Keyence IM-8001 (KIM) Interface Manager

User Manual & Documentation Guide

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KIM Interface Manager – User Manual

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I: Understanding the Program & Environment

Purpose:

The purpose of the KIM Interface is to bridge the gap between **i-Reporter Forms (Gateway)** and **Keyence IM-8001** lineside machines. The software integrates the two systems, allowing YNA to utilize the information collected by Keyence IM-8001 machines quickly and directly.

Documentation & Support:

To improve YNA's utilization of the KIM Interface software, a large suite of documentation has been created. This documentation will help new users learn to navigate, understand, and use the KIM Interface in an efficient, effective way.

Reading this entire document is the best way to understand the specifications of the KIM Interface. The information included will outline each of the functions of the software, including a behind-the-scenes explanation and a use guide.

Much of this software runs on the backbones of the YNA network. If any issues occur while using this software, please contact the IT Department to verify that the system is configured correctly. If the issue cannot be resolved by the network managers, you may contact Mason Ritchason (via GitHub) for support with the software:

Mason Ritchason – https://github.com/masonritchason

For more information on the development and design of the software, visit KIM Interface Manager on GitHub. A history of the program's development and versioning, including issue history, can be accessed from this repository. Users can create a GitHub account and submit bug reports, create new feature requests, and even submit security alerts to bring attention to possible vulnerabilities.

System Files & Environment:

The KIM Interface is a medium-sized software that involves several components. Many of these components are "back-end" and will not require user interaction. However, these files are still necessary. **Manipulation of the system files is *highly discouraged***; the system environment is configured to function in a specific way, so manually editing the environment will likely cause issues.

KIM Interface is designed to run from the **Gateway Host VM** on YNA's network. Users should operate the KIM Interface from the **Gateway Host** to avoid network issues, permissions issues, etc. It is installed and located at the following directory:

***Host* > This PC > System (C:) > Program Files > ConMas Gateway > scripts > KIM Interface**

A KIM Interface Manager shortcut has also been placed on the desktop of the Gateway Host VM. You can quickly access it from there.

An explanation of each folder and file in the KIM Interface system environment begins on the next page.

I: Understanding the Program & Environment

System Files & Environment (continued):

application (folder): This folder holds most of the system's files. These files are generally not to be interacted with. They are self-sufficient components and do not need any special instruction.

__pycache__ (folder): A Python dependency folder. **Do not** manipulate this folder in any way. Doing so can cause issues with Python's environment, a very difficult issue to fix.

assests (folder): A system dependency folder. Manipulating this folder may cause graphical issues and even cause crashes in the system. **Do not** manipulate this folder.

bin (folder): A temporary, 'garbage bin' folder. The system utilizes this folder to save temporary files such as converted CSV sheets.

build (folder): This folder may or may not be in the system environment at given times. These files are development build resources and are generally not required.

classes (folder): A Python dependency folder. **Do not** manipulate this folder. Without the Python classes in this folder, the KIM Interface Manager will not function properly.

config (folder): This file holds the configuration information that the KIM Interface software runs from. It holds Model, Machine, and general configuration information and is crucial to the system. Editing this file is not recommended, especially if the user is not literate in the JSON language syntax. Making changes to this file without understanding how JSON works or how the system formats its own configuration can cause **fatal issues, possibly corrupting the entire system's saved data.** The configuration file is built up over time as users add, edit, and remove components of the Keyence IM-8001 machines and the i-Reporter forms that utilize their information. If this file is corrupted, it may mean a complete loss of the system YNA's associates have built over time.

backups: The KIM Interface Manager holds backups of its configuration. Backups hold the KIM Interface configuration as specified by users. Models, Machines, and Mapping Configurations are included in backups. If the main KIM Interface configuration files are lost, damaged, or corrupted, loading a backup can help recover lost information. To do this, open the backup folder and copy the files **KIM_interface_configuration.json** and **mapping configurations** to the **config** folder inside **application**.

logs (folder): A folder that holds the log information of the software. This folder is one that the user is encouraged to interact with. There are two types of logs held by the system:

Output Logs (output logs (folder)): The output logs folder holds .txt files with dates and times. These .txt files hold the result set for the 50 most recent runs of the software. This folder is limited to a maximum of 50 logs at any given time. When the folder exceeds this number, log files are destroyed from oldest to newest;

I: Understanding the Program & Environment

System Files & Environment (continued):

application (continued):

logs (continued):

Runtime Logs (runtime_log.txt (file)): A .txt file that logs the runtime and the date/time of each software run. This log file is a compact way to analyze the speed of the software and to see when it is being used. The file is limited to 500 lines and will be trimmed, from oldest to newest, when it exceeds this limit.

Change Log (changelog.txt (file)): A .txt file that logs every change made in the KIM Interface Configuration. The information is pulled from the KIM Interface Manager and will include the timestamp of the change, the user making the change, the file that was impacted, and a short description of what was done to what virtual object. This can be used to track changes and further diagnose issues.

KIM Interface Manager.exe (executable; launcher): This file will run the system and **MUST NOT** be moved from this location. There is a shortcut in the main KIM Interface folder as well as on the **Gateway Host VM** Desktop. Users may copy those shortcuts.

KIM_Interface.py (component): This is the actual interface between the **i-Reporter form** and the **Keyence IM-8001** machines. Interaction with this component is **highly discouraged**, as changes could completely corrupt the function of the system.

KIM_Interface_Manager.py (component): This is the component that users will interact with. It allows for the manipulation of the KIM Interface configuration (adding/editing/removing Models, Machines, and Configurations for i-Reporter forms). See **Chapter IV** for more information on the KIM Interface Manager and how to use it.

KIM_interface_manager_config.json (configuration file): A separate configuration file that holds basic version information for the KIM Interface and the KIM Interface Manager.

results.txt (file): This file holds the most recent result produced by the software. Users can interact with this file to see how the system produces and formats its information.

.github (folder): A GitHub (Git-integrated version control system) dependency. **Do not** manipulate this file in any way. Doing so will make updating the system difficult.

.gitignore (file): A GitHub (Git-integrated version control system) dependency. **Do not** manipulate this file in any way. Doing so will make updating the system difficult.

LICENSE (file): A GiHub (Git-integrated version control system) dependency. **Do not** manipulate this file in any. Doing so will make updating the system more difficult.

KIM Interface Manager User Manual: This document; reference material for KIM Interface system.

I: Understanding the Program & Environment

Models:

'Model' refers to the Model name that corresponds with the Keyence IM-8001 machines on YNA's production floor. Model names are three characters in length and contain **only numbers and capitalized letters**. Examples are 3D4, TZ3, and T4P. The KIM Interface stores defined Models in its configuration file and each Model 'owns' a set of machines. In the KIM Interface environment, Models hold the information for the line they run on. Each Model has a set of 'base information' fields that indicate the basic information included on every machine for that Model. These often include Program Name, Judgment, Operator, and fields like that.

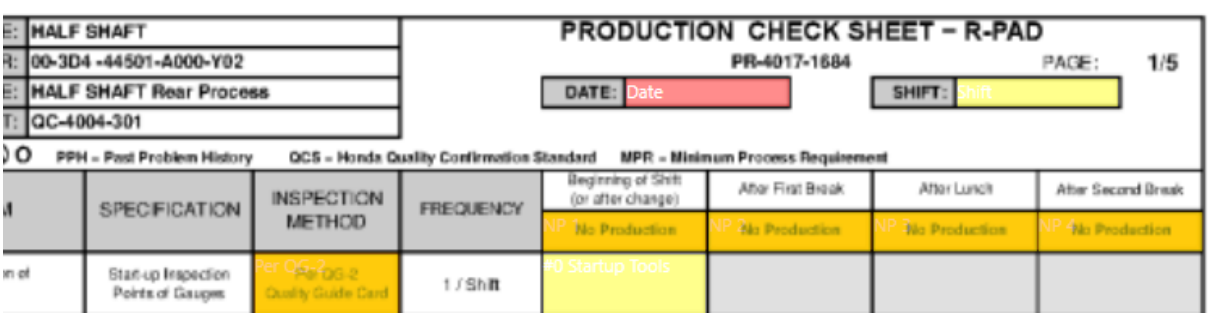
Machines:

'Machine' refers to the name of the actual Keyence IM-8001 machine on YNA's production floor. Machine names are prefixed by the Model they belong to and describe the process they measure. Examples are **3D4 HS DIFF OD LATHE 2** and **TZ3 HS SUPPORT ROLL FORM**. The KIM Interface stores defined Machines in its configuration file under ownership of its Model. In the KIM Interface environment, the Machine holds its own measurement information (specs).

Mapping Configurations:

'Mapping Configuration' refers to a set of instructions that informs the system on the intended use of the information it collects. They essentially instruct the KIM Interface to send its information to the correct location/cluster on the i-Reporter form. Each Machine stores its Mapping Configurations and the KIM Interface refers to the instructions in each Configuration depending on which one is used. Mapping Configurations hold a sheet and cluster number 'map' for every piece of information that needs to be sent to an i-Reporter form. Machines **must** have a Mapping Configuration for every form that use their measurement information. For a form to populate with information processed by the KIM Interface, Gateway requires that there is a 'mapping' for that information. 'Mappings' essentially indicate two things: the information's name/origin/meaning and the actual value, and where that information needs to go on the i-Reporter form. Each Mapping Configuration has a unique numerical identifier. When you add a configuration, make sure to give each of them a unique identifier. If you use the same ID for multiple mapping configurations, you will likely experience errors. **The KIM Interface Manager keeps you from duplicating IDs, but users who manually add Configurations may create duplicates.**

Example: On the following form, the red "selected" cluster is mapped using 1, 0 (sheet #1, cluster #0).



II. The KIM Interface Itself

The Interface:

There are two components of the system that create the integration between i-Reporter Gateway and the Keyence IM-8001 machines. These components are the **KIM Interface** and the **KIM Logger**. User interaction with the interface components is very limited, as they are designed to run on the back-end, solely over the network. Each component is explained below.

Interface Component:

The Interface component is what connects to the measurement information collected by the Keyence IM-8001 machines. The machines store their measurement information in CSV (Excel) sheets on YNA's network. Every time a lineside associate makes a measurement, that measurement is added to the CSV sheet with all the information it produced.

When the Interface component runs, it 'retrieves' the most recent measurement made by the Machine it is asked to access. It pulls the measurement from the machine's measurement sheet and sends it directly to the i-Reporter form for mapping and input.

Direct user interaction with this component is not possible as there is no UI or input. It is designed to be invoked solely by the i-Reporter form via the Gateway connection.

This component also manages the log information that the KIM Interface produces. Log information can be used to fix issues with the connection between an i-Reporter form and a Keyence IM-8001 machine, to see the recent results of the system, or assess the connection and speed of the KIM Interface itself.

The logs are useful in the case of errors on i-Reporter forms. The KIM Interface is designed to return a result set with a specific error code and description, even when results are not successfully generated. The error codes are outlined in the **Administrative Notes (Chapter VII)**. The log files can be accessed by navigating to the **'logs'** folder (found in the **'application'** folder).

Direct user interaction with this component is not possible as there is no UI or input. It is designed to be invoked solely by the KIM Interface component.

