



# FactoryTalk Analytics VisionAI

## User Guide

Version 1.00.00

FTALK-UM002A-EN-P



**Rockwell  
Automation**

Original Instructions

# Important User Information

Read this document and the documents listed in the additional resources section about installation, configuration, and operation of this equipment before you install, configure, operate, or maintain this product. Users are required to familiarize themselves with installation and wiring instructions in addition to requirements of all applicable codes, laws, and standards.

Activities including installation, adjustments, putting into service, use, assembly, disassembly, and maintenance are required to be carried out by suitably trained personnel in accordance with applicable code of practice.

If this equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

In no event will Rockwell Automation, Inc. be responsible or liable for indirect or consequential damages resulting from the use or application of this equipment.

The examples and diagrams in this manual are included solely for illustrative purposes. Because of the many variables and requirements associated with any particular installation, Rockwell Automation, Inc. cannot assume responsibility or liability for actual use based on the examples and diagrams.

No patent liability is assumed by Rockwell Automation, Inc. with respect to use of information, circuits, equipment, or software described in this manual.

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Throughout this manual, when necessary, we use notes to make you aware of safety considerations.



**WARNING:** Identifies information about practices or circumstances that can cause an explosion in a hazardous environment, which may lead to personal injury or death, property damage, or economic loss.

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**ATTENTION:** Identifies information about practices or circumstances that can lead to personal injury or death, property damage, or economic loss. Attentions help you identify a hazard, avoid a hazard, and recognize the consequence.

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**IMPORTANT**

Identifies information that is critical for successful application and understanding of the product.

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These labels may also be on or inside the equipment to provide specific precautions.



**SHOCK HAZARD:** Labels may be on or inside the equipment, for example, a drive or motor, to alert people that dangerous voltage may be present.

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**BURN HAZARD:** Labels may be on or inside the equipment, for example, a drive or motor, to alert people that surfaces may reach dangerous temperatures.

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**ARC FLASH HAZARD:** Labels may be on or inside the equipment, for example, a motor control center, to alert people to potential Arc Flash. Arc Flash will cause severe injury or death. Wear proper Personal Protective Equipment (PPE). Follow ALL Regulatory requirements for safe work practices and for Personal Protective Equipment (PPE).

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The following icon may appear in the text of this document.



Identifies information that is useful and can help to make a process easier to do or easier to understand.

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### **FactoryTalk Analytics VisionAI Overview**

FactoryTalk Analytics VisionAI is a quality inspection platform for manufacturing. It provides AI vision that identifies and classifies defects, delivering actionable insights used to improve quality and maximize yield.

FactoryTalk Analytics VisionAI will operate as part of FactoryTalk Hub and be available as a cloud-based Software as a Service (SaaS). There is also an edge application that runs on an industrial edge compute. Model development, training, and management as well as quality data analysis occurs in the cloud. All inferencing occurs at the edge.

FactoryTalk Analytics VisionAI simplifies integration of the vision inspection system with the automation system. An add-on profile and add-on instructions are available to ease integration with Rockwell Automation control systems.

Rockwell Automation has partnered with Elementary to bring to market a unique, edge-to-cloud quality inspection platform that leverages AI algorithms to identify and classify product imperfections and provides out-of-the-box quality data analysis through pre-built dashboards to help drive root cause analysis and continuous operational improvement.

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## Getting Started

This section helps you to get started with FactoryTalk Analytics VisionAI.

### Prerequisites

- A valid organization must exist in FactoryTalk Hub.
- Your organization must have a valid subscription of FactoryTalk Analytics VisionAI.

For more information on FactoryTalk Hub please refer:

### Access FactoryTalk Analytics VisionAI

If you are a new user, you must first sign up and create your MyRockwell credentials. After your credentials are created, you can proceed to access the application.

Once the account is created user will be added to above organization, please refer to the FactoryTalk Hub user manual for more references.

You can sign-in to FactoryTalk Analytics VisionAI in the following ways:

- Launch the application from FactoryTalk Hub.
- Launch the application using the direct URL.

### Sign-in Prerequisites

Ensure the following prerequisites are met before you sign in:

- You are a valid user in FactoryTalk Hub.
- You have your MyRockwell credentials.

### Access FactoryTalk Analytics VisionAI from FactoryTalk Hub

FactoryTalk Hub is the online portal where you can access Rockwell Automation's cloud-based Software as a Service (SaaS) offerings to simplify the way you design, create, and maintain your assets.

1. Click [here](#) to navigate to the FactoryTalk Hub sign in page.

Alternatively, you can paste the following URL in your browser's address bar and press Enter.

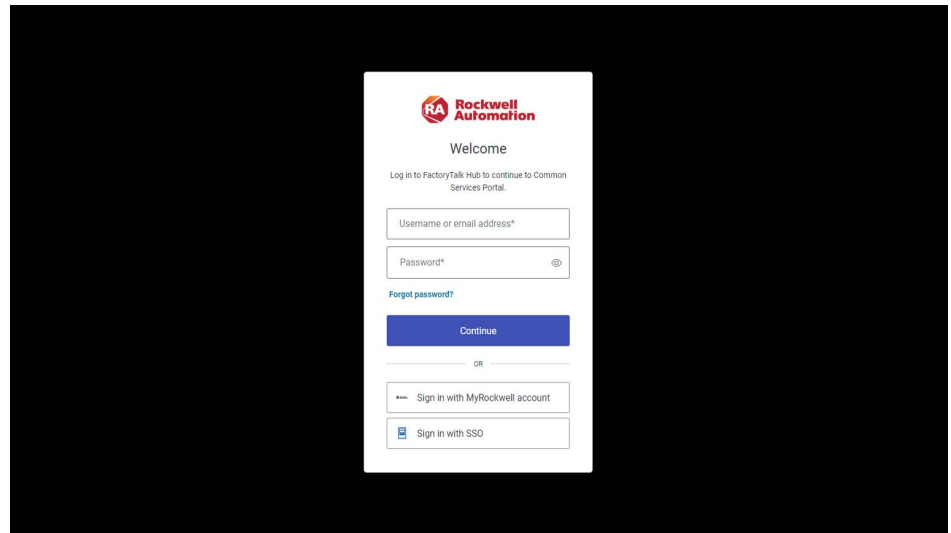
<https://home.cloud.rockwellautomation.com/>

**Figure 1 - FactoryTalk Hub Sign-in Page**



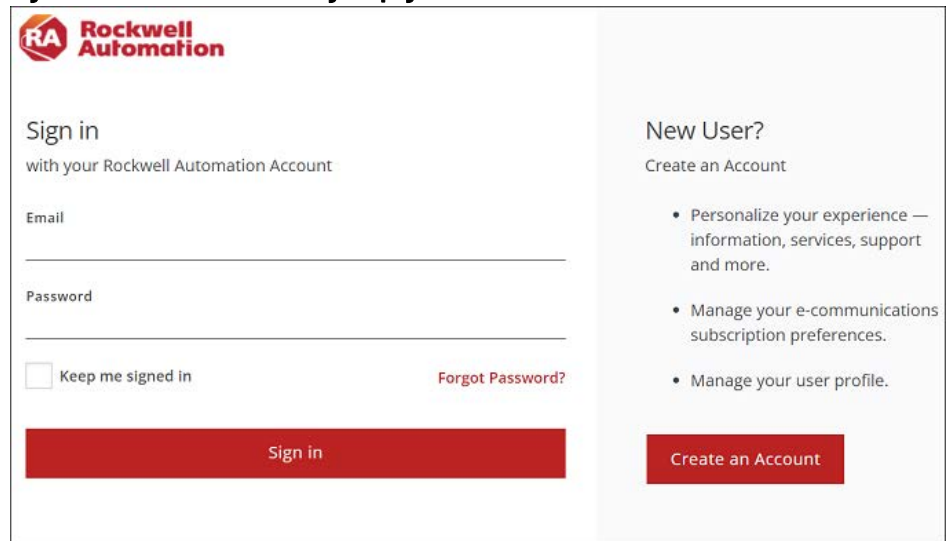
2. Click **Sign in**.  
The Sign in page is displayed.

**Figure 2 - Sign-in Page**



3. Click **Sign in with MyRockwell account**.

**Figure 3 - Rockwell Automation sign-in page**



4. Provide your MyRockwell credentials.



Click **Create an Account** if you are a new user.

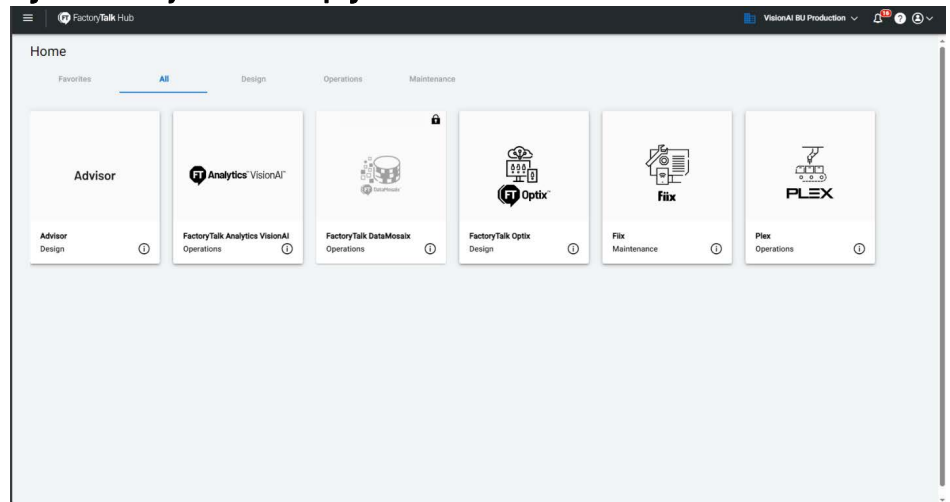


Ask administrator to add this account to Organization

5. Click **Sign in**.  
The FactoryTalk Hub Home page is displayed. It shows all the applications offered based on your [subscriptions and entitlement](#).



Figure 4 - FactoryTalk Hub Home page



6. Click the **Operations** tab.

You should be able to see all the applications in the Operations category.

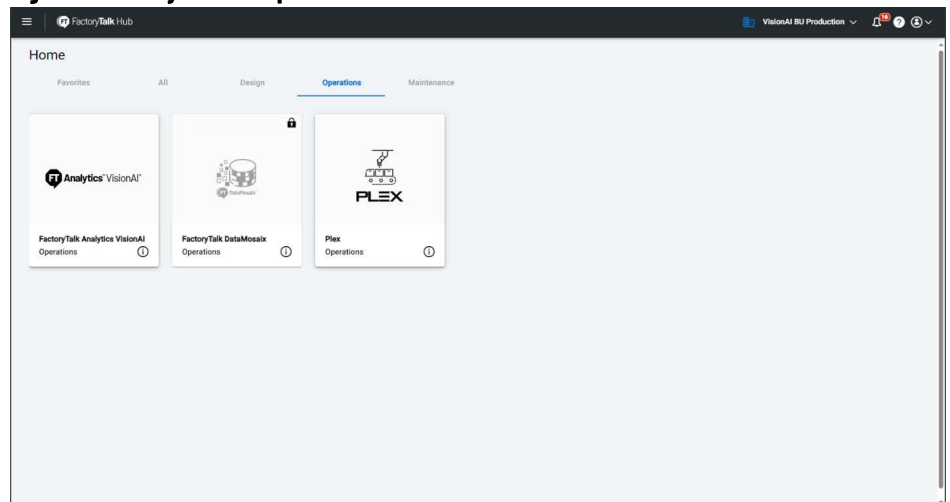


If you see the FactoryTalk Analytics VisionAI tile is locked, it means your organization has not purchased the entitlement for this application.

