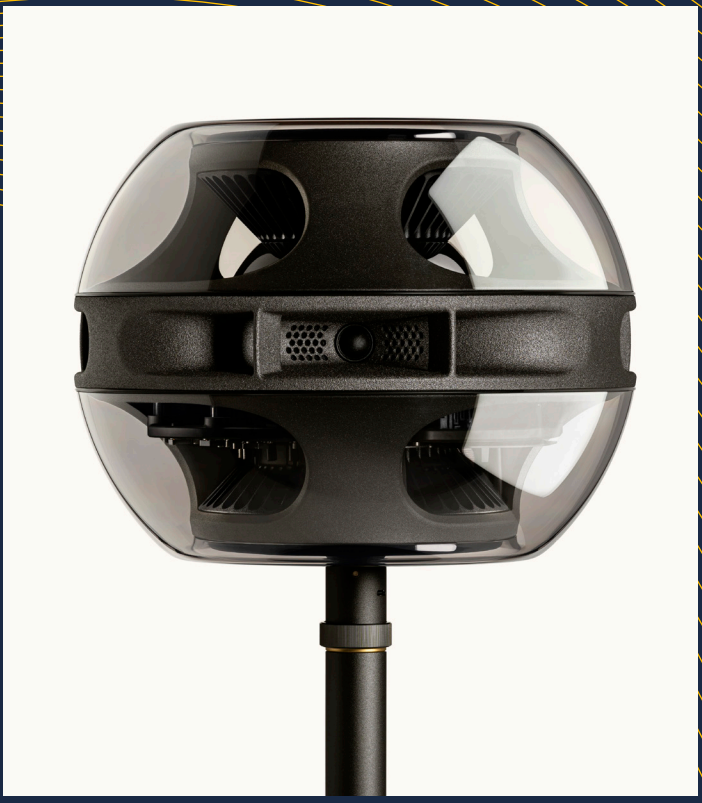
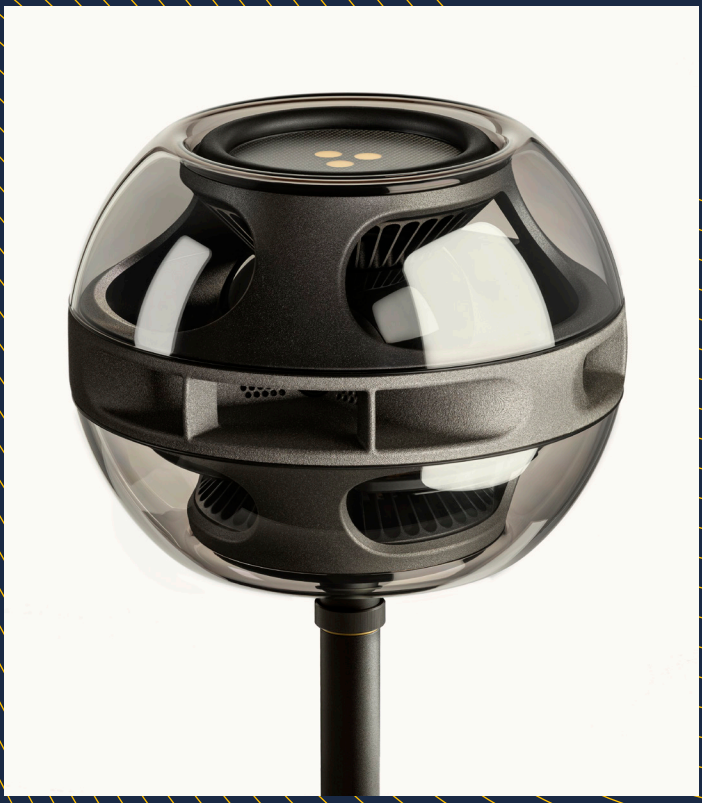
GKN ADDITIVE
FORECAST 3D

