CLAIMS

We claim:

1. A method for maintaining an aircraft, comprising:

accessing a maintenance task database through a computing device to obtain location and timing of current aircraft maintenance task;

accessing a maintenance personnel database through said computing device to obtain a list of available maintenance persons and classify said available maintenance persons as a first collection of candidates;

determining whether each candidate in said first collection of candidates meets requirements for said location and timing of said current aircraft maintenance task through said computing device, and then classifying the candidates meeting said requirements in said first collection of candidates as a second collection of candidates; and

selecting a first maintenance person based on priority from said second collection of candidates through said computing device to perform said current aircraft maintenance task, and determining an estimated start time t_i and an estimated end time t_e of said current aircraft maintenance task based on information of the first maintenance person.

2. The method for maintaining an aircraft according to claim 1 further comprising: selecting other maintenance persons from the second collection of candidates through said computing device to perform the current aircraft maintenance task together with the first maintenance person, wherein each of said other maintenance persons meets the requirements for the estimated start time and the estimated end time of the current aircraft maintenance task.

3. The method for maintaining an aircraft according to claim 1 or 2, wherein determining whether each candidate in said first collection of candidates meets the requirements for said location and timing includes

for each candidate in the first collection of candidates,

(a) determining if the candidate satisfies $T \geqslant T_S + 2\Delta T$; and in response to the candidate satisfies $T \geqslant T_S + 2\Delta T$, determining that the candidate meets the requirements of said location and timing,

wherein T is an amount of time corresponding to a time period during which an idling time period of the candidate is overlapped with a task time period of the current aircraft maintenance task; T_S is a predetermined amount of time required for the current aircraft maintenance task; ΔT is a predetermined redundant time; and the task time period of said current aircraft maintenance task is a time period for performing the current aircraft maintenance task;

or,

(b) determining if the candidate satisfies $T \geqslant T_S + (\Delta L_1 + \Delta L_2)/V_S$; and in response to the candidate satisfies $T \geqslant T_S + (\Delta L_1 + \Delta L_2)/V_S$, determining that the candidate meets the requirements of said location and timing,

wherein T is an amount of time corresponding to a time period during which an idling time period of the candidate is overlapped with a task time period of the current aircraft maintenance task; T_S is a predetermined amount of time required for the current aircraft maintenance task; ΔT is a predetermined redundant time; the task time period of said current aircraft maintenance task is a time period for performing the current aircraft maintenance task, ΔL_1 is a distance between a location of said current aircraft maintenance task and a location of an aircraft maintenance task assigned to the candidate prior to said current aircraft maintenance task, ΔL_2 is a distance between the location of said current aircraft maintenance task and a location of an aircraft maintenance task assigned for the candidate following said current aircraft maintenance task, and V_S is an average speed.

4. The method for maintaining an aircraft according to claim 3, further comprising:

ranking candidates in the second collection of candidates in order of time priority based on comparison result of the time amount T_S and T_A which is each candidate's corresponding idling time period, wherein a smaller difference between T_A and T_S means a higher time priority;

and/or,

ranking candidates in the second collection of candidates in order of distance priority based on the combined distances of the location of current aircraft maintenance task, the location of the previous aircraft maintenance task, and the location of the next aircraft maintenance task, wherein a shorter combined distance means a higher priority.

5. The method for maintaining an aircraft according to claim 4, further comprising one of the following operations:

(i) selecting the candidates with the highest or higher time priority from the second collection of candidates as said first maintenance person;

(ii) selecting the candidates with the highest or higher distance priority from the second collection of candidates as said first maintenance person; and

(iii) for each candidate in said second collection of candidates, calculating a weighted sum of said time priority and said distance priority using predetermined weights, as a comprehensive priority; and selecting a candidate with the highest or higher comprehensive priority from the second collection of candidates as the first maintenance person; preferably, the predetermined weight for said time priority is greater than that for said distance priority while calculating said weighted sum.

