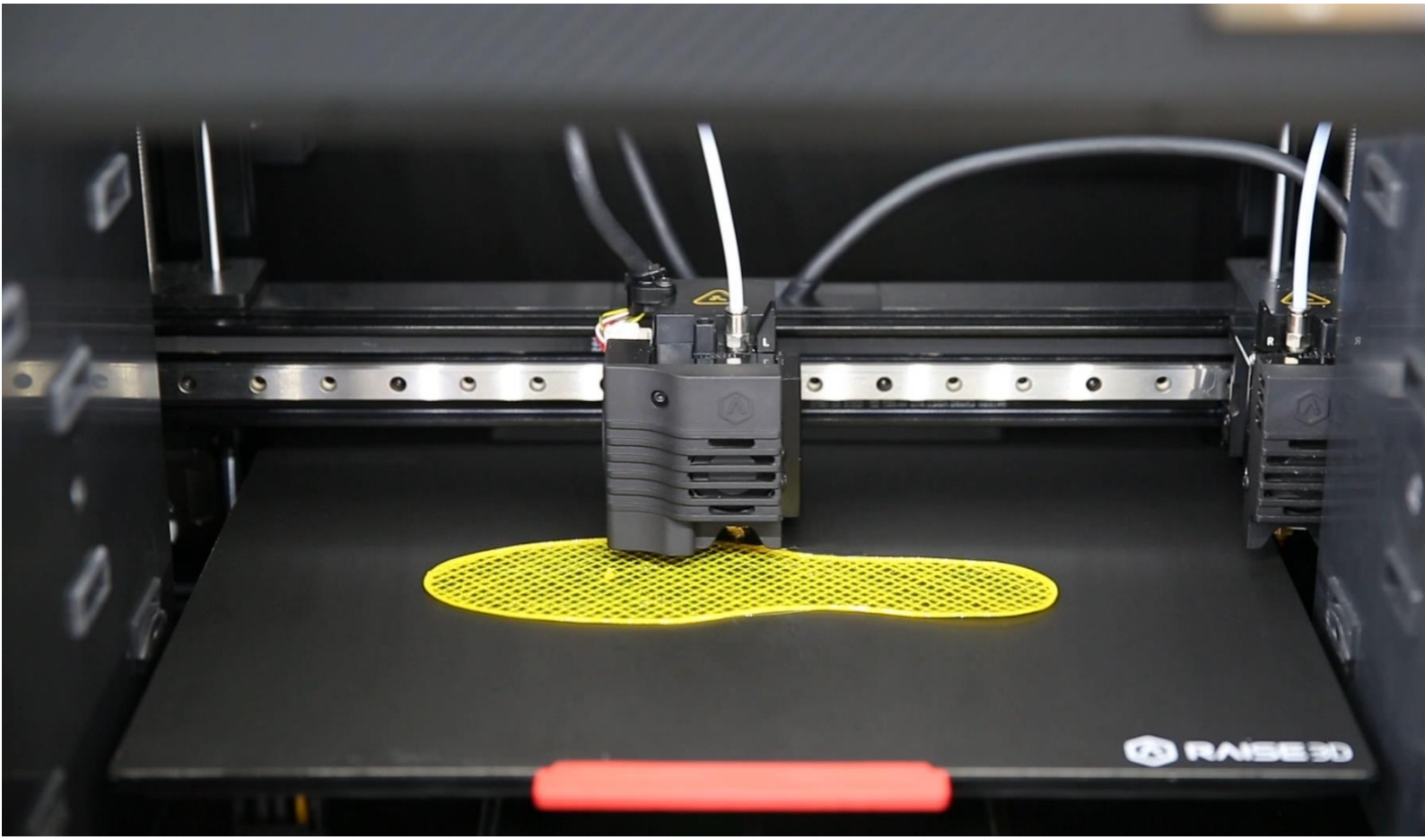
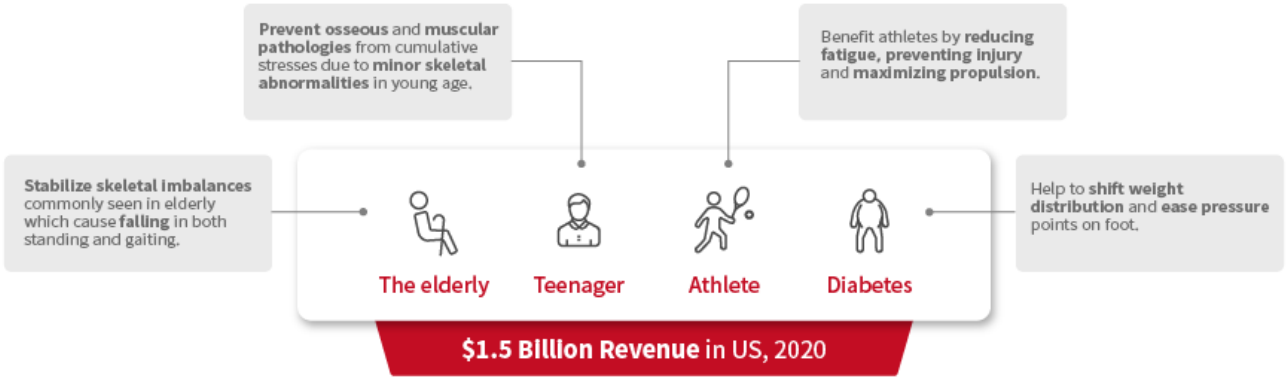
Raise3D Shows How to 3D Print Economical and Customized Orthotic Insoles

