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(54) **Xerographic Paper and Coating Compositions Therefor**

(57) A photopaper coating composition comprising a solvent containing up to about 40% by weight of polyester and wax and a process for making such coating composition. The composition having use as a coating

on a substrate, the coated substrate being suitable for use in colour engines employing oil-less fusers.

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Description

FIELD OF THE INVENTION

[0001] The present invention is directed to papers, and more specifically, to papers for electrography, such as xerographic compatible photographic papers, that is for example coated papers containing a supporting substrate with certain coatings, and the use of these papers in imaging, especially xerographic processes and digital imaging processes, and wherein uniform high gloss and high image quality can be obtained. More specifically, the present invention is directed to coating compositions for application to supporting substrates as a coating, such for use in xerographic engines employing oil-less fusers as well as methods for providing such coating compositions to a substrate.

BACKGROUND OF THE INVENTION

[0002] Certain polyester coated papers are known, reference for example U.S. Pat. Nos. 5,627,128; 5,534,479 and 4,692,636.

[0003] There is disclosed in U.S. Pat. No. 4,663,216 a synthetic paper comprised of: (1) a multilayer support, (2) a layer of a transparent film of a thermophotographic resin free from an inorganic fine powder formed on one surface of the support (1), and (3) a primer layer of a specific material, reference the Abstract of the Disclosure for example. The support (1) comprises (1a) a base layer of a biaxially stretched film of a thermophotographic resin, a surface and a back layer (1b), and (1c) composed of a monoaxially stretched film of a thermophotographic resin containing 8 to 65 percent by weight of an inorganic fine powder.

[0004] Further, there is disclosed in U.S. Pat. No. 4,705,719 a synthetic paper of multilayer resin film comprising a base layer (1a) of a biaxially stretched thermophotographic resin film, and a laminate provided on at least one of opposite surfaces of the base layer, the laminate including a paper-like layer (1b) and a surface layer (1c), the paper-like layer containing a uniaxially stretched film of thermophotographic resin containing 8 to 65 percent by weight of inorganic fine powder, and wherein the surface layer contains an uniaxially stretched film of a thermophotographic resin.

[0005] In U.S. Pat. No. 4,868,581, there is disclosed an opaque paper-based receiving material for ink jet printing which comprises a poly(olefin)coated paper overcoated with an ink-receiving layer which contains a mixture of gelatin and starch. Reportedly, these receiving materials exhibit gloss, good color density and are smudge resistant. Although such receiving materials, when pictorially imaged with an ink jet printing device, may enable images acceptable in appearance and feel, the images thereon are still not believed to be of the same high quality that is customarily expected from and exhibited by photographic prints.

[0006] Also, there is disclosed in U.S. Pat. No. 4,903,039 an opaque paper-based receiving material for ink jet printing, which papers comprise a poly(olefin)-coated paper overcoated with an ink-receiving layer which contains an aqueous dispersion of a polyester ionomer, namely a poly[cyclohexylenedimethylene-co-oxydiethylene isophthalate-co-malonate-co-sodiumsulfobenzenedicarboxylate], dispersed in vinyl pyrrolidone polymer.

[0007] Further, there is disclosed in U.S. Pat. No. 4,903,040 an opaque paper-based receiving material for ink jet printing which comprises a poly(olefin)-coated paper overcoated with an ink-receiving layer which contains an aqueous dispersion of a polyester ionomer, namely a poly[cyclohexylenedimethylene isophthalate-co-sodiumsulfobenzene dicarboxylate], dispersed in vinyl pyrrolidone polymer.

[0008] Moreover, there is disclosed in U.S. Pat. No. 4,903,041 an opaque paper-based receiving material for ink jet printing which comprises a poly(olefin)-coated paper overcoated with an ink-receiving layer which contains an aqueous dispersion of a polyester ionomer, namely a poly[cyclohexylenedimethylene-co-xylylene-terephthalate-co-malonate-co-sodiumoiminobis(sulfonylbenzoate)], dispersed in vinyl pyrrolidone polymer.

[0009] U.S. Pat. No. 5,451,458, the disclosure of which is totally incorporated herein by reference, discloses a recording sheet which comprises (a) a substrate; (b) a coating on substrate which comprises (1) a binder selected from the group consisting of (A) polyesters; (B) polyvinyl acetals; (C) vinyl alcohol-vinyl acetal copolymers; (D) polycarbonates; and (E) mixtures thereof; and (2) an additive having a melting point of less than about 65°C and a boiling point of more than about 150°C and including, for example, furan derivatives; and developing the latent image with a toner which comprises a colorant and a resin selected from the group consisting of (A) Polyesters; (B) polyvinyl acetals; (C) vinyl alcohol-vinyl acetal copolymers; (D) polycarbonates; and (E) mixtures thereof; and (3) transferring the developed image to a recording sheet which comprises (a) a substrate; (b) a coating on the substrate which comprises (1) a binder selected from the group consisting of (A) polyesters; (B) polyvinyl acetals; (C) vinyl alcohol-vinyl acetal copolymers; (D) polycarbonates; and (E) mixtures thereof.