III: Getting Started with KIM Interface

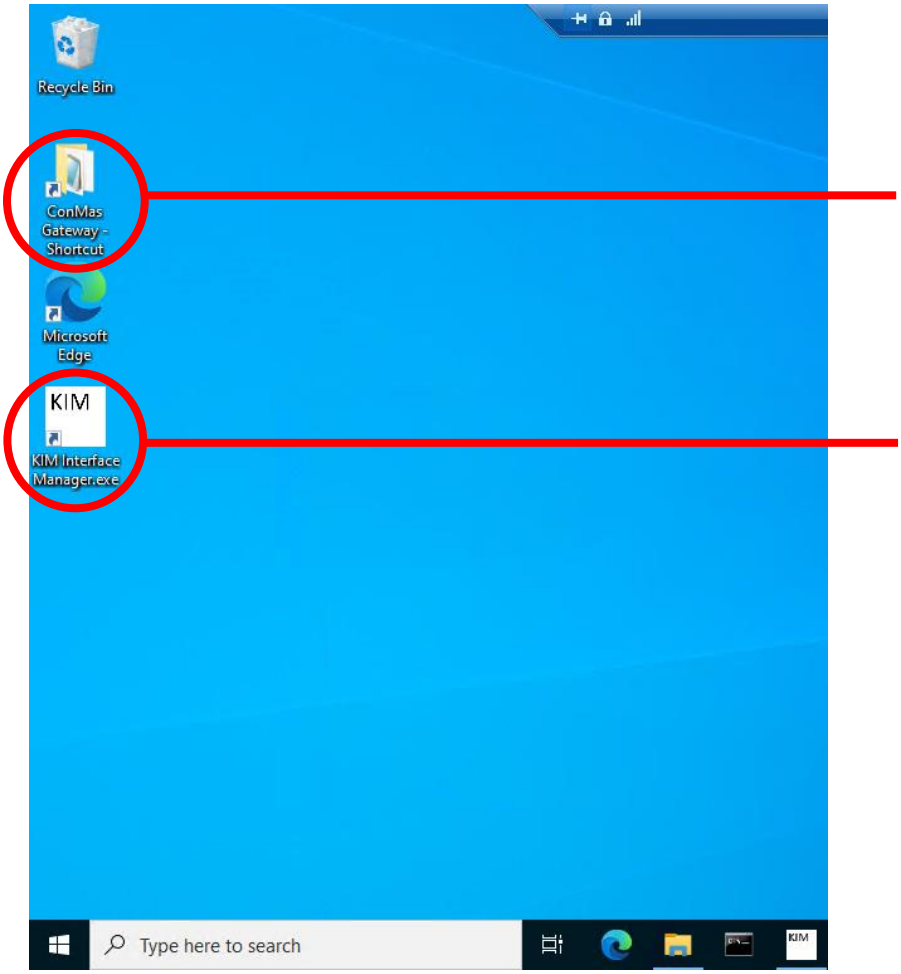
Accessing the Gateway VM to use the KIM Interface:

As stated in **Chapter I**, it is highly recommended that users interact with the KIM Interface directly on the **Gateway Host Virtual Machine (VM).** To gain access to the VM, please contact the IT Department. Once users have access to the Gateway Host VM, they can begin interacting with the KIM Interface system.

Interacting with the KIM Interface:

The safest, most secure, and easiest way for users to interact with and manipulate the KIM Interface is to use the provided **KIM Interface Manager**. To open the KIM Interface Manager, locate the **KIM Interface Manager.exe** file on the Gateway Host VM desktop and double-click it:

Gateway Host VM Desktop



Shortcut to the Gateway system folder. Holds the information and components that Gateway uses.

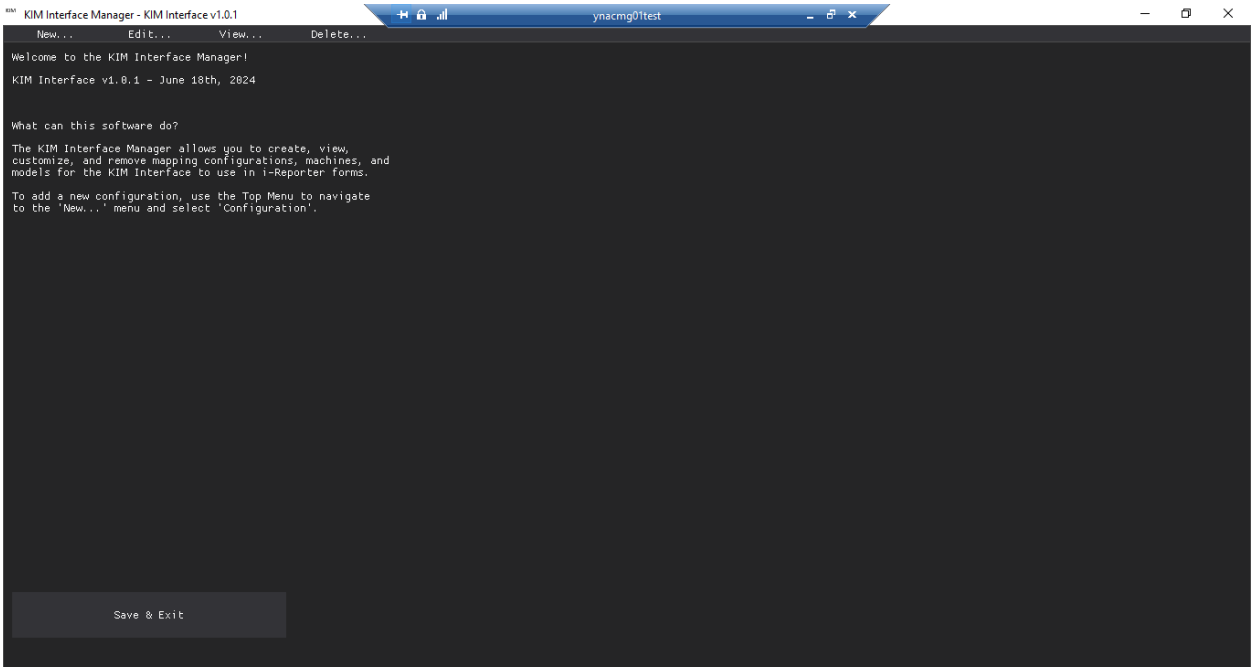
Shortcut to launch the KIM Interface Manager (stored in the ConMas Gateway files).

Double-click this file to launch the KIM Interface Manager program. The software will run from its native location in the Gateway files, ensuring that all actions will properly affect the KIM Interface.

III: Getting Started with KIM Interface

Interacting with the KIM Interface (continued):

After double-clicking the file, the user should see the following window:



This is the home menu of the KIM Interface Manager. From here, users can manipulate all the information in the KIM Interface, including Models, Machines, and Mapping Configurations for i-Reporter forms.

Chapter IV gives an in-depth guide for use of the KIM Interface Manager. It should be referenced frequently as users learn to manipulate the KIM Interface's configuration.

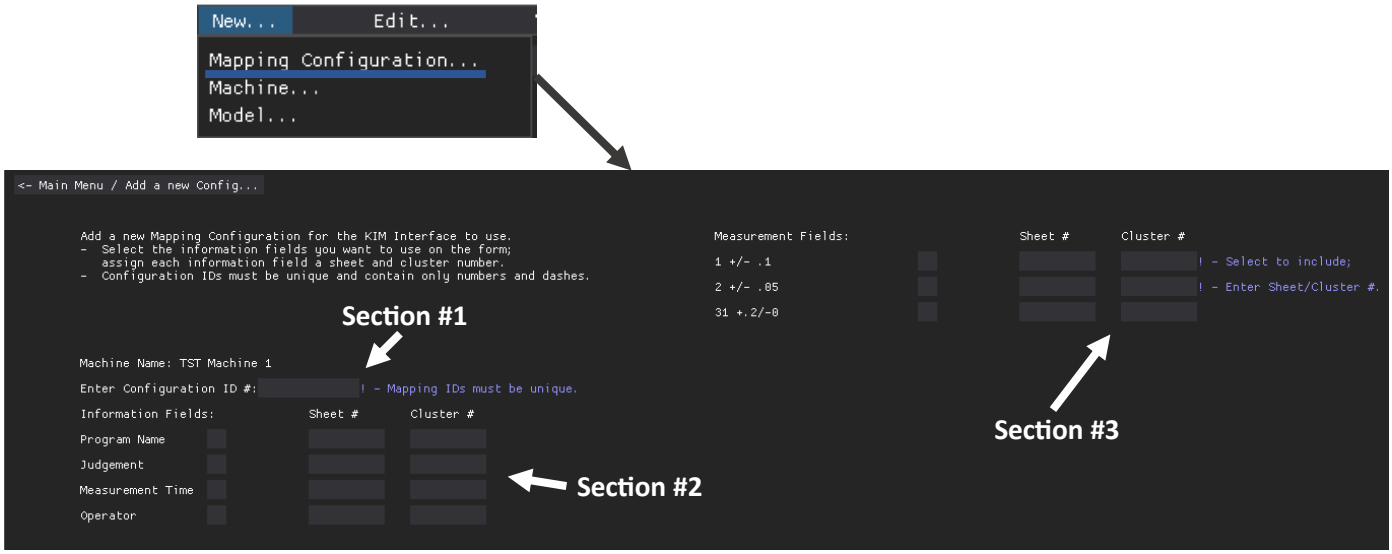
Notes: The most common actions users will carry out will be adding, editing, and removing Mapping Configurations. Manipulating Machines and Models will be uncommon unless YNA changes the Keyence IM-8001 machines used on the production floor (remove, add, update). It is highly recommended that users become comfortable with the KIM Interface Manager (via this documentation) before carrying out large-scale changes to the KIM Interface. Changes are irreversible and repairing damages to the Interface's configuration may take a significant amount of work.

IV: The KIM Interface Manager

Manipulating Mapping Configurations:

Creating and editing **Mapping Configurations** allows new connections to be made between Keyence IM-8001 Machines and i-Reporter forms. The processes of adding, removing, and editing them are outlined below:

Adding Mapping Configurations: To connect a Keyence IM-8001 Machine to an i-Reporter form, users must create and define Mapping Configurations for the KIM Interface to use. This process starts by clicking the button on the top menu of the KIM Interface Manager and selecting 'Mapping Configuration…' The user will see the following window:



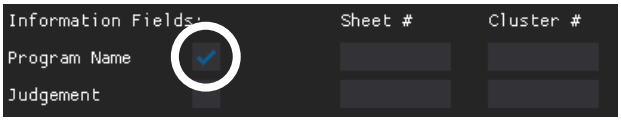
The user should note the **three** distinct sections of the screen:

- **1**: Configuration ID; **2**: Model Base Information Fields; **3**: Machine Measurement Fields.

To create a new Mapping Configuration, the user first needs to assign it an ID in **section 1**.

Note: Mapping Configuration IDs must be unique, contain only digits and dashes (0-9, -), and not blank. The Manager will block users from adding Configuration IDs that violate these restrictions.

In **section 2,** the user can select which of the Model's Base Information Fields need to be sent to the i-Reporter form. To select a field, simply click the checkbox to the right of the Field's header:



Each selected Base Information Field must then be assigned a sheet # and cluster # pair to map to. Users can find this information in **ConMas Designer** while editing their targeted i-Reporter form:

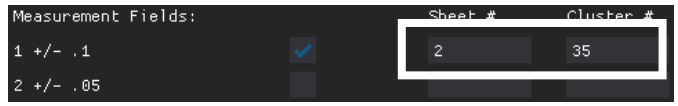
IV: The KIM Interface Manager

Manipulating Mapping Configurations (continued):

Adding Mapping Configurations (continued):

Section 3 works identically to **section 2,** but instead the user selects which Machine Measurements need to be sent to the form:

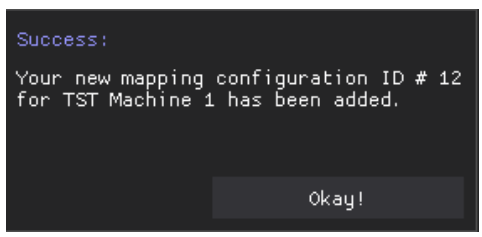
Similarly, each selected Measurement must be assigned a sheet # and cluster # pair to map to:



Explanation: the above workflow would create a Mapping Configuration mapping the following:

- "Program Name" of the Machine from **TST** to the 34th cluster on page #2 of the document;
- Measurement result from the "1 +/- .1" specification field of **TST Machine 1** to the 35th cluster on page #2 of the same document.

Once all necessary Model and Machine fields have been selected and mapped on the form, click the Add Mapping Configuration button to finalize the addition of the Mapping Configuration. If the information entered was accepted, there will be a popup that looks like the following, indicating that the Mapping Configuration was added successfully:



A view of the new Configuration will immediately open for review after addition.