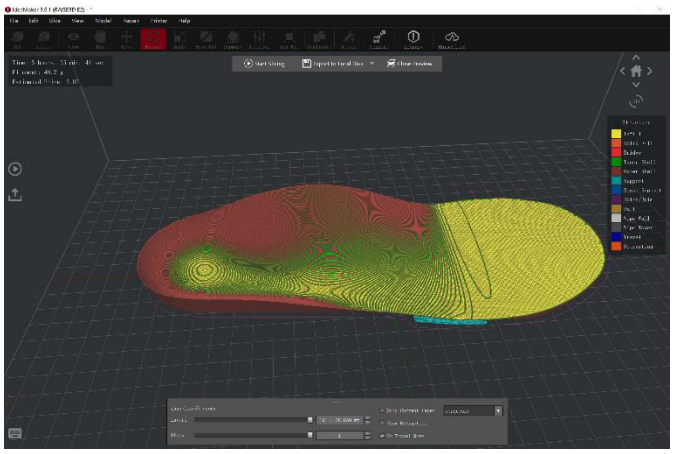


Raise3D Case Study
Dec 2, 2020

Orthotic insoles emerged after WWII as a treatment for lower limb biomechanical diseases. Orthotic insoles became a popular treatment due to its easy accessibility and a wide range of applications. For example, at present, around 9.4% of the American population, which equates to 30.3 million Americans, have diabetes. Meanwhile, over 70% of Americans suffer from overpronation. Such a high percentage of Americans suffering from diabetes and overpronation results in many people needing orthotic insole treatment.



For over 70 years, the orthotic insole fabrication process relied heavily on manual labor and CNC machining. This heavy reliance on both these methods resulted in high costs and considerable production lead times, while battling the constant risk of variance in its production precision. However, with the adoption of 3D printing, the orthotic insole fabrication process is changing within the manufacturing sector.

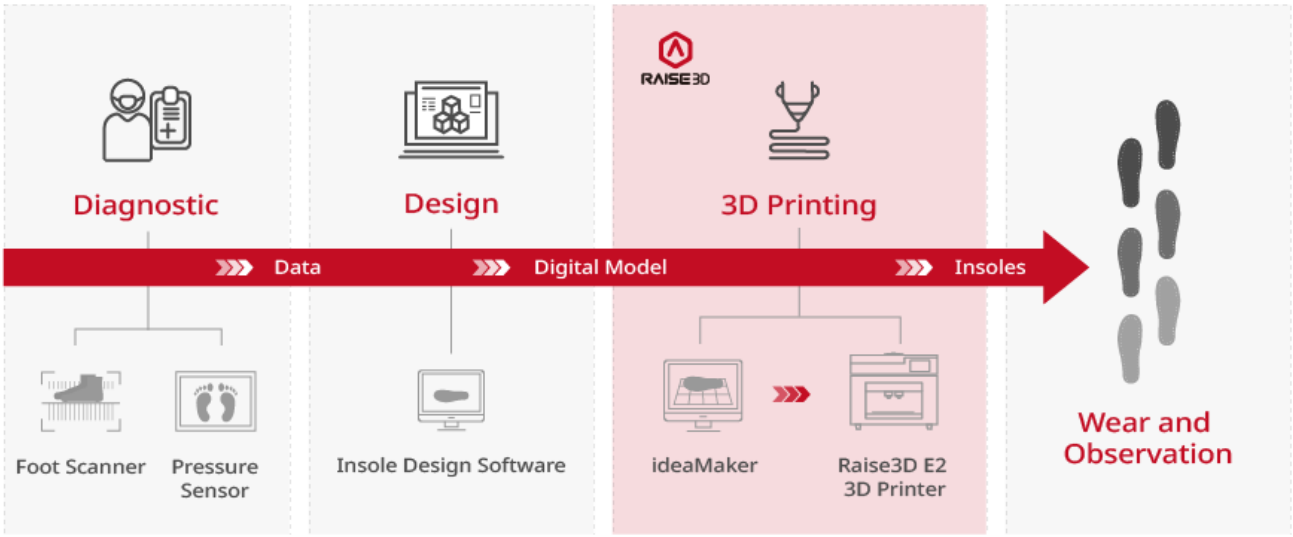


Raise3D is collaborating with an innovative hospital to incorporate specialized FFF 3D printing into the production of orthotic insoles. By combining Raise3D's E2 desktop 3D printer with ideaMaker, Raise3D's 3D slicing software, the insoles retain their high performance while remaining cost-effective.

