ARRAY OF ARTICLES OF MANUFACTURE

Inventors: Jennifer Lori Steeves-Kiss, Cincinnati, OH (US); Illya Torrance Thomas, Cincinnati, OH (US); Thorsten Knobloch, Loveland, OH (US); Michael Ricardo Burns, Cincinnati, OH (US)

Correspondence Address:
THE PROCTER & GAMBLE COMPANY
INTELLECTUAL PROPERTY DIVISION
WINTON HILL TECHNICAL CENTER - BOX 161
6110 CENTER HILL AVENUE
CINCINNATI, OH 45224 (US)

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ABSTRACT
An array of articles of manufacture, more particularly, an array of sanitary tissue products each of which comprises at least one value of a common intensive property that is different from the others is provided.
ARRAY OF ARTICLES OF MANUFACTURE

CROSS REFERENCE TO RELATED APPLICATION

[0001] This application claims the benefit of U.S. Provisional Application No. 60/648,569 filed Jan. 31, 2005.

FIELD OF THE INVENTION

[0002] The present invention relates to an array of articles of manufacture, more particularly, to an array of sanitary tissue products each of which comprises a different common intensive property value different from the others.

BACKGROUND OF THE INVENTION

[0003] In the past, consumers of articles of manufacture, especially sanitary tissue products, have had the opportunity to purchase articles of manufacture that have similar common intensive property values but have differed in physical form and/or additives contained within the articles of manufacture. For example, sanitary tissue products are currently offered in physical forms that vary by number of plies, most often one-ply or two-ply. In addition, some sanitary tissue products may add additives, such as lotion, to the fibrous structures that make up the sanitary tissue products. For example, Charmin® brand toilet tissue comes in a two-ply physical form under the name Charmin® Ultra, whereas its one-ply physical form is marketed under the name Charmin® and/or Charmin® Plüs and/or Charmin® Scents.

[0004] It is believed that different consumers, especially consumers of sanitary tissue products, desire different common intensive property values in the articles of manufacture that they purchase. However, conventional product and marketing strategies utilized by producers of articles of manufacture, especially of sanitary tissue products, fail to satisfy the consumers’ desires.

[0005] Accordingly, there is a need for an array of articles of manufacture each of which comprises a different common intensive property value different from the others, processes for displaying such an array for the consumer to choose amongst the array of articles of manufacture and processes for making the array of articles of manufacture.

SUMMARY OF THE INVENTION

[0006] The present invention fulfills the need described above by providing an array of articles of manufacture that address the consumers’ desires.

[0007] In one example of the present invention, an array of sanitary tissue products comprising two or more multi-ply sanitary tissue products each of which comprises at least one value of a common intensive property that is different from the others, wherein the two or more multi-ply sanitary tissue products are marketed by one company, is provided.

[0008] In another example of the present invention, a process for displaying an array of sanitary tissue products, the process comprising the step of displaying an array of sanitary tissue products comprising two or more multi-ply sanitary tissue products each of which comprises at least one value of a common intensive property that is different from the others, wherein the two or more multi-ply sanitary tissue products are marketed by one company, wherein the two or more multi-ply sanitary tissue products are packaged in a package such that a consumer desiring to purchase one of the multi-ply sanitary tissue products has the opportunity to choose one of the two or more multi-ply sanitary tissue products, is provided.

[0009] In yet another example of the present invention, a process for making an array of sanitary tissue products, the process comprising the steps of:

[0010] a. producing a first multi-ply sanitary tissue product;

[0011] b. producing a second multi-ply sanitary tissue product;

[0012] d. packaging the first and second multi-ply sanitary tissue products in packages comprising a common single source identifier, wherein the first and second multi-ply sanitary tissue products exhibit at least one value of a common intensive property that is different from the others, is provided.

[0013] In still another example of the present invention, an array of articles of manufacture each of which comprises a different common intensive property value different from the others, wherein each of the three or more articles of manufacture are packaged in a package comprising a common single source identifier, is provided.

[0014] In yet another example of the present invention, a process for displaying an array of articles of manufacture comprising three or more articles of manufacture each of which comprises a different common intensive property different from the others, wherein each of the three or more articles of manufacture are packaged in a package comprising a common single source identifier such that a consumer desiring to purchase one of the articles of manufacture has the opportunity to choose one of the three or more articles of manufacture, is provided.

[0015] In even yet another example of the present invention, a process for making an array of articles of manufacture, the process comprising the steps of:

[0016] a. producing a first article of manufacture comprising a first common intensive property value;

[0017] b. producing a second article of manufacture comprising a second common intensive property value different from the first common intensive property value;

[0018] c. producing a third article of manufacture comprising a third common intensive property value different from the second common intensive property value;

[0019] d. packaging the first, second and third articles of manufacture in packages comprising a common single source identifier and a separate, independent product designation that delineates the first, second and third articles of manufacture from each other, is provided.

[0020] Accordingly, the present invention provides an array of articles of manufacture, such as an array of sanitary tissue products that address the consumers’ desires, a process for displaying such an array and a process for producing such an array.

BRIEF DESCRIPTION OF THE DRAWINGS

[0021] FIG. 1 is a schematic illustration of an array of articles of manufacture in accordance with the present invention.
FIG. 2 is a schematic illustration of an article of manufacture useful in an array of articles of manufacture in accordance with the present invention.

**DETAILED DESCRIPTION OF THE INVENTION**

**Definitions**

**[0023]** “Array of Articles of Manufacture” as used herein means a group of consumer products/goods that provide a similar benefit to a consumer. In other words, an array of articles of manufacture includes a group of consumer products/goods within a category such as sanitary tissue products. In one case, such a group of consumer products/goods includes those products/goods residing on the same shelf in a retail store and/or in the same aisle in a retail store. For example, sanitary tissue products are an array of articles of manufacture.

