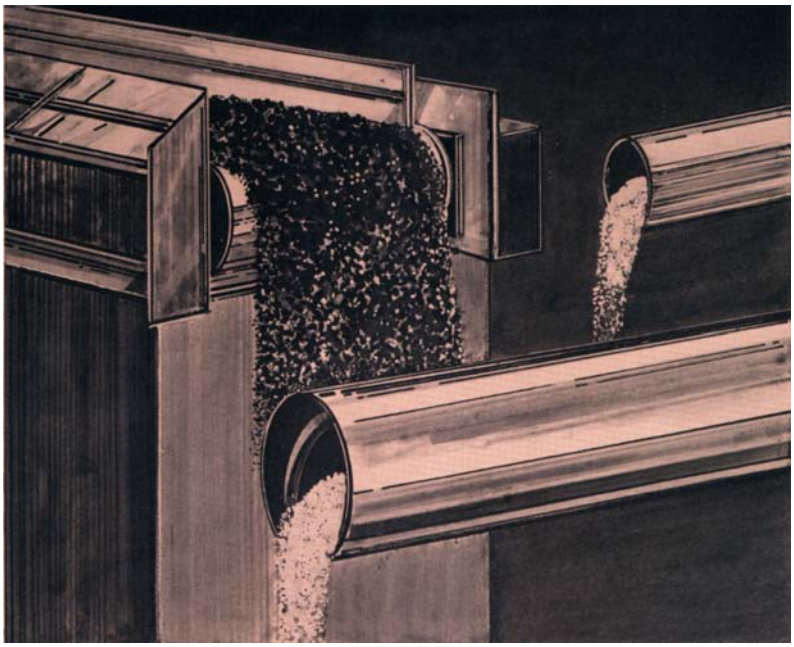
# A GUIDE FOR EVALUATING DRY SOLIDS FEEDING EQUIPMENT



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**When evaluating a dry solids feeder manufacturer, with the intent to purchase equipment, there are a number of factors that should be taken into consideration before making a decision. The following is a list of those items that require careful evaluation.**

## I. SYSTEM DESIGN PARAMETERS

### 1. Feed Rates:

a) Minimum, average and maximum rates are important design criteria which need to be considered carefully when selecting a feeder.

### 2. How will the material get to the feeder?

(Example: manually, pneumatically, live bottom, conveyor, other?)

a) Does the means of filling the feeder affect the product characteristics in any way (densify, fluidize, degrade, etc.)?

### 3. What will the feeder discharge into?

Check for presence of moisture, pressure, extreme temperature, etc., that can possibly affect performance, or cause mechanical difficulties.

## II. TESTING PARAMETERS

### 1. Size of the test unit... as compared to the unit that will be required for the actual intended application (an especially important consideration when evaluating weigh feeders because of the performance differences that may often exist). Feeder performance will not necessarily be the same between two different size feeders of the same model and type.

### 2. Size and design of the test unit:

a) Scale capacity (when a weight-loss type weigh feeder).

b) Hopper size.

c) Metering auger size (or size of another type of feeding mechanism).

d) Feed range capability. Is a mechanical change to the feeder required to achieve the necessary feed range?

e) Ruggedness of construction (for longevity and low maintenance).

f) Quality of construction/design (for durability and long life).

g) Is the drive system directly coupled to avoid maintenance-intensive mechanisms?

h) Are any of the major components manufactured out of materials that are subject to wear, fatigue, discoloration and/or that are not affixed by sound mechanical means?

### 3. Consistency of feed:

a) Materials-handling capabilities and versatility of the selected/recommended equipment in its ability to effectively meter the product or products anticipated for use and normal variations thereof.

b) Metering auger (or other type feeding mechanism) should be full, without any voids, during operation in order to achieve highest metering accuracy. The feeding mechanism must be selected and sized to provide optimum and reliable performance.

c) If utilizing an auger feeding mechanism of sorts, careful evaluation by the manufacturer is necessary to determine the optimum auger design to ensure uniformity and/or smoothness of feed... if this is a desired functional parameter.

**4. Hoppering of material:**

a) Look into the hopper while the feeder is feeding; material should flow uniformly downward without "rat-holing" or bridging. And because product variables and atmospheric variations affect flow characteristics, a reasonable degree of "hoppering" flexibility is a necessity.

b) Volumetric feeders should be tested from full to empty hopper level to check for both hoppering and output changes due to head effect.

