Claims

1.

A method, comprising:

(a) providing a molten glass gob in a transport cup that includes a wall and an endcap covering an outlet of a passage defined by the wall;

(b) moving the endcap relative to the wall to uncover the outlet of the passage to discharge the molten glass gob from the transport cup;

(c) observing the molten glass gob discharged from the transport cup in step (b); and

(d) adjusting at least one parameter of a fluid flow of the transport cup based on at least one characteristic of the molten glass gob observed in step (c).

2.

The method set forth in claim 1, wherein step (c) includes obtaining an image of the glass gob and the image is indicative of the at least one characteristic.

3.

The method set forth in claim 1, wherein the at least one characteristic includes a diameter of the glass gob, and the at least one parameter includes a transport cup cooling gas flowrate or a timing of a cooling gas flowrate transition.

4.

The method set forth in claim 1, wherein the at least one characteristic includes a diameter of the glass gob, and the at least one parameter includes a transport cup endcap fluid flowrate or a timing of a cooling gas flowrate transition.

5.

The method set forth in claim 1, wherein the at least one characteristic is a shape of a nose of the glass gob, and the at least one parameter includes a transport cup endcap fluid flowrate or a timing of an endcap fluid flowrate transition.

6.

The method set forth in claim 1, wherein the at least one characteristic includes a temperature of the glass gob, and the at least one parameter includes a transport cup endcap fluid flow flowrate or a timing of an endcap fluid flowrate transition.

7.

The method set forth in claim 1, wherein the at least one characteristic includes a timing of the discharge of the glass gob from the transport cup, and the at least one parameter includes a transport cup endcap fluid flow flowrate or a timing of an endcap fluid flowrate transition.

8.

The method set forth in claim 1, further comprising:

adjusting at least one parameter of a transport cup cooling gas flow based on a temperature of the transport cup measured after step (c) and before the transport cup receives a subsequent glass gob.

9.

The method of claim 8, wherein step (d) includes adjusting a duration of a cooling period after the transport cup discharges the glass gob.

10.

A method, comprising the steps of:

(a) observing at least one characteristic of a first glass gob discharged from a molten glass transport cup at a glass gob discharge location, the at least one characteristic including a temperature of the first glass gob;

(b) moving the transport cup to a glass gob receiving location after step (a);

(c) receiving a second glass gob in the transport cup at the receiving location after step (b), wherein the transport cup has a transport cup endcap fluid flow at the receiving location;

(d) moving the transport cup containing the second glass gob to the discharge location after step (c);

(e) discharging the second glass gob from the transport cup after step (d);

(f) moving the transport cup to the receiving location after step (e); and

(g) regulating at least one parameter of the fluid flow in step (c) based on the at least one characteristic observed in step (a),

wherein the at least one parameter includes at least one of an initial flowrate of the transport cup endcap fluid flow, a secondary flowrate of the transport cup endcap fluid flow, or a timing of a transition from the initial flowrate to the secondary flowrate.

11.

The method set forth in claim 10, further comprising:

measuring a temperature of the transport cup after step (a), and

regulating at least one of a duration of a cooling period or a flowrate of a transport cup cooling gas flow during step (f) based on said temperature.

12.

The method set forth in claim 10, wherein the at least one characteristic includes a shape of the first glass gob.

13.

The method set forth in claim 10, wherein step (g) includes regulating a duration of the initial flowrate of the transport cup endcap fluid flow during step (c) based on the at least one characteristic observed in step (a).

14.

The method set forth in claim 10, further comprising regulating a parameter of a cooling gas flow profile of the transport cup during step (d) and before step (e) based on the at least one characteristic observed in step (a), the at least one characteristic including a shape of the first glass gob.

15.

The method set forth in claim 14, wherein the parameter of the cooling gas profile of the transport cup includes at least one of an initial flowrate of a cooling gas flow through a porous wall of the transport cup, a secondary flowrate of the cooling gas flow through the porous wall of the transport cup, or a timing of a transition from the initial flowrate to the secondary flowrate of the cooling gas flow, the at least one characteristic including a diameter of the first glass gob.

16.

The method set forth in claim 1, wherein the at least one characteristic includes at least one of a diameter of the glass gob, a uniformity of the diameter of the glass gob, a shape of a nose of the glass gob, a temperature of the glass gob, a timing of the discharge of the glass gob from the transport cup, or a temperature of the transport cup, and wherein the at least one parameter includes a parameter of at least one of a transport cup cooling gas flow profile or a transport cup endcap fluid flow profile.

17.

The method set forth in claim 1, wherein the transport cup is moveable back and forth between a glass gob receiving location and a glass gob discharge location, step (a) being performed at the glass gob receiving location and step (b) being performed at the glass gob discharge location.

18.

The method set forth in claim 1, wherein the wall of the transport cup is a porous wall and the fluid flow includes a cooling gas flow into the passage permeably through the porous wall according to a transport cup cooling gas flow profile, and wherein the at least one parameter includes a parameter of the transport cup cooling gas flow profile.

19.

The method set forth in claim 1, wherein the fluid flow is through the endcap and into the passage according to a transport cup endcap fluid flow profile when the endcap is covering the outlet of the passage, and wherein the at least one parameter includes a parameter of the transport cup endcap fluid flow profile.

20.

