Revolutionizing Custom Orthotics Production:

The Impact of SAF™ Technology and 3D Printing in Manufacturing of Custom Made Insoles

stratasys

Solution Guide

The Evolution of Orthotic Manufacturing: Traditional Methods and Their Challenges

Orthotic manufacturing has evolved from traditional methods such as traditional casting and molding methods, to incorporate more digital processes; CNC milling and 3D Scanning, each with its unique set of challenges. These techniques, while foundational to the industry, present significant limitations.

- **Traditional casting and molding methods:** Orthotic manufacturing traditionally involves making a physical mold of the foot using a foam box for a negative impression, which guides the creation of a positive plaster model. This model is used in vacuum forming, where a thermoplastic sheet is shaped over the model. Despite being a core part of manufacturing, this process often leads to variations in the orthotic's thickness and density, affecting comfort and effectiveness. Manual adjustments for cushioning and patient-specific corrections are also made, which are time-consuming and labor-intensive. This traditional approach faces challenges in precision and efficiency, making it difficult to produce custom orthotics quickly.
- **Digital Innovations:** CNC Milling and 3D Scanning: The integration of 3D scanners is revolutionizing conventional workflows by transitioning them into a digital realm. This integration facilitates precise customizations and showcases the potential for more efficient and personalized orthotic production.

  CNC milling and 3D scanning have introduced major improvements to the manufacturing of custom-made insoles. The CNC milling process, although precise, is time-consuming, limiting the design possibilities and generating waste compared to 3d printing processes.

Moreover, both struggle to balance the need for personalized customization with production efficiency and cost. And as demand for custom foot-orthotics, tailored to individual foot shapes and biomechanical needs, continues to increase, these traditional methods are limited in their ability to provide such customization quickly and affordably.

The limitation of these traditional methods have prompted the orthotic industry to seek out more innovative, efficient and sustainable manufacturing solutions. This quest has led to the emergence and adoption of 3D printing technology, with Stratasys® Selective Absorption Fusion (SAF™) technology at the forefront of this transformation.

Embracing Cutting-Edge Technology in Orthotics

The adoption of 3D printing in orthotic manufacturing marks a significant shift in the industry. Pioneers like Tim Ganley, Podiatrist and Managing Director of GO Orthotics, have recognized the potential of this technology to overcome the challenges posed by traditional methods. With a history of embracing innovative solutions, these early adopters have turned to 3D printing as the next step in providing high-quality, functionally effective foot orthotics.

The Stratasys H350® printer, leveraging SAF technology, exemplifies this innovative shift. Unlike traditional methods, the H350 is designed for volume production while maintaining a small footprint, making it an ideal choice for orthotic manufacturing facilities. This printer enables the creation of custom foot orthotics, each uniquely designed to meet individual patient needs, thus revolutionizing the customization aspect of orthotic manufacturing.

The Benefits of Additive Manufacturing in Foot-Orthotics Production

Revolutionizing Comfort and Customization

The advent of additive manufacturing, specifically SAF technology, has brought about a paradigm shift in the production of custom foot-orthotics. One of the most significant benefits is the dramatic improvement in comfort. This is achieved by reducing weight and thickness where it's not necessary, using a minimum thickness of 1 mm and is possible to adjust infill geometry to match a patient's individual needs. This not only makes the foot-orthotics lighter but also more comfortable for the wearer.

Customization takes a leap forward with SAF technology. Traditional methods often require compromises between customization and production efficiency. However, SAF provides an unprecedented level of personalization, with no trade-offs on production time or cost. This includes local reinforcements for improved rigidity, textures for better grip, and the ability to add personal touches like serial numbers, names and brand markings directly during the production process.

Cost-Effectiveness and Productivity

In terms of cost and productivity, SAF technology outperforms traditional casting methods and CNC milling. The efficiency of 3D printing allows for a shorter lead time, which is crucial in today's fast-paced market. The ability to produce multiple foot-orthotics simultaneously without compromising on quality or customization significantly reduces the cost per part. This makes SAF technology not only a more productive choice but also a more economical one.

Sustainability: A Step Towards Eco-Friendly Manufacturing

Sustainability is another critical advantage of SAF technology. Traditional orthotic manufacturing methods can be wasteful in terms of material usage. In contrast, SAF technology allows for up to 90% less material consumption when compared to traditional CNC milling. This reduction in waste is not only economically beneficial but also environmentally friendly, marking a significant step towards more sustainable manufacturing practices in the orthotics industry.

Technical Advantages of SAF Technology in Custom Foot-Orthotics Production

Unparalleled Productivity with the SAF H350

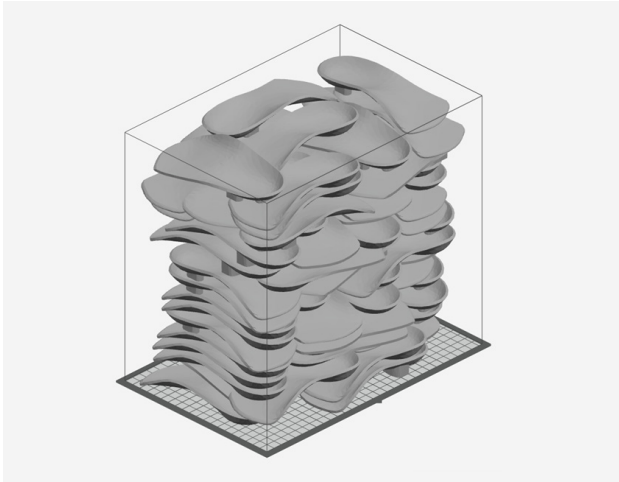
The Stratasys H350 printer, utilizing SAF technology, stands out for its remarkable productivity capabilities. It is designed to handle high-volume production without compromising on quality. For instance, the SAF H350 can print up to 35 pairs of foot-orthotics in a single 12-hour build. This efficiency is a result of the printer's unconstrained design space, which allows for more foot-orthotics per build, thereby enabling higher throughput while optimizing material consumption.

