CLAIMS

1. A pallet module (10; 20; 30; 40; 10*; 20*; 30*) configured to allow formation of a nested pallet assembly (1000; 1000*) of at least two similar pallet modules (10; 20; 30; 40; 10*; 20*; 30*), which nested pallet assembly (1000; 1000*) is configured to act as a self-supporting platform allowing the handling and transportation of goods, the pallet module (10; 20; 30; 40; 10*; 20*; 30*) comprising:

- a main structural body (100; 200; 300; 400; 100*; 200*; 300*) exhibiting a generally quadrilateral peripheral border (100A; 200A; 300A; 400A; 100A*; 200A*; 300A*) with first to fourth lateral sides (101-104; 201-204; 301-304; 401-404; 101*-104*; 201-204*; 301-304*) extending between upper and lower sides (100B, 100C; 200B, 200C; 300B, 300C; 400B, 400C; 100B*, 100C*; 200B*, 200C*; 300B*, 300C*) of the main structural body (100; 200; 300; 400; 100*; 200*; 300*);

- first and second lateral flanges (110, 120; 210, 220; 310, 320; 410, 420; 110*, 120*; 210*, 220*; 310*, 320*) extending outwardly from the peripheral border (100A; 200A; 300A; 400A; 100A*; 200A*; 300A*) of the main structural body (100; 200; 300; 400; 100*; 200*; 300*), along the first and second lateral sides (101, 102; 201, 202; 301, 302; 401, 402; 101*, 102*; 201*, 202*; 301*, 302*), the first and second lateral flanges (110, 120; 210, 220; 310, 320; 410, 420; 110*, 120*; 210*, 220*; 310*, 320*) being configured to cooperate with a corresponding side portion of another similar pallet module (10; 20; 30; 40; 10*; 20*; 30*) to form the nested pallet assembly (1000; 1000*); and

- a foot structure (90; 90*) disposed on the lower side (100C; 200C; 300C; 400C; 100C*; 200C*; 300C*) of the main structural body (100; 200; 300; 400; 100*; 200*; 300*),

characterized in that the main structural body (100; 200; 300; 400; 100*; 200*; 300*) exhibits first and second lateral grooves (130, 140; 230, 240; 330, 340; 430, 440; 130*, 140*; 230*, 240*; 330*, 340*) extending inwardly from the peripheral border (100A; 200A; 300A; 400A; 100A*; 200A*; 300A*) of the main structural body (100; 200; 300; 400; 100*; 200*; 300*), along the third and fourth lateral sides (103, 104; 203, 204; 303, 304; 403, 404; 103*, 104*; 203*, 204*;

303*, 304*), the first and second lateral grooves (130, 140; 230, 240; 330, 340; 430, 440; 130*, 140*; 230*, 240*; 330*, 340*) being each configured to receive the first and second lateral flanges (110, 120; 210, 220; 310, 320; 410, 420; 110*, 120*; 210*, 220*; 310*, 320*), respectively, of another similar pallet module (10; 20; 30; 40; 10*; 20*; 30*), so that the first, respectively second lateral flange (110, 120; 210, 220; 310, 320; 410, 420; 110*, 120*; 210*, 220*; 310*, 320*) of said other similar pallet module (10; 20; 30; 40; 10*; 20*; 30*) nests within the first, respectively second lateral groove (130, 140; 230, 240; 330, 340; 430, 440; 130*, 140*; 230*, 240*; 330*, 340*) to form the nested pallet assembly (1000; 1000*),

and in that the pallet module (10; 20; 30; 40; 10*; 20*; 30*) further comprises:

- first and second toggle latch components (51, 52) arranged in the vicinity of the first and second lateral sides (101, 102; 201, 202; 301, 302; 401, 402; 101*, 102*; 201*, 202*; 301*, 302*), respectively; and
- third and fourth toggle latch components (53, 54) arranged in the vicinity of the third and fourth lateral sides (103, 104; 203, 204; 303, 304; 403, 404; 103*, 104*; 203*, 204*; 303*, 304*), respectively,

the first and second toggle latch components (51, 52) being each configured to cooperate and interlock with the third and fourth toggle latch components (53, 54), respectively, of another similar pallet module (10; 20; 30; 40; 10*; 20*; 30*) of the nested pallet assembly (1000; 1000*), to form releasable toggle latches (500) allowing the pallet module (10; 20; 30; 40; 10*; 20*; 30*) to be secured to or released from said other similar pallet module (10; 20; 30; 40; 10*; 20*; 30*).

