3D Body-Scanning Technology: Creating the Perfect Fit

1) Most ready-to-wear apparel manufacturers decide the fit and sizing of their garments based on limited information. In the absence of accurate body measurement data, apparel companies generally size garments by using fit models in one or two standard sizes, and then scale prototypes proportionally to all sizes based on the originals. For a consumer, finding the right size for one’s body shape is often challenging, as the retail industry has no standard sizing system for all brands.

2) 3D body-scanning technology could be the solution to these fitting challenges. The noncontact technology can be used to capture the shape of a human body via a line of laser lights or a camera. The technology records the body’s exact shape and size and creates a 3D digital model of the body within seconds.

3) 3D body-scanning technology can help apparel companies create garments with a more accurate fit by providing true measurements of customers of different shapes and sizes. Body-scanning tools can also benefit consumers, by enabling them to virtually try on clothing in order to find the best fit. Use of such tools could, in turn, drive down return rates for online orders, which are currently as high as 30%–40%.

4) Looking beyond current industry practices, consumer-generated 3D body measurement data could help retailers optimize the size composition of their inventory and avoid excess markdowns. Retailers could use body measurement data collected by devices such as fitness scales and smartphones to make sizing decisions. We might see further interconnection between artificial-intelligence-powered shopping devices (such as Amazon’s Echo) and body-shape-tracking devices that results in a more seamless shopping experience.
Designing the Right Size for All Shapes Has Always Been a Challenge

Most ready-to-wear apparel manufacturers decide the fit and sizing of their garments based on limited information. Manufacturers generally decide on sizing by using fit models in one or two standard sizes and then scale prototypes proportionally up and down to all sizes based on the one or two originals. Apparel companies typically choose fit models of a medium size (usually a size 8) who share many of the same characteristics (such as age, gender and lifestyle) of the target customer base.

The proportional scale method often results in misfit products because it does not account for variations in body shape and proportion among individuals who wear the same size, as illustrated in the graphic below. Creating clothing that fits well is particularly challenging in the petite and plus-size categories, where specific parts of garments need to accommodate different body shapes instead of following a proportional scale from standard sizes. For example, a garment in a large size might have a larger-than-proportional waist or a longer torso than mathematically scaled measurements would call for.

Figure 1. Body Scans Show Significant Variation in Proportions Among Three Women Who Wear the Same Size (Size 10)

Source: Cornell Body Scan Research Group

For consumers, finding the right size for their body shape is also challenging, as the retail industry does not have a standard sizing system. Different brands have different numerical sizes and definitions of small, medium and large. The fit problem is particularly challenging for online shoppers because they cannot try on garments before they purchase them. This has resulted in high return rates in e-commerce: the average return rate for online apparel purchases is 30%–40%. In some categories where fit is an important factor, such as women’s dresses, the return rate is as high as 50%, according to industry sources.
3D Body-Scanning Technology and Its Role in Apparel Today

3D body-scanning could help apparel manufacturers and retailers solve the fit problem. It is a noncontact technology that captures the shape of a human body using a line of laser lights or a camera. When an individual stands within reach of the scanner, the scanner captures the person’s body shape in a 3D digital model within seconds. The scanner generates the model by digitizing the surface of the individual, and the model is then stored and processed by computer programs for different applications.

3D body-scanning systems can help apparel manufacturers create a more accurate fit by providing true measurements of customers in different shapes and sizes, so they no longer have to rely on a proportional scale of one medium size that is based on a limited number of fit models. The technology can provide valuable customer measurement data at scale for apparel retailers to improve the fit of mass-produced garments. The 3D digital models created by scanning contain tailor measurement data points such as chest size and body circumference, which are highly valuable data for fitting. The models also provide visualizations of the individual from different angles. Finally, 3D body scanning reduces the cost and time associated with taking manual measurements, while improving measurement accuracy.

Some of the companies that provide 3D body-scanning services include:

3D-a-Porter: This UK-based firm provides a set of 3D scanning applications that includes body scanning, 3D virtual try-on and 3D magic mirrors. The company has helped high-end fashion brands gather sizing information that is specific to their products.