**[0024]** “Fiber” as used herein means an elongate particle having an apparent length greatly exceeding its apparent diameter, i.e., a length to diameter ratio of at least about 10. Fibers having a non-circular cross-section are common; the “diameter” in this case may be considered to be the diameter of a circle having cross-sectional area equal to the cross-sectional area of the fiber. More specifically, as used herein, “fiber” refers to papermaking fibers. The present invention contemplates the use of a variety of papermaking fibers, such as, for example, natural fibers or synthetic fibers, or any other suitable fibers, and any combination thereof.

**[0025]** Natural papermaking fibers useful in the present invention include animal fibers, mineral fibers, plant fibers and mixtures thereof. Animal fibers may, for example, be selected from the group consisting of: wool, silk and mixtures thereof. Plant fibers may, for example, be derived from a plant selected from the group consisting of: wood, cotton, cotton linters, flax, sisal, abaca, hemp, hesperaloe, jute, bamboo, bagasse, kudzu, corn, sorghum, gourd, agave, loofah and mixtures thereof.

**[0026]** Wood fibers; often referred to as wood pulps include chemical pulps, such as kraft (sulfate) and sulfite pulps, as well as mechanical and semi-chemical pulps including, for example, groundwood, thermomechanical pulp, chemi-mechanical pulp (CMP), chemi-thermomechanical pulp (CTMP), neutral semi-chemical sulfite pulp (NSCS). Chemical pulps, however, may be preferred since they impart a superior tactile sense of softness to tissue sheets made therefrom. Pulps derived from both deciduous trees (hereinafter, also referred to as “hardwood”) and coniferous trees (hereinafter, also referred to as “softwood”) may be utilized. The hardwood and softwood fibers can be blended, or alternatively, can be deposited in layers to provide a stratified and/or layered web. U.S. Pat. No. 4,300, 981 and U.S. Pat. No. 3,994,771 are incorporated herein by reference for the purpose of disclosing layering of hardwood and softwood fibers. Also applicable to the present invention are fibers derived from recycled paper, which may contain any or all of the above categories as well as other non-fibrous materials such as fillers and adhesives used to facilitate the original papermaking.

**[0027]** The wood pulp fibers may be short (typical of hardwood fibers) or long (typical of softwood fibers). Nonlimiting examples of short fibers include fibers derived from a fiber source selected from the group consisting of Acacia, Eucalyptus, Maple, Oak, Aspen, Birch, Cottonwood, Alder, Ash, Cherry, Elm, Hickory, Poplar, Gum, Walnut, Locust, Sycamore, Beech, Catalpa, Sassafras, Gmelina, Albizia, Anthocephalus, and Magnolia. Nonlimiting examples of long fibers include fibers derived from Pine, Spruce, Fir, Tamarack, Hemlock, Cypress, and Cedar. Softwood fibers derived from the Kraft process and originating from more-northern climates may be preferred. These are often referred to as northern softwood kraft (NSK) pulps.

**[0028]** Synthetic fibers may be selected from the group consisting of: wet spun fibers, dry spun fibers, melt spun (including melt blown) fibers, synthetic pulp fibers and mixtures thereof. Synthetic fibers may, for example, be comprised of cellulose (often referred to as “rayon”); cellulose derivatives such as esters, ether, or nitrous derivatives; polyelefin (including polyethylene and polypropylene); polyesters (including polyethylene terephthalate); polyamides (often referred to as “nylon”); acrylics; non-cellulosic polymeric carbohydrates (such as starch, chitin and chitin derivatives such as chitosan); and mixtures thereof.

**[0029]** “Fibrous structure” as used herein means a structure that comprises one or more fibers. Nonlimiting examples of processes for making fibrous structures include known wet-laid papermaking processes and air-laid papermaking processes. Such processes typically include steps of preparing a fiber composition, oftentimes referred to as fiber slurry in wet-laid processes, either wet or dry, and then depositing a plurality of fibers onto a forming wire or belt such that an embryonic fibrous structure is formed, drying and/or bonding the fibers together such that a fibrous structure is formed, and/or further processing the fibrous structure such that a finished fibrous structure is formed. For example, in typical papermaking processes, the finished fibrous structure is the fibrous structure that is wound on the reel at the end of papermaking, but before converting thereof into a sanitary tissue product. In one example, the fibrous structure is a wet-laid fibrous structure.

**[0030]** “Sanitary tissue product” comprises one or more finished fibrous structures, converted or not, that is useful as a wiping implement for post-urinary and post-bowel movement cleaning (toilet tissue), for otorhinolaryngological discharges (facial tissue), and multi-functional absorbent and cleaning uses (absorbent towels).

**[0031]** “Ply” or “Plies” as used herein means an individual finished fibrous structure optionally to be disposed in a substantially contiguous, face-to-face relationship with other plies, forming a multiple ply (“multi-ply”) finished fibrous structure product and/or sanitary tissue product. It is also contemplated that a single fibrous structure can effectively form two “plies” or multiple „plies”, for example, by being folded on itself.

**[0032]** “Intensive Property” as used herein means a property of a fibrous structure and/or sanitary tissue product, wherein the property is selected from the group consisting of: lint, softness, basis weight, texture, tensile strength, absorbency and mixtures thereof.

**[0033]** “Value of a Common Intensive Property” as used herein means a measured value of an intensive property that is present in two or more articles of manufacture.
“Basis Weight” as used herein is the weight per unit area of a sample reported in lbs/3000 ft² or g/m². Basis weight is measured by preparing one or more samples of a certain area (m²) and weighing the sample(s) of a fibrous structure according to the present invention and/or sanitary tissue product comprising such fibrous structure on a top loading balance with a minimum resolution of 0.01 g. The balance is protected from air drafts and other disturbances using a draft shield. Weights are recorded when the readings on the balance become constant. The average weight (g) is calculated and the average area of the samples (m²). The basis weight (g/m²) is calculated by dividing the average weight (g) by the average area of the samples (m²). In one embodiment, the fibrous structures and/or sanitary tissue products according to the present invention exhibit a basis weight of from about 10 g/m² to about 120 g/m² and/or from about 20 g/m² to about 60 g/m².

