A GUIDE TO TROUBLE SHOOTING THE MOST COMMON PROBLEMS ASSOCIATED WITH VIBRATORY BOWL FEEDERS

INTRODUCTION

Nearly all vibratory bowl feeders run trouble free for long periods of time requiring little or no attention and without maintenance; but as with any mechanical device problems do arise from time to time.

The following information is a detailed guide on trouble shooting some of the most common problems found with vibratory bowl feeders. It is not specific to any particular manufacturer's product as it is deemed that the majority of electro-magnetically driven vibratory bowl feeders, or vibratory parts feeders as they are sometimes referred to, operate along the same principles.

Component selection tooling is NOT covered in this article.

PROBLEMS ACCOCIATED WITH VIBRATORY BOWL FEEDERS:

Here are four of the most common problems that can occur within a vibratory bowl feeder:-

1. Declining feed rate due to low amplitude. This will usually occur gradually over a period of time.

2. A phenomenon commonly known as a "dead spot" appears within the bowl feeder. Parts will not feed past a certain point along the track even though they are moving elsewhere within the bowl feeder.

3. Intermittent operation. The bowl feeder will spontaneously run at excessive amplitude (speed up) or possibly reduced amplitude (slow down) without any apparent cause. Included in this category is for a bowl feeder not to work at all.

4. Excessive noise within a vibratory bowl feeder.

1. DECLINING FEED RATE

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

A Cracked or Fractured Steel Spring

A cracked or fractured steel spring can cause a “dead spot”, however it can also slow down the bowl feeder as a whole. The crack or fracture in a spring frequently occurs adjacent to one of the main fixing points in the spring, and sometimes is so fine it may not be visible to the naked eye. Some manufacturers fit fibreglass springs, so the following would not apply.

Before inspection, the ends of the spring should be wire brushed or polished with abrasive cloth or similar. A quick simple test of the spring is to drop it onto a hard surface with a little force and usually the spring will break at the point of fracture.

The Anti-vibration Feet or Shock Absorber

There is usually a set of three or four identical rubber composite feet fitted to the underside of the main body of the bowl feeder or drive unit casting, as it is commonly known. Also, hardening of the rubber feet usually attributed to age, can contribute to poor bowl feeder performance. The rubber feet can also soften or swell from environmental conditions such as exposure to petroleum based products and corrosives. The remedy to this is to simply replace all the feet (as a set recommended).

A damaged or split rubber foot can also lead to poor performance, even loose feet can cause this problem, as the feet are an essential part of the vibratory bowl feeder and they must also all be tightened securely.

Electro-Magnetic Coil Gap also known as the Air Gap

An excessive gap between the electro-magnetic coil and the armature faces can cause low amplitude. This adjustment will be discussed later.

Weld Seam

Although this is rare, on the electro-magnetic coil or armature assembly the weld seams can fail. Usually the cause of this is operating the bowl feeder with the face of the armature hitting the face of the electro-magnetic coil known as hammering.

After time the weld will fail, resulting in poor performance. In some instances it can be re-welded, although it is recommended to simply replace the electro-magnetic coil and armature as a set.

Rust or Oxidization

Rust or oxidization between the springs and spacers indicates corrosion (normally evident by a fine rust coloured dust) this can cause low amplitude. When this is detected it is necessary to disassemble and clean the drive unit spring packs by means of abrasive paper or ideally sand or bead blasting. Some manufacturers opt for fibreglass leaf springs, so the above will not apply in this instance.

Absence of the Outer Cover

The absence of the outer cover can cause feed problems. Most bowl feeders are tuned for use with the cover in place. Removal of it, especially on some larger models can cause a severe imbalance and loss of amplitude.

2. DEAD SPOT WITHIN A BOWL FEEDER

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

Balancing a Bowl Feeder:-

- Counter-weights can be added to the periphery of the bowl itself, similar in principle to that when balancing a car wheel (but not as critical). Balance weights will vary in size dependant on the physical size of the bowl.

- Adjusting the torque on the bottom end of the spring clamping bolt, (tighten or loosen the bolts on the bottom end of the spring packs).

- Adding or removal of leaf springs.

Spring Pack Clamp Bolts

A clamp 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 high tensile steel bolts, as the load on them is very high. Case hardened or mild steel bolts will fail quickly.

A Broken or Fractured Spring

This can also cause a "dead spot". Checking for this is covered above.

