

Lean, flexible and efficient powder formulation, mixing and packing.

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**FORMULATION / SIEVING**  
(manual or automatic recipe batch formulation system)



**MIXING / BLENDING**  
(demonstrating the IBC batch Blender with or without high shear)



**PACKING / SIEVING**  
(Auger type packing machine or direct packing from IBC to bag)

# Lean Powder Processing

## The Key to Survival

as featured in  
UK, Swedish  
Danish &  
Spanish  
Magazines

The trend within the food industry is an escalating variety of similar products on offer to the consumer. We are all world citizens and want the ability to enjoy any style of food wherever we are. The result is supermarket shelves filled with a huge variety of products, creating an ever increasing demand for frequent product changes at the manufacturing level.

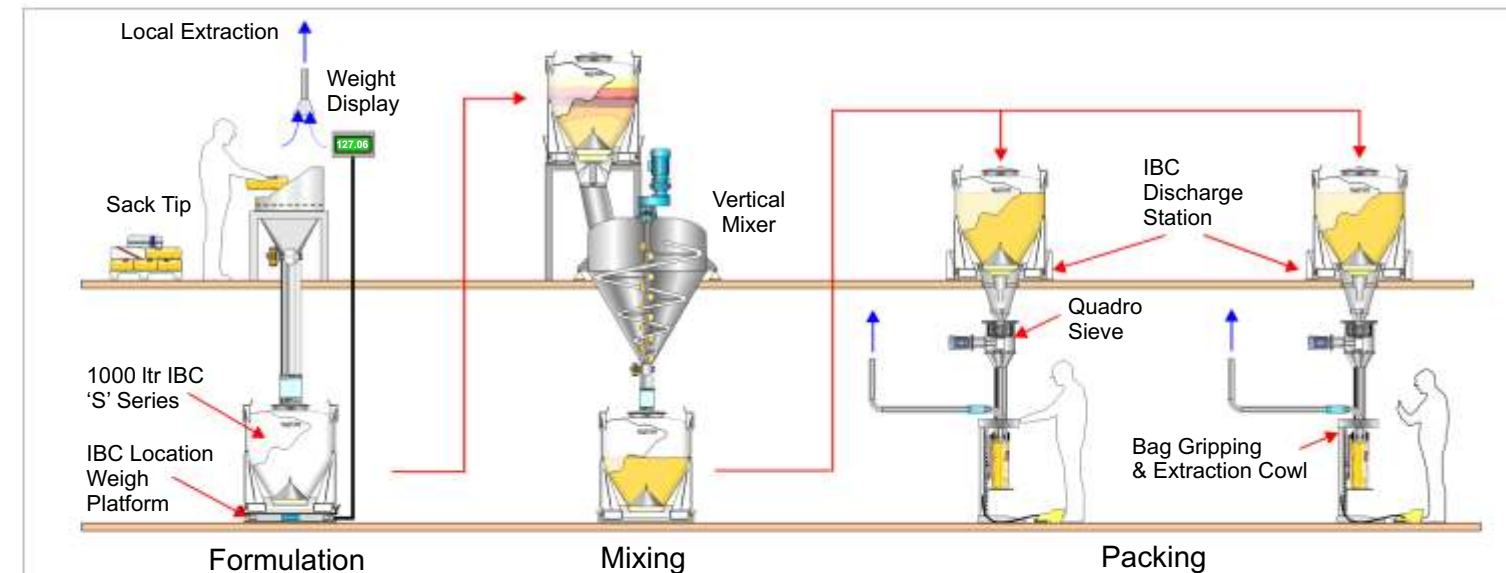


Fig 1: Separating the mixer from Formulation and Packing to improve Overall Equipment Effectiveness (OEE).

