Claims

1. A containment device for laser ablation, the device comprising:

an endless wall structure forming a continuous loop defining a central volume of space, the endless wall structure having an endless base edge portion and an endless upper edge portion, and wherein the endless wall structure comprises one or more exhaust outlet orifices in the endless wall structure;

an inflow manifold lined along the endless upper edge portion of the endless wall structure, the inflow manifold having a plurality of outlets and at least one inlet; and

a plurality of nozzles, wherein each of the plurality of outlets of the inflow manifold is respectively provided with at least one of said nozzles, and wherein respective nozzle extends into the central volume of space.

2. The device as claimed in claim 1, wherein the endless wall structure is of a funnel-liked shape, wherein the endless upper edge portion is wider than the endless base edge portion and the endless wall structure tapers from the endless upper edge portion towards the endless base edge portion.

3. The device as claimed in claim 1 or 2, wherein the inflow manifold is lined along the endless upper edge portion in a manner so as to form an inwardly overhanging extension from the endless upper edge portion which suspends over the central volume of space.

4. The device as claimed in any one of claims 1 to 3, wherein the endless upper edge portion comprises an inward curl portion.

5. The device as claimed in any one of claims 1 to 4, wherein each of the plurality of outlets of the inflow manifold comprises a spout extending into the central volume of space.

6. The device as claimed in any one of claims 1 to 5, wherein a connection portion of each of the plurality of nozzles is respectively coupled to a corresponding outlet of the plurality of outlets of the inflow manifold via a ball and socket joint.

7. The device as claimed in any one of claims 1 to 6, wherein the plurality of outlets of the inflow manifold is equally spaced from each other along the inflow manifold, wherein each of the respective nozzle of the plurality of outlets of the inflow manifold that are equally spaced is configured to direct a spray towards an opening formed by the endless base edge portion of the endless wall structure with a spray axis angled off a vertical axis, which is parallel to a central axis passing through a centre of the opening, by an angle of 30° +/- 10° and whose orientation about the vertical axis is such that the spray axis lies in a same vertical plane with a line tangent to a predetermined circle, wherein the predetermined circle is coaxial with the base opening and is of a smaller diameter than the base opening and in a same horizontal plane with the base opening, and wherein the vertical plane is perpendicular to the horizontal plane.

8. The device as claimed in any one of claims 1 to 6, wherein a first subset of the plurality of outlets of the inflow manifold is equally spaced from each other along the inflow manifold, and each of a second subset of the plurality of outlets is disposed between two of the first subset of the plurality of outlets, wherein a number of outlets of the second subset is less than a number of outlets of the first subset, wherein each of the respective nozzle of the first subset of the plurality of outlets that are equally spaced is configured to direct a spray towards an opening formed by the endless base edge portion of the endless wall structure with a spray axis angled off a vertical axis, which is parallel to a central axis passing through a centre of the opening, by an angle of 30° +/- 10° and whose orientation about the vertical axis is such that the spray axis lies in a same vertical plane with a line tangent to a predetermined circle, wherein the predetermined circle is coaxial with the base opening and is of a smaller diameter than the base opening and in a same horizontal plane with the base opening, and wherein the vertical plane is perpendicular to the horizontal plane.

9. The device as claimed in claim 8, wherein the respective nozzle of each of the second subset of the plurality of outlets is configured to direct a spray towards the centre of the opening.

10. The device as claimed in any one of claims 1 to 9, further comprising an exhaust manifold running alongside an exterior wall surface of the endless wall structure, wherein the one or more exhaust outlet orifices in the endless wall structure is respectively connected to the exhaust manifold via respective connecting tube.

11. The device as claimed in claim 10, wherein the exhaust manifold has a closed terminal end and an opened terminal end.

12. The device as claimed in claim 11, wherein the exhaust manifold has an increasing diameter from the closed terminal end to the opened terminal end.

13. The device as claimed in any one of claims 1 to 12, wherein the endless wall structure comprises eight exhaust outlet orifices equally spaced along the endless wall structure, and wherein each exhaust orifice is located immediately underneath the inflow manifold.

14. The device as claimed in any one of claims ~~10~~ 11 to 13, further comprising a fume extractor connected to the opened terminal end of the exhaust manifold.

15. The device as claimed in any one of claims 1 to 14, wherein the endless wall structure forms a continuous circular loop, and wherein the inflow manifold comprises a ring-shaped tube.

16. The device as claimed in any one of claims 1 to 15, wherein the at least one inlet of the inflow manifold is connected to a cold air supply.

17. The device as claimed in claim 16, wherein the cold air supply comprises a heat exchanger configured to supply cold air to the at least one inlet of the inflow manifold, or a vortex tube with a cold air outlet of the vortex tube connected to the at least one inlet of the inflow manifold.

18. The device as claimed in any one of claims 1 to 17, further comprising one or more mechanical fixture or vacuum pad configured to couple the endless wall structure to a work surface.

19. A laser ablation system, comprising:

the containment device according to any one of claims 1 to 18; and

a laser scanner module , wherein the laser scanner module comprises a laser directed towards the central volume of space in a direction from the upper edge portion towards the endless base edge portion.

20. The laser ablation system according to claim 19, wherein the laser is directed towards a radially central portion of the central volume of space at the level of the endless base edge portion.