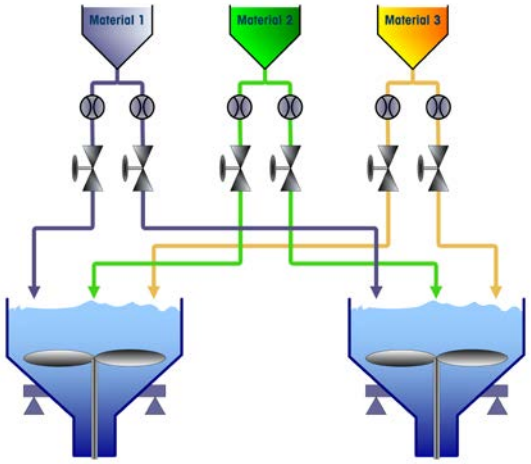
Batching

# Understanding Your Batching System

**Designing a stand-alone batch control solution requires careful selection of components to fulfill unique process requirements. Batch control systems can vary from operator-driven simple manual formulation systems to large integrated automatic batching systems. It can be difficult to determine the best solutions for your business and it might not be helpful to look to larger or smaller batch producers whose operations could be vastly different than yours.**

There is not much information regarding best practices for implementation of batching processes. This is, in part, because many batch processes are producing proprietary or confidential formulations. What should be considered when determining how to implement a stand-alone batch control solution? Following is a list of key application questions to consider when choosing the right batch control system for your needs. These questions focus on considerations for smaller manual formulation and automatic batching systems, which is how most batch processing is handled.

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METTLER TOLEDO

# 1 Application Questions and Considerations

## Your Batch Process

| Application Questions | Additional Considerations | My Notes |
|---|---|---|
| **What are you trying to achieve in your batch process?** | Think about your long-term objectives and what you wish to achieve with this batching system. | |
| **What are the problems you have with your current batch process?** | Think about any issues you frequently encounter. | |
| **What expectations do you have for the final solution you implement?** | Establish clear objectives for your batch system so your supplier understands your goals. | |
| **How many scales does your batch system include?** | Describe each scale in your batch process in detail using your own terminology. | |
| **What is the capacity and resolution of each of your scales?** | Define the capacity and resolution of each scale. | |
| **Do you require new scales in your batch process to increase your batch size?** | Consider any special needs, such as stainless steel, hygienic, bench scales, floor scales, etc. | |
| **How many materials does your process use?** | Create a list of the material used in the batch process. | |
| **Will your batch controller be located adjacent to the scale, or will it be mounted remotely?** | If batch controller is placed where an operator has easy access for data entry and acknowledging commands, it may increase productivity and reduce errors. | |

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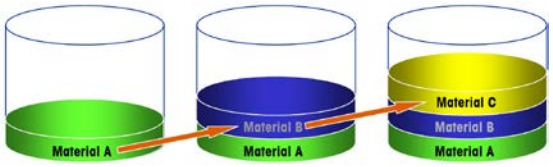
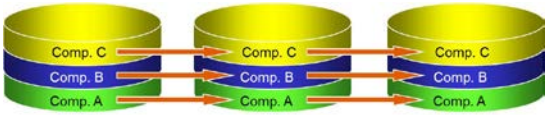
|---|---|---|
| **Do you require the batch controller to be housed in a non-corrosive enclosure that can withstand wash-down?** | Describe the installation environment for the batch controller, including the wash-down area, hazardous area, etc. | |
| **Does your batch process require that your batches run vertically and/or horizontally?** | With vertical batching, one material after another fills a container or vessel until complete. With horizontal batching, each material fills its own container. Examples of vertical and horizontal batching applications:<br>• Vertical batching application<br>  <br>• Horizontal batching application<br>  | |