If you are sure that your organization has purchased the entitlement, and you are a member of the Organization, but you do not see the FactoryTalk Analytics VisionAI tile, then you must ask the Organization administrator to enable visibility of FactoryTalk Analytics Vision AI in the organization.

Users will also need either Organization level role (Admin or Contributor) or FactoryTalk Analytics Vision AI service role (Admin or Contributor) to be able to access FactoryTalk Analytics Vision AI in the Organization. Without an Organization or Service Level role, the FactoryTalk Analytics Vision AI tile will show as locked.

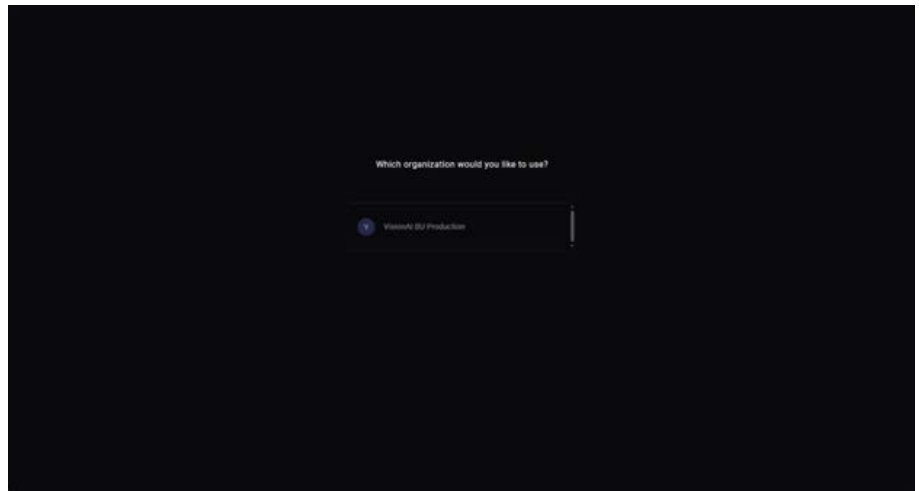
Figure 5 - FactoryTalk Hub Operations Tab



7. Click the **FactoryTalk Analytics VisionAI** tile.

The FactoryTalk Analytics VisionAI application opens in a new tab. You will be prompted to select the organization you want to sign in to.

**Figure 6 - FactoryTalk Analytics VisionAI Organization Selection**

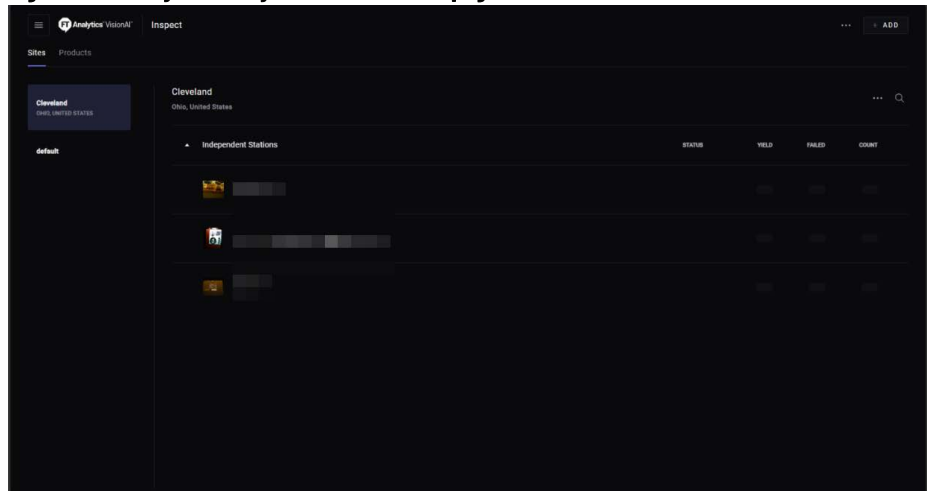


The FactoryTalk Hub Organization Owner should login through the FactoryTalk Analytics VisionAI tile before any other user. The Owner will be prompted to select the region where the data will be stored. This setting is permanent and cannot be changed. After region selection is complete, the Owner will enter the FactoryTalk Analytics VisionAI application.

After the Owner completes the region selection, any FactoryTalk Analytics VisionAI user can log in.

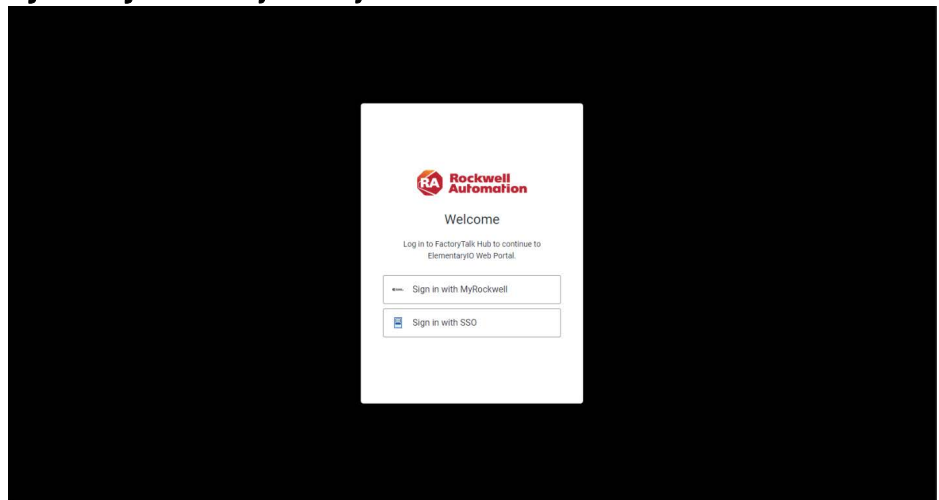
Once you select an organization, you should see the FactoryTalk Analytics VisionAI home page.

**Figure 7 - FactoryTalk Analytics VisionAI Home page**



## Sign in to FactoryTalk Analytics VisionAI

1. Click [here](#) to navigate to the FactoryTalk Analytics VisionAI Login page. Alternatively, you can paste the following URL in your browser's address bar and press Enter.  
<https://visionai.elementaryml.com/login/rockwell>

**Figure 8 - Sign in to FactoryTalk Analytics VisionAI**

2. Click **Sign in with MyRockwell** to proceed.  
You must proceed with your SAML-based credentials when prompted.
3. Click **Continue with MyRockwell**.  
The Sign in page is displayed.

**Figure 9 - Rockwell Automation Sign-in page**

4. Provide your MyRockwell credentials.



Click Create an Account if you are a new user.

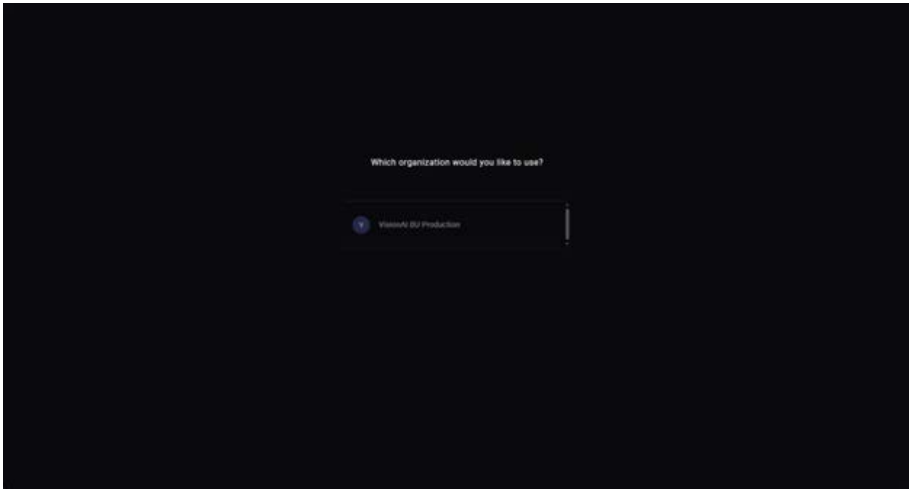


Ask administrator to add this account to Organization

5. Click **Sign in**.

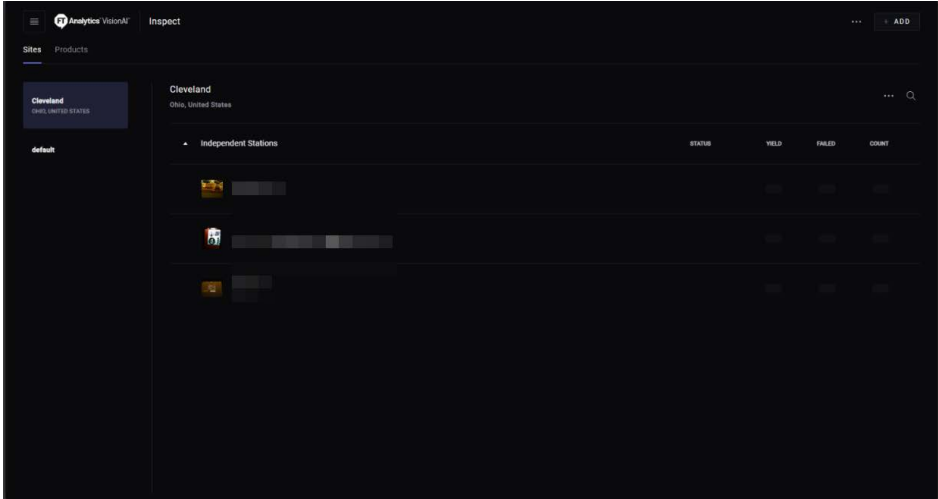
The FactoryTalk Analytics VisionAI application opens in a new tab. You will be prompted to select the organization you want to sign in to.

Figure 10 - FactoryTalk Analytics VisionAI Organization Selection



Once you select an organization, you should see the FactoryTalk Analytics VisionAI home page.

Figure 11 - FactoryTalk Analytics VisionAI Home Page



## Manage Access

In this section, you will find information related to assigning roles to users. In FactoryTalk Analytics VisionAI, users can perform tasks based on their assigned roles.

### Users

FactoryTalk Analytics VisionAI Users are provisioned the first time an authenticated FactoryTalk Hub User accesses the application through the tile in FactoryTalk Hub.