[0010] U.S. Pat. No. 6,177,222 and U.S. Patent 6,326,085, the disclosures of which are totally incorporated herein by reference, disclose a process for forming an image on a substrate, and developing the image with toner. Also disclosed is a coated substrate in which a coating of a polyester which is a poly(propoxylated bisphenol A fumarate) resin, a polyester resin of a terephthalic acid, bisphenol-A-ethylene oxide adduct, cyclohexane dimethanol or a low, from about 1,000 to about 50,000 molecular weight branched copolyester formed from isophthalic and nonanedioic acids with diols and triols is provided.

[0011] U.S. Pat. No. 5,968,689 discloses a removable and recyclable image forming material on a substrate. The image forming material comprises a polyester binding resin and 30 to 90 wt % of a releasing agent. The releasing agent is preferably a hydrophobic resin and/or a wax. The image forming material is formed by first making the releasing agent as a dispersion in ethyl acetate. To the dispersion is added polyester resin prepared in an oil phase. A dispersion stabilizer of an aqueous medium of carboxymethyl cellulose sodium and calcium carbonate is prepared and added to the oil phase and mixed until finely divided and the solvent removed by heating. The resultant residue is washed, filtered and dried to yield releasing-agent-containing image-forming particles of average particle size of 7.6 μm with the releasing agent being 30 wt % based on solid content. The image forming particles were further mixed with silica and applied onto a paper substrate for formation of a solid image.

[0012] U.S. Pat. No. 5,981,077 discloses an image transfer sheet having a formed image thereon which can be transferred onto an image receiving material such as cloth, canvas, plastics, paper, wood, leather, glass, china, metals or the like. The image transfer sheet has a releasing layer and a transfer layer thereon. Alternatively, a back coat layer is also provided on the uncoated side of the sheet. The releasing layer is preferably a silicone compound.

[0013] While the above materials and processes may be suitable for their intended purposes; a need remains for photographic papers particularly suitable for use in electrophotographic applications utilizing oil-less fusers. More specifically, a need remains for photographic papers which can be used in colour engines employing oil-less fusers to reduce any sticking or wrapping on the oil-less fuser roll while maintaining high image quality with high uniform gloss. Further, there is a need for a coating composition that can be applied to a suitable substrate to form a coating such that the coated substrate can be used in an oil-less fuser colour engine as well as a method of making such composition and coating.

SUMMARY OF THE INVENTION

[0014] It is a feature of the present invention to provide photographic papers with many of the advantages indicated herein.

[0015] It is another feature of the present invention to provide photographic papers, inclusive of xerographic photopapers particularly suitable for use in electrophotographic imaging systems; and also wherein there are enabled developed images with uniform gloss, and wherein, for example, the coating on the paper, such as the composition illustrated herein, does not adhere to an oil-less fuser roll thereby resulting in a smooth image surface with high gloss and high image quality.

[0016] It is yet another feature of the present invention

to provide photographic papers which can be employed with xerographic oil-less fusers, wherein there are obtained images with uniform gloss throughout the visible image and which gloss is improved compared with silver halide prints.

[0017] It is still another feature of the present invention to provide photographic papers which can be selected with colour engines that employ oil-less fusers, and wherein jamming of the photographic papers in the fusing apparatus is minimized.

[0018] According to an aspect of the present invention there is provided a photopaper coating composition comprising;

- a solvent containing up to about 40% by weight of polyester and wax.

[0019] According to another aspect of the present invention there is provided a photopaper coating composition comprising;

- a solvent containing up to about 40% by weight of polyester and wax, wherein said polyester is molecularly dispersed throughout the organic solvent and the wax is provided as wax particles of up to about 3 μm in diameter. Preferably said particles are about 0.5 μm to about 2.0 μm .

[0020] According to another aspect of the invention is a process for the production of a photopaper coating composition, the method comprising;

- mixing up to about 40% by weight of a solid dispersion of polyester/wax particles of a size of about 10 μm to about 50 μm with a solvent under shear agitation.

[0021] According to yet another aspect of the invention is a process for the production of a photopaper coating composition, the method comprising;

- mixing up to about 40% by weight of a solid dispersion of polyester/wax particles in a solvent under shear agitation. Preferably said solid dispersion of polyester/wax particles comprises particles of about 10 μm to about 50 μm in diameter of a polyester matrix having finely dispersed wax therein.

[0022] According to yet another aspect of the invention is a process for the production of a photopaper coating composition, the method comprising;

- mixing about 15% to about 25% by weight polyester/wax particles having a size of about 10 μm to 50 μm with a solvent under shear agitation to form a mixture;
- filtering said mixture.

[0023] According to another aspect of the present invention is a photopaper comprising:

- a substrate; and
- a coating over the substrate, wherein the photopaper enables the generation of toner images with a substantially uniform gloss throughout the images on the coating in an oil-less fuser xerographic engine. Preferably the coating comprises polyester having wax particles up to about 3 μm dispersed therein.

[0024] According to still another aspect of the present invention is a photopaper comprising;

- a substrate; and
- a thin polyester/wax coating over the substrate, wherein said coating comprises a polyester matrix having wax particles of up to about 3 μm throughout.

[0025] According to still another aspect of the present invention is a photopaper comprising;

- a substrate; and
- a thin polyester/wax coating over the substrate, wherein said coating comprises a polyester matrix having wax particles therein, wherein substantially over about 90% of said wax particles are up to about 2 μm .

[0026] According to still another aspect of the present invention is a photopaper comprising;

- a substrate; and
- a thin polyester/wax coating over substrate, wherein said coating comprises a polyester matrix having wax particles therein, wherein substantially over about 95% of said wax particles are up to about 2 μm .