Bowl Feeder Support

The support stand upon which the bowl feeder sits can contribute to a "dead spot", especially if the support is of a light or inadequate construction.

Bowl Feeder Top

If the bowl itself is not fastened to the drive unit tight enough this could cause a "dead spot", especially on smaller diameter bowls where normally they are secured via a single centre mount fixing.

3. INTERMITTENT OPERATION

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

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

- Intermittent operation is sometimes an indication that the controller is about to fail. Maintaining a spare controller is a wise and economical policy to practice.

- External sources can cause intermittent operation on bowl feeders, especially with the newer modern electronic controllers. Resistance welding, induction heaters, arc welding or ultrasonic cleaners, and other high frequency equipment can generate electrical noise which may affect the controller. If the bowl feeder suddenly runs at maximum speed while a resistance welder is being cycled for instance then this could be a likely cause.

- The source of the electrical noise does not necessarily have to be in the same area as the bowl feeder. It can be on the same electrical line and sometimes be quite a distance away. It would be a practical solution to filter the electrical noise by installing suitable electronic filters across the incoming power supply to the bowl feeder, this should eliminate the problem. However, most modern electronic controllers are designed to filter out this type of electrical interference.

- 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 speed for long periods of time. This is determined by an electrical check and should be carried out by a qualified electrician.

- Another potential cause for unsatisfactory performance is low line voltage in a factory. If the bowl feeder is operated at maximum performance, then it usually requires a minimum of 115/230 volts AC 50-60Hz (dependant on country specific supply) on the incoming power supply.

  However, in many factories this voltage may drop below this when machines, ovens, and other large current hungry devices are in operation. It will usually be noticed as these items are turned off and the performance of the bowl feeder returns. If this is the case, it is sometimes necessary to install a constant voltage transformer in line with the bowl feeder, this should keep the voltage supply stable even throughout wide fluctuations of the supply voltage.

4. NOISE

By the very nature of its design, a vibratory bowl feeder itself generates a minimal amount of physical noise (even without the presence of product within the bowl feeder itself). Usually a low level hum is heard generated by the bowl feeder physically moving through air at a high frequency, which in turn creates a low level hum. If it is making an undesirable level of noise, this normally indicates there is a problem.

Noisy operation of vibratory bowl feeders is becoming more and more of a problem in factories due to Health and Safety legislation. However, many sources of noise in vibratory bowl feeders can be reduced with simple maintenance and repairs.

Some of the instances that may contribute to noisy operation:-

Excessive Noise

By the very nature of a bowl feeder's operation, noise is generated by parts hitting/clanging and knocking against each other within the bowl itself whilst running.

Reducing the number of parts within the bowl feeder via the use of an external feed hopper and controlling device such as a level sensor will help resolve this problem.

Another solution would be to install a physical sound enclosure around the entire bowl feeder.

If the bowl feeder itself is empty and is making an abnormal or loud noise, this also indicates a problem.

Noise can be generated by the Drive Unit / Base Unit

On occasion, the bowl feeder can appear to be noisy. However, the noise can be generated by resonance of the base upon which the bowl feeder is sitting. Make sure the stand is conducive to the dissipation of sound through dispersion. Bracing the open spans of a steel fabricated stand for instance will help transfer the noise away from audible mediums and providing a way for the noise to be "grounded".

Armature Striking the Electro-magnet

The bowl feeder electro-magnetic coil may be improperly adjusted such that the electro-magnet face is being struck by the armature face. When this occurs a great deal of noise is generated and damage will inevitably ensue. This is eliminated simply by increasing the clearance known as the air gap between the magnet and armature. The gap settings will be found in the Manufacturer's manual, but are typically between 0.5mm and 2.5mm depending on the model.

Bowl Top

Occasionally a bowl top may work loose from the base/drive unit, so it is worthwhile checking. This condition can generate a very loud noise and poor feed performance. In this case, it is necessary to remove the bowl top and clean the mating surfaces of the bowl top and the drive/base unit with abrasive paper or a flat file and re-fix securely with all fixing bolts.

The bowl feeder can operate in such a way that it is striking stationary parts of the surrounding machinery, such as the track onto which the parts are being fed. This again should be obvious and can be easily remedied.

If your problems persist then we are able to offer servicing for most Manufacturers' vibratory bowl feeders. Please contact the number below or visit our website link below:

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