METTLER TOLEDO

Manual Batching 101

A Quick Start Guide

Table of Contents

Introduction

The purpose of this guide is to explain the basic concept of IND780batch, where it can be used and specifically to detail what is required to configure the system to work on a Manual Batching/Formulation application. To start let's review some terminology because it is often that terms are used that can mean the same thing, so understanding what these terms is important, because they are often used by customers interchangeably. For example, a customer may say they need a Filling system, but what they really require is a Batching system.

- **Batching**: From the ISA S88.01 standard: "A process that leads to the production of finite quantities of material by subjecting quantities of input materials to an ordered set of processing activities over a finite period of time using one or more pieces of equipment".

- **Blending**: Combining or mixing two or more ingredients so that the constituent parts are indistinguishable from one another.

- **Filling**: Process of adding material to a container.

- **Dosing**: (Aka **Dispensing.**) The process of dispensing a certain amount of material from a weigh vessel into multiple containers, one after the other.

- **Formulation**: To combine two or more ingredients together in a consistent sequence, including material traceability. (Typically used in the pharma industry, and often means that the materials are added to the scale by hand).

- **Formula, Recipe**: Used interchangeably (defines the necessary information required to produce a specific product).

- **Component, Material, Ingredient**: Used interchangeably.

So what actually defines a manual batching or formulation system? In our case, we're looking for applications where:

- the customer is following a prescribed sequence of steps to produce a product, and

- wants to be able to guide the operator through each step, and

- wants to generate a report when the batch is complete, reflecting what went into that batch.

Operator Intervention and Batching Reliability

Vulnerabilities in Paper-Guided Batching

In most cases the system will be using a single scale, and the operator will be adding the materials to the scale by hand. However the operator could be adding materials by manually running a feed system such as a screw feeder, vibratory feeder, feed control valve, etc. Another great application involves customers who do manual batching in a truly manual fashion – meaning that operators follow a paper document that specifies what to add to the recipe. The operator then also documents the results on a paper batch ticket like the one shown here:

A system like this leaves the process open to errors and, worse, a higher probability that the batch can be missing materials or that critical processing activity, such as mix cycles, were skipped.

IND780batch – Reliable Manual Batching

Having a batch controller like IND780batch allows the operator to be guided through the recipe, step by step, and tracks each step of the process so that a detailed batch report can be generated to see exactly what went into each batch of product (see image below).

Batch Detail Report		Project: Manual Test		Terminal: Brian's 780	
Batch Name: 888800000y0001IN		Order: Manual test		Recipe: 8888	

Step #	StartDateTime	EndDateTime	Phase Type		
	3/9/2012 2:59:00PM	3/9/2012 3:01:15PM	Batch Results	Target Weight: 900 g	
			Delivered Weight:: 902.000 g		Status: Complete OK
1	3/9/2012 2:59:00PM	3/9/2012 2:59:12PM	PHASE_OPER_HOLD Enter User ID		Status: Complete OK
			Entry Value: 77		
2	3/9/2012 2:59:12PM	3/9/2012 2:59:17PM	PHASE_OPER_HOLD Verify Container		Status: Complete OK
			Entry Value: ACK		
3	3/9/2012 2:59:17PM	3/9/2012 2:59:24PM	PHASE_OPER_HOLD Verify Material 1		Status: Complete OK
			Entry Value: 11		
4	3/9/2012 2:59:24PM	3/9/2012 2:59:35PM	PHASE_OPER_HOLD Verify Lot#		Status: Complete OK
			Entry Value: 11		
5	3/9/2012 2:59:35PM	3/9/2012 2:59:54PM	PHASE_MANUAL	Material 1	Status: Complete OK
	Material: 1 - Material 1		Target: 300 g	Delivered: 302.0 g	Tare Weight: 0.0 g
6	3/9/2012 2:59:54PM	3/9/2012 3:00:00PM	PHASE_OPER_HOLD Verify Material 2		Status: Complete OK
			Entry Value: 22		
7	3/9/2012 3:00:02PM	3/9/2012 3:00:16PM	PHASE_MANUAL	Material 2	Status: Complete OK
	Material: 2 - Material 2		Target: 200 g	Delivered: 200.0 g	Tare Weight: 302.0 g
8	3/9/2012 3:00:16PM	3/9/2012 3:00:46PM	PHASE_OPER_HOLD Timed Operator Hold		Status: Complete OK
			Entry Value:		

Page 1 of 2   3/22/2012 11:47:50AM

IND780batch is a flexible batch control system that can be configured to manage a manual batching application. A typical example of this type of system is show in the figure below:

In this example you can see that the application involves the use of a single scale; the operator will be adding the materials to the scale by hand; a bar code reader will be used to scan each material before it is added to the scale; and the IND780batch terminal will guide the operator through each step of the recipe using its color HMI display.

ISA S88 Standard: Elements of a Batching System

It is important to note that IND780batch was designed based on the concepts of the ISA S88 standard. The reason for this is to allow us to utilize defined terminology and concepts of the batching industry, instead of just making up our own terms and concepts. This provides the advantage in that if you run into a customer that is familiar with or using the S88 standard, they will easily pick-up and understands how IND780batch is structured.

Some of the terms you will see and need to understand are outlined below; these definitions are useful but not critical – a diagram included below will offer a visual representation of the relationship between the terms.

- **Equipment Channel Module:** The physical configuration of the Batching equipment – a functional group that can carry out a finite number of specific minor processing activities, such as dosing or weighing. Examples of an Equipment Modules are a **Scale**, a **Flow meter**, and an **Operator Control Panel**.

- **Control I/O Module:** The properties associated with each Equipment Module, including discrete I/O, which comprise the lowest level grouping of equipment in the physical model that can carry out basic control. Essentially a Control module defines the I/O that will be used as part of the batching process. An example would the case where material 1 is fed to a scale via a control valve, and that valve is controlled from Output 0.5.2 in the terminal. This output would be defined as a **Control Module** in the batch configuration.

- **Material Path:** A material path is the combination of a material, an Equipment Channel Module (measurement device) and a final control element (valve, screw feeder, etc.); the material path defines how the material flows in the system. Each material path is managed by an Equipment Module.

- **Recipe:** The static definition of the phases that determine how a product is to be made. A recipe accounts for the capabilities of the equipment in the system, and may include information specific to a process cell.

Once started, the recipe's procedural structure cannot be changed, though the formula can change if the recipe permits. When necessary, process actions can be skipped. The base recipe is referred to as the Master Recipe. When an Order is created calling a specific Master Recipe, a copy of the Master Recipe is made and any Order specific changes are applied, such as the number of batches to run, and re-scaling parameters.

- **Order**: A process order to produce a certain amount of a product. An order is generated based on the master recipe and defines which elements will be used. The order identifies the properties of the run, including the recipe, the number of batches, and any re-scaling factors

The illustration below shows an example of a single scale system, and identifies the terms described above:

Control I/O Module

This is the valve to control the feed, and assigns the I/O point. You will hear this referred to as the Final Control Element or FCE.

Material Path

Defines what material and where the material goes

Equipment Channel Module

The scale base

Recipe & Order

Stored in the IND780batch terminal
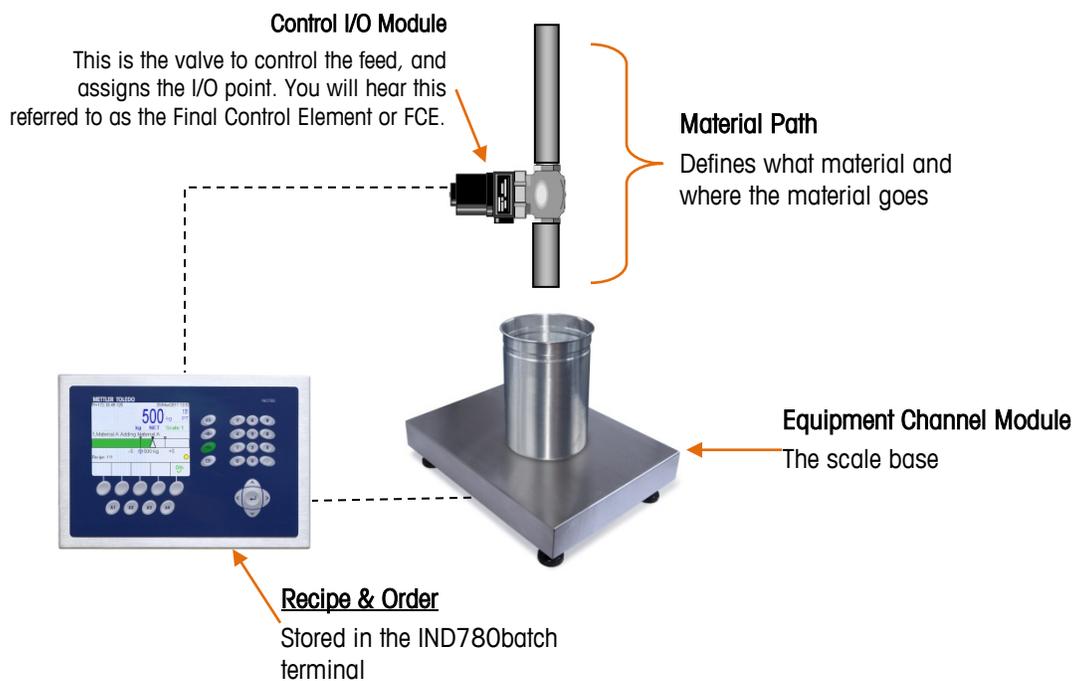
As you can see, while the definition of terms may appear complicated, their actual application is fairly simple. They take some getting used to, but in time these terms become more familiar with repeated use.

The Elements in Action: Example of a Batch Process

So what is the typical batch process and how does it work? The diagram below illustrates the typical batch process, which is fairly consistent regardless of the individual application. The key points are:

- The operator must schedule an Order, based on a Master Recipe.

- The order defines any specific changes required to the order such as number of batches to run and any re scaling required.

- The materials to be used in the batch are gathered or they may already be available to the operator at the batching station.

- The operator begins the batch process, adds materials following the on-screen prompts.

- The finished product is moved to storage and Batch reports are produced to document what the batch contains.

5 easy steps to predictable formulation results!
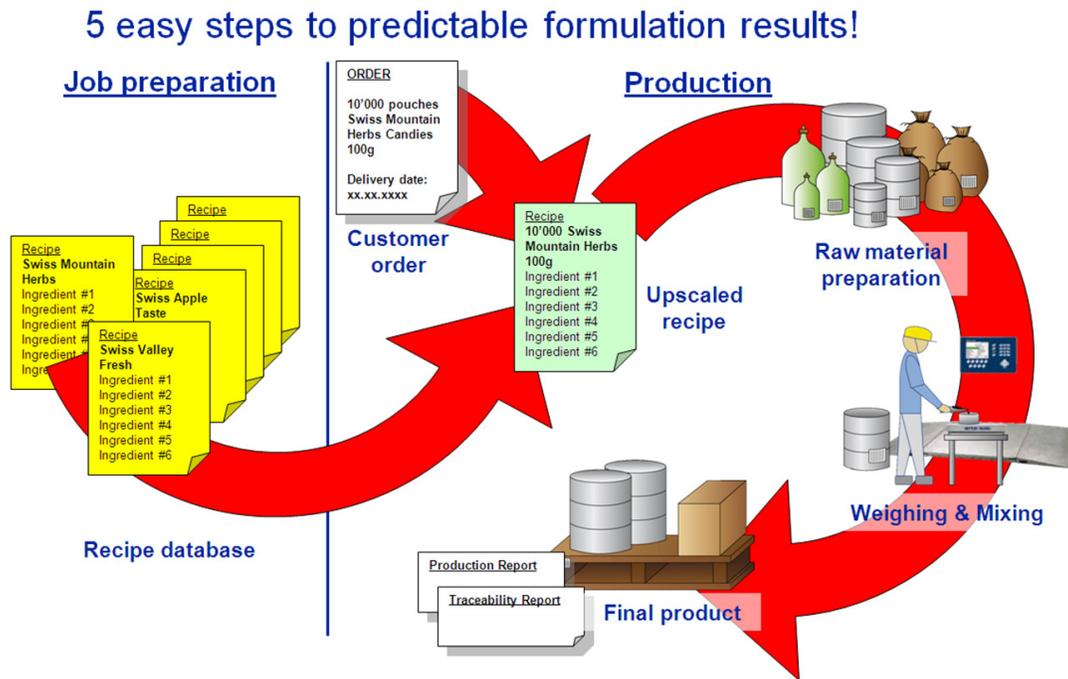
Manual Batching: An Overview

Let's look at an example application of a manual batching system. We can use this as the basis for building up the system configuration in BatchTool 780 and in the IND780batch terminal.

Our customer, Acme Co., needs a manual batching system to help guide their operator through the batch making process, and to produce a batch report so they can document what went into each batch the operator produces. Their current system is a paper-based system, so the operator will sometimes forget where s/he is in the batch process, and will fail to add all the required ingredients. Also, the busy operator often fails to note on the batch record the amount of material that was added to the batch, leaving the company open to liability on product quality. The company has also noticed an increase in material waste over the past several months, and based on the batch records can see that the operators are adding more material than required during the making of a batch – erring because they think more is better than too little. This overfilling is costing the company money, and the Plant Manager and Quality Manager have both finally agreed to invest in a new batch controller to improve their ability to make consistent batches, improve product quality, minimize material waste, and produce a reliable and detailed batch report.

Acme Co. currently has a PBA220 6kg bench scale. They purchase an IND780batch terminal, model # 78J1000000B0A00 (IND780 desk/harsh, with analog scale card and Batch Manual application PAC, US line cord) and a bar code reader (with USB connection).

Acme CO. has provided you with one of their recipes to help them get the system set up. They currently use 4 materials, and all materials are added into a plastic container on the scale. Acme's current recipe is shown below:

1. Batch Size – 1100 grams
2. Record Batch name, and current date and time on batch record
3. Record Operator ID on batch record
4. Add material 1 to 300 grams
5. Record delivered weight on batch record
6. Add material 2 to 200 grams
7. Record delivered weight on batch record
8. Add material 3 to 400 grams
9. Record delivered weight on batch record
10. Manually Mix material 1, 2, & 3 for 30 seconds
11. Record actual mix time on batch record
12. Add material 4 to 200 grams
13. Record delivered weight on batch record
14. Record batch complete time on batch record

After learning more about the capabilities of IND780batch Acme, decided that they would use a barcode label to assign an ID number to each material. The operator will be required to scan this bar code and ensure that it matches the material that the recipe requests before adding it to the scale. Acme also wants the operator to enter the Lot # for Material 1 as part of the recipe sequence. Finally, the Quality Control Manager has assigned a unique User ID number to each operator, which must be entered as part of the recipe sequence. In this way, will be possible to see which operator ran a batch, and also to track the amount of time each operator takes to run a batch of material. Finally, the system is to be set so that an operator **cannot** re-scale batch to more than the target batch weight, but **can** scale the recipe down to 50% of the batch size.

Now it is your job to take this data from the customer and transform it into a configuration for IND780batch that will fulfill these requirements.

The steps required to configure a Batch system are:

- Determine the physical configuration (scales, operator control stations, and any I/O, and material paths).

- Determine the logical configuration (recipe sequence).

- Determine the required configuration settings in the IND780batch terminal.

- Download the configuration to the IND780batch terminal.

- Create an order, specify the number of batches to run and apply any re-scaling required for this order.

