

# VIBRA SCREW, Inc.

## LOSS-IN-WEIGHT AND BATCH WEIGHING SYSTEMS

*For Solids and Liquids*



**Vibra Screw® Inc.**

# Weigh Feeding

## The Controlled Vibration Difference

Vibra Screw is the only Weigh Feeder equipment supplier to offer a controlled vibration feeder design. This means minimal loss of accuracy during the volumetric refill cycle and unprecedented accuracy in the gravimetric mode. This makes our feeders much more accurate than competitive designs.

Thousands of Vibra Screw Feeders have proven over the years that gentle vibration to assist flow provides extremely accurate and repeatable feed of even the most difficult dry bulk materials. There is no need for paddles or internal agitators that are less effective, complicate the design, and degrade the product.

### How Controlled Vibration Improves Your Operation

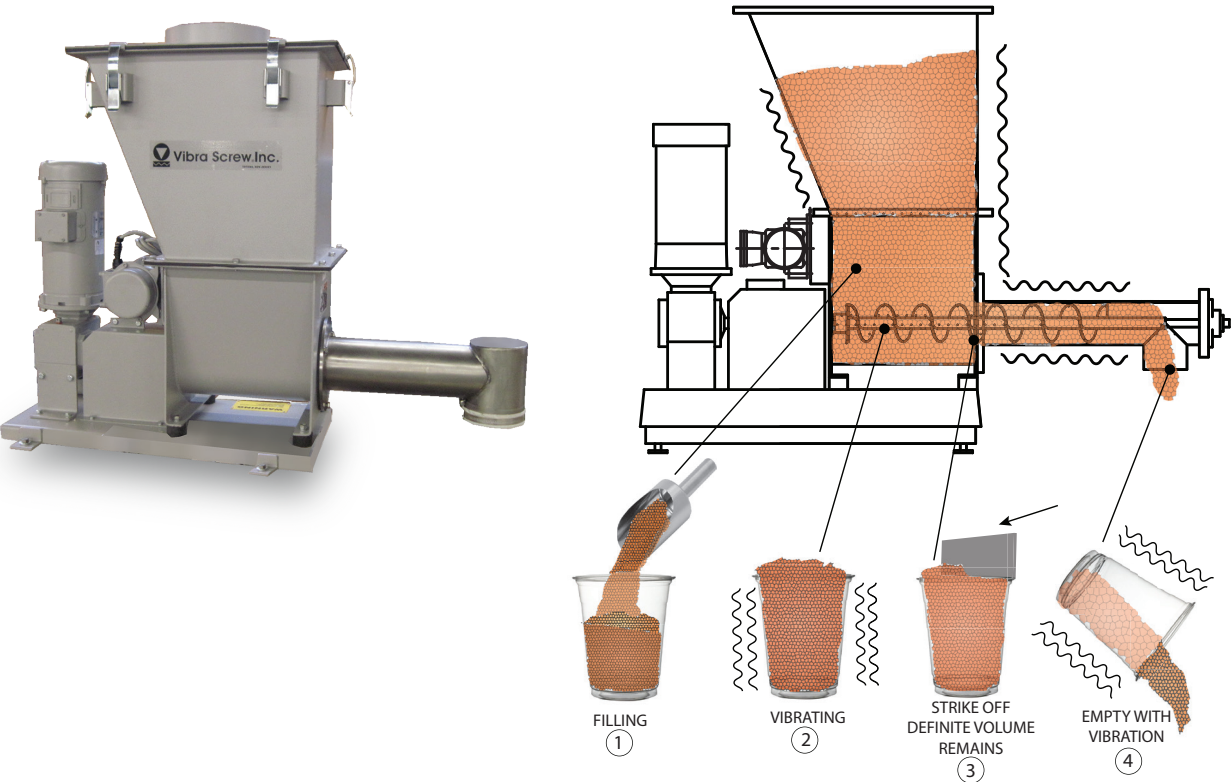
The operating principle of a vibrating Screw Feeder can be compared with the repetitive filling and emptying of cups. Most accurate filling occurs when the cup is filled with material (1), vibrated to obtain uniform density (2), and the excess struck off (3). On emptying (4), vibrating the cup also ensures complete release of the material.

In our vibrating Screw Feeders, the same process occurs. Material fills the screw flights in the trough area

- (1), is vibrated to a uniform density
- (2), and is struck off
- (3) as it enters the metering tube. Vibration of the metering tube and screw
- (4) ensures complete release of material at the discharge end.

Successive weighing of material samples will show volumetric accuracies of  $\pm 1\%$ . The Loss-In-Weight controller easily refines this; providing gravimetric accuracies as great as  $\pm \frac{1}{4}\%$ .

