

# U-TURN AUDIO CASE STUDY

## Phillips Medisize and U-Turn Audio turn up the volume on next-gen turntable tonearms

Taking audio-gear performance to the next level requires seamless orchestration of product design, engineering and magnesium injection-molding expertise

### CHALLENGES

- Improving tonearm design required complex product design and engineering
- Specialized manufacturing expertise needed to make parts from magnesium
- Highly complex product design created significant production considerations

### SOLUTION

- Phillips Medisize's experience making medical devices using magnesium proved instrumental to the project's success
- Expert mold-design and flow analysis backed by decades of experience in magnesium "thixomolding" production process
- Customer-first focus expedited combination of physical and mechanical properties needed to develop a light, strong and durable tonearm

### BENEFITS

- New tonearm elevates sound quality thanks to ability to dissipate vibrations while reducing resonance
- Ability to consolidate parts lowered tooling costs, supply chain requirements and assembly time
- New Orbit Theory receives awards and accolades, spurring U-Turn Audio to make new tonearm available on additional turntable models

Bringing Possibilities To Life

**Phillips  
Medisize**  
a **molex** company





“Our mission from the beginning has always been to create great sounding audio equipment that is accessible to everyone. We’re now the largest turntable manufacturer in the U.S. by volume.”

**Bob Hertig,**  
**President and CEO, U-Turn Audio**

Anyone who has carted a carefully curated record collection from coast-to-coast can attest to the superiority of vinyl. Diehard audiophiles believe spinning discs produce better sounding music and truly immersive listening experiences. Still, the decades-long domination of compact discs and the advent of music streaming seemed to signal the end of vinyl until recently. Now, thanks to new generations of music fans and LP loyalists, records are making a comeback.

According to the Recording Industry Association of America (RIAA), vinyl sales have outpaced CDs for the first time since 1987. In its 2022 annual revenue report, RIAA reveals that vinyl made up \$1.2 billion of the \$1.7 billion in physical media sales, outselling CDs by nearly 8 million units. While streaming still accounts for the most recorded music revenues, growth in physical music format revenues rose 4% over the previous year.

Vinyl’s resurgence is music to the ears of the entrepreneurs at U-Turn Audio, a Woburn, Mass.-based audio equipment manufacturer of turntables, preamps and speakers. Founded in 2012 by high-school friends Ben Carter, Bob Hertig and Pete Maltzan, the company started while Bob was finishing a degree in mechanical engineering at Northeastern University. The initial design concepts for the flagship Orbit turntable were part of his senior project, which led to a grant from the university’s entrepreneurship program. A follow-up Kickstarter campaign enabled the fledgling team to sell about 1,000 turntables to its first customers.

## **ENGINEERING BETTER SOUND FOR EVERYONE**

As part of the company’s quest to design and build top-quality products at affordable prices, U-Turn Audio designs and assembles its audio equipment by hand. Fastidious attention to detail involves rigorous inspections, including 15-point quality-control and listening tests to ensure optimal performance. The dedication and craftsmanship that goes into making U-Turn’s critically acclaimed, award-winning turntables and audio gear have attracted a loyal customer following among vinyl aficionados and everyday listeners.

From inception, U-Turn Audio grew rapidly, and now assembles and ships more than 15,000 to 20,000 products annually. A continued focus on advancing both turntable design and sound performance led U-Turn Audio to initiate a complete tonearm redesign. “The tonearm is basically the heart of the turntable,” says Hertig. “It’s responsible for so much of the actual audio production. We wanted to simplify what we had by taking multiple components and forming them into one solid piece to reduce resonance and create a more rigid and better performing tonearm.”

## FINDING AN ALLY IN MAGNESIUM PRODUCT DESIGN AND MANUFACTURING

To execute on its innovative tonearm concept, U-Turn Audio experts wanted to leverage the unique mechanical and physical properties inherent in magnesium. For starters, magnesium is the lightest construction material available, with a weight that is approximately 33% less than aluminum. This delivers a very high strength-to-weight ratio, which makes it equally strong, light and rigid. As a result, magnesium often is used in various products spanning medical and industrial products.

Additionally, magnesium has a “damping” quality, which dissipates vibration. This attribute is especially useful in reducing resonance, which can lessen sound quality. Once U-Turn Audio settled on magnesium, the team sought an ideal engineering ally capable of producing the part from the desired material. This proved to be challenging based on the specialized skills and processes required to make parts from magnesium.

Phillips Medisize, a Molex company, immediately stood out as the largest and most well-established magnesium molder in North America with a strong track record of manufacturing excellence.



U-Turn’s ability to utilize the tonearm on multiple products reinforces Phillips Medisize’s goal as a collaborator. “What inspired us to work with U-Turn Audio was the opportunity to help them fully realize their design idea,” concludes Semingson. “We saw a growth opportunity for both businesses, which now is being fulfilled as they expand use of this innovative tonearm across U-Turn Audio’s complete product portfolio.”



"It was extremely difficult to make all of the moving details work together at the same time to produce an acceptable part for the customer's requirements, collaboration between our mold design and mold-flow analysis engineers, as well as extensive expertise in thixomolding, helped us achieve success."