# Initial Setup in BatchTool 780

Configuration Options

The physical configuration and logical configuration are both set up in BatchTool 780. Run BatchTool; once it's started, check to see that the BatchTool configuration settings (**Tools | Config**) are as you require them.
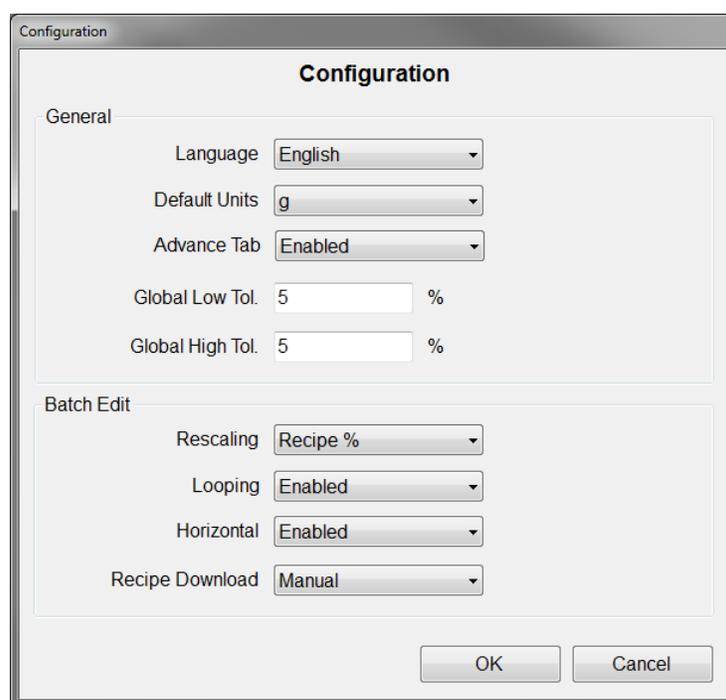

In this Configuration menu you can select your language, default weight units, determine whether the advanced tab (which typically provides access to some of the more advanced settings of Batch) is enabled, and set a Global low and high tolerance value that the recipe can use. On this menu you can also select how you want to re-scale a recipe, whether looping is enabled or disabled, whether configuring a horizontal batch is possible, and control for how you transfer recipes to the terminal. Here, the choice is between the automatic transfer of all recipes to the terminal at once, and a manual transfer in which only a single selected recipe is transferred to the terminal. For this example, we'll leave all these settings as they are.

The next thing to determine is whether the customer wants to set up users, in order to limit what each operator can do within BatchTool 780. At **Tool I Users**, you can set up new Admin and User accounts for BatchTool. An Admin account has full control, whereas a User account's access to various functions can be restricted. You can also set up passwords for all users in the system, to prevent unauthorized personnel from gaining access to it. The next image shows the types of permissions you can control for a User account. In this example, the user is only permitted to Run Reports and Add Orders to the system.
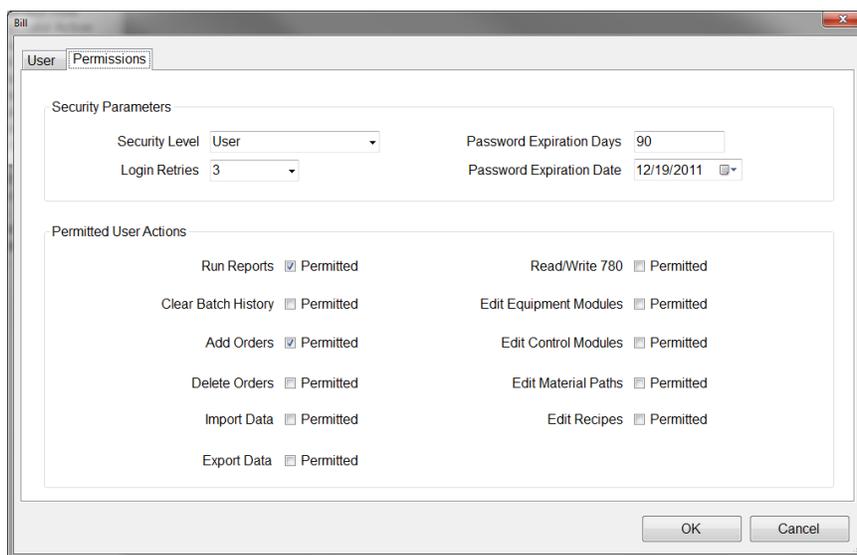

Creating a Project

After the Configuration settings and User accounts are set, you're ready to begin creating the configuration. First, create a Project in BatchTool 780. To do this, go to **File I New Project**. You will be prompted to enter in a name for your project:
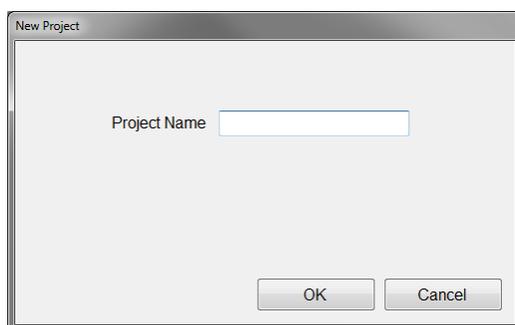
You can call this project anything you like up to 40 characters; we'll name this example **Manual 101**.

Creating a Terminal

Now that we have our project, we need to create a terminal within the project that will control our batch application. You can have multiple terminals within a project, as each terminal will require its own unique IP address. To add a terminal, access **Edit I New I Terminal**. A screen will appear, like the one shown below:
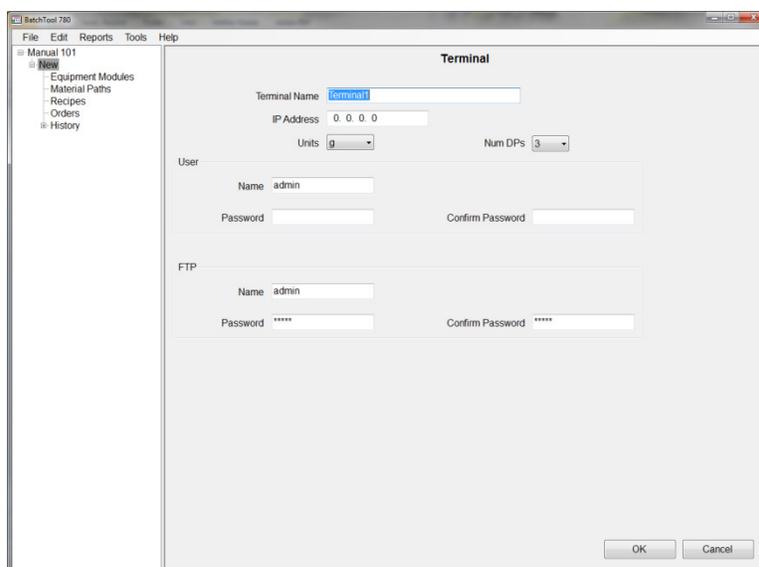
Here, we need to enter a name we'll use to refer to our terminal, and the terminal's IP address. Our terminal will be called **Batch system**, and its address will be **172.18.55.42**.

■ You may need to consult the customer's IT department to provide you with an IP address that you can use.

You will notice that the units of measure were pulled from the Configuration settings we made earlier. If you want to change the project units, use the **Units** drop-down selection box. For this example, we'll leave it as grams. To the right of the **Units** drop-down, you'll notice that you can specify the number of decimal places BatchTool 780 will use. Currently this is set for 3, which means that it will allow up to 3 places after the decimal point when manipulating data and performing calculations.

In the User section of this window, there are fields used to enter User Name and Password. These are used if Users have been created in the IND780 terminal. In that case it will be necessary to have the same User names and passwords set up in BatchTool 780. If there no Users are set up in the terminal, then simply enter **admin** in the Name field and leave the password and confirm password fields blank

■ Note that, if you do have Users set up in your terminal, only those with Administrator privileges will be permitted to write data from BatchTool to the IND780batch terminal.

There is also an FTP section with fields for a name and password. Again, if you have changed the FTP name and password in the IND780 terminal, then you must also change these to match in BatchTool 780. If they don't match you won't be able transfer the configuration and recipe from BatchTool 780 to the terminal. If the terminal's FTP Name and Password have **not** been changed, enter "admin" in the Name, Password, and Confirm Password fields in BatchTool 780, as seen in the screen image above.

That completes the Terminal configuration procedure, so click OK at the lower right of the screen to accept the changes

■ Note: After clicking OK, you will not be able to edit the Terminal Name, so make sure that the name you choose is acceptable before clicking OK.

Our page should look as follows:
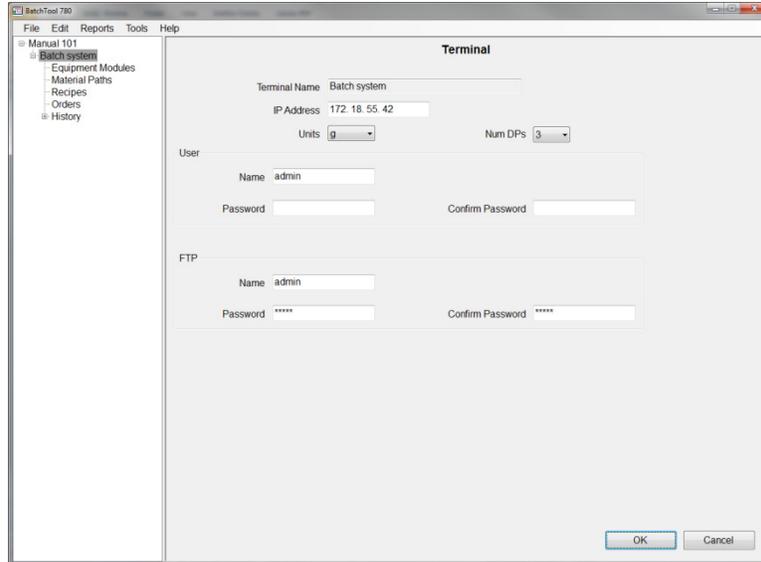
With the Project and Terminal specified, we're ready to start configuring the batch system.

Setting up Equipment Modules

Let's start with the physical configuration. In this case we know that our customer has 1 scale and will be using the IND780batch terminal as the Operator panel. Since we have two pieces of equipment – a scale, and the IND780batch terminal – we need to configure two Equipment Modules.

To set up the Scale Equipment Module (SEM), right clock on "Equipment Modules" in the left pane of the BatchTool window, and select **New I Scale Equipment Module**:
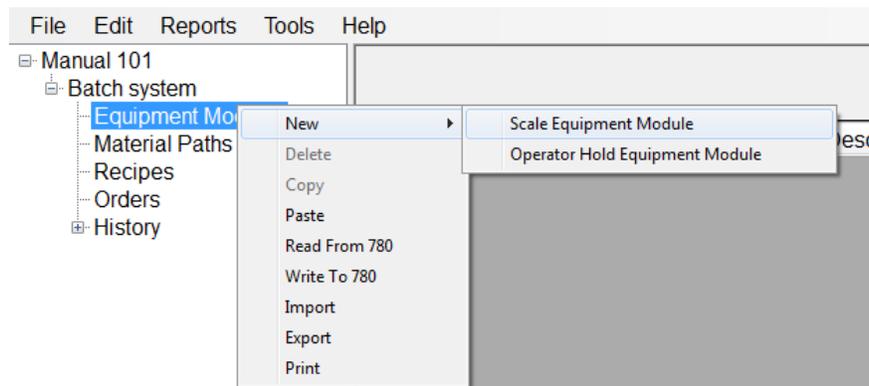
A screen like the one shown here will appear:
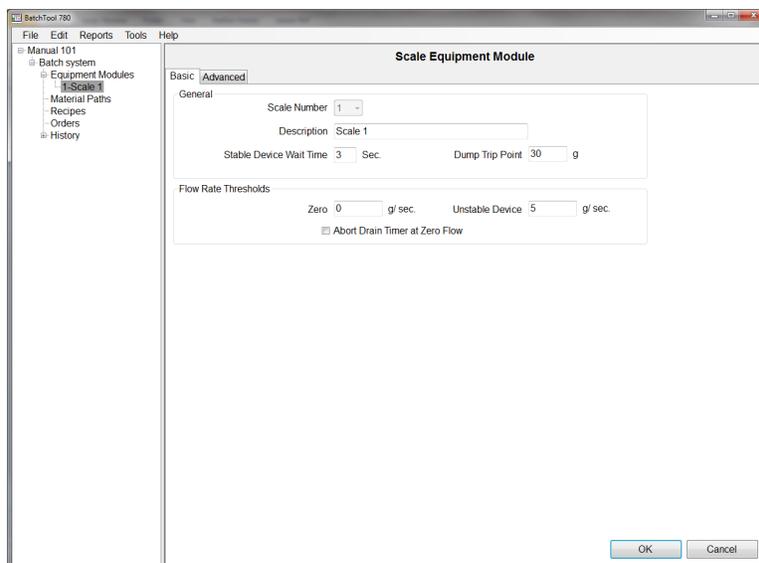
Notice that BatchTool 780 automatically created this SEM as **Scale 1**. We can have up to 4 Scale Equipment Modules associated with a terminal, and they will be given Equipment Module numbers 1-4. We can give our scale a description (for simplicity, we'll call it **Scale 1**), and change any of the Scale and Flow Rate parameters to fit the application. You can see that some of the parameters have default values associated with them, like Stable Device Wait Time. The parameters for this Equipment Module require a little further explanation. First, we'll cover the settings available on the Basic tab, then the ones of the Advanced tab.

Basic Tab settings

Stable Device Wait Time	The amount of time to wait before returning an "unstable device" error status. The default system value is 3 seconds.
Dump Trip Point	The point where the drain timer will start on a Dump to Empty feed. This is typically set for 3% of the scales' calibrated capacity. In our example our scale is calibrated for 1000 grams, so we should set this value for 30 grams
Zero Flow Rate Threshold	The flow rate below which the system assumes zero flow conditions. This is typically set for 5 x the scale divisions. So if the number of divisions for the scale is set to 1, then this value should be set for 5. If the process associated with the scale is noisy (meaning it has a mixer or agitator associated with it), then this value may need to be 10 to 15 times the number of deviations. In our example since the process is for manual batching we will leave this value at 0.
Unstable Device Flow Rate Threshold	The flow rate above which the system generates a "Noisy Scale" condition when waiting for a stable scale reading. This value will typically be set 5 times the zero flow rate threshold; the default system value is 5 units/second.
Abort Drain Timer on Zero Flow check box	When checked the batch system will abort the drain times on a material transfer if zero flow is detected. This is only active on Automatic material transfers.

Advanced Tab Settings

We won't get into the details of each of these parameters on the Advanced Tab, because they don't apply to a manual batch application. If your system is using Automatic Material Transfers, then these parameters become effective and can have an effect on feed performance.

This sets all of the needed parameters for the Scale Equipment Module. It is important to note that you must still set your scale type, capacity, increments, and calibrate your scale using the Scale configuration settings in the IND780 terminal **before** operating the system. You can access these configuration settings by

Pressing the A4 application key on the IND780 terminal, then pressing the Setup softkey. The IND780 Setup menu will appear, where you can access the scale settings to make any necessary scale configuration adjustments.
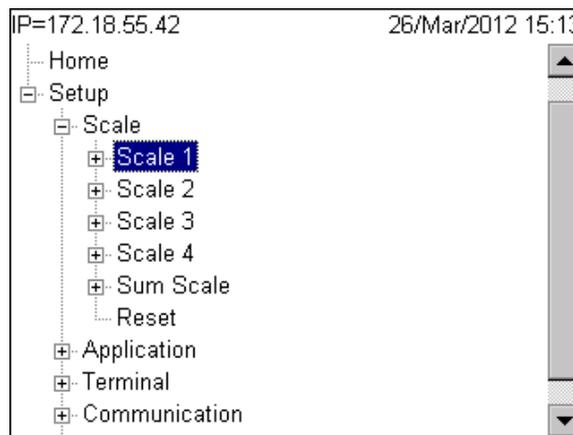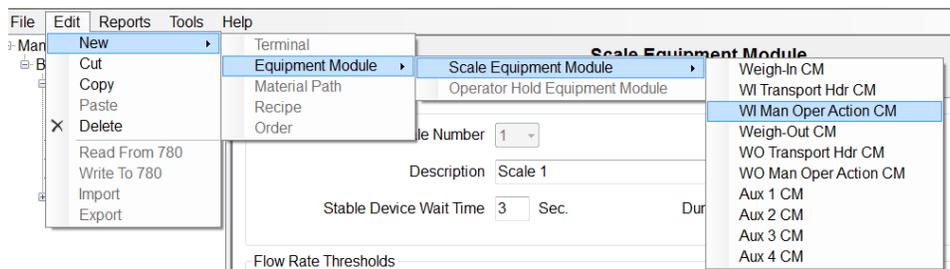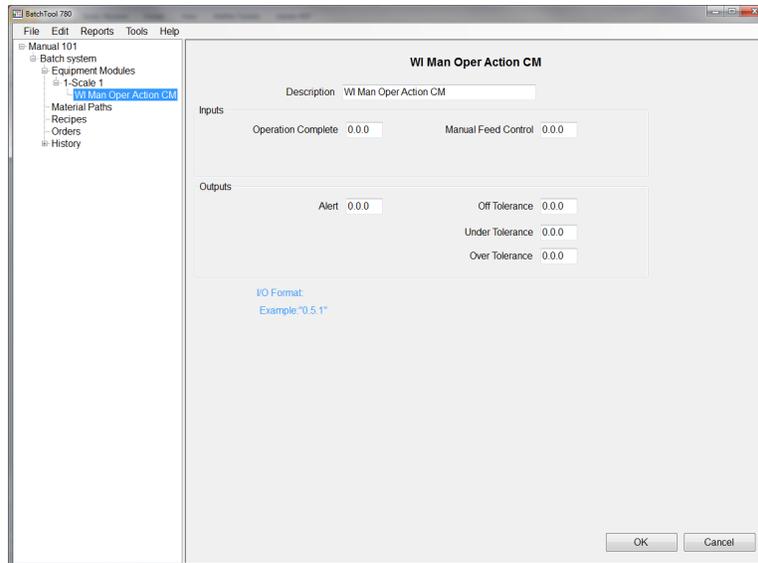

Control Modules

Scale CM

Within the SEM, we need to setup the Control Modules (CMs) that control how material is delivered to/from the scale. In the system we're configuring, the operator will add material to the scale by hand, so we aren't controlling any feed valves or screw feeders. However, we still have to let the batch system know that we will be doing manual feeds to the scale, by adding a **Weigh In Manual Operator Action Control Module**. Select the SEM, then access **Edit | New | Equipment Module | Scale Equipment Module | WI Man Oper Action CM**, as shown here.

