Acoustics: From Prototyping to 3D-Printed Production

Raise3D Case Study
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TGI-TOA and NTEK Using Raise3D Printers in Manufacturing PA Systems and Speakers

Sound – An auditory effect produced by mechanical vibrations transmitted through the air or another medium. From sound diffusing acoustic panels to inflatable concert halls and complex new-age speaker structures, the world of acoustics has changed drastically in the past decade.

Consider how the industry has innovated and perfected sound engineering technology to improve the quality and delivery of sound in our lives. What earlier required bulky speakers, the acoustics industry has now been able to deliver exceptional 360 ˚ audio experiences with tiny Bluetooth speakers that can now fit in the palm of our hand. A lot of the progress and innovation in audio engineering is a result of adopting newer technologies like 3D printing and acoustic meta-materials.

Raise3D clients like **TGI**, an Indonesian manufacturer (parent company **PT TOA Galva Industries)**, and **NTEK**, an Italian acoustics company, engineer, and produce innovative audio systems and PA systems that bring us the pleasure of sound perfected. Like many other industrial manufacturers, these audio- engineering companies initially adopted 3D printers as a quick internal prototyping solution. After reaping enormous cost efficiencies, flexibility and the benefits of additive manufacturing, they are now changing their entire production line and investing heavily in 3D printing technology. Using Raise3D's Pro2 series large volume industrial 3D printers, they can customize a varied selection of materials and incorporate them into the original designs. If you're thinking, "What would an audio engineer want to 3D print and why?" this blog will lay it all out.

Prototyping and Production with 3D Printing

Raise 3D Pro2 user TGI (PT TOA Galva) is a specialist manufacturer of professional and commercial audio and video solutions. You will find their products in schools, concert halls, malls, commercial buildings, airports, and sports stadiums providing both surveillance and audio transmission. Since being founded in 1934, TOA has grown to be one of the world's largest suppliers of commercial Public Address (PA) systems by constantly improving its tech capabilities in acoustics and developing innovative products to produce the ultimate in sound performance.

3D Printing Prototypes: Prior to having their own 3D printers, TGI followed the traditional manufacturing methods and outsourced their designs to a third-party for production. This process was time-consuming and expensive. If the design had issues that required a change, TGI would have to cancel their order and restart it with a new design. Even small iterations to the design required another 3-4 weeks of lead time for newer versions.

In any industrial setting, too, creating designs that have practical uses is necessary for manufacturers to remain profitable. Additionally, having an efficient prototyping process that cuts costs while increasing the capacity for creativity and impacting profitability. Previously, this type of customized flexibility was wishful thinking. However, due to their increasing sophistication and affordability, large-format printers like Raise3D Pro2, 3D printers are now fulfilling all these requirements.

Industrial 3D printing helps product designers and engineers develop functional prototypes and end-use production parts faster and more economically than before.

"By switching their prototyping process, from outsourcing to using in-house 3D printers, TGI is saving time now that they can change designs within minutes instead of days."

– TGI

Benefits of Prototyping with Raise3D Pro2 Printers

By switching their prototyping process to in-house 3D printed prototypes, TGI is saving time and money by being able to change designs within minutes instead of days.

- **An added benefit of using Raise3D Pro2 series printers is having two extruders, which allows two filaments for one print.**
- **Our Open Filament Program (OFP) gives users access to multiple filaments, including carbon-fiber, PLA, metal-filled, wood-filled, and many more.**
- **Raise3D printers offer a scalable solution to the issues created by prototyping.**
- **The Pro2 and Pro2 Plus printers' reliability and precision directly contribute to profitability by lowering costs and giving engineers more options to design the perfect part.**
- **Benefits of a second nozzle: since 3D printers work by building layer upon layer, in principle, you can't print an overhang. So working single extrusion (one nozzle) would mean printing parts separately and then assembling them. Which means more work, ill-fitting parts, and unfortunately, higher fail-rates. The Pro2 and Pro2 Plus are both electronic-driven dual-extrusion, armed with two heated nozzles. This upgraded feature makes it possible to print multiple materials and colors with PVA plastic which acts as a support for an overhang which is then dissolved away in hot water when the print is complete.**

By using Raise3D Pro2 printers, TGI has been able to lower prototyping costs by 200% and develop more versatile equipment thanks to increased production capabilities.

- **Increase production of prototypes by 5X**
- **Generate savings of 200% per part**
- **Greater flexibility in design and quick in-house adaptations**

Why Raise3D Printers?

Many desktop printers have high miss-rates. By some accounts, about 50% of prints end up less-than-perfect and need tweaking and adjusting. *You know where this is going.* It cannot be stressed enough, but in a manufacturing and industrial setting, you need a work-horse that will produce consistent quality prints each and every time without much effort (or nail-biting) on your part.

