RODIX INC.

Rockford, IL
Toll Free (800) 562-1868
E-Mail: custserve@rodix.com
Website: www.rodix.com

CONTROL PRODUCTS FOR INDUSTRY

How to Tune a Vibratory Parts Feeder Bowl.

The physics of a vibratory feeder behaves like a parent pushing a child on a swing. The parent adjusts the time that he pushes according to the natural frequency of the swing. When tuning a vibratory feeder, the frequency of the pushing is fixed by the power line, so the springs of the feeder need to be adjusted to resonate the feeder at the line frequency. The spring/mass ratio sets up the resonate frequency of the bowl.

A bowl should be tuned to the power line frequency of the destination country. Areas inside of North America usually have 60 Hz power lines, and areas outside of North America usually have 50 Hz power lines.

Bowls that are tuned to the 60 Hz power line can vibrate at either 60 magnetic pulses per second or 120 magnetic pulses per second. 60 magnetic pulses per second is known as 60 pulse, half wave and DC. 120 magnetic pulses per second is known as 120 pulse, full wave and AC.

Bowls that are tuned to the 50 Hz power line can vibrate at either 50 magnetic pulses per second or 100 magnetic pulses per second. 50 magnetic pulses per second is known as 50 pulse, half wave and DC. 100 magnetic pulses per second is known as 100 pulse, full wave and AC.

A vibratory feeder bowl builder generally chooses to feed larger, heavier parts at 60 pulse and smaller, lighter parts at 120 pulse. Bowls that are 30” or larger, inline and hoppers are generally tuned for 60 pulse. The Quantity of springs on each post should be as close to the same number as possible.

Vibratory feeders that are “slightly over-tuned” perform better when there are line voltage fluctuations or parts weight variations.

How to Check the tuning of the vibratory feeder:

Method #1 - Use a Rodix VF (variable frequency control) with a CFR sensor attached to the bowl and perform an auto-scan. The frequency of the bowl will be given on the display. Add a spring to increase the resonate frequency of the feeder. Remove a spring to decrease the resonate frequency of the feeder. Once it is know how much one spring changes the resonate frequency, a guess can be made about how many springs need to be added or removed to get close to the desired frequency. The feeder should be tuned to be about 1 Hz above the desired frequency to allow the feeder to be slightly over tuned. Then test the feeder with a fixed frequency control to verify feed system performance.

Method #2 Use a fixed frequency control for feeder tuning.
Determine Tuning Status:

1. Check all the bolts on the drive unit to see if they are properly tightened. (See enclosed torque information).
2. Fill the bowl with a typical load of parts (2-3 layers of parts for a bowl).
3. Turn on the Vibratory Feeder Control and set it at around 70-80% of full power.
4. Let the bowl tooling fill up with parts. Then count how many parts feed out of the bowl for 10 seconds.
5. Next, with the bowl operating, slowly loosen one of the bolts on the bottom of a spring pack by ½ to ¾ of a turn so that it is not heavily torqued.
6. Count how many parts feed out of the bowl for 10 seconds and compare the number to the original count.
7. Analysis

   If the parts slow down **suddenly,** the bowl is **under tuned** and springs need to be added**.**

   If the parts speed up **suddenly,** the bowl is **over tuned** and springs need to be removed**.**

   If the parts speed appeared to increase as the torque was removed, the bowl may be in tune. Loosen the bolt further to see if the parts slow way down. If they slow way down, the bowl is slightly over-tuned, indicating that the bowl is **properly tuned** and tuning is finished. Retighten the bolt to the proper torque specification.

Under tuned bowl – tuning:
Springs need to be added to increase the resonate frequency.
Tip: Add only one spring and spring spacer at a time. Then retighten bolts to specification and repeat tuning status test.

1. Count the number of springs on each spring pack.
2. When every spring pack has the same number of springs, add one spring and spring spacer to a spring pack that is next to a coil. Re-torque the bolts and repeat the tuning status test. If another spring must be added, add it to the spring pack on the opposite side.
3. When there are fewer springs on one spring pack than any other pack, add a spring to that spring pack first. Re-torque the bolts and repeat the tuning status test.
4. Generally, the thinner that the spring is, the closer it should be to the bolt head.

Over tuned bowl – tuning:
Springs need to be removed to decrease the resonate frequency.
Tip: Remove only one spring and spring spacer at a time. Then retighten bolts to specification and repeat tuning status test.

1. Count the number of springs on each spring pack.
2. When every spring pack has the same number of springs, remove one spring and spring spacer from a spring pack that is not next to a coil. Re-torque the bolts and repeat the tuning status test. If another spring must be removed, remove it from the spring pack on the opposite side.
3. When there are more springs on one spring pack than any other pack, take a spring off of that spring pack first. Re-torque the bolts and repeat the tuning status test.
4. Generally, the thinner that the spring is, the closer it should be to the bolt head.

Typical bolt torque: (consult the bowl's manufacture for their recommended torque settings.)

1 /4 – 20 Socket head cap screw	190 inch pounds
3/8 – 16 Socket head cap screw	59 foot pounds
1 /2 – 13 Socket head cap screw	144 foot pounds
5/8 – 11 Socket head cap screw	180 foot pounds
3 /4 – 10 Socket head cap screw	200 foot pounds

Coil Gap
The coil gap needs to be correct so that the feeder system will perform properly and not run too slow or hammer. The middle and all four corners of the coil should be about the same distance from the pole face weldment on the cross arm. Use a feeler gauge to measure the gap settings while the system is turned off. Record the gap settings.

1. Determine the intended pulses required per second for the feeder.
   120 pulse per second (full wave) usually has a gap of around .040 inches.
   60 pulse per second (rectified) usually has a gap of about .080 inches.
2. Use the four bolts on the rear of the coil to adjust the gap. Two bolts pull the coil to the coil post and two bolts push on the coil. Record the coil gap measurements before any adjustments are made.
3. Set the coil gap as noted above.
4. Turn on the Vibratory Feeder Control and set it to about 80-100 percent power level.
5. If the coils are hammering the gap is too small and should be increased.
6. If the coils are not hammering, the gap may be larger than needed and could be decreased until hammering is noticed. Then gradually increase the gap until the hammering stops.

Dead spots in the bowl: Dead spots are caused by a weight imbalance in the feeder. Dead spots are seen as a place in the bowl where the parts move at a slower rate than in the rest of the bowl. Dead spots can be corrected by adding a counter-weight, or adjusting the springs. Counter-weights should be located on the side that is opposite of the feeder bowl's dead spot. Check for a missing counter-weight. Check to see if the dead spot was caused by added or modified tooling on the bowl. Check to see if broken spring might be causing a dead spot.

Click here for information on "How to Troubleshoot a Vibratory Parts Feeder Bowl, Feeder Control and Power Line Problems."

Troubleshooting guides & Application Notes
Rodix has troubleshooting guides and application notes available at **www.rodix.com** under Technical Documents, or call for technical support at 1-800-562-1868 extension 22.