

Ask Joe! Column

Rigid IBCs in the Metal Powder Industry

Guest article by Carl Andrews, General Manager, Matcon USA Inc



Introduction

Storing, handling, transporting, and processing of dry solids continues to be a challenge to most industries, especially because of the increasing number of “designer” materials available to process. These new “designer” powders have an increasingly unique role as super carriers, binders, catalysts, etc.

Each powder will come with a certain flow characteristic, shelf-life, and toxicity. With the double-edged sword that official regulation brings, finished components are becoming purer, cheaper, more varied, and have greater adaptability to the market. The trade-off to these advantages is the need to control emissions, improve plant safety, avoid or eliminate dust, and to improve containment and cross-contamination of the product. The controlled containment of powders throughout the manufacturing process not only protects the consumer, the operator, and the environment, but also protects the corporation from law suits and negligence issues.

The Metal Powder Industry is one of the most intense applications where, at virtually every process step, industry-specific material handling technology needs to be taken into consideration. Below are some of the very particular solids handling challenges faced by the Metal Powder processing industry today:

The raw materials:

- The raw product is generally very heavy, requiring any manufacturing machinery to be robust and powerful.
- When handling toxic materials, exposure to the operator, environment and other processes must be eliminated.
- A fully blended product with correct particle size distribution is crucial for the quality of the final component.
- Segregation of blended product during feeding to the press must be avoided.
- Controlled discharge is essential to the performance of the downstream equipment.
- Batch traceability is often required to prove the origin of supply and QA of the final product.

The Metal Powder Industry is divided into three main sub-categories:

1. Metal Powder Producers
2. Metal Powder Converters
3. Metal Powder Custom Reprocessors

Metal Powder Producers

Producers manufacture products that are defined as:

- discrete particles of elemental metals
- discrete particles of alloys



Metal powder producers simply formulate and mix powders according to their customer's request, sometimes modifying product characteristics (chemically or thermally) to enhance the performance of the blend. They also manufacture and refine single product that they sell in great quantity.

The trend in these companies is to extend the value of their supply by offering an increasingly diverse range of mixed elemental metals or alloys. These more specialized products generally do not command great volumes, so they need more specialized manufacturing machinery. Producing smaller pure product batches will require the manufacturers to use smaller, more contained manufacturing equipment. This will include the use of containerized technology (IBCs) and in-bin-blending. There is also the possibility of shipping the finished product directly to the customer's site in the container. This will completely eliminate the need for dispensing into a shipping container, and for the client to dispense back into 'on site' processing containers.

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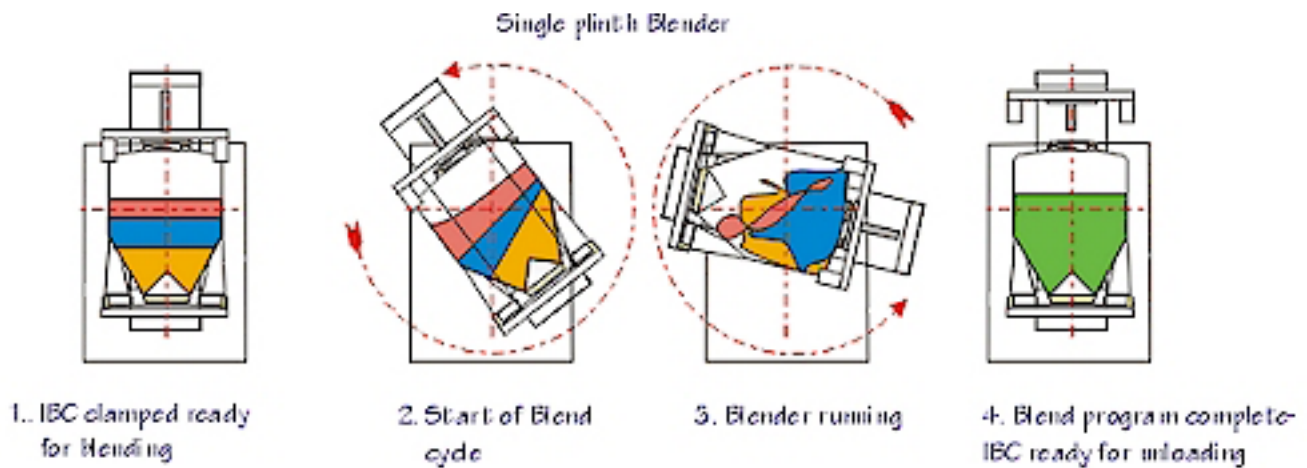
Cross-Contamination & Equipment Handling

IBC technology offers a modern say solution to the problems that affect storage, transportation, quality, efficiency and containment.