Syng

Customer Case Study



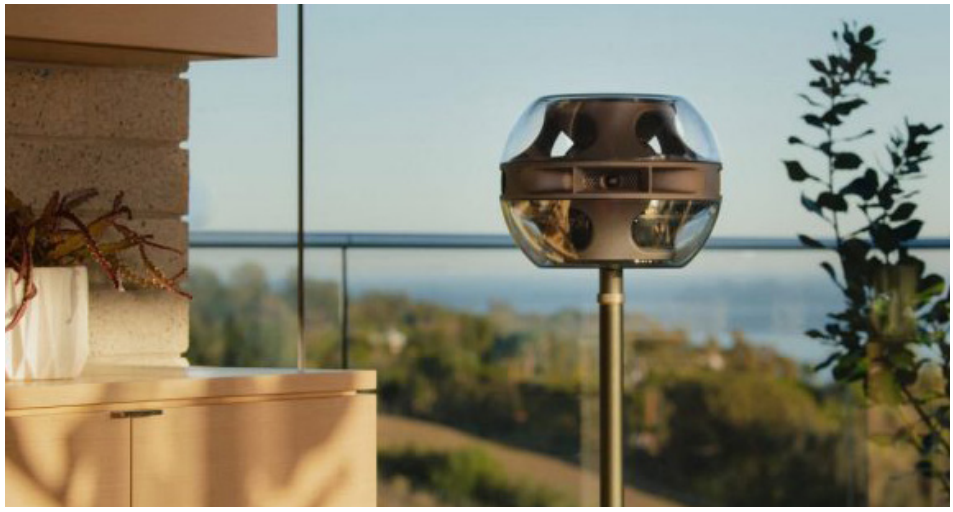


Introducing Syng: A Pioneer in Revolutionary Audio

HP's Multi Jet Fusion yields key speaker part

Syng, creator of the world's first triphonic speaker, is revolutionizing the way people listen to music. Co-founders Christopher Stringer, Damon Way, and Afrooz Family launched the Venice, Calif.-based audio firm in 2018 under the shared vision of shifting passive listening habits into active, multisensory experiences. Today, the company is led by Stringer (CEO Chief Design Officer), formerly one of Apple's chief industrial designers, and Way (Chief Brand Officer), a serial entrepreneur and seasoned brand builder with ties to DC Shoes and Incase.

With an eye on creating sound for the future, Syng's leadership — backed by an in-house ensemble of 50+ top performers in design and engineering — has stepped into uncharted territory to reinvent high-fidelity speaker technology and unlock a new category of audio: smart sound. The company's flagship product, Cell Alpha, made its official public debut in May 2021 after more than three years of planning and development. Heralded for its groundbreaking strides in innovation, the Cell Alpha is the first all-encompassing audio solution capable of rendering sound for the wide spectrum of content available to today's entertainment consumers — from music and television, to podcasts and webinars, to computer and video games, and much more.



Syng's Cell Alpha speaker uses 3D-printed parts to project audio.

The Cell Alpha's entirely new, object-based sonic architecture can play any format of recorded sound and make it feel tangible. The pioneering triphonic speaker system combines advanced sound technology software with 3D-printed parts to project audio with unrivaled precision. The end result is high-fidelity sound that is more spacious and immersive than ever before. Using a complementary mobile app called Syng Space, listeners can move, shrink, magnify, and layer audio in highly imaginative and artistic ways, achieving multisensory experiences that can be likened to "painting" sound in space.

Innovative Design Resonates With New Possibilities in Spatial Sound

The futuristic design of the Cell Alpha is quite distinctive. Measuring roughly 12 inches in both height and diameter, and weighing approximately 13 pounds, the product features a clear plastic, sealed, dual-truncated spheroidal shape. The mirror-like, yet transparent, surface provides a modern aesthetic and offers a glimpse at some of the mesmerizing internal components. The intuitive system can be used either solo or in a multicellular configuration. Ideally, three Cell Alpha speakers should be employed in a space to provide the fullest expression of what Syng calls "triphonic" audio. According to Stringer, his team's invention is the first product capable of tapping into this unique dimension of spatial sound.

One of the key elements of the Cell Alpha is the triphone, a three-horned sound projector that resumbles a halo that encircles the middle of the spheroidal speaker. This component consists of three coaxial drivers,

mounted at 120-degree angles from each other. The unique driver assembly is what is used to project audio with pinpoint accuracy around a room. Specifically, the triphone's three beamforming microphones adjust the sound field in response to real-time data it collects. These sophisticated capabilities include automatic room equalization, wall proximity and direction detection, and multi-Cell geometry calculation.

During early conception phases, Syng's team of audio and design experts established that complex, uninterrupted pathways would allow sound to travel uninhibited through the triphonic system. However, this integral component would have to be manufactured as a single, seamless part in order to achieve Syng's design objectives. According to Syng's Director of Mechanical Engineering, Yoav Ben-Haim, it was no easy feat to ensure the structural integrity and acoustical performance of such a complicated assembly.

"All of the conventional ways of making those parts had downsides we wanted to avoid," Ben-Haim explains. "Ultimately, 3D printing proved to be the one method of manufacturing that would allow us to create this component in a singular piece to impart with its various functionalities: six speakers mounted with precise features, 10 pressure seals, complex airways, and unique cosmetics."

The prospect of leveraging the agility of digital manufacturing to speed design iteration — and get the product to market faster — also appealed to members of Syng.

