CLAIMS:

1. A furnace system for cracking hydrocarbons, comprising:

a radiant firebox comprising a plurality of burners and an injection nozzle;

a primary transfer line exchanger fluidly coupled to and downstream of the radiant firebox;

a flow restrictor fluidly coupled to and downstream of the primary transfer line exchanger;

a decoke vessel comprising an effluent inlet, a fluid outlet, and a coke outlet, wherein the effluent inlet is fluidly coupled to and downstream of the flow restrictor and the fluid outlet is fluidly coupled to and upstream of the injection nozzle of the radiant firebox; and

at least one of (a) a moveable coke collection bin that is coupled to the coke outlet of the decoke vessel and (b) a fixed coke collection bin that is coupled to the coke outlet of the decoke vessel and is adapted to convey coke away from the furnace system.

2. The furnace system of claim 1, further comprising a valve disposed between the primary transfer line exchanger and the flow restrictor.

3. The furnace system of claim 1, further comprising a secondary transfer line exchanger fluidly coupled to and downstream of the primary transfer line exchanger and to the flow restrictor.

4. The furnace system of claim 3, further comprising a valve disposed between the primary transfer line exchanger and the secondary transfer line exchanger.

5. The furnace system of claim 3, wherein the secondary transfer line exchanger comprises an inlet and an outlet, wherein the inlet of the secondary transfer line exchanger is fluidly coupled to the an outlet of the primary transfer line exchanger and the outlet of the secondary transfer line exchanger is fluidly coupled to a recovery system.

6. The furnace system of any of claims 1 to 5, wherein the decoke vessel is configured to operate at ambient pressure.

7. The furnace system of ay of claims 1 to 5, wherein no flow restrictor is present between

the fluid outlet and the injection nozzle.

8. The furnace system of claim 1, wherein the decoke vessel comprises a cyclone separator.

9. The furnace system of claim 8, wherein the cyclone separator is configured to:
receive decoke effluent via the effluent inlet,
separate the decoke effluent into coke particles and a decoke fluid, and
transfer the coke particles to the coke collection bin via the coke outlet and the decoke fluid to the injection nozzle via the fluid outlet.

10. The furnace system of claim 1, wherein the coke collection bin is configured to store the coke particles at ambient pressure.

11. The furnace system of claim 1, wherein at least a portion of the plurality of burners is located on a bottom surface of the radiant firebox.

12. The furnace system of claim 1, wherein the injection nozzle is located adjacent to at least a portion of the plurality of burners.

13. The furnace system of claim 1, wherein the radiant firebox further comprises one or more coils disposed therein.

14. The furnace system of claim 13, wherein the coils comprise radiant coils, convection coils, or any combination thereof.

15. A furnace system for cracking hydrocarbons, comprising:
a radiant firebox comprising a plurality of burners and an injection nozzle;
a primary transfer line exchanger fluidly coupled to and downstream of the radiant firebox;
a secondary transfer line exchanger fluidly coupled to and downstream of the primary transfer line exchanger;
a first valve disposed between the primary transfer line exchanger and the secondary transfer line exchanger;

a decoke effluent line fluidly coupled to and downstream of the primary transfer line exchanger and fluidly coupled to and upstream of the first valve;

a second valve fluidly coupled to the decoke effluent line downstream of the primary transfer line exchanger;

a flow restrictor fluidly coupled to the decoke effluent line downstream of the second valve;

a decoke vessel fluidly coupled to the decoke effluent line and comprising an effluent inlet, a fluid outlet, and a coke outlet, wherein the effluent inlet is fluidly coupled to and downstream of the flow restrictor and the fluid outlet is fluidly coupled to and upstream of the injection nozzle of the radiant firebox; and

at least one of (a) a moveable coke collection bin that is coupled to the coke outlet of the decoke vessel and (b) a fixed coke collection bin that is coupled to the coke outlet of the decoke vessel and is adapted to convey coke away from the furnace system.

16. The furnace system of claim 15, wherein the decoke vessel comprises a cyclone separator.

17. The furnace system of claim 15 or claim 16, wherein the decoke vessel is configured to operate at ambient pressure.

18. The furnace system of claim 15 or claim 16, wherein no flow restrictor is present between the fluid outlet and the injection nozzle.