“Machine Direction” or “MD” as used herein means the direction parallel to the flow of the fibrous structure through the papermaking machine and/or product manufacturing equipment.

“Cross Machine Direction” or “CD” as used herein means the direction perpendicular to the machine direction in the same plane of the fibrous structure and/or sanitary tissue product comprising the fibrous structure.

“Dry Tensile Strength” (or simply “Tensile Strength” as used herein) of a fibrous structure and/or sanitary tissue product is measured as follows. One (1) inch by five (5) inch strip of fibrous structure and/or sanitary tissue product are provided. The strip is placed in a conditioned room at a temperature of 73°F ± 4°F (23°C ± 2°C) and a relative humidity of 50% ± 10%. The crosshead speed of the tensile tester is 2.0 inches per minute (about 5.1 cm/minute) and the gauge length is 4.0 inches (about 10.2 cm). The Dry Tensile Strength can be measured in any direction by this method. The “Total Dry Tensile Strength” or “TDST” is the special case determined by the arithmetic total of MD and CD tensile strengths of the strips.

“Absorbency” as used herein means the characteristic of the fibrous structure which allows it to take up and retain fluids, particularly water and aqueous solutions and suspensions. In evaluating the absorbency of paper, not only is the absolute quantity of fluid a given amount of paper will hold significant, but the rate at which the paper will absorb the fluid is also. Absorbency is measured herein by the Horizontal Full Sheet (HFS) test method described in the Test Methods section herein. In one embodiment, the fibrous structures and/or sanitary tissue products according to the present invention exhibits an HFS absorbency of greater than about 5 g/g and/or greater than about 8 g/g and/or greater than about 10 g/g up to about 100 g/g. In another nonlimiting embodiment, the fibrous structures and/or sanitary tissue products according to the present invention exhibit an HFS absorbency of from about 12 g/g to about 20 g/g.

“Lint” as used herein means any material that originated from a finished fibrous structure and/or sanitary tissue product comprising such finished fibrous structure that remains on a surface after which the finished fibrous structure and/or sanitary tissue product comprising such finished fibrous structure has come into contact. The lint value of a finished fibrous structure and/or sanitary tissue product comprising such finished fibrous structure is determined according to the Lint Test Method described herein.

“Texture” as used herein means any pattern present in the fibrous structure. For example, a pattern may be imparted to the fibrous structure during the papermaking process, such as during a through-air-drying step. A pattern may also be imparted to the fibrous structure by embossing the finished fibrous structure during the converging process.

“Softness” of a fibrous structure according to the present invention and/or a paper product comprising such fibrous structure is determined as follows. Ideally, prior to softness testing, the samples to be tested should be conditioned according to ‘Tappi Method #T402M-88’. Here, samples are preconditioned for 24 hours at a relative humidity level of 10 to 35% and within a temperature range of 22°C to 40°C. After this preconditioning step, samples should be conditioned for 24 hours at a relative humidity of 48% to 52% and within a temperature range of 22°C to 24°C. Ideally, the softness panel testing should take place within the confines of a constant temperature and humidity room. If this is not feasible, all samples, including the controls, should experience identical environmental exposure conditions.

Softness testing is performed as a paired comparison in a form similar to that described in “Manual on Sensory Testing Methods”, ASTM Special Technical Publication 434, published by the American Society For Testing and Materials 1968 and is incorporated herein by reference. Softness is evaluated by subjective testing using what is referred to as a Paired Difference Test. The method employs a standard external to the test material itself. For tactile perceived softness two samples are presented such that the subject cannot see the samples, and the subject is required to choose one of them on the basis of tactile softness. The result of the test is reported in what is referred to as Panel Score Unit (PSU). With respect to softness testing to obtain the softness data reported herein in PSU, a number of softness panel tests are performed. In each test ten practiced softness judges are asked to rate the relative softness of three sets of paired samples. The pairs of samples are judged one pair at a time by each judge; one sample of each pair being designated X and the other Y. Briefly, each X sample is graded against its paired Y sample as follows:

1. a grade of plus one is given if X is judged to be a little softer than Y, and a grade of minus one is given if Y is judged to be a little softer than X;
2. a grade of plus two is given if X is judged to be a little softer than Y, and a grade of minus two is given if Y is judged to be a little softer than X;
3. a grade of plus three is given to X if it is judged to be a lot softer than Y, and a grade of minus three is given if Y is judged to be a lot softer than X; and, lastly:
4. a grade of plus four is given to X if it is judged to be a whole lot softer than Y, and a grade of minus 4 is given if Y is judged to be a whole lot softer than X.

The grades are averaged and the resultant value is in units of PSU. The resulting data are considered the results of one panel test. If more than one sample pair is evaluated...
then all sample pairs are rank ordered according to their grades by paired statistical analysis. Then, the rank is shifted up or down in value as required to give a zero PSU value to which ever sample is chosen to be the zero-base standard. The other samples then have plus or minus values as determined by their relative grades with respect to the zero base standard. The number of panel tests performed and averaged is such that about 0.2 PSU represents a significant difference in subjectively perceived softness.

[0048] All percentages and ratios are calculated by weight unless otherwise indicated. All percentages and ratios are calculated based on the total composition unless otherwise indicated.

[0049] Unless otherwise noted, all component or composition levels are in reference to the active level of that component or composition, and are exclusive of impurities, for example, residual solvents or by-products, which may be present in commercially available sources.

Array of Articles of Manufacture

[0050] In one example, an array of articles of manufacture in accordance with the present invention may comprise a plurality of single- and/or multi-ply sanitary tissue products. The sanitary tissue products may be dry and/or wet. The sanitary tissue products may come in a variety of roll sizes and may be packaged in different numbers, such as four, six, nine, twenty-four, and the like. The plurality of sanitary tissue products may be displayed on a shelf at a point of sale, such as within a retail store, in such a way that the different sanitary tissue products within the array are visible to a consumer during the consumer's purchasing decision process.