The FactoryTalk Analytics VisionAI **Administration** page displays the list of users that are part of the organization.

**Figure 12 - Administration-Users**

FIRST NAME	LAST NAME	EMAIL	LAST LOGIN	ROLE	Y
[Redacted]	[Redacted]	[Redacted]	6d ago	Admin	
[Redacted]	[Redacted]	[Redacted]	1w ago	Admin	
[Redacted]	[Redacted]	[Redacted]	34m ago	Admin	
[Redacted]	[Redacted]	[Redacted]	1w ago	Admin	
[Redacted]	[Redacted]	[Redacted]	2d ago	Admin	
[Redacted]	[Redacted]	[Redacted]	7h ago	Admin	
[Redacted]	[Redacted]	[Redacted]	5h ago	Editor	

A user can join an organization in the following ways:

- by accepting an [email](#) invitation from FactoryTalk Hub.
- by using join organization option in FactoryTalk Hub.

Upon accepting the invitation, the user gains access to the organization. A user starts appearing in the User listing.

Users can only be added or deleted through FactoryTalk Hub. Users cannot be added or deleted directly in the FactoryTalk Analytics VisionAI application. The buttons to **Add User** or **Delete** a user in the FactoryTalk Analytics VisionAI UI have been disabled to enforce user management through FactoryTalk Hub.

### Roles

FactoryTalk Analytics VisionAI has four predefined roles. Each role has a separate set of capabilities and privileges. Based on the task a user wants to perform, they are assigned a role. A project admin can change the role of other users.

When a FactoryTalk Analytics VisionAI user is provisioned, their initial role is determined based on the role they hold in the FactoryTalk Hub Organization. Roles transfer from FactoryTalk Hub to FactoryTalk Analytics VisionAI in the following way:

- FactoryTalk Hub Owner - FactoryTalk Analytics VisionAI Admin
- FactoryTalk Hub Admin - FactoryTalk Analytics VisionAI Admin
- FactoryTalk Hub Contributor - FactoryTalk Analytics VisionAI Operator

Once the user account is provisioned, FactoryTalk Analytics VisionAI admins are free to upgrade or downgrade the members of their organization through the FactoryTalk Analytics VisionAI web application.

The guide below defines the capabilities available to each user role found in the FactoryTalk Analytics VisionAI application.

**Figure 13 - High Level Overview of Capabilities per User Role**

	Admin	Editor	Operator	Viewer
<b>Admin</b> Manages all products, routines, and users				
<b>Editor</b> Manages all products and routines, but only some users				
<b>Operator</b> Runs inspections and labels images				
<b>Viewer</b> Views inspections and analytics				
<b>Permissions</b>	Admin	Editor	Operator	Viewer
View inspections and analytics	✓	✓	✓	✓
Subscribe to notifications	✓	✓	✓	✓
Run inspections	✓	✓	✓	—
Label images	✓	✓	✓	—
Create products and routines	✓	✓	—	—
Train tools	✓	✓	—	—
Manage operators and viewers	✓	✓	—	—
Manage admins and editors	✓	—	—	—

## Admin

The Admin role can perform the following actions:

- Create, archive, unarchive Products
- Create, archive, unarchive Recipes
- Edit camera settings
- Add, modify, delete tools from Recipes
- Start and stop batches (inspections)
- Label images
- Train ML Models
- Deploy recipe versions to stations
- Monitor inspection results
- Receive daily or weekly inspection reports
- Receive station alerts via email or SMS
- Add additional users to the UI
- Edit user roles of Admins, Editors, Operators and Viewers
- Deactivate users (all roles)

## Editor

The Editor role can perform the following actions:

- Create, archive, unarchive Products
- Create, archive, unarchive Recipes
- Edit camera settings
- Add, modify, delete tools from Recipes
- Start and stop batches (inspections)

- Label images
- Train ML Models
- Deploy recipe versions to stations
- Monitor inspection results
- Receive daily or weekly inspection reports
- Receive station alerts via email or SMS
- Add additional users to the UI as Operators or Viewers only
- Edit user roles of Operators and Viewers
- Deactivate users assigned Operator and Viewer roles

## Operator

The Operator role can perform the following actions:

- Start and stop batches (inspections)
- Monitor inspection results
- Receive daily or weekly inspection reports
- Receive station alerts via email or SMS

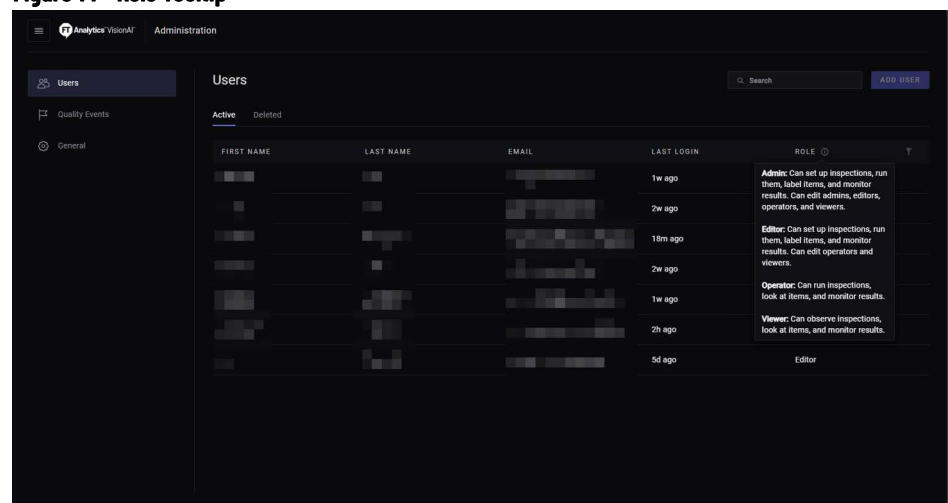
## Viewer

The Viewer role can perform the following actions:

- View active batches (inspections)
- Monitor inspection results
- Receive daily or weekly inspection reports
- Receive station alerts via email or SMS

Role definitions are also available in the FactoryTalk analytics VisionAI UI by navigating to the Users tab on the **Administration** page and hovering over the Role tooltip.

**Figure 14 - Role Tooltip**

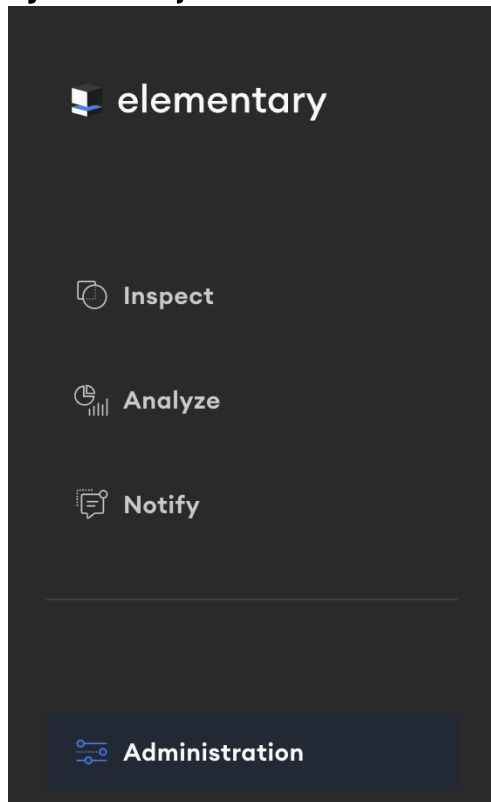


## Role Settings

User roles can be modified at any time.

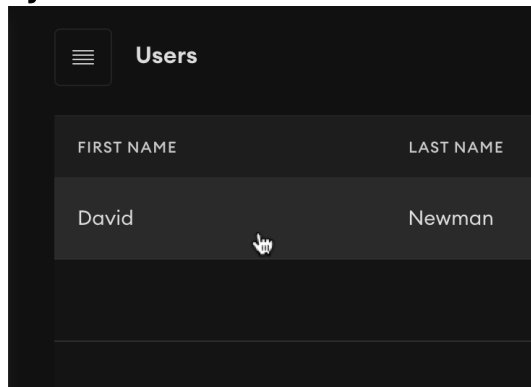
1. After logging into the FactoryTalk Analytics VisionAI UI, navigate to **Administration** in the primary menu.

Figure 15 - Primary Menu

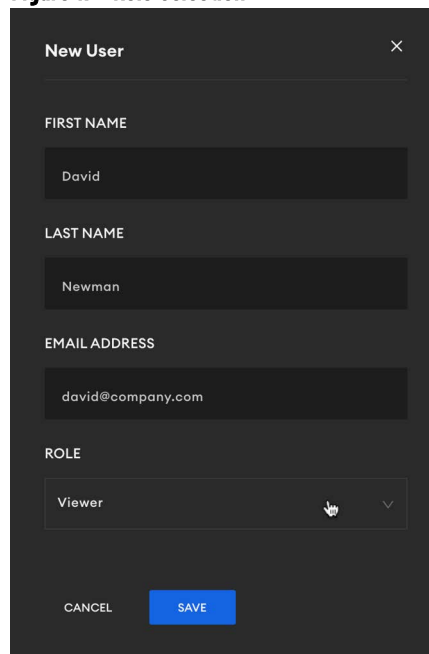


2. To change the role of an existing user, click on the relevant user in the table, click on the **Role** dropdown, select the desired role, and click **Save**.

Figure 16 - User Selection





**Figure 17 - Role Selection**

The image shows a dark-themed modal window titled "New User" with a close button (X) in the top right corner. The form contains the following fields:

- FIRST NAME:** A text input field containing "David".
- LAST NAME:** A text input field containing "Newman".
- EMAIL ADDRESS:** A text input field containing "david@company.com".
- ROLE:** A dropdown menu with "Viewer" selected and a downward arrow on the right. A mouse cursor is hovering over the dropdown.

At the bottom of the form, there are two buttons: "CANCEL" and "SAVE".

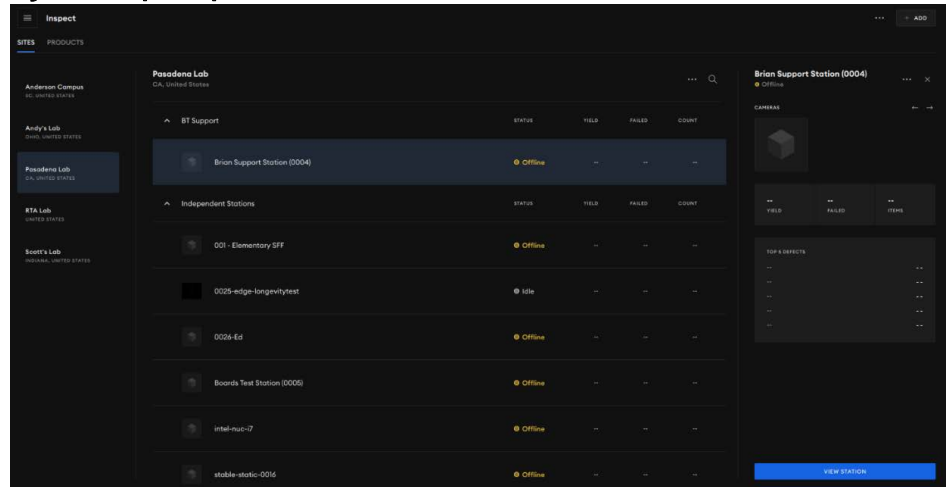
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## Sites and Products

# Inspect Top View

When you log in to FactoryTalk Analytics VisionAI, you will be presented with the Inspect Top View. This view is only available from a remote connection. It does not show up on a local HMI.