## Operator Management

| Application Questions | Additional Considerations | My Notes |
|---|---|---|
| **How can you minimize operator interaction in the batch process by implementing an automated material delivery system?** | Consider the entire cost to implement a fully automated batch process, including piping, automatic material delivery equipment, control wiring, etc. | |
| **Do operators miss steps in recipes?** | Providing your operators step-by-step guidance through the recipe will minimize the risk of missing a step in batch production. Evaluate the factors that cause operators to miss steps today. | |
| **Do operators need better guidance through the execution of the batch sequence?** | Evaluate the importance of providing a better method for operator messages or prompts.<br>Consider if the process requires a fixed sequence of events, who's order of execution cannot be changed. | |
| **In case of overfilling a material, does the operator have to discard the batch?** | Evaluate the value of using the re-scaling function to adjust the other material amounts in the correct ratios and save the batch. | |

## Material Management

| Application Questions | Additional Considerations | My Notes |
|---|---|---|
| **What type of feed system does your process use?** | Examples include:<br>• Electric pump<br>• Pneumatic pump<br>• Gravity feed<br>• Vibratory feeder<br>• Auger/screw feeder<br>• Belt conveyor<br>• Bucket elevator<br>• Hand-add material (by operator) | |
| **What types of materials are you feeding?** | Examples include:<br>• Granular<br>• Pelletized<br>• Fine powders<br>• Caking powders<br>• Liquids (all types) | |
| **What method is used to cut off the material delivery for your material feeds?** | Examples include:<br>• Rotary valve<br>• Butterfly valve<br>• Knife valve<br>• Control Gate<br>• Manual valve | |
| **Do you want to improve the speed of your material delivery?** | Determine the importance of filling your materials at a high rate of speed while achieving high accuracy. | |
| **Do you want to improve the accuracy of your material delivery?** | Evaluate how over- and underfilling of materials impacts your per-batch profitability. | |
| **Do you require a two-speed feed material delivery solution?** | Consider the speeds necessary for increased productivity in your system. | |
| **Are there problems with how materials feed into your scale, such as erratic feed rates, clumping of material, etc.?** | Some materials are problematic to feed. If you see any issues with your materials, describe them in detail. | |

## Recipe Management

| Application Questions | Additional Considerations | My Notes |
|---|---|---|
| **Would you prefer that your system is configurable, with a simple interface that allows supervisors or operators to create and add new recipes when required?** | A configurable system will allow you to set up the system to suit your needs, whereas a customized solution will be designed to your specific requirements. Evaluate that additional cost and what you do when your process changes. | |
| **Do you have multiple sites that could benefit from sharing recipes in a common batch control solution?** | If you have a multi-site batching operation, having a common solution could lead to savings in implementation time and training. | |

## Data Collection and Reporting

| Application Questions | Additional Considerations | My Notes |
|---|---|---|
| **Have you collected data about your current batch process?** | Optimized Microsoft SQL Server 2008 R2 Express database loads data quickly. | |
| **Have you collected data about your current batch process?** | Important information to consider:<br>• Cycle time for each batch<br>• Cycle times per operator or shift<br>• Amount of material waste<br>• Raw material cost<br>• Number of batches produced per day<br>• Profitability of your batch process<br>• Maintenance costs and impacts<br>• Number of recipes in your process | |
| **Do you have a reporting system that tells you which materials went into each batch and which operator produced a certain batch of material?** | Look for a batch system that automates the batch data storage. | |
| **If you have a reporting system, is it a manual reporting system that requires the operator to manually enter data into a batch record?** | If you rely on your operators to manually record batch data, consider a batch system that will automatically record batch data without operator interaction. | |

## Tracking and Tracing

| Application Questions | Additional Considerations | My Notes |
|---|---|---|
| **Do you need the ability to print batch tickets as part of your batch process?** | Think about what you print during batch execution. | |
| **Do you need the ability to export the batch history information into a format that would allow you to extract certain parts for uses to update other programs, such as inventory systems?** | The ability to export material consumption history would allow a user to update their Inventory records. | |
| **Do you need to keep track of who creates the batch?** | Logins keep a digital record of users. | |