[0027] According to still another aspect of the invention is a photopaper comprising a substrate and a thin polyester/wax coating over the substrate, wherein said polyester/wax coating comprises wax particles up to about 3 μm .

[0028] According to still another aspect of the invention is a photopaper comprising a substrate and a thin polyester/wax coating over the substrate, wherein said polyester/wax coating comprises wax particles up to about 3 μm .

[0029] According to still another aspect of the invention is a process for the production of a coating for a photopaper, the method comprising;

- mixing up to about 40% by weight of polyester/wax particles of a size of about 10 μm to 50 μm in a solvent under shear agitation to form a dispersion of wax micron sized particles;

- filtering said dispersion; and
- evaporating said solvent.

[0030] According to yet another aspect of the invention is a method for coating a photopaper with a coating composition to form a coating that does not adhere to an oil-less fuser roll, said method comprising;

- applying a coating composition comprising a solvent containing up to about 40% by weight of molecularly dispersed polyester and micron sized wax particles to a substrate; and
- evaporating said solvent.

[0031] According to yet another aspect of the invention is a coating for a photopaper substrate that does not adhere to an oil-less fuser roll, said coating comprising polyester having wax particles dispersed therein, wherein over 95% of the wax particles are up to about 2 μm .

[0032] According to still a further aspect of the invention is a process for making a coated photopaper that will not stick to an oil-less fuser roll, said process comprising;

- applying a composition of a solvent containing up to about 40% by weight of polyester and wax, wherein said polyester is molecularly dispersed within said solvent and said wax is provided as particles of up to about 3.0 μm , to a cellulosic substrate; and
- drying said composition to evaporate said solvent and form a coating on said substrate of up to about 8 μm .

[0033] In one embodiment, typically 90% or more of the wax particles are up to about 2 μm .

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0034] The present invention relates to a novel coating composition for application to photopaper used in oil-less colour engines. The coating composition forms a coating on the photopaper which coating resists sticking and wrapping on oil-less fuser rolls. The invention also relates to a novel photopaper having a novel coating thereon that prevents sticking of the photopaper to an oil-less fuser roll.

[0035] Aspects of the present invention relate to a novel photopaper coating composition which comprises polyester and wax in a solvent, where the wax is provided as micron sized particles and the polyester is molecularly dispersed in the solvent; a novel coating suitable for use on a variety of substrates that will not adhere to an oil-less fuser roll; a process which comprises making a polyester/wax photopaper coating composition for use on a photopaper substrate suitable for use in an oil-less colour engine. Other aspects relate to a coated photo-

paper substrate having a polyester and wax coating thereon wherein the coating prevents sticking and wrapping of the coated photopaper on an oil-less fuser in a colour engine; a coated photopaper providing high absolute gloss, low differential gloss and high image quality. Still other aspects relate to making a coated photopaper that will not jam, stick or wrap on an oil-less fuser roll.

[0036] The present invention relates to a coated photographic paper comprised of a substrate, such as a cellulosic substrate, and a coating thereover of a polyester/wax composition and which coating is preferably thin, for example about 1 μm to about 15 μm thickness, or from about 1 μm to about 10 μm , or more preferably from about 2 to about 8 μm as measured by a thickness gauge, model MT-12 from Heidenhain, and wherein there is enabled uniform glossy images with such papers. More specifically, there are provided in accordance with the present invention processes for generating high, for example, from about 50 to about 100 gloss units (GU) as measured with a 75° Glossmeter, Glossgard from Pacific Scientific, and which gloss is uniform, that is it does not significantly vary, or change on the image, or wherein the differential gloss level is reduced or minimized. Furthermore, the coating provides a surface to the photopaper which does not adhere to an oil-less fuser roll.

[0037] The coating composition of the invention comprises an organic solvent having up to about 40% by weight of a polyester and wax. The polyester is molecularly dispersed within the solvent whereas the wax is provided as micron sized particles. More preferably, the coating composition comprises from about 10% to about 40% by weight of the polyester and wax, and even more preferably is about 15% to about 25% by weight of the polyester and wax in the composition.

[0038] The coating composition of the invention is made by mixing solid particles in the form of a powder of a polyester/wax with a suitable organic solvent. The particles of powder comprise a suitable polyester resin and a suitable wax in a ratio of about 98:2 to 85:15 by weight and more preferably from about 96:4 to about 90:10 by weight. The particles are about 10 μm to about 50 μm in diameter, more preferably about 10 μm to about 20 μm and most preferably about 10 μm in size. 'It is understood by one of skill in the art that a mixture of sizes of particles of polyester/wax can be provided to make the composition so long as in general, the particle size ranges between about 10 μm to about 50 μm . The initial particles of polyester and wax added to the organic solvent are a matrix of polyester with the wax dispersed therein. As such, the polyester dissolves and molecularly disperses within the organic solvent under shearing conditions whereas the wax does not dissolve in the organic solvent under shearing conditions but rather forms microparticles of up to about 3.0 μm in diameter and more preferably up to about 2.0 μm .

