CLAIMS

1. Method (100) for optically inspecting an ophthalmic lens (2) in an automated lens production process to determine an orientation state and an inversion state of the ophthalmic lens (2), the method comprising the steps of

- acquiring (101) an image of the ophthalmic lens (2),
- determining (102) from the acquired image an orientation value of the ophthalmic lens (2),
- comparing (103) the determined orientation value with an orientation threshold value, and determining that the ophthalmic lens is oriented right side up (104b) when the determined orientation value is higher than the orientation threshold value, or determining that the ophthalmic lens is oriented upside down (104a) when the determined orientation value is lower than the orientation threshold value, or vice versa,
- determining from the acquired image an inversion value of the ophthalmic lens (2),
- comparing the determined inversion value (105a, 105b) of the optically inspected ophthalmic lens (2) with an inversion threshold value and determining that the lens is non-inverted (108a, 108b) when the determined inversion value is higher than the inversion threshold value, or determining that the ophthalmic lens is inverted (107a, 107b) when the determined inversion value is lower than the inversion threshold value, or vice versa,

wherein at least one of the orientation threshold value and the inversion threshold value is determined based on a distribution of orientation values and a distribution of inversion values of previous optically inspected ophthalmic lenses, respectively,

characterized in that the at least one of the orientation threshold value and the inversion threshold value is dynamically adapted during the automated lens production process,

wherein both the orientation threshold value and the inversion threshold value are determined based on the distribution of orientation values and the distribution of inversion values of previous optically inspected ophthalmic lenses (2), respectively, and wherein both the inversion threshold value and the orientation threshold value are dynamically adapted during the automated lens production process, wherein the dynamically adapted orientation threshold value and the dynamically adapted inversion threshold value are determined during the automated production process based on a distribution of orientation values and a distribution of inversion values, respectively, of a predetermined number of the most recent previous optically inspected ophthalmic lenses.

2. Method according to claim 1, wherein determining the orientation state of the ophthalmic lens (2) is performed prior to determining the inversion state of the ophthalmic lens (2).

3. Method according to claim 2, wherein the ophthalmic lens (2) is an ophthalmic lens (2) containing coloring pigments, wherein determining the orientation value is performed by determining the degree of defocus of a central portion (4, 5) of the image of the ophthalmic lens,
and wherein for the ophthalmic lens (2) determined to be oriented right side up the inversion value is then determined by calculating a deformation image noise level (105b) related to a deformation state of the coloring pigments of a section (61) of the image of the ophthalmic lens,
whereas for the ophthalmic lens determined to be oriented upside down the inversion value is then determined by determining (105a) a width of a dark edge zone in the image of the ophthalmic lens.

4. Method according to claim 3, wherein determining the degree of defocus of the central portion (4, 5) of the image of the ophthalmic lens containing the coloring pigments comprises calculating a defocus image noise level related to an amount of blur of the central portion of the image.

5. Method according to claim 1, wherein the predetermined number of the most recent previous optically inspected ophthalmic lenses is in a range of 100 to 10000.

6. Method according to claim 5, wherein the predetermined number of the most recent previous optically inspected ophthalmic lenses in a range of 1000 to 3000.

7. Method (100) for optically inspecting an ophthalmic lens (2) in an automated lens production process to determine an orientation state and an inversion state of the ophthalmic lens (2), the method comprising the steps of
- acquiring (101) an image of the ophthalmic lens (2),
- determining (102) from the acquired image an orientation value of the ophthalmic lens (2),
- comparing (103) the determined orientation value with an orientation threshold value, and determining that the ophthalmic lens is oriented right side up (104b) when the determined orientation value is higher than the orientation threshold value, or determining that the

ophthalmic lens is oriented upside down (104a) when the determined orientation value is lower than the orientation threshold value, or vice versa,