[0051] The array of sanitary tissue products of the present invention may comprise two or more multi-ply sanitary tissue products, such as two or more two-ply sanitary tissue products. The array may comprise at least one single-ply sanitary tissue product. The array may comprise a mixture of single-ply and multi-ply sanitary tissue products.

[0052] The array of sanitary tissue products may comprise two or more sanitary tissue products each of which comprises at least one value of a common intensive property that is different from at least the others.

[0053] The array of sanitary tissue products may comprise a single-ply sanitary tissue product that comprises at least one value of a common intensive property that is different from at least one multi-ply sanitary tissue product within the array of sanitary tissue products.

[0054] The array of sanitary tissue products may comprises a single-ply sanitary tissue product that comprises at least one value of a common intensive property that is different from the two or more multi-ply sanitary tissue products within the array of sanitary tissue products.

[0055] The array of sanitary tissue products may comprise two or more single-ply sanitary tissue products each of which comprises at least one value of a common intensive property that is different from the others.

[0056] The sanitary tissue products within the array of sanitary tissue products may differ in at least one value of a common intensive property selected from the group consisting of: lint, softness, tensile strength, basis weight, texture, absorbency and mixtures thereof.

[0057] The two or more sanitary tissue products within the array of sanitary tissue products may differ in price, for example differ in retail price to a consumer.

[0058] The sanitary tissue products within the array of sanitary tissue products may differ in price from each other, for example differ in retail price to a consumer.

Fibrous Structures

[0059] Nonlimiting types of finished fibrous structures according to the present invention include conventionally felt-pressed fibrous structures; pattern densified fibrous structures; and high-bulk, uncompacted fibrous structures. The fibrous structures may be of a homogenous or multi-layered (two or three or more layers) construction; and the sanitary tissue products made therefrom may be of a single-ply or multi-ply construction.

[0060] The finished fibrous structures and/or sanitary tissue products of the present invention may exhibit a basis weight of between about 10 g/m² to about 120 g/m² and/or from about 14 g/m² to about 80 g/m² and/or from about 20 g/m² to about 60 g/m².

[0061] The finished fibrous structures and/or sanitary tissue products of the present invention may exhibit a total dry tensile strength of greater than about 59 g/cm (150 g/in) and/or from about 78 g/cm (200 g/in) to about 394 g/cm (1000 g/in) and/or from about 98 g/cm (250 g/in) to about 335 g/cm (850 g/in).

[0062] The finished fibrous structure and/or sanitary tissue products of the present invention may exhibit a density of less than about 0.60 g/cm³ and/or less than about 0.30 g/cm³ and/or less than about 0.20 g/cm³ and/or less than about 0.10 g/cm³ and/or less than about 0.07 g/cm³ and/or less than about 0.05 g/cm³ and/or from about 0.01 g/cm³ to about 0.20 g/cm³ and/or from about 0.02 g/cm³ to about 0.10 g/cm³.

[0063] In one example, the finished fibrous structure of the present invention is a pattern densified fibrous structure characterized by having a relatively high bulk region of relatively low fiber density and an array of densified regions of relatively high fiber density. The high-bulk field is characterized as a field of pillow regions. The densified zones are referred to as knuckle regions. The knuckle regions exhibit greater density than the pillow regions. The densified zones may be discretely spaced within the high-bulk field or may be interconnected, either fully or partially, within the high-bulk field. Typically, from about 8% to about 65% of the fibrous structure surface comprises densified knuckles, the knuckles may exhibit a relative density of at least 125% of the density of the high-bulk field. Processes for making pattern densified fibrous structures are well known in the art as exemplified in U.S. Pat. Nos. 3,301,746, 3,974,025, 4,191,609 and 4,637,859.

Article of Manufacture

[0064] In one example, the article of manufacture in accordance with the present invention comprises a sanitary tissue product according to the present invention and apackage housing said sanitary tissue product. The package may be configured such that the sanitary tissue product is
visible to a consumer, especially at the time and/or point of sale or purchase decision of the article of manufacture by the consumer.

[0065] In addition, the package may comprise a common single source indicator, such as a trademark.

[0066] As shown in FIG. 1, an array of articles of manufacture 10 comprises three or more articles of manufacture 12, 14, 16. Each article of manufacture comprises at least one value of a common intensive property that is different from the others. Further, each article of manufacture comprises a consumer product 12', 14', 16' that is packaged (housed) within a package 12", 14", 16". Each package 12", 14", 16" comprises a common single source identifier represented by the letter “A” in FIG. 1.

[0067] In one example of the present invention, each package 12", 14", 16" may also comprise a separate, independent product designation represented by the letters “B”, “C”, “D” respectively. The product designation functions to delineate the consumer products within the array of articles of manufacture so the consumer can choose the consumer’s desired consumer product.

[0068] FIG. 2 shows a single article of manufacture 18 that can be a part of an array of articles of manufacture in accordance with the present invention. The article of manufacture 18 may comprise a plurality of consumer products 18'. The consumer products 18' may be packaged (housed) within a package 18". The package 18" comprises a single source identifier represented by the letter “A”. The package 18" may also comprise a separate, independent product designation represented by the letter “B”.

[0069] Any suitable material may be used for the package. For example, plastic materials, cardboard materials, other paper materials may be used. In one example, the package is a polywrap material.

[0070] Each package containing a sanitary tissue product may comprise a common single source identifier. The common single source identifier may comprise a trademark.

[0071] Each package may comprise a separate, independent product designation by which a consumer can differentiate one of the sanitary tissue products from another.

[0072] The package in accordance with the present invention may comprise a non-verbal cue, [such as word(s), symbol(s), representation(s)], that connotes strength.

[0073] The package in accordance with the present invention may comprise a non-verbal cue, [such as word(s), symbol(s), representation(s)], that connotes softness.

[0074] The package may comprise a representation of a texture present on the sanitary tissue product within the package.

[0075] The package may comprise information about at least two other sanitary tissue products within the array of sanitary tissue products.