2. The pallet module (10; 20; 30; 40; 10*; 20*; 30*) according to claim 1, wherein each of the first and second lateral flanges (110, 120; 210, 220; 310, 320; 410, 420; 110*, 120*; 210*, 220*; 310*, 320*) exhibits at least one positioning notch (110A, 120A; 210A, 220A; 310A, 320A; 410A, 420A; 110A*, 120A*; 210A*, 220A*; 310A*, 320A*) formed along an outer edge of the first and second lateral flanges (110, 120; 210, 220; 310, 320; 410, 420; 110*, 120*; 210*, 220*; 310*, 320*),

and wherein each of the first and second lateral grooves (130, 140; 230, 240; 330, 340; 430, 440; 130*, 140*; 230*, 240*; 330*, 340*) exhibits at least one protrusion (130A, 140A; 230A, 240A; 330A, 340A; 430A, 440A; 130A*, 140A*; 230A*, 240A*; 330A*, 340A*) configured to mate with the at least one positioning notch (110A, 120A; 210A, 220A; 310A, 320A; 410A, 420A; 110A*, 120A*; 210A*, 220A*; 310A*, 320A*) provided on the first and second lateral flanges (110, 120; 210, 220; 310, 320; 410, 420; 110*, 120*; 210*, 220*; 310*, 320*) of another similar pallet module (10; 20; 30; 40; 10*; 20*; 30*).

3. The pallet module (10; 20; 30; 40; 10*; 20*; 30*) according to claim 2, wherein a position of each positioning notch (110A, 120A; 210A, 220A; 310A, 320A; 110A*, 120A*; 210A*, 220A*; 310A*, 320A*) along the outer edge of the first and second lateral flanges (110, 120; 210, 220; 310, 320; 110*, 120*; 210*, 220*; 310*, 320*) and a position of each protrusion (130A, 140A; 230A, 240A; 330A, 340A; 130A*, 140A*; 230A*, 240A*; 330A*, 340A*) within the first and second lateral grooves (130, 140; 230, 240; 330, 340; 130*, 140*; 230*, 240*; 330*, 340*) coincide with a position of each of the first to fourth toggle latch components (51-54) along the first to fourth lateral sides (101-104; 201-204; 301-304; 101*-104*; 201*-204*; 301*-304*)

4. The pallet module (10; 20; 30; 40; 10*; 20*; 30*) according to any one of the preceding claims, wherein the first and second lateral flanges (110, 120; 210, 220; 310, 320; 410, 420; 110*, 120*; 210*, 220*; 310*, 320*) are offset sideways with respect to the first and second lateral sides (101, 102; 201, 202; 301, 302; 401, 402; 101*, 102*; 201*, 202*; 301*, 302*).

5. The pallet module (10; 20; 30; 10*; 20*; 30*) according to claim 4, wherein the first and second lateral flanges (110, 120; 210, 220; 310, 320; 110*, 120*; 210*, 220*; 310*, 320*) are joined together to form an L-shaped lateral flange.

6. The pallet module (10; 20; 30; 40; 10*; 20*; 30*) according to any one of the preceding claims, wherein the first to fourth toggle latch components (51-54) are provided on the upper side (100B; 200B; 300B; 400B; 100B*; 200B*; 300B*) of the main structural body (100; 200; 300; 400; 100*; 200*; 300*) at least partly within recesses (151-154; 251-254; 351-354; 451-454; 151*-154*; 251*-254*; 351*-354*) formed below an upper surface of the upper side (100B; 200B; 300B; 400B; 100B*; 200B*; 300B*) of the main structural body (100; 200; 300; 400; 100*; 200*; 300*).

