TROUBLESHOOTING VIBRATORY FEEDER SYSTEMS

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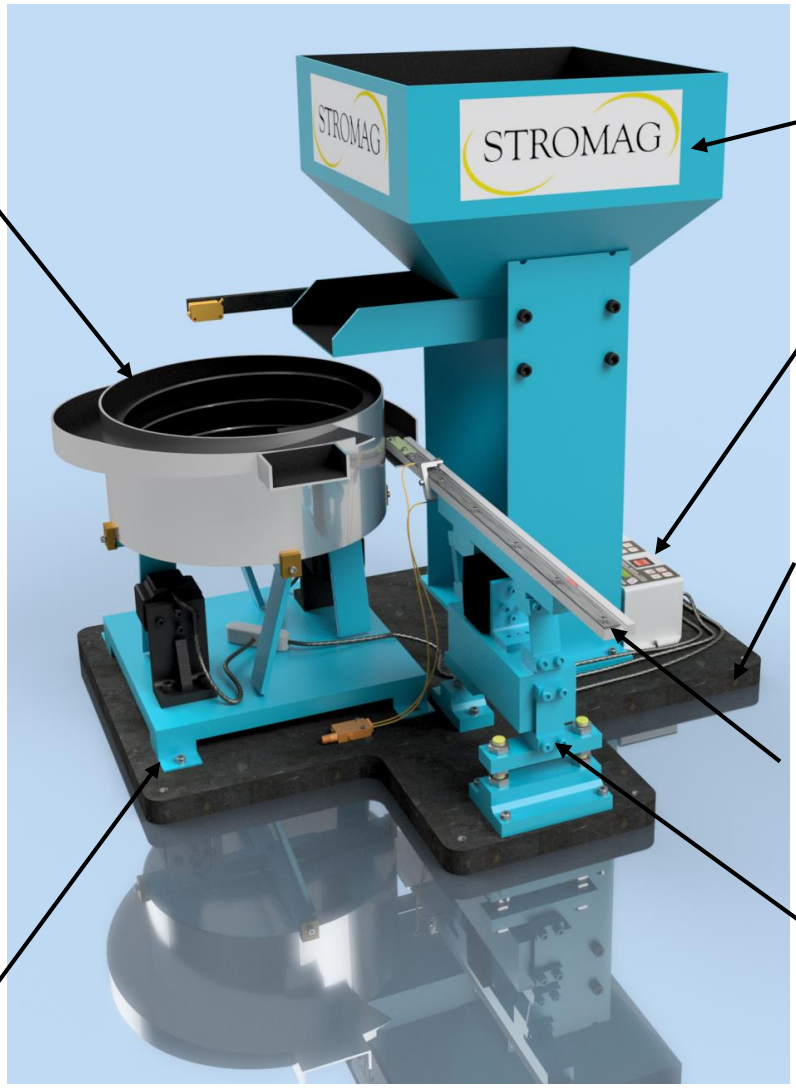
ANATOMY OF THE FEEDER BOWL SYSTEM



HOPPER UNIT

FEEDER BOWL

FEEDER CONTROLLER

MACHINE BASE PLATE

INLINE TRACK

INLINE DRIVE UNIT

FEEDER BOWL DRIVE UNIT

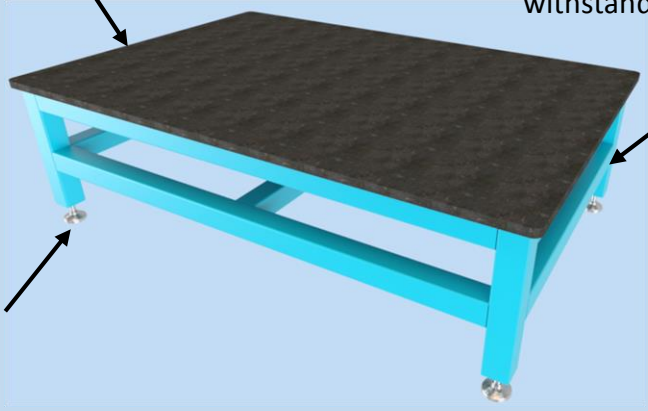
RIDGED MACHINE BASE / TABLE

The machine base table, constructed of heavy walled structural tubing, thick surface plate and isolating leveling feet, provides plenty of structural support for the most demanding machines.

Custom manufactured and tailored to be the best base for every machine, tables are fabricated for any size machine, minimizing the overall footprint.

1. The thick Blanchard ground surface plate is custom machined to hold all of the components securely in place, while insuring the structural integrity needed to isolate unwanted vibrations or movement. The flat ground surface allows for perfect setups when fastening down all of the components.

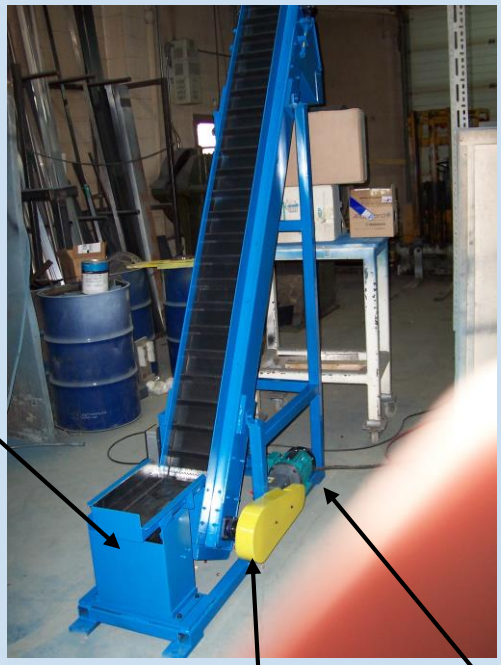
2. The heavy walled tubular frame, large fillet welds and professional fabrication will withstand the abuse.



3. In order to level the machine base table and offer vibration isolation, rubber isolating feet are securely threaded into the bottom of the table legs. Adjustable upon installation, some foot models can be further anchored to the machine foundation.