Viewing & Deleting Mapping Configurations: Once there are Configurations defined, users can manipulate them. Viewing and Deleting Mapping Configurations follow a similar workflow. To start, select the 'View…' or 'Delete…' button in the top menu of the Manager. Select 'Mapping Configuration…' from the dropdown. The user will be prompted to select a Configuration.

Viewing: If 'View…' was selected, the following window will appear:

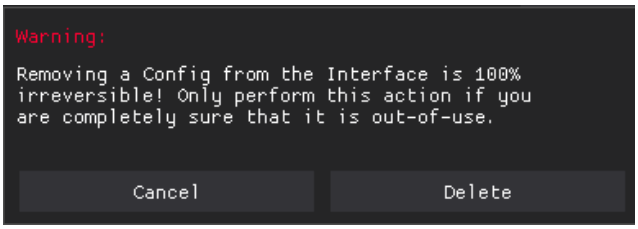
This is the **view window** for **Mapping Configurations**. The cluster mappings assigned in this Configuration are all visible on the left-hand side.

IV: The KIM Interface Manager

Manipulating Mapping Configurations (continued):

Viewing & Deleting Mapping Configurations (continued):

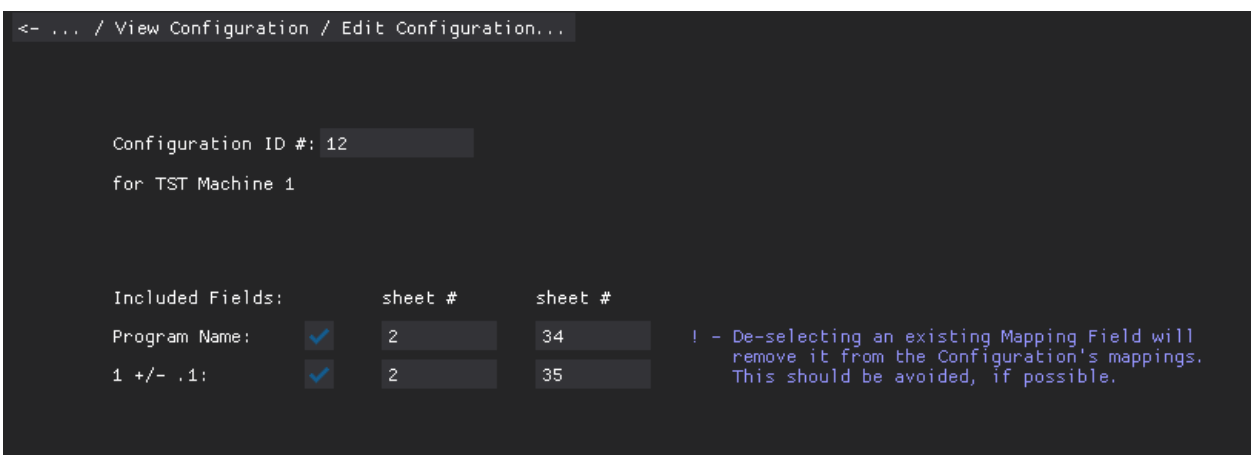
Deleting: If 'Delete…' was selected, or if the user clicks the `Remove this Configuration !!` button, the following pop-up will appear:



Note: Deleting a Configuration from the Manager will remove it from the KIM Interface **entirely**. This action is **irreversible** and should only be performed if the Configuration is permanently out-of-use.

Editing Mapping Configurations: There are two ways to start editing a Configuration. The user can either select 'Edit…' and then 'Mapping Configuration…' from the top menu of the Manager. Alternatively, the `Edit this Configuration ->` button on the view window can be clicked.

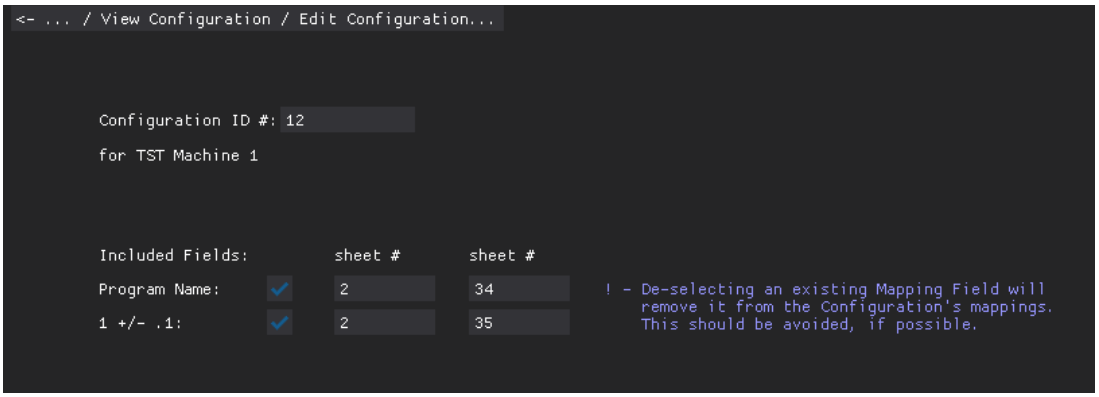
Both workflows will open the following edit Mapping Configuration window:



IV: The KIM Interface Manager

Manipulating Mapping Configurations (continued):

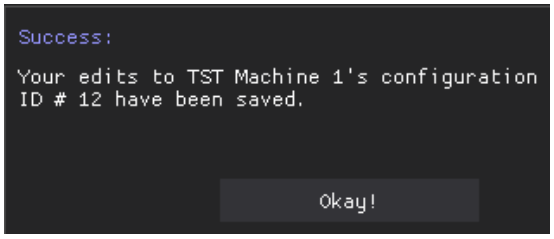
Editing Mapping Configurations (continued):



The Edit workflow is like the Add workflow in that the checkboxes will toggle the inclusion of the corresponding field while the sheet/cluster fields indicate the cluster receiving that information. As the tip on the window states, de-selecting an existing Mapping Field will remove it from the Configuration. **It is not currently possible to add additional fields to an existing Configuration.**

Editing a Mapping Configuration's ID is possible, but the ID must remain unique. If the ID is not changed, it will stay as it is currently set at the time of editing. If the user enters a non-unique ID as an edit, the Manager will block the edits from being committed until a unique ID is entered.

The user can commit their edits to the Interface by clicking `Finish Editing Configuration...`. If the edits are accepted, the following pop-up will appear:



A view of the edited Configuration will immediately open for review after edition.

Note on Mapping Configuration IDs: When giving Configurations their IDs, it is important to keep track of what numbers have been used. The dash (hyphen) character has been included in the allowed characters to provide a simple solution. Users are encouraged to use the form number that corresponds to the i-Reporter form they are using when assigning Mapping Configuration IDs. For example, if a user is adding a Configuration to a Machine for YNA form PR-4017-1684, the Configuration's ID would be 4017-1684. If the form requires multiple Configurations for the same Machine (a common occurrence), the user would simply add '-1', '-2', '-3', etc. to the end of the ID. This ID system allows for an infinite number of Configurations for each Keyence IM-8001 Machine/i-Reporter form pairing.

IV: The KIM Interface Manager

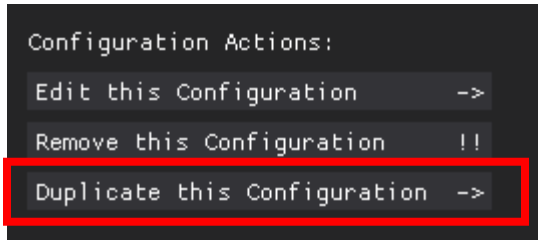
Manipulating Mapping Configurations (continued):

Duplicating Mapping Configurations:

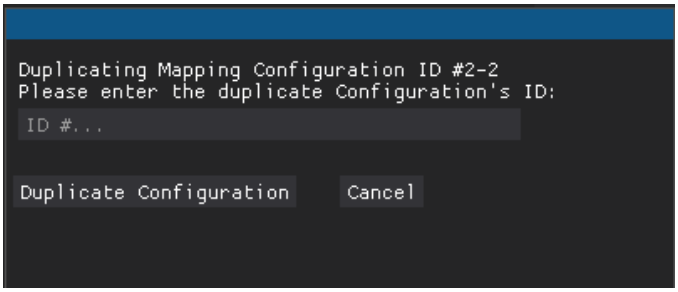
Users may find that copying a Mapping Configuration is very useful when a form uses multiple mappings of the same information to different clusters on an i-Reporter form. Duplicating clusters is a feature that can be utilized to decrease the amount of work this process requires.

To duplicate a cluster, click the 'View…' button on the top menu and select 'Mapping Configuration…'. The following window will appear:

From here, click the 'Duplicate this Configuration' button in the Configuration Actions menu:

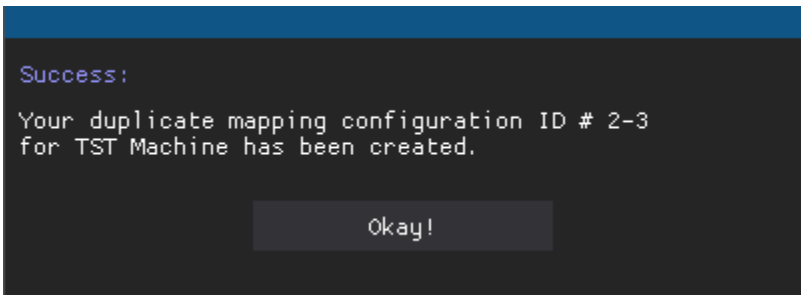


This will create a popup requesting a new ID for the duplicate Configuration. Users will be forced to follow the restrictions for Mapping Configuration IDs when creating a duplicate Configuration, just as they are when creating a new one. See **Adding Mapping Configurations.**



←Duplicate Configuration ID entry popup. Click 'Duplicate Configuration' to finalize the process.

If the ID for the duplicate Mapping Configuration was accepted by the KIM Interface Manager, the following confirmation popup will appear:

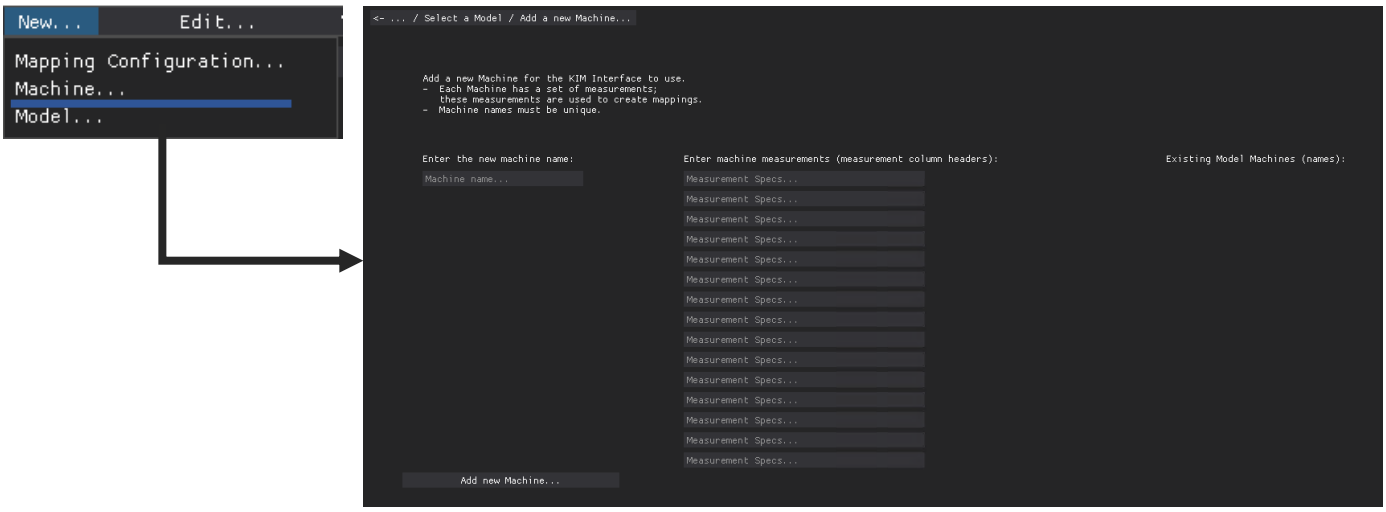


IV: The KIM Interface Manager

Manipulating Machines:

Adding and configuring **Machines** in the KIM Interface is the virtual equivalent of adding a physical Keyence IM-8001 machine to the production floor. Each physical machine must be added into the KIM Interface for its information to be sent to i-Reporter forms.