Most modern production plants built in the '90s employ a high degree of automation, but few have the ability to switch between product families efficiently. The "conventional" way to achieve greater flexibility is to reduce automation and employ numerous operators for simple, repetitive tasks. The problem with this model is that there are less and less individuals in Western Europe interested in production based jobs. More recently the general high salary levels have encouraged manufacturers to consider moving or outsourcing production to lower cost economies. Such a move however is not easy to realise and manage especially for small to medium size enterprise and the risk of failure is

very high. Ever increasing transportation costs and the environmental impact of shipping produce around the world supports the argument for producing "high variation" goods close to where they are consumed. Maintaining research and development together with production is also more efficient. Significant changes facing food processors over the last 10 years are being generated by increased levels of consumer sensitivity. The most widespread issue is the need to separate potential "allergens" (proteins, egg products, nuts etc) from other ingredients. Increasing ethnic requirements such as Kosher and Halal seriously limits the practicality of using

conventional 'high volume' automated systems such as those adopted in the '90s. It also presents a significant burden in a manually operated plant, as the human factor has to be constantly managed to minimise the risk to product and brand. LEAN production theory offers a superb compromise - embracing sensible automation and providing almost instant change-over times by applying "SMED" (single-minute exchange of dies). There are "smart" manufacturing methods available that when correctly applied bring benefits that far outweigh the apparent (and often non-existent) savings of relocating manufacturing to cheap labour territories.



# LEAN MANUFACTURE IN POWDER PROCESSING

## Waste

In the world of Lean Manufacturing, avoidance of waste is the driving philosophy. The reality for traditional food processors is often the opposite waste everywhere:

1. Overproduction - mixing more than ordered because cleaning is such a burden.
2. Waiting - operators and expensive process machinery standing idle whilst other parts of the process are being cleaned.
3. Inventory - customer requirements for rapid and "next day" delivery resulting in huge finished goods and intermediate goods storage.
4. Defects - from human error or equipment cross contamination causing frequent rework or at worst, risking the company brand value.
5. Transporting - additional transportation to and from inventory storage and between processes to meet 'peaks and troughs' of market demand.
6. Over processing - technology selected on 'worst case scenarios' and applied to the whole as opposed to applying sufficient technology for the application. The 80/20 rule applies in many cases to both process technology and level of automation.
7. Motion - unnecessary movement of people and product between processes due to poor process flow - additional motion being caused by poor plant/factory layout.



Fig 2: "Direct" packing from IBC through sieve to 25kg bags.

The actual and potential cost associated with waste is enormous, leading to higher consumer prices and reduced profitability for producers. Moving the same "wasteful" process to a lower cost economy is not the long-term answer. Smarter manufacturing without waste is the key to sustainable profitability.

## Achieving flexibility and efficiency with modern IBC technology

Many of the answers to the challenges presented to food producers lies in the use of an "IBC" (intermediate bulk container) system. A modern IBC System allows a greater degree of automation, whilst assuring batch traceability with "one batch, one dedicated storage and process vessel". This allows fast product changeover (SMED) and virtually unlimited flexibility to meet market demand without relying on campaign manufacturing philosophies and large process and finished goods inventory. These solutions are by no means new - IBCs have been used for decades, but often had a pretty poor reputation for bad design resulting in dusty and labour intensive plants. The trend shift in the market place has forced most of the significant powder handling system suppliers to focus their development towards modular IBC systems. This has resulted in rapid technology improvements, some of which are described below.

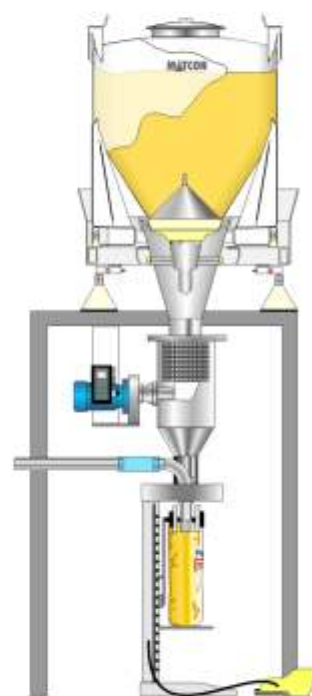


Fig 3: IBC batch mixer with 'high shear' capability.