6. The method for maintaining an aircraft according to claim 2, wherein selecting said other maintenance persons from said second collection of candidates further comprises:

for each candidate in said second collection of candidates, other than the first maintenance person, determining whether a start time t_i' and an end time t_e' of a corresponding idling time period of the candidate satisfy said estimated start time t_i and said estimated end time t_e;

classifying the candidate in the second collection of candidates which meets said estimated start time and said estimated end time, other than the first maintenance person, as a third collection of candidates; and

selecting said other maintenance persons from said third collection of candidates.

7. The method for maintaining an aircraft according to claim 6, wherein determining whether the start time t_i' and the end time t_e' of the corresponding idling time period of the candidate meet said evaluated start time t_i and said evaluated end time t_e includes:

(a) determining whether t_i' is earlier than t_i by an amount of time which is greater than or equal to ΔT and t_e' is later than t_e by the amount of time, and if the answer is YES, determining that the candidate meets said estimated start time t_i and said estimated end time t_e;

or,

(b) determining whether t_i' is earlier than t_i by an amount of time which is greater than or equal to $\Delta L_1/V_S$ and t_e' is later than t_e by an amount of time which is greater than or equal to $\Delta L_2/V_S$, wherein ΔL_1 is a distance between a location of said current aircraft maintenance task and a location of an aircraft maintenance task assigned for the candidate prior to said current aircraft maintenance task, ΔL_2 is a distance between a location of said current aircraft maintenance task and a location of an aircraft maintenance task assigned for the candidate following said current aircraft maintenance task, and V_S is an average speed, and if the answer is YES, determining that the candidate meets said estimated start time t_i and said estimated end time t_e.

8. The method for maintaining an aircraft according to claim 6, wherein selecting said other maintenance persons from said third collection of candidates comprises:

ranking candidates in the third collection of candidates in order of time priority based on comparison results of the amount of time T_A of each candidate's corresponding idling time period and the estimated amount of time T_S of said current aircraft maintenance task, wherein a smaller difference between T_A and T_S means a higher time priority, and

selecting candidates with higher time priorities from the third collection of candidates as said other maintenance persons.

9. The method for maintaining an aircraft according to claim 1 or 2, further comprising:

accessing said maintenance task database through said computing device to obtain a maintenance level of said current aircraft maintenance task, and

removing the maintenance person who does not conform with said maintenance level from said first collection of candidates.

10. The method for maintaining an aircraft according to claim 1 or 2, further comprising:

determining whether the selected maintenance persons for said current aircraft maintenance task include a maintenance person qualified to release aircraft;

in response to the determination that a maintenance person qualified to release aircraft is not included , obtaining information of maintenance persons qualified to release aircraft from said database and classifying as candidate aircraft release persons, and

among said candidates release persons, selecting those who meet said location and timing of said current aircraft maintenance task to perform said current aircraft maintenance task.

11. The method for maintaining an aircraft according to claim 1 or 2, further comprising:

receiving a change request of aircraft maintenance tasks; and

re-arranging aircraft maintenance tasks which are affected by the change request;

preferably, the change request of aircraft maintenance tasks comprises one or more of: addition or subtraction of an aircraft maintenance task, change in maintenance level of an aircraft maintenance task, change in location of anaircraft maintenance task, change in timing of an aircraft maintenance task, and change in maintenance persons.

12. The method for maintaining an aircraft according to claim 2 further comprising:

following the selection of said first maintenance person for said current aircraft maintenance task, updating said maintenance task database based on the estimated start time and estimated end time of said current aircraft maintenance task;

and/or,

following the selection of said first maintenance person and said other maintenance persons for said current aircraft maintenance task, updating said maintenance personnel database based on the estimated start time and estimated end time of said current aircraft maintenance task.

13. The method for maintaining an aircraft according to claim 1 or 2 further comprising:

receiving a fault message sent by the aircraft on a real-time basis through ACARS system,

analyzing the fault message and reading aircraft fault information, and

adding records for an aircraft maintenance task to said maintenance task database according to said aircraft fault information.

