CLAIMS

1. A workpiece aligner apparatus comprising:

an aligner chuck including a rotatable arm having a first end and a second end extending in an X-Y plane;

a first edge gripping element on the first end and a second edge gripping element on the second end, the first edge gripping element and the second edge gripping element spaced apart to hold a workpiece with an opening therein at edges thereof during an alignment procedure; and

a central workpiece handling element located in a central region of the rotatable arm, wherein the central workpiece handling element has a height in a Z-direction such that the central workpiece handling element extends higher than the first edge gripping element and second edge gripping element in the Z-direction and is configured to hold a solid workpiece without an opening therein during an alignment procedure so that the solid workpiece does not contact the first edge gripping element and the second edge gripping element during the alignment procedure.

2. The workpiece aligner apparatus of claim 1, wherein the apparatus does not include a separate workpiece lifting mechanism to lift the workpiece off of the rotatable arm.

3. The workpiece aligner apparatus of claim 2, wherein the first edge gripping element and the second edge gripping element are configured to hold either a flat solid workpiece or a flat workpiece having a central opening therein.

4. The workpiece aligner apparatus of claim 3, wherein the central workpiece handling element is configured to hold a flat solid workpiece but not configured to hold a flat workpiece having a central opening therein.

5. The workpiece aligner apparatus of claim 4, further comprising a controller that controls rotation of the rotatable arm.

6. The workpiece aligner apparatus of claim 5, wherein the controller is configured to rotate the rotatable arm to a first position in which a robot blade can load the workpiece to be held by the first edge gripping element and the second edge gripping element.

7. The workpiece aligner apparatus of claim 6, wherein the controller is configured to prevent the robot blade from loading workpiece when the first edge gripping element and the second edge gripping element are in a second position which would interfere with the robot blade.

8. The workpiece aligner apparatus of claim 7, further comprising a memory to store the first position and the second position.

9. A workpiece aligner apparatus comprising:

an aligner chuck including a rotatable arm having a first end and a second end opposite the first end extending in an X-Y plane;

a first edge gripping element on the first end and a second edge gripping element on the second end, the first edge gripping element and the second edge gripping element spaced apart to hold a workpiece with an opening therein at edges of the workpiece during an alignment procedure;

a central workpiece handling element located in a central region of the rotatable arm, wherein the central workpiece handling element has a height in a Z-direction such that the central workpiece handling element extends higher than the first edge gripping element and second edge gripping element in the Z-direction, and is configured to hold a solid workpiece without an opening therein during an alignment procedure so that the solid workpiece does not contact the first edge gripping element and the second edge gripping element during the alignment procedure; and

a controller which controls rotation of the rotatable arm between a dead zone in which a robot blade is prevented from loading the workpiece to be held by the first edge gripping element and the second edge gripping element when the rotatable arm is in a first position and a transfer zone in which the robot blade is permitted to load the workpiece to be held by the first edge gripping element and the second edge gripping element when the rotatable arm is in a second position.

10. The workpiece aligner apparatus of claim 9, further comprising a memory to store the first position and the second position.

11. The workpiece aligner apparatus of claim 10, wherein the first position includes a first range of radial positions in which the robot blade does not interfere with the first edge gripping element or the second edge gripping element.

12. The workpiece aligner apparatus of claim 11, wherein the second position includes a second range of radial positions in which the robot blade interferes with the first edge gripping element or the second edge gripping element.

13. The workpiece aligner apparatus of claim 12, further comprising a memory which stores the first position and the second position.

14. A method of processing a workpiece in an aligner apparatus, the method comprising:

moving a workpiece on a robot blade and moving the robot blade toward an aligner chuck including a rotatable arm having a first end and a second end opposite the first end, a first edge gripping element on the first end and a second edge gripping element on the second

end, the first edge gripping element and the second edge gripping element extending in an X-Y plane and spaced apart to hold the workpiece at edges thereof, a central workpiece handling element having a height in a Z-direction such that the central workpiece handling element extends higher that the first edge gripping element and the second edge gripping element in the Z-direction and is configured to hold a solid workpiece without an opening therein during an alignment procedure so that the solid workpiece does not contact the first edge gripping element and the second edge gripping element during the alignment procedure, the rotatable arm moveable from a first radial position which permits loading of the workpiece on the aligner chuck to a second radial position which does not permit loading of the workpiece on the aligner chuck;

checking if the rotatable arm is in the first radial position or the second radial position; and

loading the workpiece on the aligner chuck when the rotatable arm is in the first radial position.

15. The method according to claim 14, further comprising rotating the rotatable arm after loading the workpiece on the aligner chuck to align the workpiece.

16. The method according to claim 14, wherein when the rotatable arm is in the second radial position, the method further comprises preventing the robot blade from loading the workpiece on the aligner chuck.

17. The method according to claim 14, further comprising: rotating the rotatable arm until the rotatable arm is in the first radial position, and then loading the workpiece on the aligner chuck when the rotatable arm is in the first radial position.

18. The method according to claim 17, further comprising aligning the workpiece.

19. The method according to claim 18, wherein the workpiece is an EUV reticle blank on a carrier.