MATCON®
POWDERS, HANDLED

CASE STUDY

REMOVE RISK OF HUMAN ERROR
in refractory powder dispensing plant

THE POWDER HANDLING EXPERTS

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A case study comparing the benefits of using rigid IBCs (Intermediate Bulk Containers) in contrast to Big Bags.

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It is common practice for major producers of refractory linings in developed countries to automate the powder batching process

Producers of refractory products face much the same pressure as many other process industries:

- Greater product variation
- Differing Order quantities
- Short Lead times – nobody wants to hold stock
- Cost and margin pressures
- Tighter quality standards

It is common practice for major producers of refractory linings in developed countries to automate the powder batching process, with the majority using big bag dischargers combined with screw feeders in a cluster or linear arrangement.

Their Need

The formulas are often quite complex, typically including multiple different raw materials of varying quantities.

Whilst the approach with big bags works very well for a single recipe, it falls short when recipes vary and the raw material ingredients need to be changed!

It is very challenging, if not impossible, to close off a big bag when it is half empty, which leads to the need to run 'campaign production' in order to use up all the ingredients in a bag. This creates the build-up of excessive finished goods inventory because it is so troublesome to change recipes. If Customers are not ordering with regularity it can mean that stock may be sitting on the shelf for months – which runs the risk that it will lose its value because the client who it is intended for changes their mind or the batch becomes damaged in some way.

A global producer of refractory linings approached Matcon to enquire how a more Lean philosophy could be applied to their recipe batching. Whilst Matcon are probably most well-known within the food and pharmaceutical industries, where we help companies optimise their production flows and improve manufacturing effectiveness, we do have a background in solids handling in heavy duty industries and applications including metal powders, brake linings and construction chemicals.

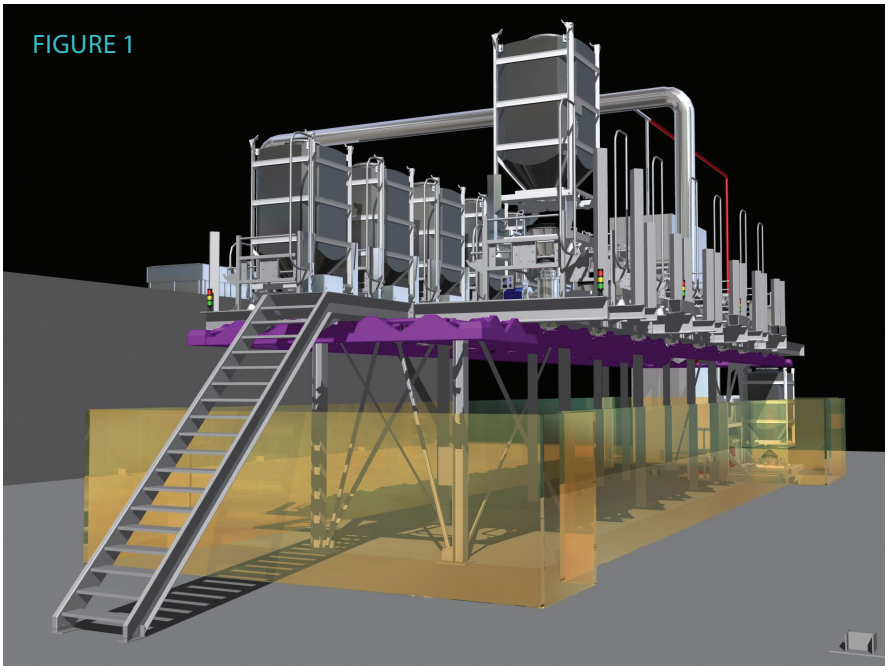
FIGURE 1

The Solution

The combination of very high capacity (several tonnes per hour) and demand for flexibility for this customer was certainly a challenge and novel solutions were required. After detailed consultation with the client, and performing a Conceptual Study, the final design involved creating a circulating track where 'batch containers' are fed from raw material IBCs (Intermediate Bulk Containers) on an elevated framework above (see page 4 figure 1).

Once the concept was defined and agreed, the next step was to validate that the solution would actually work – this was achieved using our full scale testing facilities. As expected, many of the refractory ingredients proved very challenging to handle, which when paired with the clients need for dosing accuracy and high throughput requirements it was indeed a demanding assignment . After several days of testing and optimising of parameters, both parties were satisfied that the proposed system design using Cone Valve IBC technology would work.

As the incoming raw materials were received in big bags, as these are the most versatile and cost effective method of shipping powders between manufacturing plants, it meant that the system design needed to incorporate the big bags being first transferred in full into Matcon IBCs. Each IBC was equipped with Radio Frequency Identification (RFID) tags so that the Manufacturing Execution System (MES) control system could safely guide the operator to select the correct IBC for any given recipe. The raw material IBCs were moved using heavy duty fork trucks.

The design incorporated a number of raw material IBCs sitting on a platform, below which Batch IBCs circulated automatically, collecting various ingredients on demand as instructed by the recipe control system. Once completed, the batch IBC automatically emptied into a mixer. Once empty, the batch IBC returns to the first dosing position for a subsequent batch. Raw material IBCs are removed from the Formulation System when they are empty or when the material contained in the IBC is not required for that recipe batch. By operating in this manner, a smaller number of dosing positions was able to provide automatic dosing for the 75 different raw materials handled at the plant.

