TROUBLE SHOOTING VIBRATORY FEEDERS

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INTRODUCTION

Most vibratory feeders function for long periods of time without attention, without maintenance and little contact is had with them by the people who are responsible for their performance.

Feeders usually feed parts into equipment of processes many times more expensive than the feeder itself. Indeed, during visits to plants, it is often found that a machine with an initial cost of $50,000 will be operating at 70% of capacity because a feeder is not putting out parts at a sufficient rate.

PROBLEMS OCCURING IN VIBRATORY FEEDERS

There are four basic malfunctions that bring attention to vibratory feeders:
1. Declining feed rate due to low amplitude. Usually this will occur gradually over a period of time.

2. A dead spot in the bowl - parts will not feed past a certain point in the bowl, even though they are moving elsewhere in the bowl.

3. Intermittent operation. The feeder will spontaneously run at excessive amplitude or possibly no amplitude without apparent cause. Included in this category is for a feeder not to work at all.

4. Noise in vibratory feeders.

DECLINING FEED RATE

There are many causes for the feed rate to decline over time. A common impulse reaction to a feeder not operating at or close to capacity is to turn the controller up. A repetitive pattern of this behavior leads to a controller turned up all the way and performance is no longer being increased. This kind of problem is best solved with a complete disassembly and retuning of the unit. However, the cause of this decline can be isolated and attributed to one or more of the following:

A cracked spring A cracked spring can cause a dead spot, however it can slow down the feeder all around. The crack frequently occurs adjacent to one of the holes in the spring and sometimes is so fine it can only be seen with a magnifying glass. Before inspection, the ends of the spring should be wire brushed or polished with emery cloth. A quick test of the spring is to throw the spring onto a concrete floor with force and usually the spring will break into two pieces if cracked.

A change in the durometer (hardness) of the rubber feet can contribute to poor feeder performance. Rubber feet can harden with age (cure) or soften or swell from environmental conditions such as exposure to petroleum based products and corrosives. The remedy is to replace all the feet.

A cut/slice in a rubber foot can lead to poor performance. Again, the foot must be replaced. Usually

the cause is a result of the feeder being dropped or picked up with a lift truck and not setting properly on the forks.

Loose feet can cause this problem. Since the feet are part of the springing system, they must be tight.

Coil Gap Too large of a gap between the coil and the armature can cause low amplitude. This adjustment will be discussed later.

A weld seam on the coil assembly can break. Usually the cause of this is operating the feeder with the armature hitting the coil. After some time, a weld will fail. Sometimes it can be re-welded, although it is be best to simply replace the coil.

Rust or oxidization between the springs and spacers indicates corrosion between the springs and spacers. This will cause low amplitude. When this is detected it is necessary to disassemble, clean, and retune the drive unit.

The absence of a shell or cover can cause low amplitude. The feeders manufactured by Automation Devices, Inc. are tuned for use with the shell in place. Removal of it, especially on some larger models, can cause a severe loss of amplitude.

DEAD SPOTS IN THE FEEDER BOWL

Dead spots usually appear suddenly, however they can develop gradually. They are always caused by some imbalance in the springing assuming that the feeder once worked satisfactorily. The presence of tooling added after factory tuning can cause dead spots and is usually noticed immediately upon operation after the addition.

Ways to Balance a Feeder:

- Counter-weights
- Adjusting the torque on the bottom end of the springs (tighten or loosen the bolts on the bottom end of the springs)
- ***IN EXTREME CASES***, add springs.

OTHER CAUSES OF DEAD SPOTS

Spring Bolts A bolt that holds the springs in position can loosen or break. Of course, broken bolts must be replaced. Caution must be taken to use only thru-hardened bolts, as the load on them is high. Case hardened or mild steel bolts will fail quickly.

A loose or a cut foot can cause a dead spot.

A broken spring can cause a dead spot. Checking for this is covered above.

The support or stand upon which the feeder sits can cause a dead spot. This is true especially if the support is light to begin with. If the support loosens in one direction and not the other it can cause several kinds of problems.

The bowl not fastened to the drive unit tight enough will cause a dead spot. This is true especially on bowls held on with three or more bolts and one of them loosens.

INTERMITTENT OPERATION

Intermittent operation is almost always electrical. Generally the symptom is that the feeder will increase its amplitude to the maximum amplitude for no apparent reason. Occasionally it will simply return to the correct amplitude again for no apparent reason or it will simply run at maximum amplitude no matter where the control is set.

The causes of intermittent operation generally fall into the following categories:

Intermittent operation is sometimes an indication that the SCR Controller is about to fail. Generally, once it exhibits inconsistencies, the controller has at most two weeks or so of operation left. Maintaining a spare controller of each type is a wise and economical policy to practice.

Also this kind of problem can occur very early in the life of the feeder, sometimes in the first month or less. It is usually easy to diagnose.

External sources can cause intermittent operation on feeders with SCR Controllers. Resistance welding, arc welding, ultrasonic cleaners, and other high frequency equipment can generate electrical noise which will affect the SCR and turn it on. It the feeder goes to maximum amplitude while the resistance welder is being cycled, it is rather easy to notice this if you are aware of the possibility of it being a problem. The point should be made, however, that the source of the noise does not necessarily have to be in the same room as the feeder. It can be on the same electrical line and sometimes be quite a distance away. It is practical to filter the noise by installing capacitors across the incoming line to the feeder. And should and often will eliminate the problem. Most controllers are designed to filter out this noise.

Rectifiers and other electronic components age with time, and sometimes their maximum performance declines over several years. It is not often that a controller is replaced because of this but it can occur if the feeder is run at maximum performance at all times. This is determined by an electrical check, and should be done by the electrician.

Another potential cause for unsatisfactory performance is low line voltage in a plant. If the feeder is operated at maximum performance, then it usually requires a minimum of 115 volts AC on the incoming line. However, in many plants this voltage may drop to below 100 volts when machines, ovens, and other large current devices are in operation. Generally, it will be noticed as these items are turned off and the performance of the feeder comes back. If this is the case, it is sometimes necessary to install a constant voltage transformer ahead of the feeder. This will keep its performance even through wide fluctuations of the input voltage.

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