CLAIMS

1. A carrier head for holding a substrate in a polishing system, comprising:

a housing;

a flexible membrane extending below the housing, the flexible membrane dividing a volume above the flexible membrane into a multiplicity of independently pressurizable chambers;

a first plurality of individually pressurizable pressure supply lines;

a second plurality of individually pressurizable pressure supply lines; and

a valve assembly coupled to the first plurality of pressure supply lines, the second plurality of pressure supply lines and the multiplicity of independently pressurizable chambers, the valve assembly having a multiplicity of valves, wherein each respective valve of the multiplicity of valves is coupled to one respective pressurizable chamber from the multiplicity of independently pressurizable chambers, and wherein each respective valve is configured to selectively couple the one respective pressurizable chamber to one pressure supply line from a respective pair of pressure supply lines, each respective pair of pressure supply lines including a pressure supply line from the first plurality of pressure supply lines and a pressure supply line from the second plurality of pressure supply lines.

2. The carrier head of claim 1, wherein the multiplicity of independently pressurizable chambers includes a first plurality of independently pressurizable chambers and the multiplicity of valves includes a first plurality of valves, and wherein each valve of the first plurality of valves is configured to selectively couple a different pressurizable chamber of the first plurality of pressurizable chambers to a pair of pressure supply lines that is different than a pair of pressure supply lines coupled to any other valve of the first plurality of valves.

3. The carrier head of claim 2, wherein the multiplicity of independently pressurizable chambers includes a second plurality of independently pressurizable chambers and the multiplicity of valves includes a second plurality of valves, and wherein each valve of the second plurality of valves is configured to selectively couple a different pressurizable chamber of the second plurality of pressurizable chambers to a pair of pressure supply lines that is different than a pair of pressure supply lines coupled to any other valve of the second plurality of valves.

4. The carrier head of claim 3, wherein at least one valve from the first plurality of valves and at least one valve from the second plurality of valves couple respective chambers to a common pair of pressure supply lines.

5. The carrier head of claim 4, wherein for every valve from the first plurality of valves there is a corresponding valve from the second plurality of valves that couples respective chambers to a common pair of pressure supply lines.

6. The carrier head of claim 1, wherein the first plurality of pressure supply lines comprises more pressure supply lines than the second plurality of pressure supply lines.

7. The carrier head of claim 6, wherein the first plurality of pressure supply lines and the second plurality of pressure supply lines each comprise at least 4 pressure supply lines.

8. The carrier head of claim 7, wherein the first plurality of pressure supply lines has no more than 8 pressure supply lines and the second plurality of pressure supply lines has no more than 4 pressure supply lines.

9. The carrier head of claim 1, wherein the multiplicity of independently pressurizable chambers comprises one or more chambers connected to a third plurality of pressure supply lines.

10. The carrier head of claim 9, wherein the one or more chambers are coupled to a preset one or more passages in a drive shaft through the third plurality of pressure supply lines.

11. The carrier head of claim 1, wherein the multiplicity of independently pressurizable chambers includes chambers arranged at different angular positions around a central axis of the carrier head.

12. The carrier head of claim 11, wherein the multiplicity of independently pressurizable chambers includes chambers arranged at different radial positions from the central axis of the carrier head.

13. The carrier head of claim 11, the multiplicity of independently pressurizable chambers is arranged in a polar array.

14. The carrier head of claim 13, wherein the polar array includes a central chamber and a plurality of radial rings, each radial ring including a plurality of angularly separated chambers.

15. The carrier head of claim 13, wherein a plurality of angularly separated chambers are evenly spaced around the central axis.

16. The carrier head of claim 1, wherein the multiplicity of valves comprises electromagnetic valves.

17. The carrier head of claim 16, comprising circuitry secured to the housing to receive data on a data line and configured to selectively actuate the valves of the multiplicity of valves based on the data.

18. The carrier head of claim 1, comprising a support plate flexibly connected to the housing so as to be vertically movable relative to the housing, and wherein the flexible membrane is secured to the support plate and the multiplicity of pressurizable chambers are formed between the flexible membrane and the support plate.

19. The carrier head of claim 18, wherein a volume between the support plate and the housing is controllably pressurizable.