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(54) **A sleeve for an anilox roll and a method for manufacturing sleeves for anilox rolls**

(57) A method for manufacturing of sleeves for anilox rolls, the sleeve comprising an inner sleeve (21) of compressible material and an outer sleeve (22) having an outer surface with ink transfer cells engraved therein. The method comprises the steps of providing an air mandrel (10), applying the inner sleeve (21) on the air mandrel (10), applying adhesive on the inner sleeve (21), applying the outer sleeve (22) on the inner sleeve (21), the outer sleeve being made of a black polymer having a hardness of between 85 and 90 Shore D (according to DIN53505), grinding the outer sleeve (22), laser-engraving ink transfer cells in the outer surface of the outer sleeve (22) with the user of a Near Infrared (NIR) laser, and polishing the outer surface of the outer sleeve (22).

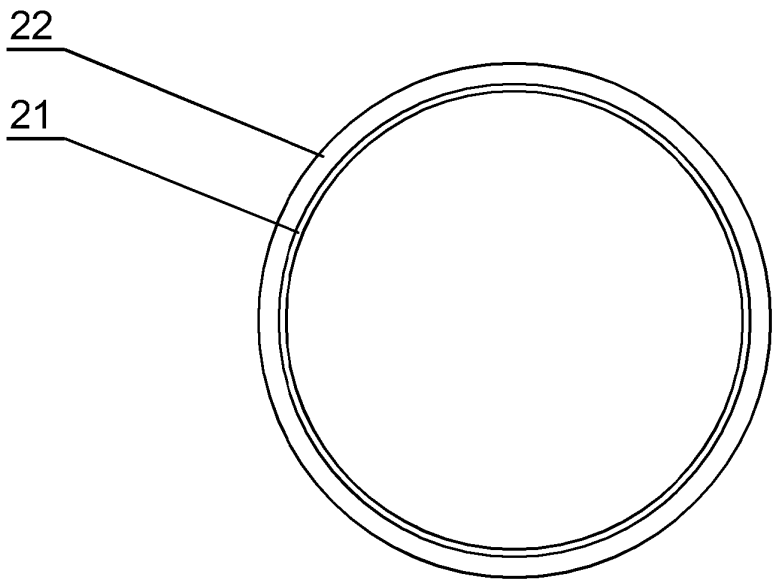

Fig. 2

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Description

[0001] The present invention relates to anilox rolls.

[0002] An anilox roll is a cylinder used to deliver a certain amount of ink to a flexographic printing plate in a flexographic printer. A typical anilox roll has a metal core coated by ceramic material, such as Cr_2O_3, the surface of which contains fine cells engraved by laser. The amount of ink that is transferred to the plate depends on the angle of the cells, cell volume and line screen (specifying the number of cells per linear inch).

[0003] A typical anilox roll is presented in a US patent US5840386. It comprises a sleeve adapted to be mounted on a mandrel to form a liquid transfer roll and comprises a radially expandable inner skin defining a radially inner surface of the sleeve, at least one radially compressible intermediate layer of resilient plastic material and a rigid, self-supporting metal outer tube, which is coated by a wear and corrosion resistant coating, which may be laser-engraved.

[0004] Typically, the outer surface of an anilox roll is coated with ceramics. An exemplary process for making a ceramic-coated anilox rolls is presented in US patent application US 2010/0015354, wherein the anilox roll is manufactured by blurring a roller surface, forming a ceramic layer on the roller surface, grinding the roller surface, polishing the roller surface, forming a pattern on the roller surface using laser, polishing the roller surface and cleaning the roller surface.

[0005] The current technology trend in development of anilox rolls is to improve the hardness of the outer coating in order to increase the durability and time of life of the roll. However, coatings of increased hardness tend to be more and more expensive and require more expensive tools to machine the rolls. Still, the rolls are very vulnerable to accidental damage such as dropping the roll while exchanging the roll on the flexographic printer machine.

[0006] The aim of the present invention is to provide an anilox roll of an alternative structure and an alternative method for manufacturing the anilox roll.

[0007] The object of the invention is a method for manufacturing of sleeves for anilox rolls, the sleeve comprising an inner sleeve of compressible material and an outer sleeve having an outer surface with ink transfer cells engraved therein, wherein the method comprises the steps of providing an air mandrel, applying the inner sleeve on the air mandrel, applying adhesive on the inner sleeve, applying the outer sleeve on the inner sleeve, the outer sleeve being made of a black polymer having a hardness of between 85 and 90 Shore D, grinding the outer sleeve, laser-engraving ink transfer cells in the outer surface of the outer sleeve with the user of a Near Infrared (NIR) laser, and polishing the outer surface of the outer sleeve.

[0008] Another object of the invention is a sleeve for an anilox roll comprising an inner sleeve of compressible material and an outer sleeve having an outer surface with ink transfer cells engraved therein, **characterized in that** the outer sleeve is made of a black polymer having a hardness of between 85 and 90 Shore D.