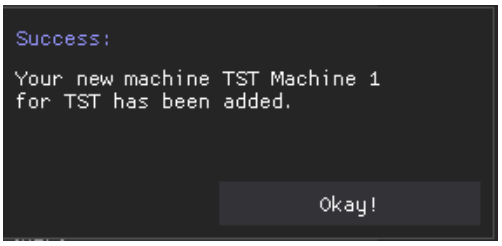
Adding Machines: Users can create a new Machine by clicking the New... button on the top menu of the KIM Interface Manager and selecting 'Machine...' The user will see the following window:



Once here, the user can enter the Machine **name** and any of the Machine's **measurement specifications**. The list of existing Machines for the current Model can be seen on the far-right side of the window.

Note: Machine names must be unique, alphanumeric (letters A-Z, a-z & 0-9), and not blank. The Manager will block users from adding Machines that violate these restrictions.

Click the Add new Machine... button to finalize the addition of the Machine. If the information entered was accepted, there will be a popup that looks like the following, indicating that the Machine was added successfully:



A view of the new Model will immediately open for review after addition.

IV: The KIM Interface Manager

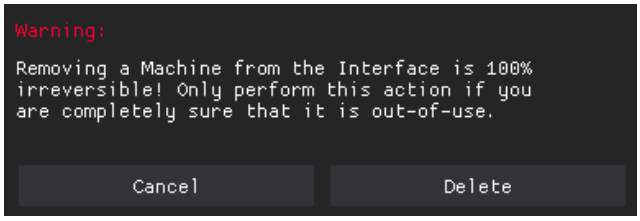
Manipulating Machines (continued):

Viewing & Deleting Machines: Once there are Machines defined, users can manipulate them. Viewing and Deleting Machines follow a similar workflow. To start, select the 'View…' or 'Delete…' button in the top menu of the Manager. Select 'Machine…' from the dropdown. The user will be prompted to select a Machine.

Viewing: If 'View…' was selected, the following window will appear:

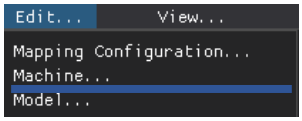
This is the **view window** for **Machines**. The Machine's Measurement specifications are all visible on the left-hand side.

Deleting: If 'Delete…' was selected, or if the user clicks the `Remove this Machine !!` button, the following pop-up will appear:



Note: Deleting a Machine from the Manager will remove it **and** its defined Mapping Configurations from the KIM Interface **entirely**. This action is **irreversible** and should only be performed if the Machine and its Configurations are permanently out-of-use.

Editing Machines: There are two ways to start editing a Machine. The user can either select 'Edit…' and then 'Machine…' from the top menu of the Manager. Alternatively, the `Edit this Machine ->` button on the view window can be clicked.



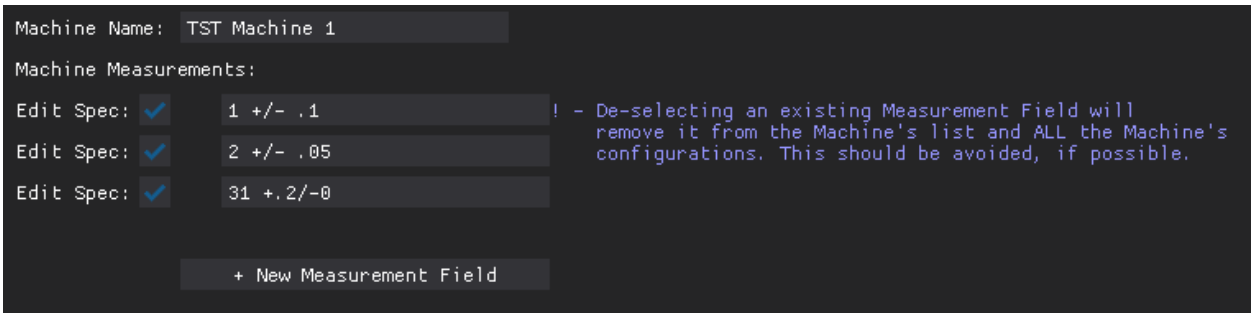
Both workflows will open the following edit Machine window:

IV: The KIM Interface Manager

Manipulating Machines (continued):

Editing Machines (continued):

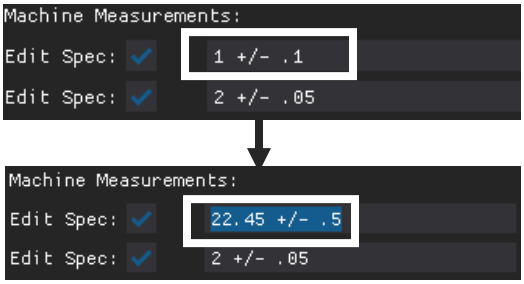
Edit Machine Window:



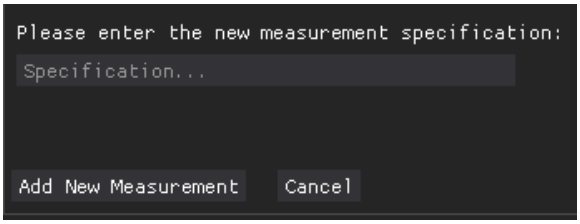
Editing Machines works similarly to **editing Mapping Configurations**. The checkboxes to the left of each Measurement specification will toggle the use of that specification. Measurements that are de-selected will be removed from the Machine and its Mapping Configurations.

Users can alter the specifications for a measurement field by changing the text in the input field that holds that specification:

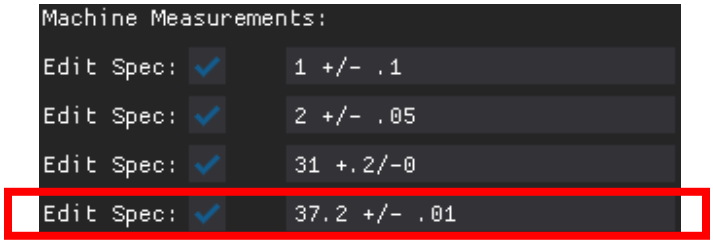
Explanation: The workflow on the right would change the specifications for the first measurement field from '1 +/- .1' to '22.45 +/- .5'.



Additionally, it is possible to add a new Measurement field to a Machine after its creation. To do so, click the + New Measurement Field button under the Measurement fields. The following pop-up will appear:



Once a valid specification has been entered, click the Add New Measurement button. The pop-up will collapse and the new Measurement field will appear at the bottom of the field list:

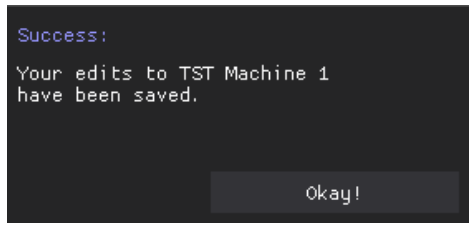


IV: The KIM Interface Manager

Manipulating Machines (continued):

Editing Machines (continued):

The user can commit their edits to the Interface by clicking `Finish Editing Machine...`
If the edits are accepted, the following pop-up will appear:

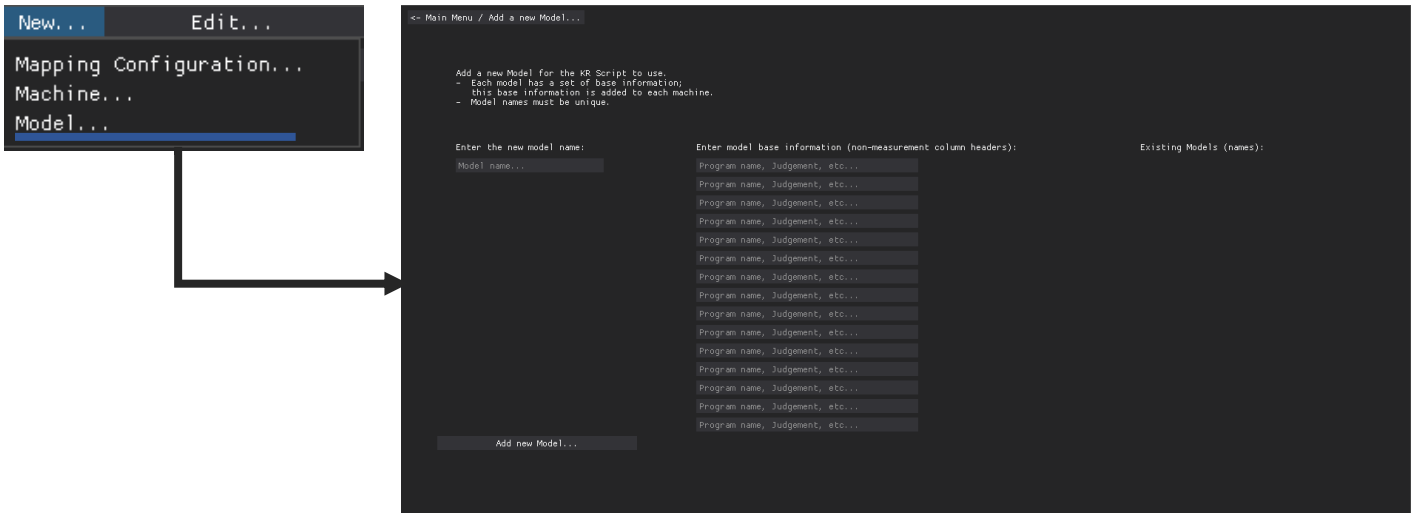


A view of the edited Machine will immediately open for review after edition.

Manipulating Models:

In the KIM Interface, **Models** control the basic information corresponding to a set of Keyence IM-8001 machines on a production line. They are the first thing the user must configure if a new YNA production line has been fitted with Keyence IM-8001 machines.

Adding Models: The first step to accessing Keyence IM-8001 Machine information is to create and define the Model(s) that the Machine(s) belong to. Users can create a new Model by clicking the `New...` button on the top menu of the KIM Interface Manager and selecting 'Model...' The user will see the following window:



Once here, the user can enter the Model **name** and any of the Model's **base information fields**. The list of existing Models can be seen on the far-right side of the window.

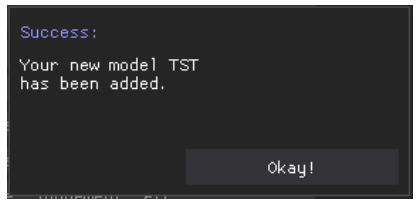
Note: Model names must be unique, alphanumeric (capital letters A-Z & 0-9), and not blank. The Manager will block users from adding Models that violate these restrictions.

IV: The KIM Interface Manager

Manipulating Models (continued):

Adding Models (continued):

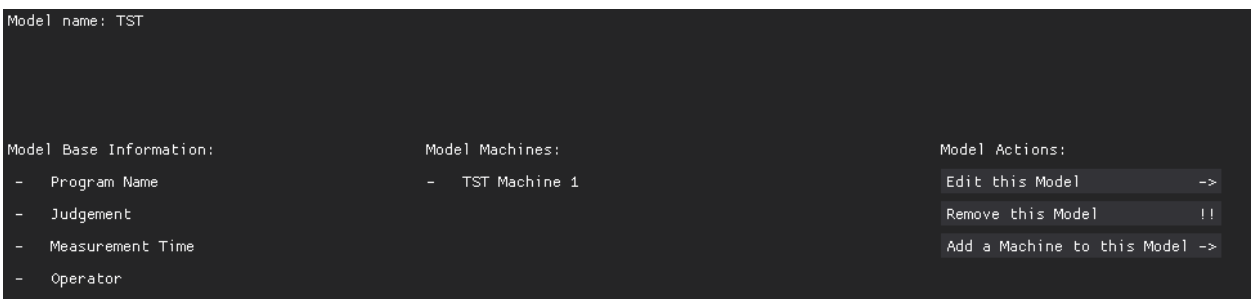
Click the `Add new Model...` button to finalize the addition of the Model. If the information entered was accepted, there will be a popup that looks like the following, indicating that the Model was added successfully:



A view of the new Model will immediately open for review after addition.