19. The furnace system of claim 16, wherein the cyclone separator is configured to:

receive decoke effluent via the effluent inlet,

separate the decoke effluent into coke particles and a decoke fluid, and

transfer the coke particles to the coke collection bin via the coke outlet and the decoke fluid to the injection nozzle via the fluid outlet.

20. The furnace system of claim 15, wherein the movable coke collection bin is configured to store the coke particles at ambient pressure.

21. The furnace system of claim 15, wherein the radiant firebox further comprises one or more coils disposed therein, and wherein the coils comprise radiant coils, convection coils, or

any combination thereof.

22. A furnace system for cracking hydrocarbons, comprising:

a radiant firebox comprising a plurality of burners, an injection nozzle, and one or more coils, wherein the coils comprise radiant coils, convection coils, or any combination thereof;

a primary transfer line exchanger fluidly coupled to and downstream of the radiant firebox;

a secondary transfer line exchanger fluidly coupled to and downstream of the primary transfer line exchanger;

a first valve disposed between the primary transfer line exchanger and the secondary transfer line exchanger;

a decoke effluent line fluidly coupled to and downstream of the primary transfer line exchanger and fluidly coupled to and upstream of the first valve;

a second valve fluidly coupled to the decoke effluent line downstream of the primary transfer line exchanger;

a flow restrictor fluidly coupled to the decoke effluent line downstream of the second valve;

a decoke vessel fluidly coupled to the decoke effluent line and comprising an effluent inlet, a fluid outlet, and a coke outlet, wherein the effluent inlet is fluidly coupled to and downstream of the flow restrictor and the fluid outlet is fluidly coupled to and upstream of the injection nozzle of the radiant firebox, wherein the decoke vessel comprises a cyclone separator and is configured to:

receive decoke effluent via the effluent inlet,

separate the decoke effluent into coke particles and a decoke fluid, and

transfer the decoke fluid to the injection nozzle via the fluid outlet; and

at least one of (a) a moveable coke collection bin that is coupled to the coke outlet of the decoke vessel and (b) a fixed coke collection bin that is coupled to the coke outlet of the decoke vessel and is adapted to convey coke away from the furnace system; wherein at least one of the movable and fixed coke collection bins has an interior volume containing coke particles at ambient pressure.

23. The furnace system of claim 22, wherein the decoke vessel is configured to operate at ambient pressure.

24. The furnace system of claim 22, wherein no flow restrictor is present between the fluid outlet and the injection nozzle.

25. A method of cracking hydrocarbons in a cracking furnace, comprising:

during decoking mode flowing a decoke effluent from a radiant firebox through a primary transfer line exchanger;

flowing the decoke effluent from the primary transfer line exchanger through a flow restrictor;

flowing the decoke effluent from the flow restrictor to a decoke vessel;

separating the decoke effluent into coke particles and a decoke fluid within the decoke vessel;

transferring the decoke fluid from the decoke vessel to the radiant firebox;

combusting the decoke fluid within the radiant firebox;

transferring the coke particles from the decoke vessel to a coke collection bin; and

transferring away from the cracking furnace at least a portion of the coke particles in the collection bin.

26. The method of claim 25, wherein decoke vessel is configured to operate at ambient pressure.

27. The method of claim 25, wherein no flow restrictor is present between the fluid oulet and the injection nozzle.

28. The method of claim 25, wherein the decoke vessel comprises a cyclone separator.

29. The method of claim 25, further comprising transferring the coke particles to the coke collection bin at ambient pressure.

30. The method of claim 25, further comprising storing the coke particles in the coke collection bin at ambient pressure.

31. The method of claim 25, further comprising:

closing a valve disposed between the primary transfer line exchanger and the flow

restrictor; and

flowing a production effluent from the primary transfer line exchanger to a secondary transfer line exchanger.

32. The method of claim 31, further comprising flowing the production effluent from the secondary transfer line exchanger to a recovery system.

33. The method of claim 25, wherein prior to flowing the decoke effluent from the primary transfer line exchanger through the flow restrictor, the method further comprises:

flowing a production effluent from the primary transfer line exchanger to a secondary transfer line exchanger;

closing a first valve disposed between the primary transfer line exchanger and the secondary transfer line exchanger;

opening a second valve disposed between the primary transfer line exchanger and the flow restrictor; and

flowing the decoke effluent from the primary transfer line exchanger through the flow restrictor.