In Batch Weighing, vibration also greatly reduces feed pulsation. At discharge, it produces a precise cutoff of flow at the end of the batch cycle without material overrun. Irregular free-fall of material overrun is the greatest source of batching error. The controlled vibrating Feeder eliminates this error and greatly enhances accuracy.



# CONTINUOUS Loss-In-Weight Feeding...

## How Does It Work

A continuous Loss-In-Weight system includes a supply hopper or tank, a metering feeder or pump, a supporting scale system, and a microprocessor controller. The system electronically balances tare weight so the controller senses only the weight of the material in the supply hopper.

The diagram below describes how it works. At time zero, the hopper is full (high weight) and the operator enters the set point or desired feed rate into the controller.

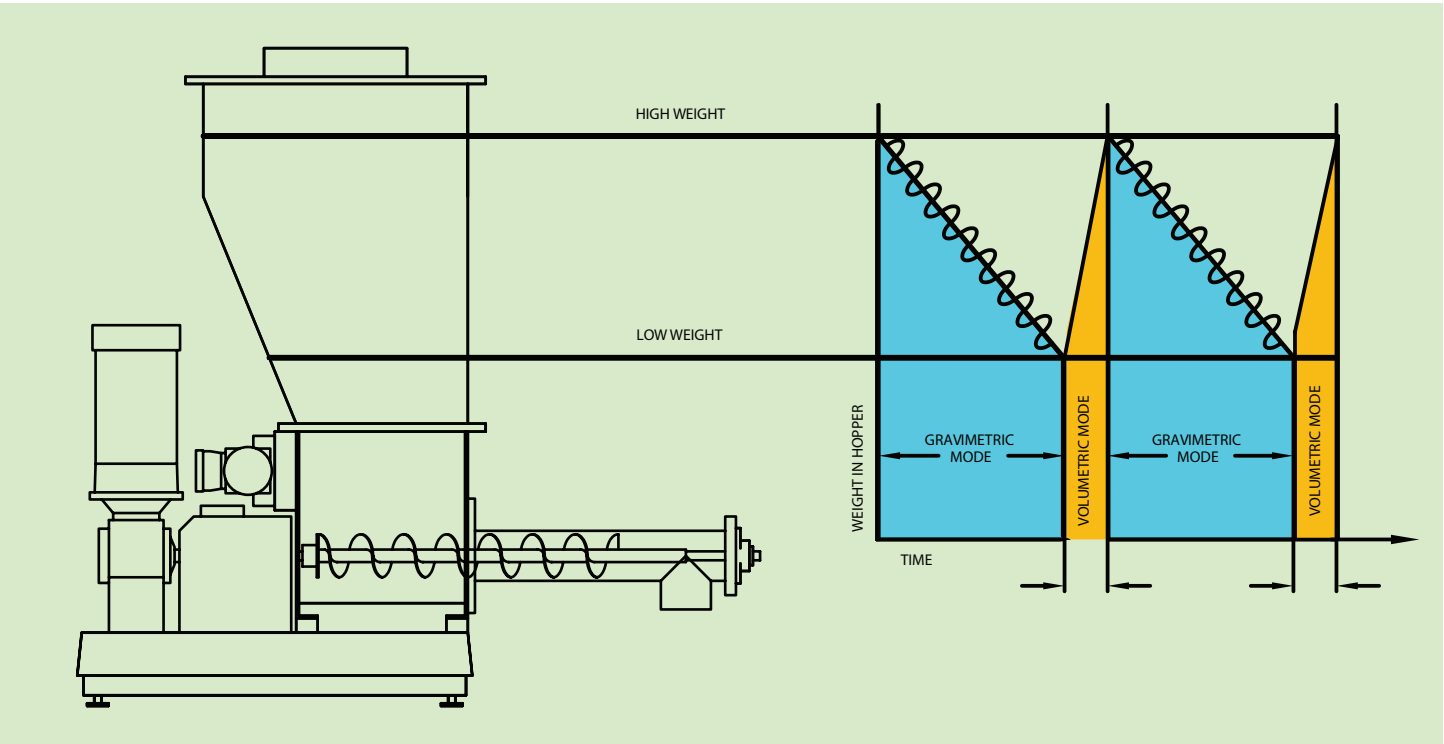
As time and discharge advance, the actual sensed “loss-in-weight” follows the decreasing scheduled weight ramp whose slop is a direct representation of the desired weight of delivered material per unit of time (set point). The controller makes frequent comparison of sensed vs. desired rate and alters the feeder’s output, keeping it at set point.

