

Engineer designs mug to keep coffee temperature just right

12 December 2013, by Matt Shipman



Dean Verhoeven (left) and Logan Maxwell (right). Maxwell began tinkering with ideas for the Temperfect mug (in his hand) as an undergrad at NC State.

(Phys.org) —Some people think that university researchers are so occupied with their laboratories that they've lost sight of the world outside the ivory tower of academia. I would refer those people to Logan Maxwell, a researcher at NC State who has developed a coffee mug that will keep your coffee hot – but not too hot – for hours at a time. And what could be more practical than that?

"Our goal was to create a [coffee](#) mug that will take piping hot coffee and cool it to a hot, but drinkable, [temperature](#) – and keep it at that temperature for a long time," says Logan Maxwell, a research assistant at NC State and co-founder of Joeveo, the company that makes the "Temperfect" mug.

Maxwell came up with the idea as an undergraduate at NC State (he graduated in May 2013), and developed the first prototypes as part of his senior design project. The idea is fairly simple.

Maxwell's design is an insulated mug with three walls. Between the outer and middle walls is a vacuum, like a conventional insulated mug. But

between the middle wall and the inner wall of the mug is a non-toxic chemical that we'll call "Material X." Material X is useful for putting into coffee mugs because it "melts" at 140 degrees Fahrenheit.

At room temperature, Material X is a solid. But when you pour hot coffee into the mug, the heat dissipates through the stainless steel inner wall of the mug and is absorbed by Material X, which becomes a liquid. This pulls the temperature of the coffee down to 140 degrees F. As the coffee cools, Material X releases its heat back through the lining of the mug – keeping the coffee hot.

"I did some research and found that most coffee is served at between 200 F and 185 F, and that coffee can burn you at any temperature above 140 F," Maxwell says. "So we set our 'ideal' temperature at 140 F."

The concept of a "phase-change" [coffee mug](#) to keep beverages warm was patented in the 1960s, but never made it to the marketplace due to manufacturing difficulties. But Maxwell happened to meet an engineer named Dean Verhoeven who had already solved the manufacturing problem. Dean and Maxwell teamed up and Joeveo was born.

The two recently launched a [Kickstarter campaign](#) to finance an initial production run of Temperfect mugs, and reached their funding goal in less than two weeks. However, anyone interested in supporting the project (and getting one of the first mugs) can donate before Jan. 1, 2014.

"NC State's senior design project pushed me to think entrepreneurially, and that was the impetus for the Temperfect [mug](#)," Maxwell says. "Without that push from NC State, and the support I got from my professors, I would have never started the project, never met Dean, and this never would have

happened for me."

Provided by North Carolina State University

APA citation: Engineer designs mug to keep coffee temperature just right (2013, December 12) retrieved 20 June 2021 from <https://phys.org/news/2013-12-coffee-temperature.html>

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