Once you've done this, you'll notice that a new branch has been created under the SEM; this is the Control Module we just created; a new window for open, allowing us to configure the CM.

You can give the WI Manual Control Module a different description if you prefer. Here, we'll leave it as it is currently designated. You can see there are also inputs for acknowledging **Operation Complete** and **Manual Feed Control**. These inputs can be specified and used if the operator has pushbuttons for these control items and there is a discrete I/O card in the IND780 terminal.

Inputs

Operation Complete   Used to acknowledge the completion of a feed in a Manual weighing phase.

Manual Feed Control   Used to activate the Final Control Element in a process to allow the operator to manual jog the feed system.

Outputs

Alert   Output that lets operator know that a manual operation required in the batch system.

Off Tolerance   Output that lets operator know that the feed is Off Tolerance.

Under Tolerance   Output that lets operator know that the feed is Under Tolerance.

Over Tolerance   Output that lets operator know that the feed is Over Tolerance.

In our example we will not be using these inputs or outputs since our customer doesn't need pushbutton inputs or pilot lights for to alert the operator to different conditions. If the customer had requested these features, the I/O address is entered in the following format – 0.0.0, where:

- The first digit is the location of the I/O device – 0 means the device is onboard the IND780; 1 would mean ARM-100 module 1; 2 would mean ARM-100 module 2, etc.

- The second digit is the slot # in the IND780 where the I/O card is installed (either 5 or 6). The second digit would be 0 if you are using an ARM-100 module.

- The third digit is the actual input or output from either the discrete I/O card or the ARM-100 module. For a discrete I/O card this could be 1-4 for an input or output, and for an ARM-100 this could be 1-4 for an input and 1-6 for an output.

This completes the setup for the items associated with the Scale Equipment Module. If the customer were going to be doing loss-in-weight feeds from the scale (manually removing material from the scale or dosing out material), then we would need to also add a Weigh Out Manual Operator Action Control Module, or **WO Man Oper CM**. Since this is a Manual Batch system, we don't need any other Control Modules, unless the customers' process has a mixer or some other Auxiliary piece of equipment that they need to control. If so then you need to have a discrete I/O card in the IND780 or an ARM-100 module and you will need to set up an Auxiliary Control Module. You can have up to 4 Auxiliary Control Modules for each scale in your configuration. If the process is truly manual it's not likely to require an output to turn a mixer on and off – that will probably be the operator's responsibility.

Operator Panel EM

Next we need to setup the Operator Panel Equipment Module. The operator will only be using the IND780 terminal as the interface to the batch process, so we need to define this in the system; it allows us to display messages to the operator on the IND780 screen.

First, select **Equipment Modules** in the left pane of the BatchTool window, then right click and select **New | Operator Hold Equipment Module**.
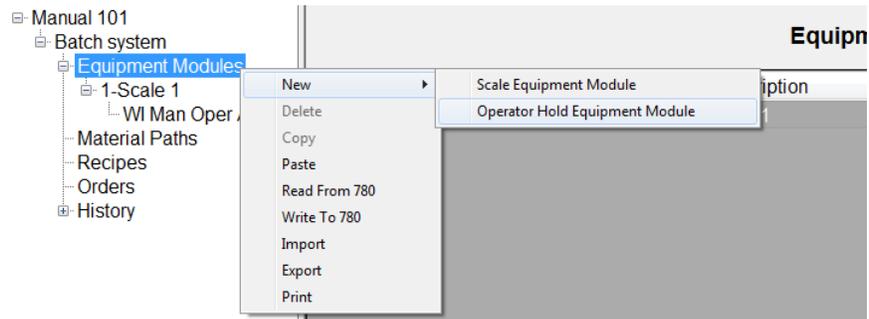
A screen will appear, like the one shown below:
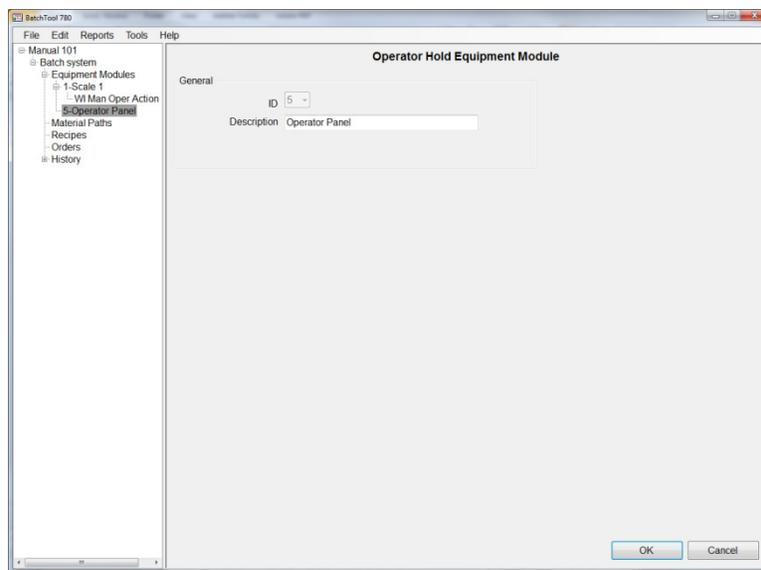
There's not much to do on this page except change the description, if you want to. Notice that the ID is 5, meaning this is the first Operator Hold Equipment Module in the system. This value is assigned

automatically by BatchTool 780. You can have up to four Operator Hold Equipment Modules configured for a terminal, and they will be assigned ID numbers 5-8.
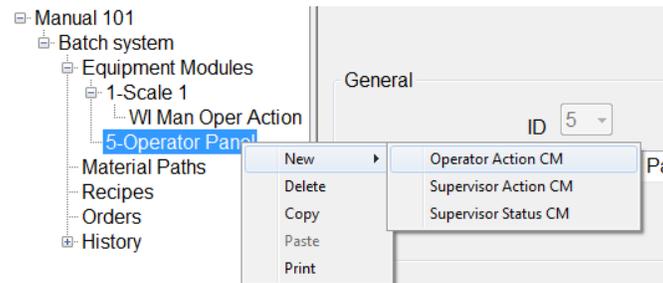
Control Modules

We can associate CMs with the Operator Hold Equipment Module; these allow us to use predefined inputs and outputs that would commonly be required in a batching system. Our example doesn't require them, but let's examine these control modules anyway so you can see what's available in case you do need to use them at some point.

There are three Control Modules that you can specify under the Operator Hold Equipment Module:

- Operator Action Control Module
- Supervisor Action Control Module
- Supervisor Status Control Module

To add one of these Control Modules first select the Operator Hold Equipment Module, then right click and select **New | Operator Action CM**.

The Operator Action configuration screen will appear:
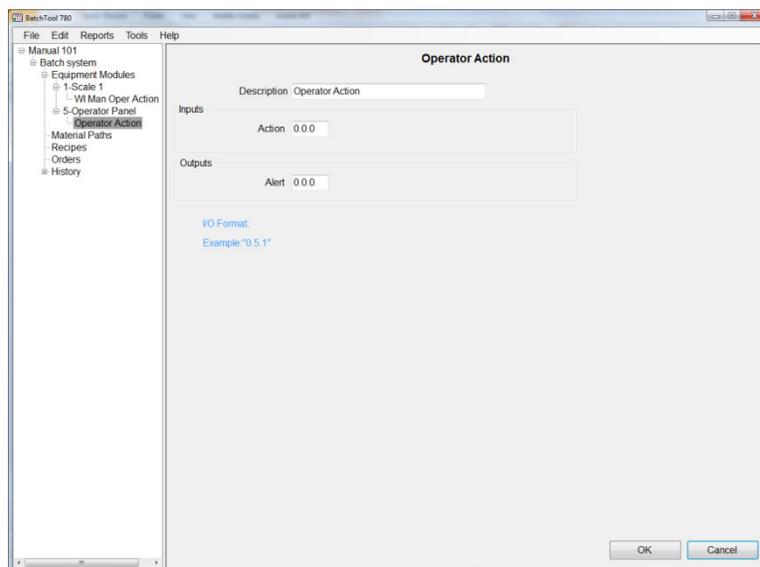
You can give this Operator Action Control Module a unique description if you like, and you can see that we have one input and one output to assign. The input "Action", is used to acknowledge an operator hold phase. The output "Alert", used to notify the operator that action is required in the batch process to allow it to continue.

■ Note: The specifics of what the operator is asked to do using this Operator Action would be specified in the recipe phase that uses the CM.

Now we'll add the Supervisor Action Control Module, using the same method.
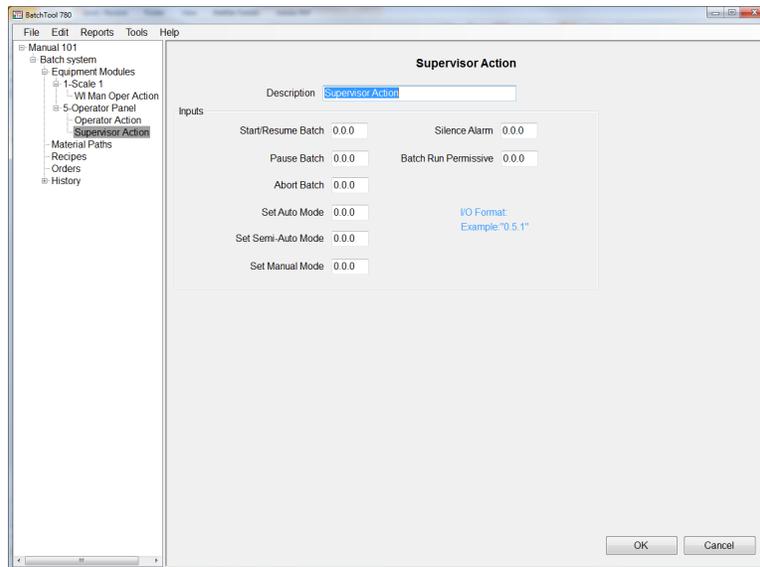
In this Control Module you can see that we have several pre-defined inputs that can be used for control of the batch process. The definitions of these are self explanatory, but for additional details on a specific input (and the outputs included in the Supervisor Status CM) please refer to Chapter 9 of the **IND780batch Technical Manual and BatchTool 780 Guide**.

Finally, let's add the Supervisor Status Control Module.
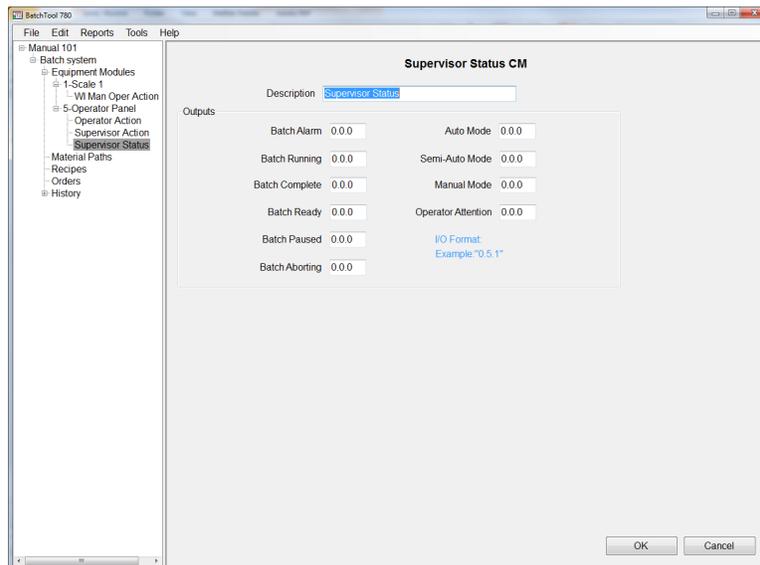
This CM has several pre-defined outputs that can be used to indicate the status of the batch process.

With EMs and CMs configured, we need to identify and set up each material our recipe will use – eaach of them needs a Material Path.

Material Paths

Our customer's recipe will use four ingredients, so we need to configure at least 4 material paths, or MPs. If the recipe will also deal with discharging the material from the scale, we'll need an additional material path – a discharge, or dump to empty MP. In this case we don't need that, because the customer is only weighing up material on the scale – they don't need to manually discharge the scale to zero weight.

To set up an MP, select **Material Paths** in the left pane of the BatchTool window, right click it, and select **New**.
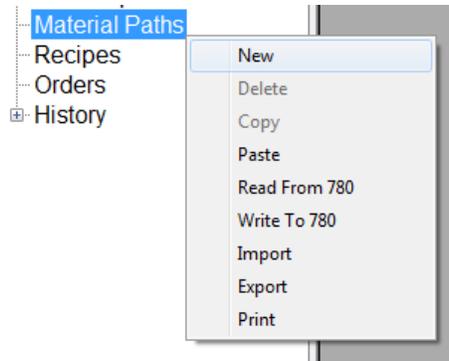
The Material Path configuration screen will appear.
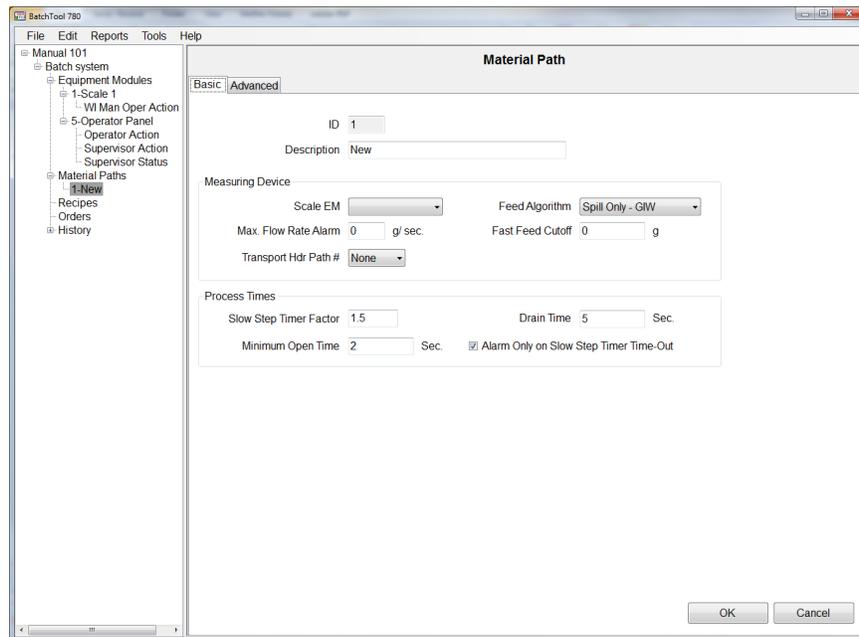
The **ID** number is automatically assigned by BatchTool 780 and cannot be changed.

