SPIROL®

HIGH PERFORMANCE FEEDER TECHNOLOGY

SPIROL® The Leading Edge of Drive Technology

The combination of Frequency, Amplitude and Phase Control places the SPIROL Series 2000 Vibratory Drives ahead of conventional feeder systems.

12" S-2000 Drive w/ Tooled Bowl

Series 2000 Features:

- Two independent axes of motion, horizontal and vertical, which allows:
  - Independent horizontal and vertical amplitude control
  - Full phase control of the timing of the vertical and horizontal axes of motion
- Automatic load compensation
- Applies the appropriate system vibrating frequency independent of the main power frequency
- Digital controls with touch screen Human Machine Interface
- On-board storage capacity for up to 50 different operating recipes
- Reinforced horizontal axis composite springs for optimum performance and long spring life
- Designed to run at resonant bowl frequency
- Ethernet communication and serial RS-232 interface
- Automatic feed direction reverse capability
- Instantaneous internal safety shut-off for hopper
- In-line track sensing capability
- On board diagnostics and fault monitoring
- Control unit with IP54 rating

Series 2000 Benefits:

- Optimal feed rate achieved by electronic adjustment of the drive angle to match bowl track angle
- Feed rates over 2x faster than conventional feed systems
- Smooth, gentle feed motion eliminates component damage and significantly reduces noise levels
- Bowl interchangeability on one drive
- Handheld control unit allows the user to easily and ergonomically use sight and sound to optimize settings
- Consistent feed rate and performance
- Elliptical bowl motion profile provides:
  - Smooth, efficient part movement
  - Minimizes abrasion of bowl and product
- Ability to completely discharge all product from the bowl
- Reduced power consumption through energy recycling via built in capacitor bank storage
- Clockwise/Counterclockwise capability without the need for mechanical alteration
- User friendly menu navigation
- Web based control, allowing the settings to be viewed and changed remotely.

MARK VI Controller shown with optional handheld control unit and remote emergency stop

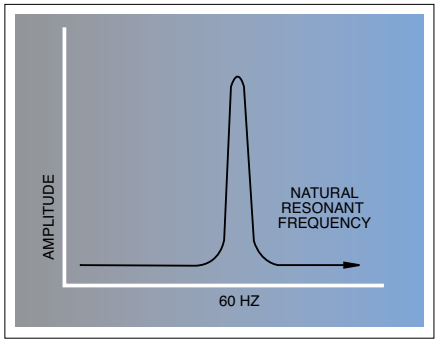
Three sizes to fit a broad spectrum of applications

MODEL	DRIVE HEIGHT INCHES (MM)	DRIVE DIAMETER INCHES (MM)	REACTION MASS MAXIMUM DIAMETER INCHES (MM)	MAXIMUM PAYLOAD WEIGHT	BASIC BOWL MAXIMUM DIAMETER INCHES (MM)
S-2000 12	9.5 - 11 (241 - 280)	12 (305)	15 (381)	60 LBS 27 KG	15 (381)
S-2000 18	9.5 - 12 (241 - 305)	17 (432)	24 (610)	140 LBS 63.5 KG	24 (610)
S-2000 24	11 - 12.5 (280 - 318)	24 (610)	32 (813)	180 LBS 82 KG	32 (813)

Superior to Conventional Feed Systems

VARIABLE FREQUENCY

Graph A shows a typical response of the amplitude of vibration of conventional drives as the natural frequency of the system varies. Accordingly, the natural resonant 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. With conventional systems, as the product mass in the bowl changes and as the springs relax from use, the performance of the feeder is adversely affected.



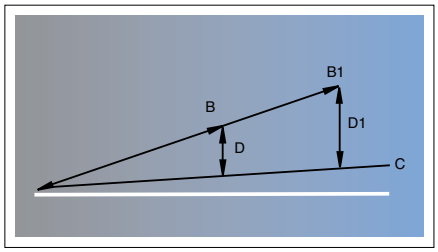
Graph A

The **SPIROL** Series 2000 variable angle vibratory drive automatically senses the natural resonant frequency of the feeding system. Based on this, the system generates an optimal drive frequency to maximize efficiency. 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 resonant frequency reduces power consumption.

Variable frequency eliminates mechanical bowl tuning allowing interchangeable bowls with a single drive. Lower operating frequencies reduce part damage, bowl wear and noise levels.

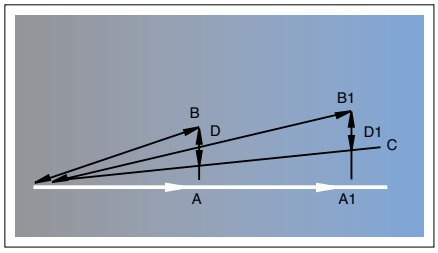
VARIABLE AMPLITUDE/DRIVE ANGLE

Conventional drives have fixed inclined springs that vibrate tangentially “B” when activated (*Graph B*). The feed track of the bowl is at angle “C”. The illustration at right 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.



Graph B

The **SPIROL** Series 2000 variable angle vibratory drive incorporates 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” (*Graph C*).



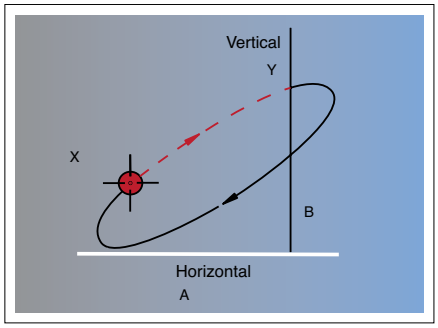
Graph C

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

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 (*Graph D*). 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. A common use of the phase control feature is programming the drive to automatically reverse the feed direction by changing phase for a preset period of time to eject incorrectly sized components or to clear jams.



Graph D

Part in contact with bowl.

Part remains airborn while bowl retracts along elliptical path.

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 results in smoother feed characteristics as well as the separation of the parts. This is crucial to the successful feeding of delicate and light weight parts.

SPIROL® Application Engineering

Application:

An assembler wanted to automatically feed and orient synthetic corks at a feed rate of 200 parts per minute. These corks are very difficult to feed due to the sticky film that remains on the surface after the manufacturing process. Other challenges included noise levels and part orientation.

A conventional feed system would not meet the assembler's performance requirements.

Solution:

SPIROL Engineering recommended an 18" Series 2000 drive unit with a dual axis controller and a 24" fabricated stainless steel, dual discharge bowl. External bowl tooling in combination with an automatic shuttle mechanism was designed to orient the parts into a gravity track. As the corks reach the end wall of the shuttle, an air cylinder pushes them sideways into a gravity track effectively converting their orientation 90 degrees. A high level sensor ensures constant feed flow.

SPIROL's Series 2000 high performance feed system achieved a linear feed rate of 440 inches per minute, resulting in a part feed rate of 220 parts per minute, exceeding the assembler's feed rate requirement by 10%.

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

View the
SPIROL Series 2000 video

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