14. The method for maintaining an aircraft according claim 2, further comprising: sending a maintenance instruction to terminal device accessible to the selected said first maintenance person and/or said other maintenance persons.

15. The method for maintaining an aircraft of claim 14, wherein sending a maintenance instruction to the terminal device accessible to the selected said first maintenance person and/or said other maintenance persons comprises:

issuing a notice of maintenance task to the terminal device accessible to the selected said first maintenance person and/or said other maintenance persons and requesting a confirmation from

said first maintenance person and/or said other maintenance persons;

preferably, giving a warning through said computing device if said confirmation is not received within a predetermined time period.

16. A computing device used to implement a method for maintaining an aircraft, comprising:

a memory,

a processor that can access said memory, wherein said memory stores instructions which make, when executed, said computing device be configured to perform said method for maintaining an aircraft according to any of claims 1-15.

17. A configuration system for aircraft maintenance, comprising:

a database system comprising a maintenance task database and a maintenance personnel database;

a data input interface unit connected with said maintenance task database for receiving records of aircraft maintenance tasks and updating said maintenance task database, and said records comprising a level, a location and a timing of each of said aircraft maintenance tasks;

a decision-making unit able to access said maintenance task database and said maintenance personnel database and configured to

obtain a location and a timing for current aircraft maintenance task by accessing the maintenance task database of said database system;

obtain a list of available maintenance persons by accessing the maintenance personnel database of said database system and classify the available maintenance persons as the first collection of candidates;

determine whether each candidate in the first collection of candidates meets requirements for the location and timing of the current aircraft maintenance task, and classify the candidates meeting said requirements in the first collection of candidates into a second collection of candidates;

select the first maintenance person based on priority from said second collection of candidates to perform said current aircraft maintenance task, and determine an estimated start time t_i and an estimated end time t_e of said current aircraft maintenance task based on information of said

first maintenance person; and

select one or more maintenance persons different from the first maintenance person as other maintenance persons from the ones in the second collection of candidates which meet the estimated start time and the estimated end time of said current aircraft maintenance task to perform said current aircraft maintenance task together with said first maintenance person; and

a display unit coupled with said decision-making unit to display a configuration result by the decision-making unit.

18. The configuration system for aircraft maintenance according to claim 17, further comprising: a trigger, wherein when said data input interface receives a change request for changing a maintenance task, said trigger triggers said decision-making unit to reconfigure a maintenance task which is affected by the change request.

19. The configuration system for aircraft maintenance according to claim 18, wherein said change request comprises one or more of: change in maintenance level of a maintenance task, location of a maintenance task, and/or timing of a maintenance task.

20. The configuration system for aircraft maintenance according to claim 18,wherein to determine whether each candidate in said first collection of candidates meets requirements for said location and timing of said current aircraft maintenance task includes:

for each candidate in the first collection of candidates,

(a) determining if the candidate satisfies $T \geqslant T_S+2\Delta T$; and in response to that it is satisfied, determining that the candidate meets the requirements of said location and timing,

wherein T is an amount of time corresponding to a time period overlapped by an idling time period of the candidate with a task time period of the current aircraft maintenance task, T_S is an estimated amount of time required by the current aircraft maintenance task, ΔT is a preset amount of time for redundancy, and said task time period of said current aircraft maintenance task is a time period used for performing the current aircraft maintenance task;

or,

(b) determining if the candidate satisfies $T \geqslant T_S+(\Delta L_1+\Delta L_2)/V_S$, and in response to that the candidate satisfies $T \geqslant T_S+(\Delta L_1+\Delta L_2)/V_S$, determining that the candidate meets the

requirements of said location and timing,

wherein T is an amount of time corresponding to a time period overlapped by an idling time period of the candidate with a task time period of the current aircraft maintenance task; T_S is an estimated amount of time required by the current aircraft maintenance task; ΔT is a preset amount of time for redundancy; the task time period of said current aircraft maintenance task is a time period used for performing the current aircraft maintenance task, ΔL_1 is a distance between a location of said current aircraft maintenance task and a location of an aircraft maintenance task assigned for the candidate prior to said current aircraft maintenance task, ΔL_2 is a distance between the location of said current aircraft maintenance task and a location of an aircraft maintenance task assigned for the candidate following said current aircraft maintenance task, and V_S is an average speed.

