In one aspect, there is provided a control system for a continuous liquid phase hydroprocessing reactor having an upper zone of gases and a substantially larger lower zone of liquids surrounding a catalyst, comprising:

(a) an indicator located on said reactor;

(b) means for sensing the quantity of liquid in said reactor;

(c) an indicator reading obtained from said sensing means;

(d) means for converting said indicator reading to an indicator signal;

(e) a computer to receive said indicator signal;

(f) means for transmitting the indicator signal to said computer;

(g) a software program to interpret said indicator signal and make adjustments based on said indicator signal;

(h) means for converting said adjustments to an adjustment signal;

(i) means for transmitting said adjustment signal;

(j) a hydrogen control valve, located upstream from said reactor, which adjusts the amount of hydrogen going into a reactor feed;

(k) means for interpreting the adjustment signal at said hydrogen control valve; and

(l) means for adjusting said hydrogen control valve based on said interpreting means; wherein the reactor comprises: a vessel having a top and a bottom; a catalyst bed containing catalyst particles which fill a majority of said vessel; inlet to allow a mixture of liquids with hydrogen dissolved therein to enter said vessel wherein the inlet to the vessel is at the top of the vessel; an upper zone of said vessel adapted to temporarily house gases inside said vessel; a substantially isothermal lower zone of said vessel adapted to temporarily house liquids, surrounding said catalyst bed inside said vessel; an outlet to allow said reacted liquid to exit said vessel; a vent to allow said excess hydrogen gas and said light end hydrocarbon gases to leave said vessel through said top of said vessel; and a valve to adjust the amount of gas leaving said vessel through said vent.