CLAIMS

We claim:

1. A system for handling a fault of an aircraft, comprising:

an interface module configured to receive a fault message of the aircraft; and

a troubleshooting decision-making unit configured to make a troubleshooting decision against the fault, wherein said troubleshooting decision-making unit is configured to make the troubleshooting decision based on a type of the fault and a cost estimation;

wherein said troubleshooting decision-making unit is configured to make the troubleshooting decision based on a type of the fault and a cost estimation in the following way:

determining whether the fault is retainable or not;

in response to that the fault is retainable, calculating a fault retention cost generated for continuing the flight with the fault retained until to a planned maintenance time or at a planned maintenance location for repair and calculating a field maintenance cost for said fault;

comparing the fault retention cost with the field maintenance cost;

in response to that the fault retention cost is higher than the field maintenance cost, making a troubleshooting decision for making a field maintenance on said fault; and

in response to that the fault retention cost is equal to or lower than the field maintenance cost, making a troubleshooting decision for retaining the fault to continue a flight.

2. The system for handling a fault of an aircraft according to Claim 1, wherein said troubleshooting decision-making unit is configured to:

calculate said field maintenance cost according to one or more of following items: a cost of abnormal flight caused by the fault, a cost of change in other flights disrupted by the fault, a cost of providing required aviation materials, a cost of urgent maintenance in other places, and a cost of work hour for a maintenance; or

calculate said fault retention cost according to one or more of following items: a cost of flight operating limitation caused by retaining said fault, and an abnormal flight cost and a fault maintenance cost caused by a non-retainable fault of fault-associated parts during a retention period of said fault.

3. The system for handling a fault of an aircraft according to Claim 2, wherein said troubleshooting decision-making unit is configured to determine a probability of occurrence for a non-retainable fault developed by fault-associated parts during a retention period of the fault; and obtain a weight value for the abnormal flight cost and the fault maintenance cost resulted from said non-retainable fault based on said probability of occurrence so as to calculate said fault retention cost;

said troubleshooting decision-making unit is configured to obtain said probability of occurrence by analyzing a performance of said fault-associated parts or a failure probability distribution of said fault-associated parts.

4. The system for handling a fault of an aircraft according to Claim 3, wherein said troubleshooting decision-making unit is configured to calculate said fault retention cost according to:

$C=P*(C_L+C_E+C_M)+(1-P)*C_L$,

Wherein:

C indicates said fault retention cost;

C_L indicates said cost of flight operating limitation caused by retaining said fault;

P indicates said weight value obtained based on said probability of occurrence;

C_E indicates the abnormal flight cost caused by said non-retainable fault;

C_M indicates the fault maintenance cost caused by said non-retainable fault;

said weight value is equal to said probability of occurrence.

5. The system for handling a fault of an aircraft according to Claim 1, wherein the

troubleshooting decision for retaining said fault to continue a flight comprises a planned time or a planned location for repairing said fault;

said troubleshooting decision-making unit is configured to identify a work-hour period with lower utilization rate for maintenance personnel, and arrange said planned time in said work-hour period with lower utilization rate.

6. The system for handling a fault of an aircraft according to any of Claims 1-5, further comprising:

a fault diagnosis module communicatively coupled with an interface module and configured to make a fault diagnosis according to said fault message so as to find a cause of the fault;

a fault-handling solution generation unit configured to generate a fault-handling solution according to result of the fault diagnosis outputted by the fault diagnosis module, wherein said fault-handling solution comprises: a task, maintenance instructions or aviation materials and tools necessary to repair the fault.

7. A method for handling a fault of an aircraft, comprising:

receiving a fault message of the aircraft through an interface module; and

generating a troubleshooting decision for the fault based on a type of the fault and a cost estimation;

wherein generating a troubleshooting decision based on a type of the fault and a cost estimation comprises:

in response to that the fault is retainable, calculating a fault retention cost generated for continuing the flight with the fault retained until to a planned maintenance time or at a planned maintenance location for repair and calculating a field maintenance cost for said fault;

comparing the fault retention cost with the field maintenance cost;

in response to that the fault retention cost is higher than the field maintenance cost, making a troubleshooting decision for making a field maintenance on said fault; and

in response to that the fault retention cost is equal to or lower than the field maintenance cost, making a troubleshooting decision for retaining the fault to continue a flight.

