A device for machining a lens which is optically active on two sides includes a cutting and milling unit and/or a polishing unit used to machine at least a first side of the lens. A re-clamping unit is used to re-clamp the lens for machining on a second side of the lens.
DEVICE AND METHOD FOR COMPLETE MACHINING OF LENSES THAT ARE OPTICALLY ACTIVE ON TWO SIDES

[0001] The invention relates to a device for machining a lens that is optically active on two sides, comprising a cutting, milling and/or polishing unit that serves to machine at least a first side of the lens, and it also relates to a method for machining a lens that is optically active on two sides, with a cutting, milling and/or polishing unit that serves to machine at least a first side of the lens, whereby the lens is held by a first holding device associated with a second side.

[0002] The prior-art methods make use of a lens blank made of plastic or glass whose one side or first side already has the final, optically active form. In the case of eyeglasses, this is the front side, in other words, the side facing away from the eye, which generally forms a spherical surface. Such lens blanks are kept in stock in various graduations in terms of the radii of curvature of the spherical surface. For purposes of grinding the back surface or second side so as to obtain a toric lens, the lens blank is mounted, that is to say, its front surface or first side is attached to a blocking member that is clamped into the chuck of a lens grinding machine.

[0003] In order to produce an individual lens that is adapted to the multiple vision defects of a given person, the front or first side is generally provided with an individualized progressive surface by means of a cutting process. The term progressive surface refers to a surface that, in partial areas, diverges from a symmetrical—usually spherical—main surface so as to create a progressive lens with near and far viewing areas and the corresponding transition areas. In order to compensate for certain vision defects, it is also necessary for the main surface of the front surface or the first side to be tilted, offset and/or phase-rotated relative to the back or second side.

[0004] In order to produce the progressive surface, until now, the back surface of the lens blank has been attached to a blocking member by means of a metallic paste. The lens thus mounted is then clamped in the head of a tool spindle so that it can be machined. Since the lens blank is attached directly to the blocking member, the tilt, the offset and/or the phase-position has to be taken into account during the mounting by attaching the lens blank to the blocking member so that it is tilted or offset. As a result, the mounting procedure is quite time-consuming. Moreover, a separate machine is needed for this purpose. In spite of all due caution, this additional step entails a certain degree of imprecision that cannot be avoided.

[0005] A machine for the production of lenses is already known from European Patent EP 0 849 038 A3. This machine has a cutting unit and a polishing unit for machining one side of a lens. Complete machining of the lens on both sides is not mentioned.

[0006] U.S. Pat. No. 5,205,076 describes a method with which, likewise while the first side of the lens blank for a contact lens made of plastic is being machined, a lateral surface is machined but there is not a bearing face with which the turned lens blank could then be clamped. It is evident that the axis of the lateral surface coincides with the workpiece spindle axis, as a result of which the lens blank does not tilt when the lens blank is placed into a holding device in order to machine the second side, as a result of which the method is not suitable for producing lenses in a simple manner when the optical axes of both sides do not coincide.

[0007] The invention is based on the objective of creating and configuring a device and a method in such a way that a complete machining of the lens on both sides is ensured.

[0008] This objective is achieved according to the invention in that a re-clamping unit is provided for re-clamping the lens from the first side to the second side for purposes of machining the second side of the lens. In this manner, it is achieved that the lens, after the first side has been machined, is held or clamped on this side, whereby the unworked second side is separated from a receptacle adapter and subsequently machined. The machining of the first side using a receptacle adapter has the advantage that, irrespective of the shape of the first surface to be produced, optimal space conditions exist during the machining step. As an alternative, the lens can also be clamped directly via its cylindrical basic shape in order to be machined.

[0009] For this purpose, it is also advantageous for the re-clamping unit to have a second holding device for the lens and for the lens to be supported relative to the second holding device via at least one positioning element, whereby the positioning element has a reference indicating the first side and/or the second side of the lens and/or its alignment. The reference between the positioning element and the first side serves to align the lens in the second holding device relative to an optical axis of the first side. In this process, the positioning element is generated when the first side is machined in the same clamping set-up. As a positioning element, it is also possible to use the first side or the first holding surface or the support part that serves to machine the first side. The relationship between this first holding surface or support part and the first side is given. The relationship between the first side and the second side is present anyway. After being clamped by the second holding device, the support part is then removed. A robot arm can also be used as the second holding device or for re-clamping.

