

Claims:

1. A system for producing a high contrast image of an ophthalmic lens under inspection, comprising:

- a) a Top camera to view the ophthalmic lens through a lens module;
- b) Motorized mechanism for positioning the Top camera at two pre-programmed positions;
- c) three illumination modules;
- d) said illumination modules focusing light through the ophthalmic lens under inspection, thereby producing a high contrast image of the features of the ophthalmic lens;
- e) wherein the ophthalmic lens is contained within a cuvette with an optical power of positive of Ten;
- f) said cuvette mounted with two optical windows, one of them being vertical and the other at an angle;
- g) said cuvette having a transparent bottom glass suitably designed to position the ophthalmic lens under inspection;
- h) said cuvette designed to be filled with Saline solution;
- i) an accurately calibrated test object positioned to achieve an image of the ophthalmic lens overlaid with the image of the pattern present on the test object;
- j) an additional illumination source comprising a laser diode; and
- h) a second camera to view the ophthalmic lens through a slanted optical lens module.

2. A system according to claim 1, further comprising a focusing lens.

3. A system according to claim 1, further comprising a set of beam splitters.

4. A method for determination of optical power of an ophthalmic lens the method comprising the steps of:

Moving the Top camera to a first position;

providing an inspection cuvette designed with an optical power of positive T_{en} , comprising an optically transparent bottom glass having a concave inner surface containing the ophthalmic lens immersed in a liquid, and positioning the inspection cuvette in the optical axis of the Top camera;

providing a set of illumination sources and a Top camera for receiving illumination having passed through the calibration target and subsequently through ophthalmic lens contained in the inspection cuvette to produce an overlaid image;

providing the inspection cuvette designed with an optical power of positive T_{en} , comprising the optically transparent bottom and containing the liquid with ophthalmic lens of zero optical power positioned at the center of the bottom glass; and

measuring the distance and tabulating the measurements between several pre-determined set of target points representative of the optical power of the reference ophthalmic lens.

5. The method according to claim 4, further comprising the steps of:

Moving the Top camera to a first position;

providing an inspection cuvette designed with an optical power of positive T_{en} , comprising an optically transparent bottom glass having a concave inner surface containing the ophthalmic lens immersed in a liquid, and positioning the inspection cuvette in the optical axis of the Top Camera;

providing a set of illumination sources and a Top camera for receiving illumination having passed through the calibration target and subsequently through ophthalmic lens contained in the inspection cuvette to produce an overlaid image;

providing the inspection cuvette designed with an optical power of positive T_{en} , comprising the an optically transparent bottom glass containing the liquid with ophthalmic lens of zero optical power positioned at the center of the glass bottom ; and

Creating a calibration chart of measurements in pixels between pre-determined set of target points using several pre-selected Ophthalmic lenses with known optical power.

6. The method according to claim 5, further comprising the steps of:

Moving the Top camera to a first position;

providing an inspection cuvette designed with an optical power of positive T_{en} , comprising an optically transparent glass bottom having a concave inner surface containing the ophthalmic lens immersed in a liquid, and positioning the inspection cuvette in the optical axis of the Top camera;

providing a set of illumination sources and a Top camera for receiving illumination having passed through the calibration target and subsequently through ophthalmic lens contained in the inspection cuvette to produce an overlaid image;

measuring the distance between several pre-determined set of target points and determining the optical power from the Calibration chart; and

Removing and segregating the ophthalmic lens under inspection based on its optical power.

7. A method for inspecting defects of an ophthalmic lens, the method comprising the steps of:

Moving the Top camera to a second position;

providing an inspection cuvette designed with an optical power of positive ten, comprising an optically transparent bottom glass having a concave inner surface containing the ophthalmic lens immersed in a liquid, and positioning the inspection cuvette in the optical axis of the Top camera;

providing a separate set of illumination sources and a Top camera for receiving illumination having passed through ophthalmic lens contained in the inspection cuvette to produce multiple enhanced images of the defects in the Ophthalmic lens;

Inspecting for defects such as scratches, tears and air bubbles within the Ophthalmic lens; and

removing the lens if the size of the defects detected in the Ophthalmic lens is beyond a predetermined size.

8. A method for determination of lens thickness of an ophthalmic lens the method comprising the steps of:

providing an inspection cuvette designed with an optical power of positive ten, comprising an optically transparent bottom glass designed to have an optical power of positive ten, having a concave inner surface containing the ophthalmic lens immersed in a liquid, and positioning the inspection cuvette in the optical axis of the Top camera;

providing a single laser illumination source and a second camera for receiving illumination directed by a set of beam deflectors and having passed through focusing lens and ophthalmic lens contained in the inspection cuvette, to produce a laser beam scattered image formed by the reflected rays, and measuring the distance between the two extremes of reflected rays of light.

9. The method according to claim 8, further comprising the steps of:

providing an inspection cuvette designed with an optical power of positive ten, comprising an optically transparent glass bottom having a concave inner surface containing the ophthalmic lens immersed in a liquid, and positioning the inspection cuvette in the optical axis of the imaging module;

providing a single laser illumination source and a second camera for receiving illumination directed by a set of beam deflectors and having passed through focusing lens and ophthalmic lens contained in the inspection cuvette, to produce a laser beam scattered image formed by the reflected rays, and measuring the distance between the two extremes of reflected rays of light; and

Creating a chart (Length in pixels vs thickness) of measurements between the two extremes of the scattered laser beams of several pre-selected lenses of known thickness, to be used as a reference for determining the lens thickness of subsequent ophthalmic lenses to be inspected.

10. The method according to claim 9, further comprising the steps of:

providing an inspection cuvette designed with an optical power of positive ten, comprising an optically transparent bottom glass having a concave inner surface containing the ophthalmic lens immersed in a liquid, and positioning the inspection cuvette in the optical axis of the second camera;

providing a single laser illumination source and a second camera for receiving illumination directed by a set of beam splitters and having passed through focusing lens and ophthalmic lens contained in the liquid filled inspection cuvette, to produce a laser beam scattered image formed by the reflected rays, and measuring the distance between the two extremes of reflected rays of light; and

Removing and segregating the ophthalmic lens from the Cuvette after determining the optical thickness of the lens under inspection, based on the chart plotted for Length in pixels vs thickness.