Once the sensed weight reaches the hopper refill level (low weight), the controller locks the feed system into volumetric control. The hopper is recharged with material, and the loss-in-weight cycle repeats.

The controller rate disturbance mode protects against any outside weight disturbance that might cause an upset and provide the unique ability to manually load the hopper at anytime without disturbing the feed process.

### Advantages of Loss-In-Weight Feeding

- Handles floodable, hot and difficult materials.
- Unaffected by dust and material accumulation
- Works well at low feed rates
- Entire system is weighed. No errors from belt tensioning and tracking.
- Uses only one process input for reduced error in operation
- No transportation lag - entire weight is sensed at all times
- Feed accuracy can always be checked during normal operation, without the need for sampling.



### Highest Accuracy in All Batching Operations

A Batch Weighing system is similar in design to a continuous Loss-In-Weight system. Batch applications do not, however, require the material to be continuously fed with a high feed accuracy. Batch systems are designed to maximize the precision of the final batch weight.

Controlled discharge from storage and non-pulsating feeding of materials are critical for a successful batching system. Vibra Screw's wide range of controlled vibration feeders and material flow aid devices permit superior accuracy in both loss-in-weight and gain-in-weight batching over a wide range of capacities.

The selection of mechanical designs for a particular material is based on our historical database and when necessary, by actual testing in our laboratories.

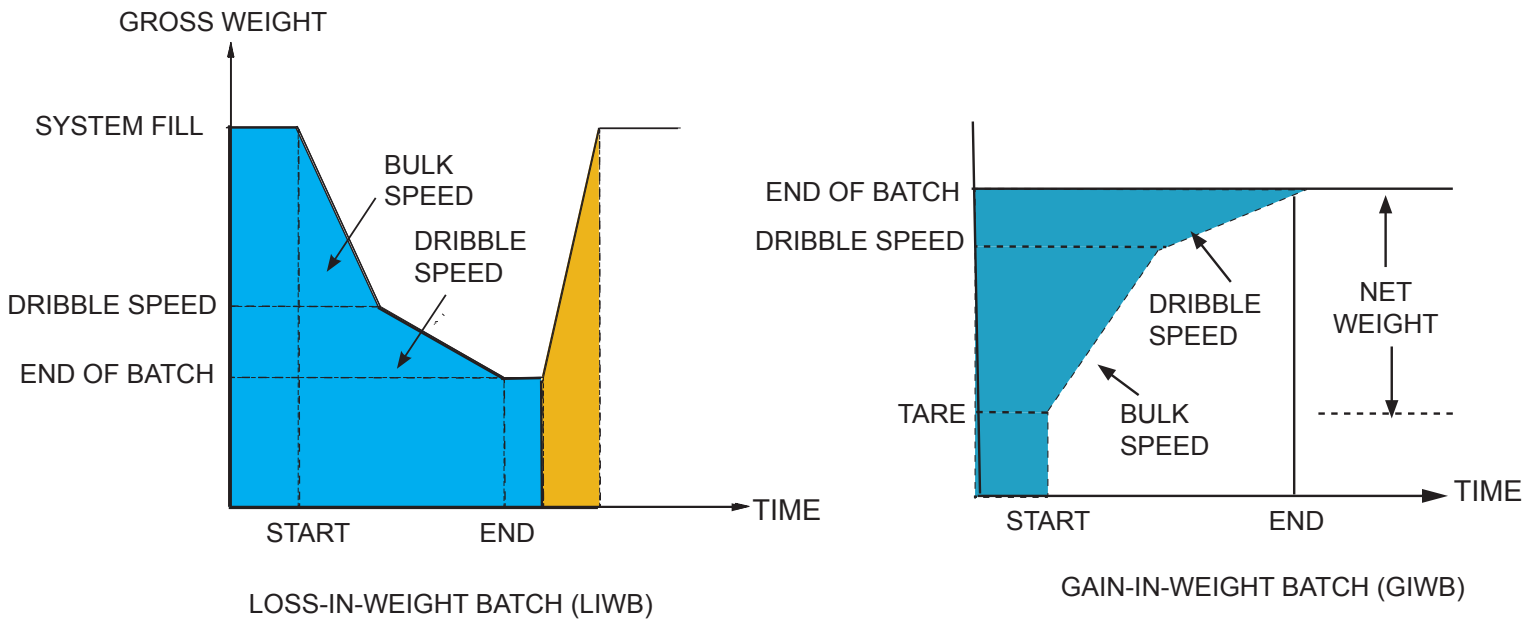
### Batching

Batching is a form of non=continuous gravimetric closed loop control in various types of processes requiring blending of weighed ingredients. The batch system is configured very similar to the continuous LIWC system having two main configurations. The Gain-In-Weight (GIWB) and Loss-In-Weight (LIWB) batch systems. Consist of a feed devise (screw feeder, vibratory feeder or rotary feeder), Scale system, and refill system. As with the LIWC system, the batch system may be comprised of many of the feed and storage/discharge devices offered in the Vibra Screw product line.

