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Claims

1. Flexible assembly line for cutlery packaging comprising:
a cutlery assembly line for receiving and dispensing cutlery items,
wherein the cutlery assembly line further comprises an automatic organizer for picking the cutlery items in forming at least one set of eating utensils, and
the automatic organizer additionally comprises an industrial robot being configured to recognize and choose different types of cutlery items in forming the at least one set of eating utensils.

2. Flexible assembly line of Claim 1 further comprising
a toothpick and tissue assembly line for providing serviettes and/or sachets of toothpicks in forming the at least one set of eating utensils.

3. Flexible assembly line of Claim 1 or 2 further comprising
a cutlery packaging machine coupled to both the cutlery assembly line and the toothpick and tissue assembly line for wrapping selected cutlery items, a serviette and a sachet of toothpick together in forming the at least one set of eating utensils.

4. Flexible assembly line of Claim 1, wherein
the industrial robot has machine vision capability in order to pick or check the cutlery items, the serviette or the sachet of toothpick for providing quality compliant eating utensils.

5. Flexible assembly line of Claim 1 or 4, wherein
the industrial robot is configured to scan profiles of the cutlery items for recognizing different patterns of the cutlery items.

6. Flexible assembly line of Claim 1, 4 or 5, wherein
the industrial robot is figured to scan surface texture of the cutlery items for quality inspection.

7. Flexible assembly line of any of the preceding Claims~~, wherein~~

~~the cutlery assembly line~~ further comprise~~s~~ing

a spreader for scattering the cutlery items.

8. Flexible assembly line of any of the preceding Claims 2 to 7, wherein the toothpick and tissue assembly line further comprises a sorter for disseminating sachets of toothpicks, serviettes or both.

9. Flexible assembly line of ~~any of the preceding Claims~~ Claim 7 or 8 further comprising

a transporting line connected to the spreader, the sorter or both to the cutlery packaging machine.

10. Flexible assembly line of Claim 1, wherein

the automatic organizer comprises a vision inspector for recognizing patterns, surface texture or quantity of the cutlery items, the serviettes and the toothpicks before their packaging.

11. Flexible assembly line of Claim 1 or 10, wherein

the automatic organizer further comprises a blower next to the vision inspector for discharging air onto the cutlery items.

12. Flexible assembly line of any of the Claims 1, 4, 5 or 6, wherein

the industrial robot comprises a buffer station for storing cutlery items.

13. Flexible assembly line of any of ~~the~~ Claims 1, 4, 5, 6 or 12, wherein

an end effector of the industrial robot comprises a suction cup for grabbing a cutlery item.

14. Flexible assembly line of any of the preceding Claims, wherein

the automatic organizer comprises an auto tissue dispenser for laying folded tissue paper onto a toothpick conveyor in an orderly manner.

15. Flexible assembly line of any of the preceding Claims~~, wherein~~

~~the cutlery assembly line~~ further comprise~~s~~ing

an upstream conveyor belt, an inspection station and a downstream conveyor belt that are sequentially laid out following a process flow direction, the inspection station further comprising a top vision camera at the upstream conveyor belt and a bottom vision camera at the downstream conveyor belt for checking opposite surfaces of a cutlery item.

16. Flexible assembly line of any of the preceding Claims~~, wherein the cutlery assembly line~~ further comprise~~s~~ing a reject bin between the upstream conveyor belt and the downstream conveyor belt for collecting quality non-complaint cutlery items.

17. Flexible assembly line of any of the preceding claims 4 to 16, wherein machine stations of the automatic organizer and ~~the~~ vision inspection station are connected in forming an artificial neural network for adaptive control.

18. Flexible assembly line of any of the preceding claims further comprising a flip over machine for turning over an cutlery item before or after vision inspection.

19. Flexible assembly line of any of the preceding Claims further comprise~~s~~ing an Automatically Guided Vehicle for transporting packaged cutlery items to or from the flexible assembly line.

20. Method for packaging cutlery items comprising:

- dispensing cutlery items onto a cutlery conveyor belt,
- recognizing different types of cutlery items, and
- picking up the cutlery items in forming at least one eating utensil set by an industrial robot.

21. Method of Claim 20 further comprising inspecting the cutlery items by machine vision for picking quality complaint cutlery items.

22. Method of Claim 20 or 21 further comprising

automatically packaging quality compliant cutlery items in forming sets of eating utensils.

23. Method for making or installing a flexible assembly line comprising

- providing a cutlery assembly line,
- presenting a toothpick and tissue assembly line,
- connecting the cutlery assembly line and the toothpick and tissue assembly line together for packaging sets of eating utensils, and
- installing at least one industrial robot at the flexible assembly line for picking or moving various types or shapes of cutlery items adaptably.