7. The pallet module (10; 20; 30; 40; 10*; 20*; 30*) according to any one of the preceding claims, wherein the first and second toggle latch components (51, 52) are spring-loaded latch elements comprising a moveable latch section (510) that extends outwardly beyond the peripheral border (100A; 200A; 300A; 400A; 100A*; 200A*; 300A*) of the main structural body (100; 200; 300; 400; 100*; 200*; 300*),

and wherein the third and fourth toggle latch components (53, 54) are catch elements comprising a catch section (550) configured to cooperate with the moveable latch section (510) of the spring-loaded latch elements of another similar pallet module (10; 20; 30; 40; 10*; 20*; 30*).

8. The pallet module (10; 20; 30; 40; 10*; 20*; 30*) according to claim 7, wherein the first and second toggle latch components (51, 52) are manually-actuatable spring-loaded latch elements further comprising a handle section (520) that is mechanically linked to the moveable latch section (510) to allow manual actuation of the first and second toggle latch components (51, 52).

9. The pallet module (10; 20; 30; 40; 10*; 20*; 30*) according to any one of the preceding claims, wherein the first and second lateral flanges (110, 120; 210, 220; 310, 320; 410, 420; 110*, 120*; 210*, 220*; 310*, 320*) are formed integrally with the main structural body (100; 200; 300; 400; 100*; 200*; 300*).

10. The pallet module (10; 20; 30; 40; 10*; 20*; 30*) according to claim 9, wherein the main structural body (100; 200; 300; 400; 100*; 200*; 300*) and the first and second lateral flanges (110, 120; 210, 220; 310, 320; 410, 420; 110*, 120*; 210*, 220*; 310*, 320*) are made of plastic or biopolymer material.

11. The pallet module (10; 20; 30; 40; 10*; 20*; 30*) according to claim 10, wherein the main structural body (100; 200; 300; 400; 100*; 200*; 300*) and the first and second lateral flanges (110, 120; 210, 220; 310, 320; 410, 420; 110*, 120*; 210*, 220*; 310*, 320*) are made of high-density polyethylene (HDPE).

12. The pallet module (10; 20; 30; 40; 10*; 20*; 30*) according to claim 10, wherein the main structural body (100; 200; 300; 400; 100*; 200*; 300*) and the first and second lateral flanges (110, 120; 210, 220; 310, 320; 410, 420; 110*, 120*; 210*, 220*; 310*, 320*) are made of a biopolymer material.

13. The pallet module (10; 20; 30; 40; 10*; 20*; 30*) according to any one of claims 9 to 12, further comprising a plurality of reinforcing elements (161, 162; 261, 262; 361, 362; 461, 462; 161*, 162*; 261*, 262*; 361*, 362*) extending within the main structural body (100; 200; 300; 400; 100*; 200*; 300*) and the first and/or second lateral flanges (110, 120; 210, 220; 310, 320; 410, 420; 110*, 120*; 210*, 220*; 310*, 320*).

14. The pallet module (10; 20; 30; 40; 10*; 20*; 30*) according to claim 13, wherein the reinforcing elements (161, 162; 261, 262; 361, 362; 461, 462; 161*, 162*; 261*, 262*; 361*, 362*) are made of a metal, of a metal alloy, or of a composite material.

15. The pallet module (10; 20; 30; 40; 10*; 20*; 30*) according to claim 14, wherein the reinforcing elements (161, 162; 261, 262; 361, 362; 461, 462; 161*, 162*; 261*, 262*; 361*, 362*) are made of aluminium.

16. The pallet module (10; 20; 30; 40; 10*; 20*; 30*) according to any one of claims 13 to 15, wherein the reinforcing elements (161, 162; 261, 262; 361, 362; 461, 462; 161*, 162*; 261*, 262*; 361*, 362*) are longitudinal rod elements extending between upper and lower surfaces of the main structural body (100; 200; 300; 400; 100*; 200*; 300*) and of the first and/or second lateral flanges (110, 120; 210, 220; 310, 320; 410, 420; 110*, 120*; 210*, 220*; 310*, 320*).