## Risk Assement for Batching Checklist

| Application Questions | Additional Considerations | My Notes |
|---|---|---|
| **What is the impact of a bad batch**<br>**- for your company?**<br>**- if products reach end user/consumers?**<br>**- for the environment?** | • Cost of raw material.<br>• Cost of disposal for hazardous waste.<br>• Cost for cleaning of contaminated equipment.<br>• Danger to the environment from hazardous waste.<br>• Potential health and safety danger for consumers.<br>• Potential danger for reputation of your brands and your company. | |
| **How likely is it that end-of-line quality control will detect a bad batch before delivery to the customer?** | • Potential health and safety danger for consumers.<br>• Potential damage to brand reputation.<br>• Potential costs for recall action. | |
| **How probable is it, that in-process quality control detects a bad batch before semi-finished products proceed to the next manufacturing step?** | • Avoid adding more value to an already defective semi-finished product.<br>• Material and labor costs of next process step.<br>• Cost for cleaning of contaminated equipment. | |
| **How do you verify if measuring equipment is accurate enough to comply with tolerances?** | • Smallest component of your recipes including tolerances in % and as absolute weight.<br>• Component with the smallest tolerance in % and as absolute weight.<br>• Components that influence character of your products the most including tolerances in % and as absolute weight.<br>• Most expensive components including tolerances in % and as absolute weight.<br>• Hazardous components including their tolerances in % and as absolute weight | |
| **Do you have to consider safety factors to ensure quality and safety?** | • Environmental effects, such temperature changes and vibrations, that might have an impact on accuracy of measuring equipment.<br>• Variations in quality of raw material. | |

# 2 Fulfilling Batch Application Needs

The new IND780batch is designed for any process-based application while maximizing productivity and minimizing operating costs. IND780batch is capable of handling any combination of multi-material filling, manual formulation, blending or dosing simultaneously on four scales without the need of an additional programmable logic controller.

User configurable, the IND780batch allows the ability to automatically fill 42 materials per scale using the patented METTLER TOLEDO material transfer control algorithms. High-speed filling, fast update rates and multiple speed capabilities ensure that the target weights are achieved quickly and accurately with precise cutoffs. Costly overfilling is minimized while the entire system works faster, more efficiently and with a higher degree of flexibility.

# 3 Solution Benefits

IND780batch provides users:

- Improves product quality and consistency
- Guides operators through the batch process
- Automatic batch recordkeeping throughout the production process helps to track and trace when problems arise
- Adds flexibility in your batch process configuration
- Easy to implement batch solution for multi-site batching facilities ensures common configuration and reduces operator/maintenance training window
- Easily manages changes in your batch process by utilizing the included BatchTool 780 configuration software, which allows users to configure recipes offline as the batch system is running
- Built-in reports provide the user with critical batch history information to make informed decisions about their batch process
- Uses ANSI/ISA-88 terminology for global consistency.

# 4 Selecting and Certifying Weighing Equipment

Good Weighing Practice™ is the global weighing standard, ensuring consistent accuracy of weighing processes, applicable to new and existing equipment from any manufacturer. It is a risk-based approach that interprets the regulations of each industry clearly and puts them into a straightforward weighing practice.

It supports users in the following topics:

- Applying a standardized scientific methodology for secure selection, calibration and operation of weighing equipment.
- Providing documented evidence for reproducible weighing results in harmony with all current quality standards in laboratory and manufacturing.

For more information visit:

**www.mt.com/GWP**


# 5 Summary

Selecting the right batch control system for your operations is an important task that not only will impact product quality and operational speed, but also the bottom line. When making such an important investment, it is important to consider every aspect of the batching process to ensure the best batching system is selected for your operation. Few expert resources exist on the topic, but METTLER TOLEDO's application questions and considerations can help you make the best decision.

The IND780batch is a flexible batching solution that fits in any small- to mid-size batching operation, reducing waste and increasing profits with unmatched accuracy and speed.

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