The polyester forming part of the micro-particles of the

coating composition may comprise a suitable polyester resin or similar polymer or mixtures of such. For example, the polyester may comprise more specifically a poly(propoxylated bisphenol A fumarate) resin, a polyester resin comprised of poly(terephthalic acid bisphenol-A-ethylene oxide adduct), cyclohexane dimethanol or a low, for example from 1,000 to about 50,000, and preferably about 20,000 M_w , branched copolyester formed from isophthalic and nonanedioic acids with diols and triols, such as resin, is Vitel 5833B™ polyester or Vitel 5833™ available from the Bostik Company. Preferred diols are 2,2,4,4-tetraalkyl-1,3-cyclobutane diol, 1,4-butane diol, or 1,3-propane diol; and preferred triols are 2-(hydroxy methyl)1,3-propane diol, 1,1,1(trishydroxy methyl)ethane, 1,2,4-butane triol, or 1,2,3-propane triol. Other suitable coatings may be selected, such as known polyesters and mixtures thereof, inclusive of the polyesters of, for example, U.S. Pat. No. 3,590,000.

[0039] Suitable wax for use in the polyester/wax micro-particles of the coating composition may comprise montanic ester waxes, montanic acid waxes, stearamide waxes, camauba waxes and mixtures thereof. Exemplative examples of such waxes include but are not limited to: Licowax F™ (a Montanic Ester wax supplied by the Clariant Corporation), Licowax E™ (a Montanic Ester wax supplied by the Clariant Corporation), Licowax S™ (a Montanic Acid wax supplied by the Clariant Corporation), Licowax LP™ (a Montanic Acid wax supplied by the Clariant Corporation), Kemamide W40™ (a Stearamide wax supplied by C.K. Witso), Hymicron G270™ (a Stearamide wax supplied by Chukyo Yushi Company), Hymicron H982™ (a Carnauba wax supplied by Chukyo Yushi Company) and SL506™ (a Carnauba wax supplied by Elementis Specialties).

[0040] Any suitable substrate can be employed in the invention. The substrates selected may be commercially available photopaper as ink jet, off set or xerographic papers. In one aspect, the substrate is a cellulosic substrate and is comprised of alkaline sized and acid sized blends of hardwood kraft and softwood kraft fibers, which blends contain from about 10 percent to about 90 percent by weight of softwood and from about 90 to about 10 percent by weight of hardwood. Examples of hardwood include SeaGUll W dry bleached hardwood kraft, preferably present, for example, in one embodiment in an amount of about 70 percent by weight. Examples of softwood include La Toque dry bleached softwood kraft present, for example, in one embodiment in an amount of 30 percent by weight. These sized substrates may also contain pigments in effective amounts of from about 1 to about 60, and preferably from about 1 to about 25 percent by weight, such as clay (available from Georgia Kaolin Company, Astro-fil 90 clay, Engelhard Ansilex clay), titanium dioxide (available from Titanium Company--Anatase grade AHR), calcium silicate CH-427-97-8, XP-974 (J.M. Huber Corporation), and the like. Also, the sized substrates may contain various effective amounts of sizing chemicals (for example from

about 0.25 percent to about 25 percent by weight of pulp), such as Mon size (available from Monsanto Company), Hercon-76 (available from Hercules Company), Alum (available from Allied Chemicals as Iron free alum), and retention aid (available from Allied Colloids as Percol 292). The sizing values of papers, including the commercial papers that can be selected for the present invention in embodiments thereof, vary between, for example, about 0.4 second to about 4,685 seconds, and papers in the sizing range of about 50 seconds to about 300 seconds are preferred, primarily to decrease costs. The porosity values of the substrates, which are preferably porous, vary from about 100 to about 1,260 mil/minute and preferably from about 100 to about 600 mil/minute to permit, for example, the use of these papers for various printing technologies, such as thermal transfer, liquid toner development, xerography, ink jet processes, and the like.

[0041] Illustrative examples of commercially available, internally and externally (surface) sized substrates that may be selected for the present invention, and which are treated with a de-sizing agent dispersed in an optional binder with a substrate thickness of, for example, from about 50 microns to about 200 microns and preferably of a thickness of from about 100 microns to about 175 microns include Diazo papers, offset papers such as Great Lakes offset, recycled papers such as Conservatree, office papers such as Automimeo, Eddy liquid toner paper and copy papers from companies such as Nekoosa, Champion, Wiggins Teape, kymmene, Modo, Domtar, Veitsiluoto and Sanyo with Xerox 4024.TM. papers and sized calcium silicate-clay filled papers being particularly preferred in view of their availability, and low print through.

Any suitable solvent may be used in the composition of the invention. Suitable solvents for use in the present invention include but are not limited to toluene, methyl ethyl ketone, isopropanol, dioxolane and mixtures thereof. Preferably, the solvent is selected from the group consisting of toluene and methyl ethyl ketone, toluene and isopropanol; toluene and dioxolane; and methyl ethyl ketone, dioxolane and isopropanol. A preferred solvent system is toluene/methyl ethyl ketone (MEK) with the ratio of toluene to methyl ethyl ketone being in the range of about 80:20 to 30:70 by weight and more preferably in the ratio of about 70:30 to 50:50 by weight. Other suitable solvent systems may include for example toluene/isopropanol (in a ratio of about 80:20 to 30:70 by weight), toluene/dioxolane (in a ratio of about 80:20 to 30:70 by weight) and methyl ethyl ketone/dioxolane/isopropanol (in a ratio of about 45:45:10 by weight).

