Claims

1. Modular production line for production of contact lenses, comprising at least three separate modules, the at least three separate modules comprising a manufacturing module (MM) in which the contact lenses are manufactured, an inspection module (IM) in which the contact lenses are inspected, and a packaging module (PP) in which the contact lenses which have been identified by the inspection module (IM) as being acceptable are packed into primary packages, the modular production line further comprising fixedly arranged transfer interfaces between individual modules (MM, IM, PP) for transferring the contact lenses from a respective preceding module of the at least three separate modules to a respective subsequent module of the at least three separate modules, wherein the manufacturing module (MM) comprises a plurality of manufacturing stations comprising a male mold exchange station (300), a female mold exchange station (301), a toric axis setting station (302), an inkjet printing station (310), a dosing station (320), a closing station (321), a forming station (322), a curing station (330), a relative mold movement station (331), a mold opening station (340), a rinsing station (341), a removal station (342), a mold cleaning station (350), a mold rinsing station (351), and a mold drying station (352), wherein the plurality of manufacturing stations of the manufacturing module (MM) are grouped to form a plurality of individual manufacturing units comprising a first individual manufacturing unit (30); inkjet printing unit (31); a second individual manufacturing unit (32); a third individual manufacturing unit (33); a fourth individual manufacturing unit (34); a fifth individual manufacturing unit (35) arranged in a closed loop, and wherein the manufacturing module (MM) further comprises reusable male and female molds (212, 112) which are transported through the plurality of manufacturing stations of the individual manufacturing units arranged in the closed loop, and wherein the manufacturing module (MM) further comprises a plurality of transfer robots (36), each transfer robot (36) of the plurality of transfer robots (36) being arranged at a location between two individual manufacturing units of the plurality of individual manufacturing units and being configured to transfer the reusable male and female molds from one of the two individual manufacturing units between which the respective transfer robot (36) is arranged to the other one of the two individual manufacturing units between which the respective transfer robot (36) is arranged.

2. Modular production line according to claim 1, further comprising an extraction and treatment module (EM) for the extraction and chemical treatment of the contact lenses

manufactured in the manufacturing module (MM), wherein the extraction and treatment module (EM) comprises a plurality of chemical treatment stations which are arranged in a U-shaped configuration from a transfer interface (MM-EM), where the contact lenses are transferred from the manufacturing module (MM) to the extraction and treatment module (EM), to a transfer interface (EM-IM) where the contact lenses are transferred from the extraction and treatment module (EM) to the inspection module (IM).

3. Modular production line according to claim 2, wherein the chemical treatment stations of the extraction and treatment module (EM) comprise at least one extraction station (401) extracting unwanted substances from the contact lenses, and at least one additional chemical treatment station for chemical treatment of the extracted contact lenses, with the at least one additional chemical treatment station being arranged downstream of the at least one extraction station (401) with respect to a path of transportation of the contact lenses through the chemical treatment stations arranged in the U-shaped configuration in the extraction and treatment module (EM).

4. Modular production line according to claim 2, wherein the plurality of chemical treatment stations or at least one additional chemical treatment station, respectively, comprises at least one coating station (403) for coating the contact lenses.

5. Modular production line according to claim 2, wherein the extraction and treatment module (EM) further comprises one or more water treatment stations (400, 402, 404, 405), with one or more water treatment stations being arranged at least between different types of the said plurality of chemical treatment stations or between different types of additional chemical treatment stations, respectively.

6. Modular production line according to claim 5, wherein the extraction and treatment module (EM) comprises at least one extraction station (401), at least one coating station (403), and a plurality of the water treatment stations (400, 402, 404, 405), wherein a first water treatment station (400) of the said plurality of water treatment stations (400, 402, 404, 405) is arranged at the interface between the manufacturing module (MM) and the extraction and treatment module (EM), wherein the at least one extraction station (401) is arranged downstream of the first water treatment station (400), wherein a second water treatment station (402) of the plurality of water treatment stations (400, 402, 404, 405) is arranged downstream of the at

least one extraction station (401), wherein the at least one coating station (403) is arranged downstream of the second water treatment station, and wherein a third water treatment station (404) of the plurality of water treatment stations (400, 402, 404, 405) is arranged downstream of the at least one coating station (403).

7. Modular production line according to claim 1, wherein in the manufacturing module (MM) the first individual manufacturing unit (30) of the plurality of manufacturing units comprises the male mold exchange station (300), the female mold exchange station (301), and the toric axis setting station (302), the second individual manufacturing unit (32) of the plurality of manufacturing units comprises the dosing station (320) dosing a contact lens forming material into male or female molds, the closing station (321) mating the male and female molds, and the forming station (322) moving the mated male and female molds to an intermediate closed position, the third individual manufacturing unit (33) comprises the curing station (330) curing the contact lens forming material to form contact lenses, and the relative mold movement station (331) performing a relative movement of the male and female molds from the intermediate closed position to a final closed position during curing of the contact lens forming material, the fourth individual manufacturing unit (34) comprises the mold opening station (340) separating the male and female molds, the rinsing station (341) rinsing away any excess contact lens forming material from the male and female molds, and the removal station (342) removing the contact lenses from the male and female molds and transferring them out of the manufacturing module (MM), and the fifth individual manufacturing unit (35) comprises the mold cleaning station (350), the mold rinsing station (351), and the mold drying station (352).

8. Modular production line according to claim 1, wherein the manufacturing module (MM) is configured to assign to each contact lens a unique contact lens identification code which is representative of a type of contact lens at least for a predetermined period of time.

9. Modular production line according claim 8, wherein the inkjet printing station is configured to print the unique contact lens identification code to one of the reusable male and female molds.

10. Modular production line according to claim 1, wherein the inspection module (IM) comprises an inversion detection station (500) inspecting the contact lenses as to whether

the contact lenses are inverted, a reinversion station (501) reinverting the contact in case they have been detected as being inverted, a diopter measurement station (503) measuring the optical properties of the contact lenses, and a center thickness measurement station (504) measuring the center thickness of the contact lenses.

11. Modular production line according to claim 1, wherein the packaging module (PP) comprises a shell providing station (602) providing a packaging shell, a contact lens placement station (603) placing a contact lens into the packaging shell, a liquid dosing station (606) dosing a packaging liquid into the packaging shell, a foil placement station (607) placing a foil onto the packaging shell, a sealing station (608) sealing the foil to the packaging shell, and a printing station (609) printing on the foil information about the contact lens contained in the sealed packaging shell.

12. Modular production line according to claim 11, wherein the packaging module (PP) further comprises a contact lens detection station (604) arranged downstream of the contact lens placement station (603), as well as a configuration station (605) intermediately storing a plurality of contact lenses and placing a contact lens intermediately stored in the configuration station into said shell in case it has been detected in the contact lens detection station (604) that no contact lens has been placed into the shell in the contact lens placement station (603).