



# Core77 Design Awards Showcase Process, Materials, and Innovation

*Diverse contest celebrates design excellence and the use of polycarbonate*

By Robert Grace

Honorees at the eighth annual Core77 Design Awards highlighted the principles of inclusivity, innovation, and excellence across a broad spectrum of design. The New York-based design portal ([www.Core77.com](http://www.Core77.com)) honored winners in 14 different categories, and this year added a new award—the Covestro Materials Prize, which recognized “the most thoughtful, sensitive, and intelligent approach to using polycarbonate and/or polycarbonate blend materials.” Panels of international design experts chose the winners.

Following is just a few of those honored, selected in part due to their creative use of plastic materials or processes. They encompass diverse end uses and concepts—from medical devices to consumer products.

## Mira Prism AR Headset

The Mira Prism Augmented Reality Headset took home the inaugural Covestro Materials Prize for its informed use of

polycarbonate in a smartphone-powered, head-mounted AR device. The visor-like headset was designed by San Francisco-based Astro Studios in conjunction with the Los Angeles-based startup Mira Labs Inc.

Mira describes itself as “a mobile augmented reality company with a mission to enhance the way we interact with our technology and each other—starting in the workplace.” Unlike virtual reality (VR), which is a totally immersive experience,



**The \$99 smartphone-powered Mira Prism AR headset has no plugs, wires, or computers, instead using an iPhone inserted into the headset to project images onto a clear PC lens in the user's line of vision, resulting in an augmented reality experience.** All Prism photos courtesy of Mira Labs Inc. and Core77



**Startup brand owner Mira, together with its design partner Astro Studios, said they strove for simplicity and elegance in the Prism AR headset. Judges for the first Covestro Materials Award said they liked how the designers leveraged the strengths of polycarbonate—low cost, lightweight, optical clarity, and durability.**

rience, AR layers digital content over the real world.

The minimalist, untethered Mira Prism requires no plugs, wires, or computers, and it doesn't contain any electronics. It consists of three primary subassemblies, according to Mira chief product officer Montana Reed—the main plastic body that is positioned on your head; the removable, clear plastic lenses that reflect the smartphone screen to see the AR content; and the head strap. The initial version functions only with Apple's iPhone and iOS operating system, though Mira is developing software to make the headset compatible with other types of phones.

The enclosure for the Bluetooth remote also is made of polycarbonate, while thermoplastic polyurethane is used in the headband.

Users first open a Mira-enabled app on their iPhone, then slide the phone into the Prism. The phone screen faces away from you and toward a transparent visor, which reflects the image back into your line of vision. Objects appear to float in front of you, in stereoscopic 3D. Though a bit bulky, the product is very lightweight—little more than 5 ounces—and its simplicity contributes to its \$99 price tag.

The jurors for this prize liked how the design maximized the properties of the polycarbonate material. Chris Lefteri, principal of London-based Chris Lefteri Design, noted how the headset exploits two key properties of PC resin—the material's clarity and its toughness, for a product that requires durability.

Juror Alberto Villareal, industrial design lead for Google: "One of the reasons I like Mira is because it's using the material in a very smart way. It's using polycarbonate not only for its structural properties, but also for its optical

properties to project the image in front of people's eyes."

In a telephone interview, Reed said Mira is focusing its efforts now on the enterprise market, as the firm sees AR as a tool for everything from machine operator training to product design. More proven software apps need to be developed for the device to see wider use amongst consumers.

More details are available at <http://bit.ly/MiraPrism>.

## AirPop Air Wearable

In 2016 Chris Hosmer co-founded Aetheris, a Shanghai-based air wearables company focused on healthy breathing. His firm's new AirPop Air Wearable mask, which earned runner-up honors in Core77's Consumer Product awards category, leverages both plastic and fabric material technology to create a flexible, well-fitting, highly functional mask filter.

While living in smog-bound Shanghai, Hosmer says he began investigating mask filters for personal reasons and accidentally discovered that none of the masks available on the market actually performed as advertised in real life. He focused on three key factors—Fit (facial anthropometrics), Flex (ergonomics), and Function (a super high-efficiency, low-resistance filter that provided a 360° full seal).

He came up with the idea for the filter to act as a "chassis" to which the softshell outer layer would affix. "We could create a line of stylish durable accessory shells that our standard consumable filters could easily swap into and out of," Hosmer says. "The filters would be invisible to others and effective for between one to two weeks while the soft shells would be highly visible and last for a year or more.



In practice, many users buy multiple soft shells to accessorize with their apparel.”

The AirPop mask consists of essentially three parts: the nonwoven filter, consisting of a polypropylene and TPE seal assembly welded to a nonwoven tented part; the jacquard knit soft shell, which is a textile that is heat pressed into the patented shape; and the Halo sensor, which is a hardware piece made of ABS that snaps into (and out of) the soft shell like a grommet would on fabric, but this upgradable piece is sold separately. (See video: [http://bit.ly/AirPop\\_Vimeo](http://bit.ly/AirPop_Vimeo).)