[0042] In an aspect of the invention, the photopaper coating composition is made by the mixing of up to about 40% by weight, more preferably about 10 % to about 40% by weight, and more preferably about 15% to about 25% by weight of the polyester/wax 10 μ m to about 50 μ m in diameter particles in a suitable organic solvent

under moderate shear agitation. As such, the polyester dissolves into the organic solvent. The wax as present within the micro-particles of polyester/wax does not dissolve in the organic solvent but rather forms small microparticles during shearing. The coating composition is then filtered through a suitable bag filter such as a 25 μ m bag filter and collected.

[0043] The coating composition is then applied in a thin layer to a desired substrate using a slot coating head to form a coating on the substrate. The coating composition as applied to the substrate is dried to provide a dry, adherent coating on the substrate having a thickness of up to about 10 μ m and more preferably about 2 μ m to about 8 μ m. Drying is achieved at a temperature and time sufficient that the wax particles move more to the surface of the coating. In this manner, the coating as provided on the substrate adheres well to the selected substrate such that it is not removable therefrom. The resultant coating comprises polyester having particles of wax of up to about 2 μ m in diameter dispersed throughout. In one embodiment over about 90% of the wax particles of the coating are up to about 2 μ m. More preferably, over about 95% of the wax particles of the coating are up to about 2 μ m. Even more preferably, over about 98% of the wax particles of the coating are up to about 2 μ m and even more preferably, over about 99% of the wax particles of the coating are up to about 2 μ m.

[0044] The coating composition as applied to a desired substrate to form a coating and used in a xerographic oil-less fuser, will not stick to the oil-less fuser roll and yet provide images with high uniform gloss. Furthermore, the coated photopapers of the present invention exhibit good qualities of reduced curl upon printing and can be used with a variety of different toners as recited in Applicant's U.S. Patent No. 6,177,222.

[0045] Specific embodiments of the invention will now be described in detail. These Examples are intended to be illustrative, and the invention is not limited to the materials, conditions, or process parameters set forth in these embodiments. All parts and percentages are by weight unless otherwise indicated. Comparative Examples and data are also provided.

EXAMPLES

[0046] The variation in gloss level of a xerographic color print can be quantified by using a specially devised differential gloss test target. The test target consists of an 8 and 1/2 by 11 inch sheet having nine equally sized squares of 5 centimeter dimension evenly spaced around the area of the sheet.

[0047] The nine squares have varying optical density which is achieved by varying the toner coverage on each square as follows: 0 percent coverage (substrate only), 10 percent coverage, 20 percent coverage, 40 percent coverage, 60 percent coverage, 80 percent coverage, 100 percent coverage, the color green (2 layers of toner)

and process black (3 layers of toner). A print of this test target is then produced on a xerographic color copier/printer using a given substrate. The gloss level of the nine squares on the resulting xerographic print is measured using a 75° Glossmeter. The variation in gloss level is then defined as the difference in gloss between the highest and lowest gloss values obtained from the nine squares of varying toner coverage.

EXAMPLE 1

[0048] Coating composition was prepared by adding a resin/wax particles to a solvent mixture of 60% toluene and 40% methyl ethyl ketone under moderate shear agitation for approximately two hours of mixing. The final coating solids were about 25% by weight. The resin used in the coating was Vitel 5856B™, a low molecular weight non-crystalline polyester. The wax was selected from montanic acid waxes and Licowax S™ was specifically used. The ratio of resin to wax was about 92:8.

[0049] The coating composition was filtered through a 25 µm bag filter into a stainless steel pressure pot. The coating substrate was a #1 Offset C2S Offset (162 gsm Centure Gloss Cover manufactured by Consolidated Paper Inc.). Coating was applied on a Faustel Model TT coater using a slot coating head. The slot width was 4 mil, die gap 3 mil, web speed 8 fpm. Drying was achieved using two banks of air-impingement dryers both operated at 135°C. Dry coating thickness applied was about 8 µm. The final coating quality was uniform and without defect. The gloss of the final coated sheet was approximately 70 GU (60° Gardiner gloss).

[0050] The Faustel coated sheets were evaluated in three different oil-less fusers: 1) NICE, which is an oil-less version of fuser used in Xerox DC12 printer, 2) the oil-less fuser used in Xerox DC2006 printer and 3) the oil-less fuser used in Xerox Phaser 7700 printer. The sheets did not stick or wrap on any of the oil-less fusers and there was no transfer of coated material to the fuser rolls. The resulting fused sheets had a high level of gloss (75° gloss>90GU).

[0051] The fused sheets were further tested in an oil-less prototype unit specifically developed for photo-finishing applications. The unit consisted of a heated, smooth, seamless belt with a cooling zone. The prototype unit increased the gloss level of the prints, further reduced differential gloss and eliminated toner contouring. The Faustel coated sheets that were imaged and fused in Xerox DC2006 printer were passed through the prototype unit. The prints released freely from the oil-less prototype belt with no transfer of material. The resulting prints had high absolute gloss (75° gloss = 99GU), extremely low differential gloss (less than 1GU) and no visible toner contouring or image defects.

EXAMPLE 2

[0052] Coating composition was prepared by adding

a resin/wax particles to a solvent mixture of 60% toluene and 40% methyl ethyl ketone under moderate shear agitation for approximately two hours of mixing. The final coating solids was about 30% by weight. The resin used in the coating was Vitel 5856B™, a low molecular weight non-crystalline polyester. The wax was selected from montanic acid waxes and Licowax S™ was used. The ratio of resin to wax was 94:6.