You can give this material a descriptive name, which probably is kinder to the operator, or you can simply identify this material by a number. Either way, you probably don't want to use the default, which is **New**.

Set the Scale EM to Scale 1, because that's the scale we will be adding this material onto. If our process had more than one scale configured you could associate this MP with any of the configured scales.

Feed Algorithm defines the type of feed this will be. In our example this will be **Hand Add**. As soon as you select this from the drop-down list, the rest of the options on the screen above disappear, except for the **Slow Step Timeout** setting.

Slow Step Timeout defines the number of minutes before the system displays an error message on the IND780 terminal's screen. This won't stop the batch process, but simply notifies the operator that the feed has taken longer than expected. We want to keep the recipe moving along, so we'll allow 1.5 minutes before the message appears to prompt the operator to continue.

The screen below shows what the configured MP will look like for Material 1:
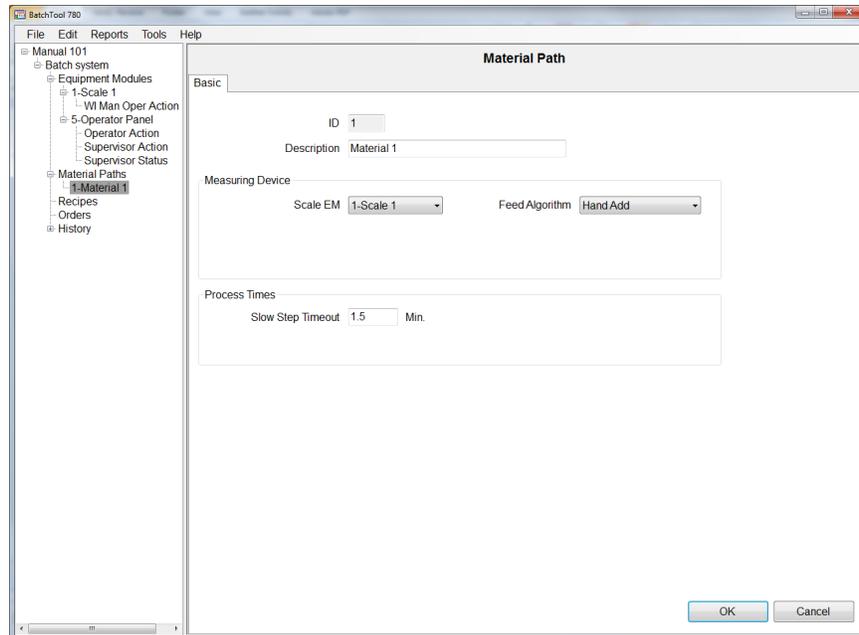
Click OK at lower right to save this MP as configured. Since the rest of our material paths will use the same configuration, we can simply copy and paste this material path 4 times.

To copy and paste, select "1-Material 1" (this MP in the left pane of the window) then right click and select Copy. Next click on the Material Path, right click and select "Paste". Once we've created the copies, we'll change the description as appropriate for each material.

Before we leave the Material Path section, let's review the other types of Feed Algorithms that are available for a Manual batch system.
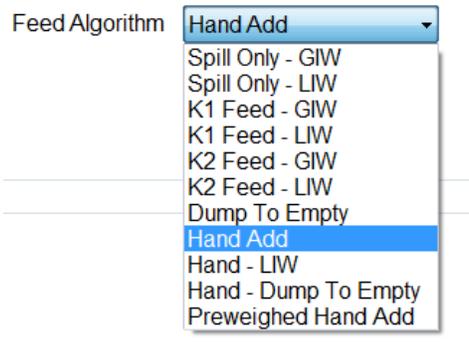
Several feed types available in the drop-down list. However, **Spill Only - GIW**, **Spill Only - LIW**, **K1 Feed – GIW**, **K1 Feed – LIW**, **K2 Feed – GIW**, **K2 Feed- LIW**, and **Dump to Empty** are all feed algorithms that are used only in automatic material delivery systems and will not apply to manual batching applications.

The manual batching feed algorithms that we can select are:

- Hand Add
- Hand – LIW
- Hand – Dump to Empty
- Preweighed Hand Add

Let's look at the definitions for these manual feed types:

Hand Add	Used to signify a Gain in weight, where material is fed onto a scale manually.
Hand – LIW	Used to signify a Loss in weight, where material is taken from a scale manually – dosing material from a scale.
Hand – Dump to Empty	Used when you want to discharge all the material from the scale manually.
Preweighed Hand Add	Used when the material is already weighed – such as bagged material of a known weight. Rather than reading the scale weight when this material is added, the known weight of the material is entered to become part of the batch record.

At this point your configuration in the left pane of the BatchTool window should look like the one shown below. We have one Scale Equipment Module, one WI Man Oper CM, one Operator Panel Equipment Module, the Operator Action, Supervisor Action and Supervisor Status CMs (which we added merely to demonstrate their options), and four material paths.
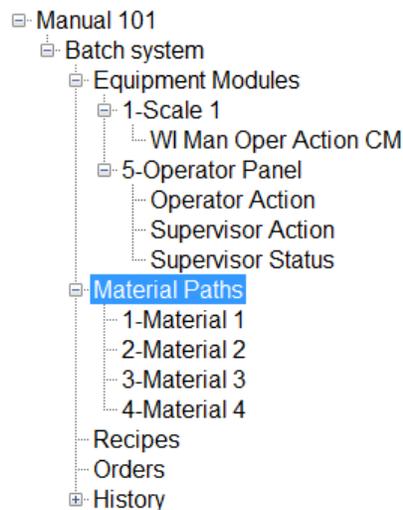

This completes the entire physical configuration. Now we need to focus on the logical configuration – meaning, the recipe.

Recipe Configuration

Recipe configuration is the logical part of the batch process; the recipe guides the operator step-by-step through the batch sequence. Our customer specified certain procedures (refer to page 6) as part of their process, and we need to incorporate these into our recipe.

Creating a New Recipe

To add a new recipe first select **Recipes** in the left pane of the BatchTool window, right click, and select **New**.
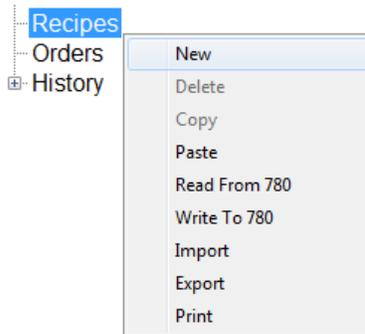

A new Recipe screen will appear.
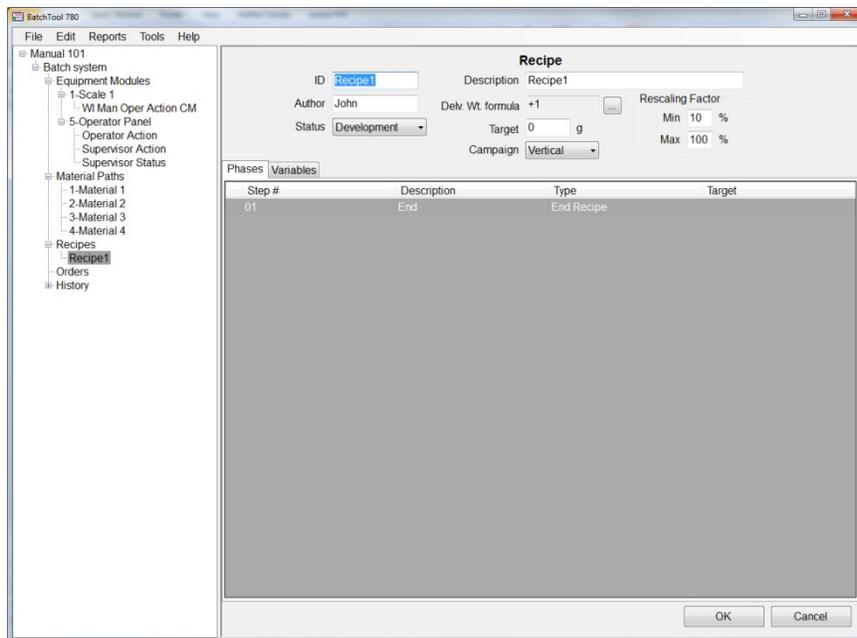
Recipe Header Setup

In the recipe header area we need to fill out the recipe's **ID** (up to 16 characters), a **Description** (up to 40 characters), and an **Author** (up to 30 characters).

The **Status** drop-down lists lets you describe the recipe as **Development**, **Testing** or **Released**. This status doesn't limit the recipe in any way, but is useful to the customer, indicating the current status of the recipe for their own tracking purposes.

The recipe can also have its own rescaling limits (**Rescaling Factor**), defined as minimum and maximum rescale percentages.

Campaign type can be **Vertical** or **Horizontal**. A vertical campaign is one in which materials are added one after another until the batch is complete.
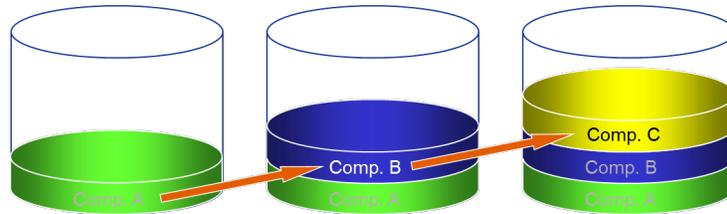
We can also do a horizontal campaign in IND780batch. This means that, if we need to make three batches simultaneously on three different scales, or in three different containers, the system will tell the operator to add material 1, then material 1 again, then material 1 a third time before moving onto the next step. This can reduce confusion when multiple materials are used in the recipe.
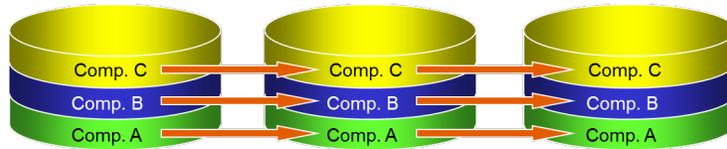
In our example, Acme's procedures require only a vertical campaign type.

The last items in the recipe header are the Delivered Weight Formula (shortened to **Delv. Wt. formula** on the screen) and **Target** weight. These items work in conjunction with one another, and they're the last parameters to set once the recipe has been created. At that point, clicking the selection button beside the Delivered weight formula field (below left) will open the Delivered Weight Calculation dialog (below right):

This formula lets us calculate the target weight for the batch based on certain criteria. So for our example, the batch delivered weight will include all materials **Fed To** Scale 1 EM – which is what's selected in the calculation shown above.

If this were a loss in weight recipe, where we were dosing material from the scale, we could select the delivered weight to include materials **Fed From** the Scale 1 EM. If we had multiple scales configured we could also calculate the total delivered weight of materials Fed To all of the scales configured, which might be nice to know in a multi-scale system. Again, this is the last thing we will do after we create our recipe, so we'll revisit this step later.

Now that we have covered the information in the recipe header, our recipe header will look as follows – the **+1** in the Delv. Wt. formula field is the system's shorthand for "added to EM 1".

You can see the Recipe ID used is **3272012**, the description is **Acme Co. Recipe**, the Author was **John**, the rescale limits are set for minimum of 50% and maximum of 100%, the status is released, and the campaign type is Vertical.

Batch Variables

Next we need to setup a few Batch Variables that we can use to store data while the recipe is executed. For example, we'd like to store the User ID and Lot numbers, and Material ID number for each material. We could also collect other data if necessary, but for this example let's start with these variables. There is a **Variables** tab underneath the recipe header section:

Click on this this tab to open a screen that allows you to enter up to 30 batch variables for use as part of this recipe. Each variable's name can be up to 12 characters long. In the image below, you can see the variables we'll use in this example. They are User ID #, Lot #, Mat 1 ID #, Mat 2 ID #, Mat 3 ID #, & Mat 4 ID #:

Now we can begin building the actual recipe.

Creating Recipe Phases

To add steps to the recipe you must select Step #1 in the recipe, then right click and choose New, then a list of the phase types will appear:
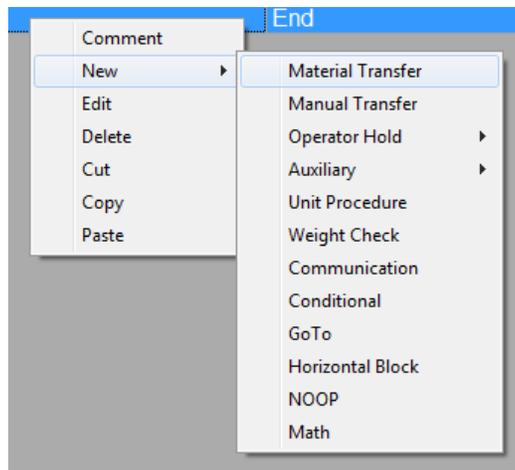
Two of the phases, **Operator Hold** and **Auxiliary**, have multiple options available. Before we start adding phases we need to examine the customers' recipe and their requirements and determine what the first step of recipe should be. So let's review their requirements.

Acme CO. has provided you with one of their recipes to help them get the system setup. They currently use 4 materials, and all materials are added to the scale into a plastic container. Acme's current recipe is shown below:

1. Batch Size – 1100 grams
2. Record Batch name, and current date and time on batch record

3. Record Operator ID on batch record

4. Add material 1 to 300 grams

5. Record delivered weight on batch record

6. Add material 2 to 200 grams

7. Record delivered weight on batch record

8. Add material 3 to 400 grams

9. Record delivered weight on batch record

10. Manually Mix material 1, 2, & 3 for 30 seconds

11. Record actual mix time on batch record

12. Add material 4 to 200 grams

13. Record delivered weight on batch record

14. Record batch complete time on batch record

We also know that Acme has decided to assign each material an ID number, to be scanned from a bar code label by the operator as a way of ensuring that the right material is being added. They also want the operator to enter the Lot number for Material 1 for Material 1 only as part of the recipe sequence. Finally, the Quality Control Manager has assigned a unique ID number to each operator, which the operator will be required to enter as part of the recipe sequence – making it possible to see which operator ran a given batch, and also to track how long each operator takes to run a batch. Finally, Acme wants to permit their operators to rescale the recipe downward, as small as 50% of the original size, but not to be able to increase its size.

The first few phases of the recipe will take care of some basic house-keeping chores – identifying the operator, checking the container, and so on.
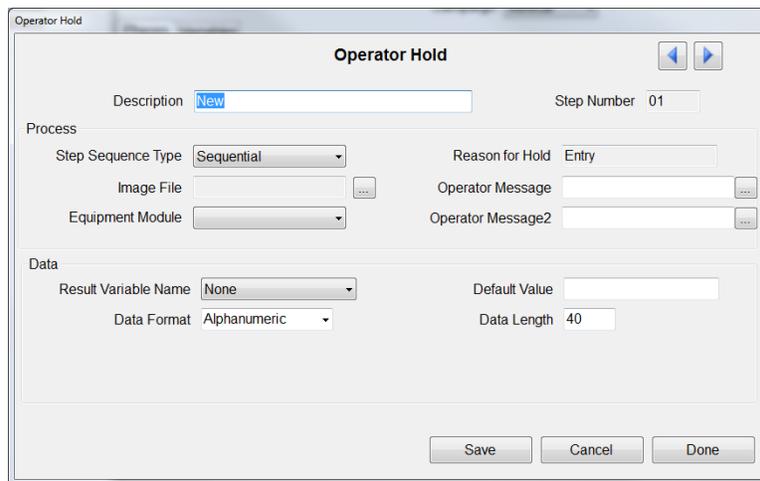
Operator Hold: Entry

The first step, then, should be an Operator Hold that asks for entry of the Operator's ID number.

■ Note: There are several different phase types available, and we will not use each of the phases in this example. Chapter 11 of the IND780batch Technical Manual and BatchTool 780 Guide provides a detailed description for each available phase type available, and forms a useful reference when you need types other than the ones we'll use here.