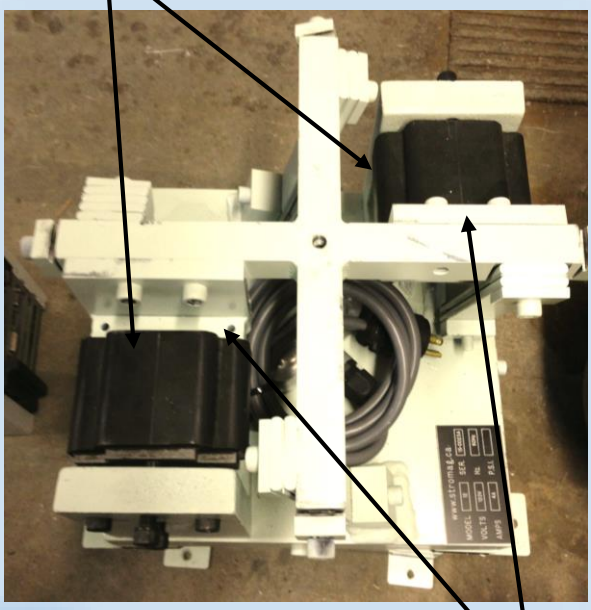
HOPPERS & INCLINE CONVEYORS

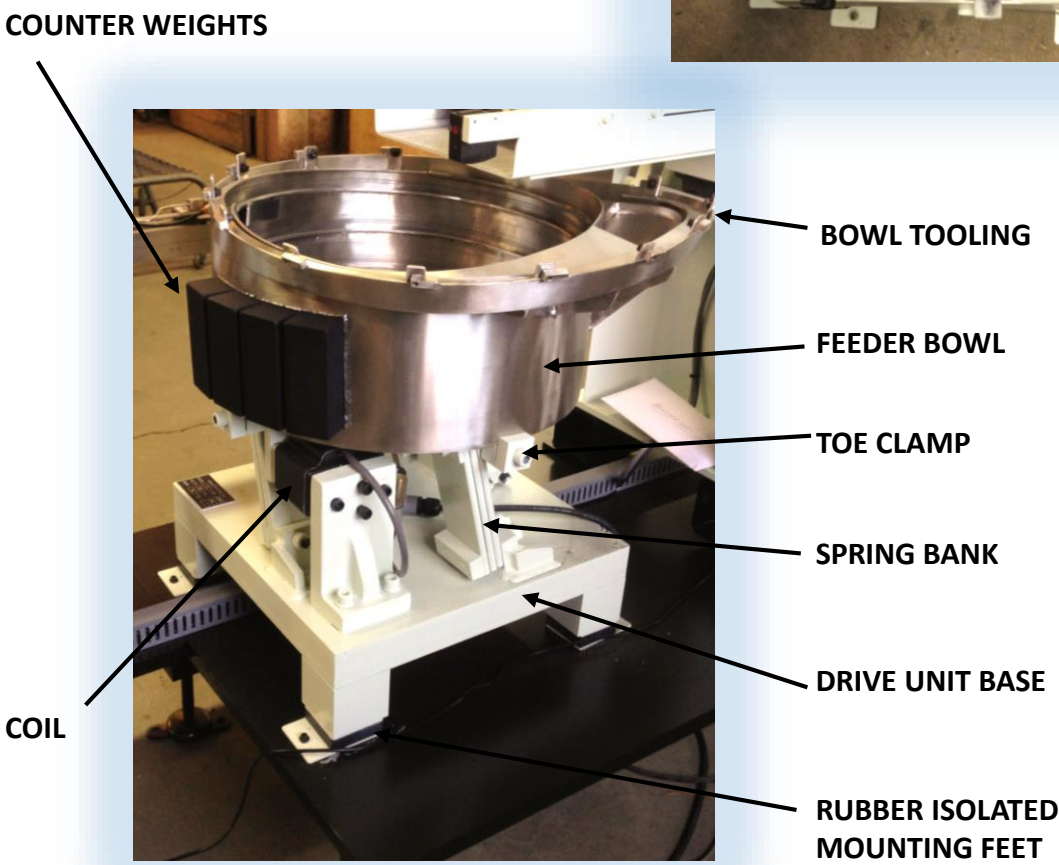
The hopper unit, built to be rugged and adaptable for any application, serves as a reservoir that feeds parts into the feeder bowl efficiently and reliably. Hopper units depend on a vibratory tray to control and direct parts into the feeder bowl at a given rate.



FEEDER BOWL & DRIVE UNITS

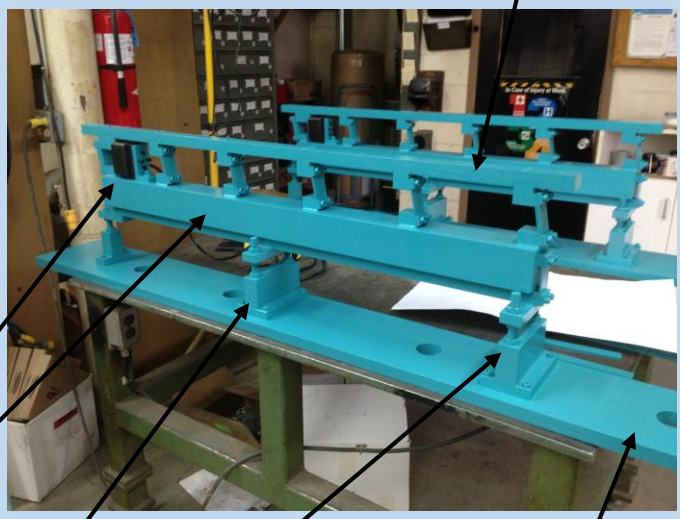
The feeder bowl unit properly sorts and orientates the parts in preparation to be transferred by the inline drive component. The feeder bowl relies on a vibratory drive unit to propel parts clockwise or counter clockwise dependent on the application. With the use of custom bowl tooling, a part can be expelled in any orientation desired.

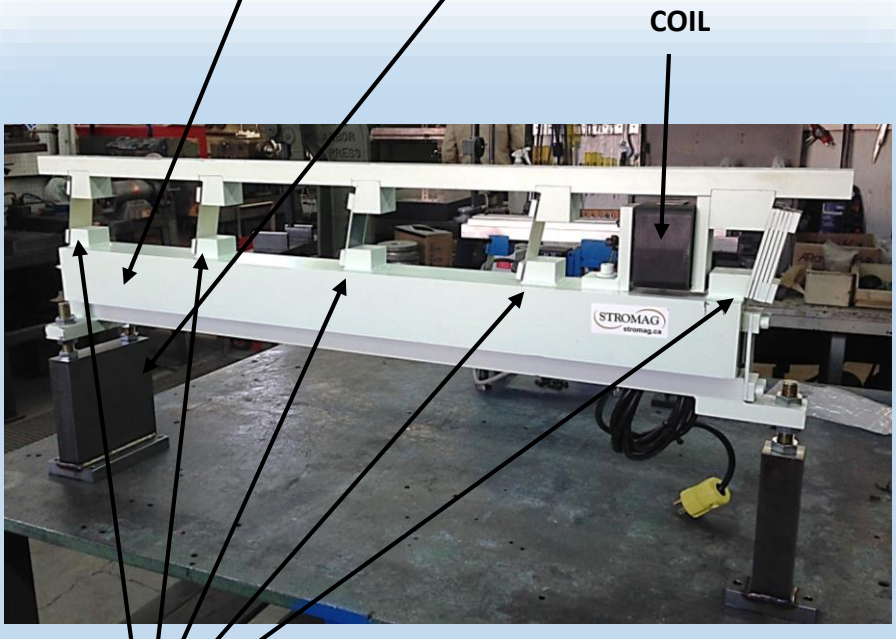




INLINE DRIVE UNIT

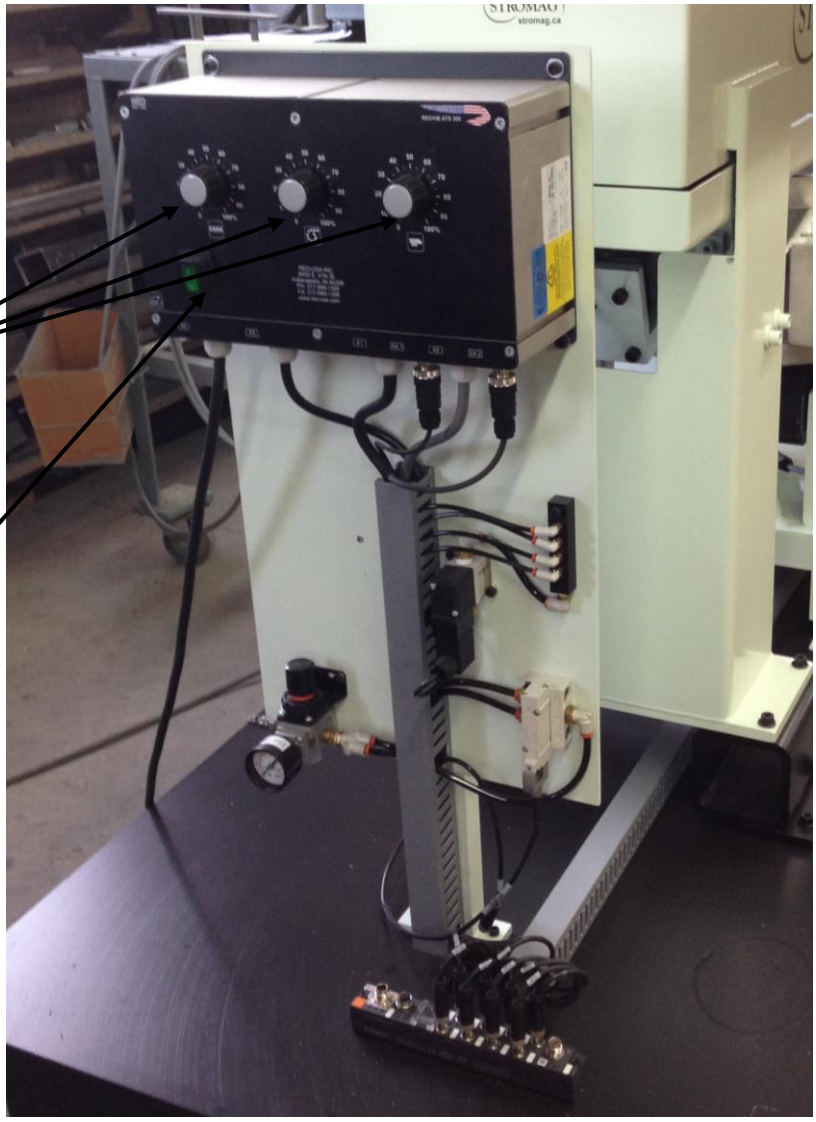
Used primarily to transfer post-orientated parts from the feeder bowl to the dead nest, the inline drive unit is set and located so that the lead part arrives exactly where needed. In correlation with the dead nest, final part height and location is set to required parameters.