**Figure 18 - Inspect Top View**



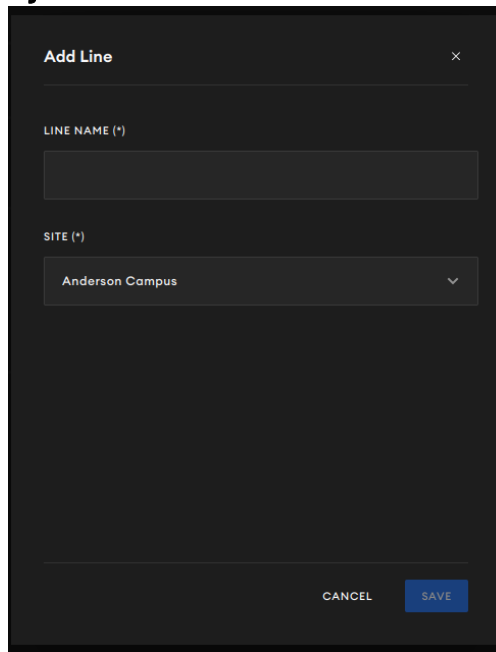
Stations are organized by Sites, listed on the left-hand column. Stations are further divided into Lines, listed to the right. Selecting a Station shows its current status on the far right-hand side, including batch statistics if available. You can search for specific Lines or Stations can by using the magnifying glass icon.

1. Click the **Add** button in the top-right corner to add a new Site or Line.
2. If adding a Site, specify the time zone and location.

**Figure 19 - Add Site**

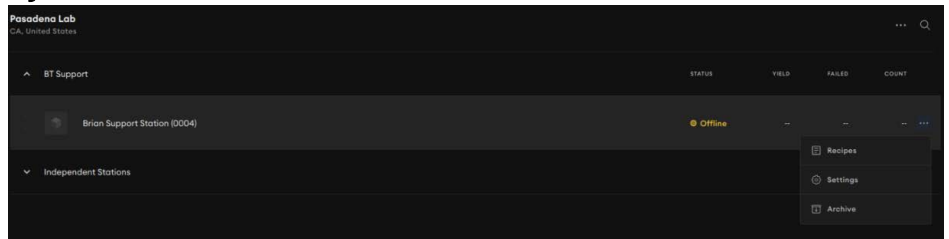
3. If adding a Line, specify the Site it belongs to.

Figure 20 - Add Line



When mousing over a Station, a "..." button will appear on the right-hand side. This button will open a menu, allowing the admin to view all Recipes associated with the station, to edit which Site and Line the station belongs to, and to Archive the station.

Figure 21 - Station Menu

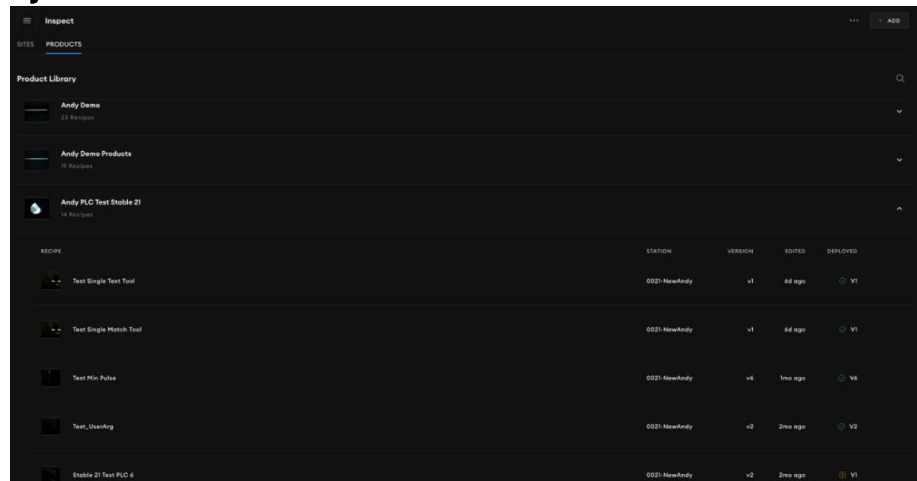


Archiving removes the Station from the main view, and it can only be seen and restored through Archive view. It does not delete Stations nor their records.

The view can be changed to show a listing of all Products across the whole organization.

1. Click Products in the upper left corner to see the Products view.

Figure 22 - Products View



The screenshot shows the 'Inspect' interface with the 'PRODUCTS' tab selected. The 'Product Library' section lists three products: 'Andy Demo' (23 Recipes), 'Andy Demo Products' (79 Recipes), and 'Andy PLC Test Stable 21' (24 Recipes). Below this is a table of recipes associated with the selected product.

RECIPE	STATION	VERSION	EDITED	DEPLOYED
Text Single Text Tool	0021-NewAndy	v1	8d ago	V1
Text Single Match Tool	0021-NewAndy	v1	8d ago	V1
Text Min Pulse	0021-NewAndy	v6	1mo ago	V6
Text_UserArg	0021-NewAndy	v2	2mo ago	V2
Enable 21 Test PLC e	0021-NewAndy	v2	2mo ago	V1

Expanding a product will show Recipes associated with that product, as well as which Station the Recipe is assigned to.

2. Select a Station and click **View Station** to move to the detailed Inspect Stations View

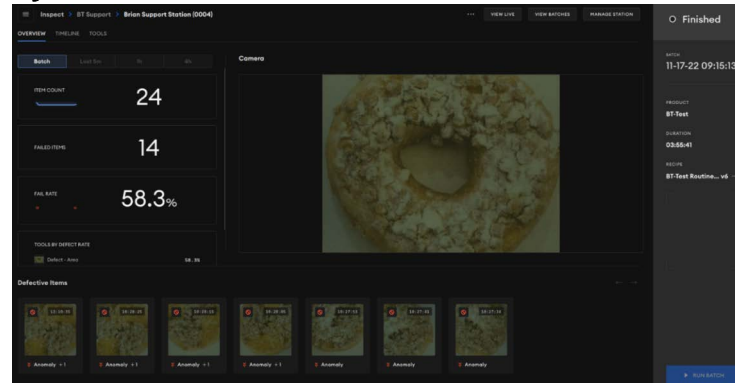
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## Inspect Stations

### Stations Overview

The Overview screen is the main operator interface. On the Overview screen, the live camera feeds are shown in center of the screen. This feed only updates if cameras are being triggered

**Figure 23 - Overview**



Statistics are provided on the left that can be filtered to an entire batch, or given time periods of Last 5 minutes, last 1 hour, and last 4 hours. Statistics provided include item count, number of failed items, and fail rate where  $\text{Fail Rate} = \text{Failed Items} \div \text{Item Count}$ . Defect rate per tool is also provided.

Defective items are shown along the bottom and can be scrolled through.

You can start and stop batches using the **Start Batch** and **Stop Batch** button on the bottom right.

You can also view data from historical batches from this screen.

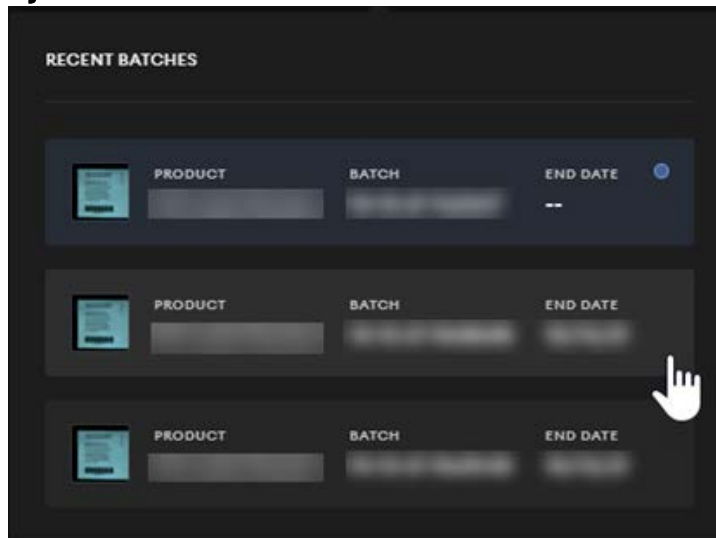
1. Click the **View Batches** button to review historical inspection batches.

**Figure 24 - View Batches**



2. Select the batch you want to view.

**Figure 25 - Historical Batch Selection**



3. Click the **View Live** button to exit historical inspection batch view and return to a view of the live batch.

**Figure 26 - View Live**



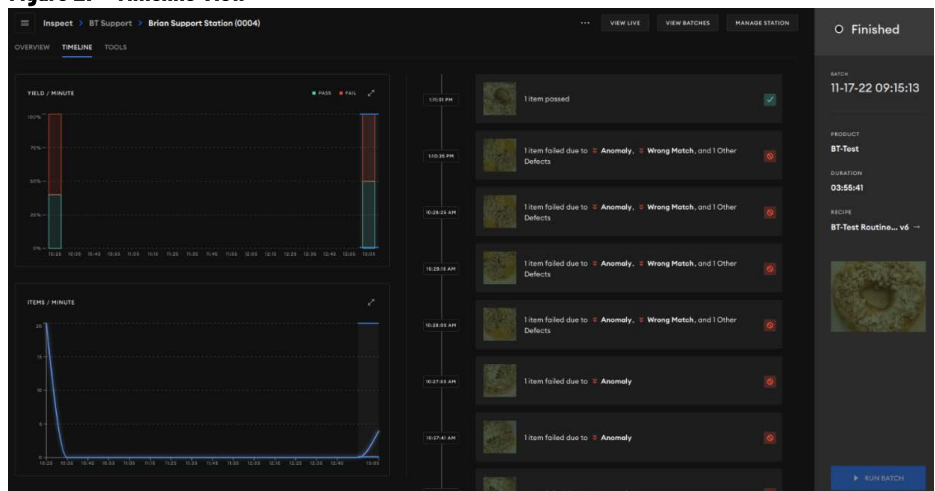
## Stations Timeline

1. Click **Timeline** in the upper left to get a timeline view of the batch.

The timeline of inspected items is shown in the center and provides you with a chronological view of items as they were analyzed, with the top image being the most recent. You may scroll up to review the most recent images analyzed during the inspection and scroll down to review older images analyzed during the inspection. You can click on a unit image to review the results of each tool for that unit.