[0010] Moreover, it is advantageous for the positioning element to be configured as a reference surface, whereby the reference surface is aligned relative to an optical axis of the first side and/or of the second side. The reference surface here is a part of the edge of the lens that is left behind after the first side of the lens has been machined. During or after the machining of the second side, this reference surface is ground away. In addition to this one reference surface, it is also advantageous to have a second reference surface that is likewise generated within the scope of the machining process for the first side of the lens. The second reference surface can be configured as a side surface or lateral surface of the lens and it is arranged perpendicular to the reference surface, that is to say, essentially parallel to the optical axis of the first side and/or of the second side. In the ideal case, the reference surface configured as a side surface constitutes the outer surface of the lens that subsequently goes into a frame, i.e. the lens does not have to undergo any further edge machining. The first holding surface or the support part that serves to machine the first side or else the axis position of the robot that fixes the lens position can also be used as the positioning element.

[0011] It is also advantageous for the second holding device to have at least two holding parts, each having at least
one back stop associated with at least one reference surface. The uniform configuration of the back stop and of the holding part ensures a precise positioning of the lens without an additional reference between the back stop and the holding part. The back stop of the lens receptacle is configured as a counter-surface to the ring surface or to the reference surface of the lens blank and it extends perpendicular to the workpiece spindle axis.

Moreover, in a preferred embodiment of the solution according to the invention, it is provided that there is a support part that can be placed against the first side of the lens, whereby the support part has a plastically and/or elastically deformable surface that can be placed against the first side of the lens and said surface is made of binder and/or filler and/or else it can be hardened. Thus, the lens is provided with a support that allows the second side to be machined. The hardening of the surface or adhesive makes it possible to mount the lens without any pre-stressing so that the second side can be machined in a reproducible manner.

It is likewise advantageous to have a device for signing and/or marking the lens. This ensures the proper positioning of the lens in its later receptacle within a component such as, for example, an eyeglass frame. This signing can be done either in a cutting unit by means of a tool and/or in a re-clamping unit by means of a laser. In addition, the marking also serves to position the lens relative to the holding device, if the relationship has not already been ensured by means of the re-clamping device during the re-clamping.

Furthermore, it is advantageous to have a washing and/or rinsing device for the lens. The first side of the lens can thus be cleaned before it is re-clamped and the completely machined lens can be cleaned before being removed. The washing and/or rinsing device here is provided in a polishing unit.

Moreover, it is advantageous for the reference surface to be arranged orthogonally or parallel to the optical axis of the first side and/or of the second side of the lens. Here, the orthogonally arranged reference surface serves to attain a vertical alignment, whereby the reference surface arranged in parallel determines the radial position of the lens. It is also possible to ensure the alignment of the lens in the vertical and in the radial directions by means of a shaping surface.

The objective is achieved by the following process steps: clamping the lens blank into a lens receptacle or holding device that can be rotated around a workpiece spindle axis. Machining a first optically active surface having an optical axis on the first side of the lens blank. Creating a clamping shoulder having a cylindrical lateral surface whose axis lies essentially in the workpiece spindle axis, whereby this step can also be carried out before the first optically active surface is machined.

Removing and turning the lens blank that has been thus machined, clamping the turned lens blank on the clamping shoulder into the previously used lens receptacle or into another one, machining a second optical surface having an optical axis on the second side of the lens blank, whereby the optical axis of this surface is offset or tilted relative to the optical axis of the first surface.

In this method, the tilt or the offset is taken into account when the sides, especially the second side, are machined, that is to say, the movement path of the tool not only takes the actual progressive surface into account but also the tilt of the main surface. Although this method is certainly feasible, it requires a very dynamic servomotor for the tool, since the latter has to traverse larger stroke amplitudes because the main surface is tilted with respect to the workpiece spindle axis.