[0053] The coating composition was filtered through a 25 µm bag filter into a stainless steel pressure pot. The coating substrate was a #1 Offset C2S Offset (162 gsm Centure Gloss Cover manufactured by Consolidated Paper Inc.). Coating was applied on a Faustel Model TT coater using a slot coating head. The slot width was 4 mil, die gap 3 mil, web speed 8 fpm. Drying was achieved using two banks of air-impingement dryers both operated at 135°C. Dry coating thickness applied was about 6 µm. The final coating quality was uniform and without defect. The gloss of the final coated sheet was approximately 70 GU (60° Gardiner gloss).

[0054] The Faustel coated sheets were evaluated in three different oil-less fusers: 1) NICE, which is an oil-less version of fuser used in Xerox DC12 printer, 2) the oil-less fuser used in Xerox DC2006 printer and 3) the oil-less fuser used in Xerox Phaser 7700 printer. The sheets did not stick or wrap on any of the oil-less fusers and there was no transfer of coated material to the fuser rolls. The resulting fused sheets had a high level of gloss (75° gloss>90GU).

EXAMPLE 3

[0055] Coating solution was prepared by adding a resin/wax particles to a solvent mixture of 60% toluene and 40% methyl ethyl ketone under moderate shear agitation for approximately two hours of mixing. The final coating solids was about 25% by weight. The resin used in the coating was a 50:50 mixture by weight of Vitel 5856B™ and Vitel 2200™. The wax was selected from montanic acid waxes and Licowax S™ was used. The ratio of resins to wax was 92:8.

The coating composition was filtered through a 25 µm bag filter into a stainless steel pressure pot. The coating substrate was a #1 Offset C2S Offset (162 gsm Centure Gloss Cover manufactured by Consolidated Paper Inc.). Coating was applied on a Faustel Model TT coater using a slot coating head. The slot width was 4 mil, die gap 3 mil, web speed 8 fpm. Drying was achieved using two banks of air-impingement dryers one operating at 50°C and the other at 105°C. Dry coating thickness applied was about 5 µm. The final coating quality was uniform and without defect. The gloss of the final coated sheet was approximately 80 GU (60° Gardiner gloss).

The Faustel coated sheets were evaluated in three different oil-less fusers: 1) NICE, which is an oil-less version of fuser used in Xerox DC12 printer, 2) the oil-less fuser used in Xerox DC2006 printer and 3) the

oil-less fuser used in Xerox Phaser 7700 printer. The sheets did not stick or wrap on any of the oil-less fusers and there was no transfer of coated material to the fuser rolls. The resulting fused sheets had a high level of gloss (75° gloss>90GU).

EXAMPLE 4

[0056] Coating composition was prepared by adding a resin/wax particles to a solvent mixture of 60% toluene and 40% methyl ethyl ketone under moderate shear agitation for approximately two hours of mixing. The final coating solids was about 25% by weight. The resin used in the coating was a 75:25 mixture of Vitel 5856B™ and Vitel 2200™. The wax was selected from montanic acid waxes and Licowax 5™ was used. The ratio of resins to wax was 94:6.

The coating composition was filtered through a 25 µm bag filter into a stainless steel pressure pot. The coating substrate was a #1 Offset C2S Offset (162 gsm Centure Gloss Cover manufactured by Consolidated Paper Inc.). Coating was applied on a Faustel Model TT coater using a slot coating head. The slot width was 4 mil, die gap 3 mil, web speed 8 fpm. Drying was achieved using two banks of air-impingement dryers one operating at 50°C and the other at 105°C. Dry coating thickness applied was about 8 µm. The final coating quality was uniform and without defect. The gloss of the final coated sheet was approximately 75 GU (60° Gardiner gloss).

The Faustel coated sheets were evaluated in three different oil-less fusers: 1) NICE, which is an oil-less version of fuser used in Xerox DC12 printer, 2) the oil-less fuser used in Xerox DC2006 printer and 3) the oil-less fuser used in Xerox Phaser 7700 printer. The sheets did not stick or wrap on any of the oil-less fusers and there was no transfer of coated material to the fuser rolls. The resulting fused sheets had a high level of gloss (75° gloss>90GU).

EXAMPLE 5

[0057] Coating composition was prepared by adding a resin/wax particles to a solvent mixture of 50% toluene and 50% methyl ethyl ketone under moderate shear agitation for approximately two hours of mixing. The final coating solids was about 25% by weight. The resin used in the coating was Vitel 5856B™, a low molecular weight non-crystalline polyester. The wax was selected from carnauba waxes and SlipAyd SL506™ was used. The ratio of resin to wax was 93:7.

The coating composition was filtered through a 25 µm bag filter into a stainless steel pressure pot. The coating substrate was a #1 Offset C2S Offset (162 gsm Centure Gloss Cover manufactured by Consolidated Paper Inc.). Coating was applied on a Faustel Model TT coater using a slot coating head. The slot width was 4 mil, die gap 3 mil, web speed 8 fpm. Drying was

achieved using two banks of air-impingement dryers both operated at 135°C. Dry coating thickness applied was about 6 µm. The final coating quality was uniform and without defect. The gloss of the final coated sheet was approximately 85GU (60° Gardiner gloss).