3D Printing in the Medical Field

The hospital had insight into a decade of the success of 3D printing and had high standards for the any insoles made using this method of production. It was decided to improve orthotic insoles by implementing 3D printing in conjunction with other digital technologies to the insole fabrication process.

The hospital established its 3D Printing Clinic to operate with additional technical support from its collaborating university biomechanical lab. This technical support includes the latest analysis, scanning, and designing technologies.



3D Printing Clinic Partners with Raise3D

Satisfied by the process efficiency and the high performance of 3D-printed insoles from Raise3D, the hospital chose to utilize Raise3D products and support for the 3D printing portion of the fabrication process. 3D Printing Clinic used Raise3D's orthotic insole solution, including a 3D printer, slicing software, slicing template, and filament to improve their orthotic insole process.

Raise3D and the hospital work together to create the best possible 3D-printed custom insole orthotics. The hospital focuses on diagnostic and insole design procedures and in-house 3D printing operations. Meanwhile, Raise3D provides technical support and advice so the hospital can produce 3D-printed orthotic insoles that fulfil its demanding requirements. Raise3D contributes to the printing parameters optimization, operation training, and technical support. In addition, the user-friendly interface of Raise3D hardware and software ensures that medical staff can easily operate, manage, and schedule the 3D printer, thus saving time and labor.

By combining 3D printing with a digital production process, 3D Printing Clinic is fully set up within the hospital and can produce insoles in-house. Each month, 3D Printing Clinic treats orthotic patients visiting from all over the country while the number of patients they treat continues to increase.

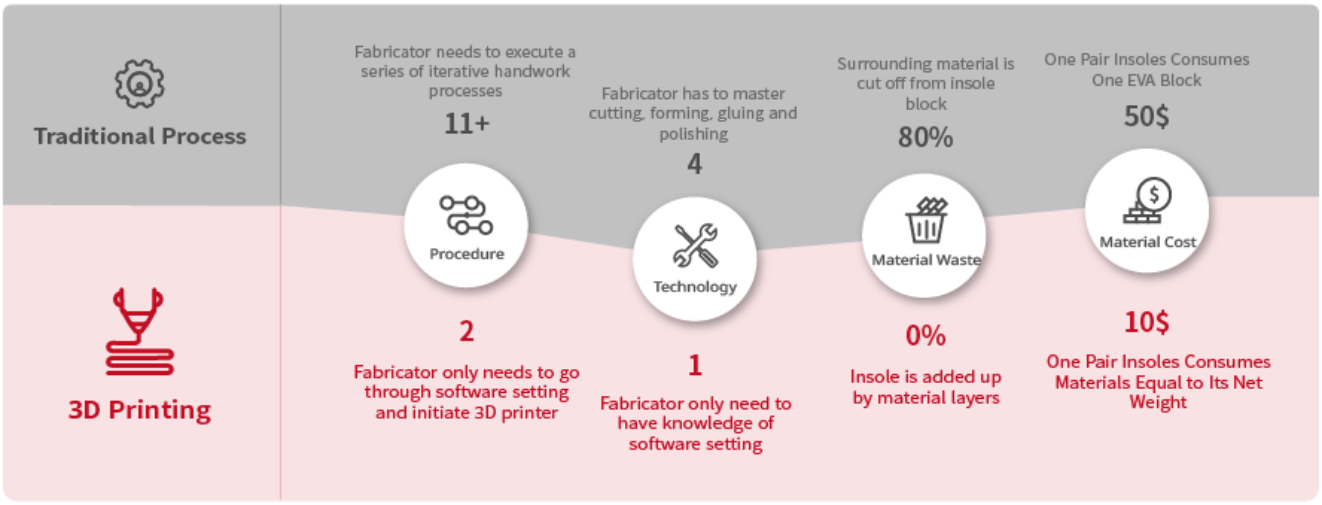
Insole Production Before 3D Printing

The traditional customizing process of orthotic insoles is complicated, because each pair of insoles is identical but each person needs a slightly different shape, which is hard to measure. To make matters more complicated, insoles will need different mechanical properties in different parts of the sole to properly correct a person's stance. For example, an individual with uneven arches and overpronation will need different arch support for each foot, to prevent each limb from falling out of alignment while moving. The applied method generally involves shaping and overlaying different material sheets together. This causes an iterative process comprised of shaping, assembling, and polishing for each material sheet. Even with the aid of CNC machine, this still requires a great amount of manual labor.