### Principles of Operation

In contrast to the continuous LIW system, the batch system uses discrete volumetric rate control instead of gravimetric rate control. The control system in a single speed batch uses a speed potentiometer to set the volumetric feeder discharge rate. This rate will not change for the entire batch.

In a two speed batch, two discrete speed settings are used during the batch. The different speeds function to first bulk feed the majority of the batch requirement and ten finish by dribbling the remaining part. The bulk speed is normally twice that of the dribble speed. The batch controller determines when the system changes from bulk to dribble speed. The weighing and refill system works the same as the LIWC system.

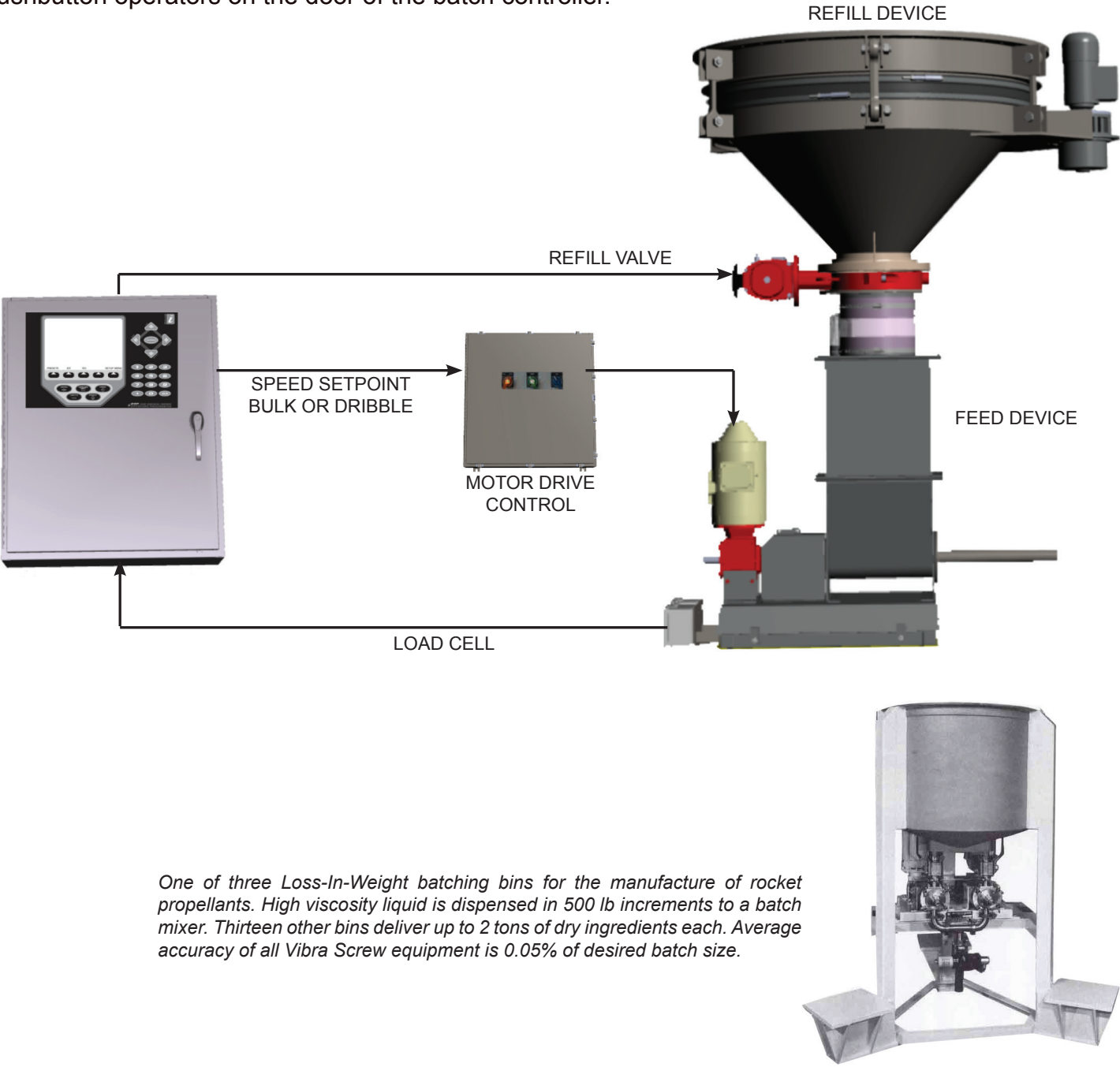


### BATCH Loss-In-Weight Feeding... How Does It Work

Loss-In-Weight Batch System is used when:

- A) The required batch amount is delivered to process equipment which cannot be weighed.
- B) The minor and major ingredients are too numerous or diverse in size to implement Gain-In-Weight techniques.
- C) Simultaneous batching is required.