HP and GKN Additive (Forecast 3D): Synergistic Partners

Syng's additive manufacturing journey began with its partnership with HP, one of the world's leading technology innovators and industry providers of 3D printing solutions. Backed by decades of research, HP has expertise in printing, precision mechanics, systems engineering, data intelligence, software, microfluidics, materials science, design, and digital manufacturing. HP, in turn, introduced Syng to GKN Additive (Forecast 3D), suggesting they team up to produce the triphone element.

With 34 HP Multi Jet Fusion (MJF) printers in its digital manufacturing factory, GKN Additive (Forecast 3D) serves as the official West Coast Experience Center for HP MJF technology and is one of the largest additive manufacturing service providers in North America. Following the meeting, Syng was sold on GKN Additive (Forecast 3D)'s expansive digital manufacturing capabilities and expertise with a proven reputation as a well-equipped, reliable, and prompt resource that would respond to Syng's needs.

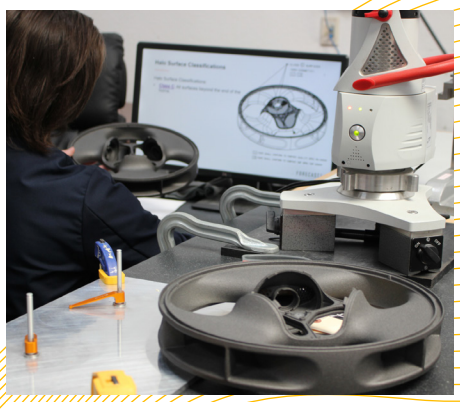
"HP's recommendation is what set us on the path to partner with GKN Additive (Forecast 3D). The team there was quick to be supportive in the early stages, which helped us make the decision easily," Ben-Haim says. "What appealed to us most was GKN Additive (Forecast 3D)'s knowledge of the HP MJF process, as well as their capacity to deliver the quantities of parts needed."

Throughout product development stages, representatives from Syng, GKN Additive (Forecast 3D), and HP worked in close collaboration to optimize the dimensional and visual aesthetics of the 3D-printed component.

"The triphone represents 20 percent of the speaker. It's a very complex, strong part with a lot of internal cavitites," explains Pere Aizcorbe, head of design at Syng.

His colleague Camille Zaba, a mechanical engineer, notes further, "We would not have achieved the shape we needed for this part, had we not gone down the additive manufacturing route. Instead, we would have had to make one of the main pieces of our speaker out of multiple parts, which adds cost, complexity, and risk."

"Because this component interfaces with the various subsystems within the product assembly, we had



The triphone is one of the key elements of the Cell Alpha.

to be diligent in ensuring all 56 critical dimensions met the design specifications to enable smooth assembly processes downstream," says Isabel Sanz, solutions architect for strategic accounts at HP.

Together, HP and GKN Additive (Forecast 3D) supported a rapid development cycle that allowed each design iteration to be completed within weeks.

Ben-Haim remarks, "Without this support, we would have had to do a significant redesign early on to accommodate conventional manufacturing processes. This would have set back our schedule significantly — at least six months, because the design would have taken longer, and we would have had to secure and validate injection molding tools."

The triphone is made from PA 12, a robust thermoplastic often used to produce high-density parts with balanced property profiles and strong structures. Unlike other 3D printing technologies, the HP MJF platform prints each layer of new material and agents atop the previous layer that is still molten. This allows for both layers to fuse completely, which delivers strong, quality, detailed, and functional 3D-printed parts.

"HP optimized the printing process for the Syng application while improving the cost, productivity, and yield in production. For example, we extended the build size and optimized the design to maximize productivity by 40 percent, which reduced the cost per part. Geometry optimization also helped improve product yield and achieve design tolerances that were suitable for production," Sanz adds.

Zaba points to a specific example where additive manufacturing saved the company considerable time and money.

"In the midst of one of our early builds, we had issues with warpage on the part: the flatness of it. Fortunately, GKN Additive (Forecast 3D)'s swift turnaround times on providing new prototypes allowed us to cut in a new design during the build, which would not have been doable with traditional injection molding tools due to the geometry of the component's supporting fins. Even if we had found an alternative design with plastic injection molding, it likely would have taken us another 12 weeks to produce those parts. We not only saved valuable time with GKN Additive (Forecast 3D)'s help, but also tens of thousands of dollars for the tool itself. Also, we were able to validate this new design without having to shut down the assembly line, which would have cost additional resources," she says.

