational fluid dynamics studies to optimize potential solutions.”

In order to maximize the rate of extraction of coffee, the senior design team created two systems, both of which productions are currently being finalized. The first system is built upon agitating a mixture of coffee grounds and water in a cylindrical brewing chamber. An impeller, a rotating hub, located towards the bottom of the chamber is spun by an electric motor at a specific speed to keep the grounds from settling out of suspension.

“We are confident that this design will efficiently produce quality coffee quickly due to preliminary testing results with a rudimentary system on a smaller scale,” Tranberg said.

The second system is centered around a water pump that will recirculate water through a layer of coffee grounds located between two fine filters, which improves upon traditional brewers that use natural filtration of water through coffee grounds. This prototype features two fluid accumulation chambers stacked on top of each other. The upper chamber contains the coffee grounds and is used as a brewing chamber. From there, the water is infiltrated through the grounds into a lower reservoir.

The fluid in the lower reservoir is then routed back to the top chamber by means of a water pump and through a shower head to evenly distribute the water over the coffee grounds. The final solution will contain an actuator linked to a

discharge line that will dispense the brewed coffee into a carafe.

“Working on this project has assisted us in better understanding the demands of product development,” Rivera said. “With this management and design role, we will be able to articulate our contributions and the outcome of our project to future employers in interviews.”

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