So the first phase type we want to add is an **Operator Hold Entry**. Right click in the Recipe pane:
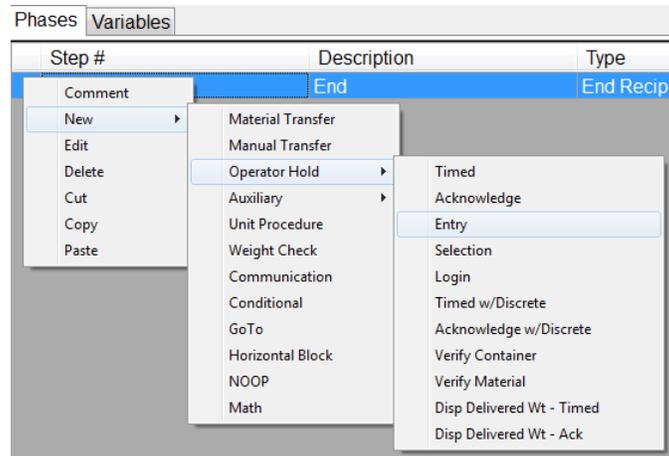
When **New I Operator Hold I Entry** is selected, a screen appear in front of the BatchTool window, looking like this:

This is the basic Operator Hold Entry screen. The options available here are as follows:

Description	A description for the phase.
Step Sequence Type	Specifies whether the step sequence should be **Sequential** or **Parallel**.
Equipment Module	Specifies the equipment with which to associate this operator hold.
Image File	Allows the specification of an image file (.bmp) that will display on the IND780 as part of this Operator Hold
Operator Message & Operator Message2	allows the user to enter a string of text or a Shared Data Variable to display on the IND780 during this phase. (16 character for each line)
Result Variable Name	if selected from a batch variable, will store the operator entered information into the selected batch variable.
Data Format	(either Alphanumeric or Numeric) defines the format of the entered data.
Default Value	defines a default value that will display when the Operator hold phase appears on the screen (for example if the default value for a material was 12345, then you could enter this into the Default Value field and this value will appear in the entry box for this phase and the operator could either accept this default value and move on enter in a different value).

Data Length	limits the length of characters the operator can enter, maximum is 40, but can be limited in the event you will only accept a 3 character value, you would specify 3 in Data Length, and if the operator entered in a 4 character value the batch system will give the operator an error message and prompt them to re-enter the data

If the Data Format is set for "Numeric" the Data window adds Num DPs, Minimum and Maximum as additional parameter settings as shown below:

Num DPs	specifies the number of decimal places to allow during operator entry.
Minimum	specifies the minimum accepted numeric value for operator data entry
Maximum	specifies the maximum accepted numeric value for operator data entry

So here is an example of what the Operator Hold Entry phase will look like with all of the data fields filled in – the ones circled in red need to be edited when the phase is created:


As you can see, the phase involves the Operator Panel (i.e., the IND780batch terminal), and includes an on-screen display to show the operator what's required ("Enter 3 digit User ID #") and a specification of how to handle the input (it's stored as the "User ID #" variable we defined on page 23). There's no default value for the User ID, and it's not necessary to change the other **Data** default values.

If the configuration's correct, click **Save**, and the phase will appear in the recipe pane.

Operator Hold: Verify Container

The next step in the recipe will be an Operator Hold Verify Container Phase. Here, the system prompts the operator to place a container of a certain capacity and tare weight on the specified Scale Equipment Module.
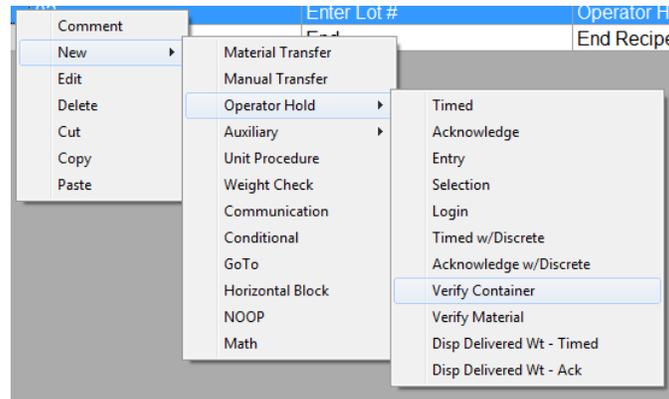
And here is the configuration screen that appears in front of the BatchTool window:

As usual, we need to specify a description for the phase (in this case, "Verify Container"), select the Step Sequence type (Sequential), select the Equipment Module for this Operator Hold (5-Operator Panel) enter an operator message into the 2 available fields ("Place container on scale"), enter the approximate tare weight and capacity of the container (10 grams and 1500 grams, respectively). Finally, we must select the Scale Equipment Module this phase is associated with (Scale 1). Click **Save** to save the phase and click **Done** to close the window.

Operator Hold: Entry

The last 'housekeeping' step prompts the Operator for the Lot # of the batch. Once this information is acquired, we can start actually producing a batch.

This phase is functionally identical to the first step, where the recipe prompts for the operator's ID number.

Notice that in this case we've set the **Data Length** to 6, meaning that the entered data must include no more than 6 digits. Save the phase, and exit the configuration screen.

Operator Hold: Verify Material

Now the recipe can turn its attention to the materials that will make up the batch. An Operator Hold phase will prompt the operator to scan the barcode on the container from which the material is to be added, in order to verify that the right material is being used.

A message to the operator prompts to "Scan bar code on Material 1." The data the barcode scanner acquires is compared to the Verify String, where the correct material code has been stored. If the scanned number is, in this case 111, the value will be stored as "Variable Mat 1 ID #." If the comparison fails, because the wrong material has been scanned, the operator will get an "Invalid Entry" message on the IND780 and will be prompted to re-enter the data. The **Step Termination** option is set to **Disable Bypass**, meaning that the Operator can't simply continue with the recipe regardless; the correct barcode must be scanned before the phase completes and the material transfer can begin.

Step Termination can also be set for **Allow Bypass**, in which case, even if the entered data doesn't match the data in the Verify String field, the recipe will move on. This option might be used to capture data only.

■ This phase type can be used to verify any item in a recipe that must match before the recipe proceeds. Some examples are container identification, lot number identification, and material identification.

Now that we have identified the material to be added, we can begin the material transfer phase. There are two types of material transfer in the batch system, a **Material Transfer** and a **Manual Transfer**. The Material Transfer is used for any **automatic material feeds** to or from a scale. The Manual Transfer is used for any **hand-add material transfer** to or from a scale. You can see these options in the fly-out phase menu shown in the next image:
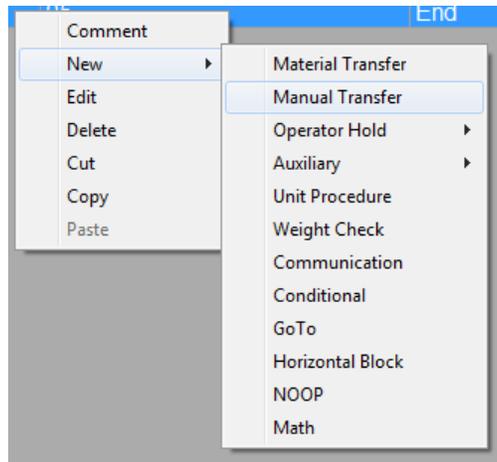
So now we can add the Manual Transfer for Material 1 in the recipe:

You can enter in the Description "Add Material 1" to describe this phase; the step type is sequential; and the Target weight 300 grams. Note that the negative and positive tolerances will be set automatically, based on the preset global tolerance % we defined in our Configuration menu (on page 7), which was 5%. If you do not want to use this global tolerance setting for this material transfer, uncheck the **Use Default** selection box and you'll be free to enter negative and positive tolerance values for this phase.

You must select the material path with which you're associating this phase. We're adding Material 1 – click on the button to the right of the **Material Path** field and a selection box will pop up choose one of the Material Paths we created when we configured the physical system (page 17). Here's how this selection box looks in the system we've created:
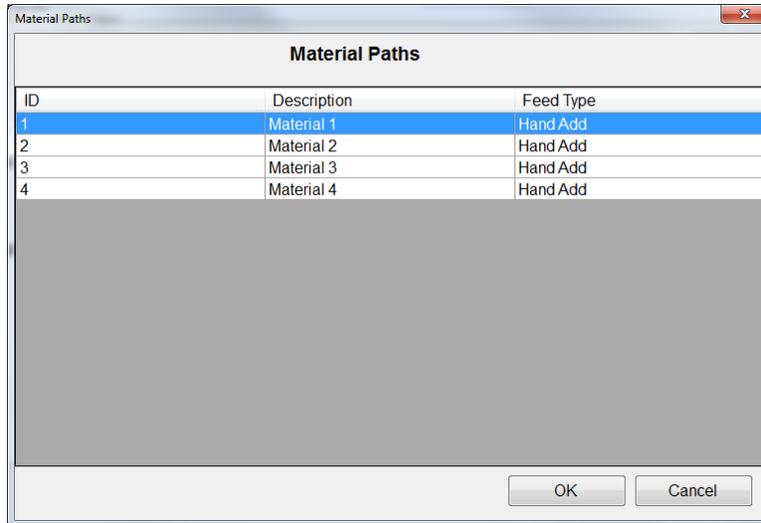
Select Material 1 and click "OK" to continue. Next, we choose whether the **Feed Type** is a **Net** or a **Gross** weight feed. The system always defaults to **Net** Weight Feed, and in our example that's what we want.

Now click on the **Advanced** tab, because we need to assign the Lot # Batch variable we entered (page 27) to this manual transfer phase as shown below:
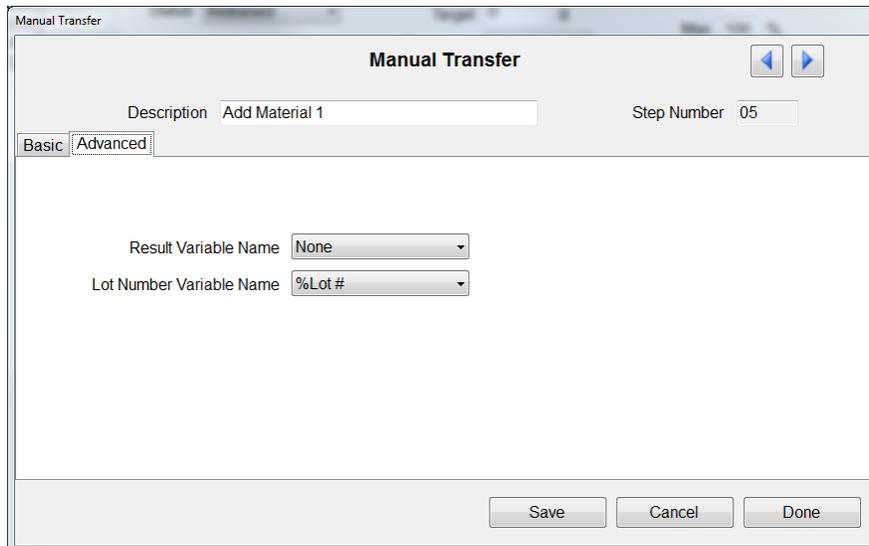
Now the Lot # is stored as part of the Manual Transfer phase, so we can later recall it in a report if required.

With the Manual Transfer phase complete, click **Save** then **Done**.

Materials 2 and 3

We now start the process – verify material, define the manual material transfer – again, repeating it for each of the remaining three materials.

This is a good time to use the Copy and Paste features in BatchTool 780, to copy the Operator Hold Verify Material for Phase 1 and paste it into the location for the Verify Material for Phase 2. To copy a phase first you must select the phase, then right click and select Copy. Here, we're copying the Verify Material phase:
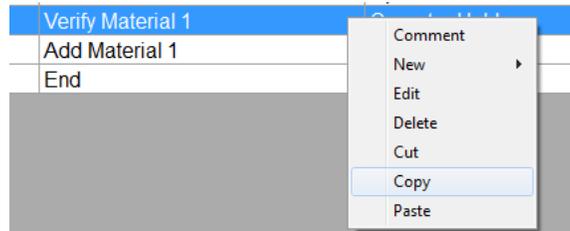
With the phase copied, you need to then select where you want it pasted in the recipe.

■ Note: BatchTool 780 will paste the copied phase **above** the step you select. So for example if you want the copied phase to become step 5, select the existing step 5 in your recipe and click Paste. The phase will be inserted as step 5, so that the previous step 5 becomes step 6.

We're creating a new recipe, so – based on this logic – we'll select the last phase, a default item called **End** (every recipe has one, and it can't be deleted) so the new phase will be pasted immediately before it, becoming step 6.
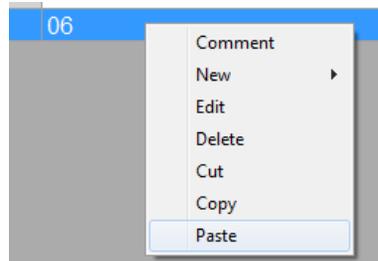
Now you can open this phase and modify its paramaters so that it verifies Material 2:

Repeat the copy-paste-modify process for each succeeding phase, building the sequence for materials 2 and 3. Don't forget to modify the parameters appropriately each time!

Mixing

Recall that the customer wanted to mix the first three materials together for 30 seconds, so stop copy/pasting when all the phases for Material 3 have been created.

This operation requires the operator to start and stop the mixer in the weigh hopper manually. The operator needs a way to time this procedure, and we'll use a type of Operator Hold phase that will help to do this. Insert an **Operator Hold – Timed with Acknowledge** phase; this will show the operator a countdown timer with the time remaining in this phase. It will also require that the operator acknowledge the completion of the phase by pressing the "OK" softkey on the IND780 terminal. Here's how the phase configuration looks:
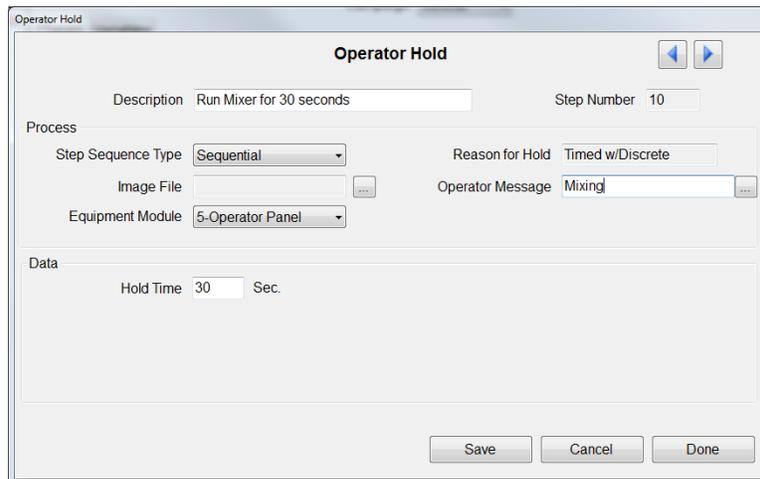
In the **Description** field, enter an instruction to the operator – "Run Mixer for 30 seconds." The **Step Sequence Type** is "Sequential," and the **Equipment Module** is "5-Operator Panel." The **Operator Message** is used as a reminder that the system is "Mixing," and the **Hold Time** is 30 seconds – the period during which the mixer should be run. Save and exit the screen.

Material 4

Now we're back to the sequence for Material 4; use the cut-paste-modify method to add these phases after the mixing period.