Therefore, another method calls for the following steps. Clamping the lens blank into a lens receptacle that can be rotated around a workpiece spindle axis. Machining a first optically active surface having an optical axis on the first side of the lens blank, whereby the optical axis of this surface lies essentially in the workpiece spindle axis. Creating a clamping shoulder having a cylindrical lateral surface and a ring-shaped bearing face, whereby the axis defined by the lateral surface and by the ring surface is offset and/or tilted with respect to the optical axis of the first optically active surface, whereby this step can also be carried out before the first optically active surface is machined. Removing and turning the lens blank that has been thus machined. Clamping the turned lens blank into the previously used lens receptacle or into a different one, so that the axis of the clamping shoulder coincides with the workpiece spindle axis. Machining a second optical surface having an optical axis on the second side of the lens blank, whereby the optical axis of this surface likewise lies essentially in the workpiece spindle axis. The slant or offset of the lens blank needed in each case for machining the second side can consequently be obtained by machining a clamping shoulder whose axis is tilted and/or offset relative to the optical axis of the first optical surface so that the turned lens blank can be clamped so as to be tilted and/or offset. The second surface is now machined, whereby its optical axis coincides with the workpiece spindle axis. This makes it considerably easier to guide the tool; it merely has to follow a path that, for the most part, follows the symmetrical main surface. Elevations or depressions that define the progressive surface only constitute minor deviations that can easily be calculated into the movement path. All in all, this leads to smaller strokes of the tool in the axial direction than if the tilt or an offset still had to be additionally machined. Therefore, both methods have in common the fact that they can dispense with the need for the time-consuming blocking procedure which requires an additional machine and which is quite error-prone.

When the description of the invention refers to an optical axis of a progressive surface, this means an axis that describes the mean curvature of the progressive surface and that orients itself towards the optical axis of the underlying symmetrical main surface.

As explained, the clamping shoulder has a cylindrical lateral surface and a ring-shaped bearing face that runs perpendicular thereto. The lateral surface is grasped by tongs or holding parts of a lens receptacle or of a holding device in order to hold the lens blank so that it cannot rotate, whereby the bearing face lies on the back stops of the holding part. Since the surface normal of the bearing face is tilted with respect to the blank axis and since the upper end or back stop of the holding parts or their back stop lies in a counter-surface running perpendicular to the workpiece spindle axis, the lens blank is held in the lens receptacle in such a way that its axis is tilted with respect to the workpiece spindle axis.
The main surface axes of the two sides have to be matched with each other. This can also be taken into account with the clamping shoulder in that a phase marking that interacts mechanically or optically with a corresponding counter-marking on the lens receptacle is integrated into the clamping shoulder. This makes it possible to place the lens blank phase-precisely into the lens receptacle so that the control unit, which knows the relative position of the workpiece spindle relative to the machining tool, also receives information about the phase alignment of the lens blank and can thus effectuate phase-correct machining of the second side.

Due to the tilting of the axis of the lateral surface, undercuts are formed on one side of the lens so that a turning tool that is stepped or offset with respect to the blank axis is used in order to create the clamping shoulder.

Moreover, when the first side is being machined, one or more line markings or signatures can be incorporated that make it possible to adjust and check the angular positions of the two optical surfaces relative to each other for machining the second side. Such line markings, also called signatures, are also applied onto the second side. The line markings contain especially information about the main and secondary axes of the lens main surface. Markings on both sides are needed primarily for edge machining of eyeglass lenses that have to be placed with phase-precision into eyeglass frames.

The objective is also achieved in that the cutting procedure provides the lens with a positioning element having a reference indicating the first side and/or the second side and in that, after the cutting and/or polishing of a first side and before the lens is removed from the first holding device or before the detachment of the first holding device, said lens is grasped by the second holding device and aligned relative to said second holding device by means of the positioning element. The positioning element here can also be incorporated into the clamping shoulder as a phase marking so that a phase-precise placement of the turned lens blank is possible.

The polishing—in addition to the usual mechanical and chemical machining—also comprises extremely fine diamond machining or machining without additives, only with water. In this manner, minute cutting marks are reworked and removed.