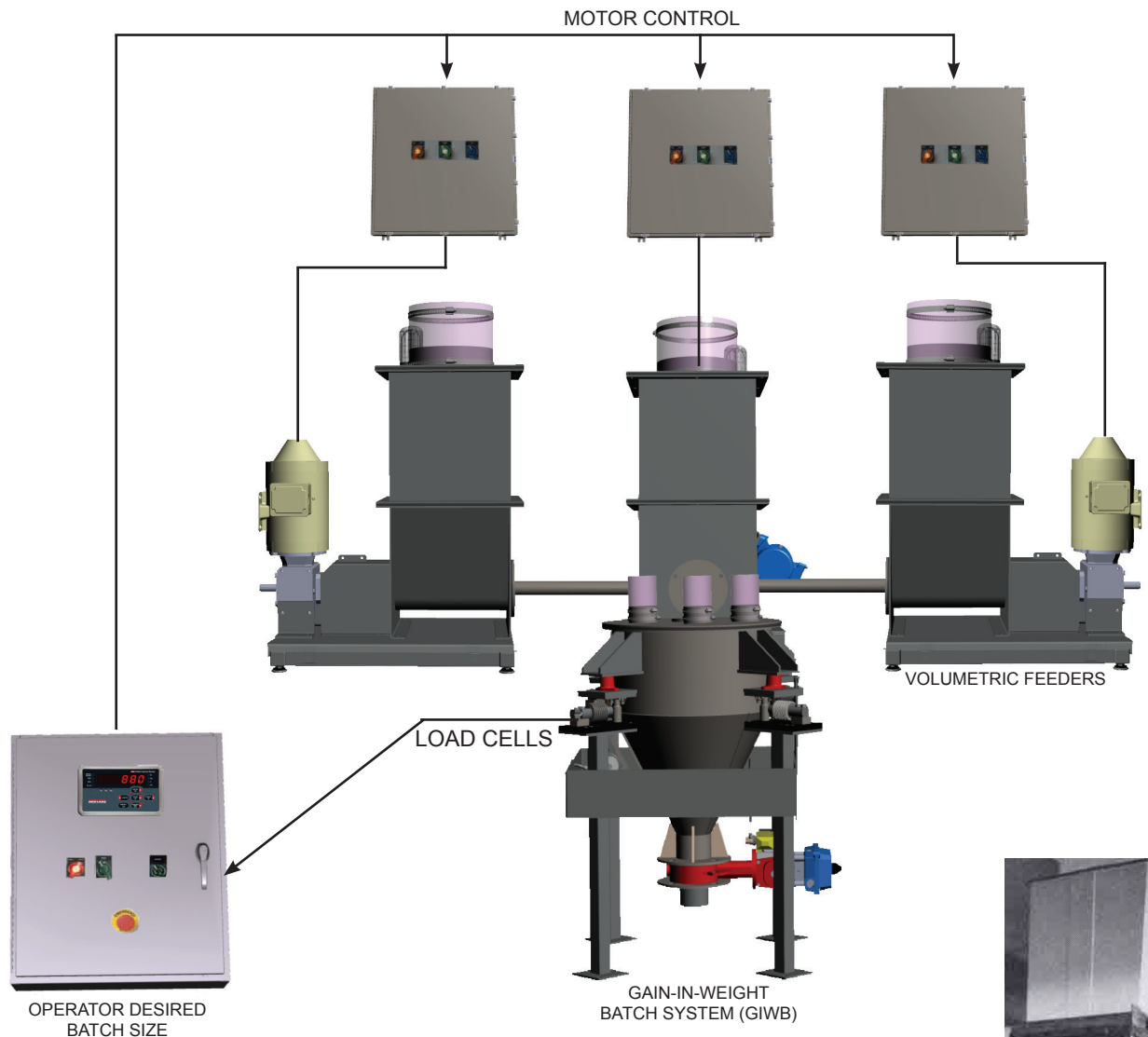
The LIWB system is sized to hold the amount of material necessary to complete the batch requirement without the need for refill. The controller monitors the net loss-in-weight from the last tare, and controls bulk and dribble speeds until the desired batch requirement is met. Refill of the system is performed automatically through the batch controller at the beginning or end of each batch. The batch weight requirements are entered through the keypad of the weight controller. The bulk and Dribble speeds are set via potentiometers on the motor controller. Start, stop and batch interrupt functions are controlled by pushbutton operators on the door of the batch controller.