[0076] The package may comprise information about various roll sizes in which the sanitary tissue product within the package is available.

Process for Displaying an Array of Articles of Manufacture

[0077] The array of articles of manufacture in accordance with the present invention may be displayed, especially in a retail store.

[0078] In one example, a process for displaying an array of articles of manufacture comprises a step of displaying an array of articles of manufacture comprising three or more articles of manufacture wherein each of the three or more articles of manufacture exhibit at least one value of a common intensive property that is different from the others, wherein each of the three or more articles of manufacture are packaged in a package comprising a common single source identifier such that a consumer desiring to purchase one of the articles of manufacture has the opportunity to choose one of the three or more articles of manufacture.

Process for Making an Array of Articles of Manufacture

[0079] In one example, a process for making an array of articles of manufacture comprises the steps of:

[0080] a. producing a first article of manufacture;

[0081] b. producing a second article of manufacture;

[0082] c. producing a third article of manufacture; and

[0083] d. packaging the first, second and third articles of manufacture in packages comprising a common single source identifier and a separate, independent product designation that delineates the first, second and third articles of manufacture from each other, wherein the first, second and third articles of manufacture exhibit at least one value of a common intensive property that is different from the others.

Test Methods

[0084] Lint Test Method:

[0085] The amount of lint generated from a finished fibrous structure is determined with a Sutherland Rub Tester. This tester uses a motor to rub a weighted felt 5 times over the finished fibrous structure, while the finished fibrous structure is restrained in a stationary position. This finished fibrous structure can be referred to throughout this method as the “web”. The Hunter Color L value is measured before and after the rub test. The difference between these two Hunter Color L values is then used to calculate a lint value. This lint method is designed to be used with white or substantially white fibrous structures and/or sanitary tissue products. Therefore, if testing of a non-white tissue, such as blue-colored or peach-colored tissue is desired, the same formulation should be used to make a sample without the colored dye, pigment, etc., using bleached Kraft pulps.

i. Sample Preparation

[0086] Prior to the lint rub testing, the samples to be tested should be conditioned according to Tappi Method T402OM-88. Here, samples are preconditioned for 24 hours at a relative humidity level of 10 to 35% and within a temperature range of 22° C. to 40° C. After this preconditioning step, samples should be conditioned for 24 hours at a relative humidity of 48 to 52% and within a temperature range of 22° C. to 24° C. This rub testing should also take place within the confines of the constant temperature and humidity room.
The Sutherland Rub Tester may be obtained from Testing Machines, Inc. (Amityville, N.Y., 1701). The web is first prepared by removing and discarding any product which might have been abraded in handling, e.g. on the outside of the roll. For products formed from multiple plies of webs, this test can be used to make a lint measurement on the multi-ply product, or, if the plies can be separated without damaging the specimen, a measurement can be taken on the individual plies making up the product. If a given sample differs from surface to surface, it is necessary to test both surfaces and average the values in order to arrive at a composite lint value. In some cases, products are made from multiple plies of webs such that the facing-out surfaces are identical, in which case it is only necessary to test one surface. If both surfaces are to be tested, it is necessary to obtain six specimens for testing (Single surface testing only requires three specimens). Each specimen should be folded in half such that the crease is running along the cross direction (CD) of the web sample. For two-surface testing, make up three samples with a first surface "out" and three with the second surface "out". Keep track of which samples are first surface "out" and which are second surface out. Obtain a 30°x40° piece of Crescent #300 cardboard from Cordage Inc. (800 E. Ross Road, Cincinnati, Ohio, 45217). Using a paper cutter, cut out six pieces of cardboard of dimensions of 2.5" x 6". Puncture two holes into each of the six cards by forcing the cardboard onto the hold down pins of the Sutherland Rub tester.

Center and carefully place each of the 2.5x6" cardboard pieces on top of the six previously folded samples. Make sure the 6" dimension of the cardboard is running parallel to the machine direction (MD) of each of the tissue samples. Center and carefully place each of the cardboard pieces on top of the three previously folded samples. Once again, make sure the 6" dimension of the cardboard is running parallel to the machine direction (MD) of each of the web samples.

Fold one edge of the exposed portion of the web specimen onto the back of the cardboard. Secure this edge to the cardboard with adhesive tape obtained from 3M Inc. (9/4" wide Scotch Brand, St. Paul, Minn.). Carefully grasp the other over-hanging tissue edge and snugly fold it over onto the back of the cardboard. While maintaining a snug fit of the web specimen onto the board, tape this second edge to the back of the cardboard. Repeat this procedure for each sample.

Turn over each sample and tape the cross direction edge of the web specimen to the cardboard. One half of the adhesive tape should contact the web specimen while the other half is adhering to the cardboard. Repeat this procedure for each of the samples. If the tissue sample breaks, tears, or becomes frayed at any time during the course of this sample preparation procedure, discard and make up a new sample with a new tissue sample strip.

There will now be 3 first-side surface "out" samples on cardboard and (optionally) 3 second-side surface "out" samples on cardboard.

**Felt Preparation**

Obtain a 30°x40° piece of Crescent #300 cardboard from Cordage Inc. (800 E. Ross Road, Cincinnati, Ohio, 45217). Using a paper cutter, cut out six pieces of cardboard of dimensions of 2.25"x7.25". Draw two lines parallel to the short dimension and down 1.125" from the top and bottom most edges on the white side of the cardboard. Carefully score the length of the line with a razor blade using a straight edge as a guide. Score it to a depth about half way through the thickness of the sheet. This scoring allows the cardboard/felt combination to fit tightly around the weight of the Sutherland Rub tester. Draw an arrow running parallel to the long dimension of the cardboard on this scored side of the cardboard.

