Jeans are fitted based on the concept of shape, not size. There are at least three shape categories for different levels of curviness. With shape category information, the consumer can more easily find and fit a pair of form-fitting jeans. These jeans can also include a body shaping panel on an inside surface of a material of the pants to help actively shape the body. The body shaping panel enhances the body's natural curves while de-emphasizing the body's flaws, so the consumer can feel confident and attractive in their jeans.
MIX SOLUTION FOR COATING MIXTURE 205

CREATE SHAPE CONTOURING PANEL FOR GARMENT 210

CUT FABRIC PATTERNS FOR GARMENT 215

SEW THE PATTERN TO FORM GARMENT (e.g., PANTS, JEANS, SHORTS) 220

ADD COSMETIC FINISHING, SEAMING AND CONSTRUCTION TO GARMENT 225

FIG. 2
CREATE SCREEN (e.g., MESH SCREEN) WITH SHAPE CONTOURING PANEL PATTERN TO BE PRINTED

PLACE SCREEN OVER SUBSTRATE (e.g., FABRIC), APPLY COATING MIXTURE TO SCREEN

APPLY PRESSURE TO SCREEN TO SQUEEZE COATING ONTO FABRIC, REMOVE SCREEN

DRY (i.e., CURE) THE PRINTED PATTERN ON FABRIC

FIG. 6
POPULATION SAMPLE, GATHER BODY MEASUREMENT DATA 1605

BODY MEASUREMENTS 1606

3-D BODY SCANS 1607

STORE BODY MEASUREMENT DATA 1610

ANALYZE BODY MEASUREMENT DATA, CORRELATE WITH BODY SHAPE 1615

BODY MEASUREMENTS DIFFERENTIAL 1617

GRAPH DATA WITH LOW HIP- HIGH HIP DIFFERENTIAL 1625

PARTITION GRAPH, GENERATE PANTS SIZING CATEGORIES 1630

FABRIC PATTERNS FOR SIZING CATEGORIES 1632

PANTS CLASSIFICATIONS FOR SHAPED FIT SIZING 1635

(A) = e.g., “SLIGHT CURVE”
(B) = e.g., “DEMI CURVE”
(C) = e.g., “BOLD CURVE”
(D) = e.g., “SUPREME CURVE”

FIG. 16
CUSTOMERS 1705

STORE (e.g., AT LEVI'S STORE SF) ONLINE WEB

USE SHAPE MEASURING TOOL, TAKE BODY MEASUREMENTS 1710

FIRST BODY MEASUREMENT 1711 SECOND BODY MEASUREMENT 1712

CALCULATE SHAPE INDEX WITH LOW HIP-HIGH HIP DIFFERENTIAL 1715

INDEX 1717

WITH SHAPE INDEX, FIND SHAPED FIT PANTS CLASSIFICATION 1720

FIG. 17

PANTS CLASSIFICATIONS FOR SHAPED FIT SIZING 1635

A = e.g., “SLIGHT CURVE”
B = e.g., “DEMI CURVE”
C = e.g., “BOLD CURVE”
D = e.g., “SUPREME CURVE”
GIRTH POINTS OF MEASURE

- Waist
- High Hip
- High Hip
- Seat/low Hip
- Thigh
- Mid Thigh
- Knee
- Calf
- Ankle

FIG. 18
POINTS OF MEASURE FOR DEPTH & SHAPE

- Waist to High Hip
- Waist to Seat/Low Hip
- Hi-High Hip to Seat/Low Hip
- High Hip to Seat/Low Hip
- Saddle Depth
- Total Rise

FIG. 19
SHAPED FIT SIZING SYSTEM WITH BODY SHAPING
CROSS-REFERENCE TO RELATED APPLICATIONS


BACKGROUND OF THE INVENTION

[0002] The present invention relates to clothing sizing systems and, more specifically, to pants, especially jeans, having shaped fit sizing and body shaping fit that actively shapes the wearer’s body.

[0003] In 1853, during the California Gold Rush, Levi Strauss, a 24-year-old German immigrant, left New York for San Francisco with a small supply of dry goods with the intention of opening a branch of his brother’s New York dry goods business. Shortly after arriving in San Francisco, Mr. Strauss realized that the miners and prospectors (called the “forty niners”) needed pants strong enough to last through the hard work conditions they endured. So, Mr. Strauss developed the now familiar jeans which he sold to the miners. The company he founded, Levi Strauss & Co., still sells jeans and is the most widely known jeans brand in the world. Levi’s is a trademark of Levi Strauss & Co.

[0004] Though jeans at the time of the Gold Rush were used as work clothes (which were relatively loose fitting since fashion was not a concern), jeans have evolved to be fashionably worn everyday by men and women, showing up on billboards, television commercials, and fashion runways. Fashion is one of the largest consumer industries in the U.S. and around the world. Jeans and related apparel are a significant segment of the industry.

[0005] As fashion, people want their jeans to have a customized fit (e.g., “tight fitting jeans”). Good fitting jeans today have a form fit that is very different than, for example, the pants of the 1800s and early 1900s. Before, loose-fit or overly baggy pants and balloon dresses were the norm, since they were intended to hide or obscure the body shape. Today, modern technology has allowed the manufacture of off-the-rack pants, jeans, and shorts having much better form fit, while at the same time being comfortable to wear.

[0006] Despite the widespread success jeans have enjoyed, there is a continuing desire to address the demands of the consumer even better. Consumers desire off-the-rack, form-fitting jeans for their own seat and hip shapes, without having to pay for custom tailoring. Existing jeans sizing systems, which may have addressed the market demand of the time they were developed, do not adequately address the demand of the modern consumer and their wide variety of body shapes.

[0007] Even when people find proper fitting pair jeans, they still want their jeans to have a tight, form fitting look, where the jeans conform to the shape of the body. Furthermore, consumers want form flattering jeans that molds and shapes the body’s natural silhouette, while flattering the body’s natural curves.

[0008] Therefore, there is a need for an improved technique and technology for jeans and similar clothing (e.g., pants, shorts, and skirts) to flatter the consumer’s body shape and can make them look good.

BRIEF SUMMARY OF THE INVENTION

[0009] A new body shaping fit system for pants is based on the concept of actively shaping the body’s silhouette. This fit system is based upon a combination of one or more unique design and engineering components including: a stretch coating formulation for fabric that customizes stretch in all directions (e.g., four way stretch that stretches in the crosswise and lengthwise directions), shape contouring panels, cosmetic finishing techniques, and seaming and construction techniques. The fit system provides a consumer with a form fitting pair of jeans with holding power to enhance the body’s natural curves while de-emphasizing the body’s flaws. The fit system is also applicable to pants, shorts, skirts, and other clothing where form fit and support is desirable in the seat, hip, and thigh areas.

[0010] A specific implementation of a system and technique of the invention is the Levi’s® Revel™ system. Revel is a trademark of Levi Strauss & Co. The Revel system works in conjunction with the Levi’s® Curve ID® system or other shaped fitting system (that work based on body shapes). Curve ID is a registered trademark of Levi Strauss & Co. Curve ID allows women to find the perfect fit based on body type. Curve ID specifically addresses women’s body shapes with its basic body shape categories: e.g., slight curve, demi curve, and bold curve. Optionally, Curve ID includes a fourth custom fit, which is called the supreme curve. This Curve ID formula for finding the perfect fit looks beyond waist size to address the true curves of a woman’s body.

[0011] Curve ID includes three custom fits based on the difference between the measurement of a woman’s hip and seat—the greater the difference, the more curvy the body. The slight curve fit is for relatively straight figures. The fit defines a woman’s waist, while accentuating her curves. The demi curve fit is for evenly proportioned women. This fit is designed to flatter a woman’s waist while smoothing her shape. The bold curve fit is for curvy women. The bold curve fit hugs a woman’s waist without gaping or pulling. Optionally, Curve ID includes a fourth custom fit, which is called the supreme curve.

[0012] These custom fits and new approaches to measuring a woman’s body were created after listening to women from around the world and are based on a study of body scans of more than 60,000 women. From the studies, three distinct body types were identified that account for 80 percent of women’s shapes. The customized fits and measurement techniques are based on these body types. These new fits allow women of many different body types to find their perfect fit and ultimately help them feel confident and attractive in their jeans.

[0013] Although Curve ID specifically addresses off-the-rack customized fit for women, aspects of the system can be applied to other classes of consumers, including men, children, teens, boys, and girls.

[0014] Each category or classification is based on a distinct body shape that is determined by a body measurement differential. As an example, for a person to be fitted, circumference or girth measurements may be taken at (1) high hip location and (2) low hip (seat) positions. A difference between these
two measurements is the body measurement differential, which is an index used to determine which body shape fit category the person is in.

[0015] After determining the body shape category and a particular size within that category using the Curve ID system, a person will try on a pair of jeans. Using body shape fitting like Curve ID, the jeans will fit the person’s shape much better. With this better fit, some people may experience that their flaws become easier to see. This application describes techniques and technology used to reduce the visibility of such flaws and defects. As one of ordinary skill will recognize, the techniques and technology are applicable to jeans and pants which are not sized using a body shape fitting. For example, the technology and techniques of the invention can be applied to, for example, standard sized fitting of jeans and pants or custom tailored jeans or pants.

[0016] With the Revel system, the jeans are specifically engineered and designed for the consumer’s body shape. The jeans provide support (e.g., holding power) for the woman’s seat, hip and thigh areas by incorporating unique shape contouring panels that are made through a unique screen printing process on the inside surface of the jeans. The unique engineering and placement of the panels inside the jeans can smooth and hold in the stomach, seat and inner and outer thighs, while lifting up the seat. In addition, the finish of the jeans is specifically designed for the woman’s body shape. Specific design techniques like placement of shading, placement of abrasion patterns, positioning of whiskers, and seam and stitch detail can create an illusion of longer, leaner thighs, a lifted seat, and flattering curves at the hip and seat. Although Revel specifically addresses fit for women, aspects of the system can be applied to other classes of consumers, including men, children, teens, boys, and girls.

[0017] In an implementation, a system includes a first sizing classification for pants, corresponding to, for a first body measurement, a first range of measurements for a second body measurement, where the pants includes a polyurethane coating to form a body shaping panel on an inside surface of a material for the pants that modifies or alters a stretch characteristic of the material; a second sizing classification for pants, corresponding to, for the first body measurement, a second range of measurements for the second body measurement, where the pants includes a polyurethane coating to form a body shaping panel on an inside surface of a material for the pants that modifies or alters a stretch characteristic of the material; and a third sizing classification for pants, corresponding to, for the first body measurement, a third range of measurements for the second body measurement, where the pants includes a polyurethane coating to form a body shaping panel on an inside surface of a material for the pants that modifies or alters a stretch characteristic of the material.

[0018] In various implementations, the first position can be a point on the person’s torso where the person bends naturally, and the second position can be a fullest point on a person’s hips. The second girth measurement can be made at a distance of about 8 inches (about 20.3 centimeters) from the natural waist of the person, and the natural waist can be a location on a person’s torso where that person bends naturally.

[0019] In an implementation, a system includes a first sizing classification for pants, corresponding to a differential between first and second body measurements in a first range, where the pants includes a polyurethane coating to form a body shaping panel on an inside surface of a material for the pants that modifies or alters a stretch characteristic of the material; a second sizing classification for pants, corresponding to a second differential between first and second body measurements in a second range, where the pants includes a polyurethane coating to form a body shaping panel on an inside surface of a material for the pants that modifies or alters a stretch characteristic of the material; and a third sizing classification for pants, corresponding to a third differential between first and second body measurements in a third range, where the pants includes a polyurethane coating to form a body shaping panel on an inside surface of a material for the pants that modifies or alters a stretch characteristic of the material.

[0020] In various implementations, the first position is a narrowest point on a person’s waist and the second position is a widest point on a person’s hips. The first position is a first distance below a point on the torso where a person bends, the second position is a second distance below the point on the torso where a person bends, and the second distance is greater than the first distance. The first position is at about 4 inches (about 10.2 centimeters) below a natural waist of the person, the second distance is at about 8 inches (about 20.3 centimeters) below the natural waist, and the natural waist is where the person bends naturally at a torso.

[0021] The system can further includes a fourth sizing classification for pants, corresponding to a fourth differential between first and second body measurements in a fourth range, where the pants includes a polyurethane coating to form a body shaping panel on an inside surface of a material for the pants that modifies or alters a stretch characteristic of the material.

[0022] In an implementation, a pair of pants includes a waistband portion, extending along a perimeter of an upper edge of pants; a first leg portion, connected (e.g., sewn together or otherwise joined) to the waistband; a second leg portion, connected to the waistband, where the first and second leg portions are connected together at a center seam, and the center seam is transverse (or perpendicular or approximately perpendicular) to a direction of the waistband; a fly, connected between the first and second leg portions on a front portion of the pants, where the fly extends from the waistband in a direction of the center seam and away from the waistband; a rear portion of pants including a seat, opposite of the fly, formed by rear portions of the first and second leg portions that are connected together, where the center seam extends on the front and rear portions of the pants; and a polyurethane coating, connected (e.g., joined, layered on the material, glued, adhesively joined, or otherwise adhered without using threads) to an inside surface of the pants.

[0023] The polyurethane coating includes a first section of the polyurethane coating on an inside surface of the first leg...
portion extending from a first point on the center seam at a first distance from the waistband along an inside seam of the first leg portion to a second distance from the waistband. The first section of the polyurethane coating also extends from the inside seam of the first leg portion to the outside seam of the first leg portion. At the outside seam of the first leg portion, the first section of the polyurethane coating extends from a third distance below the waistband to a fourth distance below the waistband. The third distance is closer to the waistband than the first and the fourth distance is farther from the waistband than the first distance.

[0024] In various implementations, between the first point and the outside seam of the first leg portion, an edge of the first section of the polyurethane coating is a fifth distance from the waistband, and the fifth distance is the same as or greater than the first distance from the waistband.

[0025] The first point is a crotch point and the first section is on an inside surface of the front portion of the pants. The first point can be a point on the center seam on the rear portion of the pants, and the first section is on an inside surface of the rear portion of the pants. The first point is a crotch point and the first section is on an inside surface of the front portion of the pants.

[0026] The polyurethane coating can further include a second section of the polyurethane coating on an inside surface of the first leg portion on the rear portion of the pants extending from a fifth point on the center seam at a first distance from the waistband along the inside seam of the first leg portion to a sixth distance from the waistband. The second section of the polyurethane coating also extends from the inside seam of the first leg portion to the outside seam of the first leg portion; and at the outside seam of the first leg portion. The second section of the polyurethane coating extends from a seventh distance below the waistband to an eighth distance below the waistband. The seventh distance is closer to the waistband than the fifth point and the eighth distance is farther from the waistband than the fifth distance.

[0027] Between the fifth point and the outside seam of the first leg portion on the rear portion of the pants, an edge of the second section of the polyurethane coating is a ninth distance from the waistband, and the ninth distance is the same as or greater than the fifth distance from the waistband.

[0028] The pants can include a graduated (or gradient) edging to the polyurethane coating including a polyurethane coating graduated with a number of open spaces, a width of the graduated edging is positioned between a portion of the polyurethane coating including a solid polyurethane coating without open spaces as in the graduated edging and the buttocks region of the pants, where the polyurethane coating is omitted. The graduated edging is at a border of the polyurethane coating and helps blend between the coated and uncoated portions of the jeans, so that there are no visible seam lines when viewing the jeans from the exterior side. In a specific implementation, a width of the graduated edging is from about 1/2 inch (about 1.3 centimeters) to about 1 inch (about 2.5 centimeters).

[0029] The material of the pants has a first stretch characteristic. The first section of the pants with the polyurethane coating, connected or joined to (e.g., coating) the inside surface of the pants, has a second has a second stretch characteristic. The second stretch characteristic is less elastic (or less stretch) than the first stretch characteristic. In other words, for some given length of material and same given force (e.g., per unit area), a material with the first stretch characteristic is capable being stretched to have a greater length than a material with the second stretch characteristic. For example, the elasticity may be a linear elasticity governed by Hooke's law, or other type of elasticity.

[0030] According an implementation that provides body shaping for the wearer, a buttocks region of the pants has the first stretch characteristic that has greater elasticity than an upper thigh region of the pants where the polyurethane coating has been put together or joined. The polyurethane coating reduces stretch of the first material to which it has been applied.

[0031] The material can be a denim material including cotton blended with a first fiber other than a cotton fiber. The cotton blended material typically has greater stretch than a pure cotton material, without the blended material. In a specific implementation, the first fiber includes spandex; other implementation can use polyester for stretch.

[0032] In an implementation, a method includes providing pants including fabric having a first stretch characteristic; on an inside surface of the pants, altering the first stretch characteristic of the fabric to have a second stretch characteristic, where the first and second stretch characteristics are different from each other; positioning a first region having the first stretch characteristic and a second region having the second stretch characteristic relative to each other, whereby helping shape a body of a wearer of the pants, whereby an inside view of the pants, the first and second regions blend seamlessly together without any thread seam lines.

[0033] In various implementations, the second stretch region has less stretch than the first stretch region. The second region is below the first region, the second region being farther from a waistband than the first region. The region having less stretch is below or beneath the region having greater stretch, providing support and countering the effects of gravity and the natural motion of the gluteal regions when a person walks.

[0034] Alternatively, the first stretch region can have less stretch than the second stretch region. Then, the first region is below the second region, the first region being farther from a waistband than the second region.

[0035] The altering first stretch characteristic of the fabric to have a second stretch characteristic can include, for example, providing a polyurethane coating on the inside surface of the pants in the second region.

[0036] In an implementation, a method includes: mixing a solution for a coating mixture; providing a pattern of a shape contouring panel; creating a screen incorporating the pattern; printing the pattern onto fabric; curing the fabric with the printed pattern; cutting the fabric according to a garment pattern; forming a garment from the garment pattern; applying cosmetic finishing, seam, and construction detailing to the garment.

[0037] In an implementation, a method of making a shape contouring panel includes: creating a screen having a pattern of the shape contouring panel; screen printing the pattern onto a substrate including placing the screen over the substrate; applying a coating mixture to the screen; applying pressure to the screen and removing the screen; and drying (or curing) the fabric. The process can be manually completed, automated, or semi-automated.

[0038] In an implementation, a method of applying cosmetic finishing to pants includes: adding highlights to a narrow portion of the front thigh; adding low light shading to an
inner and outer portion of the thigh; adding whiskers to the front of the pants; and adding an abrasion portion to the back of the pants, along the seat.

[0039] In an implementation, a system of shaped fit sizing includes a pair of jeans including at least one inside shape contouring panel, the panel including a polyurethane based coating; a low light shading along an inner thigh area and an outer thigh area on the outside of the jeans; a highlighting on a front area of the thigh; and a highlighting on a back of the jeans along the seat area.

[0040] In an implementation, a body shaping panel positioned on an inside surface of a thigh portion of pants includes: a first edge extending along an outer thigh of the pants, from about a hip area down to a mid-thigh area; a second edge extending along an inner thigh, where a length of the second edge is shorter than a length of the first edge; a third edge extending from the hip area down to a crotch area; and a fourth edge that wraps around a portion of the outer mid-thigh of the pants and curves up to the inner thigh.

[0041] The system of the invention is not limited to a single manufacturer or brand of jeans nor is it necessary that the system be used for or with any single fit system (e.g., Curve ID). The system can be used to create a single garment or a collection of garments. In addition, specific elements, methods, and techniques of the system can be used alone or in combination, and can be applied to other garments, or collections of garments made by other manufacturers.

[0042] Other objects, features, and advantages of the present invention will become apparent upon consideration of the following detailed description and the accompanying drawings, in which like reference designations represent like features throughout the figures.

BRIEF DESCRIPTION OF THE DRAWINGS

[0043] FIG. 1A shows a front view of a woman's body indicating body areas that need support and shaping.
[0044] FIG. 1B shows a back view of a woman's body indicating body areas that need support and shaping.
[0045] FIG. 2 shows a flow diagram of forming a garment of a body shaping system. The system is applicable to pants, shorts, and other types of shaped fit clothing, especially those worn, at least in part, at and below the waist.
[0046] FIG. 3A shows a front view of a specific implementation of a shape contouring coating on the inside of jeans.
[0047] FIG. 3B shows a back view of a specific implementation of a shape contouring coating on the inside of jeans.
[0048] FIG. 4 shows a specific implementation of patterns for shape contouring panels of coating for pants.
[0049] FIG. 5 shows a specific implementation of patterns for shape contouring panels of coating for pants.
[0050] FIG. 6 shows a specific implementation of a method for forming and applying a shape contouring panel of coating for a garment.
[0051] FIG. 7 shows a specific implementation of screens with patterns for shape contouring panels.
[0052] FIG. 8 shows a specific implementation of a coating having a graduated edge printed onto the inside surface of jeans.
[0053] FIG. 9A shows a specific implementation of a front panel for pants, the front panel having a graduated edge.
[0054] FIG. 9B shows a specific implementation of a back panel for pants, the back panel having a graduated edge.
[0055] FIG. 10 shows a magnified view of a portion of a graduated edge.
[0056] FIGS. 11A-11C show specific implementations of cosmetic finishing techniques applied to a front side of shaped fit jeans. FIG. 11A shows an example of jeans in a first fit category A of jeans (e.g., slight curve). FIG. 11B shows an example of jeans in a second fit category B of jeans (e.g., demi curve.) FIG. 11C shows an example of jeans in a third fit category C of jeans (e.g., bold curve).
[0057] FIGS. 12A-12C show specific implementations of cosmetic finishing techniques applied to a back side of shaped fit jeans. FIG. 12A shows an example of jeans in a first fit category A of jeans (e.g., slight curve). FIG. 12B shows an example of jeans in a second fit category B of jeans (e.g., demi curve.) FIG. 12C shows an example of jeans in a third fit category C of jeans (e.g., bold curve).
[0058] FIG. 13A shows a front view of a specific implementation of a positioning of a coating on an inside surface of pants.
[0059] FIG. 13B shows a back view of a specific implementation of a positioning of a coating on an inside surface of pants.
[0060] FIG. 14 shows a back view of another specific implementation of a positioning of a coating on an inside surface of pants.
[0061] FIG. 15A shows a front view of a specific implementation of a shape contouring coating on the inside of jeans.
[0062] FIG. 15B shows a back view of a specific implementation of a shape contouring coating on the inside of jeans.
[0063] FIG. 16 shows a system of shaped fit sizing for pants. These pants include fashion jeans and shorts.
[0064] FIG. 17 shows a system for fitting a person to pants having shaped fit sizing.
[0065] FIG. 18 shows various points on a person, below a waist point, at which girth can be measured.
[0066] FIG. 19 shows some points at which differential girth body measurements can be measured on a person. These differential girth body measurements can be used as an indication of depth and shape of a person.
[0067] FIG. 20A shows a specific implementation of seaming and construction techniques applied to a front side of jeans.
[0068] FIG. 20B shows a specific implementation of seaming and construction techniques applied to a back side of jeans.

DETAILED DESCRIPTION OF THE INVENTION

[0069] Many people have difficulty finding form fitting jeans that flatter their body shape and help define their silhouette. Form fitting jeans can actually appear to be too tight in some areas, and too loose in others. A problem with tight jeans is that they do not offer support for the wearer's body to hold in and smooth out certain areas that need added support. Consumers generally indicate these problematic areas to be the stomach, hips, seat, and thighs. After repeated wear, what were once tight-fitting jeans can noticeably begin to stretch, sag, and wear in the fabric around these areas of the body. As a result, the jeans can actually emphasize flawed areas of the body rather than flattering the natural curves and shape of the wearer. Jeans manufacturers do not take into consideration the need to provide increased support for these body areas.

