~~What is claimed is:~~Claims

1. A substrate carrier system, comprising:

a plurality of carrier arms each having a midpoint between opposing ends of the carrier arm, the plurality of carrier arms further having at least one respective substrate carrier mounted on each end of the carrier arm;~~,~~

a hub including a plurality of concentrically mounted drives, each of the plurality of drives is coupled near the midpoint of a respective one of the plurality of carrier arms and configured to be controlled independently of the remaining plurality of concentrically mounted drives; ~~and~~

a respective drive motor coupled to each of the concentrically mounted drives and configured to move the coupled carrier arm in a rotary manner;~~.~~

~~2. The substrate carrier system of claim 1 further comprising~~ at least one load/unload port positioned proximal to an outer periphery of the substrate carriers;~~.~~ and

~~3. The substrate carrier system of claim 2 further comprising~~ a lifter station positioned beneath a circular path traversed by midpoints of the substrate carriers and positioned on a radial line between the midpoint of the plurality of carrier arms the at least one load/unload port.

24. A substrate carrier system, comprising:

a plurality of carrier arms each having a midpoint between opposing ends of the carrier arm, the plurality of carrier arms further having at least one respective substrate carrier mounted on each end of the carrier arm;

a hub including a plurality of concentrically mounted drives, each of the plurality of drives is coupled near the midpoint of a respective one of the plurality of carrier arms and configured to be controlled independently of the remaining plurality of concentrically mounted drives;

a respective drive motor coupled to each of the concentrically mounted drives and configured to move the coupled carrier arm in a rotary manner; and ~~The substrate carrier system of claim 1 further comprising~~

an inner track section and an outer track section each mounted concentrically with the hub and arranged to respectively support an inner and outer periphery of each of the substrate carriers.

35. The substrate carrier system of claim 24 wherein the outer periphery of each of the substrate carriers is supported by both a topside portion and a bottom-side portion of the outer track section.

46. The substrate carrier system of claim 24 wherein the inner periphery of each of the substrate carriers is supported by a topside portion of the inner track section.

~~7. The substrate carrier system of claim 1 wherein each of the drive motors is a stepper motor.~~

~~8. The substrate carrier system of claim 1 wherein each of the drive motors is a servo motor.~~

~~9. The substrate carrier system of claim 1 wherein each of the drive motors is independently programmable by a velocity profile.~~

~~10. The substrate carrier system of claim 1 wherein each of the drive motors is configured to be programmed by a similar velocity profile.~~

~~11. The substrate carrier system of claim 10 wherein the similar velocity profile programmed into each of the drive motors is configured to be temporally offset from each of the other velocity profiles.~~

5~~12~~. A substrate carrier system, comprising:

a plurality of carrier arms each having a midpoint between opposing ends of the carrier arm, the plurality of carrier arms further having at least one respective substrate carrier mounted on each end of the carrier arm;,

a hub including a plurality of concentrically mounted drives, each of the plurality of drives is coupled near the midpoint of a respective one of the plurality of carrier arms and configured to be controlled independently of the remaining plurality of concentrically mounted drives; and

a respective drive motor coupled to each of the concentrically mounted drives and configured to move the coupled carrier arm in a rotary manner; and~~The substrate carrier system of claim 1 further comprising~~

_____at least one chemical-supply head.

6~~13~~. The substrate carrier system of claim 5~~12~~ wherein the at least one chemical-supply head is positioned above a path of the substrate carriers.

7~~14~~. The substrate carrier system of claim 5~~12~~ wherein the at least one chemical-supply head is positioned below a path of the substrate carriers.

8~~15~~. The substrate carrier system of claim 5~~12~~ wherein the at least one chemical-supply head has a wider cross-sectional width at an outer periphery of the head than at an inner periphery of the head.

9. The substrate carrier system of claim 1, claim 2 or claim 5, wherein each of the drive motors is a stepper motor.

10. The substrate carrier system of claim 1, claim 2 or claim 5, wherein each of the drive motors is a servo motor.

11. The substrate carrier system of claim 1, claim 2 or claim 5, wherein each of the drive motors is independently programmable by a velocity profile.

12. The substrate carrier system of claim 1, claim 2 or claim 5, wherein each of the drive motors is configured to be programmed by a similar velocity profile.