8. The method for handling a fault of an aircraft according to Claim 7, wherein said field maintenance cost is calculated according to one or more of following items: a cost of abnormal flight caused by the fault, a cost of change in other flights disrupted by the fault, a cost of providing required aviation materials, a cost of urgent maintenance in other places, and a cost of work hour for a maintenance; or

said fault retention cost is calculated according to one or more of following items: a cost of flight operating limitation caused by retaining said fault, and an abnormal flight cost and a fault maintenance cost caused by a non-retainable fault of fault-associated parts during a retention period of said fault.

9. The method for handling a fault of an aircraft according to Claim 8, further comprising:

determining a probability of occurrence for a non-retainable fault developed by fault-associated parts during a retention period of the fault; and

obtaining a weight value for the abnormal flight cost and the fault maintenance cost resulted from said non-retainable fault based on said probability of occurrence so as to calculate said fault retention cost;

said probability of occurrence is obtained by analyzing a performance of said fault-associated parts or a failure probability distribution of said fault-associated parts.

10. The method for handling a fault of an aircraft according to Claim 9, wherein said fault retention cost is calculated according to:

$C=P*(C_L+C_E+C_M)+(1-P)*C_L$,

Wherein:

C indicates said fault retention cost;

C_L indicates said cost of flight operating limitation caused by retaining said fault;

P indicates said weight value obtained based on said probability of occurrence;

C_E indicates the abnormal flight cost caused by said non-retainable fault;

C_M indicates the fault maintenance cost caused by said non-retainable fault;

said weight value is equal to said probability of occurrence.

11. The method for handling a fault of an aircraft according to Claim 7, wherein the troubleshooting decision for retaining said fault to continue a flight comprises a planned time or a planned location for repairing said fault;

the method further comprising determining a work-hour period with a lower utilization rate for maintenance personnel, and arranging said planned time in said work-hour period with lower utilization rate.

12. The method for handling a fault of an aircraft according to any of Claims 7-11, further comprising:

making a fault diagnosis according to said fault message so as to find a cause of the fault; and

generating a fault-handling solution according to result of the fault diagnosis outputted by the fault diagnosis module, wherein said fault-handling solution comprises: a task, maintenance instructions or aviation materials and tools necessary to repair the fault.

13. A method for handling a fault of an aircraft, comprising:

determining whether the fault is retainable or not;

in response to that the fault is retainable, calculating a fault retention cost generated for continuing the flight with the fault retained until to a planned maintenance time or at a planned maintenance location for repair and calculating a field maintenance cost for said fault;

comparing the fault retention cost with the field maintenance cost; and

in response to that the fault retention cost is higher than the field maintenance cost, making a troubleshooting decision for field maintenance on said fault;

in response to that the fault retention cost is equal to or lower than the field maintenance cost, making a troubleshooting decision for retaining the fault to continue a flight.

14. The method for handling a fault of an aircraft according to Claim 13, wherein,

said field maintenance cost is calculated according to one or more of following items: a cost of abnormal flight caused by the fault, a cost of change in other flights disrupted by the fault, a cost of providing required aviation materials, a cost of urgent maintenance in other places, and a cost of work hour for a maintenance; or

said fault retention cost is calculated according to one or more of the following: a cost of flight operating limitation caused by retaining said fault, and an abnormal flight cost and a fault maintenance cost caused by the non-retainable fault of fault-associated parts during the retention period.

15. The method for handling a fault of an aircraft according to Claim 14, further comprising:

determining a probability of occurrence for the non-retainable fault developed by the fault-associated parts during the retention period; and

obtaining a weight value for the abnormal flight cost and the fault maintenance cost resulted from said non-retainable fault based on said probability of occurrence so as to calculate said fault retention cost.

16. The method for handling a fault of an aircraft according to Claim 15, wherein said fault retention cost is calculated according to:

$C=P*(C_L+C_E+C_M)+(1-P)*C_L$,

Wherein:

C indicates said fault retention cost;

C_L indicates said cost of flight operating limitation caused by retaining said fault;

P indicates said weight value obtained based on said probability of occurrence;

C_E indicates the abnormal flight cost caused by said non-retainable fault;

C_M indicates the fault maintenance cost caused by said non-retainable fault;

said weight value is equal to said probability of occurrence.

17. The method for handling a fault of an aircraft according to any of Claims 13-16, further comprising:

making a fault diagnosis according to said fault message so as to find a cause of the fault; and

generating a fault-handling solution according to a result of the fault diagnosis outputted by the fault diagnosis module, wherein said fault-handling solution comprises: a task, maintenance instructions or aviation materials and tools necessary to repair the fault.