Once Material 4 is accounted for, we've completed all the manual transfer the recipe requires. Only one step remains – we need to direct the operator to remove the container from the scale, using an **Operator Hold Acknowledge** phase. The phase will display a message instructing the operator to remove the container and to acknowledge that this has been done:
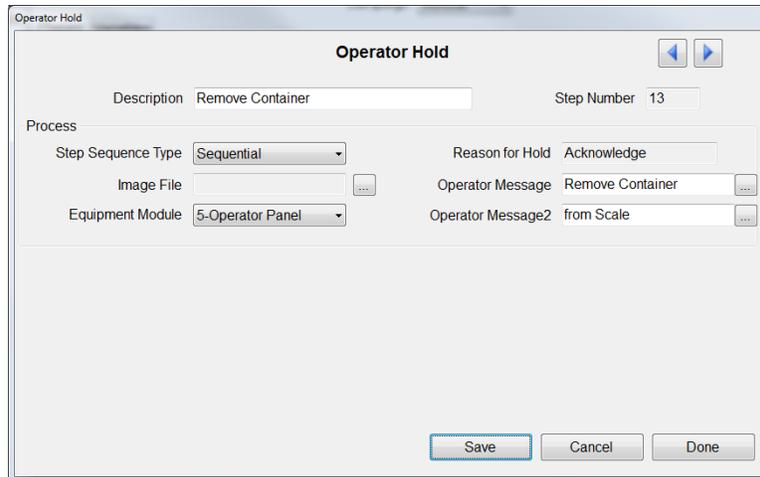
The End

The last step in the Recipe is the **End** command that lets the batch system know that we've reached the end of a recipe. This phase exists by default, and although you can view its 'configuration' screen, there's nothing to modify:
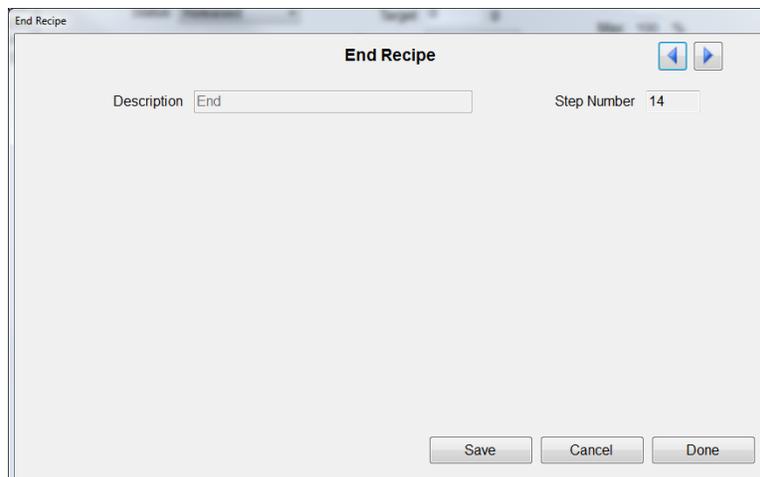
Delivered Weight Calculation

You now have a complete recipe that fulfills the customer's requirements; but you must return to the Recipe Header and perform the **Delivered Weight Calculation** mentioned on page 21. Let's review this procedure:

In the Recipe Header, first click the button beside the **Delv. Wt. formula** field:

The delivered weight formula allows us to calculate the target weight for the batch based on certain criteria. In this example the batch delivered weight will include all materials fed to the Scale 1 EM. When you click **OK**, the batch system will review the recipe, look for all the feeds to the scale, and calculate a batch Target Weight. It automatically places the resulting value in the **Target** field of the Recipe Header:

Click **OK** at the lower right corner of the screen to save the recipe in its current configuration.

Creating an Order

To run a recipe, we need to create an **Order**. This can be done either in BatchTool 780, or in the IND780batch terminal. First, we'll consider how to use BatchTool 780 to make do this.

Orders: BatchTool 780

Order Setup

In the left pane menu tree, below the "Manual 101" recipe, you'll see a branch called **Order**. Right click it, and select **New**:
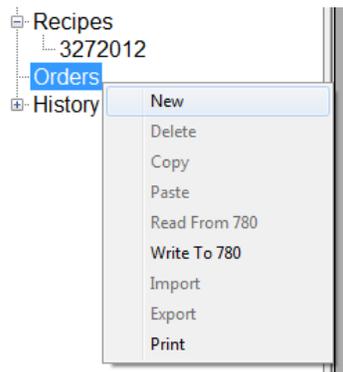
An **Orders** screen will appear in the right pane of the BatchTool window:

This screen includes the following items:

ID	Identifies the order – you can assign any identifier you like, up to 16 characters
Description	Describes the order – you can give it any description you like, up to 40 characters.
Master Recipe	Select the Master Recipe you want to execute. Click the button to the right of the **Master Recipe** field to select from available master recipes for this order. Once a recipe is selected,

	the campaign type (Vertical or Horizontal) and target weight for the batch will display.
Batch Size	This field will automatically display the size of the current batch, accounting for any rescaling that might be called for in the order.
Total Order	This field will automatically show the Total order weight. This is calculated by multiplying the **Batch Size** by the **Rescale Amount** by the **Number of Batches**.
Rescale Amount	Changes the weight of the resulting batch, by percent. The ability to rescale is constrained by settings in the recipe. In our recipe, we've permitted the batch size to be **rescaled downward** by as much as 50%, but not **increased** at all.
Number of Batches	Specifies the number of batches to be produced from this recipe. This can be any amount from 1 to 9,999 for a vertical campaign, and any number from 1 to 99 for a horizontal campaign.
Loop	If this is set to **Yes**, the order will run the selected recipe repeatedly until the operator stops the process.
Order Line 1, 2 and 3	Here you can enter information relating to this order, such as customer PO number, customer name, current temperature, etc. Each of these fields will hold 40 characters, and this information will appear in various reports.
Recurring	Set this to **Yes** if you want this order to reside in BatchTool, and not be deleted when it's run. In this case, it'll continue to exist until the user decides to delete it. This is helpful for a customer that wants to push the same order to the IND780batch terminal every day, for the operator to run.
Permanent Order	Set this to **Yes** if you want this order to reside in the IND780batch terminal until it is deleted by the user.
Convert button	This function is used to convert a batch from its current state into a different batch. This feature is covered in detail in Chapter 12 of the **IND780batch Technical Manual and BatchTool 780 Guide**. Please refer to this section to learn about the capabilities this feature offers the user.

For this order, enter data to match the screen shown here:

Write to Terminal

Now that the order's created, you're almost ready to run it. First, however, the whole configuration, recipe and order you've created must be transferred to the IND780batch terminal.

In the left pane of the BatchTool window, right click your terminal (we called it **Batch System**, on page 9) and select **Write to 780**. Assuming you're properly connected to the terminal, this will transfer all of the Equipment Modules, Control Modules, Material Paths, Recipes, and Orders to it.
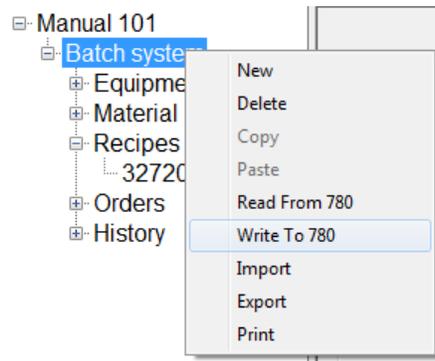
After all this information has been written to the IND780batch, you probably won't need to transfer it again because it probably won't change, unless you add a new Material Path to your configuration. If you do add a new material path, then you can write just the revised material path information to the IND780 by right clicking **Material Paths** selecting **Write to 780**:
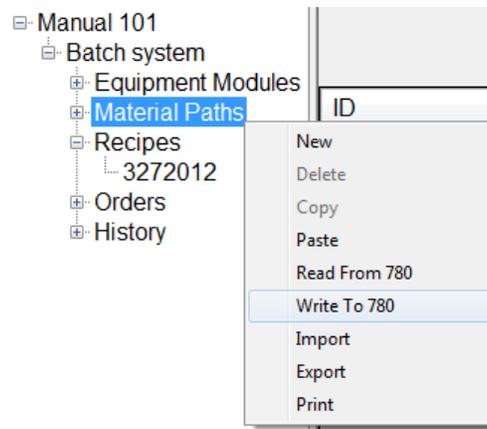
The same is true for Recipes and Orders as well. To add a new Recipe and Order, you can write these to the IND780batch by following the procedure outlined above.

Orders: IND780batch Terminal

Configuring the Terminal

Now you've seen how to create an order in BatchTool 780, let's consider how to create the same order directly in the IND780batch terminal.

First, though, you must ensure that the configuration (Equipment Modules, Control Modules, Material Paths, and Recipes) has been written to the IND780batch terminal, as described under **Write to Terminal**, above. Once that's done, you're ready to create an order in the IND780batch terminal.

Creating the Order

Press A1 Application Key on the terminal's front panel to open the default **Order View** screen:

You can see that we don't yet have any orders in our terminal. To add one, press the ⬜ (Add Order) softkey. This will display the **Add Order** screen:

Just as you did in BatchTool 780, you must add an Order ID, Order Description, and Recipe ID.

🔹 This information can be entered using the alphanumeric selection keys that appear once you select the entry field, but it's easier to do if you're using an external, QWERTY USB keyboard.

If you know your recipe's ID (in this case, we called it **3272012**) enter it. Otherwise, press the TABLE SEARCH softkey 🔍, click SEARCH 🔭, choose your recipe from the **Master Recipe List**, and click OK:

Once the recipe is selected, the **Recipe Description** field will populate and the target weight for the batch will appear. Note that this is a scrolling page, and scrolling down will show additional fields:

Note that in the **Order Type** field you can select whether this order is a **Single** order (an order that you wish to run only once) or an **Endless** order, which will keep this order in the batch terminal until an operator erases it – equivalent to the **Permanent Order** Option in BatchTool 780:

You also have three **Order Line** fields, just as we saw in BatchTool 780, where text or data that you might want to associate with this order can be added.

To specify the number of batches to run, and to apply any rescaling that might be required for this order, press the ⓘ BATCH INFORMATION softkey. Unsurprisingly, this causes the **Batch Information** screen to display:

Here you have three options: whether you want the recipe to loop, the number of batches you want to run, and a rescaling factor to apply the recipe. Recall that possible values for the **Rescale Amount** are constrained by the recipe.

There is one further softkey on the **Add Order** page, CONVERT BATCH. As noted above, this feature is covered in detail in Chapter 12 of the **IND780batch Technical Manual and BatchTool 780 Guide**. Please refer to this section to learn about the capabilities that this feature offers the user.

Here's how the **Add Order** screen looks once all the appropriate information has been entered:

Next you can press the OK softkey to add the order to the IND780batch. Your **Order View** page will now look like this:

Now you can see that we have one order that we can run, its Order ID is **4212**, its Order Description is **Acme Order 2**, and it's based on Recipe **3272012**.

Before we run this order we must first go to the IND780batch terminal and make any necessary changes to how the terminal will behave during the batch execution.

Setup requirements in the IND780

The IND780batch terminal has to be configured in order to control how it behaves when a batch executes. To make these changes, enter setup – first, press the A4 application key, then the SETUP softkey:

A screen will ask for confirmation that you wish to enter setup:

```
IP=172.18.55.42                         02/Apr/2012 11:34




Enter Setup?




 [Esc]                                              OK
                                                    ✓
```
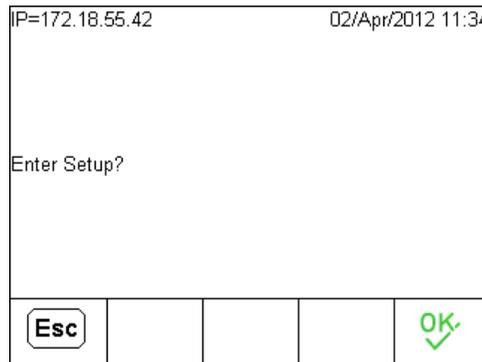
Press the OK✓ softkey to continue, and the setup menu tree will appear:

```
IP=172.18.55.42                         02/Apr/2012 11:36
  Login
  Home
 ⊟ Setup
      ⊞ Scale
      ⊞ Application
      ⊞ Terminal
      ⊞ Communication
      ⊞ Maintenance


```
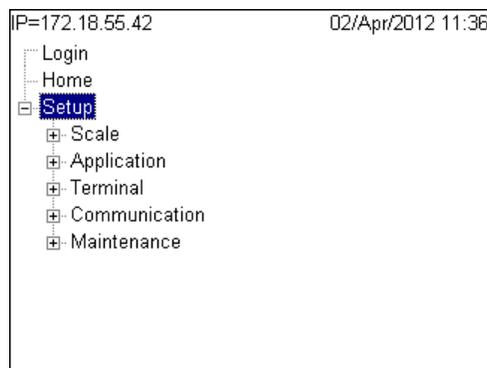
From here, you can perform scale setup and calibration, application setup (Batch, in this example), and establish communication connections for connecting to BatchTool 780. Once that's done, you can configure the terminal to print through a COM or EtherNet port, if required.

To configure the Batch application, scroll down to **Application** and press the right arrow key on the IND780:

```
IP=172.18.55.42                         02/Apr/2012 11:45
  Login                                               ▲
  Home
 ⊟ Setup
      ⊞ Scale
      ⊟ Application
           ⊞ Memory
           ⊞ Operation
           ⊞ Discrete I/O
           ⊞ Batch-780
           ⊞ TaskExpert
             Reset
      ⊞ Terminal                                      ▼
```
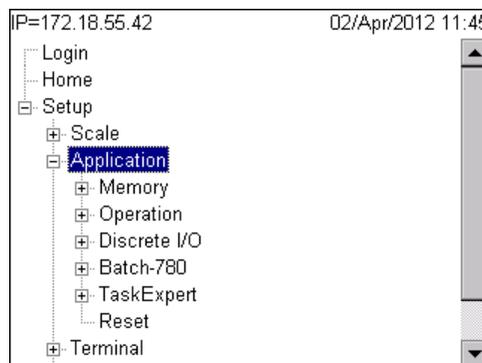
You can see that, with **Application** expanded, several selections are available. In this case we're interested in **Batch-780**, so scroll down to that and press the right arrow key again, to expand that branch:
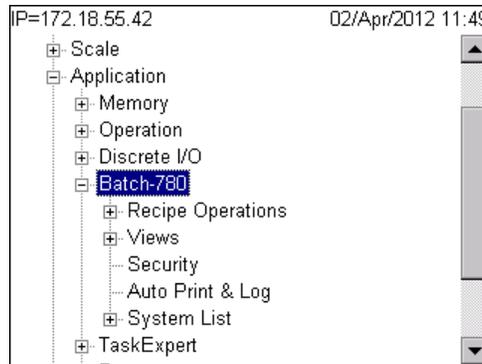
Now scroll down to **Recipe Operations** and expand that branch by pressing the right arrow:
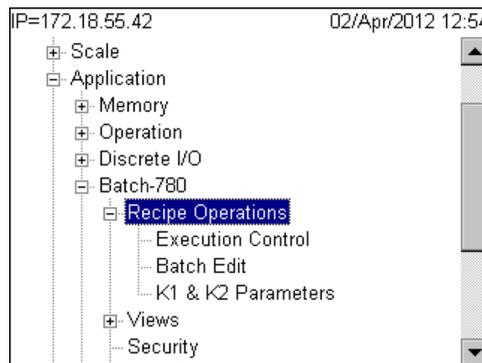
Scroll down to **Execution Control** and press the terminal's ENTER key to access the configuration screen:
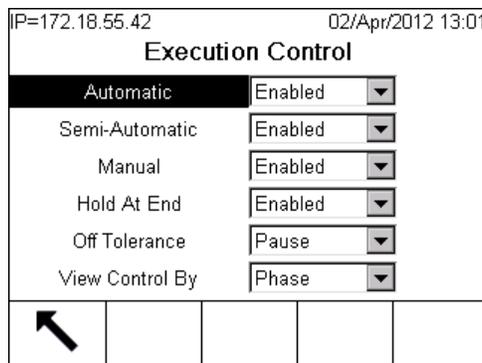
The options here determine how the system behaves while executing a batch:

Automatic	Enabled or Disabled; if enabled, the batch will execute in automatic phase mode, progressing through each phase of the recipe automatically without the need for operator intervention, unless called for in the recipe.
Semi Automatic	Enabled or Disabled. If enabled, the terminal will require the operator to press the START softkey or a discrete input, to begin the execution of each step. Steps are executed in the order defined in the recipe.
Manual	Enabled or Disabled. If enabled, the operator is required to both select and start each step. In this mode, steps may be executed in any order until the batch is complete.
Hold At End	Enabled or Disabled. If enabled, when an order is configured to loop endlessly the operator will be permitted to pause at the end of each batch operation using the Hold-At-End softkey.