[0009] When the anilox roll according to the invention is used in the flexographic printer, its time of service will be much shorter than that of a ceramic-coated roll, due to the lower durability of the plastic outer sleeve as compared to the ceramic coatings. However, this disadvantage is compensated by a much cheaper and easier production process of the roll. Therefore, accidential damage to the roll will not be a problem any more, as the roll will be cheap to replace.

[0010] The invention is shown by means of an exemplary embodiment on a drawing, in which:

Fig. 1 shows a schematic view of an anilox roll,
Fig. 2 shows a cross-section of the sleeve of the anilox roll according to the invention,
Fig. 3 shows a diagram of a technology line for manufacturing the anilox roll according to the invention.

[0011] An anilox roll is presented in Fig. 1. It comprises an air mandrel 10 of a conventional type, terminated with axle stubs 11. A sleeve 20 is applied on the air mandrel. The air mandrel 10 has air passages distributed at its surface and when air is inflated inside the mandrel 10, a cylindrical cushion of air is created around the mandrel that slightly expands and supports the sleeve 20 such as to allow to remove the sleeve from the mandrel or to slid the sleeve 20 on the mandrel. As soon as the air supply is discontinued, the sleeve 20 is firmly fitted on the mandrel 10.

[0012] Fig. 2 shows a cross-section of the sleeve according to the invention. The sleeve 20 comprises an inner sleeve 21 made of a compressible material, preferably glassfiber. An outer sleeve 22 made of a polymer material is applied on the inner sleeve. The outer sleeve 22 is made of a black material having a hardness of between 85 and 90 Shore D (according to DIN53505). Preferably, the outer sleeve is made of Iglidur X ® by Igus, Köln, Germany.

[0013] The inner sleeve 21 functions as compression layer to allow applying the sleeve on the air mandrel 11. Its thickness should be preferably from 1 to 3 mm.

[0014] The outer sleeve 22 functions as the direct base for ink transfer cells. The outer sleeve 22 is preferably not coated with any further layers and the ink transfer cells are laser-engraved directly in the outer surface of the outer sleeve 22. The shape, volume and line screen of the cells are adapted to the particular requirements for the anilox roll and are adapted accordingly in a manner equivalent to that used with ceramic-coated rolls. By making the outer sleeve 22 from a black material, effective absorption of the laser beam energy to efficiently engrave the cells is guaranteed. The outer sleeve 22 is formed in a mould to desired dimensions, then grinded to remove any impurities, laser-engraved to obtain the desired shape and density of the ink transfer cells and polished to provide the final quality of the outer surface. The outer sleeve has dimensions corresponding to the

particular requirements of the flexographic printer for which it is to be used.

[0015] For example, the inner sleeve 21 may have an internal diameter of 64,9 mm, a thickness of 2 mm, the adhesive layer may have a thickness of 0,1 mm and the outer sleeve 22 may have a thickness of 5,8 mm.

[0016] The polymer of the outer sleeve should be resistant to the chemical agents used in the flexographic printer, such as inks, solvents and cleaning agents.

[0017] Fig. 3 presents the steps of manufacturing the roll. First, in step 31, an air mandrel 10 is provided according to the specifics of the flexographic printer to which the anilox roll is designed. Next, in step 32, the inner sleeve 21 is applied on the air mandrel 10 and in step 33 it is covered by an adhesive. Then, in step 34 the outer sleeve 22 is applied on the sleeve 21 and the adhesive is allowed to cure. After the sleeve is assembled, in step 35, the external surface of the outer sleeve 22 is grinded to remove any impurities. Next, in step 36 the outer sleeve is laser-engraved to form ink transfer cells therein. Preferably, a Near Infrared (NIR) laser is used, preferably having a wavelength of 1070nm. This has proved to produce cells of satisfying quality on anilox rolls made of black materials with hardness of 85-90 Shore D. Finally, in step 37, the engraved roll is polished.

Claims

1. A method for manufacturing of sleeves for anilox rolls, the sleeve comprising an inner sleeve (21) of compressible material and an outer sleeve (22) having an outer surface with ink transfer cells engraved therein, **characterized in that** the method comprises the steps of providing an air mandrel (10), applying the inner sleeve (21) on the air mandrel (10), applying adhesive on the inner sleeve (21), applying the outer sleeve (22) on the inner sleeve (21), the outer sleeve being made of a black polymer having a hardness of between 85 and 90 Shore D, grinding the outer sleeve (22), laser-engraving ink transfer cells in the outer surface of the outer sleeve (22) with the user of a Near Infrared (NIR) laser, and polishing the outer surface of the outer sleeve (22).

2. A sleeve for an anilox roll comprising an inner sleeve (21) of compressible material and an outer sleeve (22) having an outer surface with ink transfer cells engraved therein, **characterized in that** the outer sleeve (22) is made of a black polymer having a hardness of between 85 and 90 Shore D.