Superior Material: High Yield PA11

A key factor in the success of the SAF H350 is the use of High Yield PA11 material. This engineering-grade polymer is known for its high ductility and impact resistance, essential qualities for durable orthotics. PA11 not only delivers high-quality surface parts but also high elongation, which increases the longevity of the orthotics. This material is bio-sourced from castor seeds, offering a 100% renewable origin, which aligns with the growing need for sustainable manufacturing solutions. Additionally, according to the manufacturer ARKEMA, PA11 significantly reduces CO2 emissions from the powder manufacturing process by 70%, further highlighting its environmental benefits.

Design Flexibility and Quality

The SAF technology empowers manufacturers to produce orthotics with intricate designs that were previously challenging to achieve. This includes varying thickness, adding reinforcing areas for stiffness, and blending different areas for flexibility. The ability to intricately design each part of the orthotic means that practitioners can provide more tailored solutions to their patients, ensuring better therapeutic outcomes.



Efficient and Space-Saving

GO Orthotics' adoption of the SAF H350 also highlights the printer's small footprint and space efficiency, which is crucial for laboratories with limited space. The combination of high-quality materials, surface finishes, and powerful design software has further augmented the value of the H350 in the orthotic manufacturing process.

The GO Orthotics Experience: A Case Study in Innovation

Pioneering 3D Printing in Orthotic Manufacturing

Led by Tim Ganley, GO Orthotics ventured into a transformative journey by integrating the Stratasys H350 printers into their production line. This strategic move marked a departure from traditional manufacturing to a more efficient and innovative 3D printing approach, setting a new standard in custom orthotic solutions.

Enhanced Production with the H350 and High Yield PA11

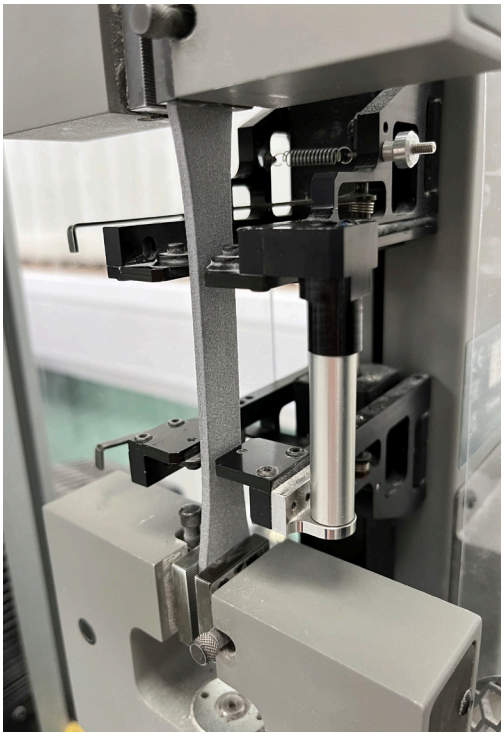
With two SAF-powered H350 printers, GO Orthotics significantly improved the quality and customization of their orthotics. The use of High Yield PA11 material not only enhanced durability and design flexibility but also contributed to more personalized and therapeutically effective orthotic solutions.

Building Client Confidence and Achieving Strategic Goals

Transitioning to 3D-printed orthotics involved overcoming initial skepticism. By closely collaborating with clients and demonstrating the superior quality of 3D-printed products, GO Orthotics successfully built trust in the new technology. This approach led to them becoming the only orthotics lab in New Zealand with such advanced onsite capabilities, thus achieving their strategic goals and maintaining market leadership.

Paving the Future of Orthotic Manufacturing with SAF

The integration of SAF technology into custom foot-orthotics production represents a significant advancement in the field of orthotics. The benefits of additive manufacturing — enhanced comfort, customization, cost-effectiveness, productivity and sustainability — are clear indicators of the technology's transformative potential. Real-world applications, as demonstrated by GO Orthotics, underline the efficacy and efficiency of SAF technology in meeting the modern demands of orthotic manufacturing. The future of this industry is clearly leaning twards more innovative, precise and eco-friendly practices, with SAF technology paving the way.



Taking the Next Step

Embark on your journey towards unparalleled efficiency and innovation in custom foot-orthotics manufacturing with Stratasys 3D printing. Whether you're considering outsourcing prototypes, initiating a small production run, or aiming to develop your own 3D printing program utilizing Stratasys SAF technology, we're here to support you.

Engage with our experts today to explore how our solutions redefine the limits of what's possible. Contact us to discuss specific applications or to address any 3D printing questions you may have. Let's transform your manufacturing capabilities.

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