Off Tolerance   This parameter has four options which determine the system's behaviour when an out-of-tolerance condition occurs:

Abort   Stops the batch, ends it as failed, and removes the order from the list.

Continue   Continues the batch as if nothing has happened.

Pause   Pauses execution and allows the operator to choose whether to resume or abort the batch.

Adjust   If a feed completes over tolerance, **Adjust** allows the operator to adjust the feed and bring it back within the tolerance range

■   Note: This feature is only active for Automatic Feeds

View Control By   This parameter determines how the recipe's progress is represented on the terminal screen during execution. It has two options. Refer to the **Recipe Execution** sections of the **Batch Application Examples** found in Chapter 15 in the **IND780batch Technical Manual and BatchTool 780 Guide**, to see an illustration of the practical effect of this selection.

Phase   During recipe execution, the EQUIPMENT DETAIL screen is always displayed.

Equipment   During recipe execution, the EQUIPMENT VIEW screen is always displayed.

Once you are happy with these settings, press the ↖ softkey to return to the Setup menu tree. Then scroll down to **Batch Edit** and press ENTER on the IND780batch's front panel:

```
IP=172.18.55.42                    09/Apr/2012 09:01
                     Batch Edit

        Rescaling       Recipe %          ▼
        Looping         Enabled           ▼
        Batch Start     Automatic         ▼
    Edit Recipe Targets Enabled           ▼
      Convert Batch     Enabled      ▼


        ↖
```
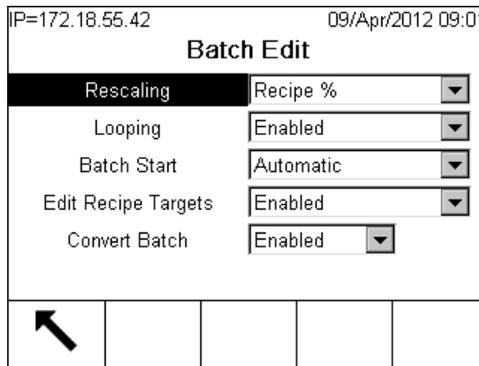
Rescaling   **Rescaling** has four options

Disabled   Disables the rescaling feature.

Recipe %   Allows the recipe to be rescaled by a percentage of the recipe's current target weight.

Recipe   Allows the recipe to be rescale to a new target weight (i.e. an absolute weight value, rather than some factor of the original size).

Material   Allows the user to rescale the recipe based on the amount of a single material that is available.

Thus, if there is only 15 kg of a material, and the recipe calls for 20, this option causes the recipe to resize all materials to 75% of the recipe value.

Looping   Disabled or Enabled. If Enabled, and Loop is set to Endless in the BatchTool 780 Orders configuration screen, the order will cycle through each batch automatically until it is complete, unless the Hold at End softkey is pressed. Looping is only active in Automatic phase execution.

Batch Start	If Looping is Enabled and the order is set up to loop, the start of looping can be Automatic, without operator intervention, or Manual, starting only after the operator acknowledges a prompt. If Batch Start is set to Manual, the operator must start the next batch by pressing the [▶] softkey.
Edit Recipe Targets	By default, **Edit Recipe Targets** is Disabled. If it is Enabled, the operator can edit individual targets within the recipe. Unlike rescaling, editing recipe targets can change the ratio of materials in the product; therefore it is unusual to allow the operator to have access to this capability.
Convert Batch	By default, **Convert Batch** is Disabled. If it is Enabled, the operator can convert a batch – the existing batch can be converted into a completely different one, eliminating the need to throw out unfinished batches of material. Unfinished batches can be re-run to make a finished product.

Once you are happy with these settings press the ↖ softkey to return to the Setup menu screen. The K1 & K2 parameters are not relevant to manual batching, since the operator is the feed mechanism, so we can skip those. The next group of terminal settings that can be adjusted are the **Views**:
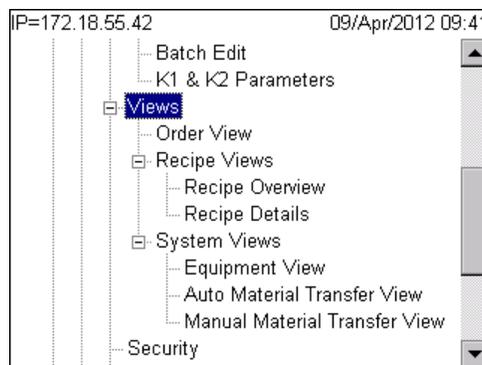
Here, the user can configure what is displayed on the IND780batch terminal screen. Certain sensitive information, for instance, can be disabled. You might have a customer who doesn't want the operator to see the actual target weight for each material; the view settings allow the user to prevent the target weight from showing on the IND780 display.

The next group of terminal settings is **Security**:
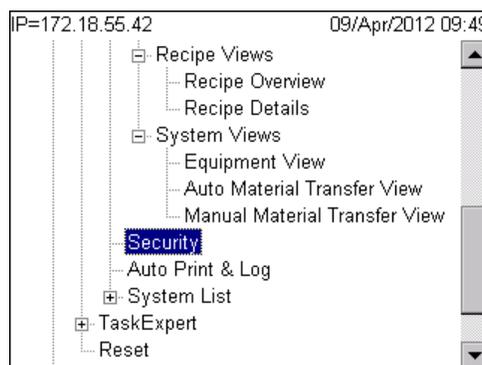
If the operator is going to be required to log in in order to work the system, for example, the security settings must be modified:

```
IP=172.18.55.42                09/Apr/2012 09:57
                    Security
        Operator Login    Disabled    ▼
        Login Timeout     0        minutes




          ↖              🔍▤
```
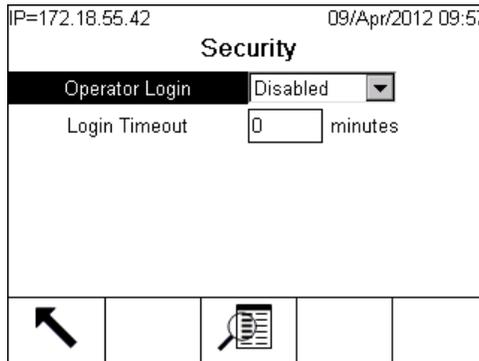
Operator Login Enabled or Disabled. If enabled, the operator must log in to the system in order to run orders. If it is disabled, any user will be able to run the system, with no constraints on access to functions.

Login Timeout This parameter sets the period of inactivity, in minutes, before which the system will automatically log out any currently logged-in user and display a pop-up message indicating the logged-out condition.

Pressing the 🔍▤ softkey opens a scrolling screen where you can set different access levels for certain actions that can be performed in the Batch terminal:

```
IP=172.18.55.42        09/Apr/2012 11:18      IP=172.18.55.42        09/Apr/2012 11:19
        Access Level                                  Access Level
  Abort Batch      Supervisor  ▼  ▲        Rescale Recipe    Supervisor  ▼  ▲
  Run Reports      Supervisor  ▼           Adjust Recipe     Supervisor  ▼
  Clear History / Log Supervisor ▼         Accept Off Tolerance Supervisor ▼
  Switch Mode      Supervisor  ▼
  Add Order        Supervisor  ▼
  Delete Order     Supervisor  ▼  ▼                                      ▼
  ↖                                        ↖
```
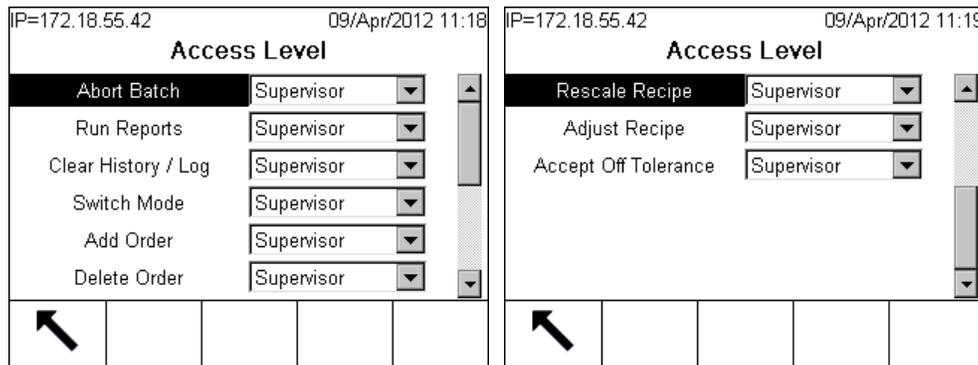
You can select Administrator, Supervisor, Maintenance, or Operator for each of these action levels in Batch.

Once you are happy with these settings, press the ↖ softkey to return to the Setup menu tree.

The next group of terminal settings is **Auto Print & Log**:

```
IP=172.18.55.42                09/Apr/2012 11:30
               Auto Print & Log
      Batch Transaction   Disabled   ▼
      Batch Summary       Enabled    ▼
      Print Audit Log     Enabled    ▼
      Batch History       Enabled    ▼


          ↖
```
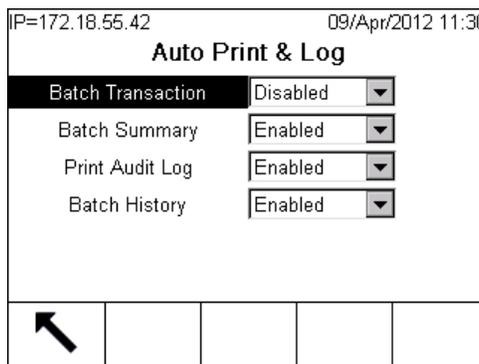
These settings control the output of data that can be printed and/or logged while a batch executes.

Batch Transaction   When enabled, batch transaction data is automatically printed after each material transfer phase in a recipe.

Batch Summary   When enabled, a Batch Summary report is automatically printed for each batch that is executed.

Print Audit Log   When enabled, the Audit is written to the Compact Flash card on the IND780batch and to a configured LPRINT device. (The Aduit log records all changes made at the IND780batch terminal).

Batch History   When enabled, all phase history records are logged, and these records are used to create reports in BatchTool 780.

Once you are happy with these settings press the ↖ softkey to return to the Setup menu tree.

The next group of terminal settings is **System List**:

```
IP=172.18.55.42                              09/Apr/2012 11:39
                    ⊟ System Views                        ▲
                        ── Equipment View
                        ── Auto Material Transfer View
                        ── Manual Material Transfer View
                ── Security
                ── Auto Print & Log
                    ⊟ System List
                        ── Equipment Module
                        ── Control Module
                        ── Material Path
                        ── Recipe
                ⊞ TaskExpert                              ▼
```

The System List screens are read-only and show all the elements configured for the batching system. You can use them to confirm that the configuration has been downloaded from the PC Tool correctly.
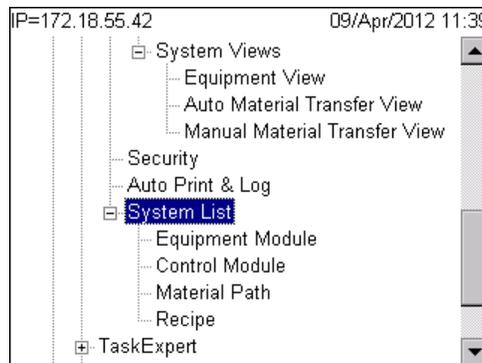
The Batch-specific application settings in the IND780 terminal are now complete, and at this point you're ready to run the Batch we created in the BatchTool. It's important to note that this document does not cover how to setup the scale or communication settings in the IND780batch terminal. These aspects are general IND780 settings, and are covered in the **IND780 Installation Manual** and **User's Guide**. Please refer to those documents for additional details on these aspects of configuration.

Operation

To run the order you created first you must select the order from the available orders on the Order View Page. In this example you only created one order so there is only one order to select. When you select the Order you will see that the ⬛ softkey appears:

■ Note: If you don't see the ⬛ softkey, press the MORE softkey to access another row of softkeys.

At this stage you can press the ⬛ softkey to start the batch. You can also view details about the batch by pressing A2 and A3 softkeys. A2 will display the Recipe Overview screen, and A3 the Equipment View screen. When you press the ⬛ softkey, the batch order will load and we can see the recipe we created in action. The first step is the Operator Hold Entry phase requiring the operator to enter a User ID number:

Enter the ID number and press OK. The next phase asks the operator to put a container on the scale of a certain capacity and tare weight. This capacity value is used in the recipe pre-scan to ensure that the container is large enough to hold the batch:

```
IP=172.18.55.42                    09/Apr/2012 13:18

Recipe: 3272012 Step: 02    Batch # : 1 of 1



Place Container on Scale 1 and Press OK
Container Tare: 10 g
Container Capacity: 1500 g                    ◯

                                              OK
                                              ✓
```

Press OK to continue. The final step before actual material transfer begins is another Operator Hold Entry phase, where the Batch Lot number is entered:

```
IP=172.18.55.42                    09/Apr/2012 13:21

Recipe: 3272012 Step: 03    Batch # : 1 of 1



Enter Batch
Lot #

┌─────────────────────────────┐  ◯
└─────────────────────────────┘

                                              OK
                                              ✓
```

This screen accepts any numeric value from 0 to 999999. Press OK to continue.

Now the material transfer phases begin, starting with the Verify Material phase for material 1. The operator is prompted to enter the material ID number, either using a barcode scanner or via keyboard entry. The entered value will be compared to the verification string we put in this phase in BatchTool 780; in this case, for material 1 the verification string was 111.

```
IP=172.18.55.42                    09/Apr/2012 13:30

Recipe: 3272012 Step: 04    Batch # : 1 of 1



Scan bar code on
Material 1

┌─────────────────────────────┐  ◯
│ 111                         │
└─────────────────────────────┘

                                              OK
                                              ✓
```

Enter 111 in this step and press OK to continue. The next step is the manual transfer phase for material 1. The operator adds material 1 to the container, while watching the bar graph:

```
IP=172.18.55.42                    09/Apr/2012 13:34

              300.0
                    g     B/G    Scale 1
1,Material 1



             -15.0   ⊕300.0 g    +15.0
Recipe: 3272012    Step: 05                  ○

                                        OK
```

When the feed is within the tolerance range (it's exactly correct in the image above), press OK to complete the feed and move to the material verification phase for material 2.

The same process is followed for materials 2 and 3, and then we reach the Timed Operator Hold phase, during which the operator is prompted to run the mixer in the container:

```
IP=172.18.55.42                    09/Apr/2012 13:43


Recipe: 3272012 Step: 10    Batch # : 1 of 1




Holding: 7 Seconds
Mix for 30 sec


                                           ●

```
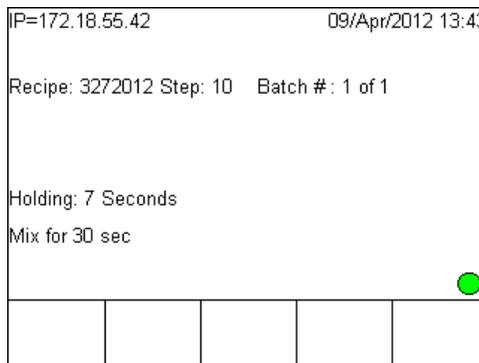
The screen shows the instruction ("Mix for 30 seconds") and the remaining time – in the image above, 7 seconds remain. Once the time has elapsed, the operator stops running the mixer and the recipe moves automatically to the next step, which is to Verify Material 4.