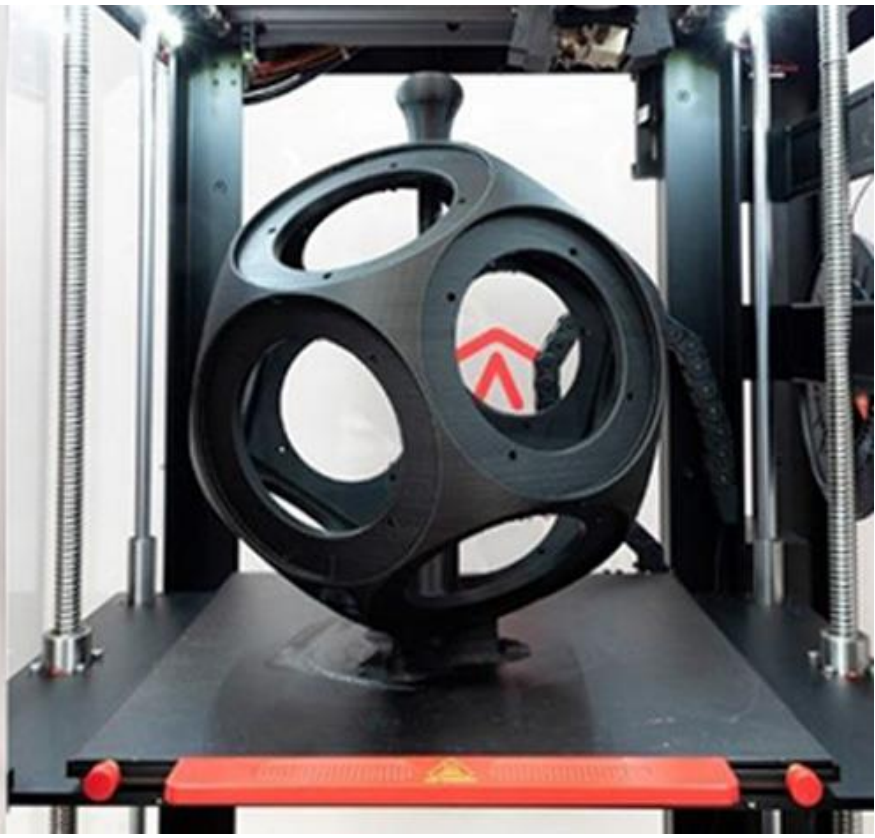
A great way to appreciate the capabilities of this intuitive workhorse is expressed by All3DP Reviewer Anatol Locker's quote:

"If you are a tinkerer, there's nothing wrong with tweaking settings, trying out filament properties and optimizing bed temperatures to get the perfect print. But if you invest $6,000 into a professional machine like the Raise3D Pro 2 Plus, you don't want to be bothered with these things. You want to get the perfect result without having to think for a second how the machine will achieve it."

See the entire review here: https://all3dp.com/1/raise3d-pro2-plus-review-3d-printer/

NTEK- An Italian acoustic speaker manufacturer is another success story for 3D printing in the audio engineering industry, also features Raise3D printers. Here's how they transformed their Omni 4 Series printer:

NTEK
A Trailblazer in Italian Acoustics is Using 3D Printing for Their Omni Series Speakers



Recently NTEK revolutionized the production process of their Omni 4″ Series focusing on 3D printing. With their trusted 3D technological partner Crea3D, NTEK designed and developed the new dodecahedral (structure with 12 sides) speakers, which radiate sound uniformly in all directions. The 360˚ surround sound facilitates accurate insulation measurement and reverberation time both in building and architectural acoustics.

The Advantages of 3D Printing- Innovation Made Easier

The traditional Omni 4 ” speakers were made of wood (Finnish Birch), which guaranteed excellent product performance. Earlier, production was entrusted to an external supplier, required high quantities to amortize the costs of the mold, with unreasonably long delivery times of a few months.

It was impossible to make changes during construction, even small ones, since they required the creation of a new mold, with additional costs and a considerable lengthening of delivery times. *Talk about squelching an engineer’s creativity in R&D!*

The new Omni 4 ” printed in 3D represents a real breakthrough. Production with additive technology allows greater freedom in design, guarantees sphericity and achievement of greater isotropy and omnidirectionality in the speakers.

The Process:

For the printing of the new Omni 4,’’ Crea3D used Raise3D large-format 3D printers, the Pro2 Plus and the Fabbrix PLA HT filament. 3D Printed with this heat-resistant material, the Omni 4” speaker structure ensures excellent performance of the structure even after long periods of activity, without incurring deformations due to the temperatures reached during operation.

Benefits of 3D Printing Using Raise3D Pro2 Printers

Innovative Design Technology: Thanks to Raise3D’s sophisticated slicing software ideamaker and the use of special polymers that guarantee and improve the performance of the Omni audio output, NTEK has greatly changed the external design of its two 4″ omnidirectional speakers. Precision printing with the Raise 3D Pro’s ultra-fine, dual-extrusion heated nozzles means they could count on quality and consistency in producing high-res prints each time. The ability to use heat-resistant material produced an excellent performance of the structure, preventing warping even after prolonged periods of activity.

Low Weight:
The product is much lighter and more manageable than the traditional wooden version:

- 3D printed OMNI 4 HP: 7 Kg instead of 8.5 Kg.
- 3D printed OMNI 4 LT: 4.2 Kg instead of 5.5 Kg.

Time & Cost Efficiencies:
NTEK can now offer customers greater customization with the possibility of printing even small quantities based on client requests or market needs. More significantly, the ability to make small changes and iterations while the project is in progress saves everyone involved both time and money.

Improved Handling:
With innovative design, the new Omni 4″ guarantees greater ergonomics. Hand transport will be more comfortable thanks to the new structure of the knob, which now ensures a more comfortable and firmer grip.

“What started out as a simple internal prototyping, in the name of new technologies, is now proving to be a major workhorse. We’re the first to adopt this new method: we feel proud to have invested and continue to invest in the field of new technologies and, where possible, make the best of them by directly modifying the production lines of NTEK”

– Giancarlo Sassi, NTEK General Manager

With revamped design capabilities, improved handling, and innovative technology makes companies like NTEK and TGI-TOA even more committed and exploration and investment in 3D printing technologies. Sounds good to us!

Connect with Raise3D

Do you have a great 3D printing success story and think it would be cool to be featured on www.raise3d.com, we would love to learn more! Write to us at inquiry@raise3d.com

For more information about Raise3D printers and services, browse our website, or schedule a demo with one of our 3D printing experts.