The YIELD / MINUTE histogram shows pass/fail percentages over time. You can select a specific point in time during the inspection to view images analyzed at that time. The ITEMS / MINUTE line graph shows Items Per Minute analyzed over time. The live camera feeds can be accessed through right-hand sidebar.

**Figure 27 - Timeline View**

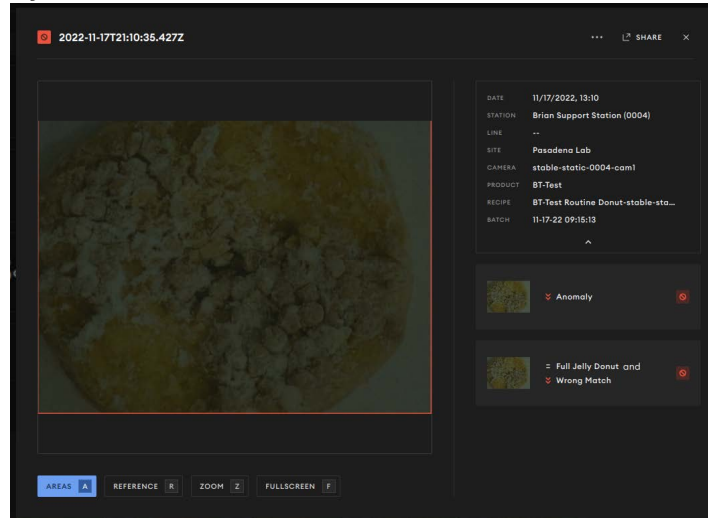




## Stations Item Modal

Individual item details can be opened by clicking on the item in either **Overview** or **Timeline** view. The Item ID/name is displayed at the top of the modal window. The detailed information associated with the image can be expanded on the right of the image and detailed results from each tool are shown. Each tool can be accessed from the tool listing on the right-hand side. Users can switch between different camera views from the camera listing on the left-hand side if the station has multiple cameras (not shown here). Users can generate an email or link to this view by clicking **Share** in the top right corner.

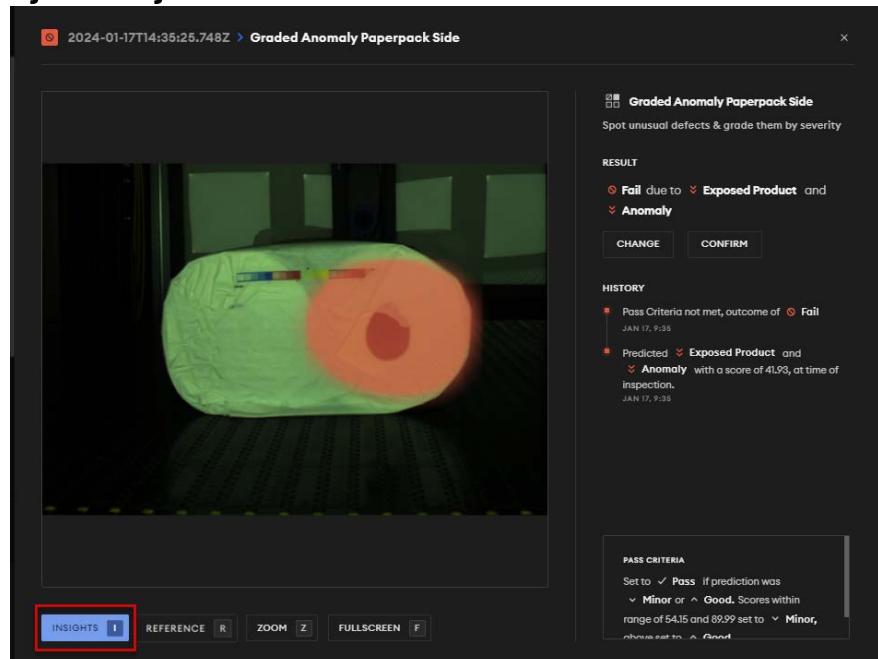
**Figure 28 - Stations Item Modal**



## Stations Insights

After clicking on a tool on the right side of the image, you will be presented with the detailed view. If you are using an Anomaly and Graded Anomaly tool, an "Insights" button is available to highlight the location of the defect on the item. Defect tools do not currently have this feature.

**Figure 29 - Insights**

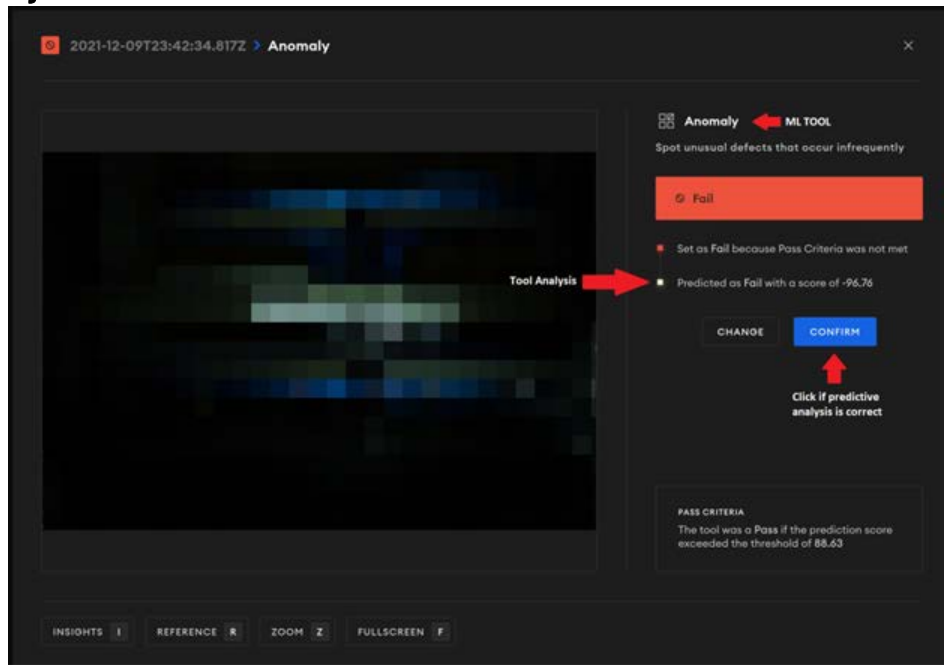


Operators can also use this view to Change or Confirm the prediction result.

1. Select the machine learning tool you would like to change or confirm.
2. If the predictive analysis is correct, click Confirm. This will add that image to the training data set.

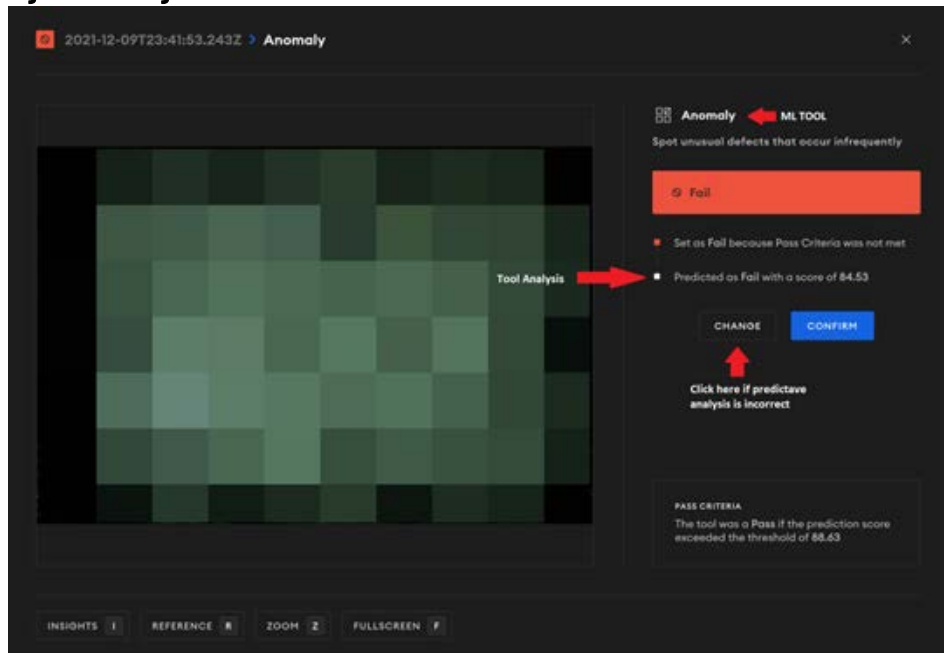
Your confirmation of the label will be noted in the Tools column.

Figure 30 - Confirm A Label



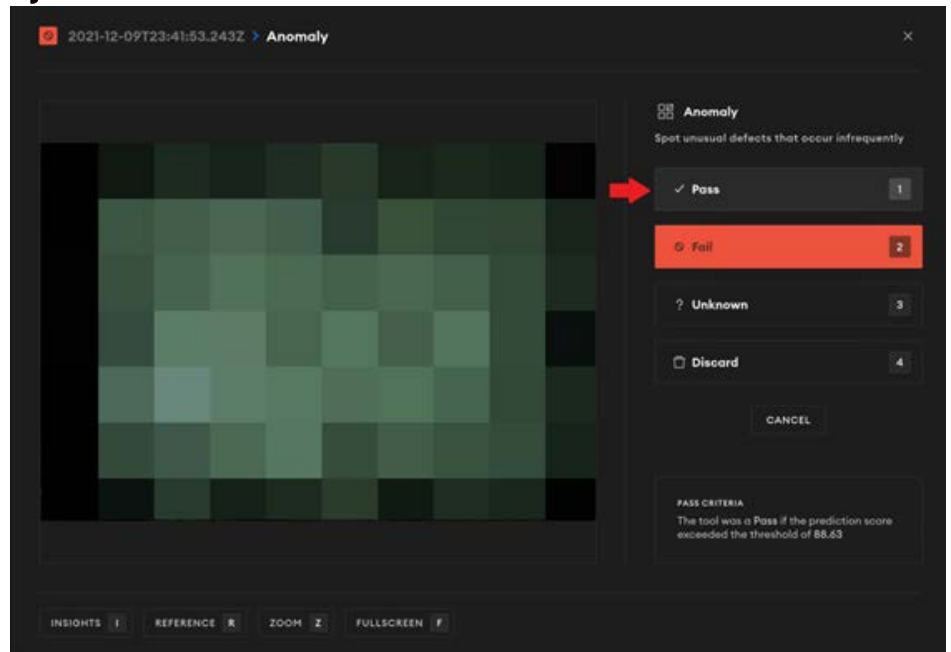
3. If the predictive analysis is incorrect, click **Change** to select a new label.

Figure 31 - Change a Label



4. Choose the correct label that should be associated with the image.

Figure 32 – Select the Correct Label



Your confirmation of the label will be noted in the Tools column and the image has been added to the model training data set.

## Stations Tools

The **Tools** view can be accessed by clicking **Tools** in the upper left of the **Inspect** view. In this view, tools can be cycled through via the left-hand listing.