The Faustel coated sheets were evaluated in three different oil-less fusers: 1) NICE, which is an oil-less version of fuser used in Xerox DC12 printer, 2) the oil-less fuser used in Xerox DC2006 printer and 3) the oil-less fuser used in Xerox Phaser 7700 printer. The sheets did not stick or wrap on any of the oil-less fusers and there was no transfer of coated material to the fuser rolls. The resulting fused sheets had a high level of gloss (75° gloss>90GU).

EXAMPLE 6

[0058] Coating composition was prepared by adding a resin/wax particles to a solvent mixture of 50% toluene and 50% methyl ethyl ketone under moderate shear agitation for approximately two hours of mixing. The final coating solids was about 25% by weight. The resin used in the coating was Vitel 5856B™, a low molecular weight non-crystalline polyester. The wax was selected from montanic ester waxes and Licowax F™ was used. The ratio of resin to wax was 93:7.

The coating was filtered through a 25 µm bag filter into a stainless steel pressure pot. The coating substrate was a #1 Offset C2S Offset (162 gsm Centure Gloss Cover manufactured by Consolidated Paper Inc.). Coating was applied on a Faustel Model TT coater using a slot coating head. The slot width was 4 mil, die gap 3 mil, web speed 8 fpm. Drying was achieved using two banks of air-impingement dryers both operated at 135°C. Dry coating thickness applied was about 6 µm. The final coating quality was uniform and without defect. The gloss of the final coated sheet was approximately 70GU (60° Gardiner gloss).

The Faustel coated sheets were evaluated in three different oil-less fusers: 1) NICE, which is an oil-less version of fuser used in Xerox DC12 printer, 2) the oil-less fuser used in Xerox DC2006 printer and 3) the oil-less fuser used in Xerox Phaser 7700 printer. The sheets did not stick or wrap on any of the oil-less fusers and there was no transfer of coated material to the fuser rolls. The resulting fused sheets had a high level of gloss (75° gloss>90GU).

EXAMPLE 7

[0059] Coating composition was prepared by adding a resin/wax particles to a solvent mixture of 60% toluene and 40% methyl ethyl ketone under moderate shear agitation for approximately two hours of mixing. The final coating solids was about 25% by weight. The resin used in the coating was Vitel 5856B™, a low molecular weight non-crystalline polyester. The wax was selected from montanic ester waxes and Licowax E™ was used. The

ratio of resin to wax was 94:6.

The coating composition was filtered through a 25 µm bag filter into a stainless steel pressure pot. The coating substrate was a #1 Offset C2S Offset (162 gsm Centure Gloss Cover manufactured by Consolidated Paper Inc.). Coating was applied on a Faustel Model TT coater using a slot coating head. The slot width was 4 mil, die gap 3 mil, web speed 8 fpm. Drying was achieved using two banks of air-impingement dryers one operating at 50°C and the other at 105°C. Dry coating thickness applied was about 9 µm. The final coating quality was uniform and without defect. The gloss of the final coated sheet was approximately 65GU (60° Gardiner gloss).

The Faustel coated sheets were evaluated in three different oil-less fusers: 1) NICE, which is an oil-less version of fuser used in Xerox DC12 printer, 2) the oil-less fuser used in Xerox DC2006 printer and 3) the oil-less fuser used in Xerox Phaser 7700 printer. The sheets did not stick or wrap on any of the oil-less fusers and there was no transfer of coated material to the fuser rolls. The resulting fused sheets had a high level of gloss (75° gloss>90GU).

EXAMPLE 8

[0060] Coating composition was prepared by adding a resin/wax particles to a solvent mixture of 60% toluene and 40% isopropanol under moderate shear agitation for approximately two hours of mixing. The final coating solids was about 25% by weight. The resin used in the coating was Vitel 5856B™, a low molecular weight non-crystalline polyester. The wax was selected from montanic ester waxes and Licowax KLE™ was used. The ratio of resin to wax was 94:6.

The coating composition was filtered through a 25 µm bag filter into a stainless steel pressure pot. The coating substrate was a #1 Offset C2S Offset (162 gsm Centure Gloss Cover manufactured by Consolidated Paper Inc.). Coating was applied on a Faustel Model TT coater using a slot coating head. The slot width was 4 mil, die gap 3 mil, web speed 8 fpm. Drying was achieved using two banks of air-impingement dryers one operating at 100°C and the other at 135°C. Dry coating thickness applied was about 8 µm. The final coating quality was uniform and without defect. The gloss of the final coated sheet was approximately 65GU (60° Gardiner gloss).

The Faustel coated sheets were evaluated in three different oil-less fusers: 1) NICE, which is an oil-less version of fuser used in Xerox DC12 printer, 2) the oil-less fuser used in Xerox DC2006 printer and 3) the oil-less fuser used in Xerox Phaser 7700 printer. The sheets did not stick or wrap on any of the oil-less fusers and there was no transfer of coated material to the fuser rolls. The resulting fused sheets had a high level of gloss (75° gloss>90GU).

EXAMPLE 9

[0061] Coating composition was prepared by adding a resin/wax particles to a solvent mixture of 50% toluene and 50% dioxolane under moderate shear agitation for approximately two hours of mixing. The final coating solids was about 25% by weight. The resin used in the coating was Vitel 5856B™, a low molecular weight non-crystalline polyester. The wax was selected from montanic acid waxes and Licowax S™ was used. The ratio of resin to wax was 95:5.