Cut the six pieces of black felt (55% or equivalent from New England Gasket, 550 Broad Street, Bristol, Conn. 06010) to the dimensions of 2.25"x8.5"x0.0625". Place the felt on top of the un-scored, gusseted, cardboard and make sure that the long edges of both the felt and cardboard are parallel and in alignment. Make sure the fluffy side of the felt is facing up. Also allow about 0.5" to over hang the top and bottom most edges of the cardboard. Smugly fold over both overhanging felt edges onto the backside of the cardboard with Scotch brand tape. Prepare a total of six of these felt/cardboard combinations.

For best reproducibility, all samples should be run with the same lot of felt. Obviously, there are occasions where a single lot of felt becomes completely depleted. In those cases where a new lot of felt must be obtained, a correction factor should be determined for the new lot of felt. To determine the correction factor, obtain a representative single web sample of interest, and enough felt to make up 24 cardboard/felt samples for the new and old lots.

As described below and before any rubbing has taken place, obtain Hunter L readings for each of the 24 cardboard/felt samples of the new and old lots of felt. Calculate the averages for both the 24 cardboard/felt samples of the old lot and the 24 cardboard/felt samples of the new lot.

Next, rub test the 24 cardboard/felt boards of the new lot and the 24 cardboard/felt boards of the old lot as described below. Make sure the same web lot number is used for each of the 24 samples for the new and old lots. In addition, sample of the web in the preparation of the cardboard/tissue samples must be done so the new lot of felt and the old lot of felt are exposed to as representative as possible of the tissue sample. Discard any product which might have been damaged or abraded. Next, obtain 48 web samples for the calibration. Place the first sample on the far left of the tab bench and the last of the 48 samples on the far right of the bench. Mark the sample to the far left with the number “1” in a 1 cm by 1 cm area of the corner of the sample. Continue to mark the samples consecutively up to 48 such that the last sample to the far right is numbered 48.

Use the 24 odd numbered samples for the new felt and the 24 even numbered samples for the old felt. Order the odd number samples from lowest to highest. Order the even numbered samples from lowest to highest. Now, mark the lowest number for each set with a letter “F” (for “first-side”) Mark the next highest number with the letter “S” (for second-side). Continue marking the samples in this alternating “F”/”S” pattern. Use the “F” samples for first surface “out” lint analyses and the “S” samples for second-side surface “out” lint analyses. There are now a total of 24 samples for the new lot of felt and the old lot of felt. Of this 24, twelve are for first-side surface “out” lint analysis and 12 are for second-side surface “out” lint analysis.

Rub and measure the Hunter Color L values for all 24 samples of the old felt as described below. Record the 12 first-side surface Hunter Color L values for the old felt. Average the 12 values. Record the 12 second-side surface
Hunter Color L values for the old felt. Average the 12 values. Subtract the average initial un-rubbed Hunter Color L felt reading from the average Hunter Color L reading for the first-side surface rubbed samples. This is the delta average difference for the first-side surface samples. Subtract the average initial un-rubbed Hunter Color L felt reading from the average Hunter Color L reading for the second-side surface rubbed samples. This is the delta average difference for the second-side surface samples. Calculate the sum of the delta average difference for the first-side surface and the delta average difference for the second-side surface and divide this sum by 2. This is the uncorrected lint value for the old felt. If there is a current felt correction factor for the old felt, add it to the uncorrected lint value for the old felt. This value is the corrected Lint Value for the old felt.

Rub and measure the Hunter Color L values for all 24 samples of the new felt as described below. Record the 12 first-side surface Hunter Color L values for the new felt. Average the 12 values. Record the 12 second-side surface Hunter Color L values for the new felt. Average the 12 values. Subtract the average initial un-rubbed Hunter Color L felt reading from the average Hunter Color L reading for the first-side surface rubbed samples. This is the delta average difference for the first-side surface samples. Subtract the average initial un-rubbed Hunter Color L felt reading from the average Hunter Color L reading for the second-side surface rubbed samples. This is the delta average difference for the second-side surface samples. Calculate the sum of the delta average difference for the first-side surface and the delta average difference for the second-side surface and divide this sum by 2. This is the uncorrected lint value for the new felt.

Take the difference between the corrected Lint Value from the old felt and the uncorrected lint value for the new felt. This difference is the felt correction factor for the new lot of felt. Adding this felt correction factor to the uncorrected lint value for the new felt should be identical to the corrected Lint Value for the old felt. Note that the above procedure implies that the calibration is done with a two-surfaced specimen. If it desirable or necessary to do a felt calibration using a single-surfaced sample, it is satisfactory; however, the total of 24 tests should still be done for each felt.

Care of 4 Pound Weight

The four pound weight has four square inches of effective contact area providing a contact pressure of one pound per square inch. Since the contact pressure can be changed by alteration of the rubber pads mounted on the face of the weight, it is important to use only the rubber pads supplied by the manufacturer (Brown Inc., Mechanical Services Department, Kalamazoo, Mich.). These pads must be replaced if they become hard, abraded or chipped. When not in use, the weight must be positioned such that the pads are not supporting the full weight of the weight. It is best to store the weight on its side.

Rub Tester Instrument Calibration

The Sutherland Rub Tester must first be calibrated prior to use. First, turn on the Sutherland Rub Tester by moving the tester switch to the “cont” position. When the tester arm is in its position closest to the user, turn the tester’s switch to the “auto” position. Set the tester to run 5 strokes by moving the pointer arm on the large dial to the “five” position setting. One stroke is a single and complete forward and reverse motion of the weight. The end of the rubbing block should be in the position closest to the operator at the beginning and at the end of each test.

Prepare a test specimen on cardboard sample as described above. In addition, prepare a felt on cardboard sample as described above. Both of these samples will be used for calibration of the instrument and will not be used in the acquisition of data for the actual samples.

Place the calibration web sample on the base plate of the tester by slipping the holes in the board over the hold-down pins. The hold-down pins prevent the sample from moving during the test. Clip the calibration felt/cardboard sample onto the four pound weight with the cardboard side contacting the pads of the weight. Make sure the cardboard/felt combination is resting flat against the weight. Hook the tester arm over the felt edge and gently place the tissue sample underneath the weight/felt combination. The end of the weight closest to the operator must be over the cardboard of the web sample and not the web sample itself. The felt must rest flat on the tissue sample and must be in 100% contact with the web surface. Activate the tester by depressing the “push” button.

