Tool Management

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Tools can be configured in the MES to define what they are, where they can be stored and used, what maintenance and calibration plans they are on, and whether they are controlled or uncontrolled.

Tool Manager

The **Tool Manager** screen allows the user to manage the tools in the system. You can create and edit **Tool Groups** and **Tool Types** from here. The user can also assign and unassign maintenance (or calibration) plans to individual tools.

The Tool Manager provides an overview of all of the tools in the system, including current tool status, location and validation status (unapproved / preproduction / approved).

You can also access other functions already discussed, directly from the **Tool Manager**.

Tool Type

Every tool in MES must have a **Tool Type** which has a name, external reference, description and location storage configuration.

The storage location mode (see details in **Create a Tool Type** section below), allows you to ensure that tooling is stored separately from stock or in designated locations with controls if needed.

Modular Tool Type

Modular tools are tools that might contain several different elements (e.g., cavities, inserts, cores, etc.) that can all process items at the same time.

'Element' is a catchall word for the modular components such as inserts, cavities, pockets, etc., that can be attached to a tool required for the tool to be used.

The production rate is determined by the number of elements. e.g., cavities and this determines the ratio of production to tool cycles. For example, a mould tool which has 100 cavities can mould 100 items every time it cycles. This is important if you are tracking the tool cycle count, for example, to determine when maintenance is due.

Typically, the number of elements is fixed but it can vary if elements become unavailable, for example, a mould tool becomes blocked or damaged. Although the tool might have 100 cavities, the current number of active cavities might fall and therefore the production rate and tool cycles will be adjusted accordingly. For example, if one cavity is damaged or faulty and therefore the mould tool can only produce 99 items every time it cycles. A job for 1000 items would take 10 cycles of the fully functioning tool to complete - it would take 11 cycles to complete if one of the cavities were removed.

Tool Types can be modelled as modular with options to specify:

- The name of the elements that go into the tool (e.g., cavities / inserts / cores).
- The maximum number of elements that the tool can be made up of.
- The number of elements currently in use.

The use count of a modular tool can then be based on the combination of the output from a machine divided by the max elements or the current elements if this is populated.

If the tool use action requirement is configured as ‘cycle per unit of production’:

*Calculation of the number of tool uses = No. Cycles per unit of production * units produced / number of active elements in the tool.*

Note if tool use action is configured as ‘fixed’, this will be a fixed number of tool uses for the item (regardless of qty of the item) and will be recorded at first completion.

Elements

A tool can be made up of a number of elements.

'Element' is a catchall word for the modular components such as inserts, cavities, pockets, dies etc., that can be attached to a tool required for the tool to be used. It's best described by way of examples:

- A Lego injection mould might have 64 cavities that outputs 64 Lego bricks with each cycle. The cavities are elements.
- A moulding tool might have 20 inserts. The inserts are elements.
- A stamping machine might have 64 dyes. The dyes are elements.
- A rotating machine might have 8 stations/heads. The stations/heads are elements.

Note that an element is simply the name used to describe the set of cavities, inserts, heads, etc., so it is meaningful for the operator - it is not intended to identify individual elements in the system or tool.

Reasons why it's important to track elements:

- Production rate is determined by the number of cavities. If you're a cavity down, your capacity will be impacted.
- The number of cavities, inserts, etc., determines the ratio of production to tool cycles. This is important if the tool’s maintenance plan is based on the number of cycles.

Create a Tool Type

To create a Tool Type

1. Navigate to **Tool Manager** click the **Tool Type** button and click **New**.

2. Complete the **Add Tool Type** pop-up.

Add/Edit Tool Type input screen

Blue fields in the form are required and are flagged with an asterisk (*) in this document.

- **SUID***
- **Name***: Name of the **Tool Type**.
- **Description**: Provide a description.
- **Element Name**: Give the element name that is meaningful to the operator, e.g., "cavity", "head", "dye", etc. Elements are the modular components a tool requires which could be inserts, heads, cavities, etc. The element name can vary dependent on the technology/type of modular tool. For more information, see the Elements section.
- **Location Mode***: Options:

    - *Do Not Filter*: Can be stored in any location.

    - *Warehouse*: Restricted to locations within a designated warehouse.

    - *Location*: Allows you to specify one or more locations for the tool to be located in. Note that some of these locations may only be able to have one tool of a type stored there at any one time , e.g., in a moulding machine you can only have one mould tool located in the machine at any one time. This restriction can be configured at a location level by selecting the **Tool Type**, clicking **Location** and then assigning locations/setting restriction as

needed.

View Tools

Select a **Tool Type** and click **Tools**, to open the **Tool Manager**, to see the tools assigned to the **Tool Type**. You can also assign and unassign tools to the **Tool Type** on this page.

Notes

You can leave notes about the tools of this types. Notes can be archived.

Tool Group

Tools can be grouped into **Tool Groups**, which are either controlled or uncontrolled. Controlled tools require stricter validation and approval for changes, while non-controlled tools offer greater flexibility and reduced admin when strict control is not required. Only controlled tools are allowed to be used in controlled recipes.

Tool Groups can be used to define which specific tools are able to be used to facilitate an action in a workflow. Note that a group can contain more than one **Tool Type**, e.g., digital torque wrench vs manual torque wrench may have different calibration requirements but both could potentially be used to tighten a specific bolt.

To create a **Tool Group**:

1. Navigate to **Tool Manager** and click the **Manage Tool Groups** button and click **New**.
2. Provide a **Name** for the **Tool Group**, **SUID** (optional) and specify if it is controlled, then click **Save**.
3. Select a **Tool Group** and under the **Tools** section, assign/unassign tools to the group. When you select a **Tool Group**, you can see the which tools are assigned to that group in the list under the **Tools** section. Assigned tools are highlighted in yellow and appear at the top of the list.