- determining from the acquired image an inversion value of the ophthalmic lens (2),
- comparing the determined inversion value (105a, 105b) of the optically inspected ophthalmic lens (2) with an inversion threshold value and determining that the lens is non-inverted (108a, 108b) when the determined inversion value is higher than the inversion threshold value, or determining that the ophthalmic lens is inverted (107a, 107b) when the determined inversion value is lower than the inversion threshold value, or vice versa,

wherein at least one of the orientation threshold value and the inversion threshold value is determined based on a distribution of orientation values and a distribution of inversion values of previous optically inspected ophthalmic lenses, respectively,

characterized in that the at least one of the orientation threshold value and the inversion threshold value is dynamically adapted during the automated lens production process,

wherein both the orientation threshold value and the inversion threshold value are determined based on the distribution of orientation values and the distribution of inversion values of previous optically inspected ophthalmic lenses (2), respectively, and wherein both the inversion threshold value and the orientation threshold value are dynamically adapted during the automated lens production process, wherein the dynamically adapted orientation threshold value and the dynamically adapted inversion threshold value are determined during the automated production process based on a distribution of orientation values and a distribution of inversion values, respectively, of a predetermined number of the most recent previous optically inspected ophthalmic lenses, wherein determining the orientation state of the ophthalmic lens (2) is performed prior to determining the inversion state of the ophthalmic lens (2), wherein the ophthalmic lens (2) is an ophthalmic lens (2) containing coloring pigments, wherein determining the orientation value is performed by determining the degree of defocus of a central portion (4, 5) of the image of the ophthalmic lens,

and wherein for the ophthalmic lens (2) determined to be oriented right side up the inversion value is then determined by calculating a deformation image noise level (105b) related to a deformation state of the coloring pigments of a section (61) of the image of the ophthalmic lens,

whereas for the ophthalmic lens determined to be oriented upside down the inversion value is then determined by determining (105a) a width of a dark edge zone in the image of the ophthalmic lens, wherein the distribution of orientation values of the most recent previous optically inspected ophthalmic lenses comprises

- a lower range (75) of orientation values of the most recent previous optically inspected ophthalmic lenses oriented upside down, and
- a higher range (76) of orientation values of the most recent previous optically inspected ophthalmic lenses oriented right side up,

wherein the dynamically adapted orientation threshold value is determined to be an arithmetic mean value (72) of a highest value (73) of the lower range of orientation values and a lowest value (74) of the higher range of orientation values,

wherein for the ophthalmic lenses oriented upside down, the distribution of inversion values comprises a distribution of values of the width of the dark edge zone in the images of the ophthalmic lenses comprising

- a lower range (95) of values of the width of the dark edge zone in the images of the inverted ophthalmic lenses, and
- a higher range (96) of values of the width of the dark edge zone in the images of the non-inverted ophthalmic lenses,

wherein the dynamically adapted inversion threshold value is determined to be an arithmetic mean value (92) of a highest value (93) of the lower range of values and a lowest value (94) of the higher range of values of the width of the dark edge zone,

whereas for the ophthalmic lenses oriented right side up, the distribution of inversion values comprises a distribution of deformation image noise level values comprising

- a lower range (85) of deformation image noise level values of the inverted ophthalmic lenses, and
- a higher range (86) of deformation image noise level values of the non-inverted ophthalmic lenses,

and wherein the dynamically adapted inversion threshold value is determined to be an arithmetic mean value (82) of a highest value (83) of the lower range of deformation image noise level values and a lowest value (84) of the higher range of deformation image noise level values.

8. An ophthalmic lens inspection system (1) configured to perform the method according to claim 1, the system comprising:

- an imaging unit (10) for acquiring an image of the ophthalmic lens (2),
- a processor (17) configured to perform the steps of:

- determining the orientation value from the image of the ophthalmic lens (2) acquired by the imaging unit,
- comparing the determined orientation value with the orientation threshold value,
- determining that the ophthalmic lens is oriented right side up, or determining that the ophthalmic lens is oriented upside down,
- determining the inversion value from the image of the ophthalmic lens (2) acquired by the imaging unit,
- comparing the determined inversion value with the inversion threshold value,
- determining that the ophthalmic lens (2) is non-inverted, or determining that the ophthalmic lens is inverted, and
- determining the at least one of the orientation threshold value and the inversion threshold value based on the distribution of orientation values and the distribution of inversion values of previous optically inspected ophthalmic lenses, respectively,

wherein the processor (17) is further configured to dynamically adapt the at least one of the inversion threshold value and the orientation threshold value during the automated lens production process.

9. The ophthalmic lens inspection system (1) according to claim 8, wherein the imaging unit comprises a camera (14) for acquiring the image of the ophthalmic lens (2).