Keep a count of the number of strokes and observe and make a mental note of the starting and stopping position of the felt covered weight in relationship to the sample. If the total number of strokes is five and if the end of the felt covered weight closest to the operator is over the cardboard of the web sample at the beginning and end of this test, the tester is calibrated and ready to use. If the total number of strokes is not five or if the end of the felt covered weight closest to the operator is over the actual web sample either at the beginning or end of the test, repeat this calibration procedure until 5 strokes are counted. The end of the felt covered weight closest to the operator is situated over the cardboard at both the start and end of the test. During the actual testing of samples, monitor and observe the stroke count and the starting and stopping point of the felt covered weight. Recalibrate when necessary.

Hunter Color Meter Calibration

Adjust the Hunter Color Difference Meter for the black and white standard plates according to the procedures outlined in the operation manual of the instrument. Also run the stability check for standardization as well as the daily color stability check if this has not been done during the past eight hours. In addition, the zero reflectance must be checked and realigned if necessary. Place the white standard plate on the sample stage under the instrument port. Release the sample stage and allow the sample plate to be raised beneath the sample port. Using the “L”, “Y”, “X”, and “Z” standardizing knobs, adjust the instrument to read the Standard White Plate Values of “L”, “a”, and “b” when the “L”, “a”, and “b” push buttons are depressed in turn.

Measurement of Samples

The first step in the measurement of lint is to measure the Hunter color values of the black felt/cardboard samples prior to being rubbed on the web sample. The first step in this measurement is to lower the standard white plate from under the instrument port of the Hunter color instrument. Center a felt covered cardboard, with the arrow pointing to the back of the color meter, on top of the standard plate. Release the sample stage, allowing the felt covered cardboard to be raised under the sample port.

Since the felt width is only slightly larger than the viewing area diameter, make sure the felt completely covers
the viewing area. After confirming complete coverage, depress the L push button and wait for the reading to stabilize. Read and record this L value to the nearest 0.1 unit.

[0109] If a D25D2A head is in use, lower the felt covered cardboard and plate, rotate the felt covered cardboard 90° so the arrow points to the right side of the meter. Next, release the sample stage and check once more to make sure the viewing area is completely covered with felt. Depress the L push button. Read and record this value to the nearest 0.1 unit. For the D25D2M unit, the recorded value is the Hunter Color L value. For the D25D2A head where a rotated sample reading is also recorded, the Hunter Color L value is the average of the two recorded values.

[0110] Measure the Hunter Color L values for all of the felt covered cardboards using this technique. If the Hunter Color L values are all within 0.3 units of one another, take the average to obtain the initial L reading. If the Hunter Color L values are not within the 0.3 units, discard those felt/cardboard combinations outside the limit. Prepare new samples and repeat the Hunter Color L measurement until all samples are within 0.3 units of one another.

[0111] For the measurement of the actual web sample/cardboard combinations, place the web sample/cardboard combination on the base plate of the tester by slipping the holes in the board over the hold-down pins. The hold-down pins prevent the sample from moving during the test. Clip the calibration felt/cardboard sample onto the four pound weight with the cardboard side contacting the pads of the weight. Make sure the cardboard/felt combination is resting flat against the weight. Hook this weight onto the tester arm and gently place the web sample underneath the weight/felt combination. The end of the weight closest to the operator must be over the cardboard of the web sample and not the web sample itself. The felt must rest flat on the web sample and must be in 100% contact with the web surface.

[0112] Next, activate the tester by depressing the “push” button. At the end of the five strokes the tester will automatically stop. Note the stopping position of the felt covered weight in relation to the sample. If the end of the felt covered weight toward the operator is over cardboard, the tester is operating properly. If the end of the felt covered weight toward the tester is over sample, disregard this measurement and recalibrate as directed above in the Sutherland Rub Tester Calibration section.

[0113] Remove the weight with the felt covered cardboard. Inspect the web sample. If torn, discard the felt and web sample and start over. If the web sample is intact, remove the felt covered cardboard from the weight. Determine the Hunter Color L value on the felt covered cardboard as described above for the blank felts. Record the Hunter Color L readings for the felt after rubbing. Rub, measure, and record the Hunter Color L values for all remaining samples. After all web specimens have been measured, remove and discard all felt. Felts strips are not used again. Cardboards are used until they are bent, torn, limp, or no longer have a smooth surface.

vii. Calculations

[0114] Determine the delta L values by subtracting the average initial L reading found for the unused felts from each of the measured values for the first-side surface and second-side surface sides of the sample as follows.

[0115] For samples measured on both surfaces, subtract the average initial L reading found for the unused felts from each of the three first-side surface L readings and each of the three second-side surface L readings. Calculate the average delta for the three first-side surface values. Calculate the average delta for the three second-side surface values. Subtract the felt factor from each of these averages. The final results are termed a lint for the first-side surface and a lint for the second-side surface of the web.

[0116] By taking the average of the lint value on the first-side surface and the second-side surface, the lint is obtained which is applicable to that particular web or product. In other words, to calculate lint value, the following formula is used:

\[
\text{Lint Value} = \frac{\text{Lint Value, First-side} + \text{Lint Value, second-side}}{2}
\]

For samples measured only for one surface, subtract the average initial L reading found for the unused felts from each of the three L readings. Calculate the average delta for the three surface values. Subtract the felt factor from this average. The final result is the lint value for that particular web or product.

Horizontal Full Sheet (HFS) Test Method

[0117] The Horizontal Full Sheet (HFS) test method determines the amount of distilled water absorbed and retained by a sanitary tissue product of the present invention. This method is performed by first weighing a sample of the sanitary tissue product to be tested (referred to herein as the “Dry Weight of the paper”), then thoroughly wetting the sanitary tissue product, draining the wetted sanitary tissue product in a horizontal position and then reweighing (referred to herein as “Wet Weight of the paper”). The absorbive capacity of the sanitary tissue product is then computed as the amount of water retained in grams of water absorbed by the sanitary tissue product. When evaluating different sanitary tissue product samples, the same size of sanitary tissue product is used for all samples tested.