The company specified and designed a proprietary flat knit fabric at the yarn level that would address its needs in terms of breathability, moisture wicking, weight and formability.

“The shape required that we figure out a set of secondary operations to the material that would essentially deform the material to such a point that it would take on new characteristics,” Hosmer says. Thermoforming such knit, soft-shell meshes is common to low-relief applications such as shoe upper designs and phone cases, but he claims Aetheris took it to a whole new level by using a 500-ton press to deforming up to 90 mm vertically.

“It took us almost two whole years of production tool and process prototyping to arrive at our final manufacturing SOP [standard operating procedure],” he says. “We press within a very tight temperature range and time window based on the textile type. And our 3D shells are laser cut

off the press. We’ve manufactured almost 3 million to date.”

There are no adhesives or mechanical fasteners in the filter construction. The filter comprises a polypropylene frame double shot with TPE dual-layer seal that is ultrasonically welded into the tented, nonwoven filter, explains Hosmer, who now lives in San Francisco.

Aetheris primarily sells its products online in mainland China, South Korea, and India. In China, the company offers its wares via the three major e-commerce platforms (jd.com, tmall.com, and mi.com), while also selling in offline channels such as pharmacies and through the stores of Chinese electronics giant Xiaomi Corp., which is an investor in Aetheris. As of this June, AirPop masks became available more widely, via Amazon.

As for pricing, Hosmer says: “We filled in the product line to capture as much of the consumer segments available, so we have a price tiered lineup now starting at [around] \$1 for an entry-level, single-use mask, all the way up to [about] \$40 for the active mask combo, and then if it includes the smart sensor, Halo, it’s another [about] \$15. We currently



**Aetheris co-founder Chris Hosmer began developing the AirPop Air Wearable mask while working in smog-bound Shanghai. The stylish mask offers highly efficient particulate filtration in a soft, comfortable form factor, all tied in to digital monitoring via an app.** All AirPop photos courtesy of Aetheris and Core77



carry a total of six product lines, but not all products are available in all markets.”

In the mass market, a flexible, rubberized seal has been available only on reusable masks but not on disposable dust-mask-style filters.

“The fact that we made one, and the patented manner in which we made it, is important for two reasons,” Hosmer asserts. “We created a new manufacturing paradigm for a commodity category that opens the door to new possibilities in consumer benefits, including price. And we did it at China scale, on the order of millions rather than tens of thousands, because we had a very large marketing and distribution partner with an installed customer base of well over 90 million daily active users.”

For more details, visit <http://bit.ly/AirPop>.

## Specs Modular Glasses

Elizabeth Stegner, a teaching assistant currently pursuing a master of fine arts degree in industrial design from the Rochester Institute of Technology, won Core77’s Student Award in the Open Design category.

For her graduate thesis, titled “American Teenage Vision and the Value of Cool,” Stegner notes that one-quarter of American youth have a vision problem that, left untreated, can impact personality and academic achievement. The vast majority of these cases could be remediated with a pair of

eyeglasses. However, even when kids and teenagers are prescribed glasses, many go without. Glasses need to be cool, comfortable, and affordable, she notes, or else many kids simply won’t wear them.

Her Specs are completely modular eyeglasses that do not require any tools to assemble. They are inexpensive to manufacture by injection molding, are 3D printable, and completely recyclable. Because she designed Specs for teenagers, they have an oversized, chunky plastic aesthetic and can be infinitely personalized. Further, she notes, they are also intended to be sold exclusively via app. Facial recognition technology—such as that used by SnapChat—could be used to fit frames to selfies, which can then be shipped directly to teens or schools.

Each pair of Specs consists of four pieces—two temples, one face piece, and one nose piece. The components can be swapped out in seconds, which allows the user to customize them. Additionally, the temples fit to the face piece in a novel way that references furniture joinery, which makes the connection point more robust and less expensive than traditional hinges. If one does break, the user can replace it cheaply and easily, Stegner says.

To facilitate appropriate fit for different noses, Stegner explains, the nose piece can be injection molded (either via co-molding or over-molding) out of two different thermoplastic elastomers. By molding the bridge in a TPE with a

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higher melting temperature than the wings, users can fit nose pieces to their noses in the same way they would with a mouthguard, i.e., by placing the piece in hot water until it is flexible, and then putting it on their nose while it hardens. This yields a low-cost but highly customized fit.

If the nose piece is 3D printed, the user can choose from two different options that snap into the frame. One has a slight curve at the end, lending itself to lower bridges, while



**Designer and RIT master's degree student Elizabeth Stegner documents in her graduate thesis how today's youth often forgo needed eyeglasses because the glasses aren't cool or affordable enough. She aims to change that with her low-cost Specs modular glasses, which have "a chunky plastic aesthetic" and can easily be personalized and repaired.**

All Specs photos courtesy of Elizabeth Stegner and Core77

the other has wings that rest on the sides of prominent bridges. Perforations render all nose pieces breathable and flexible and spreads out pressure.