FEEDER CONTROLLER

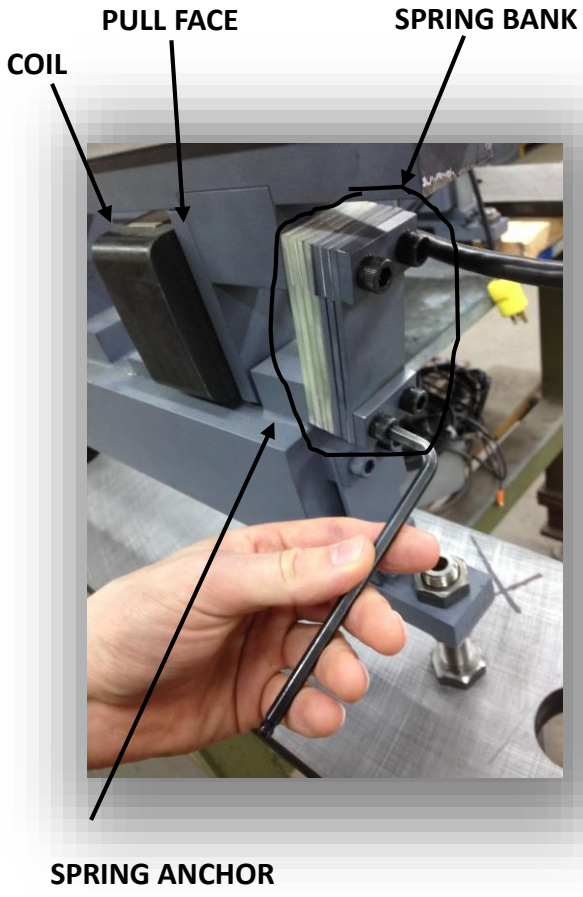
The feeder control boxes supply the hopper, bowl drive, and inline track with the power required to vibrate the parts along and into the nest. The controller will have a potentiometer dial associated with each coil series to control the amplitude of the vibration. The controllers can be set to output 60hz or 120hz, dependent on the application.



DECREASE IN FEED RATE

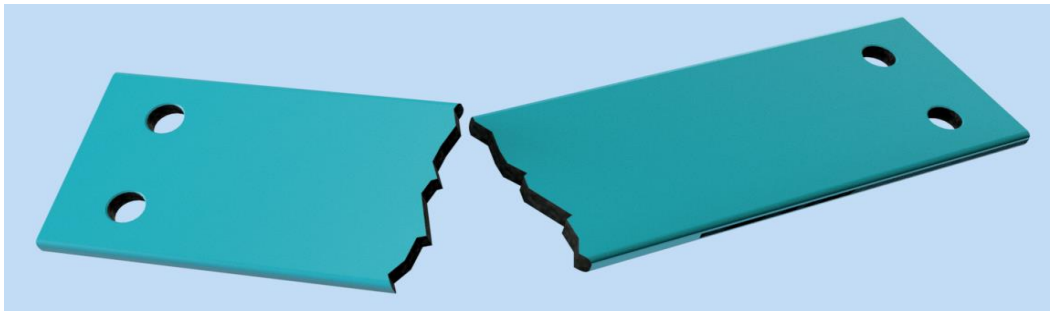
SPRING TENSION

The most common attribute that tends to decrease the feed rate of a feeder system is the amount of spring tension available. To check if the system is *under-sprung*, or *over-sprung* turn the feeder to the 'ON POSITION' and with a hex wrench, temporarily "crack loose" (approximately quarter turn) a fastener on one of the spring banks. If the feed rate of the feeder increases, then the unit was *over-sprung*; in this case, removing a spring will yield desired results. If the result causes the feed rate to become slower than before, the unit is *under-sprung.* By adding springs to the feeder, the feed rate will increase until desirable. Be sure to firmly tighten all fasteners, to insure proper spring tension in the system.



CRACKED SPRING

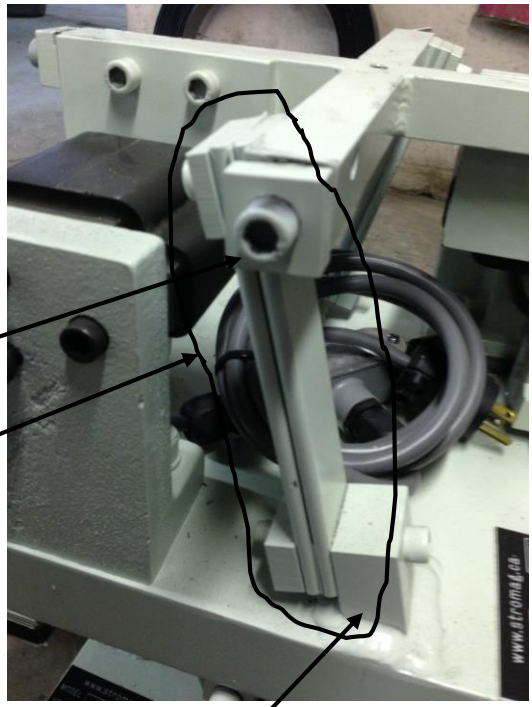
The feed rate of a feeder system will be drastically influenced if a spring has physically failed due to fatigue or any other means of damage. In cases where it is not obvious as to where the spring has failed, it has most likely cracked close to the bottom, where it is clamped onto the spring holder. A crack may not always be visible to the eye. Remove each spring from its unit, and by holding the spring with a finger and thumb, tap the end of the spring with a dense object. If the spring is 'good', it will resonate with a clear reverberating sound. If the spring fails to do so, its integrity has been compromised and should fracture easily upon exerted force.