[0118] The apparatus for determining the HFS capacity of sanitary tissue product comprises the following: an electronic balance with a sensitivity of at least ±0.01 grams and a minimum capacity of 1200 grams. The balance should be positioned on a balance table and slab to minimize the vibration effects of floor/benchtop weighing. The balance should also have a special balance pan to be able to handle the size of the sanitary tissue product tested (i.e.; a paper sample of about 11 in. (27.9 cm) by 11 in. (27.9 cm)). The balance pan can be made out of a variety of materials. Plexiglass is a common material used.

[0119] A sample support rack and sample support cover is also required. Both the rack and cover are comprised of a lightweight metal frame, strung with 0.012 in. (0.305 cm) diameter monofilament so as to form a grid of 0.5 inch squares (1.27 cm²). The size of the support rack and cover is such that the sample size can be conveniently placed between the two.

[0120] The HFS test is performed in an environment maintained at 23±1°C and 50±2% relative humidity. A water reservoir or tub is filled with distilled water at 23±1°C to a depth of 3 inches (7.6 cm).

[0121] The sanitary tissue product to be tested is carefully weighed on the balance to the nearest 0.01 grams. The dry
The weight of the sample is reported to the nearest 0.01 grams. The empty sample support rack is placed on the balance with the special balance pan described above. The balance is then zeroed (tared). The sample is carefully placed on the sample support rack. The support rack cover is placed on top of the support rack. The sample (now sandwiched between the rack and cover) is submerged in the water reservoir. After the sample has been submerged for 60 seconds, the sample support rack and cover are gently raised out of the reservoir.

The sample, support rack and cover are allowed to drain horizontally for 120±5 seconds, taking care not to excessively shake or vibrate the sample. Next, the rack cover is carefully removed and the wet sample and the support rack are weighed on the previously tared balance. The weight is recorded to the nearest 0.01 g. This is the wet weight of the sample.

The dry weight of the sample is defined as (Wet Weight of the paper-Dry Weight of the paper).

All documents cited in the Detailed Description of the Invention are, in relevant part, incorporated herein by reference; the citation of any document is not to be construed as an admission that it is prior art with respect to the present invention.

While particular embodiments of the present invention have been illustrated and described, it would be obvious to those skilled in the art that various other changes and modifications can be made without departing from the spirit and scope of the invention. It is therefore intended to cover in the appended claims all such changes and modifications that are within the scope of this invention.

What is claimed is:

1. An array of sanitary tissue products comprising two or more multi-ply sanitary tissue products each of which comprises at least one value of a common intensive property that is different from the others, wherein the two or more multi-ply sanitary tissue products are marketed by a single company.

2. The array of sanitary tissue products according to claim 1 wherein the array further comprises at least one single-ply sanitary tissue product.

3. The array of sanitary tissue products according to claim 2 wherein the at least one single-ply sanitary tissue product comprises at least one value of a common intensive property that is different from at least one of the two or more multi-ply sanitary tissue products.

4. The array of sanitary tissue products according to claim 2 wherein the at least one single-ply sanitary tissue product comprises at least one value of a common intensive property that is different from the two or more multi-ply sanitary tissue products.

5. The array of sanitary tissue products according to claim 2 wherein the array comprises two or more single-ply sanitary tissue products each of which comprises at least one value of a common intensive property that is different from the others.

6. The array of sanitary tissue products according to claim 1 wherein each sanitary tissue product is packaged in a package comprising a common single source identifier.

7. The array of sanitary tissue products according to claim 6 wherein the common single source identifier comprises a trademark.

8. The array of sanitary tissue products according to claim 6 wherein the package further comprises a separate, independent product designation by which a consumer can differentiate one of the sanitary tissue products from another.

9. The array of sanitary tissue products according to claim 6 wherein at least one package further comprises a non-verbal cue that connotes softness.

10. The array of sanitary tissue products according to claim 6 wherein at least one package further comprises a representation of a texture present on the sanitary tissue product within the package.

11. The array of sanitary tissue products according to claim 6 wherein at least one package further comprises information about at least two other sanitary tissue products within the array of sanitary tissue products.

12. The array of sanitary tissue products according to claim 13 wherein each of the sanitary tissue products is priced differently.

13. The array of sanitary tissue products according to claim 6 wherein the package further comprises information about at least two other sanitary tissue products within the package as available.

14. The array of sanitary tissue products according to claim 13 wherein each sanitary tissue product comprises a separate, independent product designation by which a consumer can differentiate one of the sanitary tissue products from another.

15. The array of sanitary tissue products according to claim 19 wherein each of the sanitary tissue products is priced differently.

16. The array of sanitary tissue products according to claim 20 wherein the package further comprises information about at least two other sanitary tissue products within the package.

17. The array of sanitary tissue products according to claim 19 wherein the array comprises a separate, independent product designation by which a consumer can differentiate one of the sanitary tissue products from another.

18. The process for displaying an array of sanitary tissue products, comprising the steps of displaying an array of sanitary tissue products comprising two or more multi-ply sanitary tissue products each of which comprises at least one value of a common intensive property that is different from the others, wherein the two or more multi-ply sanitary tissue products are marketed by a single company, wherein the array comprises two or more single-ply sanitary tissue products each of which comprises at least one value of a common intensive property that is different from the others.

19. A process for making an array of sanitary tissue products, comprising the steps of:

a. producing a first multi-ply sanitary tissue product;

b. producing a second multi-ply sanitary tissue product; and

c. packaging the first and second multi-ply sanitary tissue products in packages comprising a common single source identifier, wherein the first and second multi-ply sanitary tissue products exhibit at least one value of a common intensive property that is different from the others.

20. An array of sanitary tissue products made by the process according to claim 19.