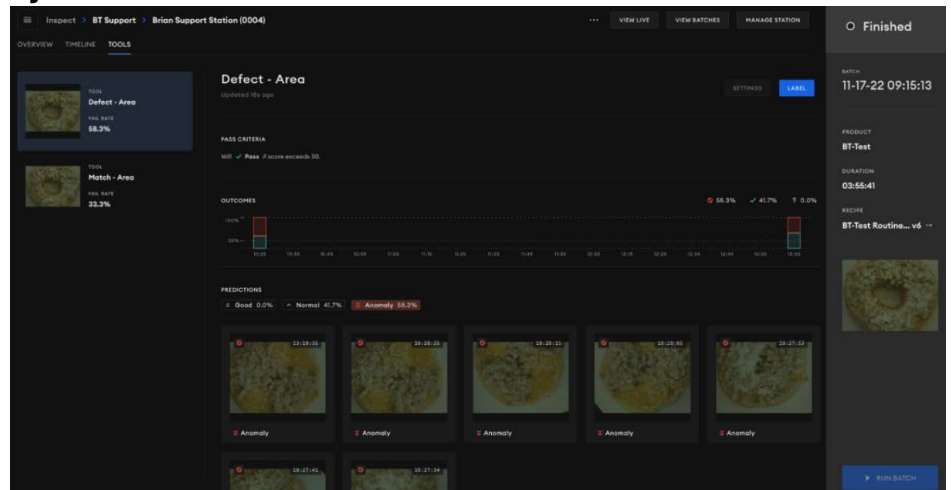
The Outcomes histogram shows pass/fail percentages over time for the selected tool.

The Predictions section shows images from the tool's Area of Interest (AOI). The Predictions section shows anomaly images by default. This filter can be changed by toggling individual labels.

Detailed item modals can be opened through these images, similar to **Overview** and **Timeline** views.

You can also label images from this view by clicking the **Label** button in the upper right corner. Clicking **Label** will take you to a labelling gallery with a filtered view of unlabeled images for the selected tool. You can review and label images as needed. Click the back button to exit the labelling gallery and return to the **Tools** view.

Figure 33 – Tools View



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## Manage Stations

### Manage Station

The **Manage Station** button in the top-right corner of the **Inspect** page brings up the management interface. The **Operate Station** button returns you to the **Overview** page.

On the **Manage Station** page, all Recipes associated with the station will be listed. From this page, Recipes can be renamed, duplicated, associated to a different station or product, or archived.

The **Communication** tab allows you to configure PLC mappings.

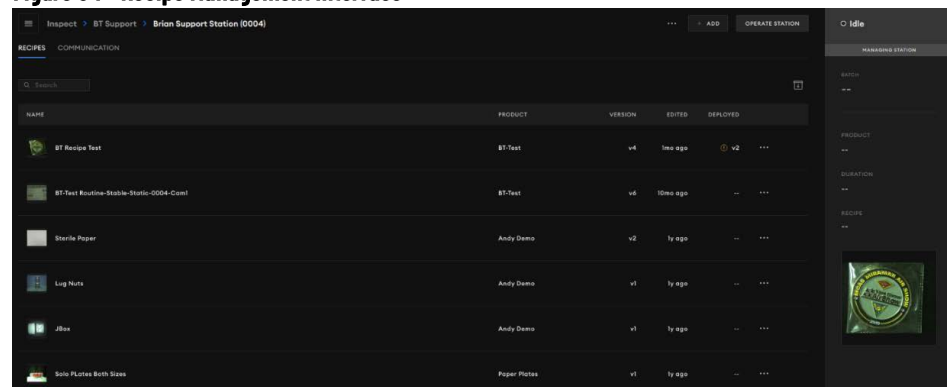
To create a new recipe, first you need to add a Product.

1. To add a Product, click **+ ADD** in the upper right.
2. Select **Product** from the drop down list.
3. Provide a Product name and click **Save**.
4. Once your product is created, click **Start** by adding a Recipe.
5. Provide a Recipe name and under location, select your Station. Click **Save**.

To edit a Recipe:

1. Click on a Recipe to bring up the Recipe Management interface.

**Figure 34 - Recipe Management Interface**



### Manage Recipes - Camera

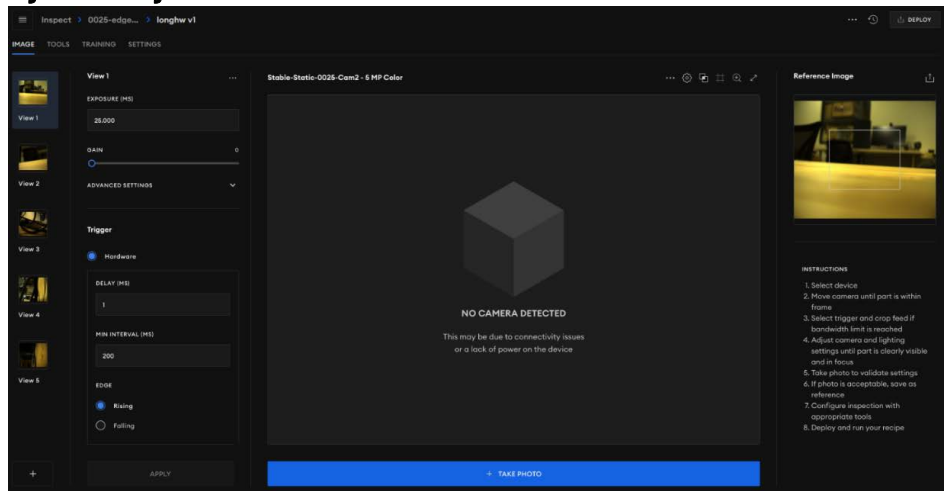
The **Image** view is used to configure camera settings. You can switch between different camera views from the camera listing on the left hand side if the Station has multiple cameras. The main settings include exposure length, gain/gamma, and trigger type. Descriptions of trigger types are provided below.

- Hardware trigger - trigger based on electrical signal sent to the system.
- Continuous trigger - images are taken every x milliseconds.
- Manual trigger - images are taken when soft button is clicked. Camera feed updates continuously.

Click **Take Photo** to take a reference image once camera settings are configured.

Click **Save as a Reference Image**. If you are using multiple cameras, a reference image will be required for each camera.

Figure 35 - Image View

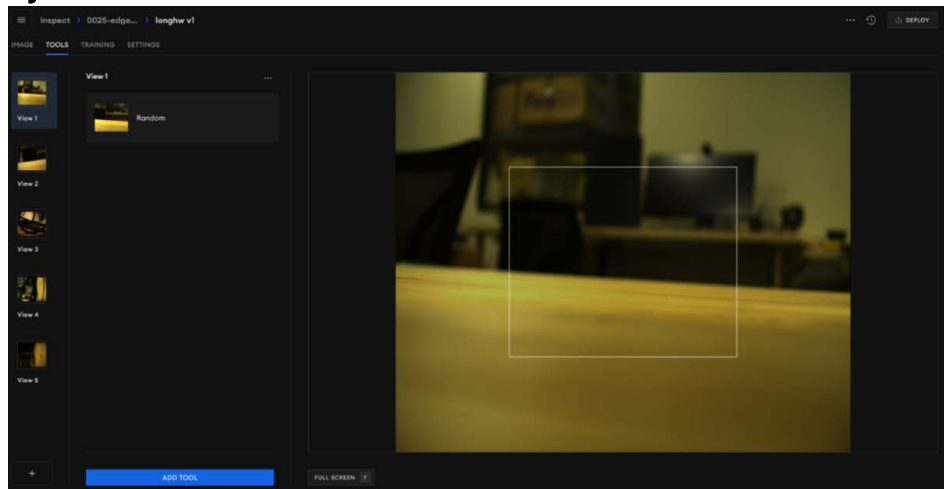


## Manage Recipes - Tools

The configured tools are displayed on the **Tools** view. Each Tool is associated with a specific camera. Switching between cameras will show different tools. Tools can be renamed, duplicated, deleted, or moved to different cameras. Individual tools can be opened to set pass criteria or change AOsIs.

See [Chapter 6, Tools Definition & Configurations](#) for more information about the Tools available in FactoryTalk Analytics VisionAI and how to configure each tool.

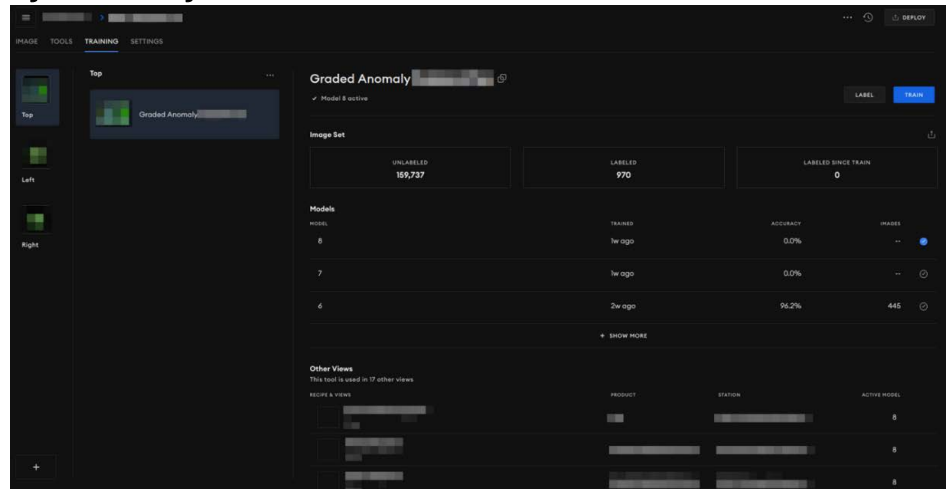
Figure 36 - Tools View



## Manage Recipes - Training

In the **Training** view, a history of trained models for the selected camera and tool is displayed. Switching between tools will change the displayed trained model history. Clicking on a model version will display the training report for that version.

**Figure 37 - Training View**

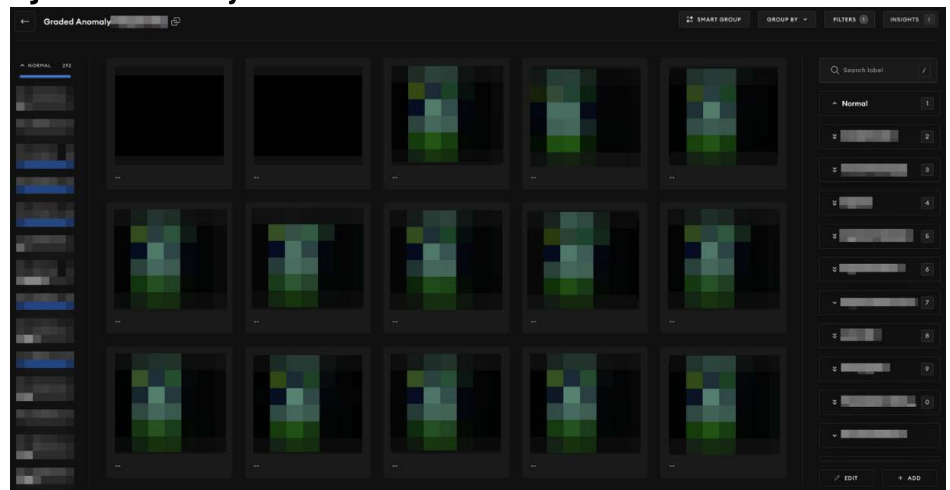


Model training data consists of images that are manually labelled as normal or anomalous. Clicking the **Label** button will open the labeling gallery interface for the selected tool.

