surface of the production tool that is smaller than the first opening. The shape and size of the openings in the production tool relative to the shape and size of the abrasive particles allows for a portion of each of the abrasive particles to protrude from the bottom surface of the production tool while the abrasive particles are removably disposed within respective cavities.

[0007] During the particle transfer process, the production tool may be guided along a first web path such that the back surface of the production tool is adjacent a transfer roll and an outer surface of the transfer roll contacts the protruding portion of the abrasive particles within the respective cavities of the production tool. The contact from the outer surface to the protruding portion displaces the particles disposed with the respective cavities. In some examples, the displacement of the particle may cause the particle to be transferred out of the cavity onto a substrate (e.g., a resin coated backing) adjacent the dispensing surface of the production tool.

[0008] In one example, the disclosure relates to an abrasive particle transfer system comprising:

a production tool comprising a dispensing surface and a back surface opposite the dispensing surface, wherein the production tool has cavities formed therein, wherein, on a respective basis, each of the cavities extends from a first opening at the dispensing surface through the production tool to a second opening at the back surface, and wherein the second opening is smaller than the first opening;

abrasive particles removably disposed within at least some of the cavities such that a portion of each particle of the abrasive particles protrudes from the back surface through the second opening; and

an abrasive particle transfer roll having an outer surface, wherein the production tool is guided along a web path such that the portion of the abrasive particles protruding from the back surface of the production tool contacts the outer surface of the abrasive particle transfer roll to displace the abrasive particles, wherein the outer surface of the abrasive particle transfer roll contacts the portion of the abrasive particles protruding from the back surface of the production tool such that an opposite portion of each particle of the abrasive particles protrudes from the dispensing surface of the production tool, further wherein the abrasive particle transfer roll contacts the portion of the abrasive particles protruding from the back surface of the production tool such that an opposite portion of each particle of the abrasive particles protrudes from the dispensing surface of the production tool from 0.025mm to 0.635 mm (1 mil to 25 mils).

[0009] In another example, the disclosure relates to a method of transferring abrasive particles, the method comprising:

providing a production tool comprising a dispensing surface and a back surface opposite the dispensing surface, wherein the production tool has cavities formed therein, wherein, on a respective basis, each of the cavities extends from a first opening at the dispensing surface through the production tool to a second opening at the back surface, and wherein the second opening is smaller than the first opening, wherein abrasive particles removably disposed within at least some of the cavities such that a portion of each particle of the abrasive particles protrudes from the back surface through the second opening; and

guiding the production tool along a web path such that the portion of the abrasive particles protruding from the back surface of the production tool contacts an outer surface of an abrasive particle transfer roll to displace the abrasive particles, wherein the outer surface of the abrasive particle transfer roll contacts the portion of the abrasive particles protruding from the back surface of the production tool such that an opposite portion of each particle of the abrasive particles protrudes from the dispensing surface of the production tool, further wherein the abrasive particle transfer roll contacts the portion of the abrasive particles protruding from the back surface of the production tool such that an opposite portion of each particle of the abrasive particles protrudes from the dispensing surface of the production tool from 0.025 mm to 0.635 mm (1 mil to 25 mils).

[0010] Features and advantages of the present disclosure will be further understood upon consideration of the detailed description as well as the appended claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] FIG. 1 is a conceptual diagram illustrating an example abrasive particle transfer system according to an example of the disclosure.

[0012] FIG. 2 is a conceptual diagram illustrating an example abrasive particle disposed within a cavity of a production tool.

[0013] FIGS. 3 is a conceptual diagram illustrating the example abrasive particle of FIG. 2 in contact with an outer surface of a transfer roll.

[0014] FIGS. 4 is a conceptual diagram illustrating an example abrasive particle being transferred to an adjacent substrate.

[0015] FIG. 5 is a conceptual diagram illustrating an example production tool from a top view.

[0016] FIG. 6 is a conceptual diagram illustrating a cross-section view of the example production tool of FIG. 5 along cross-section A-A.

[0017] FIG. 7 is a conceptual diagram illustrating another example abrasive particle disposed within a cavity of a production tool.

[0018] Repeated use of reference characters in the specification and drawings is intended to represent the same or analogous features or elements of the disclosure. It should be understood that numerous other modifications and embodiments can be devised by those skilled in the art, which fall within the scope and spirit of the principles of the disclosure.

DETAILED DESCRIPTION

[0019] As describe above, examples of the disclosure relate to systems and techniques for manufacturing abrasive articles including, for example, abrasive particles adhered to a resin coated backing or other substrate.