21. The configuration system for aircraft maintenance according to claim 20, wherein said decision-making unit is further configured to:

rank candidates in the second collection of candidates in order of time priority based on comparison result of the time amount T_S and T_A which is each candidate's corresponding idling time period, wherein a smaller difference between T_A and T_S means a higher time priority;

and/or

rank candidates in the second collection of candidates in order of distance priority based on the combined distances of the location of current aircraft maintenance task, the location of the previous aircraft maintenance task, and the location of the next aircraft maintenance task, wherein a shorter combined distance means a higher priority.

22. The configuration system for aircraft maintenance according to claim 21, wherein said decision-making unit is further configured to perform one of the following operations:

(i) selecting a candidate with the highest or higher time priority from the second collection of candidates as said first maintenance person;

(ii) selecting a candidate with the highest or higher distance priority from the second collection of candidates as said first maintenance person; and

(iii) for each candidate in said second collection of candidates, calculating a weighted sum of said time priority and said distance priority using predetermined weights, as a comprehensive priority; and selecting a candidate with the highest or higher comprehensive priority from the

second collection of candidates as the first maintenance person; preferably, the predetermined weight for said time priority is greater than that for said distance priority while calculating said weighted sum.

23. The configuration system for aircraft maintenance according to claim 18, wherein to select said other maintenance persons from said second collection of candidates further comprising,

for each candidate in said second collection of candidates other than the first maintenance person, determining whether a start time t_i' and an end time t_e' of the corresponding idling time period of the candidate satisfy said estimated start time t_i and said estimated end time t_e;

classifying candidates in the second collection of candidates meeting said estimated start time and said estimated end time, other than the first maintenance person, as a third collection of candidates; and

selecting said other maintenance persons from said third collection of candidates.

24. The configuration system for aircraft maintenance according to claim 23, wherein to determine whether a start time t_i' and an end time t_e' of the corresponding idling time period of the candidate meet said estimated start time t_i and said estimated end time t_e includes:

(a) determining whether t_i' is earlier than t_i by an amount of time which is greater than or equal to ΔT and whether t_e' is later than t_e by the amount of time which is greater than or equal to ΔT, and if the answer is YES, determining that the candidate satisfies said estimated start time t_i and said estimated end time t_e;

or,

(b) determining whether t_i' is earlier than t_i by an amount of time which is greater than or equal to $\Delta L_1/V_S$ and t_e' is later than t_e by an amount of time which is greater than or equal to $\Delta L_2/V_S$, wherein ΔL_1 is a distance between a location of said current aircraft maintenance task and a location of an aircraft maintenance task assigned for the candidate prior to said current aircraft maintenance task, ΔL_2 is a distance between a location of said current aircraft maintenance task and a location of an aircraft maintenance task assigned for the candidate following said current aircraft maintenance task, and V_S is an average speed, and if the answer is YES, determining that the candidate meets said estimated start time t_i and said estimated end time t_e.

25. The configuration system for aircraft maintenance according to claim 23, wherein selecting

said other maintenance person from said third collection of candidates comprises:

ranking candidates in the third collection of candidates in order of time priority based on comparison results of the amount of time T_A of each candidate's corresponding idling time period and the estimated amount of time T_S of said current aircraft maintenance task, wherein a smaller difference between T_A and T_S means a higher time priority; and

selecting candidates with higher time priorities from the third collection of candidates as said other maintenance persons.