13. The substrate carrier system of claim 12 wherein the similar velocity profile programmed into each of the drive motors is configured to be temporally offset from each of the other velocity profiles.

146. A method of programming a substrate carrier system having n drive motors, each of the n drive motors being coupled to a respective independent rotary substrate carrier, the method comprising: providing a base velocity profile for programming a first of the n drive motors including the steps of: programming a first time period portion to positively accelerate the first drive motor; programming a second time period portion to negatively accelerate the first drive motor; programming a third period portion to maintain the first drive motor at a constant velocity; programming a fourth time period portion to positively accelerate the first drive motor; programming a fifth time period to negatively accelerate the first drive motor; and programming a sixth time period to maintain the first drive motor in a fixed position; and applying the base velocity profile to a program controlling the first of the n drive motors to provide motion to a first of the independent rotary substrate carriers.

157. The method of claim 146 further comprising: programming a seventh time period portion to negatively accelerate the first drive motor, the seventh time period portion arranged to occur between the third and fourth time period portions; and programming an eighth time period portion to follow the seventh time period and maintain the first drive motor at a constant velocity.

168. The method of claim 146 further comprising: producing n-1 versions of the velocity profile, each of the n-1 versions being temporally shifted from an immediately prior version; and applying each of the n-1 versions of the velocity profile to each of the n-1 drive motors remaining in the substrate carrier system.

179. A processor-readable storage medium storing an instruction that, when executed by a processor, causes the processor to perform a method of programming a substrate carrier system having n drive motors, each of the n drive motors being coupled to an independent rotary substrate carrier, the method comprising: providing a base velocity profile for programming a first of the n drive motors including the steps of: programming a first time period portion to positively accelerate the first drive motor; programming a second time period portion to negatively accelerate the first drive motor; programming a third period portion to maintain the first drive motor at a constant velocity; programming a fourth time period portion to positively accelerate the first drive motor; programming a fifth time period to negatively accelerate the first drive motor; and programming a sixth time period to maintain the first drive motor in a fixed position; and applying the base velocity profile to a program controlling the first of the n drive motors to provide motion to a first of the independent rotary substrate carriers.

1820. The processor-readable storage medium of claim 179 wherein the method further comprises: programming a seventh time period portion to negatively accelerate the first drive motor, the seventh time period arranged to occur between the third and fourth time period portions; and programming an eighth time period to follow the seventh time period and maintain the first drive motor at a constant velocity.

1921. The processor-readable storage medium of claim 179 wherein the method further comprises: producing n-1 versions of the velocity profile, each of the n-1 versions being temporally shifted from an immediately prior version; and applying each of the n-1

versions of the velocity profile to each of the n-1 drive motors remaining in the substrate carrier system.

202. A wafer cleaning chamber, comprising: a plurality of carrier arms having concentrically-mounted midpoints between opposing ends of the carrier arms, the plurality of carrier arms further having a respective wafer carrier mounted on each of the opposing ends of the carrier arms, a hub including a plurality of concentrically mounted drives, each of the plurality of drives being coupled near the midpoint of a respective one of the plurality of carrier arms, each of the plurality of drives being configured to be controlled independently of the remaining plurality of concentrically mounted drives; a respective motor coupled to each of the concentrically-mounted drives and configured to move the coupled carrier arm in a rotary manner under control of a program containing a velocity profile; and at least one cleaning chemical-supply head positioned proximate to a path of the wafer carriers.

213. The wafer cleaning system of claim 202 further comprising at least one load/unload port positioned proximate to an outer periphery of the wafer carriers.

224. The wafer cleaning system of claim 213 further comprising a lifter station positioned beneath a circular path traversed by midpoints of the substrate carriers and positioned on a radial line between the midpoint of the plurality of carrier arms the at least one load/unload port.

235. The wafer cleaning system of claim 202 wherein the at least one cleaning chemical-supply head has a wider cross-sectional width at an outer periphery of the head than at an inner periphery of the head.

246. The wafer cleaning system of claim 202 wherein the velocity profile programmed into each of the motors is temporally offset from each of the other velocity profiles.

257. The wafer cleaning system of claim 202 wherein each of the motors is a stepper motor.

268. The wafer cleaning system of claim 202 wherein each of the motors is a servo motor.