## Manage Recipes - Label Gallery

Once you have clicked Label on the Training view to enter the Label Gallery, images that have been taken in batch inspections are displayed. The counts of currently applied labels are listed on the left. Images can be selected and labelled via label buttons on the right. A detailed view can be accessed by clicking on an individual image. The images can be arranged by Smart Groups (which will group similar-looking images), prediction, or label. The images can also be filtered by new to old, label, prediction, score, outcome, batch, or date inspected. Insights can be layered onto all images for which they are available to support the labeling process.

**Figure 38 - Label Gallery**



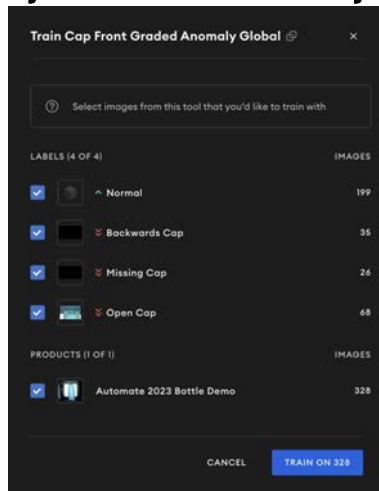
Click the return arrow in the upper left corner to return to the **Training** view.

## Manage Recipes - Train

Clicking the **Train** button on the **Training** view will build a new model using cloud resources, using the currently labelled images.

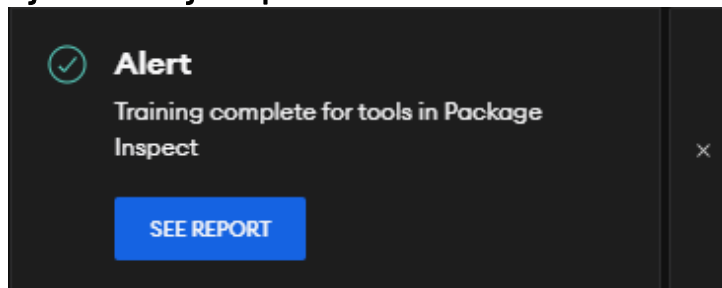
When you click **Train**, a new window will pop up allowing you to select all Labels, or just the Labels you have adequate images for. When you are ready to start training, click the **Train on** button. If the model is shared across Products, you have the option to train for one or more Products.

**Figure 39 - Tool Selection for Training**



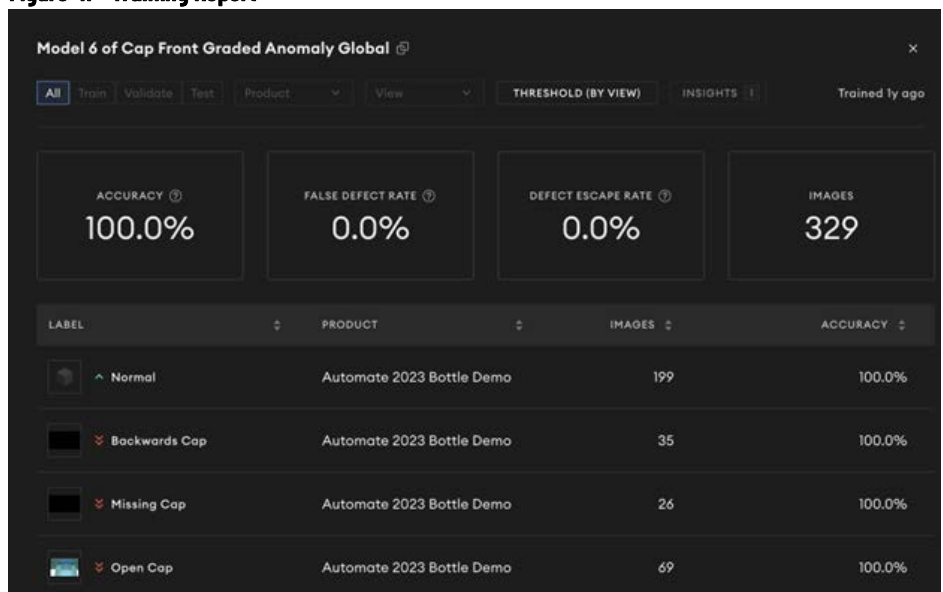
Training occurs in the cloud and time to completion will depend on the number of images used in the training set. An onscreen message will be displayed once training is complete.

**Figure 40 - Training is complete alert**



To understand how well the model is able to predict whether images can be identified correctly (pass/fail or classification), you can view the training report. It will provide you with an accuracy %, and other key metrics such as False Defect Rate, Defect Escape Rate, and total images used to train. These are useful metrics to understand whether you need to adjust the threshold, relabel images, or add more labeled images to the model to improve its performance.

**Figure 41 - Training Report**





## Manage Recipes - Settings

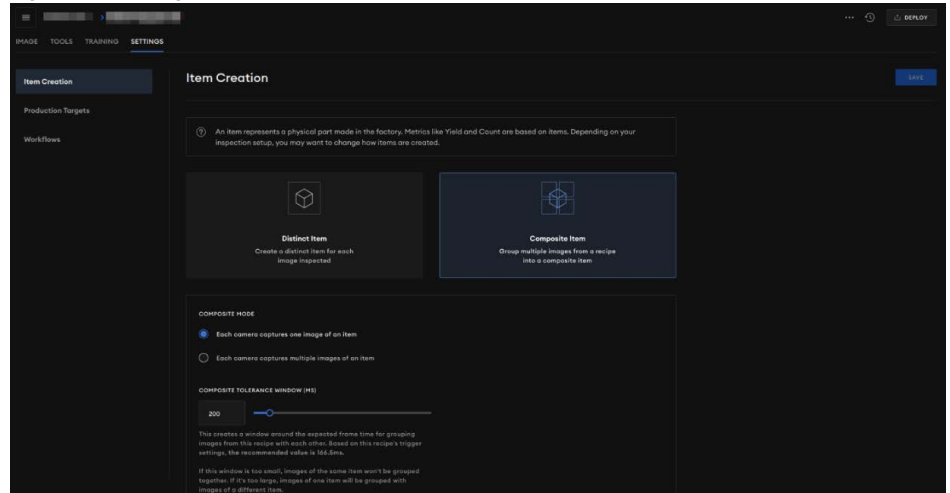
In the **Settings** view, general settings for the entire recipe can be configured.

**Item Creation** settings are used to correlate multiple images into a single item. Correlation is generally based on images being taken at close to the same time.

**Production Targets** add a display to the Inspect screen, showing current production rates versus the configured target rates.

**Workflows** can be used to prompt operators to print item summaries after passes or failures.

**Figure 42 - Settings View**

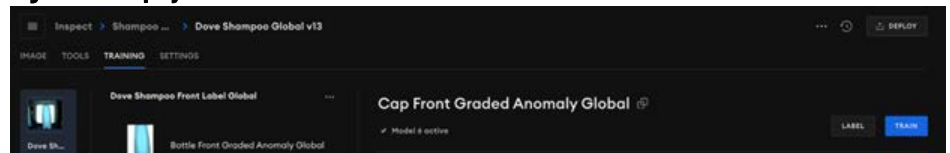


## Manage Recipes - Deploy

After a model has been created and/or trained, it must be deployed to the edge system before an inspection will benefit from model analysis.

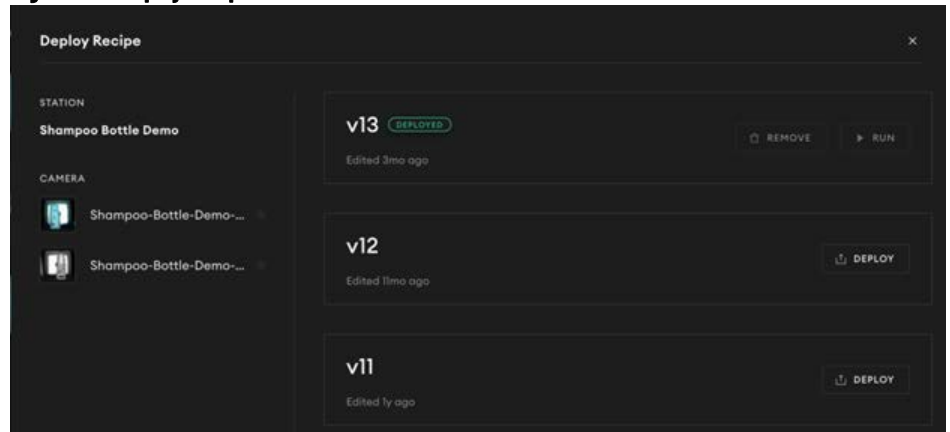
1. From the **Manage Station** view, click on **Deploy** on the upper right-hand corner of the page.

**Figure 43 - Deploy**



2. Within the Deploy modal, select the version of the recipe that contains the model you want to deploy. The deployment process may take several minutes.

**Figure 44 - Deploy Recipe**



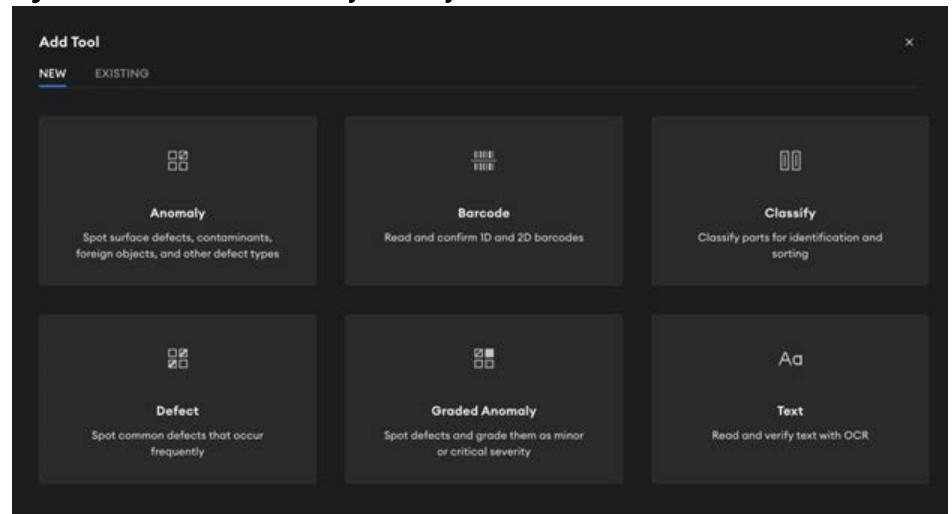
Once the new recipe version has been deployed, you are ready to begin an inspection using the latest trained model for image analysis.

