CLAIMS

1. An apparatus to electroplate a surface of a tubular structure, wherein the apparatus comprises:

a chamber forming mechanism configured to enclose portions of a tubular structure to form an electroplating chamber with an inner wall comprising a surface of the tubular structure to be electroplated,

wherein the chamber forming mechanism comprises:

an inlet to let fluid for use in an electroplating process to enter and fill up the electroplating chamber to immerse the surface of the tubular structure to be electroplated in the fluid during the electroplating process;

an outlet to let the fluid exit the electroplating chamber as required during the electroplating process; and

an electrode extending from the chamber forming mechanism into the electroplating chamber,

wherein the surface of the tubular structure to be electroplated is electrically conductive,

wherein the apparatus further comprises:

a clamping mechanism configured to clamp the chamber forming mechanism to the tubular structure to compress one or more seal disposed between the chamber forming mechanism and portions of the tubular structure enclosed by the chamber forming mechanism,

wherein the clamping mechanism comprises:

a first jaw configured to contact a first portion of the tubular structure; and

a portion of the chamber forming mechanism as a second jaw opposite to the first jaw for covering a second portion of the tubular structure, wherein distance between the first jaw and the second jaw is adjustable to clamp the chamber forming mechanism to the tubular structure.

2. The apparatus according to claim 1, wherein the chamber forming mechanism comprises:

a second outlet located at a top portion of the electroplating chamber for removing waste gas from the electroplating chamber.

3. The apparatus according to claim 2, wherein the second outlet is disposed above the outlet for fluid to exit.

4. The apparatus according to claim 2 or 3, wherein a first conduit is connected to the second outlet and a second conduit for channeling exiting fluid is connected to the outlet for fluid to exit and the first conduit is connected to the second conduit.

5. The apparatus according to any one of claims 2 to 4, wherein the apparatus comprises:

a tilting mechanism comprising a platform configured to mount the tubular structure in a horizontal orientation, and the platform is adjustable to tilt by an angle relative to the horizontal orientation to correspondingly tilt the tubular structure mounted to the platform to direct waste gas in the fluid to move upwards to the second outlet.

6. The apparatus according to claim 5, wherein the angle is 0 to 45 degrees.

7. The apparatus according to claim 5 or 6, wherein the platform is adjustable to tilt by an angle relative to the horizontal orientation to correspondingly tilt the tubular structure mounted to the platform to direct, with assistance of gravity, fluid downwards to the outlet for fluid to exit.

8. The apparatus according to any one of the preceding claims, wherein the chamber forming mechanism is configured to form the electroplating chamber with inner walls comprising:

internal surface of the tubular structure to be electroplated; and

surface of one or more portion of the chamber forming mechanism covering one or more respective opening of the tubular structure.

9. The apparatus according to any one of the preceding claims, wherein the apparatus comprises:
   a barrier for plugging an inner channel portion of the tubular structure to prevent fluid leakage pass the inner channel portion.

10. The apparatus according to claim 9, wherein the barrier comprises a seal and the barrier is adjustable to press the seal against the inner wall of the tubular structure at the inner channel portion.

11. The apparatus according to claim 10, wherein the barrier comprises two plates and the seal is disposed such that when the two plates are adjusted to come together, the seal is compressed to press against the inner wall of the tubular structure at the inner channel portion.

12. The apparatus according to claim 11, wherein the seal is seated on one of the two plates and the plate on which the seal is seated comprises a slope for the seal to stretch and move up the slope when the two plates are adjusted to come together and to retract and move down the slope when the two plates are adjusted to move apart.

13. The apparatus according to claim 9, wherein the chamber forming mechanism comprises:
   an adjustment mechanism mounted to the barrier via a support member, wherein the adjustment mechanism is configured to adjust movement of the barrier to a position of the inner channel portion where the barrier is to be placed.

14. The apparatus according to claim 10, wherein the adjustment mechanism comprises:
   a handle rotatable to make the adjustment; and
   a spindle with one end connected to the handle and another end connected to the barrier,
   wherein rotation of the handle moves the barrier to the position of the inner channel portion where the barrier is to be placed..

15. The apparatus according to any one of claims 9 to 14, wherein the chamber forming mechanism is configured to form the electroplating chamber with inner walls comprising:
   internal surface of the tubular structure to be electroplated;
   surface of one or more portion of the chamber forming mechanism covering one or more respective opening of the tubular structure; and
   surface of the barrier.

16. The apparatus according to any one of the preceding claims, wherein the chamber forming mechanism comprises:
   a housing configured to enclose external surface of the tubular structure to form the electroplating chamber with inner walls comprising:
   the external surface of the tubular structure to be electroplated; and
   walls of the housing of the chamber forming mechanism.