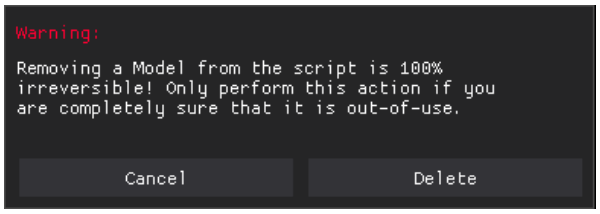
Viewing & Deleting Models: Once there are Models defined, users can manipulate them. Viewing and Deleting Models follow a similar workflow. To start, select the 'View…' or 'Delete…' button in the top menu of the Manager. Select 'Model…' from the dropdown. The user will be prompted to select a Model.

Viewing: If 'View…' was selected, the following window will appear:



This is the **view window** for **Models**. All the Model's information is visible at this point, including machines belonging to the Model and its base information fields.

Deleting: If 'Delete…' was selected, or if the user clicks the `Remove this Model !!` button, the following pop-up will appear:

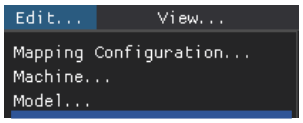


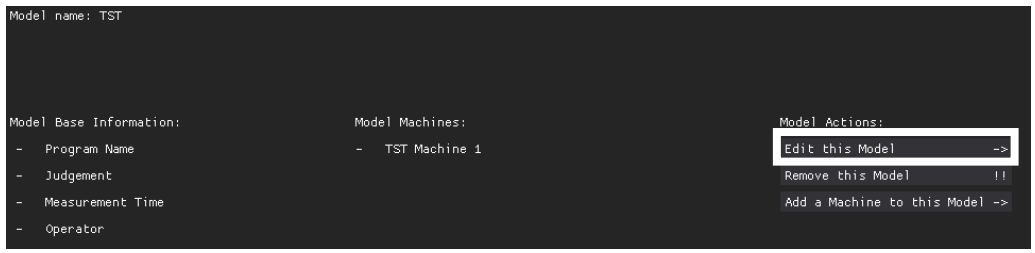
Note: Deleting a Model from the Manager will remove it, its Machines, and all the Machines' Configurations from the KIM Interface **entirely**. This action is **irreversible**, removes a large amount of information, and should only be performed if the Model is permanently out-of-use.

IV: The KIM Interface Manager

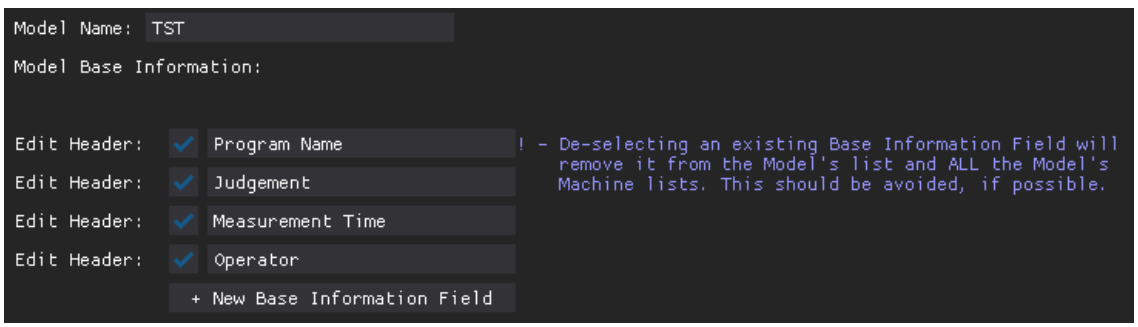
Manipulating Models (continued):

Editing Models: There are two ways to start editing a Model. The user can either select 'Edit…' and then 'Model…' from the top menu of the Manager. Alternatively, the `Edit this Model ->` button on the view window can be clicked.





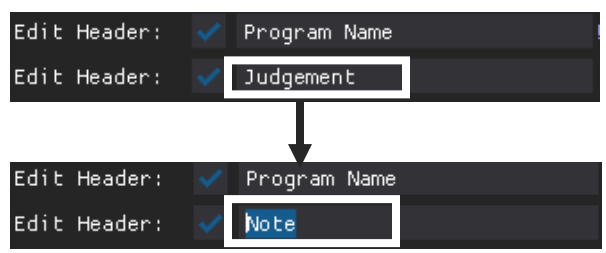
Both workflows will open the following edit Model window:



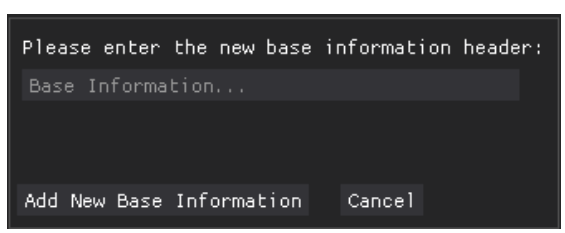
Editing Models works identically to **editing Machines**. The checkboxes to the left of each Base Information field will toggle the use of that field. Base Information that is de-selected will be removed from the Model and its Machines' Mapping Configurations.

Users can alter the header for a base information field by changing the text in the input field that holds that field's header:

Explanation: The workflow on the right would change the second field from 'Judgment' to 'Note.'



Additionally, it is possible to add a new Base Information field to a Model after its creation. To do so, click the `+ New Base Information Field` button under the Base Information fields. The following pop-up will appear:

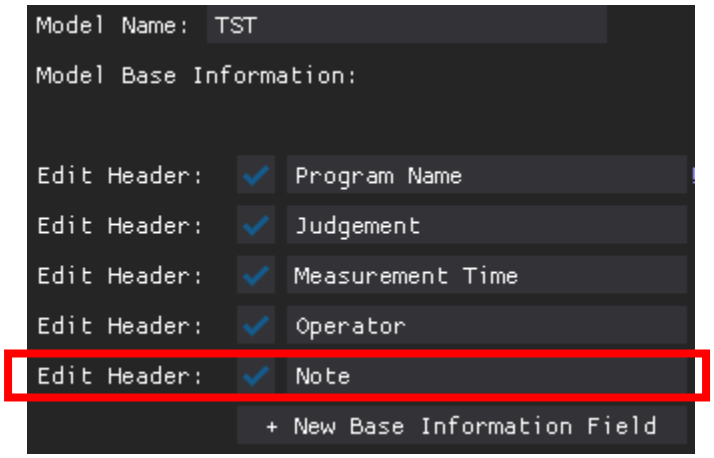


IV: The KIM Interface Manager

Manipulating Models (continued):

Editing Models (continued):

Once a valid header has been entered, click the `Add New Base Information` button. The pop-up will collapse and the new Base Information field will appear at the bottom of the field list:



The user can commit their edits to the Interface by clicking `Finish Editing Model...`
If the edits are accepted, the following pop-up will appear:

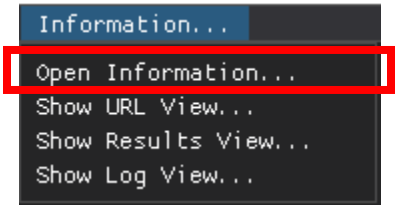
A view of the edited Machine will immediately open for review after edition.

Note: Edits to a Model will cascade to its Machines and all the Mapping Configurations belonging to the Machines the Model owns. Users should be certain that the Edits they make will not interfere with the KIM Interface's connection between Keyence IM-8001 Machines and i-Reporter forms. It is recommended that i-Reporter forms are tested after Model edits to ensure that the Edits did not create any new, adverse results or issues.

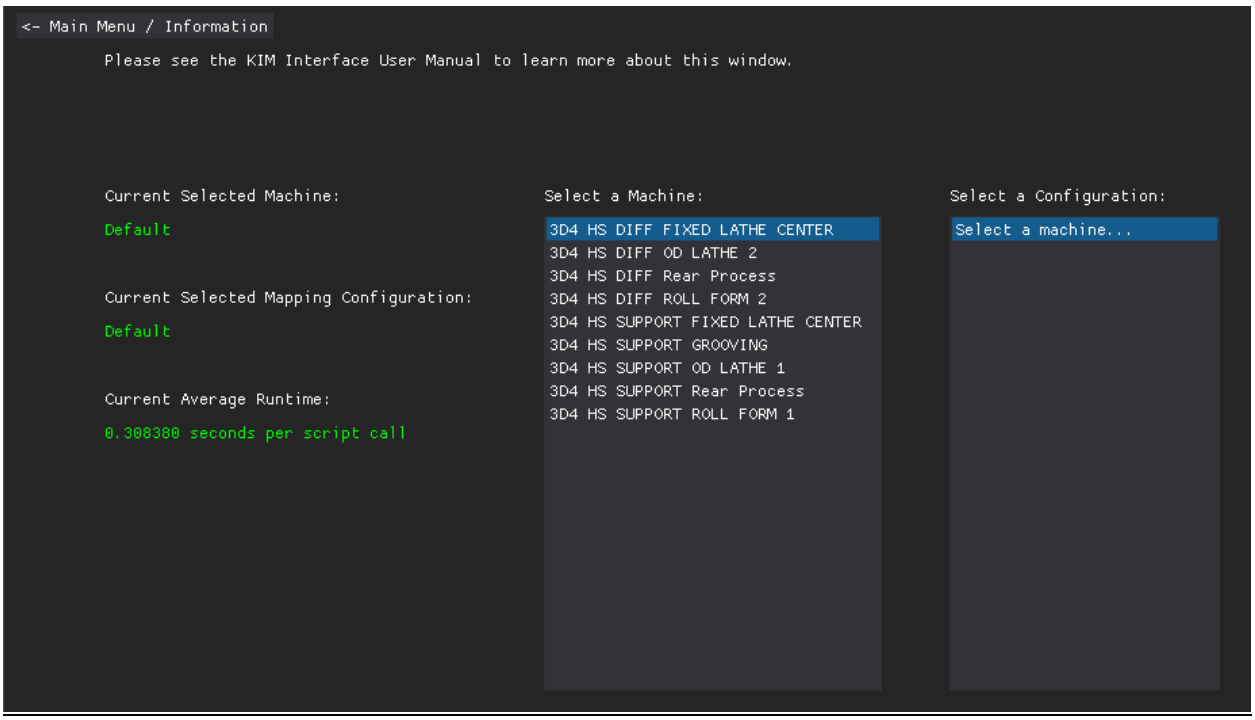
V: The Information Window

The Information Window is an important feature of the KIM Interface Manager software. Its purpose is to provide a simple view into the internal reporting of the KIM Interface. Log information and Result data can be seen in a palatable form for users.

To open the window, click the 'Information…' tab in the top menu and select 'Open Information…'



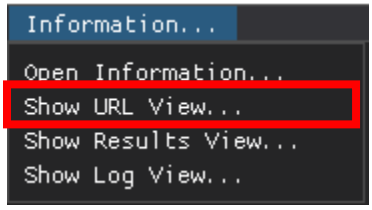
The following window will open:



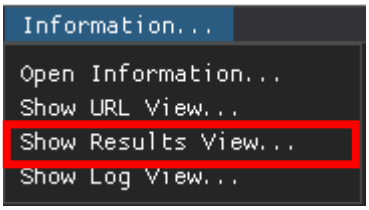
There are three views connected to the Information window: **URL View; Results View; Logs View.**

Each of these views presents the user with an important subset of the KIM Interface's internal data. To enable the views, click the 'Information…' tab in the top menu and select the 'Show […] View…' button.