DECREASE IN FEED RATE

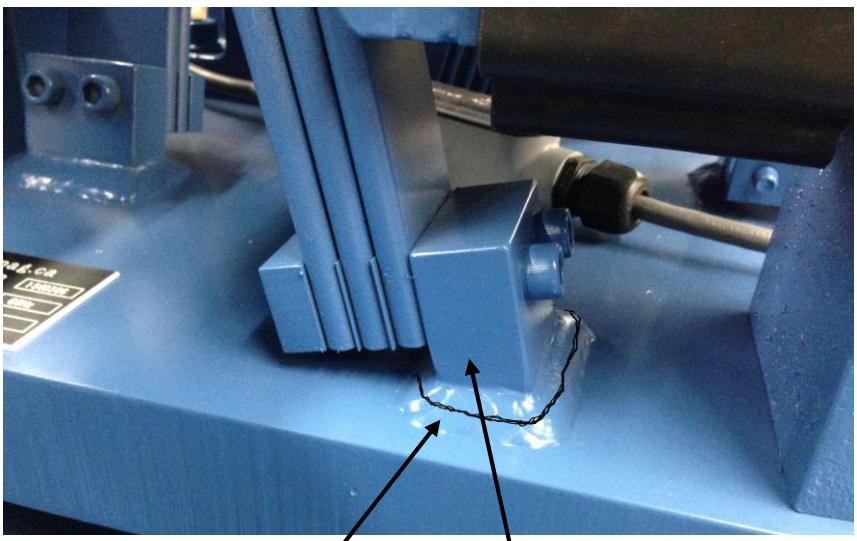
SPRING FATIGUE

Over extended periods of time and use, a spring may become fatigued and loose its ability to store mechanical energy. In this case, the spring must be replaced with a new one. If spring fatigue proves to be a problem, it is recommended that all of the springs in the feeder system are to be replaced at the same time.



LOWER SPRING ANCHOR FRACTURE

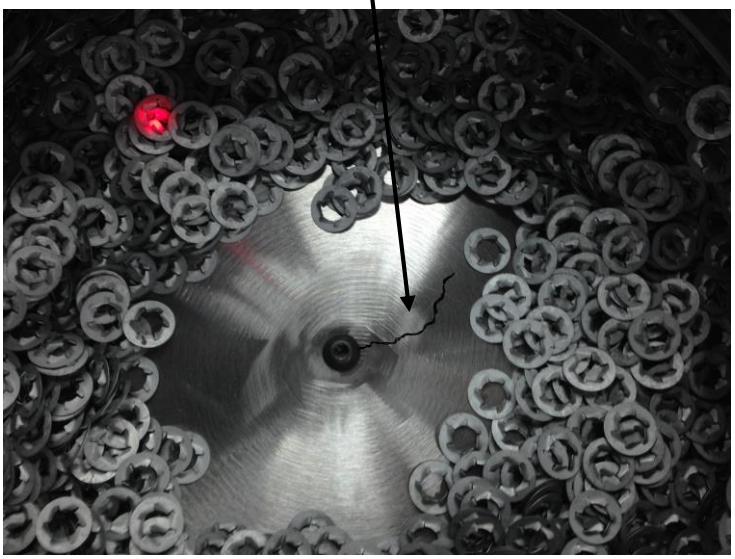
Cracked welds around the lower spring holders and gussets will affect the feed rate of the system. After removing the springs from their holders, apply a sufficient rap with a hammer to further expose any fractures in the welds. Other methods to check for stress cracks can also be used.



DECREASE IN FEED RATE

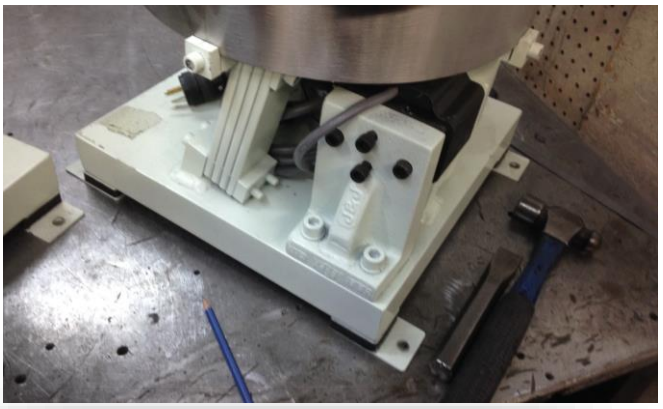
CRACK IN THE FEEDER BOWL

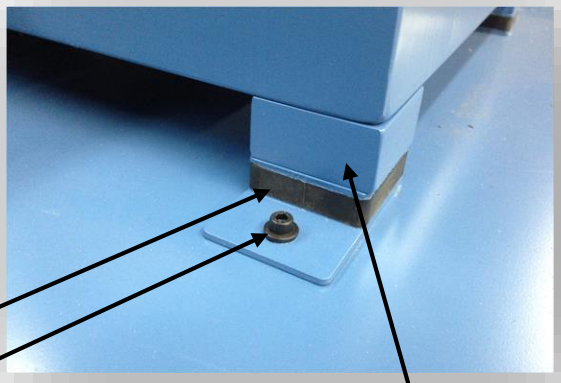
A crack in the feeder bowl can cause performance issues to feed rate in the system. The most common area to check for cracks would be in the outer band of the bowl where it is clamped to the cross arm members (toe clamps). The second place where a fracture could occur is around the centre bolt, inside bottom of the bowl. The stainless steel feeder bowls must be properly T.I.G. welded using the correct filler material (308L).



MOUNTING FEET

The rubber mounting feet that are fastened to the bottom of the drive unit isolate vibration to the feeder bowl in order to achieve efficient part movement. These isolation characteristics can degrade as a result of change in the rubber over time and use. The rubber can become hard, dense and brittle with age, or may become too soft and malleable if exposed to certain oils or coolants. All of the rubber feet should be replaced at the same time with the appropriate matching thicknesses. The feet are fastened to the under side of the drive unit plate with a single socket head cap screw.



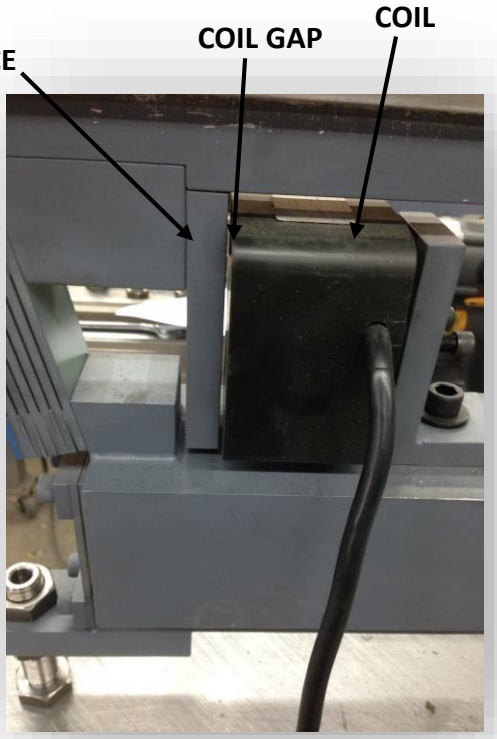


DECREASE IN FEED RATE

COIL GAP

The coil gap (the space between the coil surface and the pull face) must be set correctly in order for the coil to vibrate the feeder bowl properly. The coil gap must be set far enough apart from the pull face so that the coil cannot make contact against the pull face. The gap must also not be too large resulting in loss of vibration and feed rate. Too large of a coil gap will also cause the coil to draw increased electrical current, which may cause overheating and permanent coil damage. Generally, the coil gap can be set using feeler gauges set at the following specifications.

- For coils operating at 120 Hz, allow 0.035” coil gap
- For coils operating at 60 Hz, (half-wave rectified) allow 0.060” coil gap



DEBRIS BETWEEN THE SPRINGS

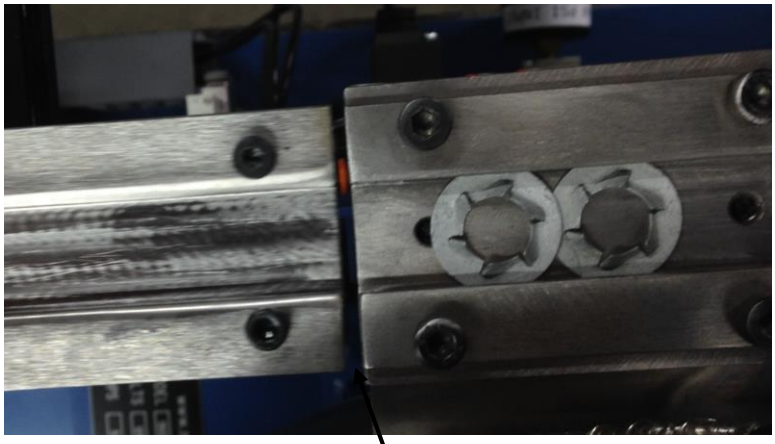
Over time, dirt and oil can become lodged in the spaces between the springs causing improper resonation and therefore affecting the feed rate. Solid debris such as metal fragments can also become trapped between springs and cause abrasive damage to the springs. In these instances, spring banks should be removed, dismantled and thoroughly cleaned.