In this process, a receptacle adapter that is optionally arranged on the second side of the lens for the machining of the first side is detached from the second side of the lens and the second side of the lens is machined by means of the cutting and/or polishing unit.

If no further positioning element is formed by the cutting process, then the first side or the first receiving surface or support part for machining the first side serves as a positioning element for machining the second side.

Furthermore, it is advantageous for the lens to be clamped in the radial direction by holding parts of the second holding device, whereby the positioning element of the lens configured as a reference surface is laid against at least one holding part or one back stop of the holding part. The back stop here is point-shaped, line-shaped or flat so that the reference surface can be laid against it.

For this purpose, it is also advantageous for the reference surface to be arranged perpendicular or parallel to an optical axis of the lens and for a support part to be laid against the first side. The support part has a plastic-elastic surface that is hardened after being applied so that the lens is supported stress-free.

Moreover, it is advantageous for a marking and/or signature to be placed onto or incorporated into the first side and/or the second side for purposes of a subsequent alignment of the lens, whereby after the first side has been machined, a protective layer or a protective film is placed on said first side. The signing here can be done directly by means of a laser before the re-clamping or else during the cutting or milling process. In addition to the simplified subsequent positioning of the lens in the component or eyeglass frame, the marking also serves for positioning the lens relative to the holding device insofar as the relationship is not ensured by the re-clamping device during the re-clamping. Due to the signing, the phase position of the lens relative to another lens or to the eyeglass frame or to the re-clamping device is ensured.

It is also advantageous for the lens to be washed after the first side has been machined or after the polishing and before the application of the protective layer or protective film and for the first side and/or the second side to be provided with a coating. For practical reasons, the coating of both sides simultaneously is of great significance.

Furthermore, it is advantageous if, after the first side has been machined and before the lens has been removed from the first holding device, it is held by the clamping jaws of the second holding device. In this manner, the positioning of the lens relative to the first holding device can be transferred to the second holding device. The use of signatures and/or markings can be eliminated.

For this purpose, it is advantageous for the lens to be removed from a receptacle adapter after the first side has been machined and/or to be detached from a support part after the second side has been machined. This ensures the machining and completion of the lens after the appertaining machining step.

Finally, it is advantageous if, before or after the coating, the edge is machined for purposes of the later positioning and attachment of the lens onto the eyeglass frame. Due to the edge machining after the coating, critical coating areas in the edge region are removed and special attachment modalities are created in the form of shaping, grooving or drilling of the lens for attachment to the eyeglass frame.

Additional advantages and details of the invention are explained in the patent claims and in the description and are depicted in the figures. The drawings show the following:

FIG. 1 a schematic diagram of a lens with a receptacle adapter on the second side;
FIG. 2 a schematic diagram of a lens with a support part and clamping jaws;
FIG. 3 a schematic diagram of a complete machining unit with a cutting and/or milling unit, a polishing unit and a re-clamping unit;
FIGS. 4-9 the consecutive steps for machining a lens from a lens blank.

The lens 1 shown in FIG. 1 has an optically active first side 1.1 and a side 1.2 that is to be machined. According to FIG. 1, the lens 1 is connected to a workpiece spindle (not shown here) of a cutting and milling unit 7 via a receptacle adapter 6 and a receptacle journal 6.1. In an embodiment (not shown here), the cylindrical lens is accommodated directly in the workpiece spindle.

According to FIG. 1, the lens 1 is glued onto the receptacle adapter 6 so that the first side 1.1 of the lens 1 can be machined. Aside from the lens shape generated on the first side 1.1 with the resultant optical axis 1.3, the lens 1 also has a reference surface 4.1 that is arranged orthogonally to the optical axis 1.3. The reference surface 4.1 is part of the still remaining material of the former blank lens 1 that is machined according to FIG. 2 in another machining step to form the second side 1.2 of the lens 1. In addition to the reference surface 4.1, there is a side surface 4.2 that is arranged perpendicular to the reference surface 4.1 and that likewise has a reference to the optical axis 1.3.

