CLAIMS:

1. Molding system for molding an electronic device comprising:

first and second mold halves;

a plurality of cavities in the first mold half corresponding to molding locations on the electronic device;

a plurality of plungers located in the first mold half, each of which is drivable against a side of a respective cavity for applying a compacting force to encapsulation material located in the cavity during molding; and

a motor operatively connected to the plungers for driving the plungers relative to the cavities.

2. Molding system as claimed in claim 1, wherein the first mold half comprises a cavity strip containing the cavities and a base plate to which the cavity strip is resiliently attached.

3. Molding system as claimed in claim 2, further comprising springs attached between the base plate and cavity strip which are operative to provide a preload force for separating the cavity strip and the base plate.

4. Molding system as claimed in claim 2 or claim 3, further comprising a middle plate located between the cavity strip and the base plate, wherein the plungers are fixedly attached to the middle plate.

5. Molding system as claimed in claim 4, further comprising a stopper located between the middle plate and the cavity strip that is operative to stop the motion of the plunger at the side of the cavity.

6. Molding system as claimed in any one of claims 2 to 5, further comprising push pillars located in the base plate connecting the plurality of plungers to the

motor, wherein the plungers are drivable simultaneously by driving the push pillars.

7. Molding system as claimed in any one of the preceding claims, wherein the plunger is movable by the motor between a first position to produce a gap between the plunger and the cavity, and a second position whereat the gap is closed and the plungers push against the side of the cavity.

8. Molding system as claimed in any one of the preceding claims, further comprising extension springs mounted between the plungers and the first mold half biasing against the driving force from the motor for providing compensation against the compacting force.

9. Molding system as claimed in any one of the preceding claims, wherein the motor comprises a servo motor.

10. Molding system as claimed in any one of the preceding claims, including a passage in the first mold half within which the plunger is movably mounted, and a vacuum channel connected to a side wall of the passage for drawing air away from the cavity.

11. Molding system as claimed in claim 10, further comprising a seal mounted on the plunger such that the vacuum channel is located between the cavity and the seal for preventing loss of vacuum through the passage.

12. Molding system as claimed in claim 10 or claim 11, further comprising vacuum slots formed along side walls of the passage which form partial indentations in the side walls and introduce air gaps between the plunger and the side walls of the passage.

13. Molding system as claimed in claim 12, including suction holes formed in the plunger near an end thereof which are interconnected and provide fluid communication between separate vacuum slots in the passage through the suction holes.

14. Molding system as claimed in claim 13, wherein each suction hole of the plunger comprises an opening adjacent to a side wall of the passage.

15. Molding system as claimed in any one of the preceding claims, wherein the plunger comprises a concave molding face for applying the compacting force against the encapsulation material and ensuring that a top surface of a molded package is substantially flat.

16. Molding system as claimed in any one of the preceding claims, further comprising film for covering at least a molding surface of one of the mold halves, and a film separator device attached to the mold half which is movable between a retracted position behind a molding surface to allow the film to rest on the molding surface and an extended position that is located beyond the molding surface to separate the film from the molding surface.

17. Molding system as claimed in claim 16, further comprising a lever operatively connected to the film separator device and which is configured to receive a pushing force to push the film separator device to the extended position.

18. Molding system as claimed in any one of the preceding claims, wherein the molding cavities are configured to mold a liquid encapsulant that is dispensed for molding the electronic device before the first and second mold halves are closed.

19. Method of molding an electronic device comprising the steps of:

closing first and second mold halves together to clamp onto the electronic device, the first mold half having a plurality of cavities corresponding to molding locations on the electronic device;

driving a plurality of plungers located in the first mold half against the sides of the respective cavities using a motor that is operatively connected to the plungers, whereby to apply a compacting force to encapsulation material located in the cavity during molding.

20. Method as claimed in claim 19, further comprising dispensing encapsulation material in the form of a liquid encapsulant for molding the electronic device, before the first and second mold halves are closed.