Insole Production After 3D Printing

Since the entire 3D printing process shifts between the workshop, computer software and a 3D printer, 3D Printing Clinic can perform the entire process in-house. When the 3D printer is equipped, the only operating procedure the medical staff needs to know is understanding a few relevant design parameters and clicking the mouse.

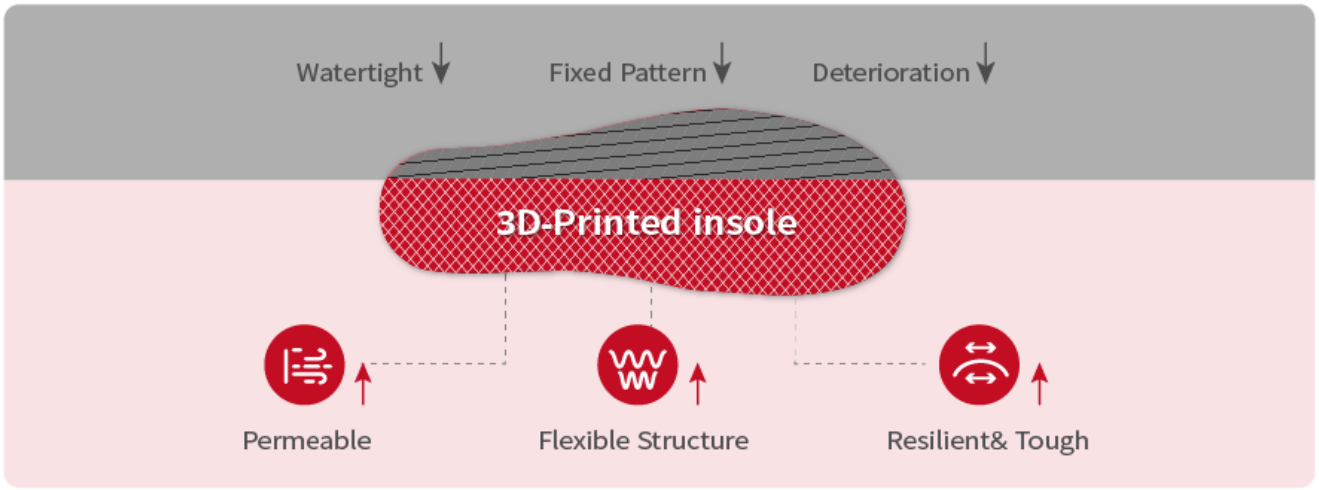
The E2 desktop 3D printer from Raise3D finishes the fabrication process of one pair of 3D-printed insoles in around 2 hours, without the need for any intervening labor. By incorporating the additional support from RaiseCloud, a cloud-based 3D printing management software from Raise3D, the hospital operators can remotely monitor the printing progress in real time. Since RaiseCloud is a cloud-based platform, it can always be accessed via the internet, which significantly improves printing management efficiency and flexibility.



3D-Printed Insoles Are High-Performing and Cost-Effective

3D-printed insoles have better performance than those produced by traditional manufacturing methods. For example, a 3D-printed custom insole has an open infill structure which makes the insole lightweight and permeable. Another benefit is that the 3D-printed insole has a more precise and flexible hardness distribution inside. This is critical for the treatment result. A 3D-printed insole from Raise3D uses TPU filament which has better mechanical properties, namely durability and strength, especially when compared to an insole produced by traditional manufacturing methods. The patient will feel a more consistent support strength for the entire time spent wearing the 3D-printed insole.

A high-performing 3D-printed insole is also cost-effective to produce, especially when compared to the cost of conventional insole production. This is because the cost structure of 3D printing is different from traditional production. For example, by implementing 3D printing, the hospital can reduce the need for different types of equipment and tools. This saves on asset expenditure and the cost of working space. It also reduces labor and material costs because it is a far less wasteful process.



3D Printing Improves Personal Rehabilitation

3D printing is changing the face of personal rehabilitation by being cost-effective, reducing waste, and improving the wearer's comfort. Aside from insoles, other medical wearables, including prosthetics and scoliosis orthoses, are already gaining significant advantages thanks to 3D printing. With a joint effort from Raise3D and healthcare professionals, other fields of medical activity can also greatly benefit from 3D printing.

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.