When the Material 4 feed is complete and acknowledged with OK, the final phase appears, directing the operator to remove the container from the scale:

```
IP=172.18.55.42                    09/Apr/2012 13:52


Recipe: 3272012 Step: 13    Batch # : 1 of 1




Remove Container
from Scale
                                           ○

                                        OK
```
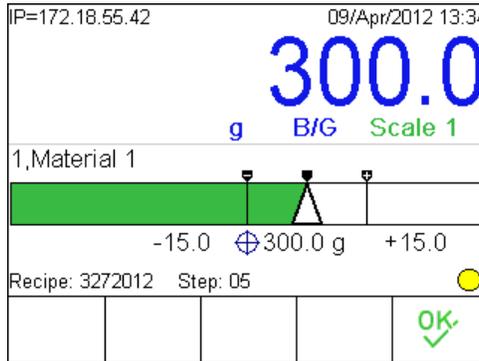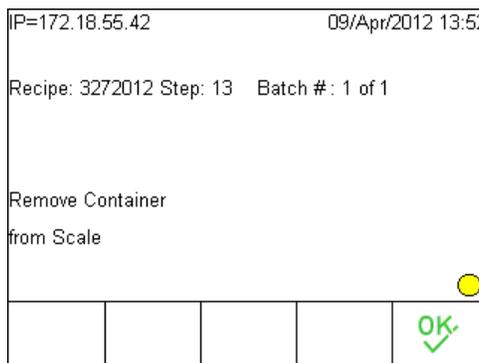
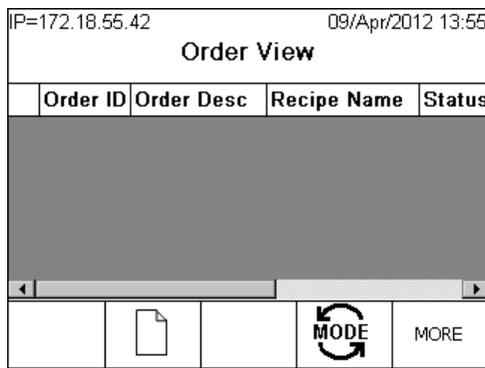With the batch complete, the operator will now see the following screen:

```
IP=172.18.55.42                    09/Apr/2012 13:54




                No Active Equipment
             Order Complete, Press A1



                                        ●

    ┌──────┬──────┬──────┬──────┬──────┐
    │      │      │      │      │      │
    └──────┴──────┴──────┴──────┴──────┘
```
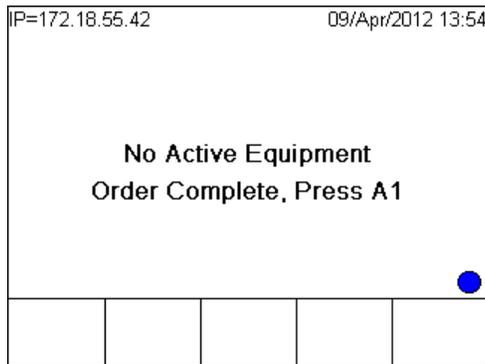
Perssing the A1 application key returns to the **Order View** screen:

```
IP=172.18.55.42                    09/Apr/2012 13:55
                  Order View

  │Order ID│Order Desc │Recipe Name │Status




  ◄ ▐▐▐▐▐▐▐▐▐▐▐                       ►
    ┌──────┬──────┬──────┬──────┬──────┐
    │      │  ▭   │      │ MODE │ MORE │
    └──────┴──────┴──────┴──────┴──────┘
```

Since there are no more outstanding orders to run, let's read the History data from the terminal into BatchTool 780, and examine how to run the standard reports in BatchTool.

Managing History/Running Reports

Reading History to the Terminal

To transfer History data from the IND780batch terminal into BatchTool 780, right click on History in the left pane of the BatchTool window, and **Read from 780**:
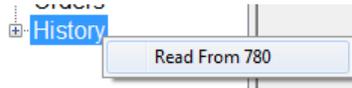
After the read completes you will see that you should have History records when you click on **History**:


Your history information page may not contain as many records as the one shown above, but as long as you have some records then you have data that will allow you to run reports.

📘 Note: Once you read the history data into BatchTool 780 from the IND780batch terminal, the history table in the IND780batch terminal is erased. As a general practice, the customer should get into a routine habit of reading the history data from the IND780batch terminal into BatchTool 780 at least once a month.
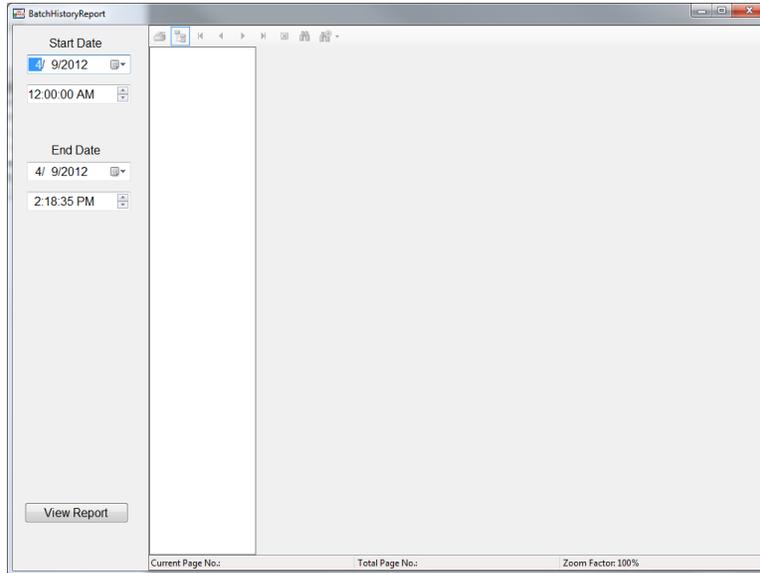
Reports

The most commonly used reports are those dealing with production, so let's walk through how to view them. First expand the History branch on the left pane view in BatchTool 780. Here, you'll see al ist of standard reports:
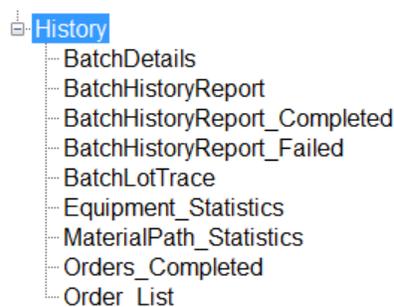
Batch History

The first report to look at is the **BatchHistoryReport**. This shows the user all the batches that have been run during a specified date and time range. Click on **BatchHistoryReport** and you'll see the following window in front of the main BatchTool screen:


Use the left pane to specifiy a date and time range – note that the Start Date defaults to the current date at 12:00:00am. Once the correct range is selected, click the [View Report] button at the bottom left of the screen. The system will then generate a report something like the one shown below, a summary of all batches that have been run during the defined period, with their start and end times, the name of the batch, the actual delivered weight, and the batch's final status:

Batch Details

The next report type is **BatchDetails**, which shows a step-by-step account of each recipe phase and its outcome. Click on BatchDetails, and a new window will appear:
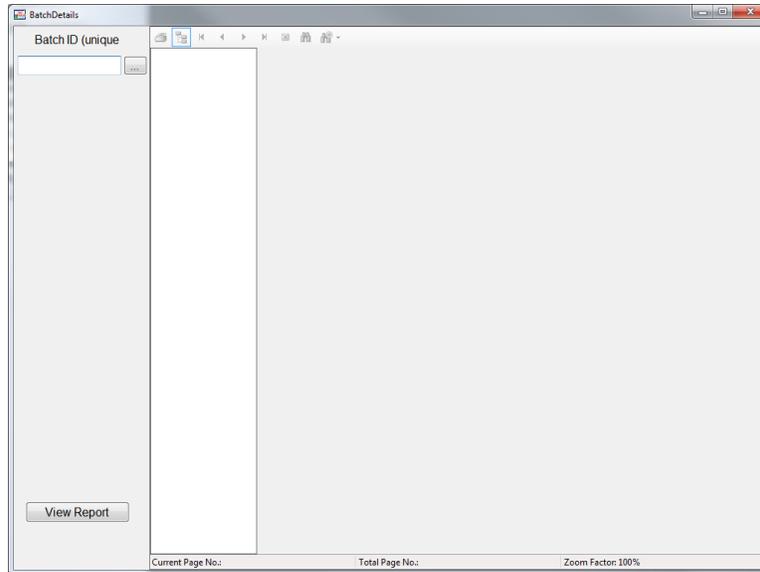
Next you can either enter the Batch ID into the field and press [View Report], or press the [...] button to access a list of Batch IDs from the history file. Here's an example of a list:

This list organizes the most recent batch first and the oldest batch last – so by clicking on the first batch in the list we can view the **Batch Detail Report** for the batch we just ran:

Batch Detail Report   Project: Manual 101   Terminal: Batch system

Batch Name: 327200002n0001IN   Order: Acme Order 2   Recipe: 3272012

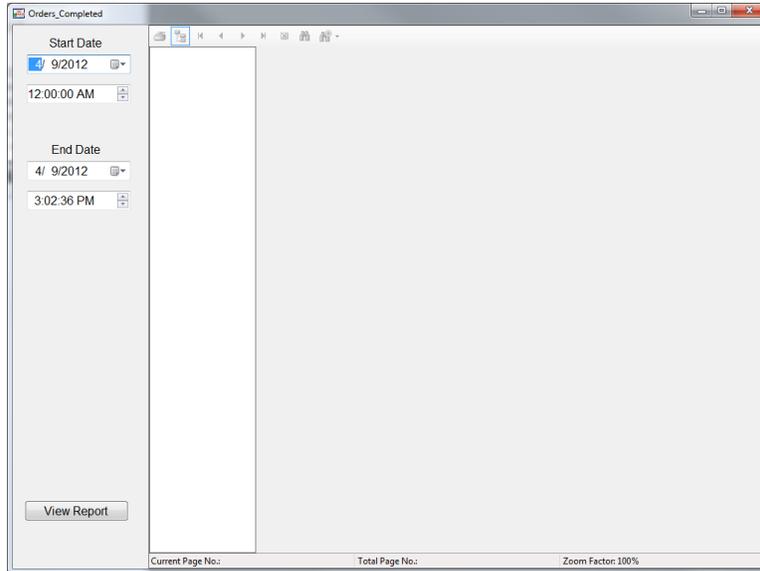| Step #	StartDateTime	EndDateTime	Phase Type			
	4/9/2012 1:11:12PM	4/9/2012 1:53:40PM	Batch Results	Target Weight: 1100 g		
			Delivered Weight:: 1100.000 g		Status: Complete OK	
1	4/9/2012 1:11:12PM	4/9/2012 1:18:01PM	PHASE_OPER_HOLD Enter User ID #		Status: Complete OK	
			Entry Value: 123			
2	4/9/2012 1:18:01PM	4/9/2012 1:21:23PM	PHASE_OPER_HOLD Verify Container		Status: Complete OK	
			Entry Value: ACK			
3	4/9/2012 1:21:23PM	4/9/2012 1:25:20PM	PHASE_OPER_HOLD Enter Lot #		Status: Complete OK	
			Entry Value: 12345			
4	4/9/2012 1:25:20PM	4/9/2012 1:34:23PM	PHASE_OPER_HOLD Verify Material 1		Status: Complete OK	
			Entry Value: 111			
5	4/9/2012 1:34:25PM	4/9/2012 1:37:25PM	PHASE_MANUAL	Add Material 1	Status: Complete OK	
		Material: 1 - Material 1	Target: 300 g	Delivered: 300.0 g	Tare Weight: 0.0 g	
6	4/9/2012 1:37:25PM	4/9/2012 1:39:34PM	PHASE_OPER_HOLD Verify Material 2		Status: Complete OK	
			Entry Value: 222			
7	4/9/2012 1:39:38PM	4/9/2012 1:40:50PM	PHASE_MANUAL	Add Material 2	Status: Complete OK	
		Material: 2 - Material 2	Target: 200 g	Delivered: 200.0 g	Tare Weight: 300.0 g	
8	4/9/2012 1:40:50PM	4/9/2012 1:42:15PM	PHASE_OPER_HOLD Verify Material 3		Status: Complete OK	
			Entry Value: 333			

Page 1 of 2   4/9/2012 2:46:31PM

Step #	StartDateTime	EndDateTime	Phase Type			
9	4/9/2012 1:42:18PM	4/9/2012 1:43:37PM	PHASE_MANUAL	Add Material 3	Status: Complete OK	
		Material: 3 - Material 3	Target: 400 g	Delivered: 400.0 g	Tare Weight: 500.0 g	
10	4/9/2012 1:43:37PM	4/9/2012 1:44:07PM	PHASE_OPER_HOLD Run Mixer		Status: Complete OK	
			Entry Value:			
11	4/9/2012 1:44:07PM	4/9/2012 1:50:55PM	PHASE_OPER_HOLD Verify Material 4		Status: Complete OK	
			Entry Value: 444			
12	4/9/2012 1:50:57PM	4/9/2012 1:52:38PM	PHASE_MANUAL	Add Material 4	Status: Complete OK	
		Material: 4 - Material 4	Target: 200 g	Delivered: 200.0 g	Tare Weight: 900.0 g	
13	4/9/2012 1:52:38PM	4/9/2012 1:53:40PM	PHASE_OPER_HOLD Remove Container		Status: Complete OK	
			Entry Value: ACK			
14	4/9/2012 1:53:40PM	4/9/2012 1:53:40PM	PHASE_END_RECIPE End		Status: Complete OK	

Page 2 of 2   4/9/2012 2:46:31PM

Completed Orders

The next report type is **Orders_Completed**, which shows details on completed orders. It provides a bit more detail than the **BatchHistoryReport**. To generate this report, click on **Orders_Completed** and then select the start and end dates from the options pane.

Finally, select at the lower left to display the report:

Materal Path Statistics

One more report that may be useful deals with **MaterialPath_Statistics**. To access this report, click on **MaterialPath_Statistics** in the left pane of the BatchTool window:

Material Statistics for   Project: Manual 101   Terminal: Batch system

Material #	Description	Last Feed Weight	Last Run Time	TotalNumber	Total Weight
1	GIW Material #1	300.000 g	4/9/2012 1:53:43PM	144	1029613.400 g
11	Weigh Out	500.200 g	3/13/2012 3:21:19PM	98	76294.000 g
2	GIW Material #2	200.000 g	4/9/2012 1:53:44PM	143	1024588.600 g
3	GIW Material #3	400.000 g	4/9/2012 1:53:45PM	142	791992.000 g
4	GIW Material #4	200.000 g	4/9/2012 1:53:46PM	120	812192.400 g
5	Material E	810.000 g	3/21/2012 3:34:01PM	16	1202650.800 g
6	Discharge Material	88.0 g	4/5/2012 11:47:18AM	13	376485.2 g
7	Hand-Add Material F	493.0 g	4/5/2012 11:47:22AM	10	3251146.8 g

Page 1 of 1   4/9/2012 3:11:21PM

These material path details include the last feed weight for the associated material, the last time it was fed, the total number of times it was fed, and the total weight of that material that's been fed.

There are several other report type available for use, and the examples here are just a small sample of the ones most commonly asked about by customers.

Report Data Management

Lastly, you can export or delete your Batch History from the BatchTool 780. To Export, select **Tools | History Management | Export | History** from the BatchTool's menu bar. The BatchTool will export all of the history data associated with this project into a comma separated values file called **INDHistory.csv**, and place it into a folder of your choice.
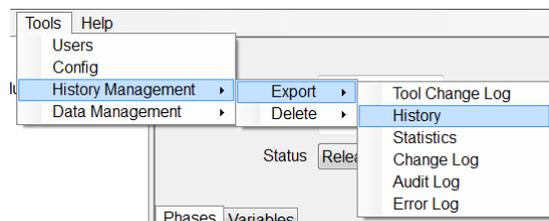
Similarly – for example, after carrying out the export – you can delete your history data from BatchTool 780 by selecting **Tools | History Management | Delete | History**.
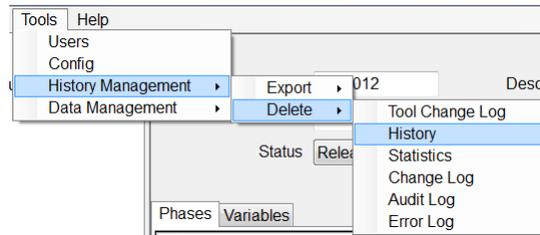
▪ Take care! Performing this action will delete all the history records from BatchTool 780, and they cannot be restored. Exercise extreme care before performing this action.

Conclusion

This completes the actions required to configure, run and record data from a manual batching operation. The intent of this document has been to give you a general outline to follow when configuring a manual batch application. Obviously, there are many more phase types available for creating a recipe than we've used here, and a lot more detail on the various features and functions of the IND780batch, and these can be reviewed in detail in the **IND780batch Technical Manual and BatchTool Guide**.

Best of luck in your batch efforts!