[0062] The coating composition was filtered through a 25 µm bag filter into a stainless steel pressure pot. The coating substrate was a #1 Offset C2S Offset (162 gsm Centure Gloss Cover manufactured by Consolidated Paper Inc.). Coating was applied on a Faustel Model TT coater using a slot coating head. The slot width was 4 mil, die gap 3 mil, web speed 8 fpm. Drying was achieved using two banks of air-impingement dryers both operating at 135°C. Dry coating thickness applied was about 7 µm. The final coating quality was uniform and without defect. The gloss of the final coated sheet was approximately 75GU (60° Gardiner gloss).

The Faustel coated sheets were evaluated in three different oil-less fusers: 1) NICE, which is an oil-less version of fuser used in Xerox DC12 printer, 2) the oil-less fuser used in Xerox DC2006 printer and 3) the oil-less fuser used in Xerox Phaser 7700 printer. The sheets did not stick or wrap on any of the oil-less fusers and there was no transfer of coated material to the fuser rolls. The resulting fused sheets had a high level of gloss (75° gloss>90GU).

EXAMPLE 10

[0063] Coating composition was prepared by adding a resin/wax particles to a solvent mixture of 45% methyl ethyl ketone, 45% dioxolane and 10% isopropanol under moderate shear agitation for approximately two hours of mixing. The final coating solids was about 25% by weight. The resin used in the coating was Vitel 5856B™, a low molecular weight non-crystalline polyester. The wax was selected from carnauba waxes and SlipAyd 5L503™ was used. The ratio of resin to wax was 96:4.

The coating composition was filtered through a 25 µm bag filter into a stainless steel pressure pot. The coating substrate was a #1 Offset C2S Offset (162 gsm Centure Gloss Cover manufactured by Consolidated Paper Inc.). Coating was applied on a Faustel Model TT coater using a slot coating head. The slot width was 4 mil, die gap 3 mil, web speed 8 fpm. Drying was achieved using two banks of air-impingement dryers both operating at 135°C. Dry coating thickness applied was about 6 µm. The final coating quality was uniform and without defect. The gloss of the final coated sheet was approximately 70GU (60° Gardiner gloss).

The Faustel coated sheets were evaluated in

three different oil-less fusers: 1) NICE, which is an oil-less version of fuser used in Xerox DC12 printer, 2) the oil-less fuser used in Xerox DC2006 printer and 3) the oil-less fuser used in Xerox Phaser 7700 printer. The sheets did not stick or wrap on any of the oil-less fusers and there was no transfer of coated material to the fuser rolls. The resulting fused sheets had a high level of gloss (75° gloss>90GU).

[0064] Other embodiments and modifications of the present invention may occur to those skilled in the art subsequent to a review of the information presented herein; these embodiments and modifications, as well as equivalents thereof, are also included within the scope of this invention.

Claims

1. A photopaper coating composition comprising;

- a solvent containing up to about 40% by weight of polyester and wax, wherein said polyester is molecularly dispersed within said solvent and said wax is provided as particles of up to about 3.0 μm .

2. The composition of claim 1, wherein said composition comprises about 98:2 to about 85:15 by weight of polyester to wax.

3. The composition of claim 1, wherein said polyester is a polyester selected from the group consisting of a polyester of poly(propoxylated bisphenol A fumarate), a polyester resin composed of terephthalic acid/bisphenol A ethylene oxide adduct, cyclohexane dimethanol or low molecular weight, branched copolyesters formed from isophthalic and nonanedioic acids with diols and triols and mixtures thereof.

4. The composition of claim 1, wherein said solvent is selected from the group consisting of toluene, methyl ethyl ketone, isopropanol, dioxolane and mixtures thereof, and/or wherein said wax is selected from the group consisting of monotanic ester waxes, monotanic acid waxes, stearamide waxes, caruba waxes and mixtures thereof.

5. A photopaper comprising:

- a substrate; and
- a coating on said substrate,

wherein the photopaper enables the generation of toner images with a substantially uniform gloss throughout the images on the coating in an oil-less fuser xerographic engine.

6. The photopaper of claim 5, wherein images have a

gloss value between about 50 GU to about 100 GU as measured by a 75 ° Glossmeter.

7. A process for the production of a photopaper coating composition, the method comprising;

- mixing up to about 40% by weight of a solid dispersion of polyester/wax particles in a solvent under shear agitation.

8. The process of claim 7, wherein said solid dispersion of polyester/wax particles comprises particles of about 10 μm to about 50 μm in diameter of a polyester matrix having finely dispersed wax therein.

9. A coating for a photopaper substrate that does not adhere to an oil-less fuser roll, said coating comprising polyester having wax particles dispersed therein, wherein over 95% of the wax particles are up to about 2 μm .

10. A process for making a coated photopaper that will not stick to an oil-less fuser roll, said process comprising;

- applying a composition of a solvent containing up to about 40% by weight of polyester and wax, wherein said polyester is molecularly dispersed within said solvent and said wax is provided as particles of up to about 3.0 μm , to a cellulosic substrate; and
- drying said composition to evaporate said solvent and form a coating on said substrate of up to about 8 μm .



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EUROPEAN SEARCH REPORT

Application Number
EP 03 01 3741

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