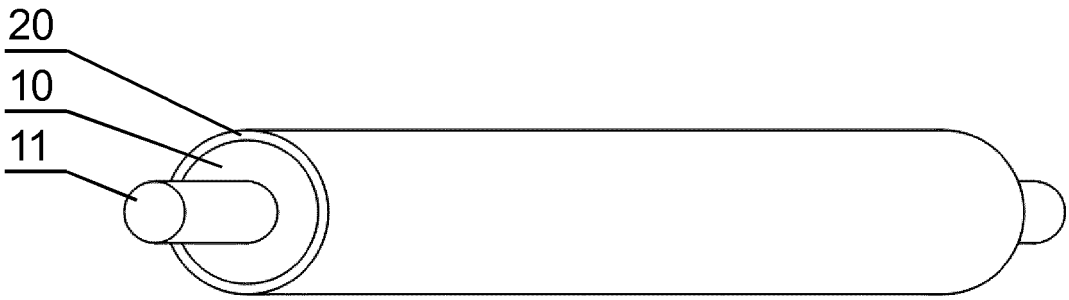

Fig. 1

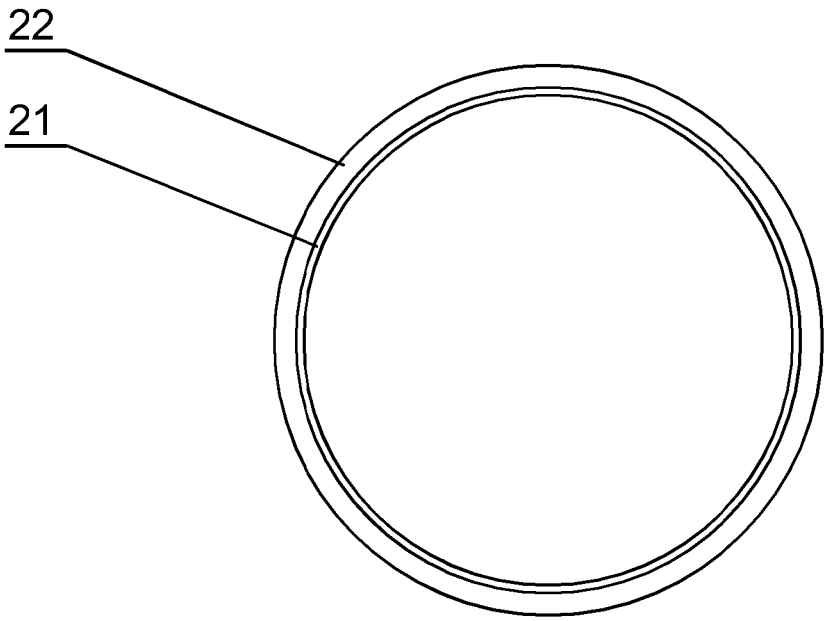

Fig. 2

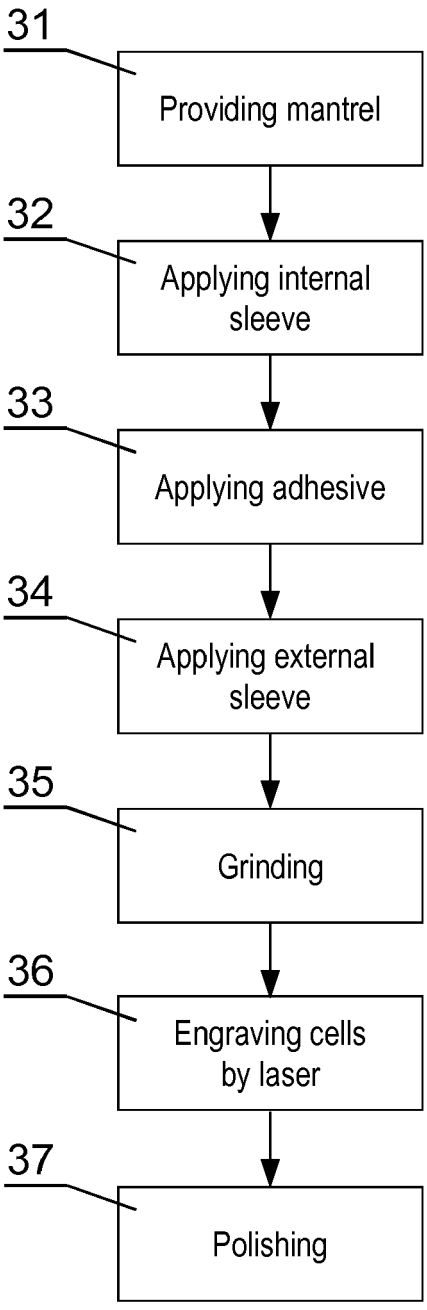
31
Providing mantrel
32
Applying internal sleeve
33
Applying adhesive
34
Applying external sleeve
35
Grinding
36
Engraving cells by laser
37
Polishing

Fig. 3

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- US 5840386 A **[0003]**
- US 20100015354 A **[0004]**