SPIROL®

VIBRATORY FEED TECHNOLOGY

SPIROL® Series 2000 Vibratory Feed Systems

The Leading Edge of Drive Technology

12" S-2000 drive with Mark VI controller.

Features:

- Variable frequency of vibration independent of the main power frequency
- Independent horizontal and vertical amplitude control
- Phase control of the timing of the horizontal and vertical relationship
- Solid state controller

The Series 2000 is ideal for lightweight parts.

Benefits:

- Adjustable drive angle
- Electronic bowl tuning
- Bowl interchangeability
- Higher feeding rates
- Smoother feeding
- Part separation on track
- Reduced component damage
- Lower noise level
- Increased energy efficiency
- Clockwise/counterclockwise capability

The combination of Frequency, Amplitude and Phase Control with solid state digital electronic circuiting clearly places the SPIROL Series 2000 Vibratory Drives at the leading edge of Radial Drive Technology.

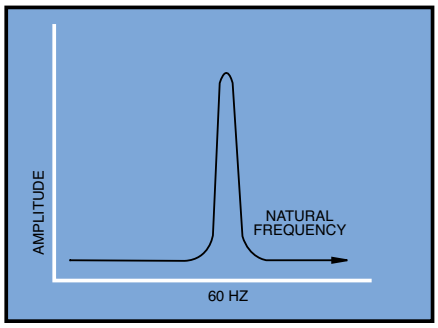
In addition to the benefits inherent from the unique features of the drive, the following features/benefits are also incorporated into the system:

- Reinforced composite springs for optimum performance and longer spring life
- Internal hopper interface
- In-line track sensing capability
- Interfacing capability with programmable logic controllers and computer systems
- Optional automatic feed reverse for a preset period of time–AUTO REVERSE
- Four-button keypad and backlit LCD display provide easy adjustment and fault diagnostics.

What Makes The Series 2000 System Superior?

VARIABLE FREQUENCY

The graph shows a typical response of the amplitude of vibration of conventional drives as the natural frequency of the system varies. Accordingly, the natural frequency must be tuned at or near the frequency of the power source. This is achieved by changing the mass of the bowl or the stiffness of the springs or both. As the product mass in the bowl changes and as the springs relax from use, the performance of the feeder is affected significantly.

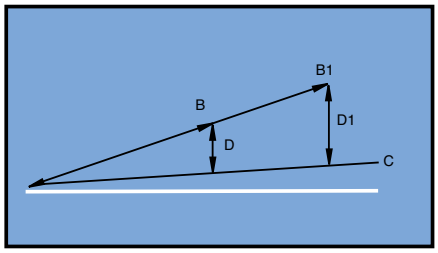


The **SPIROL** variable angle vibratory drive automatically senses the natural frequency of the feeding system and generates drive signals equal to the natural frequency to maximize the efficiency of the feeding system. It is totally independent of the main power source frequency and it compensates for changes in mass and relaxation of the springs. In practice, the drive normally operates at 25 to 35 cycles. Operation at or near the natural frequency reduces power consumption.

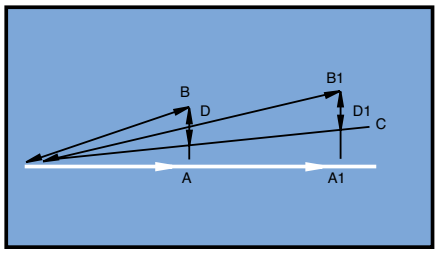
Variable frequency eliminates bowl tuning and makes interchangeable bowls a practical reality. Lower operating frequencies reduce part damage, bowl wear and noise levels.

VARIABLE AMPLITUDE/DRIVE ANGLE

Conventional drives have fixed inclined springs that vibrate tangentially “B”. The feed track of the bowl is at angle “C”. The illustration at left shows the resultant vertical component “D”. This component must be such that the part being fed is airborne while the track is reversing and is in contact with the track during the forward travel. With conventional drives there is only one optimum value “D” and only one optimum feed rate. An increase in amplitude to “B1” to increase the feed rate also increases the vertical component “D1” causing excessive bouncing and inefficient motion.



The **SPIROL** variable angle vibratory drives incorporate a system of vibration angle control. The conventional spring layout has been replaced by two separate sets of springs — one in the vertical plane and the other in the horizontal (radial) plane. The horizontal component “A” when combined with the vertical component “D” results in vibration angle “B”. As can be seen in the illustration, an increase in the feed rate to “B1” does not necessarily increase the vertical component “D1”.

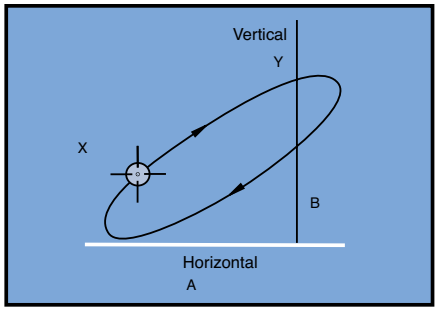


Variable amplitude control allows increased feed rates without excessive bouncing and its negative side effects such as noise and orientation problems.

The electronic amplitude control is also used to maintain a preset amplitude. A sensor located in the drive unit provides continuous amplitude feedback to the controller. As the level of parts in the bowl varies, the controller automatically adjusts power and frequency levels to the drive to maintain amplitude.

PHASE CONTROL

The phase control governs the timing relationship between the horizontal and vertical components of the drives to enable the user to obtain the optimum feed rate and to control the direction of feed. Displacing the phase 180˚ reverses the direction and, therefore, the drives are not dedicated to either clockwise or counterclockwise bowls but can be used for either. The AUTO REVERSE option automatically reverses the feed direction by changing phase for a preset period of time to eject incorrectly sized components or to clear up jams.



Slight adjustment of the phase control produces an elliptical motion of the bowl. The bowl does not return on its forward path but rather returns on a lower path moving away from the parts being fed. The condition is achieved where the parts are only in contact with the bowl from “X” to “Y” thus increasing the suspended motion time and feed rate. The elliptical motion also results in smoother feed characteristics as well as the separation of the parts being fed.

SPIROL® Application Engineering

Application:

A customer wanted to automatically feed and orient synthetic corks while achieving a feed rate of 200 parts per minute at minimal noise levels. Automatically feeding synthetic corks is very difficult due to the sticky film that remains on the cork after the manufacturing process.

A conventional feed system could not meet the customer's performance requirements.

Solution:

SPIROL Engineering recommended an 18" Series 2000 drive unit with a Mark VI dual axis controller along with a 24" fabricated stainless steel, dual discharge bowl with external tooling. The Series 2000 drive is capable of providing more amplitude than a conventional feeder enabling the sticky corks to move along the tracks effortlessly. One challenge was that the corks could not be turned into their final orientation fast enough using the track tooling alone; therefore, an automatic shuttle was designed and equipped with high level part sensing. As the corks reach the end wall of the shuttle, an air cylinder pushes them sideways into the gravity track, effectively converting their orientation 90 degrees.

This system achieved a feed rate of 220 parts per minute, exceeding the customer's expectation by 10%.

SPIROL Application Engineers will review your application needs and work with your design team to recommend the best solution. One way to start the process is to select **Feeder Systems** in our **Optimal Application Engineering** portal at www.**SPIROL**.com.

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