[0070] To address these shortcomings, this patent introduces a new body shaping fit system for garments including for example, pants, shorts, active wear, underwear, and shape wear. Although the system is discussed with respect to pants,
jeans, capris, and shorts, the system can also be applied to other types of shaped fit clothing, especially those worn, at least in part, at and below the waist. These include shorts (combination of shorts and a skirt), slacks, formal wear (e.g., tuxedo trousers), school uniforms, military wear, athletic wear, sportswear (e.g., cycling wear, ski wear, golf wear, martial arts wear, track and field wear, swim wear, gymnastics wear, softball uniforms, baseball uniforms, football uniforms, hockey uniforms, lacrosse uniforms, winter and summer Olympics team apparel, gym wear, and others), dance wear, lingerie, panties, boxers, briefs, corsets, costumes (e.g., Halloween costumes or masquerade ball), compression wear, and many others.

[0071] FIGS. 1A and 1B show views of specific body areas of a wearer that need support and shaping. FIG. 1A shows a front view of the wearer’s body. Women want an attractive, feminine shape when wearing jeans. Women want to look like their hips 102a and 102b are smoothed out and held in. They want to hide any bulge of the hips, while accentuating the natural curves of the hips. A flattened stomach is another desirable feature that women often look for in a pair of jeans. Along the thighs 104a and 104b, women want a long, lean appearance, to look like their legs are slimmer.

[0072] FIG. 1B shows a back view of the wearer’s body. The seat 106a and 106b is an area that can be problematic for many women. Women want to look like their seat is lifted and curvaceous when wearing jeans. Slimmer women who are less curvy may want a pair of jeans to accentuate their natural curves in the seat area. On the other hand, more curvaceous women with wider hips and a rounder seat may want jeans that hold in and support these areas, while hiding bulges. Further, a slim looking thigh, around the inner thighs 108a and 108b, and outer thighs 108a and 108b, is another desirable look.

[0073] A specific implementation of the body shaping fit system works with the Levi’s Curve ID® system. Curve ID is a registered trademark of Levi Strauss & Co. Curve ID specifically addresses women’s body shapes with its body shape categories: e.g., slight curve (straighter figure, flatter fanny), demi curve (evenly proportioned hip and seat) and bold curve (smaller waist, larger seat). The slight curve fit is for relatively straight figures. The fit defines a woman’s waist, while accentuating her curves. The demi curve fit is for evenly proportioned women. This fit is designed to flatten a woman’s waist while smoothing her shape. The bold curve fit is for curvy women. The bold curve fit hugs the woman’s waist without gaping or pulling. Optionally, Curve ID includes a fourth custom fit, which is called the supreme curve.

[0074] To use the Curve ID system, a woman finds her shape using a shape measuring tool. The shape measuring tool calculates a shape category based on a differential of two measurements in the hip area. With this shape category information, the woman can easily locate a pair of form-fitting jeans.

[0075] A specific implementation of the body shaping fit system of the invention is the Levi’s Revel system. Revel extends beyond the Curve ID fit sizing system by providing a new fit system of jeans that actively shape a woman’s body. In the Revel system, jeans are specifically engineered and designed for the woman’s body shape. The jeans provide support (e.g., holding power) for the woman’s seat, hip and thigh areas by incorporating unique shape contouring panels of a coating that are formed through a unique printing process on the inside surface of the jeans. The unique engineering and positioning of the coated panels inside the jeans can smooth and hold the stomach, seat and inner and outer thighs, while lifting the seat.

[0076] In addition, the finish of the jeans is specifically designed for the woman’s body shape. Specific design techniques like placement of shading, placement of abrasion patterns, positioning of whiskers, seam and stitch detail can create an illusion of longer, leaner thighs, a lifted seat, and flattering curves at the hip and seat.

[0077] Revel system jeans are provided for each shape category of Curve ID, in a variety of styles, sizes, colors, rinses, finishes, and embellishments. For example, styles can include skinny leg, straight leg, boot cut, wide leg, flare, trouser cut, boyfriend cut, low rise, high rise, and many others. Colors can include blue, black, indigo, white, and any other color. In a specific implementation, a skinny cut and a straight cut style of jeans will be offered in each shape category of Curve ID. For each style of jean, there are various sizes, colors, rinses (e.g., indigo, red, purple, black, and others), and embellishments (e.g., contemporary, progressive, and others) available. In other implementations, any combination of style, size, color, rinse, finish, and embellishment can be used for jeans in the Revel system.

[0078] FIG. 2 shows a flow diagram of making a garment of the body shaping fit system. The system has components to generate a garment or a collection of garments that actively shape a person’s body shape to accentuate the natural curves while de-emphasizing any flaws. Components include: mixing a solution for a coating mixture for a shape contouring panel 205, creating the shape contouring panel on fabric (e.g., natural and synthetic fabric) 210, cutting the fabric according to a pattern for a garment 215, forming the pattern into a garment, and adding cosmetic finishing details to the garment 225.

[0079] The shape contouring coating is engineered to be incorporated in various positions of a garment to target specific areas of the body. A liquid coating mixture can be applied (e.g., screen printed, sprayed, painted, brushed, adhered to or otherwise deposited) to an inside surface of a garment to form a shape contouring panel (i.e., a coated panel). FIGS. 3A and 3B show a specific implementation of the shape contouring panel incorporated in a pair of jeans. Another technique includes digitally printing the shape contouring panel on the material. In a specific implementation, the liquid coating mixture is used as an ink for a printer, such as an ink jet printer. The printer is used to print a pattern using the liquid coating mixture onto the material.

[0080] Creating the coated panel includes applying a liquid coating of a compound onto fabric. The compound has a different stretch factor than that of the fabric, and when incorporated into the fabric, changes the stretch properties of the fabric in the areas to which it has been applied. The compound is applied to one or more areas of the fabric, and can be shaped according to a predetermined pattern (to yield a panel of a specific shape and design) or applied to random areas of the fabric without using a pattern. In some implementations, the compound is applied to the entire surface of a piece of fabric. The fabric having the incorporated compound can be used to create a garment.

[0081] The shape contouring panel is not visible from the outside of the finished garment. The compound is applied to an inner surface of the garment and configured to contact the body of the wearer at various positions. From the outside of the garment, edge lines of the panels are not noticeable. As
will be explained below, the panels have smooth transitions (e.g., edges) and do not create unsightly visible lines in the fabric of the garment when the garment is worn by the wearer (e.g., outline of the panel on the inside of the garment is visible through the garment).

[0082] FIG. 4 shows a specific implementation of shape contouring panels that are shaped according to a pattern for pants. There are four panels of coating, each of which can be applied to a different area of the interior surface of the pants. The upper right panel 402 and left panel 404 are applied to a front inside surface of the pants, as shown in FIG. 3A. The lower right panel 406 and left panel 408 can be applied to a back inside surface of the pants, as shown in FIG. 3B. In a finished pair of pants, as discussed below for FIG. 5, the front panels and back panels meet at a crotch point 420. The first edge 313 of panel 402 and the first edge 341 of panel 406 can be joined to form a side seam 424 of the pants on the right side of the pants, the left side, or both. In the finished pair of pants, the front panels and back panels meet at crotch point 420. It is not necessary that the pants have all four panels incorporated or joined in this manner in a single garment. In other implementations, the pants can have any combination of front and back panels incorporated in the finished garment. For example, a pair of jeans can have a single panel (front or back), two front panels, two back panels, or a front and a back panel only. The panel or panels can be placed in any position on the inside of the pants, depending on the particular application or based on the particular garment or situation.

[0087] For a collection of garments where there are different sizes for a type of garment (e.g., increasing sizes of jeans starting from size 0 to size 24, or from waist size 23 to size 34, or increasing sizes of athletic shorts from size extra-small to size extra-large) the size of the coated panels can increase with the size of the garment. This increase in size can be proportional to the increase in size of the garment, but can also be nonproportional. A panel of a specific size and shape can be used for a specific size garment or for more than one size garment. For example, the same size and shape panel can be used in both a size 2 and a size 4 pair of jeans, while a large size and shape panel is used in a size 6 jean, and an even larger panel is used in both a size 8 and a size 10 jean. In other implementations, the size and shape of the panel need not change and can be used in each garment of a whole collection of garments.

[0088] In a specific implementation, where the L. evi’e Revel system is used as an extension to the Curve 1D system, there are different size panels for different sizes of jeans within each shape category (e.g., slight curve, demi curve, bold curve, and supreme curve). For example, there can be a set of patterns (i.e., templates) of increasing dimensions that is used for forming the panels on jeans of increasing size in one curve shape category (e.g., 24 demi, 25 demi, 26 demi, and so forth). In a specific implementation, a set includes 8 to 12 patterns of increasing dimension for each category. A pattern can be used for two consecutive sizes. For example, the smallest pattern in a set can be used to create a waist size 23 jean and a size 24 jean. In other implementations, each size of jean can have a different size panel, or for at least two sizes of jeans, the same size panel can be used.

[0089] The panel includes a coating (e.g., film or layer) of a compound (e.g., liquid compound having specific stretch properties when dry or cured) that is applied to the fabric of the garment. The coating, after it is cured on the fabric, will have a different stretch factor than that of the fabric. The coating changes the stretch properties of the fabric in the areas to which it has been applied. So, the coated regions of the fabric will stretch differently than the uncoated fabric.

[0090] In implementations, after being applied to the fabric, the coating limits the natural stretch of the fabric. The coated fabric has a lower stretch factor than that of the uncoated fabric (i.e., the stretch is more limited, less elastic). These areas of the garment with coating having less stretch (lower elasticity) can provide firm support and shaping for the wearer in the areas where the panels of coating are positioned (e.g., below the curve of the seat, inner and outer thighs). This coating can be referred to as a liquid or fluid shaping technology (or liquid or fluid stretch technology), and can regulate the level of stretch in predetermined areas of the garment. As a result, the panels can be positioned in targeted areas on the garment to custom shape the wearer’s body. For example, shape contouring panels in a pair of jeans can actively shape
a person’s lower body to create the appearance the person has longer, leaner thighs, a lifted seat, and a flat stomach. In other implementations, the coated panel can have about the same stretch factor as that of the fabric or have a higher stretch factor.

[0091] In an implementation, the incorporated panel of coating customizes a bi-stretch effect of the fabric, in which the coated fabric can stretch in all directions in a customized or engineered way. This allows the panels to mold and shape to the natural curves of the wearer’s body. In other implementations, depending on the compound used and the placement of the panel on the garment, the panel can stretch along a certain direction but not in other directions.

[0092] The incorporated panel has a smooth hand feel. The coating is lightweight, and provides the wearer with lasting comfort. In addition, the panels can stretch and recover with the wearer’s body as the wearer moves, so that the pants do not feel restrictive against the body.

[0093] In implementations, a compound for the coating is a mixture of different compounds. In other implementations, the compound is a single compound. In some implementations, the mixture includes a polyurethane (PU) compound (e.g., a polyurethane resin) that is applied (e.g., sprayed, printed, brushed, painted, or otherwise deposited) onto fabric. PU compounds are flexible and lightweight yet durable once applied to fabric. An example of a PU compound is Hausthane®. Hausthane is a product of Hauthaway Corporation. In other implementations, other types of PU and synthetic compounds can be used in the coating mixture. For example, these can include plastisol, polyethylene, water-based coatings, polypropylene, thermoplastics, and many others.

[0094] The polyurethane compound can be used in a coating or finish for textile fabrics. Polyurethane is resistant to wear and cracking, and can bend and move with the fabric once it has been applied. Once applied to fabric, the polyurethane compound can limit the stretch of the fabric. In implementations, the fabric is a woven or knit fabric (e.g., denim, twill, or corduroy), made of a cotton blend fabric (e.g., cotton blended with Lyca, polyester, acrylic, nylon, acetate, viscose, and triacetate). In other implementations, the fabric can be any natural fiber textile (e.g., wool or silk), synthetic fabric or a combination of these.

[0095] The polyurethane compound can be mixed with other compounds to form the coating mixture. Other compounds include resins, emulsifiers, thickening agents, and many others. The mixture can further include colored dyes so that the finished panels have a different color than fabric onto which it is applied.

[0096] In a specific implementation, the mixture includes a combination of Hausthane®. Carbodilute®, Lurprint®, Imperon® Blue K-RR dye, Imperon® Black K-FBB dye, and Verdicker LP. Carbodilute® is a resin that acts as a cross linking agent for other compounds such as paints, inks, adhesives and coatings. It can cross link dispersions and emulsions at ambient and elevated temperatures. It is a product of Nishinbo Chemical Inc., and a registered trademark of Nishinbo Holdings Inc. Lurprint® is an emulsifier used in printing processes. Any version of Lurprint can be used, including Lurprint PE New. Lurprint® is a registered trademark of BASF Corporation. Imperon® Blue K-RR is a dye for textile printing. It is a navy shade. Imperon Black K-FBB is another dye for textile printing. It is a bluish black color. Imperon® is a product and a registered mark of DyStar Colours Distribution GMBH. Verdicker LP is a synthetic thickener for liquids and coating pastes. In other implementations, other compounds can be substituted for or replace any of the one or more compounds described above.

[0097] In an implementation, the mixture is a specific formulation of an amount of each compound. In a specific implementation, the mixture includes 30-70 percent Hausthane, 1-5 percent Carbodilute, 10-20 grams per liter of Lurprint PE New, 1-2 grams per liter of Imperon Blue K-RR dye, 0.5-1.5 grams per liter of Imperon Black K-FBB dye, and 10-20 grams of Verdicker LP. The range of specific percentages presented can be in percentage by volume or percentage by weight, depending on the particular application or based on the data or situation.

[0098] It should be understood that the invention is not limited to the specific percentages presented. A formulation of the invention may have additional compounds (not necessarily described in this application), different compounds which replace some of the compounds presented, fewer of the compounds presented, or any combination of these. Further, the compounds in other implementations of the invention may not be exactly the same as the compounds presented and may be modified or altered as appropriate for a particular application or based on the data or situation. For example, in other implementations, other polyurethane compounds and other resins, emulsifiers, thickeners, dyes, and others can be used in any combination for the coating.

[0099] Referring back to FIG. 2, the shape contouring panel is created. This step can be processed before, during, or after the mixture solution for the coating is mixed.

[0100] FIG. 6 shows a flow diagram of a specific implementation for creating the panel. The flow includes the components: creating a screen (e.g., using a mesh screen) with a pattern of a shape contouring panel in preparation for printing 605, placing the screen over a substrate (e.g., fabric) and applying the coating mixture to the screen 610, applying pressure to the screen to squeeze the coating onto the fabric and removing the screen 615, and allowing the printed pattern of the panel to dry (or cure) on the fabric 620.

[0101] FIG. 7 shows a specific implementation of three screens with various patterns for making the panels. The panel can be made through a screen printing (i.e., silkscreen printing) process in which a screen 701 is created with a pattern 705 of the panel. The screen can be prepared using a mesh screen 707 that is stretched over a frame 709. Other types of porous materials (e.g., any woven fabric, nylon, polyester, steel, and many others) can also be used in the process. A stencil of the pattern can be formed by applying an emulsion to the screen, and blocking off parts of the screen in the negative image of the pattern (e.g., using a stencil, a cutout, or transfer paper). The screen can undergo a prepresor process in which the shape of the pattern is burned into the screen (e.g., through exposure to light). Many other preprinting processes used in screen printing can be incorporated prior to printing.

[0102] The screen is then placed over the fabric, and the coating mixture (of compounds previously mixed) is applied (sprayed, painted, brushed, poured, or otherwise deposited) onto the screen. In screen printing, specialized inks are used, which are known in the industry as inks or pastes interchangeably. These specialized inks have a pigment to give a desired color, and are also formulated to give a good working consistency for the process. Depending on factors such as the temperature and the mesh material or thread count, the viscosity of screen printing inks used can vary, such as from being more
viscous (e.g., like butter) to less viscous (e.g., like syrup). The viscosity of the ink can be adjusted as desired by using a thinner or reducer.

[0103] For the screen printing process, the coating mixture is formulated to have properties analogous or similar to the inks or pastes used for screen printing. In other implementations, the liquid coating can be formulated to have properties appropriate for other processes. For example, for printers such as ink jet printers, the liquid coating can have properties analogous or similar to the inks used for such printers.

[0104] A bar (e.g., fill bar or floodbar) is dragged across the screen and used to push the coating mixture into the openings of the mesh. The bar starts at one end of the screen and is moved to an opposite end with a slight downward force. During this, the actual screen is lifted a bit off the garment to avoid contact. A blade (e.g., a rubber squeegee) is then used to move the mesh down to the printing surface of the fabric. The ink that is in the mesh opening is pumped or squeezed by capillary action to the fabric in a controlled and prescribed amount (i.e., the amount of coating mixture deposited is proportional to the thickness of the mesh and stencil). As the squeegee moves toward the rear of the screen, the tension of the mesh pulls the mesh up away from the fabric, leaving the coating mixture upon the surface of the fabric.

[0105] The screen printing can be completed through a manual, automatic, or semi-automatic process. There are semi-automatic and automatic screen printing machines that are commercially available. In a specific implementation, an automated process of printing a panel onto fabric includes using a mesh screen having opening size of about 43-60 micrometers, applying the coating mixture to the screen, stroking the screen 2-4 times by a bar of the printing machine, at a pressure of 2-4 bars of air pressure.

[0106] The process further includes curing (or drying) the fabric having the printed panel. In specific implementations, the curing is completed through an automated process at about 100 degrees Celsius to about 175 degrees Celsius, from about 1 minute to about 10 minutes.

[0107] This description of the screen printing process has been presented for the purposes of illustration and description. It is not intended to be exhaustive or to limit the invention to the precise form described, and many modifications and variations are possible. The implementations were chosen and described to best explain the principles of the invention and its practical applications.

[0108] In a specific implementation, the printed panel of the coating has a graduated edge. FIG. 8 shows a panel with a graduated edge 805 printed onto the inside surface 801 of a pair of jeans. The graduated edge provides a smooth, seamless transition between the printed panel and the underlying fabric (e.g., the edge of the panel where the panel transitions to the denim). As a result, no visible seams (or lines, hems, or edges) show through the outer fabric when the pants are worn by the wearer. U.S. patent applications 29/431,723 and 29/431,724, filed Sep. 10, 2012, are incorporated by reference.

[0109] FIGS. 9A-9B show an implementation of printed panels for pants having a graduated edge 805. FIG. 9A shows a front panel and FIG. 9B shows a back panel.

[0110] FIG. 10 shows a magnified view of a portion of the graduated edge 805. The figure is a digital rendition of an actual gradation pattern and does not accurately show the characteristics of the gradation itself. In an implementation, the panel is a solid fill 1010 of the coating mixture, while the edges include open spaces 1015 of underlying fabric 1020 (shown as white regions in FIG. 8) where the coating mixture did not adhere, and the fabric is visible. In a specific implementation, a width w of the gradation edge is about ½ inch to about 1 inch. In other implementations, the dimension of the gradation edge can be less or more, and the solid fill area can also be graduated in varying intensities.

[0111] As described above, it is not necessary that the coated panel is made according to a pattern. The shape of the panel can be indefinite and arbitrary (e.g., straight, curved, graduated, stipulated, or patterned). Furthermore, in some implementations, the edge may not be visible on the inside surface of the fabric because it is hidden by a seam, other material or fabric, a pocket, a zipper, a button, or the like.

[0112] In a specific implementation, the fabric is denim. Denim includes cotton and spandex (or Lycra®). Spandex is a synthetic fiber, made of a polyurethane-polyurea copolymer, that gives greater elasticity to the cotton material, especially compared to 100 percent cotton denim. Spandex is also known as elastane. A specific brand of spandex is Lycra®. Lycra fiber is a trademark of Invista.

[0113] Referring back to FIG. 2, the fabric with the printed panel of coating is cut or otherwise shaped according to a pattern for the manufacture of a garment.

[0114] In a specific implementation, where the Levi’s Revel system is used as an extension to the Curve ID system, to facilitate the manufacture of pants with shaped fit sizing, fabric patterns are created based on the determined shaped fit categories (e.g., slight curve, demi curve, bold curve, and supreme curve). The fabric patterns are patterns used for cutting of the material for the pants. After the pieces are cut based on the pattern, the pieces are sewn together. Additionally, rivets may be used to hold some pieces (e.g., pocket openings) together, which increases durability and strength. See U.S. Pat. No. 139,121, issued on May 20, 1873 to Levi Strauss & Co.

[0115] In a specific implementation, fabric patterns are generated by an engineer (who may be referred to as a “pattern engineer”) with a computer aided design (CAD) tool. The engineer uses the tool to create individual pattern components. These pattern components are two-dimensional patterns. For example, Assyst GmbH, Autometrix, OptiTex, Bluewater Software, Gerber Scientific, Inc., and Quest CAD, CAD are manufacturers of such tools. With an apparel CAD tool, 2D fabric patterns are developed. The tool may also include a 3D visualization component that may be used to show the design from a three-dimensional perspective.

[0116] To ensure the fit is good, pants can be manufactured according to the computer generated patterns. Then an actual person can try pants. Based on the results, the engineer can make further modifications to the computer patterns. This process can be repeated as needed to ensure good fit and a proper look.

[0117] Separate patterns can be created for each pair of jeans of a particular size and shape category. For example, there is a first pattern for a size 27 jean in the slight curve category. There is a second pattern for a size 27 jean in the demi curve category. There is a third pattern for a size 27 jean in the bold curve category. Sizings may be from waist size 23 to 34, with different inseam sizes.

[0118] Jeans with the same waist size are made with different inseam measurements to accommodate people with longer or shorter legs. Jeans also are made with different leg
shapes or leg cuts such as skinny, straight, skinny boot, boot cut, flare, wide, trouser, boyfriend, and others. These provide different styles of jeans for different preferences. These may use different patterns. Since the inseam sizes and boot cuts do not necessarily affect the fit in the seat area (which is sometimes called the top block), some of the pattern pieces or potions or pattern pieces may be similar or the same as jeans with different inseam or boot cuts. The top block is a cut of the jean from the waistband through the hips and butt. Therefore, the top block can remain the same or about the same for some jeans, while the inseam and leg shapes or leg cuts will differ.

The patterns for the pieces are designed to facilitate shaped fit sizing. So for a single size (e.g., size 27) of jeans in the three different shaped fits, the patterns will differ to achieve the desired shaped fit. One pattern piece for jeans is the waistband. In a specific implementation, a difference between waistbands for one shaped fit (e.g., slight) and a curvier shaped fit (e.g., bold) is that the two-dimensional (2D) waistband pattern is more arced or curved.

Referring back to FIG. 2, cosmetic finishing techniques are applied to the outside of the jeans to further flatten the figure of the wearer. Seaming and construction techniques can also be applied to create the look of a shapely silhouette.

Cosmetic finishing techniques can include strategic placement of whiskers (e.g., straight or angled) on the front of the jeans, and the addition of highlights to the center front leg and low lights toward the inner and outward thigh to visually slim and elongate the hips and thighs. Further, a knee positioning is raised to lengthen the leg, the addition of downward pointing chevrons on the inner and outer thigh to create a slimming visual, and the addition of highlights under the seat and feathering up to create a lifted seat look. Other cosmetic finishing techniques can also be included.

The cosmetic finishing techniques can be applied differently for various body shapes. Where there are several shaped categories of fit, a woman with a less curvy shape may want to emphasize her natural curves while a woman with a more curvy shape may want to hide or de-emphasize those same curves on her body.

