Claims

[Claim 1]

A system comprising:

a planning section that generates a production plan for a production site, using a planning model to generate the production plan for the production site;

a simulating section that simulates operation of at least a portion of the production site, based on a simulation model to simulate the at least a portion of the production site by using a control parameter or a set of control parameters;

a monitoring section that monitors actual operation of the at least a portion of the production site;

a calibrating section that calibrates the simulation model, based on a difference between the simulated operation and the actual operation; and

a control section that controls the at least a portion of the production site by using the control parameter or the set of control parameters that realizes a simulation result obtained by simulating the at least a portion of the production site in accordance with the production plan, using the simulation model that has been calibrated.

[Claim 2]

The system according to Claim 1, wherein

the production site includes a refinery that produces a plurality of petroleum products by refining crude oil.

[Claim 3]

The system according to Claim 2, wherein

the at least a portion of the production site includes at least one of a crude distillation unit, vacuum distillation unit, naphtha hydrotreating unit, catalytic reforming unit, benzene extraction unit, kerosene hydrotreating unit, diesel desulfurization unit, heavy oil desulfurization unit, fluid catalytic cracking unit, FCC gasoline desulfurization unit, thermal cracking unit, hydrocracking unit, or asphalt production unit.

[Claim 4]

The system according to Claim 3, wherein

the control section controls at least one of a reactor temperature, distillation cut temperature, furnace outlet temperature, stripping steam ratio, reflux ratio, reboiler duty or pump around heat removal rate.

[Claim 5]

The system according to any one of Claims 1 to 4, wherein

the at least a portion of the production site is one process unit at the production site.

[Claim 6]

The system according to Claim 5, wherein

the control section selects a control parameter that realizes a simulation result that maximizes gross profit, from among a plurality of simulation results obtained by simulating operation of the at least a portion of the production site a plurality of times using different control parameters.

[Claim 7]

The system according to any one of Claims 1 to 4, wherein

the at least a portion of the production site is a group of a plurality of process units at the production site.

[Claim 8]

The system according to Claim 7, wherein

the control section selects a set of control parameters that realizes a simulation result that maximizes gross profit, from among a plurality of simulation results obtained by simulating operation of the at least a portion of the production site a plurality of times using different sets of control parameters.

[Claim 9]

The system according to any one of Claims 1 to 8, wherein

the simulation model is a steady state model.

[Claim 10]

The system according to any one of Claims 1 to 9, wherein

the planning model is a linear programming model.

[Claim 11]

The system according to any one of Claims 1 to 10, wherein

the calibrating section calibrates the simulation model when the difference exceeds a predetermined threshold value.

[Claim 12]

A method comprising:

generating a production plan for a production site, using a planning model to generate the production plan for the production site;

simulating operation of at least a portion of the production site, based on a simulation model to simulate the at least a portion of the production site by using a control parameter or a set of control parameters;

monitoring actual operation of the at least a portion of the production site;

calibrating the simulation model, based on a difference between the simulated operation and the actual operation; and

controlling the at least a portion of the production site by using the control parameter or the set of control parameters that realizes a simulation result obtained by simulating the at least a portion of the production site in accordance with the production plan, using the simulation model that has been calibrated.

[Claim 13]

A program that, when executed by a computer, causes the computer to function as:

a planning section that generates a production plan for a production site, using a planning model to generate the production plan for the production site;

a simulating section that simulates operation of at least a portion of the production site, based on a simulation model to simulate the at least a portion of the production site by using a control parameter or a set of control parameters;

a monitoring section that monitors actual operation of the at least a portion of the production site;

a calibrating section that calibrates the simulation model, based on a difference between the simulated operation and the actual operation; and

a control section that controls the at least a portion of the production site by using the control parameter or the set of control parameters that realizes a simulation result obtained by simulating the at least a portion of the production site in accordance with the production plan, using the simulation model that has been calibrated.