## Why use IBCs?

The process flow chart shown in figure 1 illustrates how a typical mixer has been separated from both the process of formulating the batch upfront and the time consuming packaging of final goods. In "lean" terms this means that the 'non value adding' operations (cleaning, loading and unloading of the mixer) can be made external, allowing the mixer availability (OEE) to be close to 100% rather than 5-15% which is the norm with traditional "in-line" systems. Along with huge productivity increases, the system becomes faster and easier to clean. It prevents cross contamination and allows full traceability of the batch a major benefit with dramatically increasing product variety and cleaning regularity.

## Final Packaging

Whether packing into 25kg bags for "Business to business" (B2B) trade or into consumer packs, the traditional

focus has been on the number of packs per hour with little or no consideration to the time it takes to clean the line when changing product. Such an approach is practically useless with today's production challenges. Cone Valve IBC solutions can re-fill any packing system without the need of a cross feeder to provide consistent top up. A well designed, complete consumer packing line can normally be wet washed in less than one hour, compared up to a full shift with traditional systems.

There are very significant developments with B2B packing to simplify these systems. It is now

possible to pack "direct" from the IBC without any feeder at all, allowing complete end of line flexibility for minimal capital outlay see figure 2. A system with an integrated sieve can be cleaned in minutes, allowing ultimate efficiency with even the most diverse production requirements.

## Mixing

The benefit of charging and unloading the mixer with IBCs is self evident. Today's trend is to use the IBC itself as the mixing vessel, totally removing the need for "on-line" cleaning, loading and discharge of a fixed mixer. IBC mixing has been used for decades across many industries providing the flexibility benefits described throughout this article. The challenge has always been how to deal with cohesive materials and even liquid addition a significant requirement in the food industry. This has encouraged the development of new 'high shear' capabilities with IBC blending. It pushes the boundaries over fixed mixing technology more than ever. The results of these developments are truly astonishing. Smart manufacturers commissioning a new project are likely to seriously consider the use of IBC mixing because of the wider lean benefits. Along with system flexibility and elimination of 'in

process' inventory, one IBC mixer can achieve 2-3 times the capacity of a conventional fixed mixer, reducing investment cost and space requirements.

## Batch Formulation

Formulating a batch of typically 10-20 ingredients is a very time consuming and labour intensive task. Smaller operations cannot justify investment for automation, but simply try to improve the working environment. Larger manufacturing plants face the challenge of handling hundreds or thousands of ingredients. Whilst Big Bags provide an appropriate distribution package for medium size components they offer limited in-house process / dosing capabilities. With a Big Bag formulation system virtually every product requires its own dosing position no matter how frequently it is being used, making the plant impractical in size and cost (capital and operational).

By decanting Big Bags into Cone Valve IBCs, the same level of automation can be achieved with a 10th of the space and a 3rd of the cost over conventional systems. The "Flexibatch" dosing system combined with smart manual systems for frequently changing micro ingredients can radically reduce the

labour requirement in the formulation area. It also eliminates the risk of human error at this critical part of the value stream.

## Conclusion

Equipment and system suppliers are constantly innovating to meet the challenges faced by their customers. Lean Thinking combined with new technology has the potential to dramatically improve the efficiency and profitability in any business. Faced with the need to cut costs, management teams need to think carefully. Should production move abroad just to take advantage of cheap labour or could existing resources be used to manufacture more efficiently? By adopting a Lean approach with the right technology, improved cash conversion times and reduced wastage could make it more profitable to re-engineer existing plant. But lean manufacturing is a not just a physical change. The message has to be championed from the top to the bottom and with the endorsement of all. Lean is a company wide philosophy, not a departmental project.

