

Claims

1. A method for managing production of molded polyurethane products, the method comprising:

- moving a first autonomous mobile platform (AMP) to a first trolley which has completed curing;

- engaging the first AMP with the first trolley to assemble into a first self-propelled trolley, wherein the first trolley comprises a first mold carrier supporting a first mold;

- moving the first self-propelled trolley to a first production station;

- advancing the first self-propelled trolley through at least the first production station;

- moving the first self-propelled trolley to a vacant first curing station;

- disengaging the first AMP from the first trolley to disassemble the first self-propelled trolley; and

- subjecting contents of the first mold to curing.

2. The method of claim 1, wherein after disengaging the first AMP from the first trolley to disassemble the first self-propelled trolley, the method further comprising:

- moving the first AMP to a second trolley which has completed curing;

- engaging the first AMP with the second trolley to assemble into a second self-propelled trolley, wherein the second trolley comprises a second mold carrier supporting a second mold;

- moving the second self-propelled trolley to the first production station;

- advancing the second self-propelled trolley through at least the first production station;

- moving the second self-propelled trolley to a vacant curing station being the first or a second curing station;

- disengaging the first AMP from the second trolley to disassemble the second self-propelled trolley; and

- subjecting contents of the second mold to curing.

3. The method of any one of claim 1 or claim 2, wherein before moving the first self-propelled trolley to the first production station, the method further comprises:

- moving the first self-propelled trolley to a non-production station; and

- at the non-production station, performing replacement of the first mold, or replacement of the first mold carrier together with the first mold, or maintenance of the first mold.

4. The method of claim 3, further comprising:
- moving a second AMP to a third trolley which has completed curing;
 - engaging the second AMP with the third trolley to assemble into a third self-propelled trolley, wherein the third trolley comprises a third mold carrier supporting a third mold;
 - while moving the first self-propelled trolley to the non-production station or while performing replacement of the first mold, or replacement of the first mold carrier together with the first mold, or maintenance of the first mold,
 - moving the third self-propelled trolley to the first production station, and advancing the third self-propelled trolley through at least the first production station; and
 - moving the third self-propelled trolley to a vacant curing station being the first, the second, or a third curing station;
 - disengaging the second AMP from the third trolley to disassemble the third self-propelled trolley; and
 - subjecting contents of the third mold to curing.
5. The method of any one of claim 1 to claim 4, wherein advancing the first self-propelled trolley through at least the first production station comprises:
- removing, at the first production station, a finished product from the first mold;
 - treating, at a second production station, the first mold which is devoid of the finished product; and
 - dispensing, at a fourth production station, a liquid polyurethane or liquid foam into the treated first mold.
6. The method of claim 5, wherein advancing the first self-propelled trolley through at least the first production station comprises:
- before removing the finished product from the first mold, positioning at least some of a plurality of wheels of the first trolley in a guide rail;
 - before treating the first mold, moving the first self-propelled trolley to the second production station, including moving the first trolley along the guide rail; and
 - before dispensing the liquid polyurethane or liquid foam into the treated first mold, moving the first self-propelled trolley to the fourth production station, including moving the first trolley along the guide rail.

7. The method of claim 5, wherein advancing the first self-propelled trolley through at least the first production station comprises:

before dispensing the liquid polyurethane or liquid foam into the treated first mold, inserting, at a third production station, an inlay or an auxiliary material into the treated first mold.

8. The method of claim 5, wherein advancing the first self-propelled trolley through at least the first production station comprises:

before removing the finished product from the first mold, connecting the first trolley to utilities at the first production station;

before treating the first mold, connecting the first trolley to utilities at the second production station; and

before dispensing the liquid polyurethane or liquid foam into the treated first mold, connecting the first trolley to utilities at the fourth production station.

9. The method of any one of claim 1 to claim 8, wherein after moving the first self-propelled trolley to the identified vacant curing station or after disengaging the first AMP from the first trolley to disassemble the first self-propelled trolley, connecting the first trolley to a heating unit.

10. The method of any one of claim 1 to claim 9, wherein the curing stations are provided in a heating tunnel or enclosure, or a designated area on a production floor.

