CLAIMS

1. A method for operating a continuous catalytic reformer unit, the method comprising:

passing a hydrocarbon reactant stream to a continuous catalytic reformer unit to form one or more product effluent streams, the continuous catalytic reformer unit comprising at least one stream pre-heater, at least one catalytic reactor, and at least one separation unit;

implementing a hydrocarbon reformer process control system comprising a hydrocarbon reformer variable data memory comprising processor-executable instructions, a hydrocarbon reformer output translation module, and one or more predictive hydrocarbon reformer modeling processors configured to execute the processor-executable instructions and cause the process control system to:

receive:

one or more signals indicative of one or more present state variables from one or more state variable actuator hardwares, wherein the one or more present state variables are process variables that cannot be directly set in the continuous catalytic reformer unit; and

one or more signals indicative of one or more present control variables of the continuous catalytic reformer unit from one or more control variable actuator hardwares, wherein the one or more present control variables are process variables that can be directly set in the continuous catalytic reformer unit; and

generate, by utilizing a machine learned model, an improved control variable that increases a selected performance variable based on the inputs of one or both of one or more present state variables or one or more present control variables, wherein the machine learned model is trained utilizing inputs of at least historic state variable data, historic control variable data, and historic performance variable data;

adjusting one or more present control variables of the continuous catalytic reformer unit based on the improved control variable determined by the machine learned model; and

wherein the improved control variable and the one or more present control variables are chosen from the reactant stream feed rate, quality of reactant feed stream, the chloride injection rate, average carbon burn rate in the catalyst regenerator, catalyst circulation rate, and hydrogen/hydrocarbon ratio.

2. The method of claim 1, wherein the hydrocarbon reformer output translation module sends one or more signals to one or more control variable actuator hardwares to adjust the one or more present control variables.

3. The method of any previous claim, wherein the process control system automatically adjusts, in real-time, the one or more present control variables based on the improved control variable determined by the machine learned model.

4. The method of any previous claim, wherein:

the one or more signals indicative of one or more present state variables is received by the process control system in real-time or near-real time; and

the one or more signals indicative of one or more present control variables is received by the process control system in real-time or near-real time.

5. The method of any previous claim, wherein the process control system generates the improved control variable in real-time or near-real time.

6. The method of any previous claim, wherein the one or more present state variables are chosen from reactant stream input rate, catalyst activity, the average pressure of a catalytic reactor, reactor down time, product yield of reformate, product yield of hydrogen, product yield of off-gas, product yield of LPG, consumption of fuel-gas, consumption of cooling water, consumption of power, the temperature of a separation unit, heat exchanger duty of the combined feed and effluent, or catalyst time in system.

7. The method of any previous claim, wherein the selected performance variable is chosen from product yield of reformate, product yield of hydrogen, product yield of off-gas, product yield of LPG, reactant stream input rate, chloride injection rate, or catalyst time in system.

8. The method of any previous claim, wherein the reactant stream comprises refinery naphtha.

9. The method of any previous claim, wherein the machine learned model comprises a neural network model.

10. A continuous catalytic reformer unit operating the method of any previous claim.