

Section 7-Central Mix Plant Material Discharge and Sequencing

When operating a central mix plant the sequence of how the materials are introduced into the central mixer greatly affects the quality of product out of it and the time it takes to achieve a good mix.

When sequencing materials into a central mix drum CON-E-CO found the best results are achieved when introducing the water into the drum first, followed by the aggregate entering one to two seconds later and the cement entering one to two seconds after the aggregate. This is all based on when the materials enter the drum not when they leave the scale (batchers or meters).

With a batch control there is no indication on when the individual materials enter or finish discharging into the drum so the operator will physically have to look at when the materials are entering and their length of discharge. You can not solely rely on the batch control when sequencing material discharge for a central mix plant.

After the materials start entering the drum they should continue discharging together. The cement should be the first material to finish with the aggregate ending one to two seconds later and the water should end one to two seconds after the aggregate.

To achieve proper starting times it is usually a good idea to use time delays to start the material discharge. The use of percentage delays is not recommended when setting up a discharge sequence because regardless of the batch size the material takes the same amount of time to travel to the mixer from each batcher. With percentage delays the start timing will vary depending on the size of batch.

Since in most cases the aggregate batcher is located furthest away from the mixer compared to the other materials the aggregate will start discharging first and the time delays will be based on when the aggregate starts. For instance if the aggregate takes eight seconds to reach the drum you would have approximately a six to seven second delay on the water from when the aggregate starts, thus allowing water to enter the drum one to two seconds before the aggregate. With this example on cement you would delay the cement nine to ten seconds to allow the aggregate to enter the drum for one to two seconds before the cement begins.

Aggregate Discharge

When controlling the speed of the material discharging or how it ends each material has to be looked at individually. With most central mix plants the speed of the material discharging is much faster than a dry batch plant. Due to this fact it may be difficult for the batch control to regulate the flow effectively enough to provide a good discharge sequence. By the time the control makes an adjustment to the discharge gate a large volume of material may have discharged and gotten ahead of all the other material.

Discharging of the aggregate batcher usually is the limiting factor (slowest material) when dealing with discharge. Discharge of the aggregate batcher will typically open the discharge gates fully or run the batcher conveyor at full speed throughout discharge; this is dependent on the type of plant.

Cement Discharge

To regulate the flow out of the cement scale a physical gate stop will be used to allow the discharge valve to only open partially and regulate discharge. When doing

this the batch control should be set up to hold an open signal on the valve throughout discharge, flow regulation should be turned off in the batch control. The gate stop will have to be manually adjusted to speed up or slow down the cement discharge so the cement ends properly in the discharge sequence, one-two seconds before the aggregate. The use of a gate stop provides an even discharge rate through the discharge sequence, when allowing the batch control to regulate the rate you may get an ever changing discharge rate.

Water Discharge

To regulate the flow out of the water scale a physical gate stop will be also used to allow the discharge valve to only open partially and regulate discharge. When doing this the batch control should be set up to hold an open signal on the valve throughout discharge, flow regulation should be turned off in batch control. The gate stop will have to be manually adjusted to speed up or slow down the water discharge so the water ends properly in the discharge sequence, one to two seconds after the aggregate.

An improper discharge sequence can cause many different issues mainly: build up in drum or long mix time to achieve uniform material. If you are experiencing problems with these issues observe how the materials are entering the drum, these problems usually can be resolved with an adjustment to the discharge sequence.