In a specific implementation where the Revel system is used as an extension to the Curve ID system, cosmetic finishing techniques include addition of whiskers, placement of abrasion patterns, and addition of low lights.

FIGS. 11A-11C show specific implementations of various cosmetic finishing techniques that can be applied to a front side of shaped fit jeans to create a shaped silhouette. FIG. 11A shows an example of jeans in a first fit category A of jeans (e.g., slight curve). FIG. 11B shows an example of jeans in a second fit category B of jeans (e.g., demi curve). FIG. 11C shows an example of jeans in a third fit category C of jeans (e.g., bold curve).

For the slight curve category 1110, angled whiskers 1115 are added at such an intensity to accentuate the curve of the hip. For the demi curve category 1120, the angle and intensity of whiskers 1125 compliments the curve of the hip, while for the bold curve category 1130, the angle and intensity of whiskers 1135 de-emphasize the widest part of the hips. Horizontal whisks can be eliminated 1132 from the bold curve category, since horizontal lines can draw attention to the widest part of the hips. Subtle wear characteristics 1134 on the front side of the jean can de-emphasize the front hip area. Darker shading (e.g., low lights) 1137 can be added to the inner and outer thighs of jeans in all fit categories to visually slim and lengthen the thighs. Abrasion patterns (e.g., highlights) 1141 can be added to the front narrow portion of the thigh to create a slim and elongated looking thigh. The abrasion pattern can be shortened for each shape category, all shape categories, or any combination of shape categories. The shortened abrasion pattern 1143 can be added to visually lengthen the front of the leg.

Cosmetic finishing techniques are further applied to the back of the jeans. FIGS. 12A-12C show specific implementations of various cosmetic finishing techniques that can be applied to the back side of shaped fit jeans to create a shaped silhouette. FIG. 12A shows an example of jeans in a first fit category A of jeans (e.g., slight curve). FIG. 12B shows an example of jeans in a second fit category B of jeans (e.g., demi curve). FIG. 12C shows an example of jeans in a third fit category C of jeans (e.g., bold curve).

Abrasion patterns 1141 can be added to jeans of all fit categories along the rounded portions of the seat to enhance the curves of the seat. The size and positioning of the abrasion pattern can vary with each shape category to accommodate different body shapes. Low lights can be added to de-emphasize larger curves. The low lights 1137 (or darker shading) can be added to the periphery of the abrasion pattern to create a gradual, receding effect to de-emphasize strong curves. For example, more low lights can be added in the more curvy shape categories (e.g., bold curve and supreme curve) to more greatly de-emphasize the widest portions of the seat.

Seaming and construction techniques are shown in FIGS. 1A and 1B. These techniques can include: front seaming 110 inside pocket scoops 112 (e.g., front curved pocket scoops) to draw the eye up to the waist and away from the widest part of the hips, omission of a coin pocket to provide less bulk and a smoother silhouette; a curved riser seam 114 that physically lifts the seat and visually creates either a shapely or de-emphasized seat; placement and size of back pockets 116 to either provide shape or to minimize appearance; an inset riser panel 118 that physically smooths the sides of the body; darting at the back of the jeans to eliminate drag lines and visually lift the seat; construction of inner pocket to control and smooth the stomach; and slightly forward-placed side seams (see reference number 360 in FIG. 3A) to draw the eye inward to create a narrower silhouette. Other seaming and construction techniques can also be included.

The seaming and construction techniques can be applied differently for various body shapes. Where there are several shaped categories of fit, a woman with a less curvy shape may want to emphasize her natural curves while a woman with a more curvy shape may want to hide or de-emphasize those same curves on her body.

In a specific implementation where the Revel system is used as an extension to the Curve ID system, any combination of the techniques described above can be used to create a shaped look. The combination of techniques can be applied to a single shape category, all shape categories, or any combination of categories. For example, a pair of size 30 jeans with a less curvy shape (e.g., slight curve category) can have a different back pocket size and placement than for a size 30 jean with a more curvy shape (e.g., bold curve or supreme curve categories).

The Revel customized body shaping system was created after listening to women from around the world express concern about areas of their bodies that need extra support and shaping. Some common body areas and fit issues...
with jeans were identified across populations of women. The
customized shaping techniques are designed to address these
problems. Like shape wear, aspects of the shaped fit system
can target problematic areas of the body and work underneath
clothing to sculpt these areas to fit and to look better in
clothing. The new shaped fit system allows women of many
different body types to obtain customized shaping, lifting,
and lengthening for their bodies and ultimately help them feel
confident and attractive in their jeans.

[0132] As described above, FIGS. 1A and 1B show various
body areas of a person’s body that may need support and
shaping. The level of support and shaping is not constant for
all body types, shapes, and sizes, but can vary across body
curve shapes. For example, a woman with a more curvaceous
shape may want to deemphasize the widest part of her hips
while a woman with fewer curves may want to create the
appearance of more shapely hips.

[0133] FIG. 1A shows a front view of a person’s lower body
in pants (e.g., jeans). Women want an attractive, feminine
shape when wearing form fitting jeans. In the hips area 102a
and 102b, women often want a smooth and contoured look. A
person may want to hide any bulge of the hips, while occu-
tuating the natural curves of the hips. Women may also want
to look like they have a flat stomach and abdominal area in
pants or jeans. At the thighs, 104a and 104b, women want a
long and lean appearance from their jeans to look like the legs
are slimmer and more toned.

[0134] FIG. 1B shows a back view of the person’s body in
pants or jeans. The seat (or gluteal regions or buttocks area)
106a and 106b is an area that can be problematic for many
women. The buttocks is comprised of skin, fat and other
muscle, and it ages similarly to how the face ages. Fat naturally
atrophy and the skin becomes loose, causing underlying
structures to lose their shape and causing the gluteal regions
to sag. This is also caused in part from the forces of gravity
pulling downwards on the gluteal regions.

[0135] Many factors cause the gluteal regions to sag, like
fat loss or excess fat, loss of elasticity and the aging process
itself. With age, it can also be common for fat to get
stored in the buttocks region and the areas around it, like the
thighs, hips, and saddlebags. Cellulite can also develop or
become more prominent with age as the skin and fat of the
gluteal regions begin to change. Further, in a younger person,
the gluteal regions can have a higher and fuller profile than in
an older person. The gluteal fold, the horizontal crease
formed by the inferior aspect of the buttocks and the posterior
upper thigh, can be short in a younger person, but as the
gluteal regions begin to sag over time, the fold can become
longer.

[0136] Women want to look like their seat is lifted up, away
from the upper thighs, when wearing jeans. This creates an
attractive seat profile, creating the appearance of a more
youthful and toned looking seat area. Women who are less
curvy may want a pair of jeans to accentuate their natural
curves in the seat area. The jeans in this fit category (e.g.,
slight curve) should target the seat by lifting and cupping the
seat to create more curves. On the other hand, more curva-
cuous women with wider hips and a larger, rounder seat may
want jeans that hold in and support these areas, while hiding
bulges. These jeans in this fit category (e.g., bold curve) can
provide more control and firming than the slight curve jeans.
In the inner thighs 108a and 108b and outer thighs 108a and
108b areas, women desire to a smoothed out look in jeans, to
create a slim appearance.

[0137] Referring back to FIG. 2, the coating mixture for
the shape contouring panels can be applied to an inside surface
of the fabric of the garment (e.g., a pair of jeans). In a specific
implementation, the coating compound can have the proper-
ties or consistency of a liquid, or in other implementations, a
paste. After the coating is applied to the fabric, the coating can
be cured on the fabric to set the coating. The curing process
allows the coating mixture (i.e., in the wet stage) to bind (or
fuse) with the fibers of the fabric. For example, heat (or light)
can be applied in the curing process, which can activate
compounds in the coating mixture that allows for binding to
the fabric. The coating can bind or fuse to the fabric fibers
(e.g., outer sheath of fibers), and can form a coating over the
fabric that has a different hand feel relative to the fabric. The
cured coating can also alter other characteristics of the fabric,
including the stretch, recovery, growth, tensile strength, and
others.

[0138] The panel of coating is designed and applied in
strategic areas of the garment to provide good body shaping
properties. Depending on factors such as the size (e.g., sur-
f ace area), thickness, formulation, and position of the coating
on the material, the shaping properties can vary. For example,
a surface area of one or more of the applied panel of coating
can vary but each panel of coating should be sufficiently large
to have good body shaping properties. If the panel is very
small, it will not provide good coverage against the person’s
body to hold and shape the body. For example, text, logos or
other markings can be printed an inside surface of a fabric of
jeans or on an inside surface of a pocket, using a polyurethane
coating, to identify the manufacturer, provide aesthetic char-
acteristics, or to display other information (e.g., where the
jeans are made). However, this coating will not have good
body shaping properties, if any, since the printed material has
gaps that cause the fabric to be elastic. Other reasons include
a small size of the printed text or images, a sporadic, sparse,
or nonuniform distribution on the fabric, a lack of symmetry
between a right and left sides of the garment, a placement on
areas of the garment that do not cover body areas that need
shaping and compression, and others.

[0139] FIG. 13A shows a front view of a specific implemen-
tation of a coating 1305 (or front shape contouring panel)
applied on an inside surface of pants. The coating can be
applied to areas of the inside of the garment that correspond to
the person’s body areas that need extra shaping and support
(e.g., hips, and upper, inner, and other thighs). The coating
changes the stretch properties of the fabric in the areas to
which it has been applied. So, the coated regions of the fabric
will stretch differently than the uncoated fabric regions 1303.
In implementations, the coating, once dried or cured, can
reduce the ability of the fabric to stretch in a single direction
or in multiple (e.g., two, three, four, or more) directions. In
a specific implementation, the cured coating have more greatly lim-
its the fabric, a denim material, to stretch in a horizontal
direction across the body (e.g., from a left hip to a right hip
across the abdomen) than in a vertical direction.

[0140] The cured coating on a fabric can be referred to as
liquid or fluid shaping technology (or liquid or fluid stretch
technology) that can regulate the level of stretch in predeter-
dined areas of the garment, and can provide more shaping
and support than the garment fabric without the applied coat-
ing. So the coated regions of the fabric with the cured coating
can have a first stretch characteristic (or stretch value) or a
first set of stretch characteristics while the regions of the
fabric without the cured coating can have a second stretch
characteristic (or stretch value) or a second set of stretch characteristics that is different from the first stretch characteristic. The first stretch characteristic will be less elastic and have more tensile strength than the second stretch characteristic.

[0141] FIG. 133 shows a back view of a specific implementation of a coating 1310 (or back shape contouring panel) applied to an inside surface of pants. The coating can be applied to areas of the inside of the garment that correspond to the person's rear body areas that need shaping and support (e.g., seat, hips, and upper, inner, and outer thighs). The coating provides targeted support to enhance the look of a person's buttocks region, hips, and thighs for example, while the person is standing and also when the person is in motion, walking or running. The coated regions are positioned below the buttocks or gluteal regions, supporting them from below against gravity and the motion of the legs when walking.

[0142] The coating can provide body shaping for many different body types across all age groups, ethnicities, and populations. For example, younger people can be in the high school to college-age category, such as age range 15-24. Older people can be in age ranges such as 25-34, 35-44, or older (e.g., 70 years old or more). Some people may have more sagging in various body areas due to factors such as gravity or aging, or a combination of factors. Body shaping of the invention can benefit people can have toned bodies (e.g., making them look even better) or less toned bodies (e.g., helping hide flaws).

[0143] Similar to the coating on the front side of the jeans, the back side coated regions of the fabric will stretch differently than the uncoated fabric regions 1307. For example, the seat (or buttocks region) of the pant has a stretch characteristic that is more elastic than the upper thigh region of the pant where the polyurethane coating has been applied. The cured coating can shape the body in various ways, depending on its placement in certain specific areas of the pants, as will be described in detail below.

[0144] The shape contouring coating on the back side of pants can include a peak or wedge region 1312, at the back center seam of the pants, that is a region of the coating that can fit at an underside of the buttocks, between cheeks of the buttocks. The peak region is optional and can be omitted; see further discussion below. Specifically, the peak region of the coating is situated against or opposite the intergluteal cleft of the sacral region of the person's body, being positioned (or wedged) between the gluteal regions. The intergluteal cleft is located between two gluteal regions (or buttocks), and generally forms an angular shape (e.g., triangular shape), where the apex of the angle points upwards into the cleft fold. The shape of the peak region of the coating is similar to the shape of the intergluteal cleft. The peak region also has a tapered, angular shape at an apex of the peak region that can fit at the cleft fold at the intergluteal cleft.

[0145] On a person's body, the peak region of coating can become taut as it is pulled up between the two gluteal regions by the back center seam of the pants. The peak region can conform to the angular, tapered shape of the intergluteal cleft. The peak region is wider at a base and tapers into the apex deeper into the cleft. The peak region may have one or more preformed shapes, such as peaks or tapered regions, that can facilitate a good fit into the intergluteal cleft. The height of the peak region may be selected in part by the depth of the intergluteal cleft of the person, and may be designed so that the peak region conforms to the skin along the contours of the cleft.

[0146] As described above, the intergluteal cleft may form an angle with an apex within the cleft. Similarly, the peak region may have a tapered or an angular shape, such as a triangular shape, that may facilitate a close fit along the taper of the intergluteal cleft. For example, the peak region may have the shape of a triangle, where an angled (tapered) portion of the triangle may be configured to fit into the crease of the intergluteal cleft. In some implementations, the peak region may have a shape having a tapered region that fits further up along the crease of the intergluteal cleft. The peak region may also have a crest shape or a ridge shape that is tapered at an upper end. The tapered region of the crest may be shaped to correspond to the angled shape of the intergluteal cleft.

[0147] The taper of peak region may have any length according to the anatomy of the intergluteal cleft. A length or height (h) of the peak region is a distance the apex of the peak is above the upper edge 1315 of the coating, where the upper edge is a maximum distance from a waistband of the pants. The height can also be measured from a base of the peak region, where the peak region is the widest, to the apex or upper tip of the peak region. The height can be from about 0.5 inch to about 2 inches, for example, from about 0.5 inch to about 1 inch, or from about 1 inch to about 1.5 inches, or from about 1.5 inches to about 2 inches. In a specific implementation, the height is about 1 inch. The dimensions (e.g., width, length, angle of apex, and degree of taper) may be varied according to the anatomy of the person. For example, a person with a more curvy buttocks region may have a larger and deeper intergluteal cleft, while a person with a less curvy buttocks region may have a relatively smaller and shallower intergluteal cleft.

[0148] The peak region can separate the buttock cheeks to create an attractive, defined shape to the buttocks. In the implementation shown in FIG. 133, the upper edge 1315 of the back coating, extending from a left hip to a right hip, can become taut and push upward on the buttocks. A first force 1318 exerted by the peak region at the intergluteal cleft can push upwards at a first angle on an inner side of a buttocks cheek. A second force 1320 exerted by the coating at an outer edge of the buttocks can push upwards at a second angle on an outer side of the buttocks cheek. The first force can balance the opposing second force so that the buttocks cheek is evenly pushed from both sides. In a specific implementation, the first and second forces are perpendicular. Together, the first and second forces can isolate each buttock cheek and compress upward and inward, to create a fixed, lifted shape.

[0149] In a specific implementation, a first direction of the first force is transverse to a second direction of the second force. A first tangent line of the arc formed by the upper edge is perpendicular to the first force, a second tangent line is perpendicular to the second force, and the first and second tangent lines are transverse.

[0150] This specific implementation with the peak region of coating can be used for example, in jeans in a slight or demi curve shape category, or both, for a person with a less curvy, flat seat. The shape of the back contouring panels can lift and separate the cheeks of the buttocks to create definition. The back panel, including the peak region, can also compress on a flatter seat, to create a round and more protruding seat profile.
In an implementation, as discussed above, the regions with the coating have less stretch than regions without the coating (or where the coating has been omitted). These coated regions can give more support than regions without the coating since they stretch less. By shaping the coating as shown, the coating provides targeted support to enhance the look of a person’s buttocks region, while the person is standing and also while the person is in motion, walking or running.

Generally, when a person walks or runs, the hips and buttocks move or sway from side-to-side and up-and-down because of the motion of the legs and gravity. In particular, when the person lifts a right leg (left leg on the ground) to take the next step, the right buttocks (or right glutal region) drops below the left buttocks (or left glutal region), while the left buttocks rises above the right buttocks. Similarly, when the person lifts a left leg (left leg on the ground) to take the next step, the left buttocks (or left glutal region) drops below the right buttocks (or right glutal region), while the right buttocks rises above the above buttocks. This motion continues while the person walks, giving the hips a swaying motion which people are familiar with.

The coated regions—being less elastic—provide support for this motion. The coated regions are below the buttocks or glutal regions, supporting them from below against gravity and the motion of the leg when walking. The coated regions are on either sides of both buttocks or glutal regions, supporting them from the sides from the motion of the leg when walking. The peak coated region is between both buttocks or glutal regions, supporting each region from an inside direction as indicated in FIG. 13B. The coated panel with less stretch serves to give good support for the buttocks while standing still, or walking or running, and extends around the entire leg region (without any gaps due to the uncoated region) to give more support. In other words, the coated region forms a band, extending from the inside seam to outside seam of the front leg portion, and then from outside seam to inside seam of the back leg portion.

In an implementation, the panel of coating is longer (or has a wider band) on the outside seam of the leg portion compared to the inside seam. Compare length L4 at the outer seam versus L3 at the inner seam in FIG. 15B. In other implementations, the coating panel can have the same lengths on the outside and inside seams, or a shorter length at the outside seam compared to the inside seam. However, in the implementation where the coating panel is longer along the outside seam than the inside seam, this helps give greater support for the buttocks on the sides, giving a more attractive shape and helping to counteract the motion of, for example, the left buttocks or left glutal region as the left leg is being lifted off the ground to take the next step.

The support from the coating is completely invisible to others, since the coating is on an inside surface, and there are no seam lines. For example, a sewn-in panel of support material would typically show some seam lines because of the threads. A panel of support material can be adhered using an adhesive, but such a support material typically is thicker and the outline of the panel would show through the fabric when worn. In contrast, the panel of coating is sufficiently thin and has a graduated edging, which prevents any seam lines from showing. So, the coating panel (e.g., polyurethane coating panel) provides support, and since it is not sewn in, there is no thread or other seam lines. This is especially important for tight fitting clothes such as jeans. The technology of the invention has been described with respect to jeans, but can be applied to other items of clothing.

In an implementation, a thickness of the coating is thin, and ranges from about 0.5 mil (i.e., 0.0005 inches) to about 10 mils. For example, the thickness can be relatively thin, such as from 0 to 3 mils (0.5, 0.75, 1, 2, or 3 mils). Or the thickness can be greater, such as about 4, 5, 6, 7, 8, 9, or 10 mils. Generally, the thicker the coating, the more durable it will be. In an implementation, the thickness applied is at least 2 mils, which provides sufficient durability to be washed (e.g., machine washed) and worn repeatedly. In a specific implementation, the thickness applied is about 5 mils or in a range from 4-6 mils.

The thickness of the coating can be varied or determined by the size of the mesh used during screen printing. Generally, the finer the mesh count (e.g., lower threads per inch or wires per inch), the thicker the coating. For example, a stainless steel wire mesh fiber having a mesh count from 50-60 count can be used to form a 4-6 mil film. After this coating cure, the coating can be thinner due to the curing process, and the compound being absorbed by the material. So the final film thickness can be from 0.5 to 4 mils thick, which is thinner than the applied thickness. Other thick film coating technologies, other than screen printing, can also be used to obtain a desired coating thickness.

In another specific implementation, a shape contouring coating or treatment can be applied to portions of the inside surface of a garment that can modify the stretch properties of the fabric to become more elastic than the untreated fabric. In implementations, the coating (e.g., after curing) or treatment can increase the ability of the fabric to stretch in a single direction or in multiple (e.g., two, three, four, or more) directions. The coating or treatment may break down the fibers of the material to increase the elasticity. The uncoated regions of the fabric will have less elasticity relative to the coated regions, and can therefore provide more shaping and support than the fabric areas with the applied coating.

Such an implementation is a negative or reverse of the implementation described above. In this implementation, where the coating is shown in, for example, FIGS. 13A and 13B, there would be no coating or treatment. And where the coating is not shown in FIGS. 13A and 13B, there would be a coating or treatment. Therefore, although this application describes a positive implementation and its equivalents, where the coating or treatment is applied to reduce stretch or elasticity, one having ordinary skill in the art understands this application also covers implementations that use a negative (or reverse) implementation and their equivalents, where the coating or treatment is applied to increase stretch or elasticity.

This application describes a material or item of clothing with two different stretch characteristics. Further, a material or item of clothing can have two or more different stretch characteristics (e.g., 3, 4, 5, 6, or more). For example, there can be two different coatings that have different stretch characteristics from each other, which are both different from the uncoated material. Further, to obtain different stretch characteristics, two coatings (e.g., different coatings, or one thicker coating), may be applied on top of each other, on the material. Some portions of the material can have a single coating, while other portions have a double layer of coating (one on top of another).

In a specific implementation, the coating can be applied to a seat portion of pants on a rear side of the pants and further allowed to cure to set. Referring to FIG. 13B, the
coating can be applied to a region 1307 of the pants. An edging 1315 of the coated portion can separate the coated portion at the seat of the pants and an uncoated portion 1310 of the pants that is below the coated portion. The uncoated portion includes sides of the hips, and upper, inner, and outer thighs. The coated regions of the fabric with the cured coating can have a first stretch characteristic (or stretch value) or a first set of stretch characteristics while the regions of the fabric without the cured coating can have a second stretch characteristic (or stretch value) or a second set of stretch characteristics that is different from the first stretch characteristic. The first stretch characteristic will be more elastic and have less tensile strength than the second stretch characteristic. In contrast, the second stretch characteristic will be less elastic.

[0162] The uncoated regions avoid the gluteal regions (or buttocks region). The edge of the coated region can follow a perimeter of the buttocks to curve around and below the buttocks. The less elastic uncoated region can push upwards on the gluteal regions from below, and push inwards on each gluteal region from the sides to shift the gluteal regions to the seat portion of the pants with the coating. In some implementations, the uncoated region can have a peak region that is between the gluteal regions, corresponding to the intergluteal cleft, as described above. The compression from around the gluteal regions (e.g., below, outer side, and in between) can shape the gluteal regions to create a higher buttocks profile. The gluteal regions can fill out the less elastic seat portion without being compressed or flattened to create a more round and full profile. In implementations, the coating can also be applied to portions of the inner surface of a front side of pants. Referring to FIG. 13A, the coated region 1303 will modify the stretch characteristics of the fabric to become more elastic. The uncoated region 1305 of the fabric, with less elasticity, can be below the coated region. The uncoated regions can hold and shape the areas of the body that may need additional support, or other predetermined areas. These areas can include the sides of the hips and the thighs.

[0163] FIG. 13B shows a back view of a specific implementation of a coating 1310 (or back shape contouring panel) applied to an inside surface of pants. The coating can be applied to areas of the inside of the garment that correspond to the person’s rear body areas that need shaping and support (e.g., seat). Similar to the coating on the front side of the jeans, the back side-coated regions of the fabric will stretch differently than the uncoated fabric regions 1307. For example, the seat (or buttocks region) of the pants has a stretch characteristic that is more elastic than the upper thigh region of the pants where the polyurethane coating has been applied. The cured coating can shape the body in various ways, depending on its placement in certain specific areas of the pants, as will be described in detail below.

