Engineering Note

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Title:	HM05 Troubleshooting Tips
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Summary:	Suggestions/checklist for solution of installation/operational problems experienced with HMO5. Intended for experienced operators/installers.

INSTALLATION

- In planetary mixers, fit the sensor with a 100mm gap between the side of the mixer and the edge of the HM05. See user guide (*HD0155) for other mixer types and wall mounting and engineering note (*EN0046) for twin shaft mixers.
- Fit in the highest point in the floor.
- Fit away from the water, cement and aggregate inlets.
- If the HM05 performance is suspect, compare the signal from HM05 (using HydroNetView or Hydro-Link) to the calculated moisture content. This will identify if the problem is with the HM05 or the control system.

ELECTRICAL

- Ensure that the cable is of suitable quality – the minimum specification is twisted pairs of 22 AWG (0.35mm^2) conductors, screened with aluminium/polyester foil and 65% minimum coverage braid - Belden 8306 or equivalent.
- Ensure that the RS485 cable is taken back into the control cabin. This can be particularly useful over the life of the equipment for diagnostic purposes and takes the minimum of effort and cost at the time of installation.
- Route the signal cable away from power cables, in particular, the mixer power supply.
- Check that the mixer is properly grounded:
    - The signal cable should only be grounded at the mixer end.
    - Ensure that the cable shield is not connected at the control cabin end.
    - Ensure that there is continuity of the shield through any junction boxes.
    - Keep the number of joints in the cable to a minimum.
    - If in doubt, connect the cable shield to the ground at the junction box, as well.
    - Note that there is a M4 threaded hole provided on the bottom of the HM05 for a ground connection.

MIXER

- Look at the mixing process. Check how the water disperses. If water sits on top of the aggregates for a time before dispersing then the spray bars will be required to get it into the mix quicker to shorten the mix time.
- Spray bars are far better than single water inlets. The greater the area of water spray the faster it mixes in.
- Plastic mixer blades are more transparent to the sensor and are less likely to damage it.

** Available from http://www.hydronix.com*

INGREDIENTS

- If the aggregate masses are not corrected for high moisture contents, then the aggregate/cement ratio will change considerably, having a bad effect on workability and concrete performance.
- If the aggregates are very wet, such as may be the case at the beginning of the day due to water drainage in the storage bin, then there may be more water in the aggregates than the mix requires.
- The moisture content of the aggregates must be above their saturated surface dry (SSD) moisture content for the HM05 to measure their moisture content accurately. The measurement loses linearity below SSD.
- Beware of hot cement, it can affect water demand and hence moisture content.
- Changes in ambient temperature also affect water demand.

WORKABILITY

- The HM05 measures moisture, it does not measure workability, or someone's perception of workability.
- Changes in many factors affect workability but these changes may not affect moisture content:
    - Aggregate grading.
    - Aggregate/cement ratio.
    - Admixture dosage and dispersion.
    - Ambient temperature.
    - Coarse/fines ratio.
    - Water/cement ratio.
    - Ingredient temperatures.

CALIBRATION

- Leave out the admixtures when calibrating.
- If the wet mix time is shortened for production, ensure that the full time is used during calibration.
- A different calibration may be required for large variations in batch volume.
- Calibrate when conditions/ingredients are typical, e.g. not first thing in the morning when the aggregates are very wet, or when the cement is hot.
- When using a calculation-based water addition method, obtaining a correct dry reading is essential:
    - Signal must be stable.
    - Dry mix time must be long enough to obtain signal stability.
    - Good measurement requires time.

MIXING

- Minimum mix times are a function of the mix design (ingredients and mixer) not just the mixer.
- Different mixes need different mix times.
- Keep batch sizes as consistent as possible. e.g. $2.5m^3 + 2.5m^3 + 1.0m^3$ is not as good as 3 x $2.0m^3$.
- Keep the premix time as long as possible, at the detriment of the wet mix time, if necessary.
- The shortest mix time is generally obtained from this mix order:
    - Load aggregates (including steel or rigid plastic fibres, if used).
    - (Load microsilica slurry, if used).
    - Load cement just after aggregates start (and after microsilica slurry, if used).
    - Run cement and aggregates together (and silica fume powder, if used).
    - Finish cement before aggregates.
    - Allow sufficient dry mix time to obtain good stable signal.
    - Measure moisture content.
    - Load water and admixtures.
    - Wet mix until the signal is stable.

MAINTENANCE & EXTRACTION

- Always keep the **HIGHEST POINT** of the ceramic adjusted to be **FLUSH** with the mixer floor.
- The mixer floor continuously wears. It is important to regularly check that the sensor is **FLUSH** and to adjust if necessary.
- Keep the mixer blades adjusted 2mm above the mixer floor.
- When extracting the sensor ensure that material around the sensor is **loosened**.
- Before extracting the sensor loosen the sensor by **jacking up into the mixer** by a few millimetres.
- **Do not hit the ceramic**, it is extremely wear resistant, but brittle and may break.
- Fit the adjustable clamp ring (part 0033, see document *HD0226) for ease of adjustment and extraction.

NOTE

The Hydronix Hydro-Mix V is a moisture measuring sensor, it only reports the moisture content of the material passing over the sensor. It will not have any effect on the mixing performance of the mixer. It will not speed up the mix cycle time, but it will enable more consistent concrete to be produced and reduce waste.

The HM05 is not magic, some trimming may be required. Concrete ingredients change continuously and mixer parts wear. It is not a plug-and–play system, it requires consideration, commissioning, calibration and, above all, **CONSISTENCY.** For the best control, keep ingredients, masses, processes and batch sizes as consistent as possible and you can join the many thousands of happy users around the world.

These tips are intended as suggestions for troubleshooting when problems occur with the water control system. This is not a comprehensive installation/user guide. When installing an HM05, reference must be made to the HM05 User Guide, supplied with each unit and available from www.hydronix.com.

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