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Bagging and packaging: Selecting a bulk bag filler

Six guidelines for choosing a bulk bag filler

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With an almost unlimited combination of bulk bag filler designs, features, and related equipment to choose from today, you can tailor your bulk bag filling system according to your current and anticipated capacity requirements, safety and plant hygiene concerns, material sources, and other factors. Using the selection guidelines in this article can help you evaluate the available equipment options and choose a bulk bag filler that meets your filling requirements.

选择散装填料容器的六个准则

面对今日市场对散装填料容器组合的设计，特征，及有关设备选择的多样化，您可根据目前及预计生产力，安全和设备清洁，材源，及其它因素的需要去选择您的散装填料器。本文所采用的准则会协助您去准确的评估，从可供选择的容器中，选择一个符合您的填料要求的填料器。

バルクバッグフィラー選びの６つのガイドライン

バルクバッグフィラーの多様な組み合わせデザインと仕様、それに関連した装置がある今日、生産する容量、安全性、衛生面、材料とその他のニーズに応じてバルクバッグフィラー一環をカスタマイズする事が可能です。この記事のガイトラインによりオプションを見直し、適したバルクバッグフィラー選びに役立てることができます。

Seis sugerencias para escoger un sistema de llenado de bolsas de residuos sólidos

Gracias a la casi ilimitada combinación de diseños, características y equipamiento disponible, hoy en día se puede confeccionar un sistema de llenado de bolsas de residuos sólidos que tenga en cuenta los requisitos específicos de capacidad actual o prevista de la bolsa, los de seguridad e higiene en la planta procesadora, el tipo de materiales y otros factores. Las sugerencias propuestas en el siguiente artículo le ayudarán a evaluar las opciones disponibles y a escoger el sistema de llenado que mejor se adapte a sus necesidades.

6 conseils pour choisir une remplisseuse de sacs pour vrac

Il existe aujourd'hui un choix quasi-illimité de combinaison de modèles de remplisseuses de sacs pour vrac, de fonctions et d'équipements complémentaires. Vous pouvez donc adapter votre système de remplissage pour produits en vrac à vos besoins de capacité actuels et futurs, à vos préoccupations de sécurité et d'hygiène, aux sources de matériaux, et à d'autres facteurs encore. Les conseils de sélection proposés ici pourront vous aider à évaluer les équipements disponibles et à choisir une remplisseuse de sacs pour vrac qui répond à vos besoins de remplissage.

Sechs Leitlinien für die Auswahl eines Füllers für Schüttgutbeutel

Bei einer fast unlimitierten Kombination von Befüllern für Schüttgutbeutel, Eigenschaften, und zugehörigen Geräten, die man heutzutage zur Auswahl hat, kann man sein Füllsystem für Schüttgutbeutel sich selbst zusammenstellen, und dabei die derzeitig und zukünftig benötigte Kapazität berücksichtigen, sowie die Sicherheitspläne und die Bedenken bezüglich der Hygiene der Anlage mit einbeziehen, als auch Materialquellen und andere Faktoren. Durch die Verwendung der Auswahlleitlinien die in diesem Artikel beschrieben sind erhält man Hilfe für die Beurteilung der vorhanden Geräteversionen, und damit einen Befüller für Schüttgutbeutel der den Füllbedingungen ihres Unternehmens entspricht.

Exponential growth in the use of bulk bags has spawned an entire manufacturing segment dedicated to producing equipment that not only fills and discharges bulk bags, but offers various degrees of automation and integrates filling and discharging operations with upstream and downstream equipment. As the number of bulk bag filler and discharger options increases, so should your ability to evaluate both standalone equipment and integrated systems against your current and anticipated needs.

The following selection guidelines address the filler half of this equation. They detail the six most important factors to consider when choosing a bulk bag filler that will meet your needs cost-effectively and perform with top efficiency.

1 Anticipate maximum capacity

Start by asking the difficult but critical question "How many bulk bags will I need to fill per week during the service life of my next bulk bag filler?"

Required filling capacities run the gamut, from one bulk bag per week to 20 bags per hour. The maximum capacity you need should influence your decision to buy a manual, semiautomatic, or fully automatic filler. Also consider future capacity requirements: With few exceptions, buying a more costly filler with higher capacity than you need now will be less costly than replacing a filler you outgrow, unless your existing machine can be retrofitted later with performance-enhancing options.