THE SPACE BETWEEN THE SPRINGS CAN TRAP DIRT AND DEBRIS

EXCESSIVE NOISE

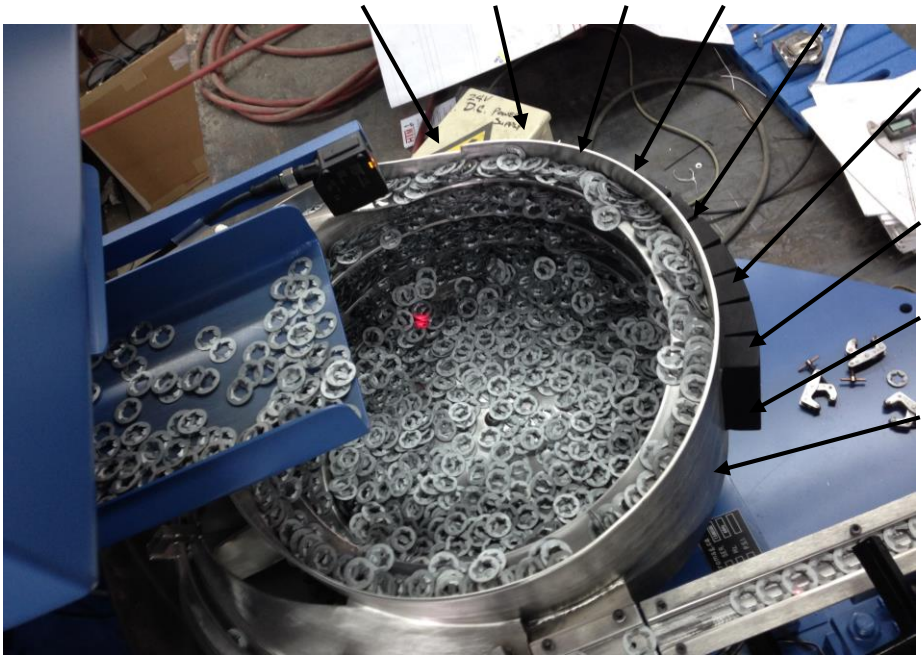
OBSTRUCTIVE INTERFERENCE

Be sure that the vibrating feeder bowl is **not** in contact with any external objects. A feeder bowl that is vibrating against a gravity or inline track will cause excessive noise and possible damage. The area around the feeder bowl should have adequate space around it, insuring that there will be no interference.



NEEDS CLEARANCE

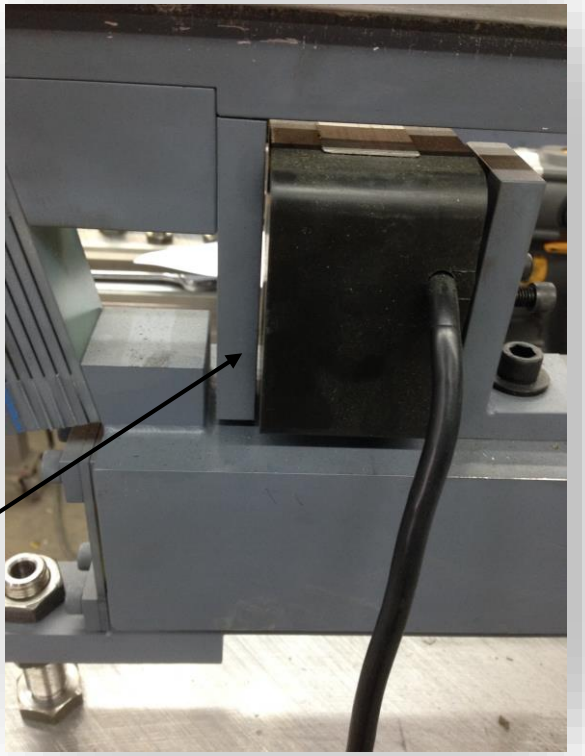
AREA AROUND THE FEEDER BOWL



EXCESSIVE NOISE

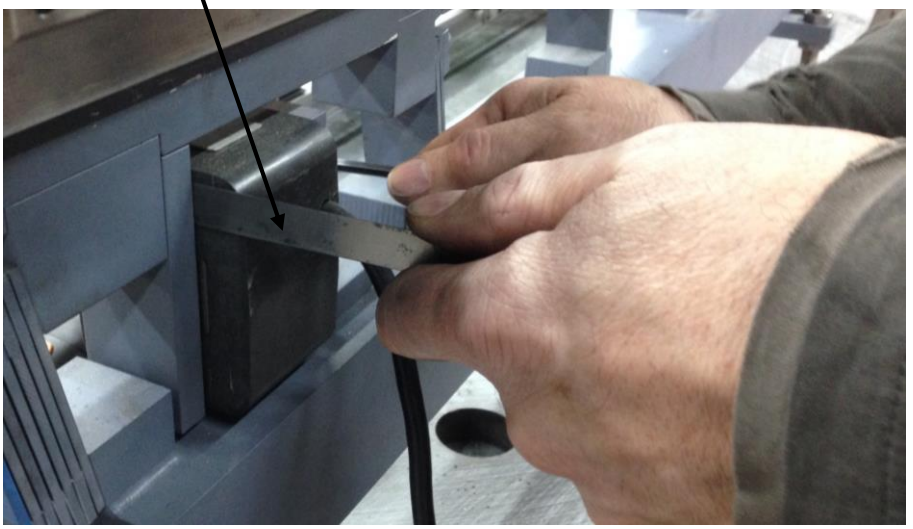
NARROW COIL GAP

If the coil gap is set too close to the pull face, the two surfaces will vibrate and physically interfere with one another creating a violent banging noise. The coil gap should be set as per specification and set at an even distance between the surfaces. Insure that the adjusting screws are torqued tight.



COIL GAP TOO NARROW

FEELER GAUGES



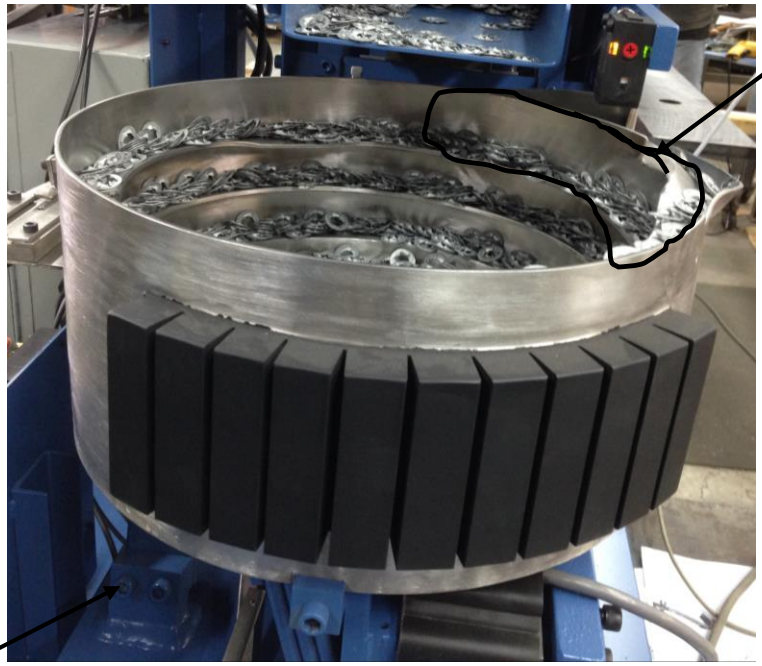
EXCESSIVE NOISE

FRACTURED SPRING

A cracked or fractured spring can cause the feeder bowl to operate violently and produce excessive noise. Compromised springs must be exchanged with the appropriate replacement springs as per the spring replacement procedure.

