SOIL COMPACTION

TROUBLESHOOTING

As described previously, several jobsite conditions and operational factors can affect the results of intelligent compaction systems. With experience, operators will begin to recognize certain patterns and understand the probable cause of a deviation from expected values. Following are some common problems and related causes and solutions. Understanding this information will help you solve jobsite problems in a shorter period of time.

Problem: Compaction Measurement Values Are Lower Than Expected

Cause: Granular soil is too dry to compact. Added compaction results in soil structure are breaking down and de-compacting the soil.***Solution:*** Add moisture to the soil before compacting further. Granular soils can take a lot of water without becoming too wet, as the water tends to drain away. Add a bit more than ideally required to allow for dryout and drainage.

Cause: Soil composition is clay rather than gravel or granular material. Or, the clay can be buried below surface level and still affect the measurements.
Solution: Remove clay soil if practical, or accept lower values. Alternatively, utilize an energy-based, compactor-integrated compaction measurement technology such as MDP, which is not as affected by cohesive soils.

Cause: Drum is de-coupling on the hardest areas of ground. When the drum de-couples, RMVs are high and compaction measurement values (CMV) tend to read lower than the ground conditions would suggest.
Solution: Reduce amplitude to low setting. If still de-coupling, compaction is complete. Further compaction while de-coupling can cause de-compaction.

Cause: Clay soil is too wet.
Solution: Use a disk, harrow, or rotary mixer to dig up the soil so it can dry before attempting to compact it. Alternatively, utilize an energy-based compactor-integrated compaction measurement technology such as MDP which is not as affected by cohesive soils, but note that the moisture levels may still be unsuitable to achieve proper compaction.

Cause: Material being compacted was placed over a non-compacted or non-stabilized soil base. As a result it is flexing too much during compaction and will not compact.
Solution: The upper layer of soil will need to be removed and the lower layer of soil will need to be remedied. This might involve drying it out and re-compacting, adding lime or some other soil stabilizing agent, or even excavating the poor soil and replacing it.

Cause: The drum frequency is higher than it should be (this is unlikely).
Solution: Drum frequency should be near 30 Hz (1800 VPM) for the most consistent results. Have a mechanic determine why vibration speed is not performing properly and correct it. Alternatively, an energy-based, compactor-integrated compaction measurement technology such as MDP can be utilized in static mode (vibration off) to see if there is any effect on uniformity of compaction results.

Cause: There is a buried object or objects that are not as stiff as the surrounding soil, a pit where trees or other biomass are buried, buried refuse, or a clay ball. It will show up on the map as a relatively localized area.
Solution: Excavate and replace materials with good soil if the situation is serious enough to warrant it.

Cause: Travel speed is too fast.
Solution: Slow down to obtain most efficient productivity and higher compaction values. Utilize automatic speed control if the compactor is equipped with this option.

Cause: Travel direction affects the integrated compaction measurement values.
Solution: This is normal; the values will measure differently in forward than in reverse. There is no solution other than to drive only in one direction or accept the compaction values from only one direction during analysis.

Problem: Compaction Measurement Values Are Higher Than Expected

Cause: Base or sub-base is stiffer soil type than expected.
Solution: None, test using a dynamic cone penetrometer and check sub-soil shear strength. If stronger, accept results as normal.

Cause: Hidden object is buried below the surface. This might be a rock, concrete slab, old pavement, or building foundation.
Solution: Excavate object to achieve uniform compaction.

Cause: Travel speed is occasionally too slow. (This is unlikely unless the operator is trying to compact using a given number of passes).
Solution: Keep speed consistent. Utilize automatic speed control if the compactor is equipped with this option.

Cause: Ground is frozen.
Solution: None.

Problem: Compaction Measurement Values Are Erratic

Cause: Actual soil conditions are varying either at the surface or below surface level. This is more common than people assume. Hidden objects, changes in fill materials and varying water content can all affect compactor-integrated compaction measurement values.
Solution: If serious variations exist and need to be rectified, start with the easiest solutions first. Check soil moisture content and adjust. Excavate hidden objects if necessary and replace soil if critical.

Cause: Compactor-integrated compaction measurement values measured in forward are higher/lower than those obtained in reverse.
Solution: This is normal, and varies with soil type and compaction level. Typically the differences become smaller as the soil becomes more fully compacted.

Cause: Drum is de-coupling while compacting. De-coupling can cause wide variation in the compactor-integrated compaction measurement values, as the average values tend to drop when the drum begins de-coupling on harder ground.
Solution: Change to low amplitude. If de-coupling in low amplitude, the soil has reached the maximum stiffness the compactor can provide. Alternatively, an energy-based integrated roller compaction measurement technology such as MDP can be utilized in static mode (vibration off) to see if there is any effect on uniformity of compaction results.