In general, the more manual the filling operation, the more its output can vary. When gauging the capacity and payback of a manual filler against that of a semiautomatic or automatic unit, you need to determine the average pace at which the operator can attach, detach, and cinch bag spouts; remove filled bags; load them on pallets; and conduct all other filler-related operations. When estimating the time allocated to these manual functions, you should anticipate a pace that an operator can realistically maintain throughout an entire shift while avoiding fatigue or injury.

For an extremely low-volume application, such as filling a few bags per week, a basic manual bulk bag filler will maximize your return on investment. Such a filler, as shown in Figure 1, is designed to allow filled-bag removal by forklift and can have two posts (as shown) or four posts that typically support a fill head, hooks for holding the bulk bag loops, and an inflatable spout seal (or collar) to tightly seal against the bag inlet spout and prevent it from collapsing during filling. The fill head usually can be adjusted by a forklift to match the bag height, and the feed chute leading to the fill head typically has a vent port that provides dust-free air displacement during filling by venting the displaced air to a dust collection system. A few equipment options can be added to the manual filler or retrofitted later, including an inflator to expand the bag prior to filling and a programmable scale system with a flow-control valve for filling by weight. If the manual filler's base is equipped with forklift tubes or casters so it can be moved easily, you can avoid the cost of a scale system for the filler by moving the entire filler onto an all-purpose plant scale, as shown in Figure 2a.

If no forklift will be available to remove filled bags from the filler, you can select a manual filler configured with a three-sided base that provides pallet-jack access from the open side, as shown in Figure 2b. This configuration's low profile also makes it useful for conserving height in a low-headroom application.

During the filling operation, the time required to prepare empty bulk bags for filling and remove filled bags from the filler can influence the filler's maximum capacity as much as — or more than — the rate at which material enters the bag. Adding a roller conveyor to the manual filler, as shown in Figure 3a, allows each filled bag to be rolled out of the filling area for spout cinching and pallet and bag removal while another bag is being filled. However, adding the conveyor typically requires a filler with rear rather than center posts and a cantilevered fill head equipped with hooks that automatically release the bag loops. If you think you'll need higher filling capacity in the future, choosing a manual filler configured with rear posts may be your best option today.

Further increasing the manual filler's capacity generally entails adding an automatic pallet dispenser, as shown in Figure 3b. The dispenser further reduces the time required for each filling cycle by automatically placing pallets and slip-sheets onto the roller conveyor upstream of the filling opera-

Figure 1

Manual bulk bag filler

Figure 2

Common manual filler configurations

a. Filler with forklift tubes allowing for placement on plant scale

b. Three-sided filler providing for pallet-jack access

Figure 3

Capacity-increasing options for manual fillers

a. Filler with roller conveyor

b. Filler with roller conveyor and automated pallet dispenser

tion, so that the only manual operation at the filler is loading the empty bag onto it.

To reduce the time required for loading the empty bag on the filler, you can select a semiautomatic filler that automatically moves the bag hooks and fill head to within arm's length of the operator standing on the plant floor. A semiautomatic filler enables the operator to place the bag loops on the bag hooks and connect the spout to the inflatable spout seal in less time than with a manual filler. When the bag reaches its target weight, the filling process automatically stops, the spout seal deflates, the fill head rises to detach from the spout, and the roller conveyor rapidly and safely moves the bag downstream.

2 Evaluate safety and capacity for manual filling operations

With manual and semiautomatic bulk bag filling operations, the potential for operator fatigue and injury can increase with the required filled-bag output per shift, depending on the equipment used. For example, a filler's connection points — that is, the bag hooks and the inflatable spout seal — are often beyond the typical operator's reach, even when short bulk bags are used. But when a roller conveyor is added to the filler, the conveyor's height plus the bulk bag's height plus the length of the bag loops puts the connection points for 120-centimeter-high bags about 2.14 meters above the floor! This requires the operator to stand on a platform, a ladder, or the roller conveyor while straining to reach the overhead connection points and

having to insert hands between the filler's temporarily disabled moving parts. Thus, difficult-to-reach connection points can compromise safety as well as capacity. Both problems can be solved by using a filler equipped with an automatically positioned fill head that moves to the operator at floor level.