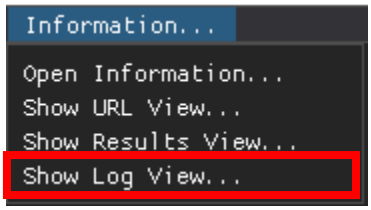
URL View:



Results View:



Logs View



V: The Information Window

Understanding Logs and Results:

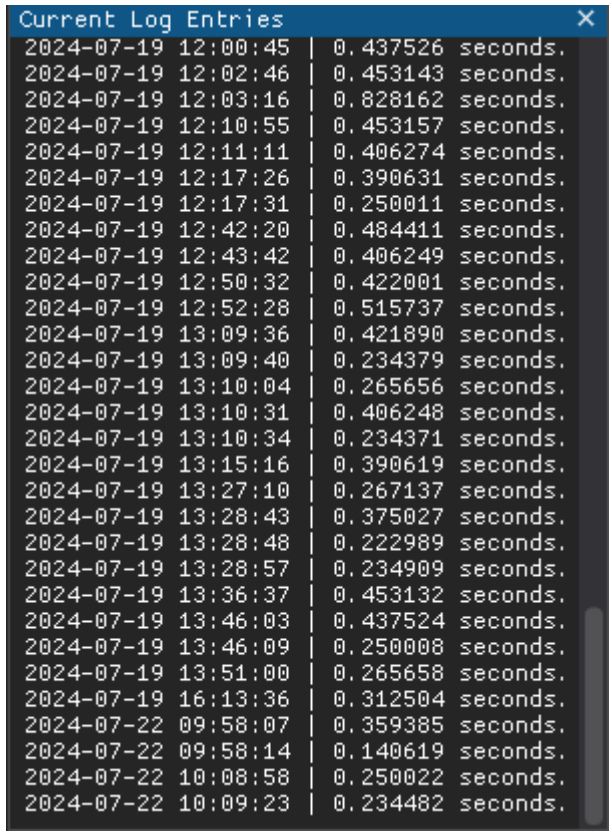
Logs and Results are generally useful for troubleshooting problems with the configuration of the KIM Interface, but they can also be used to help users understand the system.

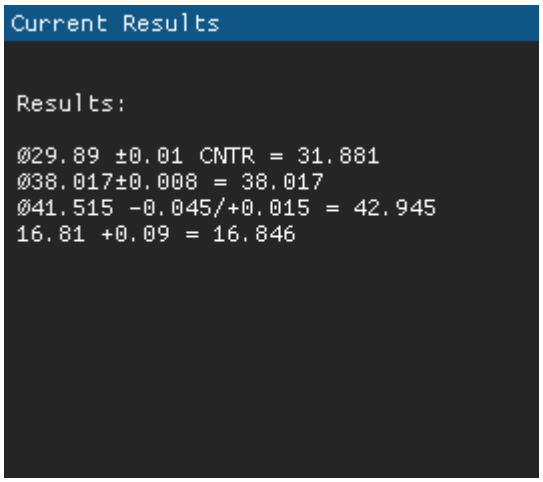
Logs:

The Logs View of the Information window gives the user the ability to see the runtime log of the KIM Interface. Each entry contains the date and time of the connection and the time the connection took to complete.

Every time a connection is invoked using the KIM Interface, an entry is added to this log.

If any issues occur (i.e. a lineside operator comes to the QA Department with an issue), users can look at the log view to find a specific connection time and find the output log in the **output logs** folder. That file will contain the results of the connection, which may help diagnose the problem.





Results:

The Results View allows the user to view the most recent Result set of the KIM Interface. Each of the fields of data that are included in the Configuration used are shown on the view.

On the left side of the window, the measurement specification and/or Model information field used to map the data can be found. The value after the equal sign is the measurement data pulled from the Machine's measurement files.

V: The Information Window

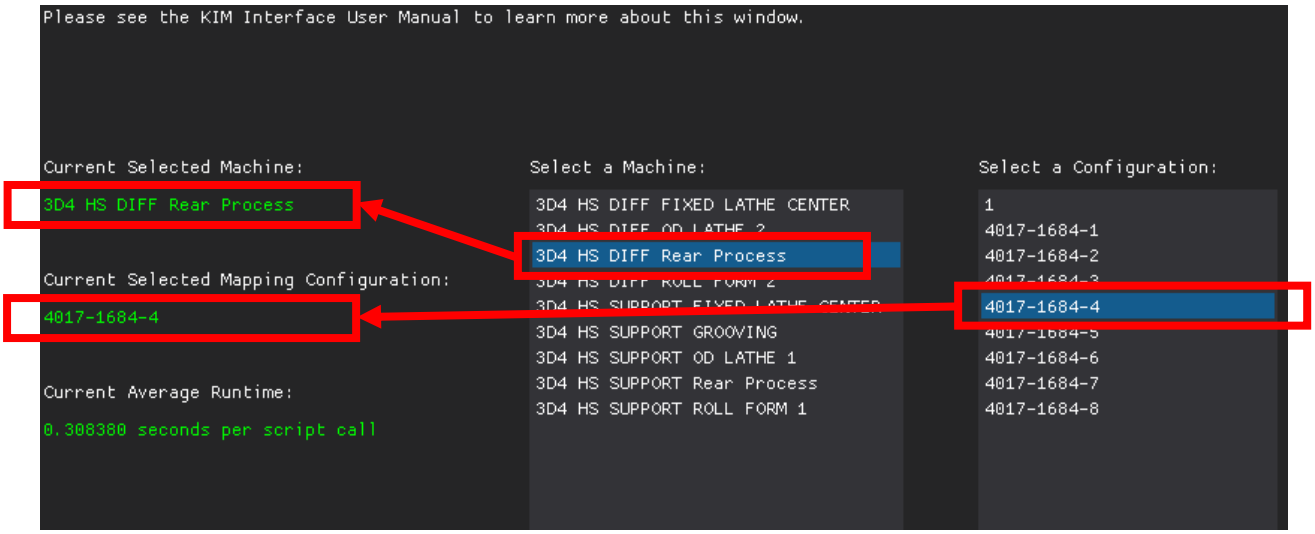
Generating URL Calls for i-Reporter Forms:

The most useful tool in the Information window is the URL View. Users can select a Keyence IM Machine and a Mapping Configuration and create a URL Call to use on an i-Reporter form.

To generate a URL, follow the steps below:

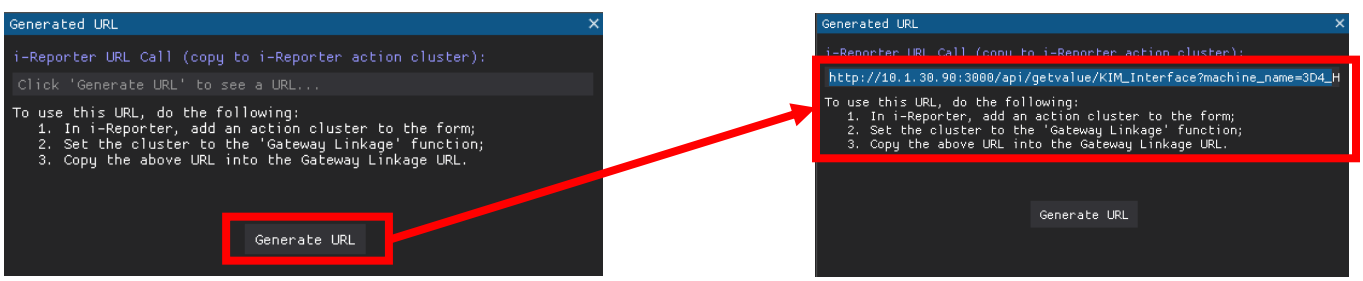
Step 1: Selecting a Machine and Mapping Configuration

Before the user can generate a URL, they must select a Machine and a Mapping Configuration to create the URL with. This will be the Machine and Configuration pair that the KIM Interface will use to make the connection and populate the data on the i-Reporter form.



Step 2: Open the URL View Window

The user can generate and copy a URL from the URL View window:



To use the generated URL to access a Machine's data as configured, copy the URL, and paste it into the **Load Button** activating the KIM Interface connection as outline in **Chapter VI.**

Note that this process replaces the workflow in the URL creation step of Chapter VI.

VI: Adding KIM Interface to an i-Reporter Form

Most of the work setting up KIM Interface connections is done in the KIM Interface Manager. However, there are a couple of small steps that must be completed in **ConMas Designer** before the connection is complete. This chapter will outline that process.

> **Notes:** It is very possible that this step will be completed **before** the addition of Mapping Configurations, as users will likely determine the sheet and cluster numbers they need for each Machine during this process.
>
> ***This document does not intend to outline usage guidelines for ConMas Designer. Please refer to the appropriate ConMas Designer Documentation provided by the developers of the i-Reporter system for guidelines of use outside of the process documented here.***

Configuring a Cluster to Accept KIM Data: Clusters accepting data from the KIM Interface need to have certain settings configured to enable a user-friendly functionality.

1. Every cluster accepting data must be a **Numerical Number Keyboard** cluster;
2. Clusters must be marked for **Mandatory Input;**
3. **Number of digits after decimal point** must be **3**;
4. **Allowable min. value and Allowable max. value** must both be configured:
    a. **Use allowable min. value:** Set to enabled;
    b. **Allowable min. value:** set to the specified minimum value (i.e. 23.095+/-0.05; allowable min. value is 23.090);
    c. **Background color:** Red; **Font Color:** White;
    d. **View message for out of allowable min. value:** set to enabled;
    e. **Message:** "Less than MINIMUM allowable value! Re-check and notify Team Leader!"
    f. **Use allowable max. value:** Set to enabled;
    g. **Allowable max. value:** set to the specified maximum value (i.e. 23.095+/-0.05; allowable max. value is 23.100);
    h. **Background color:** Red; **Font Color:** White;
    i. **View message for out of allowable min. value:** set to enabled;
    j. **Message:** "Exceeds MAXIMUM allowable value! Re-check and notify Team Leader!"
5. Use the "copy/paste cluster setup" function in i-Reporter to copy these settings to each cluster in the row (only clusters that are accepting data from the same measurement specification).

The cluster settings needed may be different depending on what users and form designers are trying to achieve. Once again, refer to the **i-Reporter Documentation** for more information.

VI: Adding KIM Interface to an i-Reporter Form

Configuring Single-cluster Populations: The following process will configure any number of clusters that are **not** part of a larger group (actions performed once per form, requiring singular inputs).

Step 1: Determine Clusters Using Keyence IM-8001 Machine Information:

This step will differ from form to form, but the user should take note of the sheet and cluster number of each cluster on the i-Reporter form that will use the KIM Interface. For example, if clusters #3-7 on page #1 and clusters #10-12 on page #3 use Keyence IM-8001 Machine information, the user's mapping list might look like the following:

Information	Sheet #	Cluster #
Program Name	1	3
Measurement time	1	4
Operator	1	5
Judgment	1	6
Note	1	7
12.5 +/- .05	3	10
23.98 +0/-.1	3	11
1.3 +/-.125	3	12

Step 2: Verify or Create the Necessary Mapping Configurations:

Following the process and workflows defined in **Chapter IV: Manipulating Mapping Configurations**, ensure that the necessary Configurations exist. If they do not, add Configurations for each Machine used in the form. This may be one Configuration or it may be eight; the amount will depend on the use case.

Step 3: Configure the Load Buttons

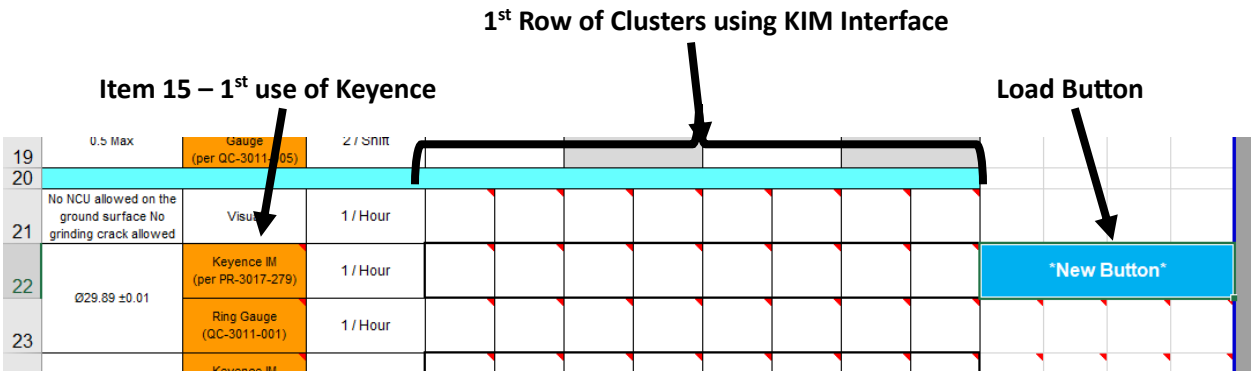
For this step, the user will need to load **ConMas Designer** and open the target form. It is their choice to perform the following additions in either ConMas Designer or an Excel form exported from ConMas Designer. Either process will achieve the desired result, but this document will use the exported Excel method.