[0164] FIG. 14 shows a back view of another specific implementation of a coating 1410 applied to an inside surface of pants without a peak region. In this implementation, the upper edge 1415 of the panel, extending from a left hip to a right hip, can push upward on the seat. However, without the peak region, there may be fewer forces acting to compress each cheek of the buttocks away from the other for separation. This specific implementation can be used for example, in jeans in a demi, bold, or supreme curve shape category, or any combination of these, for a person with a more curvy, wide seat. The shape of the back contouring panels can lift the seat to create a higher seat profile, while deemphasizing bold curves. The peak region can be omitted since creating a separation in the cheeks of the buttocks may draw unwanted attention to a person with a wider buttocks region.

[0165] The fabric of the garment can have good shaping properties. Even without the shape contouring panels, the fabric itself can have properties that provide shaping to the body which flatter the body’s natural curves. In some implementations, the fabric is woven or knit fabric (e.g., denim) made of a cotton blend (e.g., cotton blended with spandex or elastane, polyester, nylon, acetate, viscose, rayon, triacetate, or any combination of these). The denim material can be a stretch denim in which fibers, other than cotton, are woven or blended with the cotton fibers to give greater elasticity to the denim material. In other implementations, the fabric is a cotton material other than a denim material, such as non-denim materials. For example, the fabric can include a cotton material that is a piece dyed twill material. This material can be blended with elastic fibers to provide the fabric with more elasticity.

[0166] In implementations, the fabric can stretch in multiple directions (e.g. four-way stretch or two-way stretch) or in a single direction (e.g., one-way stretch). A four-way stretch material can stretch and recover both on the crosswise (or horizontal) and lengthwise (or vertical) grains while a two-way stretch material can stretch and recover on either the crosswise or lengthwise grains. A one-way stretch material can for example, stretch on either the crosswise or the lengthwise grains but may not be able to recover.

[0167] Typically, stretch denim can include cotton and spandex (or elastane). Spandex is a synthetic fiber that gives greater elasticity to the cotton material, especially compared to 100 percent cotton denim. A specific brand of spandex is Lycra®. Lycra fiber is a trademark of Invista.

[0168] Over time, typical stretch denim material can lose elasticity and strength with increased wear and washing. After several wears, the jeans can have a stretched out look, particularly in areas where there may be more strain (e.g., waistband, hips, seat, abdomen, and thighs). The pigment can also fade more quickly in these areas of greater strain and use. This is undesirable for many consumers.

[0169] A fabric according to the present invention has improved elasticity, strength, and recovery than typical stretch cotton blend fabrics. In implementations, the fabric is a denim fabric that includes cotton woven or knit with an elastic fiber (e.g., spandex or elastane, lycocell, or a combination of these) and a polyester-based fiber (e.g., elastomultiester, elastester-p, and others). When worn on the body, the stretch denim fabric can stretch in multiple directions (e.g. four-way stretch in horizontal and vertical direction) across the body to conform to the shape of the body. A four-way stretch material can stretch and recover both on the crosswise (or horizontal) and lengthwise (or vertical) grains. In a specific implementation, the stretch denim fabric can stretch more in a horizontal direction across the body (i.e., is more elastic), than in a vertical direction.

[0170] In a specific implementation, the polyester-based fiber is poly(trimethylene terephthalate) (also referred to as “PTT”). PTT fiber is a subclass of polyester. PTT fiber is also sometimes known as triexta. PTT fibers can be spun into yarn along with other materials such as cotton, wool, spandex, nylon, other polyester, rayon, lycocell, polyurethane, and others. The yarn is woven into a denim fabric for apparel. The denim fabric with PTT fibers can have a soft hand feel, good resiliency, and stretch recovery, and other desirable proper-
ties. Fabric with PTT can be stain resistant, UV-resistant, quick drying, and have improved color fastness than similar materials without PTT. In other implementations, the denim fabric can include cotton, an elastic fiber material (e.g., spandex), and another polyester fiber material (e.g., polyethylene terephthalate (PET)).

[0171] When worn, the denim fabric with polyester-based fiber can also stretch in multiple directions (e.g. four-way stretch) along the body. Further, the fibers can recover from stretching without losing their shape, strength, and integrity. Denim fabric with polyester-based fibers can retain its shape after repeated wear, stretching, and washes. So the denim fabric will not stretch out at the waist, hips, seat, thighs, knees, and other areas of strain. This fabric can provide structure, support, and shaping to the body.

[0172] In certain implementations, the coating mixture, in the wet stage, is applied to a stretch denim fabric. In a specific implementation, the denim fabric also includes a polyester-based fiber. The coating can change the stretch properties of the fabric in the areas to which it has been applied. The coating, when cured (or dried), can decrease the ability of the fabric to stretch in a single direction or in multiple (e.g., two, three, four, or more) directions. So the regions of the fabric where the panels are applied can have a first stretch characteristic (or stretch value) or a first set of stretch characteristics while the regions of the fabric without the panels (i.e., only denim fabric, with or without polyester-based fiber) can have a second stretch characteristic (or stretch value) or a second set of stretch characteristics that is different from the first stretch characteristic. The first stretch characteristic will be less elastic and have more tensile strength than the second stretch characteristic.

[0173] For woven fabrics, the ability of the yarn in the fabric to stretch in various directions can be a measure of a degree of stretch of the fabric. For example, the stretch of the fabric can be determined by testing the stretch of the warp and weft threads in the fabric. In woven textiles, the warp is the lengthwise core of a fabric, while the weft is woven between the warp threads to create various patterns. In certain implementations, the first stretch characteristic includes a warp stretch in a range from about 9 percent to about 11 percent, and a weft stretch in a range from about 13 percent to about 16 percent. The second stretch characteristic of the denim fabric without the panels, will have a warp and weft stretch values that are greater than that of the first stretch characteristic. For example, the second stretch characteristic can have a warp stretch in a range from about 12 to about 45 percent, and a weft stretch in a range from about 17 to about 45 percent. The degree of stretch can also be determined by testing other properties of the fabric including the growth, recovery, tear strength, tensile strength, and many other properties.

[0174] In a specific implementation, the denim fabric includes cotton, Lycra, and PTT fiber, and the coating includes polyurethane. The first stretch characteristic includes a warp stretch of about 9.5 percent, and a weft stretch of about 15.3 percent. A first growth characteristic includes a warp growth of about 2 percent, and a weft growth of about 1.6 percent. A second stretch characteristic, a second growth characteristic, or both can be greater.

[0175] In another specific implementation, the first stretch characteristic includes a warp stretch of about 10 percent, and a weft stretch of about 13.5 percent. A first growth characteristic includes a warp growth of about 0.7 percent, and a weft growth of about 1.5 percent. A second stretch characteristic, a second growth characteristic, or both can be greater.

[0176] In another specific implementation, the first stretch characteristic includes a warp stretch of about 9 percent, and a weft stretch of about 13.2 percent. A first growth characteristic includes a warp growth of about 1.3 percent, and a weft growth of about 1.8 percent. A first tear characteristic includes a warp tear strength of about 3600 grams, and a weft tear strength of about 2500 grams. A first tensile characteristic includes a warp tensile strength of about 50 kilograms, and a weft tensile strength of about 50 kilograms. A second stretch characteristic and a second growth characteristic can be greater. A second tear strength, a second tensile strength, or both can be less.

[0177] In another specific implementation, the first stretch characteristic includes a warp stretch of about 10.5 percent, and a weft stretch of about 13 percent. A second stretch characteristic can be greater in the warp, weft, or both directions.

[0178] In another specific implementation, the first stretch characteristic includes a warp stretch of about 10 percent, and a weft stretch of about 13.9 percent. A second stretch characteristic can be greater in the warp, weft, or both directions.

[0179] In another specific implementation, the first stretch characteristic includes a warp stretch of about 9.8 percent, and a weft stretch of about 15.4 percent. A second stretch characteristic can be greater in the warp, weft, or both directions.

[0180] In a specific implementation, the denim fabric includes cotton, Lycra, and PTT fiber. A specific brand of PTT is Sorona® from E.I. du Pont de Nemours and Company (Du Pont). Sorona is a trademark of Du Pont. The Sorona PTT fiber contains poly(trimethylene terephthalate) polymers that are derived in part from corn-derived glucose.

[0181] In implementations, the shape contouring panels are applied to a stretch denim fabric without PTT fiber. A stretch denim typically has 2 percent spandex. Generally, the amount of spandex in denim varies from about 1 to 5 percent. However, depending on the amount of stretch desired, the amount of spandex in denim can be up to 10 to about 15 percent. In certain circumstances (e.g., specialized wear), the denim can have even greater than 15 percent spandex.

[0182] The particular weave used to weave the cotton and spandex fibers together to make the denim will affect the stretch. With the weave and spandex, the denim material can have different stretch levels. In a specific implementation, the denim material can have a second stretch characteristic in a range from about 15 to about 35 percent for the warp, weft, or both types of threads. However, depending on the weave and amount of spandex, the stretch can range extending from about 12 to about 45 percent. The first stretch characteristic of the material with the coating applied can have a stretch characteristic that is less than the second stretch characteristic. For example, a denim material can have a second stretch value that is about 20 to about 25 percent, and a first stretch value that is less than 20 percent.

[0183] Referring to FIG. 15A, in a specific implementation, a front side of a pair of pants, turned inside out, includes a coating, shown by the shaded sections. The coating is applied to an inside surface of the pants. From a front side, the pants include a waistband portion 1503, a crotch point 1505, a fly 1507, extending from the waistband toward the crotch point, a right leg portion 1510, and a left leg portion 1515. The
waistband extends along a perimeter of an upper edge of the pants. The first and second leg portions are joined at a center seam 1542 of the pants. The center seam is in a direction that is transverse (or perpendicular) to a direction of the waistband. The coating is applied to selected regions of the right and left leg portions. The coating applied to the right leg portion forms a first section of coating 1512a, and the coating applied to the left leg portion forms a second section of coating 1512b.

[0184] In an implementation, the pants include a fly. This fly can be, for example, a zipper fly button fly, hook and loop fly, or other type of fly. The fly increases the size of the opening of the pants, so that it is easier for person to get into and out of a pair of jeans, especially tight fitting jeans. Although this application describes pants having a fly, the invention can be applied to pants without a fly—such as sweat pants, leggings, workout pants, yoga pants, and the like.

[0185] The first and second sections of coating can be applied according to a pattern. The same pattern can be used for the first section and the second section, or two different patterns can be used, one for each leg portion. More details on patterns for the coating are discussed below.

[0186] The first and second sections can be positioned in the same areas of the leg portions. In some implementations, where the first and second sections are applied according to the same pattern, and are placed in the same areas of either leg, the first and second sections will be mirror images of each other. This placement can provide the same shaping on the left side of a person’s body as for the right side of the body. In other implementations, the first and second sections can be placed at different positions on each leg portion. For example, a second section may be positioned slightly higher on the left leg portion than the first section is on the right leg portion. This may be useful for a person who needs different areas of body shaping on a right side of the body compared to a left side of the body.

[0187] In implementations, the first section of coating does not overlap the second section of coating. In a specific implementation, the first section and the section meet at the crotch point of the pants. In other implementations, the first and second sections can meet at the crotch point and along a front center seam of the pants. In another specific implementation, the first and second sections do not touch.

[0188] In a specific implementation, as shown in FIG. 15A, the first section of coating on the inside surface of the right leg portion and the second section of coating on the inside surface of the left leg portion are mirror images. The description below of the first section of coating can also apply to the second section of coating.

[0189] The first section of the coating can extend from the crotch point along an inside seam 1516 of the right leg portion to a second point 1517 below the crotch point. The crotch point is a first distance d1 from the waistband (e.g., a bottom seam or edge of the waistband) and the second point is a second distance d2 from the waistband. The second distance is greater than the first distance. In a specific implementation, the first distance is from about 6 inches to about 7 inches below a bottom edge of the waistband, and the second distance is from about 13 to about 14 inches below the waistband. For example, the first distance is about 6.5 inches, and the second distance is about 13.5 inches.

[0190] The first section further extends from the inside seam of the right leg portion to an outer seam 1518 of the right leg portion. At the outer seam, the first section extends from a third point 1519 that is a third distance d3 below the waistband, along the outer seam, to a fourth point 1521 that is a fourth distance d4 below the waistband. The fourth point is below the third point, and the fourth distance is greater than the third distance (i.e., the fourth point is farther from the waistband than the third point). The third distance is closer to the waistband than the first distance of the first point, and the fourth distance is farther from the waistband than the first distance.

[0191] In a specific implementation, the third distance is from about 2 inches to about 3 inches below a bottom edge of the waistband, and the fourth distance is from about 13 to about 14 inches below the waistband. For example, the third distance is about 2.5 inches, and the fourth distance is about 13.5 inches.

[0192] An upper edge 1522 of the first section extends from the crotch point along a curved line to a fifth point 1523. The upper edge further extends along a straight or approximately straight line from the fifth point to the third point at the outer seam. The curved line of the upper edge can curve gradually in a first direction from the inner seam to the outer seam. The curved line can have a slight curve as the line approaches the fifth point, and then become more curved at the fifth point.

[0193] A lower edge 1524 of the first section extends from the second point along a curved line to a sixth point 1525. The lower edge further extends along a straight or approximately straight line from the sixth point to the fourth point at the outer seam. In the first direction, the curved line of the lower edge can have a slight curve (or be approximately straight), then become more curved as the line approaches the sixth point, and then curve sharply down to the sixth point.

[0194] A height of the first section is between the upper and lower edges of the first section. Moving in the first direction, the height of the first section can increase. A first length L1 between the crotch point and the second point at the inner seam is less than a second length L2 between the third and fourth points at the outer seam. In a specific implementation, the second length is at least twice as long as the first length. In a specific implementation, the first length is from about 4 to about 5 inches, and the second length is from about 11 to about 11.5 inches. For example, the first length is about 4.5 inches and the second length is about 11.5 inches.

[0195] The first section can form the shape of a closed-shape polygon, and can be referred to as a panel of coating. The polygon shape in FIG. 15A has six sides or edges. In other implementations, the polygon shape can have fewer (e.g., 3, 4, or 5) or more sides (e.g., 7, 8, 9, 10, or more), depending on the pattern for the first section.

[0196] When the first and second sections are joined at the crotch point of the pants, the upper edges of the first and second sections form a concave region 1301 where there is no coating. The first concave region avoids and does not cover or compress the abdomen and pelvic area. This can provide greater comfort to the wearer since there will be less constriction to these areas of the body. In a specific implementation, a width 1350 of the concave region is about 9 inches. A length 1355 of the concave region is about 4.25 inches.

[0197] In a specific implementation, a protruding portion 1540 of the first and second sections of coating between the fourth and sixth points, and extending up along the outer seam, is referred to as a lower outer thigh region. This region of the first section can shape the thighs by compressing the outer thighs in toward a midline of the body. This can prevent the thighs from bulging out and forming bulge lines and
creases underneath the pants. This region can smooth out the thighs and create a more slimming thigh contour. In some implementations, the lower outer thigh region can be shortened (e.g., the fourth point can be moved up along the outer seam, closer to the waistband) or can be omitted from the panel. This reduces the area of the shaping coating on the pants. A smaller provides less shaping relative to a larger thigh region. For example, for a pair of exercise shorts, this region can be shortened.

[0198] Referring to FIG. 15B, in a specific implementation, a back side of a pair of pants, turned inside out, includes a coating, shown by the shaded sections. The coating is applied to an inside surface of the pants. From a back side, the pants include a waistband portion 1503, a center seam 1542, a crotch point (not visible), a seat portion (or a buttocks regions where the gluteal regions are positioned), a right leg portion 1510, and a left leg portion 1515. The seat portion is opposite of the fly on the front side of the pants. The seat portion can be formed by the rear portions of the first and second leg portions that join at the center seam. The center seam can extend on the front and back sides of the pants. Like the front side, the center seam is in a direction that is transverse (or perpendicular) to a direction of the waistband. The coating is applied to selected regions of the right and left leg portions, below the seat portion. The coating applied to the right leg portion forms a first section of coating 1550a, and the coating applied to the left leg portion forms a second section of coating 1550b.

[0199] Similar to the front sections of coating, the first and second sections of coating on the back side can also be applied according to a pattern. The same pattern can be used for the first section and the second sections, or two different patterns can be used, one for each leg portion. More details on patterns for the coating are discussed below.

[0200] The first and second sections can be positioned in the same areas of the leg portions. In some implementations, where the first and second sections are applied according to the same pattern, and are placed in the same areas of either leg, the first and second sections will be mirror images of each other. This placement can provide the same shaping on the left side of a person's body as for the right side of the body. In other implementations, the first and second sections can be placed at different positions on each leg portion. For example, a second section may be positioned slightly higher on the left leg portion than the first section is on the right leg portion. This may be useful for a person who needs different areas of body shaping on a right side of the body compared to a left side of the body.

[0201] In implementations, the first section of coating does not overlap the second section of coating. In a specific implementation, the first section and the section meet at the back center seam of the pants. In other implementations, the first and second sections can meet at the crotch point and along the back center seam of the pants. In another specific implementation, the first and second sections do not touch.

[0202] In a specific implementation, shown in FIG. 15B, the first section of coating on the inside surface of the right leg portion and the second section of coating on the inside surface of the left leg portion are mirror images. The description below of the first section of coating can also apply to the second section of coating. The second distance is greater than the first distance. In a specific implementation, the first distance is from about 6 inches to about 7 inches below a bottom edge of the waistband, and the second distance is from about 13 to about 14 inches below the waistband. For example, the first distance is about 6.5 inches, and the second distance is about 13.5 inches.

[0203] The first section of the coating can extend from a first point 1552 at the center seam, along an inside seam (see FIG. 3A, reference number 1516) of the right leg portion to a second point 1554 below the first point. The first point is a fifth distance d5 from the waistband (e.g., a bottom seam or edge of the waistband) and the second point is a sixth distance d6 from the waistband. The sixth distance is greater than the fifth distance. In a specific implementation, the fifth distance is from about 6 inches to about 7 inches below a bottom edge of the waistband, and the sixth distance is from about 13 to about 14 inches below the waistband. For example, the fifth distance is about 6.5 inches, and the sixth distance is about 13.5 inches.

[0204] The first section further extends from the inside seam of the right leg portion to an outer seam (see FIG. 3A, reference number 1518) of the right leg portion. At the outer seam, the first section extends from a third point 1556 that is a seventh distance d7 below the waistband, along the outer seam, to a fourth point 1558 that is an eighth distance d8 below the waistband. The fourth point is below the third point, and the eighth distance is greater than the seventh distance (i.e., the fourth point is farther from the waistband than the third point). The seventh distance is closer to the waistband than the fifth distance of the first point, and the eighth distance is farther from the waistband than the fifth distance of the first point.

[0205] In a specific implementation, the seventh distance is from about 2 inches to about 3 inches below a bottom edge of the waistband, and the eighth distance is from about 13 to about 14 inches below the waistband. For example, the seventh distance is about 2.5 inches, and the eighth distance is about 13.5 inches.

[0206] An upper edge 1560 of the first section extends from the first point along a curved line to a fifth point 1562. The upper edge further extends along a straight or approximately straight line from the fifth point to the third point at the outer seam. The curved line of the upper edge can curve gradually in a first direction from the inner seam to the outer seam. The curved line can become more curved as the line approaches the fifth point.

[0207] A lower edge 1564 of the first section extends from the second point along a curved line to a sixth point 1566. The lower edge further extends along a straight or approximately straight line from the sixth point to the fourth point at the outer seam. In the first direction, the curved line of the lower edge can have a slight curve (or be approximately straight), then become more curved as the line approaches the sixth point, and then curve sharply down to the sixth point.

[0208] A height of the first section is between the upper and lower edges of the first section. Moving in the first direction, the height of the first section can increase. A third length L3 between the first point and the second point at the inner seam is less than a fourth length L4 between the third and fourth points at the outer seam. In a specific implementation, the second length is at least twice as long as the first length. In a specific implementation, the third length is from about 4 to about 5 inches, and the fourth length is from about 11 to about 11.5 inches. For example, the third length is about 4.5 inches and the fourth length is about 11.5 inches.

[0209] The first section can form the shape of a closed-shape polygon, and can be referred to as a panel of coating.
The polygon shape in FIG. 15B has seven sides or edges. In other implementations, the polygon shape can have fewer (e.g., 3, 4, 5, or 6) or more sides (e.g., 8, 9, 10, or more), depending on the pattern for the first section.

[0210] In a specific implementation a protruding portion 1570 of the first or second sections of coating between the fourth and sixth points, and extending up along the outer seam, is referred to as a lower outer thigh region. This region of the first section can shape the thighs by compressing the outer thighs in toward a midline of the body. This can prevent the thighs from bulging out and forming bulge lines and creases underneath the pants. This region can smooth out the thighs and create a more slimming thigh contour. In some implementations, the lower outer thigh region can be short­ened (e.g., the fourth point can be moved up along the outer seam, closer to the waistband) or can be omitted from the panel. This reduces the area of the shaping coating on the pants. A smaller provides less shaping relative to a larger thigh region. For example, for a pair of exercise shorts, this region can be shortened.

[0211] When the first and second sections of the back coating are joined at the back center seam of the pants, the upper edges of the first and second sections form a first concave region 1575 and a second concave region 1580 where there is no coating. The upper edges can curve around a perimeter of the wearer’s buttocks. The first and second concave regions correspond to the cheeks of the seat area (or buttocks region). The first and second concave regions avoid and do not cover or compress the buttocks. This can provide greater comfort to the wearer since there will be less constriction to these areas of the body. In a specific implementation, the width 1580 of the first and second concave regions is about 12 inches. A length 1582 of the concave region is about 5.5 inches.

[0212] The buttocks region can fill out the concave regions, while pushed from an underside by the first and second sections of the back coating. This can provide the buttocks region with lift and support, creating a higher and more attractive buttocks profile. This is a desirable look to many people since it creates the appearance of a younger, toned, and healthy buttocks region. The back coating does not cover the buttocks cheeks since any compression from the coating would likely flatten the buttocks, leading to an unattractive profile.

[0213] Referring to FIG. 15B, the upper edges of the first and second sections of the back coating meet at the back center seam to form a peak region 1312 of coating. The peak region can correspond to the intergluteal cleft of the person’s body that is in between the two gluteal regions at an underside of the gluteal regions. As discussed above, the peak region can have a triangular shape, and can also be referred to as a tapered region. In a specific implementation, the first point 1522 at the center seam is a fifth distance d5 from the waistband (e.g., a bottom edge or bottom seam of the waistband). Between the first point and the outside seam of the right leg portion, the upper edge 1560 of the first section of the coating is a ninth distance d9 from the waistband, and the ninth distance is the same as or greater than the fifth distance from the bottom edge of the waistband to the first point. So, the upper edge of the first section of coating can curve away from and below the first point. This portion of the upper edge can correspond to the curve of the underside of the buttocks where the buttocks meet the back upper thigh.

[0214] In a specific implementation, the peak region can have a curved or pointed shape. An angle peak region can conform to a space between the intergluteal cleft. As previously described for FIG. 13B, the peak region can separate (i.e., push up and out) the buttock cheeks to create a higher, fuller, and more defined shape to the buttocks.

[0215] In a specific implementation, as shown in FIG. 8, the printed panel of the coating has a graduated edge 805 or a gradation (i.e., a gradient edge, a feathered edge, or a blurred edge) such that the coating fades gradually at the edges, rather than having a hard (or sharp) edge. This can provide the edges with a soft look, where the coating is blended into the garment material. The coating has a first density or frequency within the interior of the panel, and at the edge, the first density or frequency of the coating can gradually decrease in a direction from the inside of the panel to the outside of the panel.