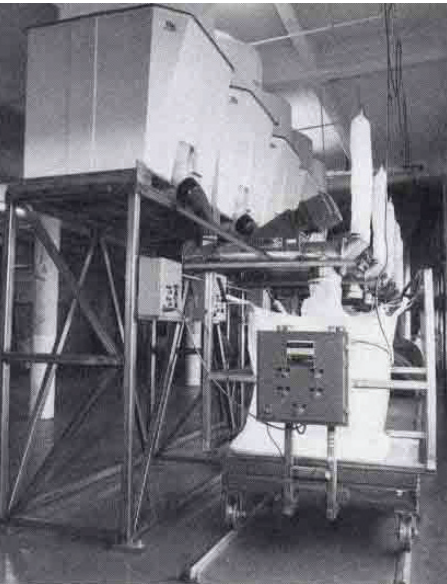
**BATCH Gain-In-Weight Feeding...**  
**How Does It Work**

- The Gain-In-Weight Batch (GIWB) system should be used when:
- A) Several ingredients are required to be batched into a weighed vessel.
  - B) High accuracy is required.
  - C) Small batch sizes will not support weighing the whole system.

The control system for the GIWB and LIWB have similar operation for refill and net change in weight. The LIWB controller automatically refills the batch feed system based on scale weight. The GIWB system must have level probes for automatic refill or simple hand refill . In the GIWB system the controller monitors the gain-in-weight in contrast to net loss-in-weight for each feeder. The GIWB system can control multiple feeders, although will NOT support simultaneous batching.