A method, comprising the steps of:

(a) observing at least one characteristic of a first glass gob discharged from a molten glass transport cup at a glass gob discharge location, wherein the at least one characteristic includes a temperature of the first glass gob;

(b) moving the transport cup to a glass gob receiving location after step (a);

(c) receiving a second glass gob in the transport cup at the receiving location after step (b); and

(d) regulating, during step (c), at least one of an initial flowrate of a transport cup endcap fluid flow, a secondary flowrate of the transport cup endcap fluid flow, or a timing of a transition from the initial flowrate to the secondary flowrate based on the at least one characteristic observed in step (a).

21.

The method set forth in claim 20, further comprising the steps of:

(i) measuring a temperature of the transport cup after step (a);

(ii) discharging the second glass gob from the transport cup at the glass gob discharge location;

(iii) moving the transport cup to the glass gob receiving location after and step (ii); and

(iv) regulating, during step (iii), a duration of a cooling period or a flowrate of a transport cup cooling gas flow based on the temperature measured in step (i).

22.

The method set forth in claim 21, wherein step (i) is performed at the glass gob receiving location.

23.

The method set forth in claim 21, further comprising regulating a parameter of a cooling gas flow profile of the transport cup after step (c) and before step (ii) based on the at least one characteristic observed in step (a), the at least one characteristic including a shape of the first glass gob.

24.

The method set forth in claim 23, wherein the parameter of the cooling gas profile of the transport cup includes at least one of an initial flowrate of a cooling gas flow through a porous wall of the transport cup, a secondary flowrate of the cooling gas flow through the porous wall of the transport cup, or a timing of a transition from the initial flowrate to the secondary flowrate of the cooling gas flow, the at least one characteristic including a diameter of the first glass gob.

25.

The method set forth in claim 20, wherein the at least one characteristic further includes a shape of the first glass gob.

26.

The method set forth in claim 20, further comprising regulating, during step (c), a duration of the initial flowrate of the transport cup endcap fluid flow based on the at least one characteristic observed in step (a).

27.

A method of delivering gobs of molten glass, the method comprising:

providing a transport cup that, in a process cycle, receives a molten glass gob when the transport cup is at a glass gob receiving location, moves from the glass gob receiving location to a glass gob discharge location, discharges the received molten glass gob from the transport cup at the glass gob discharge location, and thereafter moves back to the glass gob receiving location from the glass gob discharge location; and

adjusting, for a subsequent process cycle, at least one parameter of at least one fluid flow of the transport cup based on at least one of:

at least one characteristic of the received glass gob observed as the received glass gob is discharged from the transport cup during the process cycle, or

a temperature of the transport cup measured during the process cycle,

wherein the at least one fluid flow includes:

a first fluid flow permeating through a porous wall of the transport cup and into a passage of the transport cup into which a molten glass gob is received during the subsequent process cycle and out of which the received glass gob is discharged during the subsequent process cycle, and

a second fluid flow through an endcap of the transport cup and into the passage of the transport cup, wherein the endcap covers an outlet of the passage while the transport cup receives the glass gob during the subsequent process cycle and does not cover the outlet of the passage while the transport cup discharges the received glass gob during the subsequent process cycle, and

wherein the first fluid flow is provided at least while the transport cup contains the received molten glass gob and moves from the glass gob receiving location to the glass gob discharge location during the subsequent process cycle and the second fluid flow is provided at least while the transport cup receives the molten glass gob during the subsequent process cycle.

28.

The method set forth in claim 27, wherein adjusting at least one parameter of the at least one fluid flow is based on a diameter of the molten glass gob observed during discharge from the transport cup during the process cycle, the observed diameter being less than a desired diameter, and the adjusting includes at least one of:

changing a timing of a transition from an initial flowrate of the first fluid flow to a lower secondary flowrate of the first fluid flow so that the transition occurs earlier in the subsequent process cycle, or

decreasing the secondary flowrate of the first fluid flow in the subsequent process cycle.

29.

The method set forth in claim 27, wherein adjusting at least one parameter of the at least one fluid flow is based on the temperature of the transport cup measured during the process cycle after the molten glass gob is discharged from the transport cup, the measured temperature being higher or lower than a desired temperature, and the adjusting includes at least one of:

respectively increasing or decreasing a duration of a cooling period during the subsequent process cycle, the cooling period occurring when the transport cup is moving back to the glass gob receiving location from the glass gob discharge location, or

respectively increasing or decreasing a flowrate of the first fluid flow during the cooling period.

30.

The method set forth in claim 27, wherein adjusting at least one parameter of the at least one fluid flow is based on a temperature or temperature profile of the molten glass gob observed during discharge from the transport cup during the process cycle, the observed temperature or temperature profile indicating a cold nose condition in which the temperature at a nose of the molten glass gob is less than the temperature at other portions of the gob, and the adjusting includes at least one of:

increasing an initial flow rate of the second fluid flow while the transport cup is at the receiving location to receive the molten glass gob during the subsequent process cycle,

increasing a lower secondary flowrate of the second fluid flow while the transport cup is at the receiving location to receive the molten glass gob during the subsequent process cycle,

changing a timing of a transition from the initial flowrate of the second fluid flow to the secondary flowrate of the second fluid flow so that the transition occurs later while the transport cup is at the receiving location to receive the molten glass gob during the subsequent process cycle.