- Product flow is promoted, by pushing up the cone to displace product prior to discharge.
- "Mass Flow" is initiated to minimize the risk of particle segregation by providing an 'annular' gap through which the product flows.
- Robust design with no mechanical parts eliminates breakdowns.
- Storage space can be minimized with the use of square IBCs in place of the more common round containers.
- For in-house blending, square containers offer a far more efficient in-bin blending container. Faster and better mixes can be achieved by using eccentric end-over-end tumbling of a square IBC.
- When combined with a discharge station the system can be used as a batch feeder, pulsing predictable shots of material down to the process.

Metal Powder Converters

Metal powder converters take the product as supplied by the metal powder producers and convert the raw product into component parts. Components are pressed into shape then sintered to give the finished characteristics as demanded by their clients. At this stage the converters are at the mercy of the raw product quality. Poor blended product, incorrect dispersion of elements, or off-spec product will translate into scrap finished components. 'Goods in' quality control can and does sometimes pick up poor product by the measurement of weight or density, but internal transportation, feed mechanisms and storage all contribute to stratification, segregation and in some instances damage to the product.



This part of the industry is probably the fastest growing at the moment - better alloys, smaller particle sizes, and industrial innovation are all pushing this section of the industry to diversify its product offering.

Today there are on average 17 lbs of pressed metal parts in an American built car engine, as compared to Europe where the average is about 8 lbs. This disparity is due to the thought that pressed parts can not take the extra stress that smaller, higher capacity engines, which rev higher and have conventional gearshifts, would impart onto the components. Gearboxes with auto shift exert far less stress onto gears than their equivalent stick shift gearboxes. By 2008 the average weight of pressed metal parts in a European car will be in excess of 17 lbs and the US will increase to 24 lbs. This acceleration in the amount of total components is being brought about by better alloying and better product quality at the press.

To ensure this quality, component manufacturers are employing techniques in-house to improve the quality of the raw product. They are re-blending in house within the process IBC, then taking it direct to the press-feed point. They are using IBCs with cone valve technology to ensure that the product remains in a blended condition all the way down to the shoe. They are also purchasing product from local custom formulation houses that focus only on formulating and blending special product for local delivery.

High Value Sintered Product Manufacturers

These companies make cutting tools, pharmaceutical pieces, aircraft supplies, and defense equipment. Most of the time blending of the ingredients prior to final processing is done in- house. In-house formulation, thermal treatment, milling, blending, drying, classifying and sintering are all process steps in this high value production environment.

IBCs are ideal, as they offer the ability for material traceability and containment throughout a wide range of process steps. Although batches are not traditionally large, the bulk density of the product requires a rugged and durable container. IBCs fit the bill, and are perfect for moving product to and from the process steps.

Shipping a blended product in an IBC becomes an attractive option when the specific product is either toxic or expensive.



Low Value Sintered Product Manufacturers

These manufacturers represent 80% of the total industry but they only represent 20% of the revenue.

They typically supply the Auto Industry, sometime running presses marginally above cost to keep up with volume. A saving of 2¢ per pound of their process powder is a substantial saving, as they run batches consisting of millions of units. These manufacturers receive blended powders and commonly do no major formulation on site. Product is delivered in shipping boxes (“Bulk-Paks”) or regular fiber drums. From the fiber drum the product is traditionally fed into a crude movable hopper by inverting the drum and manually scooping the product.

- IBCs are ideal as they pulse-feed a small surge of material into a buffer hopper located above the shoe. Using cone valve technology, an IBC can automatically deliver a completely consistent head of product.
- The docking operation and discharge from the IBC is completely automatic and safe. It requires no manual intervention to initiate and will produce no dust when discharging product.

Metal Powder Custom Reprocessors

Custom formulation houses have sprung up to answer the needs of both the component manufacturers and the metal powder producers. They have the ability to respond quickly to the varying demands of the component manufacturers to produce a high quality small batch of specialized product. They also fulfill the need to re-blend or re-grind scrap material, for re-sale back to the component manufacturers.

The metal powder producers can easily ship their product to the customhouses in fiber drums, Gaylord’s or similar, in single product form. Local blending and shipment to local facilities reduces the probability of material segregation during the packaging process at the producers and further stratification during long haul road transport.

These custom formulation houses exist in all industries; they are sometimes called toll processors or custom-houses.

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Welcome to Ask Joe!, a monthly column by our resident materials handling guru, Joe Marinelli of Solids Handling Technologies. Joe addresses the issues that bug you the most. And Joe knows!! Formerly with Jenike & Johanson, Solids Flow and Peabody TecTank, Joe is an expert on materials handling.

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Guest articles for the **Ask Joe!** Column are always welcome, for more information please contact Joe Marinelli directly at his email address: joe@solidshandlingtech.com.

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