Step 3: Configure the Load Buttons (continued)

Load buttons are special **Action Clusters** that will be set as buttons. These buttons will invoke an instance of the KIM Interface to collect the information requested by the button itself. Each Load buttons will hold a 'script' style URL call of the software that tells the KIM Interface which Machine to access and which of the Machine's Mapping Configurations to use.

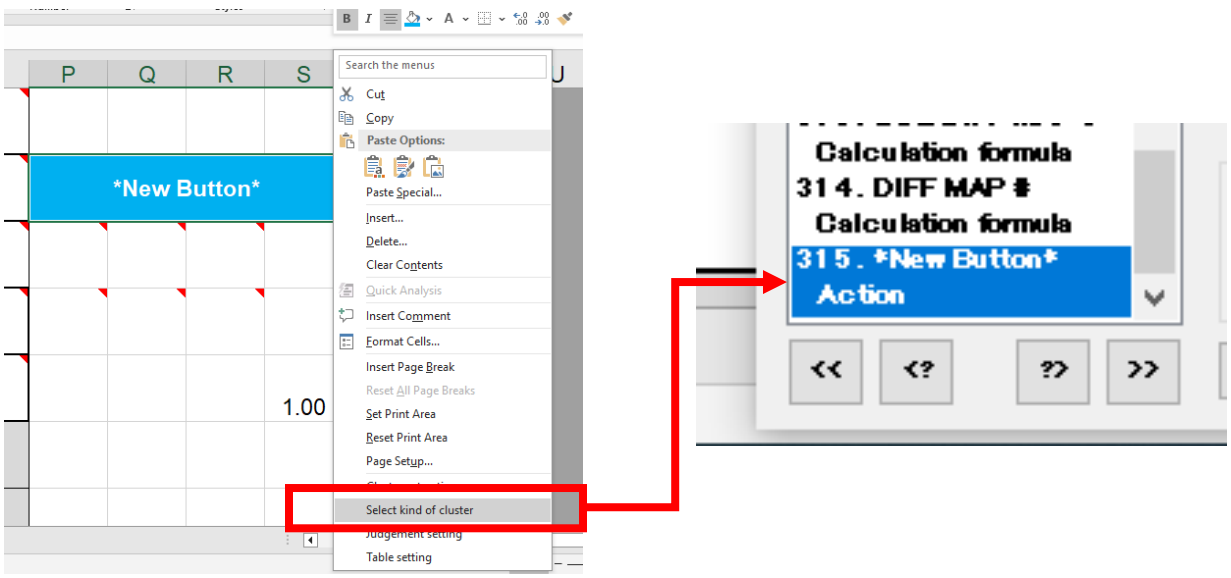
VI: Adding KIM Interface to an i-Reporter Form

a) With the form open, find a convenient place to create a new button on the form near each set of clusters using Keyence IM-8001 Machine information. It is recommended to place these buttons on the right-hand margin of the form, directly adjacent to the first row it effects.



See in the above image that the *New Button* is placed in the right margin directly next to the first column marked as 'Keyence IM (per PR-3017-279)'.

b) Right-click the *New Button* cluster and select 'Select Kind of Cluster' from the menu. In the Select Kind of Cluster menu, give the Load button a name and a cluster ID, then set the cluster type as **Action.**



VI: Adding KIM Interface to an i-Reporter Form

Step 3: Configure the Load Buttons (continued)

c) Load the updated form into **ConMas Designer** (only if editing in Excel).

d) Find the new Load button on the form and select it, then open the cluster's settings menu. Configure the cluster with the following settings:

Button type:	**True**
Character string of button display:	**Load from Keyence IM**
Action type:	**Gateway linkage**
Method:	**GET**
URL:	**(see next step)**
Token:	**yamadatoken**
Schedule time:	**BLANK**

Any setting that is not included in the above list does not affect the button.

e) The URL for every Load button will begin with the following:

http://10.1.30.90:3000/api/v1/getvalue/KIM_Interface?

From here, the URL must be configured manually to include the Machine and the Mapping Configuration. First, add the following onto the end of the URL:

machine_name=

After the equal sign (no spaces), add the target Machine name, as it appears in the KIM Interface, **but replacing every space with an underscore '_.'** For example, if the user was configuring the button to access the **3D4 HS SUPPORT Rear Process** machine, they would add **'machine_name=3D4_HS_SUPPORT_Rear_Process'** to the URL.

Finally, add the following string to the end of the URL:

&mapping_config=

Add the ID of the Configuration the KIM Interface needs to use for this Load button. For example, if the user was configuring form **PR-4017-1684** using their new Configuration under **ID 4017-1684**, they would add **'&mapping_config=4017-1684'** to the URL.

The final URL will look something like the following:

http://10.1.30.90:3000/api/v1/getvalue/KIM_Interface?machine_name=*Machine_Name*&mapping_config=*Configuration-ID*

The URL generated from the example would be the following:

http://10.1.30.90:3000/api/v1/getvalue/KIM_Interface?machine_name=3D4_HS_SUPPORT_Rear_Process&mapping_config=4017-1684

VI: Adding KIM Interface to an i-Reporter Form

Step 4: Test the New Load Buttons

It is important for every new KIM Interface connection to be tested to ensure that it was established correctly. To test the KIM Interface connection on a new form, the user needs to save their new form in the Test file of **i-Reporter**. They then need to open the form on an **R-Pad** and click the **Load from Keyence IM** button wherever they added it.

If the form successfully populates the proper data in every cluster the user configured, the button and the connection are established and configured correctly. Below are some troubleshooting steps users can take to solve common issues:

- If **any** cluster populates incorrect data or no data at all, the Mapping Configuration is likely configured improperly. Ensure that each field of data is mapped to the correct cluster.
- If a **coded error message** shows, see **Error Codes** in **Chapter VII: Administrative Notes.**
- If an error stating that a connection issue occurred, contact the IT department. **There is likely some connection issue between i-Reporter, ConMas Gateway, and the KIM Interface.**
- If an error stating that the URL was invalid, please review the construction of the URL used on the Load button causing the error. There is likely a format issue with the URL. Follow the process in **Step 3e** carefully to ensure URLs are formatted correctly.

If an issue not outlined above occurs, contact the IT department. If further support is needed, see **Documentation & Support** in **Chapter I: Understanding the Program and Environment** for information getting support from the developer.

Configuring Multi-cluster Populations: The following process will configure any number of clusters that **are** part of a larger group (actions performed two or more times per form, requiring a set of related inputs). This is for forms that require hourly measurements, four or two measurements per shift, etc.

Step 1: Complete the Single-cluster Process

The user will need to complete the processes outlined in the single-cluster population configuration before they configure the Load Buttons to dynamically populate to different clusters. Ensure that each button is working correctly before continuing to this workflow.

Step 2: Determine the Total Number of Clusters using Data

To configure dynamic population, the i-Reporter form will use an **accumulation** function. The user needs to know the total number of clusters using each piece of information before they begin configuring the accumulation on the form itself.

Example: if the specific data being accessed is measured **every hour per shift**, the form will use eight individual clusters and the total number of clusters using this data would be **eight.**

VI: Adding KIM Interface to an i-Reporter Form

Configuring Multi-cluster Populations (continued):

Step 3: Duplicate the Mapping Configuration(s)

Populating multiple clusters with the same piece of information on a single form requires multiple Mapping Configurations. Each Configuration will map the same data to a different cluster in the group, allowing several **different** measurements to be added to the same form.

To achieve this, the user can take the original Mapping Configuration they created in **Step 2** and add **'-1'** to the end of the ID, indicating it is the **first** Configuration to be used. They can then copy it to a new Configuration, simply changing the cluster numbers that are populated and incrementing the number at the end of the ID. This must be done for each cluster using the data.

Example: If data is used by **eight** clusters on **PR-4017-1684**, the user would change Mapping Configuration **4017-1684** to **4017-1684-1**. Then, they would create identical Configurations **4017-1684-2** through **4017-1684-8**, mapping the data to the corresponding cluster.

If the user is populating multiple measurements with a single Load button, but one measurement is used four times and the other is used eight, they would simply omit the first measurement from the last four Configurations, like so:

Data Configured in each Mapping Configuration:

Config 1	**Config 2**	**Config 3**	**Config 4**	**Config 5**	**Config 6**	**Config 7**	**Config 8**
Meas 1 Meas 2	Meas 1 Meas 2	Meas 1 Meas 2	Meas 1 Meas 2	Meas 2	Meas 2	Meas 2	Meas 2

Step 4: Configure the Accumulation Formulas in Excel

This step **must** be performed in Excel, with a copy of the form exported from **ConMas Designer.**

The **accumulation formula** will assess which clusters have already been populated and determine which Mapping Configuration should be used. If 5 of the 8 measurements have been made, the accumulation formula will tell the KIM Interface to use the 6th Configuration, populating the 6th cluster in the set.

a) In Excel, navigate to the new Load button. Considering the total number of clusters using the data field, find a space near the button that can fit that number of clusters. Directly below or above the load button is generally a good spot to place these clusters.

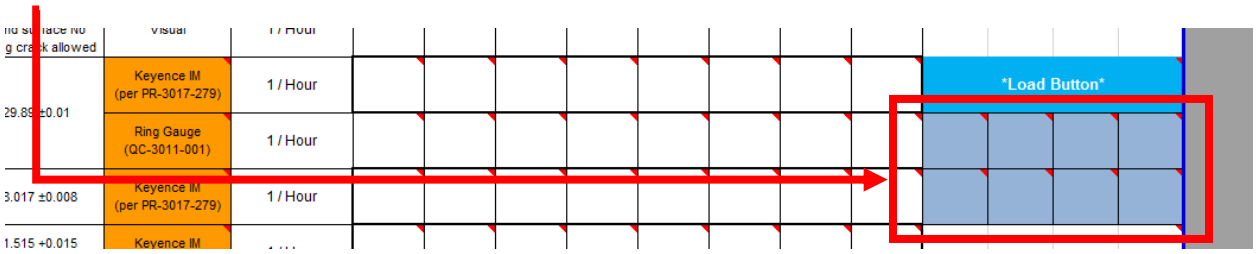
b) In that space, add **Calculation Formula** clusters equal to the total clusters using the data (if the data field is used by eight clusters, the user must add eight clusters):

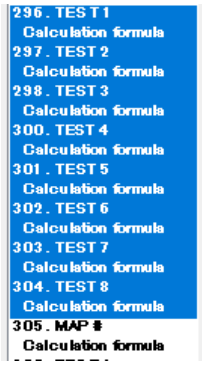
VI: Adding KIM Interface to an i-Reporter Form

Configuring Multi-cluster Populations (continued):

Step 4: Configure the Accumulation Formulas in Excel (continued)

Eight new Calculation Clusters added directly below the newly-configured Load Button:





c) Name the Calculation clusters **'TEST 1'**, **'TEST 2'**, etc. until each is named.

d) Add one final **Calculation Cluster** near the **TEST** clusters and name it **MAP #.**

The image on the right is what the cluster list should look like if the user was configuring a data field that is used by **eight** clusters. There are eight **TEST** clusters and a ninth **MAP #** cluster.

Note: These Calculation clusters are unconfigured at this point and should not have calculations assigned to them.

e) Set each of the **TEST** clusters to determine whether their corresponding data cluster has been populated or not. To do this, copy the following Excel formula into each cell:

=IF(*CELL*="", "", 1) ; where ***CELL*** is the cell number of the cluster on the Excel Workbook. This formula tests if the target ***CELL*** has **any** input and sets its own value to **1** if so.

