CLAIMS:

1. An inspection system for an aviation pallet cargo, comprising:

a carrying device configured to carry an aviation pallet cargo to be inspected in an inspection region of the inspection system;

at least one ray source configured to emit X-rays, wherein each ray source comprises a separate housing to define a vacuum space and comprises a plurality of target spots enclosed within the housing; and

a detector assembly configured to receive X-rays emitted from the at least one ray source and passing through the inspection region,

wherein the at least one ray source is rotatable between a plurality of scanning positions around a rotation axis relative to the carrying device, and the at least one ray source and the detector assembly are lifted or lowered along the rotation axis relative to the carrying device; and

wherein the inspection system is configured such that: the at least one ray source and the detector assembly are lifted or lowered along the rotation axis relative to the carrying device and the at least one ray source emits X-rays, when the at least one ray source is located at one of the plurality of scanning positions relative to the carrying device; and the at least one ray source rotates around the rotation axis relative to the carrying device to another one of the plurality of scanning positions, when the at least one ray source and the detector assembly are lifted or lowered a predetermined distance relative to the carrying device,

wherein a rotation angle of the at least one ray source between two adjacent scanning positions relative to the carrying device is greater than an angle of adjacent target spots of each ray source relative to the rotation axis;

wherein the at least one ray source is further configured to be movable between at least two target spot positions relative to the carrying device, and a rotation angle of each ray source between two adjacent target spot positions relative to the carrying device is less than an angle of two adjacent target spots of the ray source relative to the rotation axis, or a movement distance of each ray source between two adjacent target spot positions relative to the carrying device is less than a spacing between two adjacent target spots of the ray source.

2. The inspection system of claim 1, wherein the inspection system is configured such that: the X-rays emitted by the at least one ray source are at least a predetermined height higher than a carrying surface of the carrying device during a process of lifting or lowering the at least one ray source relative to the carrying device, and the predetermined height is determined by a pallet thickness of the aviation pallet cargo to be inspected.

3. The inspection system of claim 1 or 2, wherein the at least one ray source is configured to rotate between different scanning positions relative to the carrying device, so that a combined scanning angle of the at least one ray source is greater than 180 degrees.

4. The inspection system of claim 1 or 2, wherein the inspection system is configured such that: the at least one ray source and the detector assembly are not lifted or lowered along the rotation axis relative to the carrying device when the at least one ray source rotates between different scanning positions relative to the carrying device.

5. The inspection system of claim 1 or 2, wherein a rotation angle of the at least one ray source between two adjacent scanning positions relative to the carrying device is less than a scanning angle of the ray source relative to the rotation axis.

6. The inspection system of claim 1 or 2,

wherein a rotation angle of each ray source between two farthest target spot positions relative to the carrying device is less than the angle of two adjacent target spots of the ray source relative to the rotation axis, or a movement distance of each ray source between two farthest target spot positions relative to the carrying device is less than the spacing between two adjacent target spots of the ray source.

7. The inspection system of claim 1 or 2, wherein the rotation axis is parallel to a vertical direction;

wherein a ray emission direction of each ray source is not perpendicular to the rotation axis;

wherein the inspection system is configured such that: the at least one ray source is configured not to emit X-rays when the at least one ray source rotates

between different scanning positions relative to the carrying device, the at least one ray source comprises a plurality of ray sources, and the plurality of ray sources are spaced around the carrying device; and

wherein the detector assembly is arranged radially closer to the rotation axis relative to the at least one ray source.

8. The inspection system of claim 7, wherein target spots of the at least one ray source are located in a first plane;

wherein detector crystals of the detector assembly are located in a second plane; and

wherein the first plane is parallel to the second plane, and a target spot of each ray source is configured to deflect a predetermined tilt angle toward the detector assembly along the rotation axis, so that the X-rays emitted by each ray source are not blocked by the detector assembly before passing through the inspection region.

9. The inspection system of claim 8, wherein the detector assembly comprises a plurality of detector arms, each detector arm is provided with a plurality of detector units, and each detector arm is configured to receive X-rays emitted by at least two ray sources;

wherein each detector unit comprises a detector crystal, and each detector crystal is arranged at an end of a corresponding detector unit close to the at least one ray source along the rotation axis; and

wherein the plurality of detector arms are configured to extend completely around the rotation axis to form a detector ring.