According to FIG. 2, the lens 1 is turned so that the already machined first side 1.1 of the lens 1 can be held by a two clamping jaws 3.1, 3.2 of a second holding device 3 of a re-clamping unit 2. According to FIG. 2, the second side 1.2 is now facing upwards and the receptacle adapter 6 has been removed. The second side 1.2 is accessible in this position and can be machined. The position of the lens 1 relative to the workpiece spindle (not shown here) according to FIG. 1 and the position of the lens 1 relative to the holding part 3.1 are maintained here.

The lens 1 lies with its reference surface 4.1 on a back stop 3.3 or back stop 3.3 of the clamping jaw 3.2 or of the clamping jaw 3.1 and is thus aligned with the optical axis 1.3 of the first side 1.1. The optical axis 1.3 now runs approximately parallel to a workpiece spindle (not shown here) or parallel to the surface 4.2 of the first side 1.1. Here, the side surface 4.2 serves to determine the position relative to the radial alignment of the lens 1. The lens 1 is held by the clamping jaws 3.1, 3.2 in the radial direction via the side surface 4.2.

In order to support the lens for purposes of machining the second side 1.2, a support part 5 is provided that has a surface 5.1 that can be hardened, such as an adhesive. The support part 5 is connected via a receptacle journal 5.2 to a workpiece spindle (not shown here). The surface 5.1 here is elastically-plastically deformable and can be placed or pressed from below against the lens 1 or against the first side 1.1 by means of the clamping jaw 3.1 so as to clamp the lens 1. Thus, the surface 5.1 adapts to the geometry of the first side 1.1 of the lens 1 and offers sufficient support after the hardening.

According to FIG. 3, a complete machining unit 10 has a cutting and milling unit 7, followed by a polishing unit 8, a re-clamping unit 2 and a coating unit 9. After the first side 1.1 has been machined in the cutting and milling unit 7, the lens is transferred to the polishing unit 8. After being polished, the lens 1 is washed in the polishing unit 8, turned by the re-clamping unit 2 as shown in FIGS. 1, 2 and transferred to the cutting and milling unit 7 so that the second side 1.2 can be machined. Then the second side 1.2 is polished and washed in the polishing unit 8. In the re-clamping unit 2, the lens 1 is detached from the receptacle adapter 6 after the first side 1.1 has been machined or detached from the support part 5 after the second side 1.2 has been machined and held by the clamping jaws 3.1, 3.2.

As desired, after the washing, a unit or a station is provided for coating the lens 1 with a protective layer or a protective film such as a plastic film so that the surface of the already machined first side 1.1 is not damaged during the machining of the second side 1.2.

After the cutting or milling and the polishing of the first side 1.1 and/or of the second side 1.2, the lens is signed in the re-clamping unit 2, for example, by means of a laser, and/or it is transferred to the coating unit 9, from which it emerges completely machined.

FIG. 4 shows a cylindrical lens blank 1 with a first side 1.1 and a second side 1.2, both of which extend perpendicular to the blank axis 1.4. The lens blank 1 is clamped in a lens receptacle 3 of a workpiece spindle (not shown here), said lens receptacle 3 having holding part or tongs 3.1, 3.2, so that the blank axis 1.4 coincides with the workpiece spindle axis.

According to FIG. 5, first of all, the optically active surface of the first side 1.1 is machined with a turning tool 11. In the simplest case, the optically active surface 1.1 is a spherical surface whose optical axis 1.3 coincides with the blank axis 1.4. However, a progressive surface can already be created here as well, whereby the optical axis 1.3 is the axis of the main surface of the progressive surface. The machining is carried out with a rapidly rotating workpiece spindle, whereby the turning tool 11 is moved up and down corresponding to the rotation of the workpiece spindle while said tool is slowly moved in the radial direction. In order to prevent excessive acceleration of the tool in the axial direction, the turning motion or rotation can be slowed down, if so desired, in those areas displaying considerable changes in the local curvature. The workpiece spindle axis is thus a controlled, that is to say, phase-regulated axis.