DEAD SPOTS

A “dead spot” is an area of the feeder bowl that prohibits part movement due to a lack of proper vibration. Dead spots are usually an indication of loose or broken fasteners, fatigued springs or cracked welds. To diagnose the source of a dead spot, check for damaged or compromised components such as springs and fasteners. These flaws can commonly be located directly across (180°) from the dead spot. To eliminate the dead spot, it may be necessary to tighten hardware or replace broken parts or preform a weld repair on a crack or fracture.



HOPPER TRAY DOES NOT TURN ON

1. Check to see if the controller box is receiving power from its power source. If powered, the lights should illuminate. If there is no power at the controller, then inspect the power source.
2. Inspect the coil on the hopper tray

a) Examine the coil gap between the coil and the pull face. If the coil gap is too small or large, the tray will not feed parts. Refer to “setting coil gap” for more information.

b) Determine if there is any vibration coming from the coil. This vibration can be heard and can sound like a “hum”. Remove the coil and hold a ferrous object up to the coil face. You should be able to feel the magnetic force of the coil moving the object.

1. Inspect the electrical wires, connections in the junction box and plug ends for any loose connections.
2. If the coil is not receiving power from the hopper tray controller, try plugging it into the inline feeder controller box to detect if the hopper tray controller is at fault.
3. By default, the hopper tray is always controlled by the bowl level sensor looking at the amount of parts in the bottom of the bowl. If the sensor is dirty, faulty, out of adjustment, or senses that there are enough parts in the bowl, then the hopper tray will not be triggered to turn on.

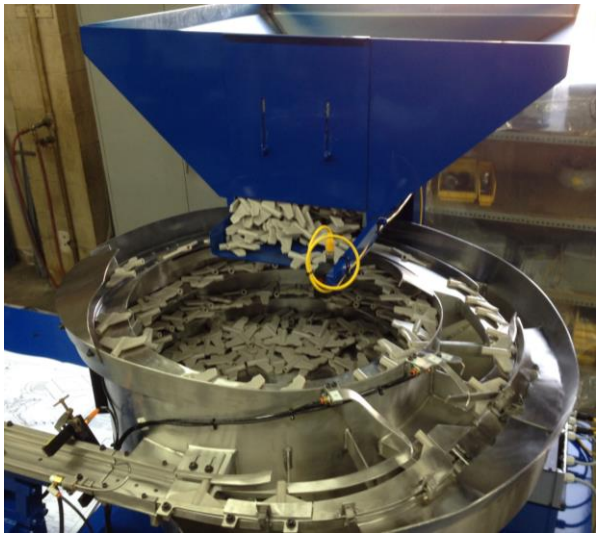
FEEDER BOWL DOES NOT TURN ON

1. Check to see if the controller box is receiving power from its power source. If powered, the lights should illuminate. If there is no power at the controller, then inspect the power source.
2. Inspect the coils on the Feeder Bowl

a) Examine the coil gap between the coil and the pull face. If the coil gap is too small or large, the tray will not feed parts. Refer to “setting coil gap” for more information.

b) Determine if there is any vibration coming from the coil. This vibration can be heard and can sound like a “hum”. Remove the coil and hold a ferrous object up to the coil face. You should be able to feel the magnetic force of the coil moving the object.

1. Inspect the electrical wires, connections in the junction box and plug ends for any loose connections.
2. If the coil is not receiving power from the feeder bowl drive controller, try plugging it into the inline feeder controller box to detect if bowl drive controller is at fault.
3. By default, the feeder bowl is always controlled by the high level part sensor of the inline track. If the sensor is dirty, faulty, out of adjustment, or senses that there are enough parts backed up the length of the track, the feeder bowl will not be triggered to turn on.



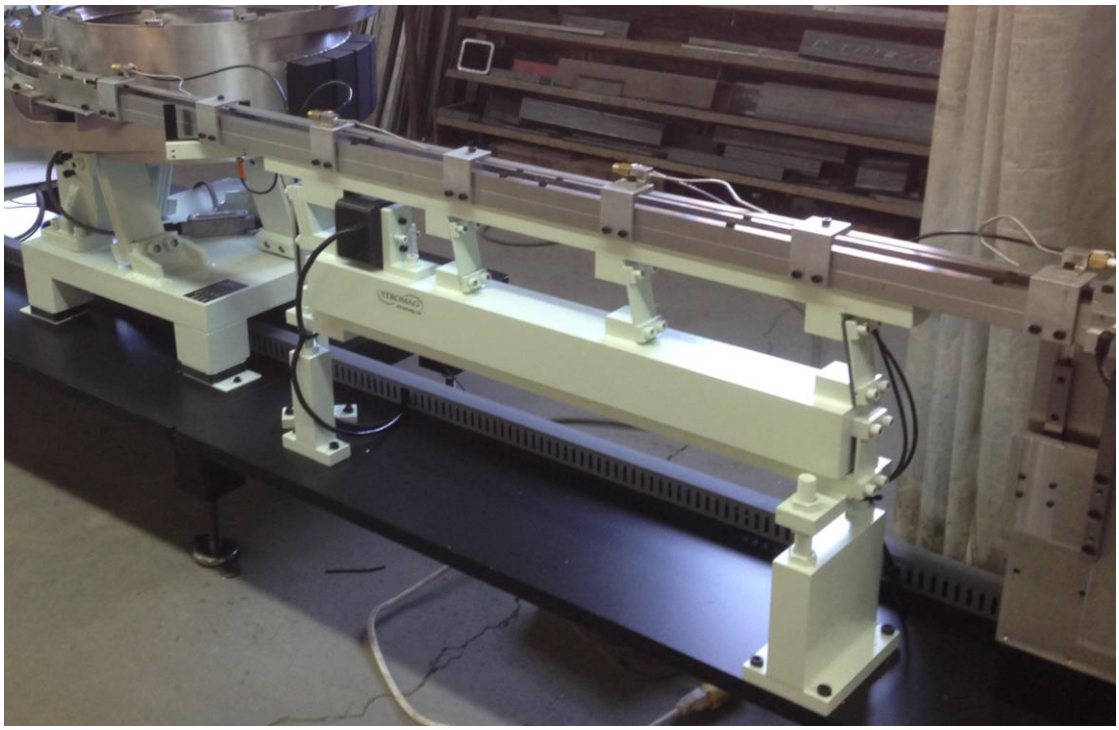
INLINE TRACK DOES NOT TURN ON

1. Check to see if the controller box is receiving power from its power source. If powered, the lights should illuminate. If there is no power at the controller, then inspect the power source.
2. Inspect the coil on the Inline drive.

a) Examine the coil gap between the coil and the pull face. If the coil gap is too small or large, the tray will not feed parts. Refer to “setting coil gap” for more information.