17. The apparatus according to any one of the preceding claims, wherein the fluid comprises a degreasing agent to degrease the surface of the tubular structure to be electroplated, a washing agent to clean the electroplated surface of the tubular structure, an electrolyte solution for coating plating material on the surface of the tubular structure to be electroplated while a potential difference between the electrode and the tubular structure is applied, or air for drying and/or flushing other fluid out of the electroplating chamber.

18. The apparatus according to any one of the preceding claims, wherein the inlet to let fluid enter and the outlet to let fluid exit are connected via respective conduits to a central fluid supply system comprising a plurality of storage tanks for holding different fluids.

19. The apparatus according to claim 18, wherein the central fluid supply system comprises:
    a central pipe connected to the plurality of storage tanks for channeling the different fluids into the electroplating chamber from the plurality of storage tanks.

20. The apparatus according to claim 19, wherein the central pipe is connected to a blower for channeling air into the electroplating chamber.

21. The apparatus according to claim 19 or 20, wherein the central pipe is connected to a water supply for channeling water into the electroplating chamber.

22. The apparatus according to any one of the preceding claims, wherein the apparatus comprises a pump configured to constantly pump fluid from a tank to the electroplating chamber so that the fluid in the electroplating chamber is constantly replaced.

23. The apparatus according to claim 22, wherein the replaced fluid exiting the electroplating chamber through the outlet is directed back to the tank thereby achieving circulation of the fluid between the electroplating chamber and the tank.

24. The apparatus according to any one of the preceding claims, wherein the surface of the tubular structure to be electroplated is an internal or external threaded surface of the tubular structure.

25. An electroplating system comprising more than one of the apparatus according to any one of the preceding claims for electroplating more than one tubular structure simultaneously.

26. A method to electroplate a surface of a tubular structure using the apparatus according to any one of the preceding claims, wherein the method comprises:
    filling up with fluid the electroplating chamber formed by the apparatus to immerse the surface of the tubular structure to be electroplated in the fluid during electroplating process.

27. The method according to claim 26, wherein the method further comprises the following steps:
    a degreasing step to channel degreasing agent through the inlet into the electroplating chamber to immerse the enclosed portions of the tubular structure in the degreasing agent to degrease the enclosed portions of the tubular structure;
    a first drying step to channel air through the inlet into the electroplating chamber to flush the degreasing fluid through the outlet and to dry the enclosed portions of the tubular structure;
    a washing step to channel washing agent through the inlet into the electroplating agent to immerse the enclosed portions of the tubular structure in the washing agent to wash the enclosed portions of the tubular structure;
    a second drying step to channel air through the inlet into the electroplating chamber to flush the washing agent through the outlet and to dry the enclosed portions of the tubular structure;
    a coating step to channel electrolyte solution through the inlet into the electroplating chamber to coat the plating material on the surface of the tubular structure to be electroplated while applying a potential difference between the electrode of the apparatus and the tubular structure; and
    a third drying step to channel air through the inlet into the electroplating chamber to flush the electrolyte solution through the outlet and to dry the enclosed portions of the tubular structure,
    wherein the surface of the tubular structure to be electroplated is immersed in the electrolyte solution in the electroplating chamber during the coating step.

28. The method according to claim 27, wherein the method comprises:
    a tilting step to tilt the tubular structure during the coating step to direct waste gas to move upwards to an outlet at a top portion of the electroplating chamber formed by the apparatus.

29. The method according to claim 27 or 28, wherein the method comprises:

during the degreasing step, washing step or coating step, a pumping step to constantly pump the respective degreasing agent, washing agent or electrolyte solution from a respective tank into the electroplating chamber formed by the apparatus so that the degreasing agent, washing agent or electrolyte solution in the electroplating chamber is constantly replaced.

30. The method according to claim 29, wherein the method comprises:
directing the respective degreasing agent, washing agent or electrolyte solution from the electroplating chamber back to the respective tank thereby achieving circulation of the respective degreasing agent, washing agent or electrolyte solution between the electroplating chamber and the respective tank.

31. The method according to any one of claims 26 to 30, wherein the method comprises:
a clamping step to clamp the chamber forming mechanism of the apparatus to the tubular structure by compressing one or more seal disposed between the chamber forming mechanism and portions of the tubular structure enclosed by the chamber forming mechanism.

32. The method according to any one of claims 26 to 31, wherein the method comprises:
a plugging step to plug an inner channel portion of the tubular structure to prevent fluid leakage pass the inner channel portion.