[0216] FIG. 8 shows a specific implementation of an edging of a coating on an inside surface of jeans. The gradient edge provides a smooth transition between the printed coating and the denim fabric, without using any stitching, sewing, or seams to secure the section of the coating to the inside surface of the fabric. The coating binds (or adheres or fuses) with fabric, so any such use of seams would be unnecessary. Further, seams would likely be visible from the outside of the jeans, which would be an undesirable and unattractive look. As a result, from the outside of the jeans, there is no visible outline of the coated panel (e.g., no visible lines, hems, or edges). Since the coating has a different stretch characteristic than the denim fabric, a hard edge for the coating could cause drag lines, wrinkles, or puckering in the denim fabric when the jeans are worn. So, with a gradient edging, the transition is more smooth. Hence, the shape of the coating is invisible from the outside of the jeans. Specific implementations of the gradient edge are shown in U.S. patent applications 29/431, 723 and 29/431,724, filed Sep. 10, 2012, are incorporated by reference.

[0217] FIGS. 9A-9B show a specific implementation of printed panels of coating for pants where the coating has gradient edging. FIG. 9A shows a front panel of coating (i.e., for a front side of pants) and FIG. 9B shows a back panel of coating (i.e., for a back side of pants).

[0218] FIG. 10 shows a magnified view of a portion of a graduated edge 805 for a coating. In a specific implementation, the panel of coating includes a solid fill 1010 of the coating mixture, while the edges of the panel include open spaces 1015 through which the underlying denim fabric is visible. These are areas where the coating mixture was not applied or did not adhere. These open spaces can be interspersed with coating at the edge. A density or frequency of the open spaces is less within the interior of the panel, and at the edge, this density of frequency of the open spaces can gradually increase in a direction from the inside of the panel to the outside of the panel. As the open spaces become more dense or frequent, the coating becomes less dense or frequent.

[0219] In a specific implementation, a width (w) of the gradient edge is about ½ inch (or about 1.3 centimeters) to about 1 inch (or about 2.5 centimeters). In other implementations, the dimension of the gradient edge can be less or more, and the solid fill area can also be graduated in varying intensities.

[0220] The coating mixture includes a polyurethane (e.g., a polyurethane resin). The polyurethane can limit the stretch characteristics of the textile to which it is applied. It can improve the tensile strength of the textile, thereby providing more durability to a textile that is coated with it. The regions of a textile with polyurethane applied will have stretch characteristics that are different from other regions of the textile.
without the polyurethane coating. The polyurethane-coated regions will have less stretch than regions without polyurethane. The coated regions can also have more tensile strength than noncoated regions (e.g., a higher ultimate tensile strength value). In a specific implementation, the coated regions will have no stretch.

[0221] It should be understood that the invention is not limited to the specific compounds presented below. A formulation of the invention may have additional compounds (not necessarily described in this application), different compounds which replace some of the compounds presented, fewer of the compounds presented, or any combination of these. Further, the compounds in other implementations of the invention may not be exactly the same as the compounds presented and may be modified or altered as appropriate for a particular application or based on the data or situation. For example, different compounds from different manufacturers can be used, depending on many factors including the desired characteristics, availability, compatibility with other compounds in the mixture, cost, and others.

[0222] In a specific implementation, a polyurethane of the mixture is Hauthane L-3360, available from Hauthaway Corporation of Lynn, Mass. L-3360 is a water-borne polyurethane dispersion that is partially bio-renewable resource based (about 50 percent) and an aliphatic compound. It contains α-ethyl pyrrolidone (NEP). The L-3360 coating can be resistant to ultraviolet (UV) light. L-3360 provides a smooth hand feel after it is applied to textiles and allowed to dry. The L-3360 dispersion provides a soft, tough, and flexible urethane coating having good abrasion and crack resistance. Other properties of L-3360 include a percentage of solids of about 35 percent, a viscosity of about 50-500 centistokes (cst), a pH value of about 7.5-10.0, and a density of about 8.5 pounds per gallon. L-3360 has a volatile organic compound (VOC) content of about 55 grams per liter (less water). Equivalents to Hauthane or Hauthane L-3360 by Hauthaway or other manufacturers can be used. For example, other polyurethane coatings include Hydrolur by COIM, Impranorm by Bayer, LuraPrep by BASF, Astacein by BASF, Permax by Lubrizol, Syntegra by Dow, WitcoBond by Brenntag Specialties, and Impranil by Bayer.

[0223] In other implementations, many other different polyurethanes and their equivalents can be used in the mixture. One of ordinary skill in the art recognizes that many different polyurethanes with varying properties (e.g., strength, hand feel, viscosity, and others) from different manufacturers can be used depending on the particular application or based on the data or situation. Some other manufacturers of polyurethanes include Dow Chemical, Du Pont, Eastman Chemical, 3M Company, Bayer MaterialScience, Mitsubishi Chemical, and I. ORD Corporation, and many others.

[0224] The mixture can include polyurethane in an amount in a range from about 1 percent to about 90 percent. In a specific implementation, the polyurethane can be in a range from about 30 percent to about 70 percent. For example, the mixture can have about 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, or 70 percent polyurethane by weight or by volume. In a specific implementation, the mixture includes about 40 percent Hauthane L-3360. In other implementations, the mixture can include about 50, 60, or 70 percent of Hauthane L-3360 or a different polyurethane dispersion.

[0225] In another specific implementation, the mixture includes polyurethane in a range from about 10 percent to about 40 percent. For example, the mixture can have about 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, or 40 percent polyurethane by weight or by volume.

[0226] A property of polyurethane resin is that it can be flexible at low temperatures and has good tensile properties overall. For example, when tested at 20 inches per minute, a polyurethane (e.g., L-3360) has about an elongation value of about 370 percent. Its ultimate tensile strength (UTS) value is about 1600 pounds per square inch (psi). This is the maximum stress that a material can withstand while being stretched or pulled before failing or breaking. An elastic modulus value at 100 percent elongation is about 700 psi. This means that a force of about 700 psi is required to produce an elongation (or strain) of about 100 percent. The elastic modulus value at 200 percent elongation is about 950 psi, and at 300 percent elongation is about 1300 psi.

[0227] In other implementations, other polymer dispersions can be used in the mixture. For example, various polyurethane dispersions can be used having good tensile strength and elongation. These polyurethane dispersions can have different grades, including aromatic grades, co-solvent free grades, flame retardant grades, polyester grades containing n-methylpyrrolidone (NMP), polycarbonate grades containing NMP, DMM based grades, hydroxyl (OH) functional grades, and many others. In other implementations, the polyurethane can be a hybrid mixture including a polyurethane and acrylic (e.g., acrylic homo or copolymers) hybrid dispersion.

[0228] The coating mixture can include a crosslinking compound or agent that is crosslinked to the polyurethane to increase the strength of the coating layer. In implementations, the crosslinking agent can be carbodiimides (e.g., Dow’s Zoldine XL-29SE or Nissinko/GSI-EXIM’s Carbodiilte V-02-L2), polyaziridines (e.g., Bayer’s XAM-7 or DSM NeoResin’s CX-100), melanines (e.g., Cytec’s Cynel 385) and epoxies (e.g., Hauthaway’s L-2522). Water dispersible isocyanates such as Bayer’s Banyhydr 302/XP-7165, Perstorp’s Easaqua XD 401/XM 501 are also suitable for both hydroxyl functional grades.

[0229] The mixture can include a crosslinking agent in an amount in a range from about 0.1 percent to about 10 percent. In a specific implementation, the crosslinking agent can be in a range from about 1 percent to about 5 percent. For example, the mixture can have about 1.0, 1.1, 1.2, 1.3, 1.4, 1.5, 1.6, 1.7, 1.8, 1.9, 2.0, 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7, 2.8, 2.9, 3.0, 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 4.0, 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 4.8, 4.9, or 5.0 percent crosslinking agent by weight or by volume.

[0230] In another specific implementation, mixture can include a crosslinking agent in an amount in a range from about 0.5 percent to about 5 percent. For example, the mixture can have about 0.5, 0.6, 0.7, 0.8, 0.9, 1.0, 1.1, 1.2, 1.3, 1.4, 1.5, 1.6, 1.7, 1.8, 1.9, 2.0, 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7, 2.8, 2.9, 3.0, 3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9, 4.0, 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 4.8, 4.9, or 5.0 percent crosslinking agent by weight or by volume.

[0231] In a specific implementation, the mixture includes about 2.5 percent Carbodiilte (Carbodiilte SV-02-V-02-L2, or E-02), available from Nissinko/GSI-Exim Chemical Inc. Carbodiilte are polycarbodiimide resins with carbodiimide groups and a hydrophilic segment, and are reactive to car-
boxylic groups which are present in some polyurethanes. In other implementations, the mixture can include about 1.2, 1.5, 1.8, 2.1, 2.7, or 4.05 percent of Carbodiylite or a different crosslinking agent. The mixture can include a single crosslinking agent or combinations of crosslinking agents depending on the substrates to be bonded.

[0232] The coating mixture can include an emulsifier that can allow the particles in the mixture to be more evenly dispersed. In implementations, the emulsifier is an aryl or alkyl polyglycol ether. In a specific implementation, the emulsifier is an aryl polyglycol ether, commercially available as Luprolint PE New, available from BASF Aktiengesellschaft. Luprolint PE New is a nonionic, alkylophenol ethoxylate (APEO)-free emulsifier for solvent-free and solvent-based printing.

[0233] The mixture can include an emulsifier in an amount in a range from about 1 gram per liter to about 40 grams per liter (or equivalent percentage). In implementations, the emulsifier can be in a range from about 10 to about 20 grams per liter (or equivalent percentage). For example, the mixture can have about 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, or more grams per liter of an emulsifier. In a specific implementation, the mixture includes about 15 grams per liter of an aryl or alkyl polyglycol ether (e.g., Luprolint PE New), or equivalent percentage. The mixture can include a single emulsifier or combinations of emulsifiers depending on the application of the mixture.

[0234] In a specific implementation, the mixture includes an emulsifier in a range from about 0.5 percent to about 3 percent (or equivalent weight). For example, the mixture can have about 0.5, 0.6, 0.7, 0.8, 0.9, 1.0, 1.1, 1.2, 1.3, 1.4, 1.5, 1.6, 1.7, 1.8, 1.9, 2.0, 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7, 2.8, 2.9, or 3.0 percent emulsifier by weight or by volume.

[0235] The coating mixture can include one or more color compounds (e.g., dyes, pigments or inks). These pigments can be suitable for textile printing and dyeing applications. Some pigments can have good colorfastness, which is the pigment's ability to resist change in any of its color characteristics, to resist transfer of its colorants to adjacent materials, or both, throughout its life. The mixture can include a single color, or multiple colors. When multiple color dyes are used, different colors, shades, and hues can be produced. For example, a blue-colored dye can be mixed with a navy blue-colored or black-colored dye to result in a darker shade of the original blue color.

[0236] In a specific implementation, the mixture includes a blue color dye that is applied to the inside surface of a pair of blue denim jeans. The blue color panels can match and blend well with the blue of the denim fabric. In other implementations, the mixture includes a dye that is the same color as a color of the denim. For example, for red colored jeans, the mixture can have a red color dye, while for purple colored jeans, the dye can be a purple color, or a combination of red and blue dyes. In other implementations, a pigmented dye is omitted from the mixture, and the mixture will not have a selected, desired color.

[0237] The mixture can include one or more color compounds in an amount in a range from greater than zero to about 15 grams per liter (or equivalent percentage). In implementations, the pigment can be in a range from about 0.5 to about 2.5 grams per liter (or equivalent percentage). For example, the mixture can have about 0.5, 0.6, 0.7, 0.8, 0.9, 1.0, 1.1, 1.2, 1.3, 1.4, 1.5, 1.6, 1.7, 1.8, 1.9, 2.0, 2.1, 2.2, 2.3, 2.4, 2.5, or more grams per liter of one or more dyes. For multiple color dyes, the amount of each dye can be adjusted to mix a desired color. For example, the mixture can include a first color dye in a first amount and a second color dye in a second amount, where the second amount is less than the first and the second color is a different color than the first color. The mixture can include a third, fourth, fifth, sixth, or more color dyes. In a specific implementation, the mixture includes about 1.6 grams per liter (or equivalent percentage) of a blue dye and 1 gram per liter (or equivalent percentage) of a black dye.

[0238] In another specific implementation, the mixture includes an amount of a dye in a range from about 0.05 percent to about 0.3 percent (or equivalent weight). For example, the mixture can have about 0.05, 0.06, 0.07, 0.08, 0.09, 0.11, 0.12, 0.13, 0.14, 0.15, 0.16, 0.17, 0.18, 0.19, 0.2, 0.21, 0.22, 0.23, 0.24, 0.25, 0.26, 0.27, 0.28, 0.29, or 0.3 percent of a dye by weight or by volume.

[0239] The coating mixture can include a thickening agent to thicken the viscosity of the mixture. In implementations, the thickening agent can be polyacrylic acids, polylvinyl pyrrolidones, silicic acids, betonites, kaolins, alginic acids, or a combination of these. In a specific implementation, the thickening agent can be an acrylic acid dispersion (e.g., Tubicoat Verdielcker LP). Verdielcker LP is a synthetic thickener for liquids and coating pastes.

[0240] The mixture can include a thickening agent in an amount in a range from greater than zero to about 25 grams (or equivalent percentage). In implementations, the thickening agent can be in a range from about 10 to about 25 grams (or equivalent percentage). For example, the mixture can have about 10, 11, 12, 13, 14, 15, 15.5, 16, 16.5, 17, 17.5, 18, 18.5, 19, 19.5, 20, 21, 22, 23, 24, 25, or 26 grams of a thickening agent. In a specific implementation, the mixture includes about 17 grams (or equivalent percentage) of an acrylic acid-based thickening agent. The mixture can include a single thickening agent or combinations of thickening agents depending on the application of the mixture.

[0241] In another specific implementation, the mixture includes an amount of a thickener in a range from about 1 percent to about 5 percent (or equivalent weight). For example, the mixture can have about 1, 2, 3, 4, or 5 percent of a thickening agent by weight or by volume.

[0242] In a specific implementation, the mixture includes about 30-70 percent polyurethane (e.g., polyurethane resin), 1-5 percent of a cross linking agent, 10-20 grams per liter (or equivalent percentage) of an emulsifier, 1-2 grams per liter (or equivalent percentage) of a blue dye, 0.5-1.5 grams per liter (or equivalent percentage) of a black dye, and 10-20 grams (or equivalent percentage) of a thickener. The range of specific percentages presented can be in percentage by volume or percentage by weight, depending on the particular application or based on the data or situation.

[0243] In another specific implementation, the mixture can include from about 10-40 percent or about 30-70 percent of a polyurethane resin, about 0.5-5 percent cross linking agent, about 0.5-3 percent of an emulsifier, about 0.05-0.3 percent of a dye, and about 1-5 percent of a thickener.

[0244] Other compounds can be included in the mixture including resins, solvents, defoaming agents, leveling agents, mar-reducing additives, and many others. In a specific implementation, an aliphatic hydroxyl compound is used as an antifoam and degrading agent for textile printing (e.g. Rapido Print SC10). The agent can promote the wetting of the fabric and improves penetration.
In a specific implementation, a composition for the coating mixture includes a polyurethane. In other implementations, the mixture can further include one or more pigments, a crosslinking agent, an emulsifier, a thickening agent, or any one or any combination of these compounds. Other compounds (and their equivalents) can be substituted for or replace any of the one or more of the listed compounds. For example, in a specific implementation, the composition for the mixture includes a polyurethane, a first pigment having a first color, and a crosslinking agent. The mixture can further include a second pigment having a second color that is different from the first color.

The composition in these implementations is not limited to the specific compounds presented. A composition of the invention may have additional compounds (not necessarily described in this application), different compounds which replace some of the compounds presented, fewer of the compounds presented, or any combination of these. For example, polyurethane can be combined with other ingredients (not presented above) such as other polymer-based compounds, crosslinking agents, emulsifying agents and thickening agents. In these implementations, various ingredients other than those presented above can be used in combination with polyurethane.

Table A below provides the range of amount of each ingredient that can be used, while still maintaining good tensile strength. It should be understood that the invention is not limited to the specific percentages presented. A formulation of the invention may have additional compounds (not necessarily described in this application), different compounds which replace some of the compounds presented, fewer of the compounds presented, or any combination of these. Further, the compounds in other implementations of the invention may not be exactly the same as the compounds presented and may be modified or altered as appropriate for a particular application or based on the data or situation. For example, the percentages can be specified by weight or by volume.

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polyurethane</td>
<td>10-70 percent in solution</td>
</tr>
<tr>
<td>Crosslinking agent</td>
<td>0.5-3 percent in solution</td>
</tr>
<tr>
<td>Pigment</td>
<td>0.5-3 percent in solution</td>
</tr>
<tr>
<td>Emulsifier</td>
<td>0.05-0.3 percent in solution</td>
</tr>
<tr>
<td>Thickening agent</td>
<td>1-5 percent in solution</td>
</tr>
</tbody>
</table>

In a specific implementation, the mixture for the coating includes a polyurethane. The mixture can further include a crosslinking agent (e.g., carboxidiimide), a first pigment, an emulsifier (e.g., an aryl polyglycol ether), a thickening agent (e.g., an acrylic acid-based thickening agent), or any one or combination of these. In a specific implementation, the first pigment includes a blue color. In other implementations, the mixture can further include a second pigment that is a different color from the first pigment. In a specific implementation the second pigment includes a color that is darker that the first pigment (e.g., navy blue, indigo, dark purple, brown, dark gray, black, and many others).

In a specific implementation, the mixture for the coating includes 40 percent in solution of a polyurethane, 2.5 percent in solution of a carboxidiimide crosslinking agent, 15 grams per liter of an emulsifier (e.g., an aryl polyglycol ether based emulsifier), 1.6 grams per liter of a blue color dye, 1 gram per liter of a black color dye, and 17 grams of an acrylic acid based thickening agent.

To form the shape contouring panels on a garment, the coating mixture, in the wet stage, is applied to a fabric for the garment. The mixture is applied to the fabric and then cured to allow the coating to bind or fuse to the fabric. The coating can be applied to the fabric based on a predetermined shape, design, or pattern. For example, a stencil or cutout of the shape can be used as a guide to apply the coating mixture. For example, the stencil is positioned over the fabric in the desired region, and the coating mixture is filled into the open areas of the stencil. The mixture can be applied by brushing or spraying on the fabric by hand, with or without a stencil. In other implementations, the shape panel is formed on a transfer medium (e.g., a transfer paper, heat transfer paper, or adhesive paper), and transferred to the fabric.

Drying can include drying at ambient temperatures (e.g., air drying), at cooler temperatures, or at higher temperatures. In implementations, after the coating is applied to the fabric, heating the coating and the fabric to temperatures higher than room temperature can increase the drying process and reduce the drying time. Curing the coating can allow for the mixture to coat the fibers of the fabric and adhere (or bond, fuse, infuse, or crosslink) to the fibers. In some implementations, curing at higher temperatures can activate ingredients or other properties in the coating mixture that allow the coating to bind to the substrate fabric and set properly.

In a specific implementation, a screen printing process (i.e., silk screen printing) can be used to apply the coating mixture onto a desired fabric. The mixture can have the consistency and the properties of a fluid. In a specific implementation, the coating mixture can have the properties or consistency of a liquid. In other implementations, the coating mixture can have the properties or consistency of a paste. In screen printing, specialized inks are used, which are known in the industry as inks or pastes interchangeably. These specialized inks have a pigment to give a desired color, and are also formulated to give a good working consistency for the process. Depending on factors such as the temperature and the mesh material or thread count, the viscosity of screen printing inks used can vary, such as from being more viscous (e.g., like butter) to less viscous (e.g., like syrup). The viscosity of the ink can be adjusted as desired by using a thinner or reducer.

For the screen printing process, the coating mixture can be formulated to have properties analogous or similar to the inks or pastes used for screen printing. As discussed above, the viscosity of the mixture can be adjusted as desired, depending on the particular process and equipment used for the screen printing. In other implementations, the fluid coating mixture can be formulated to have properties appropriate for other processes. For example, for printers such as ink jet printers, the coating can have properties analogous or similar to the inks used for such printers. The mixture can be applied to a surface of the fabric that will be an inside surface (i.e., facing the skin of the person) of the final garment.

Typically, in a screen printing process, a stencil of a desired shape (or image, pattern, design, text or combination of these) is to be printed on a screen. Ink is forced through open areas of the stencil onto a substrate (e.g., a fabric). The stencil is removed, leaving behind the printed shape on the fabric, which is dried.

The desired image is printed onto a film that will be used to burn the image into a screen. The image will be
printed on the film using a dark or black ink, or can be burned into the film using a laser printing technique. The screen-printed image will appear the same as the dark image on the film (e.g., have the same dimensions).

In a specific implementation, the coating shape can have a gradient pattern at the edges as described above for FIGS. 8-10. An image of the shape of the coating (e.g., a front panel or a back panel), with gradient edges, is printed onto a film.

A half-tone technique can be used to create the gradient pattern at the edges. Half-tones are patterns of very small shapes (e.g., dots, ellipses, squares, and others) that taper out to create the appearance of color fading (or graduating) to white or another color at the edges. The angle, frequency, size, and shape of the dots, for example, can be adjusted to increase or decrease the density of the half-tone pattern. For example, a half-tone with larger dots will provide more space in between the dots, and therefore, a more visible gradient appearance. By contrast, a half-tone using relatively smaller dot size will produce less space between them, resulting in a tighter and smoother gradient appearance.

The screen can be prepared using a mesh screen that is attached to or stretched over a frame. The mesh can include a nylon, polyester, or steel material, and many others. The mesh has openings that will allow a liquid or paste mixture to push through to the fabric. The amount of mixture pushed through onto the fabric can depend in part on the size of the mesh openings. The lower the mesh opening size, the larger the holes in the screen and the more ink or paste is pushed through to the fabric. For example, mesh with larger openings (i.e., low mesh) can allow for more of the paste mixture to pass through onto the fabric while a mesh with smaller openings (i.e., high mesh) will allow less of the paste mixture to pass through.

In a specific implementation, a process of screen printing a panel onto a fabric includes using a mesh screen having openings that are about 43 to about 60 micrometers in width (or in diameter). For example, the openings can be about 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, or 60 micrometers. In another implementation, the mesh count of the screen is from about 50 to about 60. The range can have a tolerance of about 15 percent, so this range can include mesh counts of 42, 43, 45, 48, 63, 65, 66, or 68. In other implementations, a mesh with an opening size of about 60 micrometers to about 230 micrometers is used.

To burn the prepared image onto the screen, a photosensitive emulsion is applied to the screen. The film with image is laid over the screen and exposed to light. The light causes the emulsion to harden and bond to the mesh screen. Where the light strikes the screen, the emulsion will bind, making a solid layer. Where the light is blocked (i.e., where dark image is placed) the emulsion remains water-soluble. The screen is washed, and the screen areas which have not been exposed to light are washed off. The clear areas are where the paste or ink will be pressed through the mesh screen.

The screen is then placed over the fabric, and the coating mixture is applied onto the screen. A bar (e.g., fill bar or floodbar) is dragged across the screen and used to push the coating mixture into the openings of the mesh. The bar starts at a first end of the screen and is moved to an opposite end with a downward force. During this, the actual screen is lifted off the garment to avoid contact. A blade (e.g., a squeegee or a bar) is then used to stroke across the mesh and push the mesh with a downward pressure onto the surface of the fabric. The liquid or paste that is in the mesh opening is squeezed by capillary action onto the fabric in a prescribed amount. The amount of the mixture applied depends on the thickness of the mesh and stencil, and the size of the mesh openings. As the blade moves toward the rear of the screen, the tension of the mesh pulls the mesh up away from the fabric, leaving the mixture on the surface of the fabric.