**Eric Semingson,**  
Advanced Development Manager,  
Phillips Medisize

At its Wisconsin-based magnesium-injection molding facility, Phillips Medisize leverages more than a half-century of expertise as a global contract development and manufacturing organization (CDMO) to design, engineer and manufacture pharmaceutical drug delivery, in vitro diagnostic, medtech and specialty consumer devices for highly regulated industries, encompassing automotive, consumer, defense and healthcare.

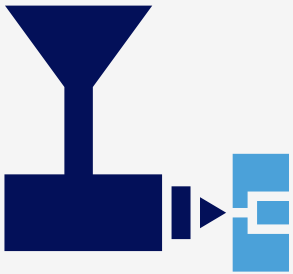
In particular, Phillips Medisize is an expert in magnesium "thixomolding," a special and eco-friendly injection molding production process that makes it possible to create and produce complex and detailed shapes from magnesium. As a result, Hertig and team turned to Phillips Medisize to help fulfill the audio company's vision for a game-changing tonearm that could significantly upgrade turntable performance.

## **HARMONIOUS COLLABORATION HITS ALL THE RIGHT NOTES**

U-Turn's audio specialists presented their original design concepts for the new tonearm, dubbed the OA3 Pro, including the challenges of unifying various parts into a single, continuous piece. "The reason this part was so challenging from a production standpoint is because of its super high complexity," explains Semingson. "It's not just a simple, open-and-closed mold. We had to incorporate a hydraulic core pull to allow the long, slender core to create the hollow diameter of the stem, requiring very thin wall thickness throughout the length of the stem."



Additionally, extremely high heat and pressure are involved in thixomolding, which further complicated the process. "It was extremely difficult to make all of the moving details work together at the same time to produce an acceptable part for the customer's requirements," Semingson adds. "Collaboration between our mold design and mold-flow analysis engineers, as well as extensive expertise in thixomolding, helped us achieve success."



"The Phillips Medisize team was very enthusiastic about working with us, even though this was a different product than what they were used to working on"

**Bob Hertig,**  
President and CEO, U-Turn Audio

According to Hertig, a close-working relationship with the Phillips Medisize project manager also kept everyone focused on clearing major hurdles. "The Phillips Medisize team was very enthusiastic about working with us, even though this was a different product than what they were used to working on," he notes. "It was incredibly important for us to be able to talk openly and honestly with the Phillips Medisize team about any issues or concerns."

Phillips Medisize applied the same customer-first design philosophy and meticulous methodologies honed over years of using magnesium thixomolding to create game-changing specialty consumer as well as medical device designs. As with every Phillips Medisize product design, the engineering team sought to elevate the user experience, which in this case meant eliminating any structural inconsistencies or air pockets in the tonearm that could affect sound quality.

The teams worked together to make subtle changes to the geometry and walls of the tonearm to better support the molding process. The final magnesium mold included gates, vents and related elements to develop an exceptionally dense, uniform end-piece that could be manufactured at scale without any deviations in sound quality.

## **SIMPLIFYING SUPPLY CHAIN, PRODUCTION AND ASSEMBLY**

Equally important were opportunities to improve product assembly and quality processes. As the new magnesium tonearms consolidate a three-part assembly into a single part, they are much easier to work with. Additionally, magnesium is more durable than aluminum, which makes the tonearms superior to previous products.



"Having fewer moving parts really expedites assembly and quality inspection," says Chris Cardone, Production Supervisor for U-Turn Audio. "It simplifies the whole thing, which is kind of the theme that runs throughout our production process — take advanced things and boil them down to the simplest level."

## **ABOUT U-TURN AUDIO**

U-Turn Audio is an American turntable and audio equipment manufacturer committed to providing a remarkable listening experience. Through direct engagement with customers, U-Turn re-imagines audiophile features to deliver high-quality and elegant turntables with lifelike and detailed sound because better music makes for a better life.

For more information, visit [www.urnaudio.com](http://www.urnaudio.com).

## **PHILLIPS MEDISIZE BRINGS POSSIBILITIES TO LIFE**

Phillips Medisize, a Molex company, collaborates with leading pharmaceutical, medical technology and invitro diagnostic companies to design, engineer and manufacture life-saving innovations. In addition, the company's specialty consumer business supports automotive, consumer and defense industries. A contract development and manufacturing organization (CDMO), Phillips Medisize leverages its 60-years of expertise and globally renowned capabilities to collaborate with customers to deliver products and solutions that annually help millions of patients, healthcare professionals and individuals live healthier, more productive lives.

For more information, visit [www.phillipsmedisize.com](http://www.phillipsmedisize.com).

## **ABOUT MOLEX**

Molex is a global electronics leader committed to making the world a better, more-connected place. With presence in more than 40 countries, Molex enables transformative technology innovation in the automotive, data center, industrial automation, healthcare, 5G, cloud and consumer device industries. Through trusted customer and industry relationships, unrivaled engineering expertise, and product quality and reliability, Molex realizes the infinite potential of Creating Connections for Life.

For more information, visit [www.molex.com](http://www.molex.com).