In an interview, she explained that she made initial prototypes out of polylactic acid (PLA) bioplastics on a MakerBot 3D printer. She then made more refined versions on a Form-Labs Form 2 stereolithography printer, making the face and temples out of nylon and the nose pieces out of NinjaFlex thermoplastic polyurethane filament. She used Autodesk's Fusion 360 CAD/CAM software for her rapid prototyping.

"I did not spec the specific TPEs that would be used if the product were to be injection molded, and instead provided proof of concept through 3D printing and collaboration with engineers to verify that my designs could be inexpensively injection molded (after an initial investment)."

More details are available at <http://bit.ly/SpecsGlasses>.

### Aer Asthma Management System

Another Student Award, this time in the Consumer Products category, went to Abidur Chowdhury of Loughborough University in England. His conceptual innovation, called Aer, is an asthma management system "that facilitates and encourages people to be more compliant with their medication in a convenient, discreet, and aesthetically pleasing way."

The product—for which only prototypes exist so far—features an environmental sensing base, a blue reliever inhaler, a brown preventer inhaler, and an extra-small emergency inhaler, says Chowdhury, himself an asthmatic. The sleek inhalers are designed to be aesthetically pleasing, and all the inhalers contain Bluetooth connectivity to an app that monitors use.



**The attractive Aer inhalers are housed in a base that senses the air quality, humidity, and particulate levels in the surrounding environment.**

All Aer photos courtesy of Abidur Chowdhury and Core77



**U.K. student Abidur Chowdhury is himself asthmatic, and recognizes first-hand the need for a sleek, user-friendly inhaler system that will help others with the condition to take their medication regularly. His conceptual Aer Asthma Management System checks all the boxes and offers Bluetooth connectivity to an app that monitors use.**

Additionally, a much smaller emergency inhaler—containing 20 doses of reliever medication—fits on a user's key ring helps to ensure help is always within reach. The base senses the air quality, humidity, and particulate levels in the surrounding environment while also housing the inhalers and displaying the time. An array of LED lights displays the output of these sensors.

In an interview, Chowdhury said he envisions the commercial product being mostly be made of ABS resin “due to

its fantastic properties such as its strength, versatility, availability, cost, impact resistance, and very simple to injection mould with.” He would use a metallic paint finish on the injection-molded ABS to achieve the metallic-looking finishes on the tops of the inhalers. The inhalers' translucent lids would be bead-blasted transparent ABS or decorated with an in-mold process to yield a frosted look.

More details are available at <http://bit.ly/AerSystem> or [www.abidurchowdhury.com](http://www.abidurchowdhury.com).



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**Brand owner Willow teamed up with Function Engineering and Ideo to create a discreet, hands-free, wearable breast pump with no cords or tubes. The quiet device features complex engineering but evokes clean simplicity on the exterior. It slips inside the user's bra and allows active mothers to remain mobile.**

All Willow Breast Pump photos courtesy of Willow and Core77

### Willow Breast Pump

Winner of the Consumer Product category was a novel, all-in-one breast pump that fits inside a bra. Honors went to design firm Ideo, Function Engineering, and Mountain View, Calif.-based brand owner Willow.

The compact, quiet, hands-free Willow wearable breast pump has no external tubes, no cords, and no dangling bottles. Each bra cup-shaped device discreetly slips into a nursing bra—meaning no undressing is required—and holds a 4-ounce, BPA-free storage bag. (The companies did not disclose further materials details about the components.)

The partners say, “While most pumps come with an intimidating set of parts and steps, Willow’s design is simple. Each pump has few pieces that connect together: the Pump, Flange, Flextube™, and Milk Bag. And Willow is easy to clean, with dishwasher-safe parts and spill-proof Milk Bags—sealed with an innovative, one-way valve—that can be stored in the fridge or freezer.”

The 'B' side of Willow required engineering prowess to arrange over 300 components in its discreet pump form. To the mom, this complexity is not evident, and the pump has been purposefully designed to look clean and simple to use, with a four-touch-pad control panel on the top of the pump that drives the pump and provides indicators.

Willow also is smart and connected to an app that syncs



data from each pump, enabling mothers to track their milk expression in real time while the pump stays hidden inside their bra.

For more information, visit [bit.ly/WillowBreastPump](http://bit.ly/WillowBreastPump).

For more about all the honorees of the 2018 Core77 Design Awards, go to:

<http://designawards.core77.com>

### ABOUT THE AUTHOR

Robert Grace is a writer, editor and marketing communications professional who has been active in B2B journalism since 1980. He was founding editor of and worked for 25 years at *Plastics News*, serving as editorial director, associate publisher and conference director. He was managing editor of *Plastics Engineering* from July 2016 through October 2017, and now is both editor of SPE's *Journal of Blow Molding* and directing content strategy for SPE. He runs his own firm, RC Grace LLC, in Daytona Beach, Fla., and can be contacted at [bob@rcgrace.com](mailto:bob@rcgrace.com).



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