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[www.matconibc.com](http://www.matconibc.com)

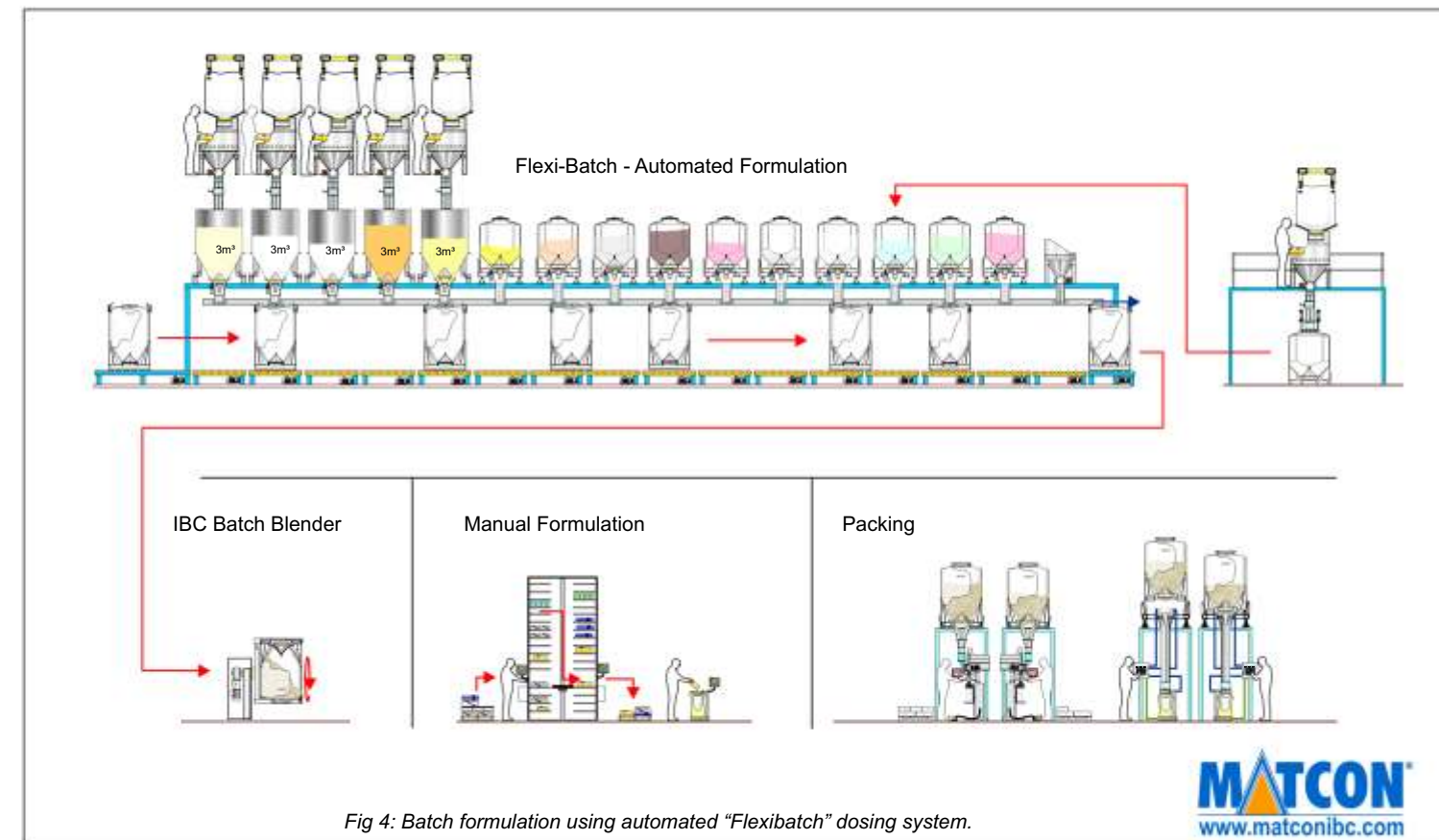


Fig 4: Batch formulation using automated "Flexibatch" dosing system.