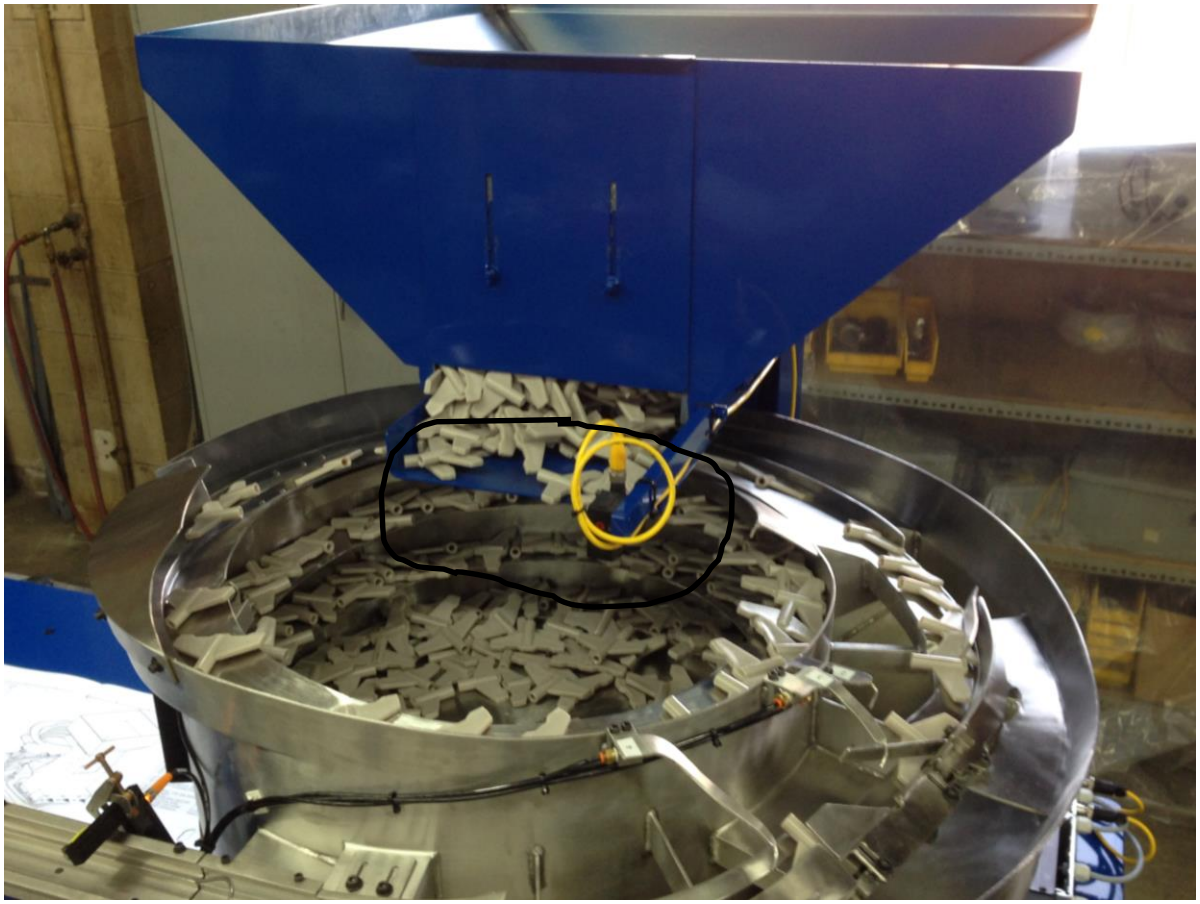
b) Determine if there is any vibration coming from the coil. This vibration can be heard and can sound like a “hum”. Remove the coil and hold a ferrous object up to the coil face. You should be able to feel the magnetic force of the coil moving the object.

1. Inspect the electrical wires, connections in the junction box and plug ends for any loose connections.
2. If the coil is not receiving power from the hopper tray controller, try plugging it into the bowl drive unit controller box to detect if the inline drive unit controller is at fault.
3. By default, inline drive unit is set to always operate. It is turned on and off by the inline drive unit controller box and does not depend on any sensors to cycle on and off.



PARTS JAMMING IN HOPPER

The most common reason parts become jammed in the hopper is due to the opening in the hopper gate. If the opening is too small, then parts will not be able to flow though while the hopper tray is vibrating. By adjusting the height of the gate, more or less space is allowed for the parts to pass through. Some parts that have more intricate geometry can have the tendency to “bridge” over themselves and lock onto one another, preventing the parts from flowing through the hopper. To prevent this, hoppers with flat vertical fronts are used.



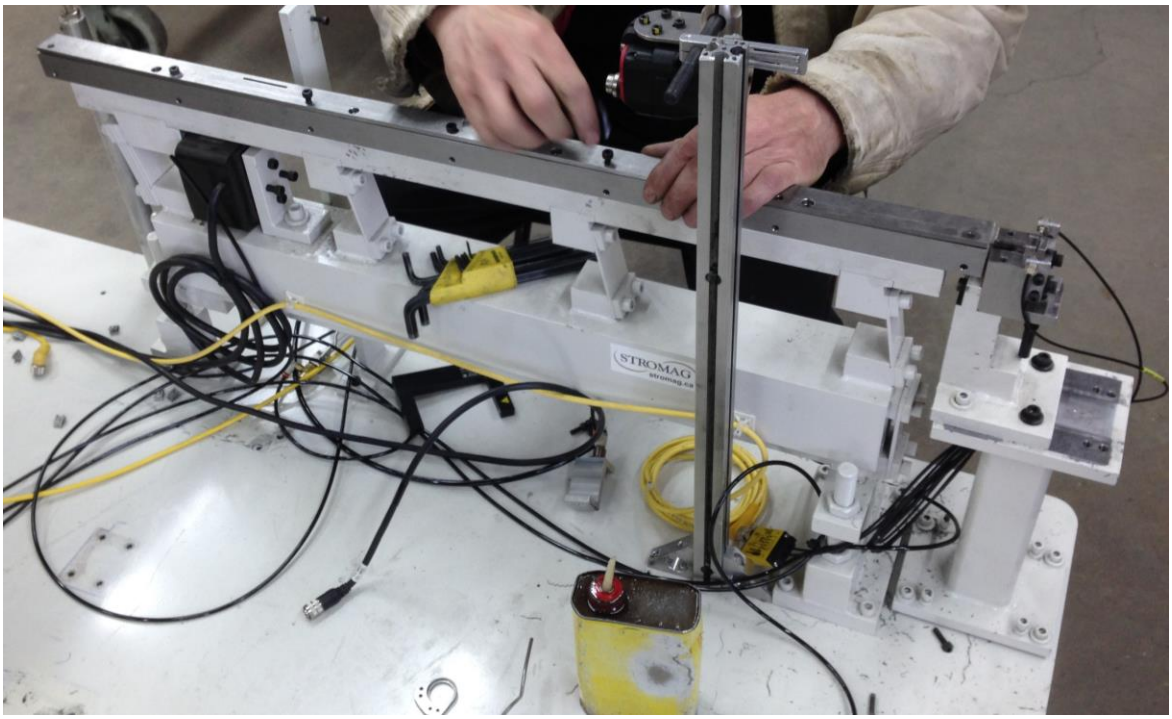
PARTS JAMMING IN FEEDER BOWL

The most common reason that parts become jammed in the bowl is due to overloading the bowl. When too many parts are circulating around in the bottom of the bowl, they can get caught between the internal tracks and not feed up to the top of the bowl. Overfilling the bowl can usually occur if the bowl is being filled by an operator. If the bowl is fed by a hopper with a vibratory tray, then a sensor or cycle problem may be at fault. Parts may also become jammed in the bowl tooling if the air jets have been altered or misconfigured.