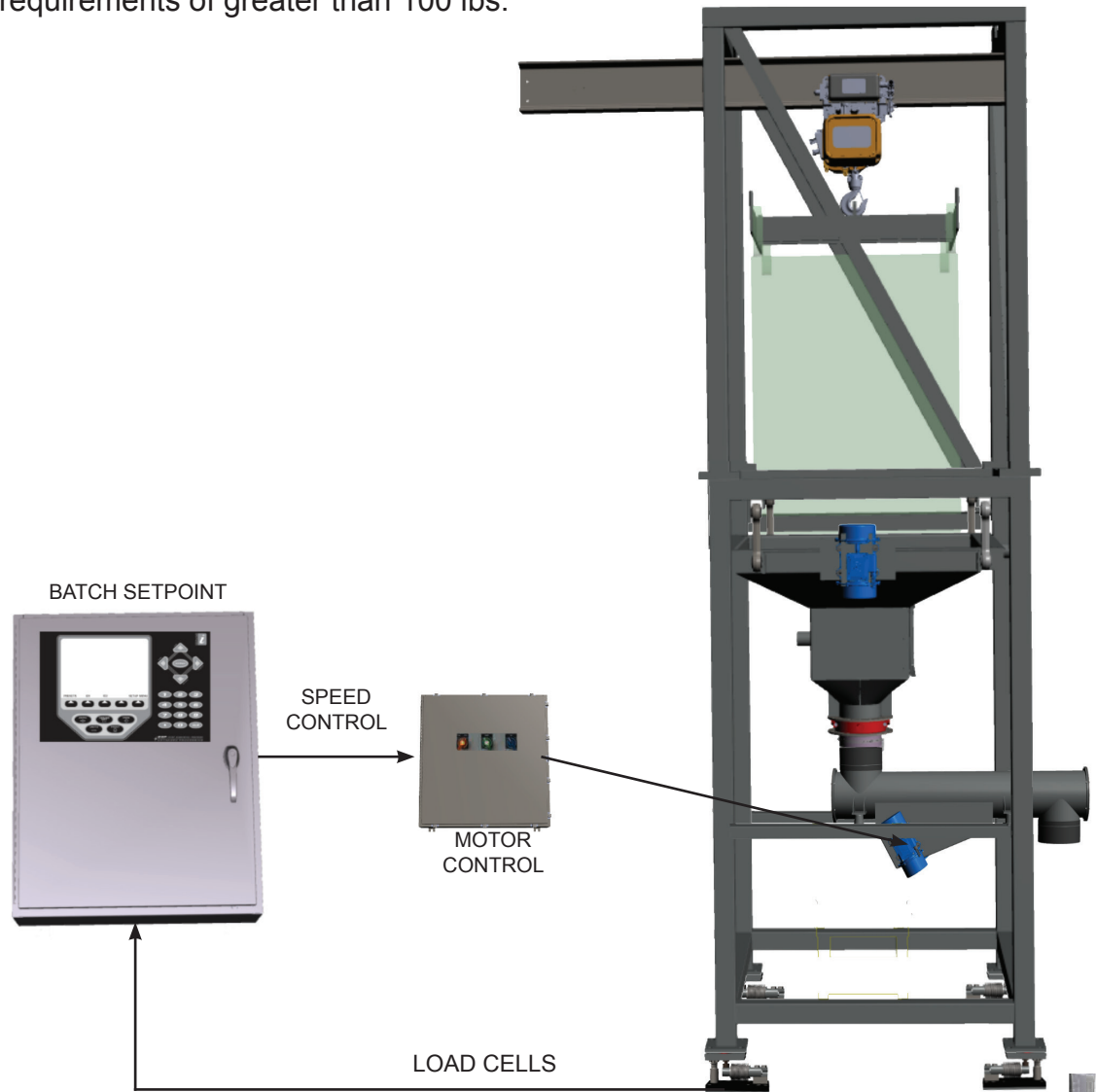


*Gain-In-Weight batching system for prepared food mixes. Five dispensing bins with two speed Vibrating Tube feeders deliver ingredients to a scale-mounted semi-bulk bag (IBC) that moves from feeder to feeder on a track. Each ingredient is weighed into the IBC, and the feed is automatically cut off when the desired weight is reached*

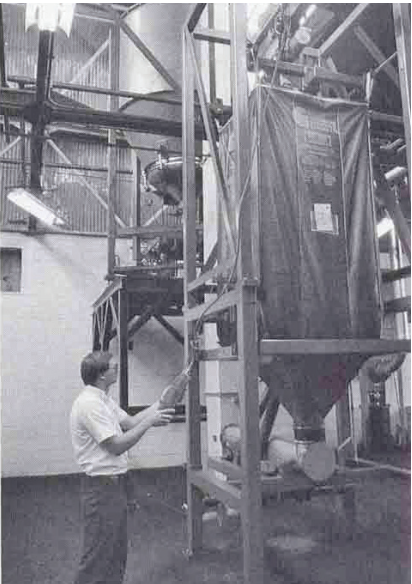


**BULK BAG Loss-In-Weight Batch Feeding...**  
**How Does It Work**

The Bulk Bag Batching system is a Loss-In-Wight Batch type system with one major difference. It allows batch requirements to be grater than one bag of material. The controller uses an accumulated batch setpoint that allows for multiple tares during batch. The feeder runs until a low-level bag is detected. The feeder stops until the bag is changed and the start is pressed on the controller. This sequence continues until the desired batch amount is obtained. This configuration is normally used for large batch requirements of greater than 100 lbs.



*Manufacture of copying machines uses a Vibra Screw Bulk Bag Unloader and Vibratory Tube Feeder on load cells to batch out carbon black to a bucket elevator*



INSTRUMENTATION

Your Loss-In-Weight or Batching System

The Vibra Screw approach to weighing systems combines the latest in electronics technology with 64 years of experience in handling bulk materials. The result is a carefully engineered total solution for your particular needs, backed by a performance guarantee to ensure your complete satisfaction.

Proper weighing demands a full understanding of the physical properties of materials and their characteristics in motion. Too often, suppliers are skilled only in the electronics aspect of the system and neglect the material handling consideration or leave it to others. Vibra Screw is unique in the Industry; combining its own mechanical and electrical designs.

Electronic Controls Boost Accuracy

To keep up with the rapidly expanding electronic technology, Vibra Screw equips its Loss-In-Weight and Batching Systems with appropriate, state-of-the-art controllers from several high visibility U.S. manufacturers. All controllers supplied incorporate user-friendly menu-driven software. Membrane keypads and easy-to-read displays support a revolutionary concept of deciphering actual weight from plant electrical noise.

Controllers provide continuous rate control for both solids and liquids with up to four load cells. And, all controllers meet world-wide metrology standards.