Claims

1. Molding system for molding an electronic device comprising:

first and second mold halves operable to close against each other to clamp the electronic device therebetween;

the first mold half comprising a cavity strip including a plurality of cavities corresponding to molding locations on the electronic device, the first mold half further comprising a base plate and a middle plate located between the cavity strip and the base plate, the middle plate being movably connected to the base plate, and the first mold half comprising springs connecting the middle plate to the cavity strip and separating the middle plate from the cavity strip, the entire first mold half being drivable with respect to the second mold half to close the cavity strip against the second mold half to clamp the electronic device;

a plurality of plungers fixedly attached to the middle plate, each of the plungers being drivable relative to both the first and second mold halves against a side of a respective cavity for applying a compacting force to an encapsulation material located in the respective cavity during molding;

a motor operatively connected to the plungers, the motor being operable to drive the plungers relative to the cavities and relative to both the first and second mold halves after the first and second mold halves have clamped the electronic device,

a second motor connected to the second mold half, the second motor being operable to drive a portion of the second mold half against the cavity strip to provide a further compacting force on the encapsulating material after the first and the second mold halves have clamped the electronic device; and

wherein each plunger comprises a molding face for applying the compacting force against the encapsulation material and ensuring that a top surface of a molded package is substantially flat, the molding face consisting of a single recessed cavity having a concave peripheral portion receding to a flattened central portion.

2. Molding system as claimed in claim 1, wherein the springs are configured to provide a preload force for separating the cavity strip and the middle plate.

3. Molding system as claimed in claim 1 or claim 2, further comprising a stopper located between the middle plate and the cavity strip, the stopper being operative to stop motion of the plunger at the side of the respective cavity.

4. Molding system as claimed in any one of the preceding claims, further comprising push pillars located in the base plate and connecting the plurality of plungers to the motor, wherein the plungers are drivable by driving the push pillars.

5. Molding system as claimed in any one of the preceding claims, wherein the each plunger is movable by the motor between a first position, in which a gap is formed between the each plunger and the respective cavity, and a second position, in which the gap is closed and the each plunger pushes against the side of the respective cavity.

6. Molding system as claimed in any one of the preceding claims, further comprising extension springs mounted between the plungers and the first mold half, the extension springs biasing against a driving force of the motor to provide compensation against the compacting force.

7. Molding system as claimed in any one of the preceding claims, wherein the motor comprises a servo motor.

8. Molding system as claimed in any one of the preceding claims, including a passage in the first mold half, the plunger being movably mounted within the passage, and the molding system further including a vacuum channel connected to a side wall of the passage for drawing air away from the respective cavity.

9. Molding system as claimed in claim 8, further comprising a seal mounted on the each plunger such that the vacuum channel is located between the respective cavity and the seal for preventing loss of vacuum through the passage.

10. Molding system as claimed in claim 8 or claim 9, further comprising vacuum slots formed along side walls of the passage, the vacuum slots forming partial indentations in the side walls and introducing air gaps between the each plunger and the side walls of the passage.

11. Molding system as claimed in claim 10, wherein the each plunger further comprises an end and suction holes located near the end, the suction holes being interconnected and providing fluid communication between separate vacuum slots in the passage through the suction holes.

12. Molding system as claimed in claim 11, wherein each suction hole of the each plunger comprises an opening adjacent to a side wall of the passage.

13. Molding system as claimed in any one of the preceding claims, further comprising a film covering at least a molding surface of one of the mold halves, and comprising a film separator device attached to the one of the mold halves, the film separator device being movable between a retracted position and an extended position, the retracted position being a position behind the molding surface so as to allow the film to rest on the molding surface, and the extended position being a position located beyond the molding surface so as to separate the film from the molding surface.

14. Molding system as claimed in claim 13, further comprising a lever operatively connected to the film separator device, the lever being operable to receive a pushing force to push the film separator device to the extended position.

15. Molding system as claimed in any one of the preceding claims, wherein the molding cavities are configured to mold a liquid encapsulant that is dispensed for molding the electronic device before the first and second mold halves are closed.

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