

Better Ways to Handle Tablets Using IBCs



In this article, Director of Pharmaceutical Sales at Matcon Limited, considers the benefits and challenges of handling tablets in larger volumes and using IBCs.

Still Handling Tablets in Drums?

It is common to find Intermediate Bulk Containers (IBCs) being used for handling powders and granules in solid dosage manufacturing processes, from initial dispensing through to tablet compression or capsule filling. The benefits of using IBCs for efficient and flexible materials handling at this stage of the process are widely appreciated and applied in modern facilities.



However, when it comes to tablets, these are still traditionally handled in small containers such as drums, small kegs or boxes.

What's Wrong with Handling Tablets in Drums?

Having had the opportunity to visit many different solid dosage manufacturing facilities around the world, I regularly see tablets being handled in drums or small containers. Most often these are plastic drums with liners, used to collect tablets



from the tablet presses, transport them from compression to coating and again from coating to primary packing (blister packing or bottle filling), sometimes via tablet inspection or tablet printing.

In some facilities, tablets have been stored and transported in drums for so long that the reason for using this method has been lost ("we have always done it this way"). In other instances, I have been told that small containers – and particularly plastic drums – were selected due to the low initial investment cost and the concern that larger containers would damage the tablets.

There are however a number of limitations associated with handling tablets in drums or small containers:

1. Efficiency and traceability:

- a. Many drums are required to hold a full batch of tablets – this is not LEAN, as large numbers of drums mean more movements and more manual operations.
- b. Slow and inefficient transfers – when processes are running slow or are stopped because of the way that the tablets are transferred, this directly impacts on the Overall Equipment Effectiveness (OEE) and the productivity of the facility as a whole.
- c. Challenges to inventory control and traceability – as the batch is split in to many small sub-lots.

2. Health & safety:

- a. Manual movement and lifting of the drums – handling all of these small containers means repetitive manual work and the risk of injuries to operators.
- b. Requirement for PPE to protect operator – manual handling and open drum connections expose operators to the tablets and make it necessary for operators to use PPE as a primary containment method.

3. Quality/GMP risks:

- a. Open connections during drum filling/emptying – with a high

risk of contamination and cross-contamination of the tablets.

- b. Manual scooping or tipping of drums – risk of tablet damage as tablet quality is dependent upon the operator handling them with care.

The Advantages of Thinking Bigger...

If larger batches of tablets can be handled in a single container, then this would replace many drums and have significant LEAN benefits:

- Fewer containers required per batch
- Reduced movements of tablet containers
- Reduced number of connections/disconnections
- Less space required for storage of containers (when empty and also inter-process)
- Reduced cleaning requirement

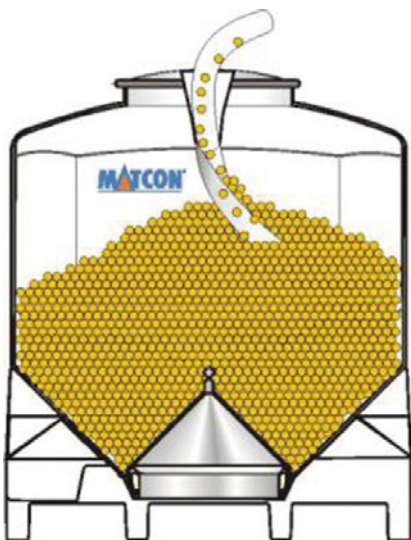
This is possible using Tablet IBCs, which enable tablet batches of up to 750Kg to be handled in a single container.

These benefits are at their greatest when the tablet handling batch size has been optimised to fit the process. Requirements and variables differ from facility to facility; however, the diagram below shows this optimisation concept applied to a 600Kg batch coating process.

In this example, a double-sided tablet press feeds to 2 x 1000L IBCs. Each IBC will receive 600Kg of tablets, which represents a coating batch. After compression, one of the IBCs will feed these tablets by gravity into a 600Kg batch coater and then, following the coating process, the full batch of tablets will be emptied from the coater by gravity into another IBC and taken to packing. As drums require multiple connections and disconnections and significant manual operations at each stage of the process, IBCs need only one connection/disconnection at each point. There is no splitting or combining of the tablet batches, which makes for easy inventory control and product traceability.



Tablet IBC Filling 1 displaying tablet spiral



Tablet IBC Filling 2

In the next three sections we look at the specific use of IBCs for tablet handling at compression, batch coating and primary packing, focussing on the ways in which IBC systems can improve production efficiency, tablet quality and operator safety.