17. The pallet module (10; 20; 30; 40; 10*; 20*; 30*) according to claim 16, wherein the plurality of reinforcing elements (161, 162; 261, 262; 361, 362; 461, 462; 161*, 162*; 261*, 262*; 361*, 362*) includes a first series of longitudinal rod elements (161; 261; 361; 461; 161*; 261*; 361*) extending in a first direction and second series of longitudinal rod elements (162; 262; 362; 462; 162*; 262*; 362*) extending in a second direction distinct from the first direction.

18. The pallet module (10; 20; 30; 40; 10*; 20*; 30*) according to any one of the preceding claims, further comprising at least one cover element (170, 180; 170', 180'; 170*, 180*) configured to cover an upper side of the first lateral flange (110; 210; 310; 410; 110*; 210*; 310*) and/or second lateral flange (120; 220; 320; 420; 120*; 220*; 320*), each cover element (170, 180; 170', 180'; 170*, 180*) having an upper surface that is flush with an upper surface of the upper side (100B; 200B, 300B; 400B; 100B*; 200B*, 300B*) of the main structural body (100; 200; 300; 400; 100*; 200*; 300*),

and wherein said at least one cover element (170, 180; 170', 180'; 170*, 180*) comprises at least one toggle latch component (71, 81) configured to cooperate and interlock with a corresponding one of the first and second toggle latch components (51, 52) to form a releasable toggle latch (500) allowing the cover element (170, 180) to be secured to or released from the pallet module (10; 20; 30; 40; 10*; 20*; 30*).

19. The pallet module (10; 20; 30; 40; 10*; 20*; 30*) according to any one of the preceding claims, wherein through-holes (190) are provided in said

main structural body (100; 200; 300; 400; 100*; 200*; 300*) and said first and second lateral flanges (110, 120; 210, 220; 310, 320; 410, 420; 110*, 120*; 210*, 220*; 310*, 320*) next to the first to fourth toggle latch components (51-54), which through-holes (190) extend from an upper surface to a lower surface of the main structural body (100; 200; 300; 400; 100*; 200*; 300*) and said first and second lateral flanges (110, 120; 210, 220; 310, 320; 410, 420; 110*, 120*; 210*, 220*; 310*, 320*).

20. The pallet module (10; 20; 30) according to any one of the preceding claims, wherein the foot structure (90) is configured as a releasable foot structure comprising one or more releasable foot elements (91) that can each be secured to or removed from a corresponding foot-receiving element (92) provided on the lower side (100C; 200C; 300C) of the main structural body (100; 200; 300).

21. The pallet module (10; 20; 30) according to claim 20, wherein each releasable foot element (91) is connected to the foot-receiving element (92) by means of a spring-loaded locking mechanism (91A, 91B, 92A, 95) configured to allow the releasable foot element (91) to be manually inserted into and automatically interlock with the foot-receiving element (92) without this requiring any tool, the spring-loaded locking mechanism (91A, 91B, 92A, 95) being further configured to allow selective manual release of the releasable foot element (91) from the foot-receiving element (92).

22. The pallet module (10; 20; 30) according to claim 21, wherein the spring-loaded locking mechanism (91A, 91B, 92A, 95) includes a mounting aperture (92A) provided on each foot-receiving element (92) and configured to receive a head portion (91A) of each releasable foot element (91), which head portion (91A) is provided with a retaining section (91B) configured to cooperate, upon axial insertion of the head portion (91A) inside the mounting aperture (92A), with a plurality of spring-loaded retaining elements (95) provided on each foot-receiving element (92) and emerging inside the mounting aperture (92A).

23. The pallet module (10; 20; 30) according to claim 22, wherein a spacing (92C) is provided between each foot-receiving element (92) and each releasable foot element (91) to allow lateral insertion of a tool for the purpose of releasing the releasable foot element (91) from the foot-receiving element (92).