11. A system for managing production of molded polyurethane products, the system comprising:

a plurality of trolleys wherein each trolley comprises a mold carrier supporting a mold;

a plurality of AMPs which are configured to move and at least among a plurality of curing stations including a first curing station and a plurality of non-curing stations including a first production station, and further configured to interchangeably engage with any of the trolleys; and

a control system configured to communicably couple with the trolleys and with the AMPs and further configured to generate control signals and transmit the control signals to the AMPs to:

move a first autonomous mobile platform (AMP) to a first trolley which has completed curing;

engage the first AMP with the first trolley to assemble into a first self-propelled trolley;

move the first self-propelled trolley to a first production station;

advance the first self-propelled trolley through at least the first production station;
move the first self-propelled trolley to the first curing station which is vacant; and
disengage the first AMP from the first trolley to disassemble the first self-propelled trolley,
wherein the first curing station is configured to:
subject contents of the mold of the first trolley to curing.

12. The system of claim 11, wherein the curing stations include a second curing station, wherein the trolleys include a second trolley, and wherein after the first AMP is disengaged from the first trolley to disassemble the first self-propelled trolley, the control system is further configured to:

move the first AMP to the second trolley which has completed curing;
engage the first AMP with the second trolley to assemble into a second self-propelled trolley;
move the second self-propelled trolley to the first production station;
advance the second self-propelled trolley through at least the first production station;
move the second self-propelled trolley to a vacant one of the curing stations being the first or the second curing station; and
disengage the first AMP from the second trolley to disassemble the second self-propelled trolley,
wherein the identified one of the curing stations being the first or the second curing station is configured to:
subject contents of the mold of the second trolley to curing.

13. The system of claim 11 or claim 12, wherein the non-curing stations include a non-production station, wherein before the first self-propelled trolley is moved to the first production station, the control system is further configured to:

move the first self-propelled trolley to the non-production station; and
wherein the non-production station is configured to:
perform, on the first self-propelled trolley, replacement of the mold, or replacement of the mold carrier together with the mold, or maintenance of the mold.

14. The system of claim 13, wherein the curing stations include a third curing station, wherein the AMPs include a second AMP, wherein the trolleys include a third trolley, and wherein the control system is further configured to:

move the second AMP to the third trolley which has completed curing;

engage the second AMP with the third trolley to assemble into a third self-propelled trolley;

while the first self-propelled trolley is moved to the non-production station or while replacement of the mold, or replacement of the mold carrier together with the mold, or maintenance of the mold is performed, move the third self-propelled trolley to the first production station, and advance the third self-propelled trolley through at least the first production station;

move the third self-propelled trolley to a vacant one of the curing stations being the first, the second, or the third curing station; and

disengage the second AMP from the third trolley to disassemble the third self-propelled trolley,

wherein the identified one of the curing stations being the first, the second, or the third curing station is configured to:

subject contents of the mold of the third trolley to curing.

15. The system of any one of claim 11 to claim 14, wherein the non-curing stations include a second production station and a fourth production station, and wherein

the first production station is configured to remove a finished product from the mold;

the second production station is configured to treat the mold which is devoid of the finished product; and

the fourth production station is configured to transfer a liquid polyurethane or liquid foam into the treated mold.

16. The system of claim 15, wherein the control system is further configured to:

before the finished product is removed from the mold, position at least some of a plurality of wheels of the first trolley in a guide rail;

before the mold is treated, move the first self-propelled trolley to the second production station and move the first trolley along the guide rail; and

before the liquid polyurethane or liquid foam is transferred into the treated mold, move the first self-propelled trolley to the fourth production station and move the first trolley along the guide rail.

17. The system of claim 15, wherein the non-curing stations include a third production station which is configured to:

before the liquid polyurethane or liquid foam is transferred into the treated mold, insert an inlay or an auxiliary material into the treated mold.

18. The system of claim 15, wherein

the first production station is configured to before the finished product is removed from the mold, connect the first trolley to utilities at the first production station;

the second production station is configured to before the mold is treated, connect the first trolley to utilities at the second production station; and

the fourth production station is configured to before the liquid polyurethane or liquid foam is transferred into the treated mold, connect the first trolley to utilities at the fourth production station.

19. The system of any one of claim 11 to claim 18, wherein the first curing station is configured to:

after the first self-propelled trolley is moved to the identified vacant curing station or after the first AMP is disengaged from the first trolley to disassemble the first self-propelled trolley, connect the first trolley to a heating unit.

20. The system of any one of claim 11 to claim 19, wherein the curing stations are provided in a heating tunnel or enclosure, or a designated area on a production floor.