Collecting Tablets from Compression in IBCs

Collecting tablets in drums or small containers means that a complete, compressed batch needs up to 20 - 50 of these units. Each drum filling operation can involve the following activities:

- Collect empty drums
- Add liner
- Connect the liner to the outlet of the tablet press
- Monitor fill level of tablets and change drums when full

- Close the liner
- Place a lid
- Print off a label and attach it to the drum
- Place the drum on a pallet

Carrying out so many operations for 20 or more drums is a very time-consuming and wasteful activity. By collecting tablets in a Tablet IBC of a size that matches the next process step (e.g. coating), then the operating time is reduced considerably.

Of course, for this approach to be successful, the uncoated tablets must be loaded into the IBC without damage. This requires a particular type of Tablet IBC such as the one illustrated. This Tablet IBC has a polyethylene construction and a special tablet spiral to protect the fragile tablets during loading.

Connection with the IBC inlet can be open or closed depending upon the containment requirement. In either case there is only the requirement for one IBC connection/disconnection per batch, as compared with drums where there may be many changeovers per

batch. The result is better protection to the operator (enhanced safety) and better protection to the product (quality/GMP).

Feeding To – and Receiving From – Batch Tablet Coaters Using IBCs

The process of opening and tipping drums into a batch tablet coater is completely manual, time-consuming and often hard work for operators! There are health and safety risks associated with lifting and tilting heavy drums.

In addition, the way in which tablets are loaded into the coater is fully operator-dependent and, as such, there is a risk of tablet damage at this stage.

On the other hand, using a Tablet IBC, the full coating batch is contained within a single container from which the tablets are automatically fed into the coater in a gentle and controlled way. As well as removing manual operations, this approach also enables the tablet coater to be loaded quickly and efficiently.

After coating, the full batch of tablets can be swiftly loaded into a single IBC, ready for movement to primary packing.



IBC feeding to and receiving from Tablet Coater

A significant increase in production throughput can be obtained when utilising full batch IBCs rather than individual drums at this stage, especially when filling and emptying the new, faster film-coating equipment. Because the waiting time of the coater is drastically reduced, the overall coating output can increase by 20-30%.

Using IBCs to Feed to Primary Packing

If the batch of tablets is split across 20 – 50 drums then, once again, there is a requirement for a high level of manual operation to open the drums, open the liner and transfer the tablets to the inlet of the blister packing or bottle filling lines. It is common that this transfer involves manual scooping of the tablets or tipping the drums.

Additionally, the drums are often located and opened up within the packing room itself, which takes up valuable space around the machine and results in a cluttered working environment. The open drums and manual handling methods bring risks to operators and the quality of the tablets.

In contrast, loading the packing line with a single Tablet IBC eliminates the manual handling of drums and tablets and removes open transfers. The IBC acts as a hopper, automatically feeding the tablets to the inlet of the packing line by gravity. As this requires no operator input, operators in this area can then focus their attention fully on the packing process – not on ‘materials handling’.

What are the Challenges with Handling Tablets in Larger Containers?

The two main challenges with handling tablets in larger containers, such as IBCs, are the risk of tablet damage and also the design of the facility to accommodate the use and movement of larger containers.

The Risk of Tablet Damage:

Tablet damage can be in the form of broken or marked tablets. To handle tablets without damage, it is important to design the complete tablet handling system to minimise tablet drop heights, acceleration, impact and tablet crushing. This requires careful consideration of all aspects of the system, including hopper and chute angles, materials of construction and the design of the IBC valve.

In addition, it is important to conduct tests, wherever practical, in order to confirm that the IBC system can handle the range of tablets.

Design of Facility:

Compared to a single drum, the IBC has a larger footprint and inlet height, which can mean that there can be the requirement for additional floor space within the process rooms. In addition, the width of doorways and corridors must be able to accommodate the movement of IBCs.

It is important that materials handling is therefore considered early in the design stage to avoid compromises.

Summary

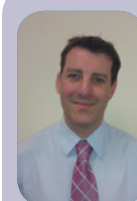
Handling tablets in larger, single containers offers significant benefits as compared to using traditional drums or small containers, including:

- Increased production throughput
- Reduced operator handling time
- Improved traceability
- Reduced risk of human error
- Improved operator health and safety

The combination of these benefits can significantly reduce manufacturing costs whilst improving production efficiency, quality and safety.



IBC Feed to Packing



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