24. The pallet module (10; 20; 30) according to claim 22 or 23, wherein each releasable foot element (91) is further provided with a lower mounting aperture (91C) configured and dimensioned to receive a head portion (91A) of another foot element (91) and with a plurality of spring-loaded retaining elements (95*) emerging inside the lower mounting aperture (91C) and configured to cooperate with and retain the retaining section (91B) of another foot element (91) upon axial insertion of the head portion (91A) inside the lower mounting aperture (91C).

25. The pallet module (10; 20; 30; 40; 10*; 20*; 30*) according to any one of the preceding claims, further comprising a smart tag providing identification and traceability of the pallet module (10; 20; 30; 40; 10*; 20*; 30*).

26. An assortment of pallet modules (10; 20; 30; 40; 10*; 20*; 30*) in accordance with any one of the preceding claims produced in at least two different sizes, wherein said assortment of pallet modules (10; 20; 30; 40; 10*; 20*; 30*) includes a unit-size pallet module (10; 40; 10*) whose main structural body (100; 400; 100*) exhibits a unit size and at least one larger-size pallet module (20; 30; 20*; 30*) whose main structural body (200; 300; 200*; 300*) exhibits a length (L2; L3) corresponding to an integer multiple of a length (L1) of the main structural body (100; 400; 100*) of the unit-size pallet module (10; 40; 10*), the unit-size pallet module (10; 40; 10*) and the at least one larger-size pallet module (20; 30; 20*; 30*) being combinable with one another.

27. The assortment of pallet modules (10; 20; 30; 40; 10*; 20*; 30*) according to claim 26, wherein the peripheral border (100A; 400A; 100A*) of the

main structural body (100; 400; 100*) of the unit-size pallet module (10; 40; 10*) exhibits a square shape.

28. The assortment of pallet modules (10*; 20*; 30*) according to claim 27, wherein the peripheral border (200A*; 300A*) of the main structural body (200*; 300*) of each larger-size pallet module (20*; 30*) exhibits a square shape.

29. The assortment of pallet modules (10; 20; 30; 40; 10*; 20*; 30*) according to any one of claims 26 to 28, including at least two types of larger-size pallet modules (20; 30; 20*; 30*), namely a medium-size pallet module (30; 20*) and a large-size pallet module (20; 30*).

30. The assortment of pallet modules (10; 20; 30; 40; 10*; 20*; 30*) according to any one of claims 26 to 29, wherein the length (L1) of the main structural body (100; 400; 100*) of the unit-size pallet module (10; 40; 10*) is comprised within a range of 150 to 300 mm.

31. The assortment of pallet modules (10; 20; 30; 40; 10*; 20*; 30*) according to any one of claims 26 to 30, wherein the length (L1; L2; L3) of the main structural body (100; 200; 300; 400; 100*; 200*; 300*) of each pallet module (10; 20; 30; 40; 10*; 20*; 30*) is comprised within a range of 150 to 1’200 mm.

32. A pallet assembly (1000; 1000*) configured to act as a self-supporting platform allowing the handling and transportation of goods, which pallet assembly (1000; 1000*) is built of multiple pallet modules (10; 20; 30; 40; 10*; 20*; 30*) according to any one of the preceding claims, which pallet modules (10; 20; 30; 40; 10*; 20*; 30*) are nested within and interlocked with one another.

33. Use of the pallet module (10; 20; 30; 40; 10*; 20*; 30*) according to any one of claims 1 to 25, of the assortment of pallet modules (10; 20; 30; 40; 10*; 20*; 30*) according to any one of claims 26 to 31, or of the pallet assembly

(1000; 1000*) according to claim 32 for freight logistics, warehousing, transport and/or shipment purposes.

34. Use of the pallet module (10; 20; 30; 40; 10*; 20*; 30*) according to any one of claims 1 to 25, of the assortment of pallet modules (10; 20; 30; 40; 10*; 20*; 30*) according to any one of claims 26 to 31, or of the pallet assembly (1000; 1000*) according to claim 32 for intralogistics purposes.