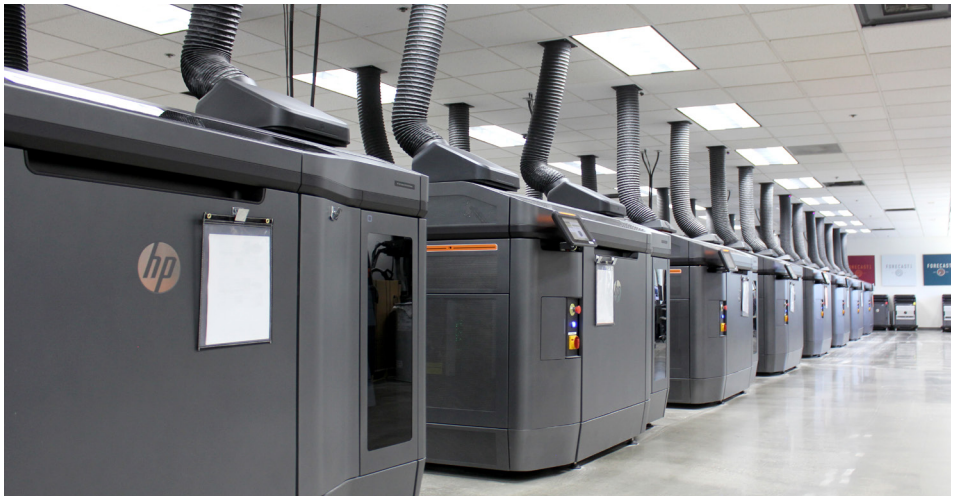
In sum, the 3D printing approach bolstered confidence in the structural integrity of the product architecture in the design and prototyping phases.

"Typically, a 3D-printed prototype is used only in the initial stages of the production process," Ben-Haim says. "However, by using 3D printing as our production intent, any learnings about our specific resin collected in the prototype phase were directly transferable to the final production design."

The Value of Tuning in to Client Needs

According to spokespersons from Syng, the additive manufacturing route helped make the Cell Alpha's journey to market simpler and easier to manage.

"We ultimately achieved a design that far exceeded our original expectations for this product rollout," Aizcorbe shares. "GKN Additive (Forecast 3D)'s commitment to produce such a challenging part — which required



GKN Additive (Forecast 3D) houses 34 HP MJF printers at its Carlsbad, Calif., and Auburn Hills Mich., facilities

hundreds of design iterations — was definitely a risk for them in terms of their profit margin. Few companies are as brave as GKN Additive (Forecast 3D) in that sense."

Aizcorbe feels that GKN Additive (Forecast 3D)'s proactivity and responsiveness were especially helpful during prototyping.

"The best way to help the design process is to move fast," he affirms. "The team at GKN Additive (Forecast 3D) was very proactive and quick to turn around samples we requested, which allowed us to make changes more swiftly."

Zaba agrees that the timeliness of GKN Additive (Forecast 3D)'s work helped simplify and streamline the product launch.

"Additive manufacturing has a nimble quality to it that pairs well with the inherent variability of the design process," she says, adding that GKN Additive (Forecast 3D) was willing to make the extra effort to provide same-day deliverables when feasible. The ease of driving to the GKN Additive (Forecast 3D) Carlsbad, Calif., headquarters location to pick up parts as needed, as opposed to waiting for products to be shipped from an overseas manufacturer, was another major pro, according to Zaba.

When asked if she would refer GKN Additive (Forecast 3D) to others, Zaba's response is, "Absolutely." She adds, "The level of care and respect coming from GKN Additive (Forecast 3D) was incredible. It was obvious they were doing everything in their power to make this project a success."

Aizcorbe concurs. "It's incredibly rewarding to be where we are right now, and we are thankful for their efforts," he says.

As Syng looks to the future, the goal is to continue finding creative and innovative ways to stretch the bounds of what audio can offer listeners. The numerous advantages of addtive manufacturing have set the stage for Syng to really shine in this ever-evolving space.

About GKN Additive (Forecast 3D)

GKN Additive (Forecast 3D) is a digital manufacturer of advanced and metal additive manufacturing (AM) parts, backed by GKN Powder Metallurgy's 260+ years of engineering and production expertise. Equipped with one of the world's largest global networks of industrial 3D printers, GKN Additive (Forecast 3D) supports projects from one part to more than one million, offering innovative digital solutions for aerospace, automotive, industrial, healthcare, defense, electronics, consumer products, and more. Leading in prototyping to production with international manufacturing, advanced technologies, and raw materials, GKN Additive (Forecast 3D) gets products to market faster.

Find out how GKN Additive (Forecast 3D) can take your product from prototype to production. Visit forecast3d.com or contact us directly at (877) 835-6170 or hello@forecast3d.com.

Front Cover
Left/right: Cell Alpha speaker

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