CROWDING PARTS ARE GETTING JAMMED

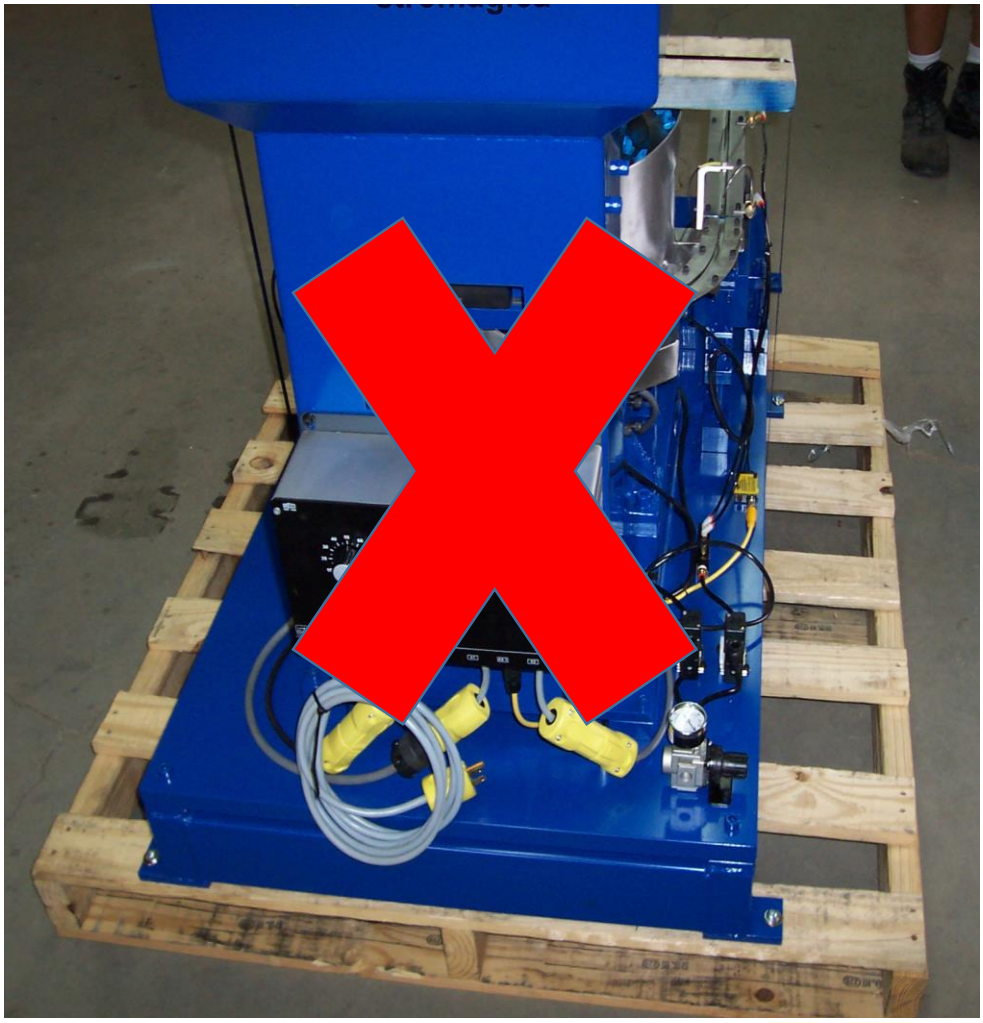
PARTS JAMMED IN THE INLINE TRACK

The most common reasons that parts become jammed in the inline track is because of parts that are not within the dimensional tolerances. Parts that are too large, too small or out of shape will not vibrate within the profile of the track and can become wedged, resulting in a jam. Parts that are not manufactured to the tolerances that the machine was deigned to handle can cause a variety of problems. Parts can also become jammed in the bowl tooling, covers, selectors, standoffs, gauges, ramps etc. Parts that are moulded or cast and have excessive “flash” or protruding seam can also cause jamming and interrupt feed rate.



FOUNDATION

It is critical that every vibratory feeder bowl system is provided a solid and stable foundation to insure maximum efficiency when handling parts. All rubber insulated feet, supports and fixtures should be securely fastened to their intended mounting points with the appropriate hardware.
Anti-vibration feet insure that the unit will preform efficiently and will prevent the machine from “walking”, vibrating out of position.
No vibratory feeder system is intended to operate while fixed or placed on shipping pallets, skids or crates.

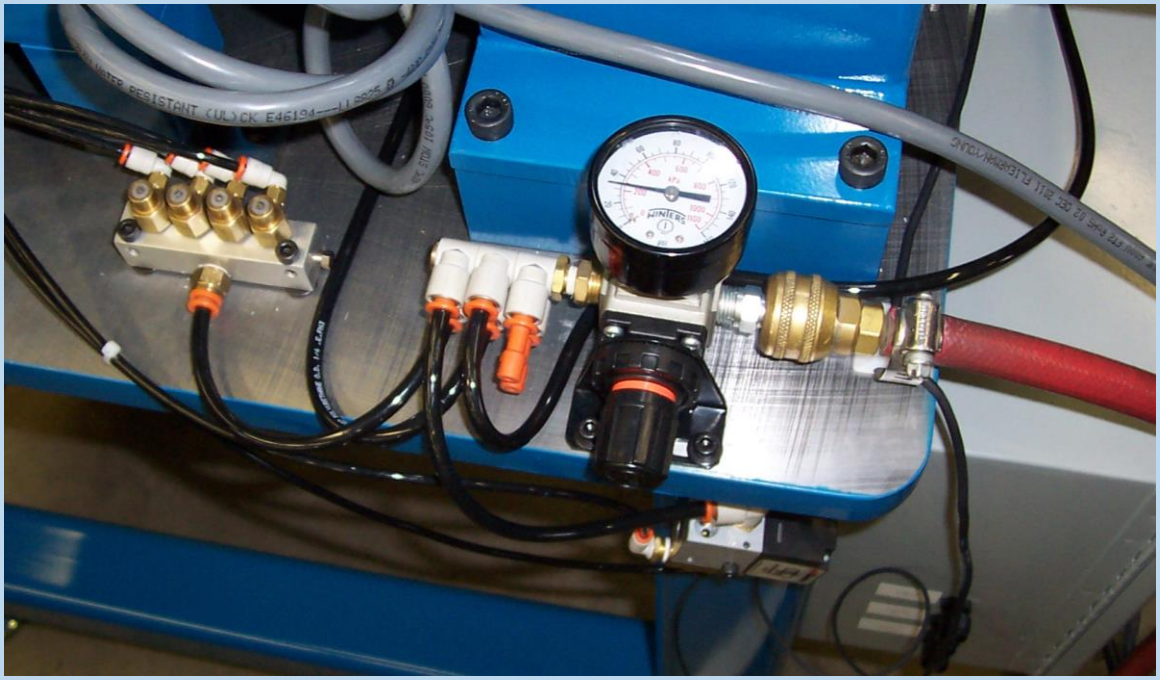


ELECTRICAL CONNECTIONS

Properly connecting every vibratory feeder system electrically is an important aspect to insure proper performance and to avoid damaging the equipment. It should be noted that the electrical components are configured to use either 60hz or 50hz depending on the expected location of the end user. Attempting to operate a vibratory feeder system on voltage other than 120VAC , 60hz (North American) can result in damage. In the instance that other equipment is being powered by the same electrical source as the feeder system, be sure that the voltage is regulated to insure constant and reliable vibratory feed rates.

COMPRESSED AIR

Connecting a vibratory feeder system to compressed air may be one of the easiest tasks when installing a vibratory feeder system. At Stromag, we provide every air equipped feeder with a regulator with an air pressure display gauge. The operating air pressure will be indicated on the regulator or name plate for customer reference. Be sure that the air that is supplied to the vibratory feeder system has been dried and separated from any contaminants.



ORIENTATION AND LEVELING

Make sure that the machine is not interfering with any outside objects or equipment. The area around the bowl and inline track must remain free and clear from any interference.

During installation, it is essential that the machine must be properly leveled to insure proper machine performance. The leveling feet are used in conjunction with a level to adjust the leg lengths.