WHAT IS CLAIMED IS:

1. A method for operating an industrial plant, comprising:

having a rule-based expert system that comprises a set of rules for evaluating the operation of a process unit in the industrial plant;

having a model-based expert system that comprises a statistical mathematical model for evaluating the operation of the process unit in the industrial plant;

applying the model-based expert system to evaluate the operation of the process unit using statistical data on the operating conditions of the process unit;

obtaining a statistical analysis result from the model-based expert system;

applying the rule-based expert system to identify a possible abnormality in the operation of the process unit using: (a) data on the operating conditions of the process unit, and (b) the result from the model-based expert system;

sending a first message from the rule-based expert system regarding an abnormality to an operator interface;

suppressing a second message from the model-based expert system, wherein the suppressed message relates to the abnormality and is redundant to the first message; and

adjusting the operation of the process unit based on the message relating to the abnormality.

2. The method of claim 1, wherein the mathematical model in the model-based expert system includes a principal component analysis model.

3. The method of claim 2, wherein the mathematical model further includes a valve flow model, a proportional-integral-derivative control monitor model, and a partial least squares (PLS) model.

4. The method of claim 1, further comprising using a database accessible by both the model-based expert system and the rule-based expert system, wherein the database comprises:

(a) data pertaining to the configuration of the mathematical model in the model-based expert system; and

(b) data pertaining to the configuration of the rules in the rule-based expert system.

5. The method of claim 4, wherein the database further comprises: (c) data pertaining to the message suppression relationships in the integrated expert system.

6. The method of claim 1, wherein the result from the model-based expert system is a statistical analysis result on the operation of the process unit, and wherein the rule-based expert system evaluates the statistical analysis result calculated by the model-based expert system.

7. The method of claim 1, wherein the model-based expert system comprises multiple different mathematical models for the same process unit in the industrial plant;

wherein the model-based expert system calculates one or more results from the different mathematical models;

wherein the rule-based expert system further uses: (c) information relating to the operating mode of the process unit; and

wherein the message selected for suppression is at least partly determined on the basis of the operating mode of the process unit.

8. The method of claim 1, wherein the step of applying the rule-based expert system comprises evaluating the set of rules in a sequence such that rules whose conditional premises are fully known are evaluated before the rules whose conditional premises are not fully known.

9. The method of claim 8, wherein the set of rules includes a first rule and a second rule that relies on a conclusion of the first rule, and wherein the first rule is evaluated before the second rule.

10. The method of claim 1, wherein the step of applying the rule-based expert system comprises evaluating the set of rules according to a rule evaluation schedule,

and wherein the method further comprises the step of making a rule evaluation schedule, which comprises the steps of:

adding to the rule evaluation schedule, a first set of rules whose conditions do not depend on other rules; and

adding to the rule evaluation schedule, a second set of rules that are not already in the schedule whose conditions include dependencies on rules in the first set of rules but do not depend on any other rules.

11. The method of claim 10, wherein the step of making a rule evaluation schedule further comprises the step of adding to the rule evaluation schedule, a third set of rules not already in the schedule whose conditions include dependencies on rules in the first set of rules or the second set of rules, but do not depend on any other rules.

12. An industrial plant, comprising:

a process unit;

multiple sensors that sense the operating condition of the process unit;

a process control system in communication with the multiple sensors;

an operator interface; and

a computer system that comprises:

a) a rule-based expert system that comprises a set of rules for evaluating the operation of the process unit;

b) a model-based expert system that comprises a statistical mathematical model for evaluating the operation of the process unit;

wherein the computer system is programmed to perform steps comprising:

receiving data on the operating conditions of the process unit;

applying the model-based expert system to evaluate the operation of the process unit using data on the operating conditions of the process unit;

obtaining a statistical analysis result from the model-based expert system;

applying the rule-based expert system to identify a possible abnormality in the operation of the process unit using: (a) data on the operating

conditions of the process unit, and (b) the statistical analysis result from the model-based expert system;

sending a first message from the rule-based expert system regarding an abnormality to the operator interface; and

suppressing a second message from the model-based expert system, wherein the suppressed message relates to the abnormality and is redundant to the first message.

13. The industrial plant of claim 12, wherein the mathematical model in the model-based expert system includes a principal component analysis model.

14. The industrial plant of claim 13, wherein the mathematical model further includes a valve flow model, a proportional-integral-derivative control monitor model, and a partial least squares (PLS) model.

15. The industrial plant of claim 12, further comprising using a database accessible by both the model-based expert system and the rule-based expert system, wherein the database comprises:

(a) data pertaining to the configuration of the mathematical model in the model-based expert system; and

(b) data pertaining to the configuration of the rules in the rule-based expert system.

16. The industrial plant of claim 15, wherein the database further comprises: (c) data pertaining to the message suppression relationships in the integrated expert system.

17. The industrial plant of claim 12, wherein the result from the model-based expert system is a statistical analysis result on the operation of the process unit, and wherein the rule-based expert system evaluates the statistical analysis result calculated by the model-based expert system.

18. The industrial plant of claim 12, wherein the model-based expert system comprises multiple different mathematical models for the same process unit in the industrial plant;

wherein the model-based expert system calculates one or more results from the different mathematical models;

wherein the rule-based expert system further uses: (c) information relating to the operating mode of the process unit; and

wherein the message selected for suppression is at least partly determined on the basis of the operating mode of the process unit.

19. A computer system comprising:

a) a rule-based expert system that comprises a set of rules for evaluating the operation of a process unit in an industrial plant;

b) a model-based expert system that comprises a statistical mathematical model for evaluating the operation of the process unit;

wherein the computer system is programmed to perform steps comprising:

receiving data on the operating conditions of the process unit;

applying the model-based expert system to evaluate the operation of the process unit using data on the operating conditions of the process unit;

obtaining a statistical analysis result from the model-based expert system;

applying the rule-based expert system to identify a possible abnormality in the operation of the process unit using: (a) data on the operating conditions of the process unit, and (b) the result from the model-based expert system;

sending a first message from the rule-based expert system regarding an abnormality to an operator interface; and

suppressing a second message from the model-based expert system, wherein the suppressed message relates to the abnormality and is redundant to the first message.

20. The computer system of claim 19, wherein the mathematical model in the model-based expert system includes a principal component analysis model.

21. The computer system of claim 20, wherein the mathematical model further includes a valve flow model, a proportional-integral-derivative control monitor model, and a partial least squares (PLS) model.

22. The computer system of claim 19, further comprising using a database accessible by both the model-based expert system and the rule-based expert system, wherein the database comprises:

(a) data pertaining to the configuration of the mathematical model in the model-based expert system; and

(b) data pertaining to the configuration of the rules in the rule-based expert system.

23. The computer system of claim 22, wherein the database further comprises: (c) data pertaining to the message suppression relationships in the integrated expert system.

24. The computer system of claim 19, wherein the result from the model-based expert system is a statistical analysis result on the operation of the process unit, and wherein the rule-based expert system evaluates the statistical analysis result calculated by the model-based expert system.

25. The computer system of claim 19, wherein the model-based expert system comprises multiple different mathematical models for the same process unit in the industrial plant;

wherein the model-based expert system calculates one or more results from the different mathematical models;

wherein the rule-based expert system further uses: (c) information relating to the operating mode of the process unit; and

wherein the message selected for suppression is at least partly determined on the basis of the operating mode of the process unit.