

It is claimed:

1. A method for determining volume of a concrete load, comprising:
 - (A) rotating a concrete load contained within a mixer drum having an inner wall, a non-vertical axis of rotation, and at least one sensor probe mounted on or along
5 the inner wall and configured to transmit in-and-out signal data when rotated through the contained concrete load, using (i) probe submergence and non-submergence intervals or (ii) probe entry angle and exit angles, to a processor configured to receive the in-and-out signal data and to calculate a value corresponding to volume of the concrete load;
 - 10 (B) the processor performing the volume value calculation by accessing a database having stored values of concrete load volumes as correlated with in-and-out signal data previously obtained from sensor probes; and
 - (C) performing, based on the volume value calculation, at least one function chosen from (i) administering a dosage of water or admixture into the concrete load, (ii)
15 expelling a volume of concrete from the mixer drum, (iii) providing an indication of the administered dosage, expelled volume of concrete, or both; and (iv) a combination of any of the foregoing functions.
2. The method of claim 1 wherein, in step (A), the calculation of a value
20 volume of the concrete load contained in the mixer drum comprises adjustment of a concrete load volume value as included in or on a batch ticket issued by a batch plant.
3. The method of claim 1 further comprising: monitoring at least one of:
rheology of the concrete load contained in the rotating mixer drum; tilt angle of the
rotating mixer drum, or both; and performing the calculation of the volume value by
accessing a database having stored values of concrete load volumes as correlated with in-
25 and-out signal data previously obtained from sensor probes at various drum rotation speeds, at various rheological conditions, and at various mixer drum tilt angles.

4. The method of claim 1 wherein the rotatable concrete mixer drum is mounted on a ready-mix concrete delivery truck.

5. The method of claim 1 wherein the slump of a current concrete load in the mixer drum is monitored by an automatic slump monitoring system wherein the slump value is derived using a force sensor, hydraulic pressure sensor, or combination thereof.

6. The method of claim 1 wherein the at least one sensor probe is a contact switch.

7. The method of claim 1 further comprising providing at least one hydraulic pressure sensor for monitoring the pressure required to rotate the concrete mixer drum at a given drum speed and obtaining an indication of slump, slump flow, or other rheology characteristic of the current concrete load in the mixer drum; and employing the at least one sensor probe to generate in-and-out data for the current concrete load contained in the mixer drum to calculate a volume value for a given drum speed, and comparing the indication of slump, slump flow, or other rheology characteristic of the current concrete load based on the hydraulic pressure and drum speed to historic signal data in which in-and-out data was stored in correlation with calculated slump, slump flow, or other rheology characteristic at various drum speeds.

8. The method of claim 1 wherein said at least one sensor probe comprises a force probe and a contact switch, both of which are mounted on a mixer drum hatch door. In a first aspect of this example, both force probe and a contact switch can provide in-and-out signal data to the same processor and be compared, to ascertain whether the force probe may have inaccuracies due to variations in the length of the force probe and the actual places on the concrete surface into which the force probe enters and exits.

9. The method of claim 1 wherein the in-and-out probe signal data obtained from current concrete load contained in the rotating mixer drum is used by the processor only after (i) a predetermined amount of mixer drum rotations have occurred or (ii) an

automated slump monitoring system has confirmed that the concrete load has attained homogeneity or uniformity.

10. The method of claim 1 further comprising obtaining in-and-out sensor probe signal which comprises data sets of probe entry point, probe exit point, mixer drum
5 rotation speed, and slump values, and further wherein a processor compares these data sets from a current concrete load in the mixer drum and compares to historic data of past concrete loads.

11. The method of claim 1 further comprising obtaining in-and-out sensor probe data signals which comprise data sets comprising probe entry point, probe exit
10 point, mixer drum rotation speed, slump; wherein the processor compares these data sets obtained from a current concrete load in the mixer drum, to stored data of past concrete loads, and wherein the processor further compares mix design number and tilt angle of the current concrete load with past concrete load stored data.

12. The method of claim 1 wherein the processor selects historic in-and-out
15 sensor probe data stored in memory based on mixer drum type.

13. The method of claim 1 further comprising monitoring slump and tilt angle of the concrete load contained in the mixer drum, and performing the calculation of the volume value calculation by accessing a database having stored values of concrete load volumes as correlated with in-and-out signal data previously obtained from sensor probes
20 at various drum rotation speeds, at various rheological conditions, and various mixer drum tilt angles, the processor being further configured to store data into the database relative to monitored in-and-out signal data, speed of mixer drum rotation, slump, tilt angle, and calculated values of concrete load volume.

14. The method of claim 1 further comprising monitoring slump and tilt angle
25 of the concrete load contained in the mixer drum, and performing the calculation of the volume value calculation by accessing a database having stored values of concrete load volumes as correlated with in-and-out signal data previously obtained from sensor probes

- at various drum rotation speeds, at various rheological conditions, and mixer drum tilt angles, the processor being further configured to store data into the database relative to monitored in-and-out signal data, speed of mixer drum rotation, slump, tilt angle, and calculated values of concrete load volume; and further wherein drum rotation speed is
- 5 within the range of 1 to 16 rotations per minute (RPM) and more preferably 1-22 rotations per minute; and further wherein slump is within the range of 0.5-10 inches, or slump flow is within the range of 10-20 inches; and wherein tilt angle of the drum is between (-)10 degrees to (+)10 degrees departure as measured when the drum is tilted such as by the delivery truck driving along upward-sloping or down-ward sloping roadway.
- 10 15. A system comprising at least one sensor probe in communication with a processor programmed to perform the method according to claim 1.