CLAIMS

1. A lift assembly, comprising:

a base bracket;

a pedestal assembly comprising:

a stem; and

a pedestal;

a pedestal assembly carrier configured to support the pedestal assembly; and

three or more servo motor assemblies that are each attached to the base bracket via pivot joints and to the pedestal assembly carrier by three or more bearing assemblies, each bearing assembly comprises:

a guide actuator;

a guide adaptor connected to the guide actuator and the pedestal assembly carrier of the lift assembly, the guide adaptor having a first pocket and a second pocket;

a bearing; and

a bolt and a spring inserted through the first pocket in the guide adaptor to connect the bearing to a top surface of the pedestal assembly carrier, the bearing having an inner race and an outer race, the inner race forced against the top surface of the pedestal assembly carrier and the outer race positioned fully within the second pocket in the guide adaptor and forced against the guide adaptor, the bolt threaded into a hole of the pedestal assembly carrier.

2. The assembly of claim 1, wherein the bolt and spring are axially preloaded.

3. The assembly of claim 2, wherein the bolt and spring are axially preloaded with about 3 pound-force (lbf) to about 200 lbf.

4. The assembly of claim 1, wherein the lift assembly is configured to repeatedly move with 3 degrees of freedom with a positional resolution of less than 0.001”.

5. The assembly of claim 1, wherein each pivot joint has one degree of rotational freedom.

6. The assembly of claim 1, wherein the bearing is a spherical thrust bearing.

7. The assembly of claim 1, wherein the bearing is an angular contact spherical bearing.

8. The assembly of claim 1, wherein the inner race forced against the pedestal assembly carrier and the outer race forced against the guide adaptor provides nominal clearance between the inner race and outer race.

9. The assembly of claim 1, wherein the inner race and the outer race are configured to slide on each other without radial motion.

10. A spherical thrust bearing assembly, comprising:

a pedestal assembly comprising:

a stem; and

a pedestal;

a guide adaptor having a first pocket and a second pocket;

a lift assembly comprising:

a base bracket;

a pedestal assembly carrier configured to support the pedestal assembly; and

three or more servo motor assemblies, each servo motor assembly attached to the base bracket via pivot joints and to the pedestal assembly carrier by a bearing assembly;

a guide actuator connected to the guide adaptor and the pedestal assembly carrier; and

a bolt and a spring inserted through the first pocket in the guide adaptor to connect a bearing to a top surface of the pedestal assembly carrier, the bearing having an inner

race and an outer race, the inner race forced against the top surface of the pedestal assembly carrier and the outer race positioned fully within the second pocket in the guide adaptor and forced against the guide adaptor, the bolt threaded into a hole of the pedestal assembly carrier.

11. The assembly of claim 10, wherein the bolt and spring are axially preloaded.

12. The assembly of claim 10, wherein the bolt and spring are axially preloaded with about 3 pound-force (lbf) to about 300 lbf.

13. The assembly of claim 10, wherein the lift assembly is configured to repeatedly move with 3 degrees of freedom with a positional resolution of less than 0.001”.

14. The assembly of claim 10, wherein each pivot joint has one degree of rotational freedom.

15. The assembly of claim 10, wherein the inner race forced against the pedestal assembly carrier and the outer race forced against the guide adaptor provides nominal clearance between the inner race and outer race.

16. The assembly of claim 10, wherein the bearing is a spherical thrust bearing.

17. The assembly of claim 10, wherein the bearing is an angular contact spherical bearing.

18. The assembly of claim 10, wherein the inner race and the outer race are configured to slide on each other without radial motion.

19. A chamber, comprising:
a chamber lid;
a plurality of chamber walls;

a chamber base;

a process region defined by the chamber lid, the plurality of chamber walls, and the chamber base;

a pedestal assembly comprising:

a stem; and

a pedestal; and

a lift assembly, the lift assembly comprising:

a base bracket;

a pedestal assembly carrier configured to support the pedestal assembly, the stem positioned through an opening of the chamber base and the base bracket, and the pedestal disposed in the process region;

pivot joints coupled to the base bracket;

three or more bearing assemblies, each bearing assembly comprising:

a guide adaptor connected to a guide actuator and the pedestal assembly carrier of the lift assembly, the guide adaptor having a first pocket and a second pocket;

a bearing; and

a bolt and a spring inserted through the first pocket in the guide adaptor to connect the bearing to a top surface of the pedestal assembly carrier, the bearing having an inner race and an outer race, the inner race forced against the top surface of the pedestal assembly carrier and the outer race positioned fully within the second pocket in the guide adaptor and forced against the guide adaptor, the bolt threaded into a hole of the pedestal assembly carrier; and

three or more servo motor assemblies that are each attached to the base bracket via the pivot joints and to the pedestal assembly carrier by the three or more bearing assemblies.

20. The chamber of claim 19, wherein the inner race and the outer race are configured to slide on each other without radial motion.