WEB-WOUND ROLLS WITH MICROSPHERE TREATED EDGE AND METHODS OF MAKING SAME

TECHNICAL FIELD

The present disclosure relates to web-wound rolls having a web edge treatment with microspheres, and processes to make the same.

BACKGROUND

Winding impression defects are very common in a web-wound roll process for winding or rolling continuous films or webs. An inside pressure distribution of a web-wound roll can be made by, for example, surface roughness of the roll core, wrinkles, foreign matters, etc., which can generate impression defects and/or film deformation. Various approaches have been described in, for example, PCT Publication No. WO 2011030684 (Maeda), and Japanese Patent Application Publication Nos. JP 201346966 and JP 2012247727 to reduce the winding impression defects.

SUMMARY

There is a desire to reduce winding impression defects in web-wound roll processes. While soft winding can be effective to reduce winding impression defects, soft winding may generate telescoping issues. The present disclosure provides soft winding processes for forming web-wound rolls that may not generate telescoping issues. The term "soft winding process" used herein refers to a web-wound roll process with a winding tension not greater than 1 N/cm, typically between 0.01 N/cm and 1 N/cm.

Briefly, in one aspect, the present disclosure describes an article that includes a continuous web including a substrate having a first major side and a second major side opposite to the first major side, and at least two web edges. One or more stripes of coated material have a thickness and are disposed on one or both of the first and second major sides adjacent to one or both of the web edges. The substrate is rolled upon itself in multiple revolutions about a central core, and each revolution is held substantially separate from the next by the one or more stripes of coated material which comprises microspheres to provide a friction and prevent a relative axial movement between adjacent revolutions.

In some embodiments, the web is a multi-layer optically clear laminate that includes a release liner, and the one or

more stripes of coated material are disposed on a surface of the release liner along one or more of the web edges.

In another aspect, the present disclosure describes a method that includes providing a continuous web comprising a substrate web having a first major side and a second major side opposite to the first major side, and at least two web edges, disposing one or more stripes of coated material having a thickness on one or both of the first and second major sides adjacent to one or both of the web edges, and winding the substrate web upon itself in multiple revolutions about a central core. Each revolution is held substantially separate from the next by the one or more stripes of coated material which comprises microspheres to provide a friction and prevent a relative axial movement between adjacent revolutions.

Various unexpected results and advantages may be obtained in exemplary embodiments of the disclosure. One such advantage of exemplary embodiments of the present disclosure is that continuous films or webs can be wound by a soft winding process without generating any telescoping issues. In contrast, conventional approaches such as, for example, taper reducing tension, knurling of roll edge, insertion of spacer, or the combinations thereof, may not achieve the advantages of the present disclosure. For example, while a process using taper reducing wind tension control may be effective to reduce the winding impression, the effect of such process is limited by factors of web handling which depends on the web properties and equipment capability. While knurling on both web edges may provide the space between adjacent layers of wounded film and may reduce the inner pressure thereof, it is difficult to obtain stable knurling process with thin films or webs since it is easy to create critical damages on web edges. While insertion of spacer at both web edges may reduce the inner wound pressure, it would be difficult to control the position, thickness, and/or flexibility of spacer to achieve the effects.

Various aspects and advantages of exemplary embodiments of the disclosure have been summarized. The above Summary is not intended to describe each illustrated embodiment or every implementation of the present certain exemplary embodiments of the present disclosure. The Drawings and the Detailed Description that follow more particularly exemplify certain preferred embodiments using the principles disclosed herein.

Claims

What is claimed is:

1. An article comprising:

a continuous web comprising a substrate having a first major side and a second major side opposite to the first major side, and at least two web edges;

one or more stripes of coated material having a thickness and disposed on one or both of the first and second major sides adjacent to one or both of the web edges,

wherein the substrate is rolled upon itself in multiple revolutions about a central core, and

wherein each revolution is held substantially separate from the next by the one or more stripes of coated material which comprises microspheres to provide a friction and prevent a relative axial movement between adjacent revolutions.

2. The article of claim 1, wherein the thickness of the one or more stripes of coated material is from 0.5 microns to 100 microns.

3. The article of claim 1, wherein the microspheres further comprise an adhesive.

4. The article of claim 3, wherein the adhesive comprises an adhesive blend.

5. The article of claim 4, wherein the adhesive blend comprises from about 1 to 50 parts by weight of microspheres and from about 50 to 99 parts by weight of an adhesive.

6. The article of claim 1, wherein the microspheres include solid, elastomeric, deformable, and non-tacky microspheres.

7. The article of claim 3, wherein the microspheres have an average diameter greater than a coating thickness of the adhesive on the substrate.

8. The article of claim 3, wherein the adhesive comprises a pressure sensitive adhesive (PSA).

9. The article of claim 8, wherein the pressure sensitive adhesive is a repositionable adhesive.

10. The article of claim 1, wherein the one or more stripes of coated material each have a width W1, the continuous web has a width W2, and the ratio of W1/W2 is between 0.01 to 0.2.

11. The article of claim 1, wherein the continuous web is a multi-layer optically clear laminate that includes a release liner, and the one or more stripes of coated material are disposed on a surface of the release liner along one or more of the web edges.

12. A method comprising:

providing a continuous web comprising a substrate web having a first major side and a second major side opposite to the first major side, and at least two web edges;

disposing one or more stripes of coated material having a thickness on one or both of the first and second major sides adjacent to one or both of the web edges; and

winding the substrate upon itself in multiple revolutions about a central core,

wherein each revolution is held substantially separate from the next by the one or more stripes of coated material which comprises microspheres to provide a friction and prevent a relative axial movement between adjacent revolutions.

13. The method of claim 12, wherein the substrate web is wound in a roll-to-roll process with a winding tension not greater than 1 N/cm.

14. The method of claim 13, wherein the winding tension is between 0.1 N/cm and 0.5 N/cm.