The Cone Valve technology within a Matcon IBC was selected for its ability to handle difficult powders and get them to flow, but also for the ability to dose straight from the IBC. An active lifting probe on the Discharge Station docks with the passive Cone Valve in the outlet of the IBC and once fully engaged, high accuracy dosing can be accomplished without any secondary feeder devices such as screws or vibratory feeders (see page 6 figure 2).

The Benefits of a Matcon System

Fully Automated & Flexible

A Matcon Cone Valve IBC system has a number of key benefits which have been proven time and again in many different applications and were shown to be a credible solution for this customer:

• Dust free connections each time a raw material IBC is docked or undocked from the batching system. This keeps the environment clean and free from hazards for the operators.

• Controlled and automated discharge of all ingredients within the IBC. The raw material IBC commences the filling of the Batch IBC on a control signal that initiates the Discharge Station and dosing process.

• Reliable and accurate dosing – even for some very challenging powders. The Cone Valve technology within each IBC helps to prevent bridging and rat-holing and can promote the flow of cohesive powders. Full control of the lift height of the valve gives the ability to dose accurately.

• No need for a secondary feeder – direct dosing from the IBC. This means that raw material changeover can be done simply and a new recipe can be run within minutes of the previous one.

• Cone Valve technology that is robust and has passed the test of time in this tough application.

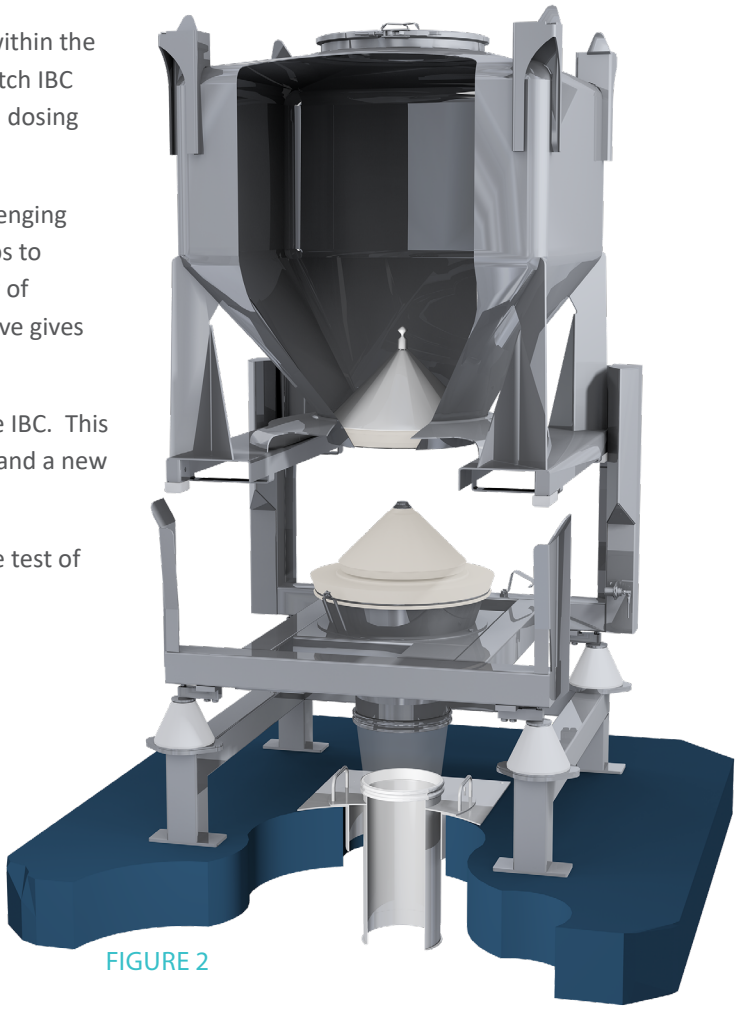

FIGURE 2

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The Results

The system has proven itself for the client who identified and addressed further improvement requirements for the site:

1. The powders being handled tended to behave differently based on their country of origin, the time of year, moisture content as well as storage time. Smart software was applied from day 1 to accommodate all extremes. Some combinations were problematic, but with “self-learning” software, combined with valuable input from the customer they were able to achieve substantially tighter standard deviations.

2. The system was designed to dose >20kg to an accuracy of +/-0.5% or better. In reality, there was always the possibility that a very small amount of powder could be required as a “topup”, as well as a changing demands from the market for smaller inclusions of “speciality” materials. Software improvements enabled such smaller inclusions to be added at very high accuracy levels.

3. The system provides unprecedented flexibility in terms of recipe and ingredient changeover. Time savings in creating batches was also noticeable.

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WHY CHOOSE MATCON

We understand the challenges faced by manufacturers of Chemical products.

YOUR CHALLENGES

No matter what the end product, a common need is for safety, containment, efficient mixing and maintaining blend homogeneity.

The very difficult-flowing nature of many ultra-fine metal powders and friction materials makes them problematic to handle.

HOW WE CAN HELP

A system designed to optimise production flow is what we do. All process steps occur simultaneously for maximum efficiency.

The unique Cone Valve in each IBC protects the blend & provides assured discharge, even on sticky mixes.

In-bin blending reduces downtimes for changeovers, and removes risk of cross-contamination.

IDEX

Material Processing Technologies