According to FIG. 6, a clamping shoulder 4 is created in the same clamping set-up. This clamping shoulder 4 consists of an encircling step 4.3 with a lateral surface 4.2 and a ring surface 4.1 running perpendicular thereto. It is crucial for the clamping shoulder 4 to be tilted with respect to the blank axis 1.4 and thus with respect to the optical axis 1.3 of the optically active surface 1.1 of the first side, in other words, for the surface normal of the ring surface 4.1, that is, the axis 12 of the clamping shoulder, to be tilted with respect to these axes. As a matter of principle, the step 4.3 can also be configured to be additionally offset with respect to the optical axis 1.3. In order to be able to machine the step 4.3, a laterally offset turning tool 11 is used so as to also be able to machine the areas that are in the form of undercuts.

The machining of the first side 1.1 of the lens blank 1 is thus completed. It is now removed from the clamping set-up and turned over, and then, with the first side 1.1 facing downwards, it is once again placed into the clamping set-up phase-precisely by using a phase marking in the form of a line marking. Such a marking can be dispensed with if the re-clamping is carried out in a controlled manner, that is to say, if the phase position of the lens 1 with respect to the spindle is known and if, thanks to the controlled movement...
of the transfer tool 3, this information is not lost, so that the turned lens 1 is once again placed phase-precisely into the chuck of a phase-regulated spindle. Here, as is shown in FIG. 7, the lens blank 1 is grasped at the step 4.3, whereby the tongs 3.1, 3.2 of the lens receptacle 3 grasp the lateral surface 4.2 and hold the lens blank 1 so that it cannot rotate. At the same time, the ring surface 4.1 lies on the upper end of the tongs 3.1, 3.2 so that the blank axis 1.4 is tilted with respect to the workpiece spindle. The second side 1.2 of the lens blank 1, which is now facing upwards, runs tilted with respect to the workpiece spindle.

According to FIG. 8, the second side 1.2 facing upwards is now machined into a progressive surface, that is the second optical surface 1.2, whereby its optical axis 1.4 coincides with the workpiece spindle axis and is thus tilted or optionally offset with respect to the optical axis 1.3 of the first side 1.1.

In order for the angle alignment of the two optical surfaces 1.1, 1.2 to have the desired value, during the machining of the first side 1.1, a line marking is created that is taken into account when the second side 1.2 is being machined. Before the cutting process begins, the lens blank 1 is aligned on the basis of the line marking. At the same time, it constitutes the starting point for the machining of the second side 1.2.

As soon as the second side 1.2 has also been machined, the lens that has been made from the lens blank 1 is removed from the lens receptacle 3 and its edges are machined, whereby at least the material area that forms the ring surface of the clamping set-up—shown here with double crosshatching—is removed.

List of Reference Numerals

1 lens
1.1 first side, first optical surface
1.2 second side or optical surface, progressive surface
1.3 optical axis
1.4 optical axis, blank axis
2 re-clamping unit
3 second holding device, lens receptacle, transfer tool
3.1 holding part, clamping jaw, tongs
3.2 holding part, clamping jaw, tongs
3.3 back stop, counter-surface
3.3' back stop, counter-surface
4 clamping shoulder
4.1 positioning element, reference surface
4.2 side surface, lateral surface
4.3 step
5 support part
5.1 surface
5.2 receptacle journal
6 receptacle adapter
6.1 receptacle journal
7 cutting and milling unit
8 polishing unit
9 coating unit
10 complete machining unit
11 turning tool
12 axis of the clamping shoulder

1-22. (canceled)
23. A device for machining a lens that is optically active on both a first lens side and a second lens side, the device comprising:

a machining element configured to machine the lens;
a first holding device for clamping the lens in a first position so as to enable the machining unit to machine the first side;
a re-clamping unit for re-clamping the lens from the first position to a second position so as to enable the machining unit to machine the second side;
a positioning element; and

a second holding device configured to support the lens via the positioning element in relation to an axial position of the lens.

24. The device as recited in claim 23, wherein the machining element includes at least one of a cutting unit, a milling unit and a polishing unit.