Where Used

You can quickly see where a **Tool Group** is used. The **Where Used** page displays the product, workflow, operation, operation number and action where the selected Tool Group is used.

Tool Group Revision

For details of the revisions for a selected **Tool Group**, click the **Revision** button to display the **Tool Group Revision** page.

Create a Tool

1. Navigate to **Tool Manager** (also accessible from the **Tool Types ->Tools** page filtered for the selected **Tool Type** filtered for the selected **Tool Type**) and click the **New** button.
2. Complete the **New Tool** input screen.

Add/Edit Tool

Blue fields in the form are required and are flagged with an asterisk (*) in this document.

- **Suid***
- **Serial No***: A unique serial number of the tool.
- **Max Number of elements***: The maximum number of elements the tool has, e.g., an injection moulding tool with 8 cavities.

- **Current number of elements** *: The number of working elements. For example 7 cavities as one of the cavities is damaged.
- **Status***: Select a status. Options for status can be configured in the **Change Status** screen.
- **Location***: Specify a location for the tool. (Location selected needs to comply with the location mode on the Tool Type).
- **Validation Status***: Select a validation status. Options:
    - Unapproved: Use cannot be recorded against any item production.
    - Approved: Use can be recorded against production of an item.
    - Preproduction: Use can only be recorded against an item being made using a preproduction or virtual test recipe.

Change Status

In addition to validation statuses the user can also configure custom statuses which can control the availability of a tool. For example:

- **Available**: Tool is available for use.
- **Obsolete**: Tool is no longer in use.
- **Out for calibration**: Tool is being calibrated and is not available to be used.

Define Tool Statuses

1. Navigate to the **Tool Status** page and click **New**.

2. Complete the **New Tool Status** pop-up.

New/Edit Tool Status

Blue fields in the form are required and are flagged with an asterisk (*) in this document.

- **Suid***
- **Name***: Name of the status.
- **Description**: A description of the status if required.
- **Allow Use** checkbox*: Defines for which **Tool Statuses** the tool can be used. By default, this checkbox is ticked. Tools that are in a status that does not allow use are removed from the dropdown options in a workflow action.

Tool Properties

Click the **Properties** button to display the **Tool Properties** pop-up. Here you can provide additional useful information about the tool.

Tool/Work Centre properties are defined in the Property Definitions page.

Assigned Tool Groups

You can assign/unassign a selected tool to a group.

Where Used

You can quickly see where a **Tool** is used. The **Where Used** page displays the product, workflow, operation, operation number and action where the selected **Tool Group** is used.

Revision History

For details of the revisions for a selected Tool, click the **Revision History** button to display the **Tool Revision** page.

Maintenance Plan

You can view the **Maintenance Plans** associated with the selected tool. You can assign/unassign maintenance plans. For more information, see Maintenance Plans.

Manage Tool Groups

See the section on Tool Groups.

Tool Types

See the section on Tool Types.

Move

The **Tool Move** pop-up is accessible from both the workstation screen and the **Tool Manager**.

1. Select the tool you want to move in **Tool Manager** and click the **Move** button.
2. Complete the **Tool Move** pop-up.
3. Select the **To Location.** This field can be filtered by **Work Centre** or **Warehouse**.

Manual Tool Use

To record a tool use and is typically used to correct historical use counts. For mor information, see the **Tool Usage** section.

1. Select the tool you to change the use counts for and click the **Manual Tool Use** button.
2. In the **Set Manual Tool Use Count** screen, click **Add**.
3. Provide the number of uses, use date and an optional comment.

Tool Usage

You can record a tool use in one of three ways:

- **Manual Tool Use**: Typically to correct historical use counts. For example, when you create a new tool and you need to record that it's done 1000 cycles since its last calibration, then you will use the **Manual Tool Use** function.
- **Tool Use workflow action**: On performing an operation, the operator is prompted to record which tool has been used to satisfy each of the requirements and how many times it's cycled as a one-off for that operation. For more information, see Tool Use action.

  Examples:
  - Torque Wrench: In a vehicle assembly operation, if there were 4 bolts to tighten, the torque wrench would cycle 4 times per unit produced. Action use count =4, use count mode cycles per unit of production
  - Mould Tool: In an injection moulding operation, the number of mould tool cycles would depend on the number of mould cavities and the batch size. e.g. for a batch size of 1000 with a mould tool with 10 cavities, the tool would cycle 100 times. Action use count = 1 use count mode cycles per unit of production.
  - Balance: In a batch process, a sample is taken and weighed at a test operation. The balance is used once regardless of batch size. Action use count = 1 use count mode = fixed.
- **Tool Use (Silent) workflow action**: You have one action to say what tools to move into work centre locations for a job and then the use count is recorded on quantity completions after that. For more information, see Tool Use (Silent) Action.

This mode is useful for longer running batch processes where the tool would be set up and would be used over the duration of the batch.

When using a silent tool, you must select a single tool of the specified type at the work centre location. Each time you complete a quantity, the system automatically records tool usage in the background. It calculates the number of cycles based on the quantities produced, or applies a fixed number of uses for the total quantity if configured that way.

Example:

- Mould Tool: In an injection moulding operation, the number of mould tool cycles would depend on the number of mould cavities and the batch size. e.g. for a batch size of 1000 with a mould tool with 10 cavities, the tool would cycle 100 times. Action use count = 1 use count mode cycles per unit of production.