Virtual try-on applications can be particularly useful to retailers by helping to drive down return rates for online orders, which are currently as high as 30%-40%. A significant portion of returned orders are due to poor fit. Virtual try-on apps match an individual’s scanned body model with the best-fitting sizes on shopping websites. With body scanning and garment specifications entered by retailers, consumers can use these apps to find the best-fitting size and to visualize how the clothes will fit on their body before placing an order. Consumers can create virtual 3D models of themselves by going to a body-scanning booth in a nearby shopping mall or use their mobile devices to generate a body scan.

mPort: is an Australia-based startup that has rolled out 3D scanning pods at shopping malls across Australia. Customers can walk into a scanning pod and have a 3D avatar created for fitness tracking and shopping purposes. Customers can obtain sizing recommendations from mPort’s retail partners based on their own measurements.

Styku: This company invented a powerful, lightweight 3D body scanner that retailers can purchase and use to collect their own proprietary data. The measurement data enable smaller apparel manufacturers to optimize and predict the best fit for their product lines without large upfront investments. This feature differentiates the company from its
competitors that use industrial-grade scanners to collect data for their industry clients. The Styku scanner captures millions of data points on a human body within seconds. The measurements are 76% more precise than those that can be captured by even the most skilled hand-measuring experts, according to the company.

[TC]²: This US-based, full-service 3D visualization company focuses on the fashion, fitness and medical industries. In retail, the company provides customized analysis and recommendations of sizing specifications based on its proprietary database, which is called SizeUSA. The database contains scanned 3D models and body measurements of 12,000 Americans from 13 US cities. Created in 2004, the database is the first updated body metrics database in 40 years and it is the first example of 3D scanning technology being used in the data collection process. The company has helped Jockey improve the fit and comfort of its products using the proprietary SizeUSA data. [TC]² has also created a customized database of 1,000 people for Lands’ End and Victoria’s Secret using 3D scanning technology. The company was one of the first 3D scanning service providers in the world.

Some other startups are addressing sizing issues through different means.

**Bold Metrics** constructs male and female body measurement models by asking shoppers a set of questions and then uses predictive analytics to recommend the appropriate size.

**FABLETICS**

Athletics brand Fabletics uses data analytics to see how customers react to different items in-store. The company analyzes potential fit and design issues by tracking whether customers are consistently buying a size smaller or larger than normal, and then adjusts the product design based on the real-time feedback.

Beyond apparel, 3D body-scanning technology is used to collect data for other industrial design purposes. It provides body shape data used by the airline, automobile and tractor industries, which need to design seats that maximize comfort. The entertainment industry uses 3D body-scanning technology to develop animated characters and characters in video games.

**VIRTU SIZE**

Virtusize is a startup that recommends the right size for online shoppers based on their previous purchases or measurements from an item they already own.

**Implications for the Future**

We are seeing increasing availability of consumer-generated 3D scanning data from daily activities, and retailers could use such data in the future. For example, there are body-scanning fitness applications that enable users to track their body shape changes over time. Retailers could use the data collected by consumers’ fitness devices to make
sizing recommendations for those consumers. And, because those apps allow users to track body shape changes over time, recommendations based on those data would be more accurate than recommendations based on a onetime scan. In addition, further interconnections between AI-powered shopping devices such as Amazon’s Echo and fitness devices that track body shape could be used to make the shopping experience more seamless.

Source: shapescale.com

The ShapeScale is a smart scale that tracks body shape changes with a built-in camera. The scale uses the detailed measurements and weight data to create a 3D avatar, so users can track their fitness results over time. The company has already announced plans to expand its offering to include sizing recommendations for customers. Naked is a startup that makes a mirrorlike smart scanner that tracks users’ body measurements, weight and body fat for health and fitness purposes.

Consumer-generated 3D body measurements could help retailers in the following ways:

1) Retailers could use the data to optimize their size composition in their inventory and to avoid excess markdowns. With accurate body measurements and location information from their customers, retailers could proactively prepare the right amount of inventory in each size at each store. Currently, retailers usually allot a standard proportion of quantities in different sizes, which often results in inventory mismatch and markdowns.

2) Body-scanning technology could help retailers with mass customization. Customers could share their measurements and look for designs provided by retailers. This made-to-order model could help retailers provide unique products to customers and reduce return rates at the same time.
3) As more consumers begin to use virtual-fitting apps, smart fitness scales and smart home devices to generate their own body shape data, they could provide accurate sizing data to apparel manufacturers, which could use these data to improve sizing. Retailers might be able to monitor subtle changes in size among their core customer base in real time, and adjust garment designs accordingly. Those retailers with access to body shape data generated by their own customers would have an advantage in terms of precision over retailers that rely on data from a 3D body measurement database.

Figure 2. How Body-Scanning Technology Can Transform Apparel Production