25. The device as recited in claim 23, wherein the second holding device is connected to the re-clamping unit.

26. The device as recited in claim 23, wherein the positioning element has at least one reference, the reference indicating at least one of the first lens side, the second lens side and an alignment of the lens.

27. The device as recited in claim 23, wherein the positioning element is configured as a reference surface aligned relative to an optical axis of at least one of the first lens side and the second lens side.

28. The device as recited in claim 23, wherein the second holding device includes at least two holding parts, each holding part having a back stop associated with a reference surface.

29. The device as recited in claim 23, further comprising a support part configured to be placed against the first lens side.

30. The device as recited in claim 29, wherein the support part has a plastically and/or elastically deformable surface for placing against the first lens side, the deformable surface.

31. The device as recited in claim 30, wherein the surface is hardenable.

32. The device as recited in claim 30, wherein the surface includes at least one of a binder and a filler.

33. The device as recited in claim 23, further comprising a marking device for signing and/or marking the lens.

34. The device as recited in claim 23, further comprising a washing device for washing and/or rinsing the lens is provided.
35. The device as recited in claim 26, wherein the reference surface is disposed at least one of orthogonally and parallel relative to an optical axis of one of the first lens side and the second lens side.

36. A method for manufacturing a lens from a lens blank having a first unworked side and a second unworked side, the method comprising:

clamping the lens blank in a lens receptacle rotatable around a workpiece spindle axis;

machining the first unworked side so as to create a first optically active surface having a first optical axis essentially coinciding with the workpiece spindle axis;

creating a clamping shoulder having a cylindrical lateral surface and a ring-shaped bearing face, the clamping shoulder serving as a positioning element, wherein a positioning axis of the positioning element is defined by the lateral surface and the bearing face and is disposed in a position that is one of coinciding with the workpiece spindle axis, offset from the first optical axis and tilted with respect to the first optical axis;

removing the lens blank from the lens receptacle;

turning the lens blank and reclamping the lens blank into one of the lens receptacle and a further lens receptacle so that the positioning axis coincides with the workpiece spindle axis; and

machining the second unworked side so as to create a second optical surface having a second optical axis essentially coinciding with the workpiece spindle axis.

37. A method for machining a lens having a first optically active lens side and a second optically active lens side, the method comprising:

holding the lens in a first position using a first holding device associated with the second lens side;

machining at least the first lens side with at least one of a cutting, milling and polishing unit, wherein the machining includes forming a positioning element having a reference indicating at least one of the first lens side and the second lens side;

grasping the lens using a second holding device and aligning the lens relative to the second holding device using the positioning element;

removing the lens from the first holding device after the grasping;

reclamping the lens from the first position to the second position so as to enable a machining of the second side; and

machining the second side of the lens using at least one of a cutting unit and a polishing unit.

38. The method as recited in claim 37, wherein the reference is a reference surface and wherein the second holding device includes a plurality of holding parts for grasping the lens in a radial direction, the reference surface being disposed against at least one holding part.

39. The method as recited in claim 38, wherein the plurality of holding parts each include a back stop and the reference surface is disposed against the back stop of the at least one holding part.

40. The method as recited in claim 37, wherein the reference is a reference surface disposed one of perpendicular and parallel to an optical axis of the lens.

41. The method as recited in claim 36, further comprising disposing a support part against the first side before the machining of the second unworked side.

42. The method as recited in claim 36, further comprising placing at least one of a marking and a signature at one of the first side and the second side so as to aid in a subsequent alignment of the lens.

43. The method as recited in claim 36, before the machining of the second unworked side, applying a protective layer on the first optical surface.

44. The method as recited in claim 43, further comprising washing the first optical surface before applying the protective layer.

45. The method as recited in claim 43, wherein the protective layer includes at least one of a protective film and a protective coating.

46. The method as recited in claim 36, wherein after the machining of the first unworked side and before removing the lens from the lens receptacle, holding the lens using clamping jaws of a second holding device.

47. The method as recited in claim 43, wherein the before or after applying the protective layer, machining the edge is machined so as to facilitate one of a later positioning of the lens and a later attachment of the lens onto an eyeglass frame.