Repetitive manual tasks such as placing pallets on a roller conveyor, starting the fill cycle, or releasing bag hooks from the bag loops also increase the potential for operator fatigue, error, and even injury. These are good reasons to use semiautomatic or fully automatic filling equipment for any but the lowest-volume applications.

3 Ensure that the filler contains dust

Even the simplest manual filler is likely to be equipped with an inflatable spout seal to hold the bag inlet spout firmly in place during filling. However, not every fill head has a vent port to send displaced air and dust to a dust collector for filtering and to draw ambient dust from the operator's vicinity as the spout is detached and cinched. For these reasons, it's important to confirm that the filler you're considering has a vent port that will contain dust generated during the filling operation, particularly when your material or plant environment can't be contaminated.

4 Determine whether you need multifunction filling

If your plant fills drums, boxes, or other containers in addition to bulk bags, choosing a multifunction filler can boost production, eliminate the cost of purchasing separate filling equipment for each container type, and reduce the amount of floor space the equipment will require. For example, a multifunction filler can be switched from filling bulk bags to filling drums by moving a drum-filling chute under the fill head. Similar fill-head adapters for boxes, rigid intermediate bulk containers, and other containers are available in various automation levels for these fillers.

5 Match the feed source to your material and filler

A bulk bag filler's capacity, accuracy, and efficiency are often limited by the upstream equipment's ability to feed material consistently and in sufficient volume. Thus high-capacity semiautomatic or fully automatic fillers typically require high-capacity automated feeding systems that feed material from a storage vessel or a plant process into the filler by gravity or via a metering device.

Gravity feeding. Whether your material can be gravity-fed to the filler depends on the material's flow characteristics and whether you have enough headroom to locate a material storage vessel above the filler. The more free-flowing the material, the more accurately its flow can be varied (down to a dribble-feed rate) by a slide-gate or other flow-control valve, which must close at the instant material has filled the bag to a precise target weight. A poor candidate for gravity feeding, for example, is titanium dioxide, which in a gravity feed system may flow first in a trickle, then in clumps, before finally bridging over the flow-control valve.

Metered feeding. To accurately and consistently feed such non-free-flowing materials to your bulk bag filler, you'll need a metered feed system. This system can use any of several metering devices that don't rely on gravity alone to deliver material. Common examples are a flexible screw conveyor, rigid screw conveyor, screw feeder, bucket elevator, pneumatic conveyor, and rotary airlock valve.

Selecting a metered feed system can hinge on the available space above your filler because some systems — such as one that includes a surge hopper above the metering device or a filter-receiver with a rotary airlock valve — may require more headroom than your plant has. In these cases, one solution may be to use a flexible screw conveyor; the unit's discharge housing can often fit between the plant's ceiling joists and the filler inlet while eliminating the need for a flow-control valve.

If your material is easily aerated, avoid using a pneumatic conveyor as the system's metering device. The pneumatic conveying process can aerate the material to the point that it requires a lengthy densification-deaeration cycle during filling to achieve an accurate bag weight and proper bag stability.

Adding surge capacity to shorten filling cycles. Whether you use gravity or metered feeding, if there's enough headroom above your filler you can add a surge hopper above the machine with a capacity equal to that of a filled bulk bag to reduce filling cycle times while maintaining accurate fill weights. This configuration allows the filled bag to be replaced with an empty one while the next batch is being weighed in the surge hopper. The same idea can be applied in a metered feed system using a pneumatic conveyor; in this case the filter-receiver above the filler can be sized to match the bulk bag's capacity.

6 Comply with sanitary requirements

While any bulk bag filler can be constructed of stainless steel with ground and polished welds for sanitary use, some fillers have designs that don't meet government standards for sanitary handling. For example, such a filler may have holes in its structural steel that allow water to accumulate during washdown or a fill head that can't be easily disassembled, inspected, and cleaned. If your operation must meet the sanitary requirements of a particular government agency or your plant elects to meet those requirements to ensure that your filling operation maintains sanitary conditions, consider only those fillers accepted by that agency. PBE

For further reading

Find more information on bulk bag filling in articles listed under "Bagging and packaging" in *Powder and Bulk Engineering/International*'s article index at www.pbeinternational.com. You can also purchase copies of past articles at the website.

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