The bar can stroke across the screen multiple times (e.g., 2, 3, 4, 5, 6, 7, 8, or more times) to push the mixture through the mesh openings onto the fabric. In a specific implementation, a process of screen printing a panel onto a fabric includes using a screen printing blade to stroke the screen about 2 to 4 or more times.

The applied pressure with each stroke can be adjusted to regulate the amount of the mixture that is applied to the fabric. For example, a stroke at high pressure can deposit more of the mixture onto the fabric while a stroke at a relatively lower pressure will deposit less of the mixture. In a specific implementation, a process of screen printing a panel onto a fabric includes applying a pressure of about 2 to about 4 bars of pressure on a screen printing blade.

The fabric with the printed image can be dried at a temperature higher than room temperature. In implementations, the mixture includes a polymer (e.g., polyurethane polymer, polyester polymer) that can be activated by heat or by light to cure and set. This mixture can be applied to the fabric and heated at a temperature of about 100 degrees Celsius or greater to allow the polymers in the mixture to polymerize and set. The heat can be applied for several seconds to about 15 minutes. For example, the heat can be applied for about 10 seconds, 20 seconds, 30 seconds, 40 seconds, 50 seconds, 55 seconds, 1, 2, 3, 4, 5, 6, 7, 8, 9, or 10 or more minutes.

In a specific implementation, a method of screen printing a panel of coating mixture onto a fabric includes applying the coating mixture having a polyurethane onto a fabric. To cure the polyurethane coating, the fabric can be exposed to a temperature that is higher than room temperature, or can be exposed to a light source (e.g., an LED or ultraviolet lamp).

In a specific implementation, the curing process includes heating the wet coating on the fabric to about 160 degrees Celsius for about 1 minute. In other implementations, the temperature can range from about 140 degrees Celsius to about 200 degrees Celsius. The cure time can be from seconds (e.g., less than 1 minute, such as from 1 to 59 seconds). In a specific implementation, the cure time several seconds at about 150 degrees Celsius.

In a specific implementation, a method of screen printing a panel of coating mixture onto a fabric includes applying the coating mixture having a polyurethane and a crosslinking agent onto a denim fabric according to a screen printing technique discussed above. The denim fabric can include cotton, an elastic fiber (e.g., spandex), and poly(trimethylene terephthalate). The mixture can further include a pigment, a resin, an emulsifier, a thickening agent, or a combination of these. The method further includes applying a pressure of about 2 to about 4 bars of pressure on a screen print screen with openings of about 55 micrometers in width for about 2 strokes. The method further includes allowing the fabric with the applied coating to cure at about 150 degrees Celsius for about less than one minute (e.g., about 1-59 seconds).
The screen printing can be completed through a manual, automatic, or semi-automatic process. There are semi-automatic and automatic screen printing machines that are commercially available.

In other implementations, the mixture can be applied to a fabric using various other printing techniques. In a heat transfer technique, the mixture is applied to a transfer paper (or carrier paper) based on a desired image or shape. The paper can include a heat sensitive material such as an adhesive. The transfer paper can be positioned over the fabric, with the mixture facing the fabric, and a downward pressure is applied to the paper (e.g., through an iron or a heat press). Heat is typically applied along with the pressure and the mixture is transferred onto the fabric.

A specific implementation of the body shaping fit system works with the Levi’s Curve ID® system to provide a new system of fitting jeans based on a body type, where the jeans actively shape a woman’s body. A specific implementation of the new system of the invention is the Levi’s Revel system. Revel and Curve ID are registered trademarks of Levi Strauss & Co. A more detailed discussion of the Curve ID system is in U.S. patent applications filed Nov. 2, 2010, issued as U.S. Patent No. 8,307,560 on Nov. 13, 2012 to Levi Strauss & Co., which claims the benefit of U.S. provisional application 61/391,579, filed Oct. 8, 2010. These patent applications are incorporated by reference along with all other references cited in this application.

Women can use the Curve ID system to find the perfect fit based on body type. To use the Curve ID system, a woman finds her shape by taking some measurements of her body at the waist and hip regions. The woman can locate a shape category based on those measurements. With this shape category information, the woman can easily locate a pair of form-fitting jeans that shapes her body. In the Revel system, jeans are specifically engineered and designed for the woman’s body shape. The jeans provide support and shaping for the woman’s buttocks, hip and thigh areas by incorporating unique shape contouring panels that are made through a unique printing process on the inside surface of the jeans. The panels are uniquely positioned on the inside of the jeans to smooth and hold in the hips, and inner and outer thighs, while lifting the buttocks. A denim fabric of the jeans includes a stretch material that has improved stretch and recovery properties in the jeans.

In addition, the finish of the jeans can be specifically designed for the woman’s body shape. Various garment construction and cosmetic finishing techniques can also be used to create an illusion of longer, leaner thighs, a lifted seat, and flattering curves at the hip and seat.

FIG. 16 shows a system of shaped fit sizing for pants. A shaped fit sizing system is targeted to specific consumers. For example, a specific target market for shaped fit is the U.S. women’s market. Other markets may be in other geographic areas, such as Asia and Russia. The shaped fit sizing system can be tailored to specific markets and populations. This will ensure the shaped fit sizing system will have sizings to accommodate the great majority of the consumers and body types in those markets.

The system in FIG. 16 can achieve shaped fit sizing for pants for a targeted population. The system has components to generate metrics upon which to classify pants having shaped fit sizes. Components include: selecting a population sample and collecting body measurement data for this sample. The collected body measurement data can include body measurements and digital body scans. This measurement data can be stored in, for example, a database, for subsequent analysis and correlation. This analysis determines a body measurement differential upon which body shape can be based. In a specific implementation, the selected differential is a low hip to high hip differential. The differential is graphed and partitioned, which forms the pants sizing categories or classifications. Based on the determined sizing categories, fabric patterns are created. The fabric patterns are used to manufacture pants with the shaped fit sizing.

In a specific implementation, there are three sizing categories, which are identified as shaped fit sizings A, B, and C. The sizings can be referred to by other names. For example, for Curve ID, the names are slight, demi, and bold. Or the shaped fit sizings may be referred to using different colors.

Another specific implementation, there is an additional shaped fit sizing D. For Curve D, this sizing name is supreme. Shaped fit sizing D is optional and may not be available in every target market. Depending on the demographics of a target population, this additional shaped sizing can ensure that greater numbers (e.g., a greater percentage) of consumers will fit the into the available shaped sizings. For example, in one marketplace, there may be people who do not fit size C, so they will need to buy size D clothes. However, in a different marketplace, there may not be any (or many) people who will fit size D, so size D clothes are not needed or sold there.

Target populations are typically divided geographically because clothing is usually sold on a geographical basis. So, there is a population of people where it is desirable to obtain shaped fit sizing for pants. Additionally, as desired to target the market and consumer better for better fit, this population may be divided by age, sex, ethnicity, or other parameters, or combinations of these.

For example, the population can be divided into geographic areas such as United States, Asia, and Russia. The population can include only females, girls and women. In other implementations, the population can include only men. Generally, men and women have different shapes so they are considered in separate population studies. Alternatively, the population may include the entire world, and the population divided up subsequently after some analysis by the system. Based on how the population is divided or organized, separate or independent sizing systems can be developed for the respective population (e.g., girls and women, men and women, and women in the U.S. and women in China).

The actual population size of an entire market is enormously large. For example, for females in the United States, the population size is roughly 150 million; in Europe, roughly 450 million; and in China, roughly 500 million. It is impractical to make measurements of every individual in the population.

So instead, a sample (1605) of the population is taken to reduce a number of measurements needed. Accurate results are desirable so the population sample should be sufficiently large to give good results which represent the entire population. In a specific implementation, for Curve ID, the population sample included over 60,000 women around the world.

Making measurements on the sample population sample can include setting up digital scanning booths at vari-
ous locations (e.g., shopping mall and airports) and scanning the bodies of the individuals and storing each scan with measurements, along with other pertinent information, in a database (such as stored on a computer hard disk). Data can also be collected by recording manual measurements and saving these into database. However, a digital scan of the body yields more information because a three-dimensional surface of the body will be recorded, not just some measurements at various points of the body (e.g., girth of waist).

With a body scan, any specific desired measurements can be made from that body scan (as if the person were actually present to take measurements). For example, not only will the girth of waist be available, the girth of waist at an offset 4 inches below the waist can be measured. Without the body scan, if the waist measurement were made manually, but the offset measurement was not made manually, then the offset measurement would not be available. The offset measurement might be estimated through a calculation, but this would generally not be as accurate as a measurement from the body scan.

In a specific implementation, the body measurement data included over 60,000 digital body scans of women. It should be appreciated that the number of body scans in a sample can vary. Generally, a larger sample size leads to increased precision in estimates of various properties of the population. In this specific implementation, the population sample included female subjects from the U.S., China, Japan, France, Germany, and Russia. The age of the subjects ranged from about 15-44 years old. In another specific implementation, the age of the subjects ranged from about 15-34 years old.

The body measurements are taken from randomly or quasi-randomly selected people in the target population. The subjects are randomly selected based on the demographic area and age groups that are targeted. In a specific implementation, the sample subjects included women from the U.S., China, Japan, France, Germany, and Russia in the 15-24 years old age bracket and the 25-34 years old age bracket. In another specific implementation, the sample further included women in the 35-44 years old age bracket for each of the countries.

In a specific implementation, the collected measurements include age, height, weight, and body dimensions such as girth measurements at specific points or locations on the body. Some or all the body scans may be collected by a third party. In a specific implementation, body scan collection centers have three-dimensional (3D) scanning equipment.

A three-dimensional scanner is a device that analyzes a real-world object (e.g., person or human being) to collect data on its shape. The collected data can then be used to construct digital, three-dimensional models. The three-dimensional scanner allows three-dimensional scans to be made based on the collected body measurement data.

These raw data measurements were stored in a database. The database can be read, accessed, analyzed, and processed by a computer system, which is hardware and software for processing and storing data. Some examples of computer system hardware include computer processors (e.g., multi-core processors), computer-readable medium, memory or nonvolatile memory on which the measurement data and software programs are stored. The nonvolatile memory may include mass disk drives, floppy disks, magnetic disks, optical disks, magneto-optical disks, fixed disks, hard disks, CD-ROMs, recordable CDs, DVDs, recordable DVDs (e.g., DVD-R, DVD+R, DVD-RW, DVD+RW, HD-DVD, or Blu-ray Disc), flash and other nonvolatile solid-state storage (e.g., USB flash drive), battery-backed-up volatile memory, tape storage, reader, and other similar media, and combinations of these.

FIG. 18 shows various points on a person, below a waist point, at which girth can be measured. The points include a natural waist, high hip, high hip, seat (or low hip), thigh, mid thigh, knee, calf, and ankle. Any or all these measurements may be included in the body scan data.

In an implementation, the natural waist refers to the location at which the body, and specifically the torso, bends (or creases or indents). The torso refers to the central part of the body (or the trunk), including the chest, abdomen, and pelvic region, extending from the bottom of the neck to the bottom of the pelvic region. Typically, the hips are part of the torso, since these are above the bottom of the pelvis (for many people).

The pelvic region is an upside-down triangular region includes the pelvic skeleton which has the two hip bones that connect the spine to the lower limbs, and the sacrum and coccyx (or tailbone) of the spine. The hip bones include an upper part of the hip bone referred to as the ilium, and a lower part of the hip bone referred to as the ischium. The ilium includes the two iliac crests, which form the prominent bones at the sides of the hip. The lower portion of the ischium of the hip bone is the ischium tuberosity, which protrude slightly at a base of the gluteal muscles (or buttocks). These are commonly referred to as the sitting bones.

So, when a person bends sideways, the point of the bend on the torso is the natural waist. This can be a reference point from which measurements are made. By using the same reference point on different people, this allows for a consistent measurement from person to person, regardless of what each person considers their waist (which can vary from person to person).

In another implementation, the natural waist refers to the narrowest point of a person’s torso or waist. A girth measurement of the natural waist will have the smallest girth relative to other points on the torso. For some people, this narrowest point of the person’s torso also is the location at which the torso bends or creases.

FIG. 19 shows some points at which differential girth body measurements can be measured on a person. These differential girth body measurements can be used as an indication of width, depth, and shape of a person. These differentials include the natural waist to high hip, natural waist to seat (or low hip), hi-high hip to seat, and high hip to seat. A differential is a difference between two lower body parameters. Other measurements include total rise and saddle depth. Any or all these differential measurements may be included in the body scan data, or calculated from the body scan data.

In an implementation, the seat or low hip refers a point of the person’s torso which is 8 inches (or other predetermined relative distance) below the natural waist. In another implementation, the seat or low hip refers to a point of the person’s torso which is the widest or fullest part (e.g., largest girth) of a person’s torso or hips or lower hips. For some people, the point of a person’s torso that is 8 inches below the natural waist will be the same as or equivalent to widest point of a person’s torso or hips. However, this can differ from person to person, and the widest point can vary depending on the natural waist for different people.
The differentials in FIG. 19 are in reference to the natural waist described above. The high hip is located about 4 inches (or about 10.2 centimeters) below the natural waist. The seat or low hip is typically located about 4 inches below the high hip or about 8 inches (or about 20.3 centimeters) below the natural waist.

Returning to FIG. 16, the collected body measurement data is analyzed 1615 to determine which of the numerous measurements taken and available correspond to body shape, and can be used as a basis for shaped fit sizing pants. FIG. 18 shows nine girth measurement points, and FIG. 19 shows four differential body measurements. There are many combinations of measurements to consider. These and other measurement points (not indicated) were considered.

The analysis, including statistical and mathematical calculations, found the low hip (or seat) to high hip differential correlates highly with body shape. The other differentials listed in FIG. 19 also correlate to body shape, but the low hip-high hip differential was selected. In alternative implementations, the shaped fit sizing system can use any of the other differentials—natural waist to high hip, natural waist to low hip, or hi-high hip to low hip.

To analyze the data and generate the charts, the components or subcomponents of the analysis and correlation component can include and be performed by a computer system. The computer system can include, for example, a computer screen to electronically display the graphs and charts. The computer system can include software programs stored in computer memory for performing (via a computer processor) the statistical analyses.

In a specific implementation, the result or output of analysis 1615 is the identification of low hip-high hip differential 1620 as indicative of body shape or body geometry. The low hip-high hip differential is used in Curve ID, where low hip is measured 8 inches from the natural waist and high hip is measured 4 inches from the natural waist. The differential may also be referred to as a shape index. Other names can be used.

For Curve ID, a difference between the high hip and low hip measurement is about 4 inches (i.e., 8 inches minus 4 inches). For shaped fit sizing system, the difference between the two body measurement points can vary. However, better accuracy and fit can be obtained when the body point differences are greater than about 3 inches. The body point differences can even be greater than the 4 inches used for Curve ID. Generally, smaller differences such as 0.5 inches or 1 inches of difference in the body points may not give as accurate a measure of body shape.

The selected body measurement differential 1617 for the target population is analyzed 1625. The analysis can include graphing the differential amounts for the target population to see a distribution of body shape. Further analysis can include raw body measurement charts, graded body measurement charts, measurement distribution graphs, comparative distribution graphs (e.g., comparing different age groups, different countries, different regions, different lifestyle groups, or combinations of these). The analysis can include statistical analyses and calculations of the data.

A distribution curve may be calculated using any demographic or combination of demographics of the human population. For example, depending upon the target market, a distribution curve may be calculated based on demographics such as gender (e.g., male and female), age bracket (e.g., 15-24 year olds and 25-34 year olds), geographic region (e.g., U.S., China, Japan, France, Germany, or Russia), or combinations of these.

Graph data 1625 is analyzed and partitioned 1630 to generate a shaped fit sizing system for pants 1635. Fabric patterns are created that correspond to the shaped fit categories 132. The pants are manufactured according to these fabric patterns.

An implementation has three shaped fit categories, each spanning 1.5 inches of differential. A first differential range (shaped fit size A or slight) is from about 2 inches to about 3.5 inches (about 5.1 centimeters to about 8.9 centimeters). A second differential range (shaped fit size B or demi) is from about 3.5 inches to about 5 inches (about 8.9 centimeters to about 12.7 centimeters). A third differential range (shaped fit size C or bold) is from about 5 inches to about 6.5 inches (about 12.7 centimeters to about 16.5 centimeters).

Based on graph 1625, this system of shaped fit categories with 1.5-inch ranges covers about 80 percent of the target population. However, it may be desirable to increase coverage. Therefore, an alternate implementation includes a fourth shaped fit category. This fourth differential range (shaped fit size D or supreme) is from about 6.5 inches to about 8 inches (about 16.5 centimeters to about 20.3 centimeters). With this additional shaped fit, the coverage of the system is over 80 percent of the target population.

The size of each differential range is not limited to a span of 1.5 inches. The differential range can depend in part on the stretch of the fabric used for the pants, the number of shape fit categories, the target population, and may other factors. For example, each shape fit category can span a differential of about 2 (or about 5.1 centimeters), 2.5 (or about 6.4 centimeters), 3 (or about 7.6 centimeters), 3.5 (or about 8.9 centimeters), or 4 (or about 10.2 centimeters) or more inches.

The curve may be partitioned or segmented into any number of differential ranges (e.g., more or fewer than three, two, five, six, or seven). Generally, the greater the number of partitions or ranges the more likely it is that a person will be able to find a pair of pants that fits the person’s shape more closely.

For example, the three shaped fit sizes described spans from 2 inches to about 6.5 inches, which is 4.5 inches of differential total. This range can be split into five shaped fit categories, each covering a 0.9 inches range (for symmetrically or identically sized ranges). However, this leads to having two additional shaped sizing categories, which compared to three sizing categories, complicates manufacturing and generally increases costs. Each additional sizing category can increase the cost to make the pants because for each garment waist size there is an additional shape fit size.

Thus, it will be desirable to identify and select groups of ranges that are most common and represent the desired coverage of the target market. In a specific implementation, there are at most three sizing classifications or three sets of differential ranges to achieve the desired coverage. In another specific implementation, there are at most four sizing classifications to achieve the desired coverage.

Although symmetrically or identically sized differential ranges have been described, a shaped fit sizing system of the invention can include asymmetrically or differently sized differential ranges. For example, the second differential...
range described above can be split into two ranges, such as one from 3.5 to 4.25 inches and another from 4.25 to 5 inches, while the first and third differential ranges remain the same size. In other implementations, there are categories that may not have a bounded range. For example, a first differential range can be about 3.5 inches (about 8.9 centimeters) or less. A second differential range can be from about 3.5 inches to about 5 inches (about 8.9 centimeters to about 12.7 centimeters). A third differential range can be about 5 inches (about 12.7 centimeters) or greater.

[0311] The 1.5-inch differential ranges can be for denim which is used in jeans. The size of each differential range also depends on the stretch of the fabric or material used for the pants. Generally, the greater stretch the material has, the larger the range can be since the material can stretch to accommodate larger shaped fit sizes. Material with less stretch may need smaller differential ranges, and therefore a greater number of categories.

[0312] In a specific implementation, there are at least three shaped fit categories. For a body measurement (e.g., a waist girth measurement), a different range of measurements for another body measurement (e.g., a seat or low hip) in each category can correspond to that body measurement. For example, for a waist girth measurement of 28 inches, a first range of a low hip girth measurement in a first shape category A (e.g., slight curve) can be from about 35 inches to about 37 inches. For the same waist girth measurement of 28 inches, a second range of the low hip girth measurement in a second shape category B (e.g., demi curve) can be from about 37 inches to about 39 inches. And for the same waist girth measurement of 28 inches, a third range of the low hip girth measurement in a third shape category C (e.g., bold curve) can be from about 39 inches to about 41 inches. The shape categories are not limited to the specific names presented.

[0313] A sample shape index chart is in Table B below. Once the shape index is known, the salesperson or consumer can look up the corresponding fit block or shaped fit sizing category. It should be understood that the invention is not limited to the specific shaped fit sizing categories, names of categories, and ranges presented. An index of the invention may have additional categories or ranges (not necessarily described in this application) or both, different categories or ranges which replace some of the categories or ranges presented, fewer categories or ranges or a subset of the categories or ranges presented, or any combination of these. Further, the categories or ranges in other implementations of the invention may not be exactly the same as the categories or ranges presented and may be modified or altered as appropriate for a particular application or based on the data or situation.

[0314] The categories may be named or referred to by any names or terms. In a specific implementation, the first, second, and third predetermined shaped sizing category for jeans can be referred to as slight curve, demi curve, and bold curve, or also, A, B, and C, respectively. In other implementations, the categories can be referred to for example, by numbers (e.g., 1, 2, and 3), by shapes (e.g., triangle, circle, and square), by colors (e.g., green, blue, and red), by a person’s name (e.g., Kate, Megan, and Jennifer), by metals (e.g., silver, gold, and platinum), by gems (e.g., ruby, emerald, and diamond), by body shape description (e.g., slender, hourglass, and pear) and by many others.

<table>
<thead>
<tr>
<th>Waist Measurement (inches)</th>
<th>First Shape Category A (e.g., Slight Curve)</th>
<th>Second Shape Category B (e.g., Demi Curve)</th>
<th>Third Shape Category C (e.g., Bold Curve)</th>
</tr>
</thead>
<tbody>
<tr>
<td>24</td>
<td>30.5-32</td>
<td>32.3-35</td>
<td>33.5-35</td>
</tr>
<tr>
<td>25</td>
<td>32-33.5</td>
<td>33.5-35</td>
<td>35-36.5</td>
</tr>
<tr>
<td>26</td>
<td>35.5-35</td>
<td>35.5-36</td>
<td>36.5-38</td>
</tr>
<tr>
<td>27</td>
<td>35-36.5</td>
<td>36.5-38</td>
<td>38-39.5</td>
</tr>
<tr>
<td>28</td>
<td>36.5-38</td>
<td>38-39.5</td>
<td>39.5-41</td>
</tr>
<tr>
<td>29</td>
<td>38-39.5</td>
<td>39.5-41</td>
<td>41-42.5</td>
</tr>
<tr>
<td>30</td>
<td>39.5-41</td>
<td>41-42.5</td>
<td>42.5-44</td>
</tr>
</tbody>
</table>

[0315] This chart has a first section of column corresponding to a first body measurement (e.g., waist girth), a section or column corresponding to a first range of a second body measurement (e.g., low hip girth) for the first predetermined shaped sizing category; a third section, adjacent to the second section, corresponding to a second range of the second body measurement for the second predetermined shaped sizing category; and a fourth section, adjacent to the third section, corresponding to a third range of the second body measurement for the third predetermined shaped sizing category.

[0316] Note that the ranges of the shape index overlap at specific measurements. For example, sizings A and B overlap at 32 inches. However, as desired, the chart can also be written not to include such overlaps. For example, sizing A can be up to 31.99 inches, B from 32 to 33.49 inches, C from 33.5 to 35 inches, and so forth.

[0317] To facilitate the manufacture of pants with shaped fit sizing 1635, fabric patterns 1632 are created based on the determined shaped fit categories 1630. The fabric patterns are patterns used for cutting of the material for the pants. Typically, there are about 10 to 15 patterns (which means there are 10 to 15 pieces of material) used for each shaped fit jean. After the pieces of material are cut based on the pattern, the pieces are sewn together. Additionally, rivets may be used to hold some pieces (e.g., pocket openings) together, which increases durability and strength. See U.S. Pat. No. 139,121, issued on May 20, 1873 to Levi Strauss & Co.