10. The inspection system of claim 1 or 7, wherein the carrying device further comprises a carrying conveyor configured to transport the aviation pallet cargo to be inspected on the carrying device to enter and leave the inspection region;

wherein the at least one ray resource and the detector assembly are lifted or lowered along the rotation axis relative to the carrying device to not obstructing the aviation pallet cargo to be inspected from entering or leaving the inspection region, when the carrying conveyor transports the aviation pallet cargo to be inspected to enter or leave the inspection region;

wherein the inspection system further comprises: an input conveyor

configured to transport the aviation pallet cargo to be inspected to the carrying conveyor, wherein the input conveyor is movable close to and away from the carrying conveyor;

wherein the inspection system further comprises: an output conveyor configured to receive the aviation pallet cargo to be inspected from the carrying conveyor, wherein the output conveyor is movable close to and away from the carrying conveyor;

wherein the inspection system further comprises: an entrance conveyor configured to maintain a fixed position and transport the aviation pallet cargo to be inspected to the input conveyor, wherein the input conveyor is movable between the entrance conveyor and the carrying conveyor; and

wherein the inspection system further comprises: an exit conveyor configured to maintain a fixed position and receive the aviation pallet cargo to be inspected from the output conveyor, wherein the output conveyor is movable between the exit conveyor and the carrying conveyor.

11. The inspection system of claim 1 or 2, wherein the at least one ray source is rotatable around the rotation axis; and/or

the detector assembly is rotatable around the rotation axis; and/or

the carrying device is rotatable around the rotation axis.

12. The inspection system of claim 1 or 2, wherein the at least one ray source and the detector assembly are lifted or lowered along the rotation axis; or the carrying device is configured such that a carrying surface of the carrying device is lifted or lowered along the rotation axis.

13. The inspection system of claim 2, wherein the inspection system is further configured to reconstruct a three-dimensional scanning image of the aviation pallet cargo to be inspected based on detection data of the detector assembly.

14. An inspection method for an aviation pallet cargo, comprising:

(a) carrying an aviation pallet cargo to be inspected on a carrying device and in an inspection region;

(b) positioning at least one ray source at one of a plurality of scanning positions surrounding the carrying device, wherein each ray source comprises a

separate housing to define a vacuum space and comprises a plurality of target spots enclosed within the housing;

(c) lifting or lowering the at least one ray source and the detector assembly along a rotation axis relative to the carrying device, while emitting X-rays from the at least one ray source, so that the X-rays pass through the aviation pallet cargo to be inspected and are received by the detector assembly, and a scanning process is completed until the at least one ray source and the detector assembly are lifted or lowered a predetermined distance relative to the conveying device; and

(d) rotating the at least one ray source around the rotation axis relative to the carrying device to another one of the plurality of scanning positions, and repeating step (c) to complete a scanning process at each of the plurality of scanning positions,

wherein a rotation angle of the at least one ray source between two adjacent scanning positions relative to the carrying device is greater than an angle of adjacent target spots of each ray source relative to the rotation axis;

wherein the inspection method further comprises: after completing a scanning process at a scanning position in step (c), moving the at least one ray source to one of a plurality of target spot positions relative to the carrying device and repeating step (c), wherein the plurality of target spot positions comprise a current scanning position;

wherein a rotation angle of each ray source between two adjacent target spot positions relative to the carrying device is less than an angle of two adjacent target spots of the ray source relative to the rotation axis, or a movement distance of each ray source between two adjacent target spot positions relative to the carrying device is less than a spacing between two adjacent target spots of the ray source.

15. The inspection method of claim 14, wherein the X-rays emitted by the at least one ray source are at least a predetermined height higher than a carrying surface of the carrying device during a process of lifting or lowering the at least one ray source relative to the carrying device, and the predetermined height is determined by a pallet thickness of the aviation pallet cargo to be inspected.

16. The inspection method of claim 14 or 15, wherein steps (c) and (d) are repeated, so that a combined scanning angle of the at least one ray source is greater than

180 degrees.

17. The inspection method of claim 14 or 15, wherein a lifting or lowering of the at least one ray source and the detector assembly relative to the carrying device is stopped after each time the at least one ray source and the detector assembly are lifted or lowered the predetermined distance relative to the carrying device, and in two adjacent repetitions of step (c), the at least one ray source and the detector assembly are lifted or lowered in opposite directions relative to the carrying device; and

wherein a rotation angle of the ray source between two adjacent scanning positions relative to the carrying device is less than a scanning angle of the ray source relative to the rotation axis.

18. The inspection method of claim 14 or 15,

wherein a rotation angle of each ray source between two farthest target spot positions relative to the carrying device is less than the angle of two adjacent target spots of the ray source relative to the rotation axis, or a movement distance of each ray source between two farthest target spot positions relative to the carrying device is less than the spacing between two adjacent target spots of the ray source.

19. The inspection method of claim 14, wherein the inspection method further comprises: reconstructing a three-dimensional scanning image of the aviation pallet cargo to be inspected based on detection data of the detector assembly.

20. The inspection method of claim 14 or 15, wherein the rotation axis is parallel to a vertical direction;

wherein a ray emission direction of each ray source is not perpendicular to the rotation axis;

wherein the at least one ray source is configured not to emit X-rays when the at least one ray source rotates between different scanning positions relative to the carrying device; and

wherein the predetermined distance is adaptively determined based on the detection data of the detector assembly.