**5. Metering auger (or feeding mechanism) speeds:**

a) High auger speeds and/or twin intermeshing augers may minimize pulsations but may also cause other problems such as heat generation, product degradation and/or high horsepower requirements. Careful evaluation is necessary in this area.

b) Other type feeding mechanisms (e.g., vibrating devices and belts) require careful scrutiny for potential drawbacks, particularly with respect to accuracy, short term and otherwise. For example, although product flow may appear extremely uniform, such as typically delivered by a vibrating device, the "visual" appearance of the flow stream can be very deceiving with respect to accuracy. In actuality, the accuracy of feed may not be nearly as good as it looks and/or consistently dependable as the proven short-term performance capability (even one second or less) of a specially designed auger. Therefore, careful evaluation is necessary if extreme uniformity of flow is a specific requirement. Also, evaluate product handling characteristics, including the potential for flushing, bridging, and detrimental head effect problems that can easily affect performance of vibrating and belt type feeding devices.

**6. When evaluating weight-loss feeders, sampling during a refill is an important operational parameter to verify since feed output variations caused by refill-related contingences can adversely affect performance (head effect, flushing, compaction, etc.). Likewise, scale disturbance protection requires careful consideration to ensure that typical in-plant conditions do not affect metering performance.**

**7. Sample time intervals:**

a) When comparing test data between manufacturers, the sample duration (seconds or minutes), type of samples (consecutive or random), and the number of samples, **must be identical for an accurate comparison.**

**8. Accuracy of the unit tested:**

a) How is accuracy verified (method of collecting data)?

b) Does the sampling means, if computerized, encompass any data manipulation or "averaging" (accomplished via hardware or software) that would enhance performance calculations, yet be totally transparent to the observer (i.e., grossly different accuracies between the various manufacturers' equipment on similar type metering devices would typically be an area requiring further scrutiny)?

c) How is accuracy (or error) calculated, and how does it relate to the vendor's written guaranty?

**Note:** The preceding paragraphs (a - c) refer to items that will have an effect on the resultant accuracy of product feed (both short and long term). Therefore, careful scrutiny is necessary before comparing the final overall performance (test results) of the various vendors' equipment.

## III. OTHER COMPARISONS AND/OR EVALUATIONS

**1.** A vendor's experience and capabilities in the specialized field of dry solids metering is extremely important.

**2.** How will a given feeder function in its intended environment?

a) What factors need evaluation in this respect?

3. **Quality control:**

   a) What percentage of the components (e.g., controls, fabricated parts, etc.) are actually designed and manufactured by the vendor?

   b) Is the unit well built and industrial quality?

   c) Does the vendor physically test each and every weigh feeder (with the actual product if possible) prior to shipment?

4. **Via a physical evaluation, does the mechanical portion of the equipment appear to be built to endure in the intended application? What sort of equipment life-expectancy is desired, and does the manufacturer back its' products with a viable and/or an extended warranty?**

5. **Versatility:**

   a) Will the equipment handle probable variations in product characteristics as well as different products? Is this a requirement?

   b) What kind of feed range does the equipment have?

   c) What feed range is necessary?

   d) How easily can the equipment be modified, if necessary, for both feed rate and/or product changes?

6. **Specific parameters regarding the evaluation of a weigh feeder:**

   a) Is periodic calibration and/or adjustment of electronic and/or mechanical components necessary?

   b) Is the control system latest state-of-the-art, easy to use, and a proven reliable device?

   c) What type of overload or shock-loading can the weigh feeder's scale tolerate?

   d) How precise and durable is the weight sensor?

   e) Does the weight sensor require periodic verification to ensure accuracy?

   f) Does the manufacturer require installation of the equipment on a specialty type structure to permit proper operation in typical in-plant environments?

7. **Maintenance/Service:**

   a) How much maintenance can be expected during the first few years of operation?

   b) Does the vendor possess the all-around expertise to cope with any type of operational contingency that may arise (materials-handling, mechanical, electrical, etc.)?

   c) What is the cost for such maintenance?

   d) How well will the unit perform in a tough environment?

   e) What is the availability of spare parts?

   f) What are the typical spare parts and associated maintenance costs per year?

   g) What is the availability of factory-trained and experienced field service technicians?

   h) Is bona fide 24 hour service available (for both technical support and parts)?

8. **What type of warranty does the vendor provide with the equipment, especially with respect to the more critical and costly components?**

   a) Is the warranty realistic?

# NOTES

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