AccuFeed LIW



Mini VersiFeeder LIW



Mini SANITARY VersiFeeder LIW



VersiFeeder LIW



VersiFeeder LIW with static hopper



VersiFeeder LIW with Live Bottom Bin

SYSTEM SPECIFICATION

|                                                                                                                                                                                                                                                             |                                                                                                                                                                     |                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                          |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>CONTACT MATERIALS</b> <ul style="list-style-type: none"><li>• Carbon Steel</li><li>• 304 Stainless Steel</li><li>• 316 Stainless Steel</li><li>• Your specification</li></ul>                                                                            | <b>STANDARD INTERNAL:</b> <ul style="list-style-type: none"><li>• Gray Enamel for carbon steel contact surfaces.</li><li>• Stainless and alloys, uncoated</li></ul> | <b>OPTIONS</b> <ul style="list-style-type: none"><li>• Explosion Proof, special TENV motors, etc.</li><li>• Various supply voltages</li></ul>                                                                                                                                | <b>FOOD GRADE FINISH</b> <ul style="list-style-type: none"><li>• Standard: All internal seams continuously welded.</li><li>• All welds ground smooth.</li><li>• Internal surfaces polished per customer requirements.</li><li>• Food grade gaskets and sleeves</li></ul> |
| <b>EXTERNAL MATERIALS</b> <ul style="list-style-type: none"><li>• Carbon Steel</li></ul>                                                                                                                                                                    | <b>Optional Internal:</b> <ul style="list-style-type: none"><li>• Epoxy Paint</li><li>• Polyurethane</li><li>• Customer Specifications</li></ul>                    | <b>CONTROLS</b> <ul style="list-style-type: none"><li>• Vary by system applications.</li><li>• Contact Factory</li></ul>                                                                                                                                                     | <b>PRESSURE APPLICATIONS</b> <ul style="list-style-type: none"><li>• Feeders can be constructed for pressure applications up to 15 PSIG.</li><li>• Contact Factory</li></ul>                                                                                             |
| <b>COATINGS</b><br>Standard External: <ul style="list-style-type: none"><li>• Gray Enamel</li></ul><br>Optional External <ul style="list-style-type: none"><li>• Epoxy paint</li><li>• Corrosion Resistant paint</li><li>• Customer Specification</li></ul> | <b>DRIVES</b> <ul style="list-style-type: none"><li>• Variable Speed DC 115/1/50 or 60</li><li>• Variable Speed AC 230-460/3/50 or 60</li></ul>                     | <b>LOAD CELLS</b> <ul style="list-style-type: none"><li>• Strain gauge type<ul style="list-style-type: none"><li>○ 150% full scale overload</li><li>○ Operating temperature: -40°F to +150° F (-22°C to +132°C</li><li>○ Repeatability: 0.02% full scale</li></ul></li></ul> | <b>HIGH TEMPERATURE APPLICATIONS</b> <ul style="list-style-type: none"><li>• Special construction of feeders permits use at temperature up to 350°F (177°C).</li></ul>                                                                                                   |

# Keeping Dry Materials Moving

With a wealth of knowledge and experience in the use of controlled vibration to process dry bulk materials, Vibra Screw engineers have devised systems to handle most materials -- probably your material included.

As the leader in dry solids processing, our name is recognized and trusted worldwide in such diverse industries as:

## **FOODS**

Flour, Soy, Meal, Sugar, Vitamin Supplements

## **MINING**

Aggregate, Kiln Feed, Crushed Ores, Coal, Lime

## **CHEMICAL**

Pigments, Additives, Starch, Carbon Black

## **STEEL**

Foundry Sand, Ores, Binders, Ferrous & Non-Ferrous Additives

## **FOREST PRODUCTS**

Chips, Sawdust, Waste-by-products

## **PLASTICS**

Reground, Virgin, Colorant, Talc

## **ENVIRONMENTAL CONTROL**

Filter Aids, Resource Recovery, Lime, Soda Ash, Activated Carbon, Fly Ash, Solid Wastes, Scrap

## **ORDNANCE**

Ammonium Nitrate, Oxidizing Salts, Solid Base Propellants, Ammonium Perchlorate, HMX, RDX

## **AGRICULTURE**

Cattle Feed, Soy Bean Meal, Nutritional Supplements, Mill Feed, Spent Grain

## **PHARMACEUTICALS**

Calcium Carbonate, Aspirin, Sodium Bicarbonate, Ascorbic Acid



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# The Vibra Screw Product Line

**For additional information, ask for literature on the following:**

- AccuFeed
- Batching Systems
- Bin Activators
- Bulk Bag Filler
- Bulk Bag Unloader
- DE Feeder
- Heavy Duty Screw Feeders
- Loss-In-Weight Feeders
- Live Bottom Bin
- Live Bin
- Live Bin Screw Feeder
- Pan & Tube feeders
- Portable Bin Unloader
- Screener
- Storage Pile Activator
- VersiFeeder
- Vibra-Blender
- Vibrating Screens
- Volumetric Belt Feeders
- Weigh Belt Feeders
- Water Treatment Systems

## **THE VIBRA SCREW GUARANTEE**

If your Vibra Screw equipment doesn't perform in the service for which it was sold, we'll refund your money. Ask any other equipment manufacturer to put that in writing.

**No time limits. No conditions.**