[0020] Shaped abrasive particles may be transferred to an adhesive resin coated substrate surface such that the particles maintain a specific pattern and orientation with respect to the optimal cutting configuration. The pattern and orientation may be achieved by employing of a patterned transfer tooling (also referred to as a "production tool") including cavities that are filled with the loose abrasive particles. The transfer tooling may then be inverted to allow the particles to drop out of the cavities from the dispensing surface onto an opposing surface of resin coated substrate under the force of gravity. However, in some instances, rather than dropping onto the surface of

CLAIMS

1. An abrasive particle transfer system comprising:

a production tool comprising a dispensing surface and a back surface opposite the dispensing surface, wherein the production tool has cavities formed therein, wherein, on a respective basis, each of the cavities extends from a first opening at the dispensing surface through the production tool to a second opening at the back surface, and wherein the second opening is smaller than the first opening;

abrasive particles removably disposed within at least some of the cavities such that a portion of each particle of the abrasive particles protrudes from the back surface through the second opening; and

an abrasive particle transfer roll having an outer surface, wherein the production tool is guided along a web path such that the portion of the abrasive particles protruding from the back surface of the production tool contacts the outer surface of the abrasive particle transfer roll to displace the abrasive particles, wherein the outer surface of the abrasive particle transfer roll contacts the portion of the abrasive particles protruding from the back surface of the production tool such that an opposite portion of each particle of the abrasive particles protrudes from the dispensing surface of the production tool, further wherein the abrasive particle transfer roll contacts the portion of the abrasive particles protruding from the back surface of the production tool such that an opposite portion of each particle of the abrasive particles protrudes from the dispensing surface of the production tool from 0.025mm to 0.635 mm (1 mil to 25 mils).

2. The abrasive particle transfer system of claim 1, wherein the web path of the production tool comprises a first web path, the system further comprising a resin coated backing guided along a second web path such that a resin layer of the resin coated backing is positioned facing the dispensing surface of the production tool and the production tool is positioned between the resin coated backing and the abrasive particle transfer roll.

3. The abrasive particle transfer system of claim 2, wherein the portion of the abrasive particles protruding from the back surface of the production tool contacts the abrasive particle transfer roll to urge the abrasive particles from the respective cavities onto the resin coating backing.

4. The abrasive particle transfer system of claim 3, wherein the abrasive particle transfer roll contacts the portion of the abrasive particles protruding from the back surface of the

production tool such that an opposite portion of each particle of the abrasive particles protrudes from the dispensing surface of the production tool to bring the abrasive particles into contact with the resin layer of the resin coated backing.

5. The abrasive particle transfer system of claim 3, wherein the resin coated backing and the dispensing surface of the production tool are separated by a gap where the abrasive particles are transferred from the plurality of cavities to the resin coated backing.

6. The abrasive particle transfer system of any of claims 1-5, wherein the portion of each particle of the abrasive particles protrudes from the back surface through the second opening at least 0.025 mm (1 mil).

7. The abrasive particle transfer system of claim 6, wherein the portion of each particle of the abrasive particles protrudes from the back surface through the second opening from 0.025 mm (1 mil) to 0.635 mm (25 mils).

8. The abrasive particle transfer system of any of claim 1-7, wherein the abrasive particles are removably disposed within at least some of the cavities such that they do not extend beyond the dispensing surface prior to the portion of the abrasive particles protruding from the back surface of the production tool contacting the abrasive particle transfer roll.

9. The abrasive particle transfer system of any of claim 1-7, wherein the abrasive particles are removably disposed within at least some of the cavities such that they extend beyond the dispensing surface prior to the portion of the abrasive particles protruding from the back surface of the production tool contacting the abrasive particle transfer roll.

10. A method comprising:

providing a production tool comprising a dispensing surface and a back surface opposite the dispensing surface, wherein the production tool has cavities formed therein, wherein, on a respective basis, each of the cavities extends from a first opening at the dispensing surface through the production tool to a second opening at the back surface, and wherein the second opening is smaller than the first opening, wherein abrasive particles removably disposed within at least some of the cavities such that a portion of each particle of the abrasive particles protrudes from the back surface through the second opening; and

guiding the production tool along a web path such that the portion of the abrasive particles protruding from the back surface of the production tool contacts an outer surface of an abrasive particle transfer roll to displace the abrasive particles, wherein the outer surface of the abrasive particle transfer roll contacts the portion of the abrasive particles protruding from the back surface of the production tool such that an opposite portion of each particle of the abrasive particles protrudes from the dispensing surface of the production tool, further wherein the abrasive particle transfer roll contacts the portion of the abrasive particles protruding from the back surface of the production tool such that an opposite portion of each particle of the abrasive particles protrudes from the dispensing surface of the production tool from 0.025 mm to 0.635 mm (1 mil to 25 mils).