CLAIMS

1. A process for producing an optical effect layer (OEL) on a substrate (x10), said process comprising the steps of:

a) applying onto a substrate (x10) surface a coating composition comprising platelet-shaped magnetic or magnetizable pigment particles so as to form a coating layer (x20) on said substrate (x10), said coating composition being in a first state,

b) placing the substrate (x10) carrying the coating layer (x20) on a first magnetic-field-generating device (x30) providing a first magnetic field vector component, said first magnetic-field-generating device (x30) being mounted on a transferring device (TD) thereby subjecting the platelet-shaped magnetic or magnetisable pigment particles to said first magnetic field vector component,

concomitantly moving said substrate (x10) carrying the coating layer (x20) and said first magnetic-field-generating device (x30) in the vicinity of a static second magnetic-field-generating device (x40), said second magnetic-field-generating device (x40) providing a second magnetic field vector component

thereby subjecting the platelet-shaped magnetic or magnetisable pigment particles to a time-dependent resultant magnetic field formed by the first and second magnetic field vector components so as to bi-axially orient at least a part of the platelet-shaped magnetic or magnetizable pigment particles,

wherein the ratio of the magnetic flux density of the first magnetic-field-generating device (x30) and the magnetic flux density of the second magnetic-field-generating device (x40) is less than about 4.0, preferably less than about 1.9 and more preferably between about 1.5 and about 0.5; and

c) hardening the coating composition to a second state so as to fix the platelet-shaped magnetic or magnetizable pigment particles in their adopted positions and orientations.

2. The process according to claim 1, wherein the transferring device (TD) is a rotating magnetic cylinder (RMC).

3. The process according to claim 1 or 2, wherein the step of applying the coating composition onto the substrate (x10) is carried out by printing process selected from the group consisting of intaglio printing, screen printing, rotogravure printing and flexography printing.

4. The process according to any preceding claims, wherein the coating composition is a UV-Vis curable composition and the hardening step is carried out by UV-Vis curing.

5. The process according to any preceding claim, wherein the step c) of hardening the coating composition is carried out partially simultaneously with the step b).

6. The process according to any preceding claim, wherein the first magnetic-field-generating device (x30) is selected from the group consisting of dipole magnets, quadrupolar magnets and combinations thereof.

7. The process according to any preceding claim, wherein the second magnetic-field-generating device (x40) comprises a) a linear arrangement of at least three magnets that are positioned in a staggered fashion, wherein each of said three magnets has its magnetic axis substantially perpendicular to the substrate (x10) surface, and wherein said at least three magnets at the same side of a feedpath have the same polarity, which is opposed to the polarity of the magnet(s) on the opposing side of the feedpath, b) a linear permanent magnet Halbach array, c) one or more pairs of two bar dipole magnets, wherein each of said two bar dipole magnets has its magnetic axis substantially parallel to the substrate (x10) surface and wherein the two bar dipole magnets have an opposite magnetic direction, d) one or more pairs of two bar dipole magnets (x41a, x41b), wherein each of said two bar dipole magnets has its magnetic axis substantially perpendicular to the substrate (x10) surface and wherein the two bar dipole magnets have an opposite magnetic direction or e) a U-shaped magnet.

8. The process according to any preceding claim, wherein the platelet-shaped magnetic or magnetizable pigment particles are platelet-shaped optically variable magnetic or magnetizable pigment particles selected from the group consisting of platelet-shaped magnetic thin-film interference pigment particles, platelet-shaped magnetic cholesteric liquid crystal pigment particles, platelet-shaped interference coated pigment particles comprising a magnetic material and mixtures of two or more thereof.

9. The process according to any preceding claim, wherein the substrate is selected from the group consisting of papers or other fibrous materials, paper-containing materials, glasses, metals, ceramics, plastics and polymers, metalized plastics or polymers, composite materials and mixtures or combinations thereof.

10. A printing apparatus comprising a transferring device (TD), preferably a rotating magnetic cylinder (RMC), and at least one of the second magnetic-field-generating devices (x40) recited in any one of claims 1 to 8, said transferring device (TD), preferably said rotating magnetic cylinder (RMC), comprising at least one of the first magnetic-field-generating devices (x30) mounted thereon and recited in any one of claims 1 to 9.

11. The printing apparatus of claim 10 further comprising a substrate-guiding system.

~~12. An optical effect layer (OEL) produced by the process recited in any one of claims 1 to 9 or produced by using the printing apparatus recited in claim 10 or 11.~~

~~13. A security document or a decorative element or object comprising one or more optical effect layer (OEL) recited in claim 12.~~

1~~4~~2. Method of manufacturing a security document or a decorative element or object, comprising:

a) providing a security document or a decorative element or object, and

b) providing an optical effect layer according to the process of one of claims 1 to 9 so that it is comprised by in security document or decorative element or object.