[0318] For the Revel system, patterns for the coating are created based on the determined shaped fit categories 1630. Patterns for the coating are used for applying a coating mixture to a surface of the material according to the predetermined or desired shape. The coating mixture can be applied to the surface that will become the inside surface of the pants which faces toward the person’s body. Using the patterns, the coating mixture can be applied to the material, in a shape of the pattern, before the material is cut into pieces based on the fabric patterns. So, the coating is applied to an uncut piece of material, allowed to dry, and then the material is then marked up, cut, or both, according to the fabric pattern. The resulting piece of material will be in the shape of the fabric pattern, and will include coating that is in the shape of the coating pattern. After the pieces of material are cut based on the pattern, the pieces are sewn together. The coating will be on the inside surface of the pants, and are not visible from an outside of the pants.

[0319] Alternatively, the coating mixture can be applied to the material, in the shape of the pattern, after the material is cut into pieces based on the fabric patterns. So, using the coating pattern, the mixture can be applied to pieces of the material. In a specific implementation, the shape of the coat-
ing is screen printed onto the cut pieces. After the coating is cured, the pieces of material are sewn together to form pants or other garments. The coating will be on the inside surface of the pants, and is not visible from outside of the pants.

[0320] In a specific implementation, fabric patterns, coating patterns, or both are generated by an engineer (who may be referred to as a “pattern engineer”) with a computer aided design (CAD) tool. The engineer uses the tool to create individual pattern components (e.g., 10-15 individual pattern pieces). These pattern components are two-dimensional patterns. For example, Assyst GmbH, AutoTextrics, OptiTex, Bluewater Software, Gerber Scientific, Inc., and Quest CAD/CAM are manufacturers of apparel CAD software tools. With an apparel CAD tool, 2D fabric patterns are developed. The tool may also include a 3D visualization component the may used to show the design from a three-dimensional perspective.

[0321] To ensure the fit is good, pants can be manufactured according to the computer generated patterns. The pants have a pattern of the coating on the inner surface of the pants, in the shape of the coating pattern. The coating is applied in areas of the pants corresponding to the areas of the person’s body that need shaping. Then an actual person can try on the pants. Based on the results, the engineer can make further modifications to the computer generated patterns. This process can be repeated as needed to ensure good fit and a proper look.

[0322] Separate fabric patterns and coating patterns are created for each pair of jeans of a particular size and shape category. For example, there is a first set of patterns (with 10-15 individual pieces of material and about 4 or more individual patterns for the coating) for a size 27 jean in the slight curve category. There is a second set of patterns (with 10-15 individual pieces of material and about 4 or more individual patterns for the coating) for a size 27 jean in the demi curve category. There is a third set of patterns (with 10-15 individual pieces of material and about 4 or more individual patterns for the coating) for a size 27 jean in the bold curve category. For each curve category, sizings can be according to waist size (e.g., size 23 to 34 or greater), with different inseam sizes (e.g., 28 inches, 30 inches, 32 inches, 33 inches, or greater). Then there would be 33 patterns (for fabric and coating) for 11 waist sizes in three shaped fit categories. Sizings can also be according to a letter sizing system (e.g., XS, S, M, L, XL, XXL, or 3X), a numerical sizing system (e.g., 0, 6, 12, 18), or a combination of a letter sizing system and the number of the letter (e.g., 3XL, or 4M), or a numerical sizing system (e.g., size 00, 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 18, 20, 22, 24, 26, 28, 30, 32, or greater).

[0323] Jeans with the same waist size are made with different inseam measurements to accommodate people with longer or shorter legs. Jeans also are made according to different cuts such as skinny, straight, skinny boot, boot cut, flare, and others. These provide different styles of jeans for different consumer preferences. These may use different patterns. Since the inseam sizes and boot cuts do not necessarily affect the fit in the seat area (which is sometimes called the top block), some of the pattern pieces or portions or pattern pieces may be similar in the same as jeans with different inseam or boot cuts. The top block is a cut of the jean from the waistband through the hips and butt. Therefore, the top block can remain the same or about the same for some jeans, while the inseam and leg shapes or leg cuts will differ.

[0324] The patterns for the pieces are designed to facilitate shaped fit sizing. So for a single size (e.g., size 27) of jeans in the three different shaped fits, the patterns will differ to achieve the desired shaped fit. One pattern piece for jeans is the waistband. In a specific implementation, a difference between waistbands for one shaped fit (e.g., slight) and a curvier shaped fit (e.g., bold) is that the two-dimensional (2D) waistband pattern is more arced or curved.

[0325] For example, for the slight curve (e.g., size 27), a waistband top is about 31 inches while a waistband bottom is about 31.25 inches, which is about a 0.75-inch difference. In comparison, for the bold curve (e.g., size 27), a waistband top is about 28 inches while a waistband bottom is about 29.5 inches, which is about 1.5 inch difference. The greater this difference, the greater arc or curve in waistband pattern. This is a reason why the bold curve waistband pattern piece is more curved than slight curve waistband pattern piece. So, for jeans in the bold curve category, the more curved waistband can address the problem of a gaping waistband that many curvy women have with typical jeans. This can happen when dimensions of jeans are increased proportionally with increase in the waist size. Therefore, the sizings do not account for a woman more disproportionate measurements, such as having wide hips and a narrow waist.

[0326] The patterns for the coating are designed to facilitate shaped fit. So for a single size (e.g., size 27) of jeans in the three different shaped fits, the coating patterns will differ to achieve the desired shaped fit. One coating pattern is for a panel of coating (i.e., shaped coating) that is applied to the back of the jeans at the upper thigh and hip area, as in FIG. 31B. The coating does not cover a buttocks region. Generally, one pattern can be created for a right leg panel, and a second pattern created for the left leg panel. However, it can be more efficient to create a single pattern for each leg, and then to create the panel for the other leg, the pattern can be flipped.

[0327] FIG. 4 shows some examples of patterns for the coating for the inside surface of front and back sides of jeans. Once applied, the coating is not visible from an exterior of the jeans. There are two front patterns 402 and 404 for front sections of the coating. The first pattern 402 is for forming and applying a first section of coating on a right leg portion on the front inside surface of jeans. The second pattern 404 is for forming and applying a second section of the coating on a left leg portion on the front inside surface of jeans. As discussed above for FIG. 15A, the first and second sections can join together (or meet) at a crotch point 420 of the jeans.

[0328] Each pattern for the first and second sections can be formed by at least four edges: an outer edge 313, an inner edge 315, an upper edge 321, and a lower edge 323. The outer edge can extend along an outer seam of the jeans from about a hip area to a mid-thigh area. The inner edge can extend from the crotch point along an inner seam of the jeans to an upper thigh. The outer edge can be longer than the inner edge.

[0329] The upper edge is between the inner and outer edges and connects the two edges. In a specific implementation, a width 410 of the first pattern for the first section of coating from the inner edge to the outer edge is about 8.25 inches. A length 412 of the first pattern, at a narrowest point, from the upper edge to the lower edge is about 6.5 inches. Once applied to a leg portion of the jeans, the upper edge extends from the outer seam of the jeans at the hip area to the crotch point. In a specific implementation, the upper edge includes first upper edge portion 321a and second upper edge portion 321b. The first upper edge portion is closest to the outer edge, and the second edge portion is closest to the inner edge. The first upper edge portion can extend in a straight line or approxi-
ately in a straight line along a hip region. The second upper edge portion can have a curved shape that extends from the first upper edge portion to the crotch point. In other implementations, the upper edge can have one, two, three, four, five, or more edge portions.

[0330] In a specific implementation, a length of the first upper edge portion of the upper edge is from about 3 inches to about 3.25 inches. A length of the second upper edge portion is about 8 inches. Once applied to jeans, coating at the first upper edge portion corresponds to a hip area of the person, and can shape the sides of the hips. This can prevent the sides of the hips from bulging out and sagging. The area of coating can smooth out the hips and create an attractive hip contour. In some implementations of pants having front pockets, the pockets can cover up the hip areas from view, as seen in FIG. 3A.

[0331] The lower edge is between the inner and outer edges and connects the two edges. Once applied to a leg portion of the jeans, in a specific implementation, the lower edge extends from the outer seam of the jeans at about the mid-thigh area to the inner seam at a first point below the crotch point. In a specific implementation, the lower edge includes a first lower edge portion 323a and a second lower edge portion 323b, and the first lower edge portion is between the second lower edge portion and the outer edge. The first lower edge portion can extend in a straight line or approximately in a straight line from the outer seam to a front side of the leg portion. The second lower edge portion can have a curved shape that extends from the first lower edge portion up and across the front of the upper thigh to the first point at the inner seam. In other implementations, the lower edge can have one, two, three, four, five, or more edge portions.

[0332] In a specific implementation, a length of the inner edge is about 4.5 inches. Once applied to jeans, the coating at the inner edge corresponds to the inner thigh of the person and can hold the inner thigh in toward the body by compressing the inner thighs inwards. This can prevent the inner thighs from bulging out and rubbing against each other. These regions of the coating can smooth out the inner thighs and create a more slimming thigh contour.

[0333] In a specific implementation, a length of the outer edge is from about 11 inches to about 11.5 inches. Once applied to jeans, the coating at the outer edge corresponds to the outer thigh of the person, and can shape the outer thigh. These regions of the coating can smooth out the outer thighs and create a more slimming, elongated thigh contour.

[0334] FIG. 4 shows some examples of patterns for the back coating for the inside surface of a back side of jeans. There are two back patterns 406 and 408 for back sections of the coating. The first pattern 406 is for forming and applying a first section of coating on a right leg portion on the back inside surface of jeans. The second pattern 408 is for forming and applying a second section of the coating on a left leg portion on the back inside surface of jeans. As discussed above for FIG. 15B, the first and second sections can join together (or meet) at a first point (FIG. 15B, reference number 1552) along a back center seam (FIG. 15B, reference number 1542) of the jeans.

[0335] A pattern for the first and second sections can be formed by at least four edges: an outer edge 341, an inner edge 342, an upper edge 343, and a lower edge 344. The outer edge can extend along an outer seam of the jeans from about a hip area to a mid-thigh. The inner edge can extend from the first point along an inner seam of the jeans to an upper thigh. The outer edge can be longer than the inner edge.

[0336] The upper edge is between the inner and outer edges and connects the two edges. In a specific implementation, a width 414 of the first pattern for the first section of coating from the inner edge to the outer edge is from about 11 to about 11.5 inches. A length 416 of the first pattern, at a narrowest point, from the upper edge to the lower edge is about 4 inches. Once applied to a leg portion of the jeans, the upper edge extends from the outer seam of the jeans at the hip area, curves around the buttocks region, to the first point. As shown in FIG. 3B, the upper edge extends around the curvature of the buttocks cheek (i.e., gluteus) 350 while avoiding (i.e., does not cover) the buttocks region. The upper edge curves along a perimeter of the buttocks cheek. The back sections of coating can support a portion of the underside of the buttocks, and push the buttocks upwards and out. The buttocks cheeks are not covered or compressed by the back coating.

[0337] In a specific implementation, the upper edge includes a first upper edge portion 343a, a second upper edge portion 343b, and a third upper edge portion 343c. The first upper edge portion is closest to the outer edge, the third upper edge portion is closest to the inner edge, and the second upper edge portion is between the first and third upper edge portions. The first upper edge portion can extend in a straight line or approximately in a straight line along a hip region. The second upper edge portion can have a curved shape that extends from the first upper edge portion, along a curvature of the buttocks to the first point. The third upper edge portion extends along the back center seam from the first point at a point at the base of the buttocks. In other implementations, the upper edge can have one, two, three, four, five, or more edge portions.

[0338] In a specific implementation, a length of the first upper edge portion of the upper edge is about 2.25 inches. A length of the second upper edge portion is about 10.5 inches. A length of the third upper edge portion is from about 3.75 to about 4 inches. Once applied to jeans, coating at the first upper edge portion corresponds to a hip area of the person, and can shape the sides of the hips. This can prevent the sides of the hips from bulging out and sagging. The area of coating can smooth out the hips and create an attractive hip contour.

[0339] The lower edge is between the inner and outer edges and connects the two edges. Once applied to a leg portion of the jeans, in a specific implementation, the lower edge extends from the outer seam of the jeans at about the mid-thigh area to the inner seam at a second point below the first point. In a specific implementation, the lower edge includes a first lower edge portion 344a and a second lower edge portion 344b, and the first lower edge portion is between the second lower edge portion and the outer edge. The first lower edge portion can extend in a straight line or approximately in a straight line from the outer seam to a back side of the leg portion. The second lower edge portion can have a curved shape that extends from the first lower edge portion up and across the back of the upper thigh to the second point at the inner seam. In other implementations, the lower edge can have one, two, three, four, five, or more edge portions. In a specific implementation, a length of the first lower edge portion of the lower edge is about 5 inches, and a length of the second lower edge portion of the lower edge is about 9.25 inches.

[0340] In a specific implementation, a length of the inner edge is about 4.5 inches. Once applied to jeans, the coating at
the inner edge corresponds to the inner thigh of the person and can hold the inner thigh in toward the body by compressing the inner thighs inwards. This can prevent the inner thighs from bulging out and rubbing against each other. These regions of the coating can smooth out the inner thighs and create a more slimming thigh contour.

[0341] In a specific implementation, a length of the outer edge is from about 11 inches to about 11.5 inches. Once applied to jeans, the coating at the outer edge corresponds to the outer thigh of the person, and can shape the outer thigh. These regions of the coating can smooth the outer thighs and create a more slimming, elongated thigh contour.

[0342] In a specific implementation, a pattern for a front section of coating for jeans, as shown in FIG. 4, has the following dimensions: a length of a first edge 313 is about 11.25 inches; a length of a second edge 315 is about 4.5 inches; a first portion 321a of a third edge is about 3 inches; a second portion 321b of the third edge is about 8 inches; a first portion 323a of a fourth edge is about 2.75 inches; and a second portion 323b of the fourth edge is about 7.5 inches. A width 410 of the front section, from the second edge to the first edge is about 8.25 inches, and a length 412, at a narrowest position, between the third and fourth edges is about 6.5 inches.

[0343] In another specific implementation, a pattern for a back section of coating for jeans, as shown in FIG. 4, has the following dimensions: a length of a first edge 341 is about 11.5 inches; a length of a second edge 342 is about 4.5 inches; a first portion 343a of a third edge is about 2.25 inches; a second portion 343b of the third edge is about 10.5 inches; a third portion 343c of the third edge is about 4 inches; a first portion 344a of a fourth edge is about 3 inches; and a second portion 344b of the fourth edge is about 9.25 inches. A width 414 of the back section, from the second edge to the first edge is about 11.5 inches, and a length 416, at a narrowest position, between the third and fourth edges is about 4 inches.

[0344] In a specific implementation, a difference between patterns of coating for one shaped fit (e.g., slight) and a curvier shaped fit (e.g., bold) is that an upper edge 321b of the pattern for a front coating and an upper edge 343b of the pattern for a back coating is more arced or curved for the curvier shaped fit. A difference between back panels of coating for one shaped fit (e.g., slight) and a curvier shaped fit (e.g., bold) is that a width 414 of the back, a width 414 of the back pattern, or both, is greater for a more curvaceous shaped fit.

[0345] For a single size (e.g., size 27) of jeans in the three different shaped fits, the different shape of the coating patterns can create a desired shaped fit that is engineered to shape and flatter the natural curves of each person. Pants 135 having shaped fit sizing A, B, and C (and optionally D) that fit body types with body measurement differentials 117 as discussed above are designed and manufactured. For example, each shaped fit sizing will have a fabric pattern dimensions different from other jeans. A size 28 jean with a 30 inseam will have slight, demi, and bold versions. Each of the slight, demi, and bold versions will have different seat shaping, though the size may be the same.

[0346] For example, pants with the bold curve shape are curvier than the demi curve, which is curvier than the slight curve. This means that for a given size for the jeans, the demi has more shape from the hip to the seat area than the slight, and the bold has even more shape than the demi.

[0347] FIGS. 11A-C show front views of three different body shape curve profiles, slight curve, demi curve, and bold curve. FIG. 11A shows a person who fits into a first fit category A of pants (e.g., slight curve). This body type is associated with a first differential range, where the differential is between a first girth measurement on the body (e.g., a low hip, a seat, or otherwise a widest point of the hips) and a second girth measurement on the body (e.g., a natural waist, a high hip, or a narrowest point of the waist). In a specific implementation, the differential is a low hip-high hip differential that ranges from about 2 inches to about 3.5 inches (about 5.1 centimeters to about 8.9 centimeters). A person with this shape may be described as relatively straight with a flatter seat.

[0348] FIG. 11B shows a person having a second body shape profile, who would fit into a second fit category B of pants (e.g., demi curve). This person is wearing the same size (e.g., size 27) as the person in FIG. 11A, but the person in FIG. 11B can have more curvaceous hip, seat, and thigh areas. This body type is associated with a second differential range, where the differential is between a first girth measurement on the body (e.g., a low hip, a seat, or otherwise a widest point of the hips) and a second girth measurement on the body (e.g., a natural waist, a high hip, or a narrowest point of the waist). In a specific implementation, the differential is a low hip-high hip differential that ranges from about 3.5 inches to about 5 inches (about 8.9 centimeters to about 12.7 centimeters). A person with this shape may be described as evenly proportioned. For example, in comparing FIGS. 11A and 11B, the seat of the second body type (FIG. 11B) is more curvy than the seat of the first body type (FIG. 11A).

[0349] FIG. 11C shows a person having a third body shape profile, who would fit into a third fit category C of pants (e.g., bold curve). This person is wearing the same size (e.g., size 27) as the persons in FIGS. 11A and 11B, but the person in FIG. 11C can have more curvaceous hip, thigh and seat areas. This body type is associated with a third differential range, where the differential is between a first girth measurement on the body (e.g., a low hip, a seat, or otherwise a widest point of the hips) and a second girth measurement on the body (e.g., a natural waist, a high hip, or a narrowest point of the waist). In a specific implementation, the differential is a low hip-high hip differential that ranges from about 5 inches to about 6.5 inches (about 12.7 centimeters to about 16.5 centimeters). A person with this shape may be described as full figured or hourglass-shaped. For example, in comparing FIGS. 11A and 11C, the seat of the third body type (FIG. 11C) is more curvy than the seat of the first body type (FIG. 11A). The hourglass figure is wider laterally (side to side), while the full seat is also wider front to back.

[0350] In another specific implementation, there is a fourth body type (not shown) that is associated with a fourth differential range, i.e., has a low hip-high hip differential that ranges from about 6.5 inches to about 8 inches (about 16.5 centimeters to about 20.3 centimeters). The fourth shaped fit category may be referred to as a supreme curve. The supreme curve is more curvy than the bold curve.

[0351] FIGS. 12A-C show back views of three different body shape curve profiles, slight curve, demi curve, and bold curve. FIG. 12A shows a person who fits into the first fit category A of pants (e.g., slight curve). This body type is associated with the first differential range, as described above for FIG. 11A. In a specific implementation, the differential is a low hip-high hip differential that ranges from about 2 inches to about 3.5 inches (about 5.1 centimeters to about 8.9 centi-
meters). A person with this shape may be described as relatively straight with a flatter seat.

[0352] FIG. 12B shows a person having the second body shape profile, who would fit into the second fit category B of pants (e.g., demi curve). This person is wearing the same size (e.g., size 27) as the person in FIG. 12A, but the person in FIG. 12B can have more curvaceous hip, seat, and thigh areas. This body type is associated with the second differential range, as described above for FIG. 11B. In a specific implementation, the differential is a low hip-high hip differential that ranges from about 3.5 inches to about 5 inches (about 8.9 centimeters to about 12.7 centimeters). In comparing FIGS. 12A and 12B, the seat of the second body type (FIG. 12B) is more curvy than the seat of the first body type (FIG. 12A).

[0353] FIG. 12C shows a person having the third body shape profile who would fit into the second fit category C of pants (e.g., bold curve). This person is wearing the same size (e.g., size 27) as the persons in FIGS. 12A and 12B, but the person in FIG. 12C can have more curvaceous hip, thigh and seat areas. This body type is associated with the third differential range, as described above for FIG. 11C. In a specific implementation, the differential is a low hip-high hip differential that ranges from about 5 inches to about 6.5 inches (about 12.7 centimeters to about 16.5 centimeters). In comparing FIGS. 12A and 12C, the seat of the third body type (FIG. 12C) is more curvy than the seat of the first body type (FIG. 12A).

[0354] Referring back to FIG. 2, various techniques can be used on the outside of the pants to visually create a more fitted and shaped appearance when the pants are worn. Seaming and construction techniques can be used to create the look of a shapely silhouette. Cosmetic finishing can be used to highlight naturally attractive features of the person's body, while deemphasizing some unflattering areas of the body. Similar to the coating on the inside of the jean, the construction and finishing techniques are designed to facilitate the appearance of a customized, shaped fit. So for a single size (e.g., size 27) of jeans in the three different shaped fits, the construction and finishing can differ to achieve the desired shaped fit look. Different techniques can be used for the front side of the pants and the back side of the pants. The seaming and construction techniques and cosmetic finishing described below is optional and can be omitted in some implementations.

[0355] Generally, for jeans construction, a durable, relatively heavyweight thread is used for the seams that is a contrasting color to the denim fabric. For example, some seams of blue jeans can have a yellow, orange, or gold color. These seams can be visible on the outside of the jeans, even from a far distance. These seams can be functional (e.g., hold two pieces of denim together), aesthetic (e.g., a stitch pattern that is indicative of a particular brand or manufacturer), or both. The seams can be adjusted in the construction of the jeans to provide a more customized fit for people of different body shapes.

[0356] An aspect of the system of the invention is the use of seams on the outside of jeans to create a contoured and flattering appearance. FIG. 20A shows a specific implementation of seaming and construction techniques applied to a front side of jeans. From a front side of the jeans, slightly forward-placed side seams 360 using a top stitching can create a long continuous line down the outside of each leg. This can draw the eye inward to visually create a narrower silhouette. Curved seams 112 that follow the edges of the front pockets (e.g., front curved pocket scoops) can draw the eye up to the waist and away from the widest part of the hips. The positioning of front inner pocket seams 110 can draw the eye away from the stomach and hips and up to the waist. Further, a coin pocket can be omitted to provide less bulk and create a smooth silhouette.

[0357] FIG. 20B shows a specific implementation of seaming and construction techniques applied to a back side of jeans. From a back view of the jeans, a riser seam 114 can be curved to physically lift the seat and also to visually create a shapely or deemphasized seat depending on the shaped fit category. Further, the addition of inset riser panels 118 can physically smooths the lines of the body.

[0358] The placement and size of the back pockets 116 can draw attention to the seat and hips. For a single size (e.g., size 27) of jeans in the three different shaped fits, the size and placement will differ to achieve the desired shaped look. For example, jeans in a slight curve category can have back pockets that can be subtly curved, angled, placed higher up, or any combination of these to provide shape for a person with a flatter seat. In contrast, for jeans in a bold curve category, to minimize appearance of a fuller behind and wide hips, the back pockets can be angled, placed higher up on the seat, or both, to draw the eye up toward the waist. The back pockets can have a curved back pocket stitch 2010 that follows the natural curved shape of the seat. This can help emphasize natural curves on a person who may have a flatter seat.

[0359] The addition of darting (not shown) at the back of the jeans can eliminate drag lines (e.g., wrinkles, folds, or puckering of the material) and visually lift the seat. For a person with a fuller and rounder seat, a flat piece of material will not contour the curved shape of the seat as well as a piece of material that has darts. Darts are folds sewn into fabric to help provide a three-dimensional shape to a garment. The inner front pocket can have panels and seaming to control and smooth the stomach. For example, the inner pocket material can be reinforced with additional layers of material. The positioning of the material corresponding to the knee region and width of this material can be adjusted based on the shaped fit category to decrease drag lines at the knee.