Example: To TEST a set of eight clusters in the 22nd row of a Workbook, the user would configure eight TEST calculation clusters with the following formulas, in order:

=IF(A22="", "", 1)	**=IF(B22="", "", 1)**	**=IF(C22="", "", 1)**	**=IF(D22="", "", 1)**
=IF(E22="", "", 1)	**=IF(F22="", "", 1)**	**=IF(G22="", "", 1)**	**=IF(H22="", "", 1)**

f) Set the formula of the **MAP #** cluster to the following **SUM** formula:

=SUM(*TESTCELL1*:*TESTCELLN*,1) ; where ***TESTCELL1*** is the first of the TEST clusters and ***TESTCELLN*** is the final, 'Nth' TEST cluster. If the TEST clusters are broken into two or more rows (as shown in the example images above), the user will need to determine the individual ranges and combine them **(see Excel SUM formula documentation).**

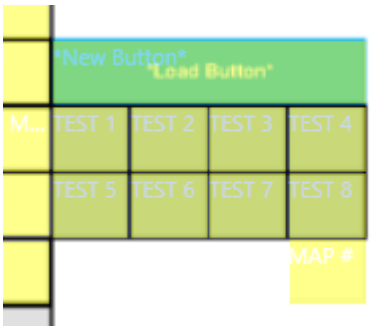
This is the **accumulation formula** that will add the **Boolean (true/false)** value of each cluster, determining which cluster needs to be populated and which Configuration to use. It begins with a value of **1** to indicate that it uses Mapping Configuration **1** first.

VI: Adding KIM Interface to an i-Reporter Form

Configuring Multi-cluster Populations (continued):

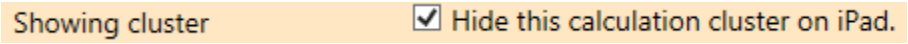
Step 5: Configure the Accumulation Formulas in i-Reporter

To complete the process, load the modified Excel copy of the form back into ConMas Designer. The user should see their new **accumulation formula** clusters on the form where they placed them in the Excel form, as seen on the right:



See the Load Button, the TEST clusters below it, and the MAP # cluster at the very bottom right of the image. This is the recommended format for adding a complex Load Button that will populate to eight clusters over the course of a shift.

a) To finalize the configuration of the TEST and MAP # clusters, the user **must** set the **Showing cluster – Hide this calculation cluster on iPad** setting to **True**. Otherwise, the calculations will be visible on the form. All other settings can remain default.



b) The last thing that must be changed is the URL of the Load Button. Assuming the URL was tested and confirmed to be functional, all the user needs to do is add the following to the end of it:

-{*MAP # SHEET #,MAP # CLUSTER #*} ; substituting the sheet and cluster numbers of the **MAP #** cluster accordingly. This will tell the URL to use the value of the **MAP #** cluster at the time it is pressed, dynamically updating the Mapping Configuration being used.

Note: This method will only work if the user is following the **'-1', '-2',** etc. Configuration ID convention. This is the easiest approach to dynamic cluster mapping; therefore, it is highly recommended that users **always employ the above suffixing convention**.

Step 6: Re-test the Load Buttons

Ensure that the accumulations work properly and that the form populates the correct clusters in the proper order. If the form successfully populates the proper data in every cluster the user configured, the button and the connection are still established and configured correctly.

VII: Administrative Notes

Errors and Error Codes

The KIM Interface is fitted with a high level of resilience and error reporting. This facilitates an easier troubleshooting process, as operators can immediately tell what is wrong and who will need to be involved in the repair process.

Each possible error case in the KIM Interface environment is coded and given a message. Below is an outline of each of the possible errors:

[Error 1] No machine name passed. This error indicates that there was no machine name included in the URL call of the KIM Interface. Users must include a valid Keyence IM-8001 Machine name, as they appear in the KIM Interface Manager. See **Chapter VI** to ensure proper configuration of the machine name in the URL. This is a **user error; assistance unnecessary.**

[Error 2] Invalid machine name passed. This error indicates that the machine name passed to the KIM Interface was not found in the KIM Interface configuration. This means that either the machine name contained a typo, or the machine name requested does not exist and needs to be configured in the KIM Interface. This is a **user error; assistance unnecessary.**

[Error 3] No mapping configuration ID passed. This error indicates that there was no mapping configuration ID number included in the URL call of the KIM Interface. Users must include a valid mapping configuration ID for that machine as they are configured in the KIM Interface Manager. This is a **user error; assistance unnecessary.**

[Error 4] Invalid mapping configuration ID format. This error indicates that the mapping configuration ID number passed to the KIM Interface was not in a valid format. This means that the ID was passed as a non-numerical string of characters. Mapping configuration IDs must be purely numerical and contain the '-' character. This is a **user error; assistance unnecessary.**

[Error 5] Undefined mapping configuration ID passed. This error indicates that the mapping configuration ID number passed to the KIM Interface was not found in the mapping configurations defined for the machine requested. This likely means the user entered an incorrect ID number for the desired mapping configuration, or the user needs to define a new mapping configuration entirely. This is a **user error; assistance unnecessary.**

[Error 6] Access to Keyence IM-8001 folder denied. This error indicates that the KIM Interface was unable to gain access to the Keyence IM-8001 folder. This error is very uncommon and means there has been some change in the Gateway Host environment or the Keyence IM-8001 folder. This is an **environment issue; contact the IT Department.**

[Error 7] Unable to locate Keyence IM-8001 folder. This error indicates that the KIM Interface was unable to locate the Keyence IM-8001 folder. This likely means there has been some change to the way the Keyence IM-8001 folder is structured. This is an **environment issue**; **contact the IT Department**.

VII: Administrative Notes

Errors and Error Codes (continued)

[Error 8] Current measurement sheet for [machine name] could not be found. This error indicates that the KIM Interface was unable to find an Excel sheet titled Measurements.xlsx or Measurements.csv in the machine's folder. This means that the sheet may have a different name or that it does not exist at all. This is an **organization error; contact the manager of the Keyence IM Machines.**

[Error 9] Unable to open the current measurement sheet. This error indicates that the current measurement sheet was located but the KIM Interface failed to open it. This could mean that the sheet is corrupt, uses an invalid character, or has some other kind of internal formatting error. This is an **organization error; contact the manager of the Keyence IM Machines.**

[Error 10] No mapping configurations folder in KIM Interface file. This error indicates that the KIM Interface environment folder is missing the internal mapping configuration files. This error is a critical issue as the KIM Interface cannot pass its results to the i-Reporter form through Gateway without a valid mapping. This is likely caused by a lack of defined mapping configurations in the KIM Interface Manager. Ensure there is at least one mapping configuration defined for the machine being accessed. This is a **user error; assistance unnecessary.**

[Error Unknown] [description]. This error indicates that the KIM Interface encountered an unexpected error that would otherwise crash it. A Python exception message will be included in the return of this error, as well as the action the KIM Interface was carrying out when the error was produced. This is an **environment issue**; **contact the IT Department**.

Organization and Network Remarks

The KIM Interface connects several systems from across YNA's network. Although a large effort was made to ensure resilience and adaptability within the system, there are some things that users of the KIM Interface should be aware of. Below are some remarks and best-practices that will help the KIM Interface run smoothly and seamlessly for YNA:

Setting Up a New Model

If YNA installs Keyence IM-8001 Machines on a new Model or Production Line, these guidelines will help ensure that users are loading the new Model into the KIM Interface properly:

- Begin by creating the new Model, making sure that all the Model's Base Information has been acquired from the engineers installing and managing the Keyence Machines;
- Configure each of the Machines next, carefully copying the Machine's name and Measurement Specifications.

VII: Administrative Notes

Organization and Network Remarks (continued)

Using KIM Interface in a New i-Reporter Form

Be sure to create a new mapping configuration for each machine sending data to the form. Follow the processes in **Chapter VI** to ensure the connection is established correctly.

Folder Structure

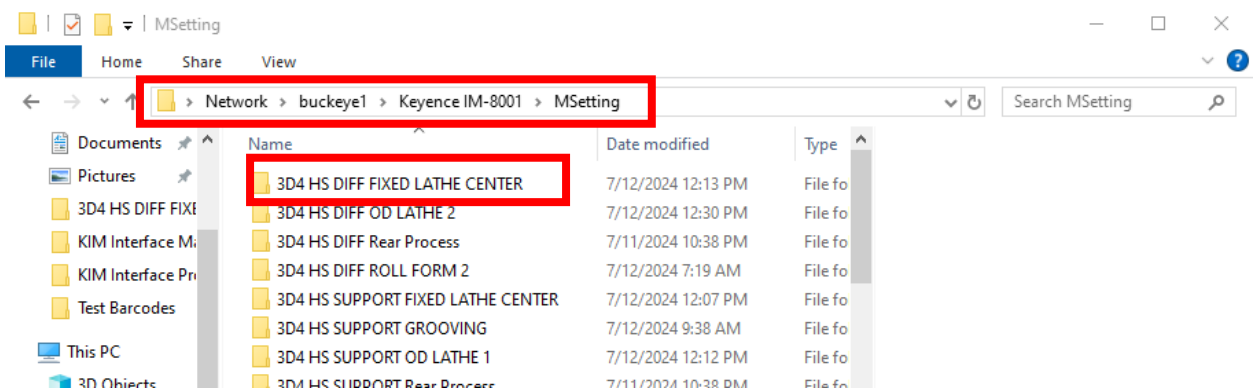
KIM Interface assumes the following Keyence IM-8001 folder structure:

\\buckeye1\Keyence IM-8001\MSetting

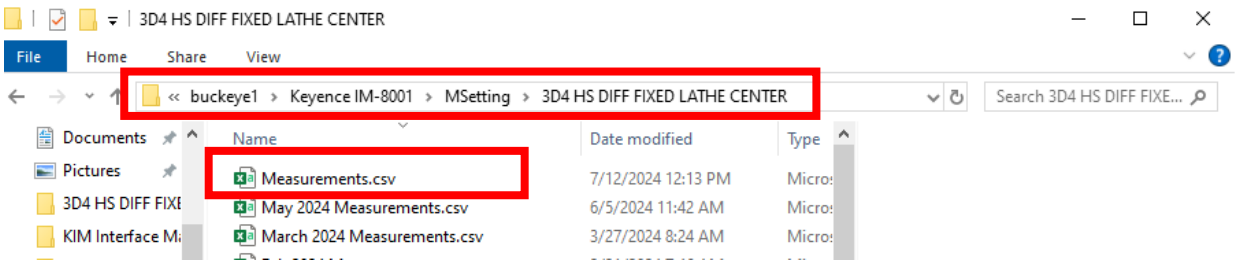
If this folder structure is obstructed or altered, the KIM Interface will fail to collect data from the Keyence IM-8001 Machine measurement sheets. Maintaining this folder structure is critical to the function of the program. If the folder structure needs to be changed, please contact the developer, as a patch will need to be distributed to YNA.

Additionally, users should verify that the Machine they are accessing has a folder inside the **MSetting** subfolder of the **Keyence IM-8001** folder. Even a machine that is correctly configured in the KIM Interface Manager will fail to access data if it does not have a folder in **MSetting**.

Example: If the user is accessing the **3D4 HS DIFF FIXED LATHE CENTER**, there must be a folder like the following:



Inside this folder, there must be a **Measurements.csv** OR **Measurements.xlsx** file holding the Machine's measurement results. If this file is absent, it will result in an **Error 8** instance.



VII: Administrative Notes

Developer Contact

Please remember that users are free to contact the developer at any time. KIM Interface is an ongoing development project and will always be open for issue submissions and feature requests. Users can contact the developer on GitHub via https://github.com/masonritchason .

Registering for a GitHub account and visiting the Development Repository for the KIM Interface software will allow users to submit issues and feature requests to the developer without directly contacting them.

Refer to this documentation frequently and the KIM Interface will become a powerful tool for managing the automatic collection of Keyence IM-8001 Machine data!

— **Mason Ritchason**, designer & developer