[0360] An aspect of the system of the invention is the use of cosmetic finishing techniques on the outside of jeans to visually create a contoured and sculpted look. From a front side of the jeans, whiskers (e.g., straight or angled) can be added to the front of the hips near the front pocket region. Whiskers are prefabricated fade lines or creases that create a broken-in and worn look in the denim at the front pocket area. Jeans with a skinny or tight fit tend to have tighter, straighter whiskers, while looser jeans can have wider, more angled whiskers.

[0361] To give new jeans a broken-in appearance, the jeans can be blasted with sand in areas where wear would occur naturally. Another technique is to use enzymes to wash, or a laser technique (e.g., to burn in wear marks and patterns) the jeans in the desired areas to create a faded, worn look. These techniques can lighten the denim, and lighter areas will draw attention to that body part. In some implementations, the addition of highlights to the center front leg and low lights toward the inner and outer thigh to visually slim and elongate the hips and thighs.

[0362] Further, positioning of the knee is raised up on the front of the jeans to lengthen the leg. Typically, there are characteristic wear marks (e.g., abrasion and fading) at the knee area. These marks can be shifted up higher on the front of the jeans legs to visually create a look of longer legs. In
some other implementations, the addition of downward pointing chevrons on the inner and outer thigh can create a slimming visual.

[0363] From a back side of the jeans, the addition of highlights under the seat can create a lifted seat look. The edges of the highlighted area can be softened so that this lighter area gradually darkens up and away from the seat.

[0364] Similar to the coating on the inside of the jean, finishing techniques are designed to facilitate the appearance of a customized, shaped fit. Cosmetic finishing techniques can be applied differently for various body shapes. Where there are several shaped categories of fit, a woman with a less curvy shape may want to emphasize her natural curves while a woman with a more curvy shape may want to hide or de-emphasize those same curves on her body. So for a single size (e.g., size 27) of jeans in the three different shaped fits, the construction and finishing can differ to achieve a customized shaped fit look.

[0365] FIGS. 11A-11C show specific implementations of various cosmetic finishing techniques that can be applied to the front of shaped fit jeans to create a shaped silhouette. These figures show front views of three different body shape curve profiles, slight curve, demi curve, and bold curve. FIG. 11A shows a person who fits into a first body shape profile 1110 (e.g., slight curve). This body type is associated with a first differential range, as described above, where the differential is between a first girth measurement on the body (e.g., a low hip, a seat, or otherwise a widest point of the hips) and a second girth measurement on the body (e.g., a natural waist, a high hip, or a narrowest point of the waist). A person with this shape may be described as relatively straight with a flatter seat. For jeans in the slight curve category, angled whiskers 1115 are added at such an intensity to accentuate the curve of the hip.

[0366] FIG. 11B shows a person having a second body shape profile 1120, who would fit into a second fit category B of pants (e.g., demi curve). This person is wearing the same size (e.g., size 27) as the person in FIG. 11A, but the person in FIG. 11B can have more curvaceous hip, seat, and thigh areas. This body type is associated with a second differential range as described above. For the demi curve category, the angle and intensity of whiskers 1125 compliments the curve of the hip. Darker shading (e.g., low lights) 1137 can be added to the inner and outer thighs of jeans in all fit categories to visually slim and lengthen the thighs.

[0367] Abstraction patterns (e.g., highlights) 1143 and 1141 can be added to the front narrow portion of the thigh to create a slimmer and elongated looking thigh. The abrasion pattern can be shortened for each shape category, all shape categories, or any combination of shape categories. The shortened abrasion pattern can be added to visually lengthen the leg.

[0368] FIG. 11C shows a person having a third body shape profile 1130, who would fit into a third fit category C of pants (e.g., bold curve). This person is wearing the same size (e.g., size 27) as the persons in FIGS. 11A and 11B, but the person in FIG. 11C can have more curvaceous hip, thigh and seat areas. This body type is associated with a third differential range as described above. For the bold curve category, the angle and intensity of whiskers 1135 deemphasize the widest part of the hips. Horizontal whiskers can be eliminated 1132 from the bold curve category, since horizontal lines can draw attention to the widest part of the hips. Subtle wear characteristics 1134 on the front side of the jean can deemphasize the front hip area.

[0369] Cosmetic finishing techniques can be applied to the back of the jeans. FIGS. 12A-12C show specific implementations of various cosmetic finishing techniques that can be applied to the back of shaped fit jeans to create a shaped silhouette.

[0370] Abrasion patterns 1141 can be added to jeans of all fit categories along the rounded portions of the seat to enhance the curves of the seat. The size and positioning of the abrasion pattern can vary with each shape category to accommodate different body shapes. Low lights 1137 can be added at the seat region (e.g., along back rise seam) to de-emphasize larger curves. The darker shading can be added to the periphery of the abrasion pattern to create a gradual, receding effect. For example, more low lights can be added in the more curvy shape categories (e.g., bold curve, and supreme curve) to more greatly de-emphasize the widest portions of the seat.

[0371] FIG. 17 shows a system for fitting a person to pants having shaped fit sizing. Jeans with shaped fit sizing are available to consumers or customers 1705 through various channels. A channel for selling and making jeans available are stores. For example, Levi's Curve ID products are available at Levi retail stores (e.g., San Francisco) or other retailers such as Macy's, J. C. Penny, and Kohl's (which may be referred to as wholesalers). A channel for selling and making jeans available on-line are Internet and Web sites.

[0372] A shape measuring tool 1710 is used to fit the consumer. In a store, a salesperson can use the shape measurement tool to measure the consumer, and find which of the shaped fit sizing categories (e.g., A, B, or C) the consumer falls within. Two girth measurements 1711 and 1712 are made. A calculation 1715 is made that indicates a shape index 1717. With the shape index, the consumer will be able to determine their shaped fit pants classification or category 1720. The consumer can choose the jeans 1635 with the appropriate shaped fit sizing.

[0373] Table C below provides a specific example of a flow for making different measurements 1710 and determining a shape index 1715. A specific implementation of the fit system of the invention is the Levi's Curve ID® system. It should be understood that the invention is not limited to the specific flows and steps presented. A flow of the invention may have additional steps (not necessarily described in this application), different steps which replace some of the steps presented, fewer steps or a subset of the steps presented, or steps in a different order than presented, or any combination of these. Further, the steps in other implementations of the invention may not be exactly the same as the steps presented and may be modified or altered as appropriate for a particular application or based on the data or situation.

<table>
<thead>
<tr>
<th>TABLE C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step 1</td>
</tr>
<tr>
<td>Step 2</td>
</tr>
<tr>
<td>Step 3</td>
</tr>
</tbody>
</table>

[0374] For steps 1 and 2, the shape measuring tool used can include a measuring tape or tape measure. This measuring tape can have a relatively narrow strip of flexible material with ruled markings in units such as inches (U.S. customary units) or centimeters (metric or SI). The measuring tape is flexible to
conform to the person being measured and can be wrapped around a person’s girth or circumference.

[0375] As discussed above, a reference point used for the measurements is the natural waist is the point at which the person can bend his or her body (i.e., the point at the waist where the body creases when leaning to one side). The natural waist can also be a point where the waist is most narrow. The high hip position is located about 4 inches (about 10.2 centimeters) down from the person’s natural waist. The low hip or seat is located about 4 inches down from the high hip, or about 8 inches down from the person’s natural waist. The low hip or seat can also be the widest part of the hips.

[0376] For step 3, shape index 1717 is a differential which is a result of subtracting first girth measurement 1711 from second girth measurements 1712. The value of the shape index (or differential) identifies the shaped fit category (A, B, or C) of pants for the user. The subtraction in step 3 can be done by the salesperson. Or the subtraction may be performed using a computer processor, such as in an electronic calculator or a computer (e.g., Web site performs calculation for on-line consumer). The shape index is relatively easy and straightforward to calculate.

[0377] For example, if the determined shape index is in a range from about 2 inches to about 3.5 inches (about 5.1 centimeters to about 8.9 centimeters), the shaped fit sizing will be the first fit category A (e.g., slight curve). If the determined shape index is in a range from about 3.5 inches to about 5 inches (about 8.9 centimeters to about 12.7 centimeters), the shaped fit sizing will be the second fit category B (e.g., demi curve). If the determined shape index is in a range from about 5 inches to about 6.5 inches (about 12.7 centimeters to about 16.5 centimeters), the shaped fit sizing will be the third fit category C (e.g., bold curve).

[0378] As an example, a person measures to have a high hip girth of 28 inches and a low hip girth of 34 inches. A difference between the high hip and low hip is 34 inches minus 28 inches, which is 6 inches. This corresponds to fit category C (e.g., bold curve).

[0379] In other implementations, a differential is taken between two girth measurements at other parts of the body as described above for FIG. 4. In a specific implementation, a differential is taken between a first girth measurement of the natural waist, and a second girth measurement of the low hips or seat. If the determined shape index is in a range from about 2 inches to about 5 inches (about 5.1 centimeters to about 12.7 centimeters), the shaped fit sizing will be the first fit category A (e.g., few curves). If the determined shape index is in a range from about 6 inches to about 9 inches (about 15.2 centimeters to about 22.9 centimeters), the shaped fit sizing will be the second fit category B (e.g., proportional curves). If the determined shape index is in a range from about 10 inches to about 13 inches (about 25.4 centimeters to about 33 centimeters), the shaped fit sizing will be the third fit category C (e.g., hourglass curves).

[0380] In a specific implementation, a differential is taken between a first girth measurement of the natural waist, and a second girth measurement of the low hips or seat. If the determined shape index is in a range from about 0 to about 8.7 inches (about 0 to about 22 centimeters), the shaped fit sizing will be the first fit category A (e.g., few curves). If the determined shape index is in a range from about 8.7 inches to about 11 inches (about 22 centimeters to about 28 centimeters), the shaped fit sizing will be the second fit category B (e.g., proportional curves). If the determined shape index is greater than about 11 inches (about 28 centimeters), the shaped fit sizing will be the third fit category C (e.g., hourglass curves).

[0381] These fit categories are for off-the-shoulder pants or jeans, which have been previously manufactured according to specifications for the shaped fit sizing categories. This is not custom tailoring because the person’s measurements are made after the pants have already been made. The measurements are to perform a fitting of the person to the predetermined shaped fit categories or classifications.

[0382] As previously described, optionally, there can be a shaped fit category D (e.g., supreme curve), which is fit for a shape index or differential of about 6.5 inches and about 8 inches (about 16.5 centimeters to about 20.3 centimeters). Also, note that the range for shaped fit category A starts at 2. However, if the consumer were to measure under 2 inches (i.e., 0 to 3.5 inches), the consumer can be fitted to category A pants (e.g., slight curve).

[0383] In some cases, a person’s shape index may be at the lower or upper limit of a range. For example, the person’s shape index may be about 3.5 inches. In this specific implementation, the person may be provided with pants having shaped fit sizing A, pants having shaped fit sizing B, or both pairs of pants. As another example, the person’s shape index may be about 5 inches. In this specific implementation, the person may be provided with pants having shaped fit sizing B, shaped fit sizing C, or both pairs of pants.

[0384] In alternate system implementations, the shape index may be the result of other mathematical computations, not merely subtracting. For example, the calculation may include adding the two measurements. The calculation may include taking a ratio (division) of the two measurements. For example, a ratio of shape may be determined by dividing the second girth measurement by the first girth measurement.

[0385] The flow in table C can be described in a measurement guide (e.g., training guide or video) that is distributed to the salespeople at the retail stores. The measurement guide can be a written description of how to measure and fit a person to the appropriate shaped fit pants. For example, the measurement guide indicates that a first girth measurement is to be taken at a first position below a person’s waist, and a second girth measurement is to be taken at a second position below the person’s waist. The measurement guide can be part of the shape measuring tool kit. The measurement guide may be posted or otherwise displayed in the retail store for the salespeople or customers to view. The measurement guide may be posted on a Web site for on-line consumers.

[0386] There can also be a shape index chart which lists the pants sizing for particular differentials, also distributed to the sales people at the retail stores. The shape index chart can be a written description listing the first, second, and third predetermined shaped sizing category for jeans (e.g., A, B, and C). The shape index chart also indicates the first and second girth measurements corresponding to the first predetermined shaped sizing category, second predetermined shaped sizing category, or third predetermined shaped sizing category. For example a difference between the first and second girth measurements of 2 to 3.5 will be shaped fit category A, 3.5 to 5 will be category B, and 5 to 6.5 will be category C. The shape index chart may be posted or otherwise displayed in the retail store for the salespeople or customers to review. The shape index chart guide may be posted on a Web site for on-line consumers.

[0387] A sample shape index chart is in table D below. Once the shape index is know, the salesperson or consumer
can look up the corresponding fit block or shaped fit sizing category. It should be understood that the invention is not limited to the specific shaped fit sizing categories, names of categories, and ranges presented. An index of the invention may have additional categories or ranges (not necessarily described in this application) or both, different categories or ranges which replace some of the categories or ranges presented, fewer categories or ranges or a subset of the categories or ranges presented, or any combination of these. Further, the categories or ranges in other implementations of the invention may not be exactly the same as the categories or ranges presented and may be modified or altered as appropriate for a particular application or based on the data or situation.

The categories may be named or referred to by any names or terms. In a specific implementation, the first, second, and third predetermined shaped sizing category for jeans can be referred to as slight curve, demi curve, and bold curve, or also, A, B, and C, respectively. In other implementations, the categories can be referred to for example, by numbers (e.g., 1, 2, and 3), by shapes (e.g., triangle, circle, and square), by colors (e.g., green, blue, and red), by a person’s name (e.g., Kate, Megan, and Jennifer), by metals (e.g., silver, gold, and platinum), by gems (e.g., ruby, emerald, and diamond), by body shape description (e.g., slender, hourglass, and pear) and by many others.

<table>
<thead>
<tr>
<th>TABLE D</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shaped Fit Sizing (Fit Block)</td>
</tr>
<tr>
<td>A (Slight Curve)</td>
</tr>
<tr>
<td>B (Demi Curve)</td>
</tr>
<tr>
<td>C (Bold Curve)</td>
</tr>
<tr>
<td>D (Supreme Curve) (optional)</td>
</tr>
</tbody>
</table>

This chart has a first section or row corresponding to the first predetermined shaped sizing category; a second section, adjacent to the first section, corresponding to the second predetermined shaped sizing category; and a third section, adjacent to the second section, corresponding to the third predetermined shaped sizing category. The second section is between the first and third section in the table; the corresponding shape index is numerically between the others. This index may be presented on multiple pages, and the second section is between the first and third section pages.

However, the chart presented in table D is relatively straightforward and easy to understand. Note that the ranges of the shape index overlap at specific measurements. For example, sizings A and B overlap at 3½ inches. However, as desired, the chart can also not be included such overlaps. For example, sizing A can be up to 3.49 inches, B from 3.5 to 4.99 inches, C from 5 to 6.49 inches, and so forth.

The shaped sizing fit system for pants, jeans and shorts, of this invention gives consumers a choice for off-the-rack clothing that focuses on shape, not size. This description of the invention has been presented for the purposes of illustration and description. It is not intended to be exhaustive or to limit the invention to the precise form described, and many modifications and variations are possible in light of the teaching above. The embodiments were chosen and described in order to best explain the principles of the invention and its practical applications. This description will enable others skilled in the art to best utilize and practice the invention in various embodiments and with various modifications as are suited to a particular use. The scope of the invention is defined by the following claims.

The invention claimed is:

1. A system comprising:
   a first sizing classification for pants, corresponding to, for a first body measurement, a first range of measurements for a second body measurement, wherein the pants comprises a polyurethane coating to form a body shaping panel on an inside surface of a material for the pants that modifies a stretch characteristic of the material;
   a second sizing classification for pants, corresponding to, for the first body measurement, a second range of measurements for the second body measurement, wherein the pants comprises a polyurethane coating to form a body shaping panel on an inside surface of a material for the pants that modifies a stretch characteristic of the material; and
   a third sizing classification for pants, corresponding to, for the first body measurement, a third range of measurements for the second body measurement, wherein the pants comprises a polyurethane coating to form a body shaping panel on an inside surface of a material for the pants that modifies a stretch characteristic of the material,
   the first body measurement comprises a person’s girth at a first position on a person’s torso,
   the second body measurement comprises a person’s girth at a second position on a person’s torso,
   the second position is a first distance below the first position, and
   the person’s girth at the second position is greater than the person’s girth at the first position.

2. The system of claim 1 wherein the first position is a point on the person’s torso where the person bends naturally, and the second position is a fullest point on a person’s hips.

3. The system of claim 1 wherein the second girth measurement is made at a distance of about 8 inches (about 20.3 centimeters) from the natural waist of the person, and the natural waist is a location on a person’s torso where that person bends naturally.

4. A system comprising:
   a first sizing classification for pants, corresponding to a first differential between first and second body measurements in a first range, wherein the pants comprises a polyurethane coating to form a body shaping panel on an inside surface of a material for the pants that modifies a stretch characteristic of the material;
   a second sizing classification for pants, corresponding to a second differential between first and second body measurements in a second range, wherein the pants comprises a polyurethane coating to form a body shaping panel on an inside surface of a material for the pants that modifies a stretch characteristic of the material; and
   a third sizing classification for pants, corresponding to a third differential between first and second body measurements in a third range, wherein the pants comprises a polyurethane coating to form a body shaping panel on an inside surface of a material for the pants that modifies a stretch characteristic of the material,
   the first body measurement comprises a person’s girth at a first position on a person’s torso,
   the second body measurement comprises a person’s girth at a second position on a person’s torso,
the second position is a first distance below the first position, and
the person’s girth at the second position is greater than the
person’s girth at the first position.

5. The system of claim 4 wherein the first position is a
narrowest point on a person’s waist and the second position is a
widest point on a person’s hips.

6. The system of claim 4 wherein the first position is a first
distance below a point on the torso where a person bends, the
second position is a second distance below the point on the
torso where a person bends, and the second distance is greater
than the first distance.

7. The system of claim 6 wherein the first position is at
about 4 inches (about 10.2 centimeters) below a natural waist
of the person, the second distance is at about 8 inches (about
20.3 centimeters) below the natural waist, and the natural
waist is where the person bends naturally at a torso.

8. The system of claim 4 comprising:
a fourth sizing classification for pants, corresponding to a
fourth differential between first and second body
measurements in a fourth range, wherein the pants comprises
a polyurethane coating to form a body shaping panel on
an inside surface of a material for the pants that modifies
a stretch characteristic of the material.

9. A pants comprising:
a waistband portion, extending along a perimeter of an
upper edge of pants;
a first leg portion, coupled to the waistband;
a second leg portion, coupled to the waistband, wherein the
first and second leg portions are coupled together at a
center seam, and the center seam is transverse to a direc
tion of the waistband;
a fly, coupled between the first and second leg portions on
a front portion of the pants, wherein the fly extends from
the waistband in a direction of the center seam and away
from the waistband;
a rear portion of pants comprising a seat, opposite of the fly,
formed by rear portions of the first and second leg por
tions that are coupled together, wherein the center seam
extends on the front and rear portions of the pants;
a polyurethane coating, coupled to an inside surface of the
pants, wherein the polyurethane coating comprises:
a first section of the polyurethane coating on an inside
surface of the first leg portion extending from a first
point on the center seam at a first distance from the
waistband along an inside seam of the first leg portion to
a second distance from the waistband;
the first section of the polyurethane coating also extending
from the inside seam of the first leg portion to the outside
seam of the first leg portion; and
at the outside seam of the first leg portion, the first section
of the polyurethane coating extending from a third
distance below the waistband to a fourth distance below the
waistband, wherein the third distance is closer to the
waistband than the first point and the fourth distance is
farther from the waistband than the first distance.

10. The pants of claim 9 wherein between the first point and
the outside seam of the first leg portion, an edge of the first
section of the polyurethane coating is a fifth distance from the
waistband, and the fifth distance is the same as or greater than
the first distance from the waistband.

11. The pants of claim 9 wherein the first point is a crotch
point and the first section is on an inside surface of the front
portion of the pants.

12. The pants of claim 9 wherein the first point is a point on
the center seam on the rear portion of the pants, and the first
section is on an inside surface of the rear portion of the pants.

13. The pants of claim 9 wherein the first point is a crotch
point and the first section is on an inside surface of the front
portion of the pants, and the polyurethane coating comprises:
a second section of the polyurethane coating on an inside
surface of the first leg portion on the rear portion of the
pants extending from a fifth point on the center seam at
a fifth distance from the waistband along the inside seam of
the first leg portion to a sixth distance from the waist-
band;
the second section of the polyurethane coating also extending
from the inside seam of the first leg portion to the
outside seam of the first leg portion; and
at the outside seam of the first leg portion, the second
section of the polyurethane coating extending from a
seventh distance below the waistband to an eighth
distance below the waistband, wherein the seventh distance
is closer to the waistband than the fifth point and the
fourth distance is farther from the waistband than the
fifth distance.

14. The pants of claim 9 wherein between the fifth point and
the outside seam of the first leg portion on the rear portion
of the pants, an edge of the second section of the polyurethane
coating is a ninth distance from the waistband, and the ninth
distance is the same as or greater than the fifth distance from
the waistband.

15. The pants of claim 9 comprising:
a graduated edging to the polyurethane coating comprising
a polyurethane coating graduated with a plurality of
open spaces, wherein the graduated edging is positioned
between a portion of the polyurethane coating comprising
a solid polyurethane coating without open spaces as
in the graduated edging and the buttocks region of the
pants, where the polyurethane coating is omitted.

16. The pants of claim 9 wherein a width of the graduated
edging is from about ½ inch (about 1.3 centimeters) to about
1 inch (about 2.5 centimeters).

17. The pants of claim 9 wherein the material of the pants
has a first stretch characteristic, the first section of the pants
with the polyurethane coating, coupled to the inside surface
of the pants, has a second has a second stretch characteristic,
and the second stretch characteristic is less elastic than the
first stretch characteristic.

18. The pants of claim 17 wherein a buttocks region of the
pants has the first stretch characteristic that has greater elas-
ticity than an upper thigh region of the pants where the poly-
urethane coating has been coupled.

19. The pants of claim 9 wherein the material is a denim
material comprising cotton blended with a first fiber other
than a cotton fiber.

20. The pants of claim 19 wherein the first fiber comprises
spandex.

21. A method comprising:
providing pants comprising fabric having a first stretch charac-
teristic;
on an inside surface of the pants, altering the first stretch char-
teristic of the fabric to have a second stretch charac-
teristic, wherein the first and second stretch character-
istics are different from each other;
positioning a first region having the first stretch character-
istic and a second region having the second stretch char-
acteristic relative to each other, thereby helping shape a body of a wearer of the pants, wherein from an outside view of the pants, the first and second regions blend seamlessly together without any thread seam lines.

22. The method of claim 21 wherein the second stretch region has less stretch than the first stretch region.

23. The method of claim 22 wherein the second region is below the first region, the second region being farther from a waistband than the first region.

24. The method of claim 21 wherein the first stretch region has less stretch than the second stretch region.

25. The method of claim 24 wherein the first region is below the second region, the first region being farther from a waistband than the second region.

26. The method of claim 21 wherein altering the first stretch characteristic of the fabric to have a second stretch characteristic comprises:

providing a polyurethane coating on the inside surface of the pants in the second region.

* * * * *