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## Tools Definition & Configurations

Tool selection is found by navigating to the **Manage Station** from the **Inspect** view and then navigating to the recipe to be configured and selecting **Tools**. This chapter will provide the user with an overview of each tool and the configuration options for each tool.

**Figure 45 - Tools available in FactoryTalk Analytics VisionAI**

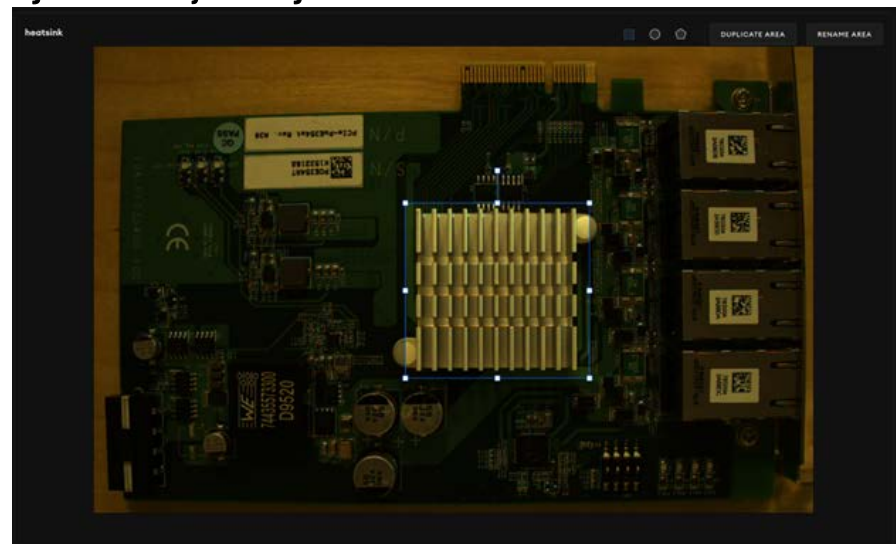


### Anomaly

The Anomaly tool allows an inspector to create an ML Model that will identify defects in an image where defects are not well known or occur infrequently. The Anomaly tool is recommended when there are very few failed product samples to train the ML Model against, or the types of failures are unknown or unexpected at the current time.

Configuration for the Anomaly tool begins with setting the Area of Interest (AOI), which should cover the image section(s) in which the inspected items will appear. Multiple areas can be defined by using the Duplicate Area button. However, when multiple areas are defined, they must all be of the same shape and dimensions.

**Figure 46 - Anomaly AOI Configuration**



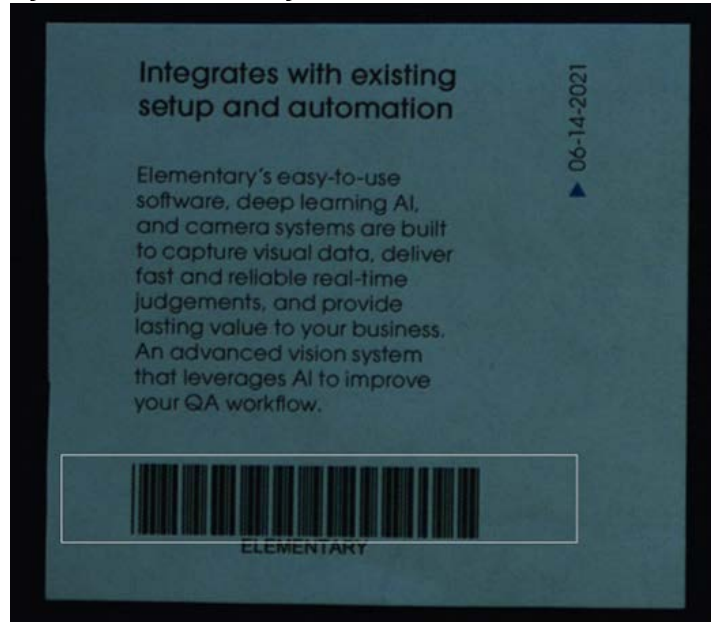
Once the AOI is defined, model training can be performed.

Once a trained model has been deployed, the Pass Criteria Threshold allows the inspector to define the model scores that are acceptable. Scores above the threshold will result in a Pass, and scores below the threshold will result in a Fail.

## Barcode

The Barcode tool allows an inspector to scan an area for the presence of any type of barcode. Configuration for the Barcode tool begins with setting the Area of Interest (AOI), which should cover the image section(s) in which the barcode is expected to appear. Multiple areas can be defined by using the Duplicate Area button. However, when multiple areas are defined, they must all be of the same shape and dimensions.

**Figure 47 - Barcode AOI Configuration**



The Barcode Type can be defined as either a specific type, or All Types, which will attempt to use all known barcode types to read barcodes found in the AOI. It is recommended that the specific type be selected if it is known, in order to yield faster performance and results.

If a barcode is found, the barcode can be read and compared against plain text or a regular expression pattern for a match.

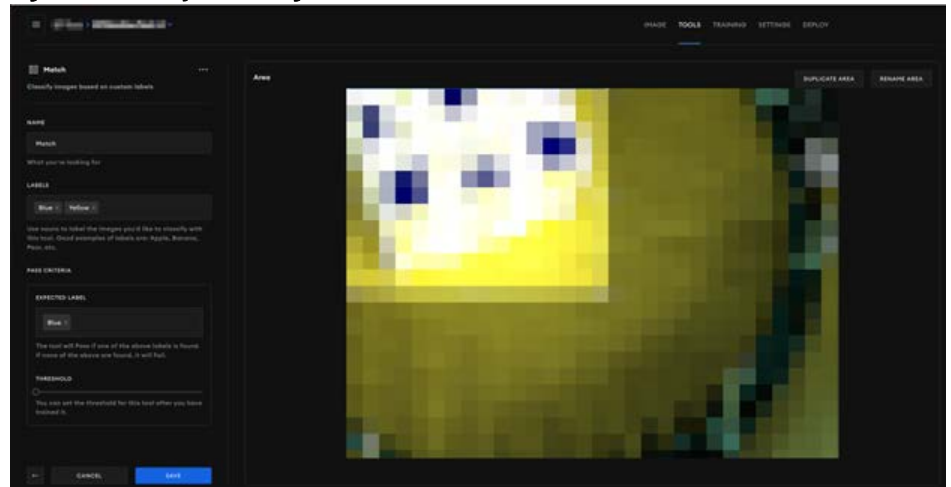
Additionally, a toggleable option of "use barcode as Item ID" is provided. If this is enabled, Item ID values will be set as the decoded barcode text, instead of using the default Item ID naming convention (timestamp). This will allow users to search for specific items in the Visual Inspection System via their real-world barcode information.

## Classify

The Classify tool allows an inspector to identify and classify products using custom defined labels. This tool is useful if the same production line is used to process similar yet different products (e.g. Club Soda vs. Tonic Water, Chocolate-Chip vs. Peanut Butter cookies) and you want to ensure that the expected product(s) are identified.

Configuration for the Classify tool begins with setting the Area of Interest (AOI), which should cover the image section(s) that the inspected items will appear in. Multiple areas can be defined by using the Duplicate Area button. However, when multiple areas are defined, they must all be of the same shape and dimensions.

Labels must be created for this tool. The labels should help classify the different possible items that will appear in the images. Once the AOI and labels are defined, model training can be performed.

**Figure 48 - Classify Tool Configuration**

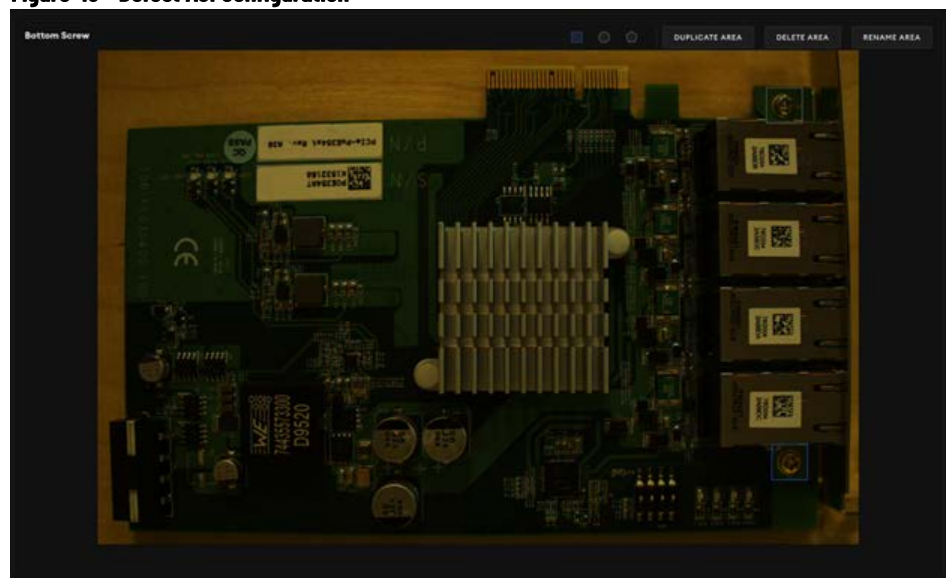
Once the model is created, the tool will score new images based on how closely each image matches up with each label's training images. It will predict a label of whichever label obtains the highest score.

The Pass Criteria is then evaluated in two steps. First, if the image's label is predicted as any of the "pass" labels, that image will be provisionally marked as Pass. Otherwise, it will be marked as Fail. Second, the Pass Criteria Threshold is considered against the score of the predicted label. If the score is above the threshold, the Pass is confirmed. If the score is below the threshold, the image will be marked as Fail.

## Defect

The Defect tool allows an inspector to create an ML Model that will identify defects in an image where defects are well known or tend to occur frequently.

Configuration for the Defect tool begins with setting the Area of Interest (AOI), which should cover the image section(s) that the known defects are expected to appear in. Multiple areas can be defined by using the Duplicate Area button. However, when multiple areas are defined, they must all be of the same shape and dimensions.

**Figure 49 - Defect AOI Configuration**

Once the AOI is defined, model training can be performed.

Once a trained model has been deployed, the Pass Criteria Threshold allows the inspector to define the model scores that are acceptable. Scores above the threshold will result in a Pass, and scores below the threshold will result in a Fail.

## Graded Anomaly

The Graded Anomaly tool allows an inspector to create an ML Model that will identify defects in an image where defects are not well known or occur infrequently. This tool differs from the normal Anomaly tool in that it can grade the anomalies by severity, using a red-amber-green notation system.

Configuration for the Graded Anomaly tool begins with setting the Area of Interest (AOI), which should cover the image section(s) in which the inspected items will appear in. Multiple areas can be defined by using the Duplicate Area button. However, when multiple areas are defined, they must all be of the same shape and dimensions.

**Figure 50 - Graded Anomaly Configuration**



Once the AOI is defined, model training can be performed.

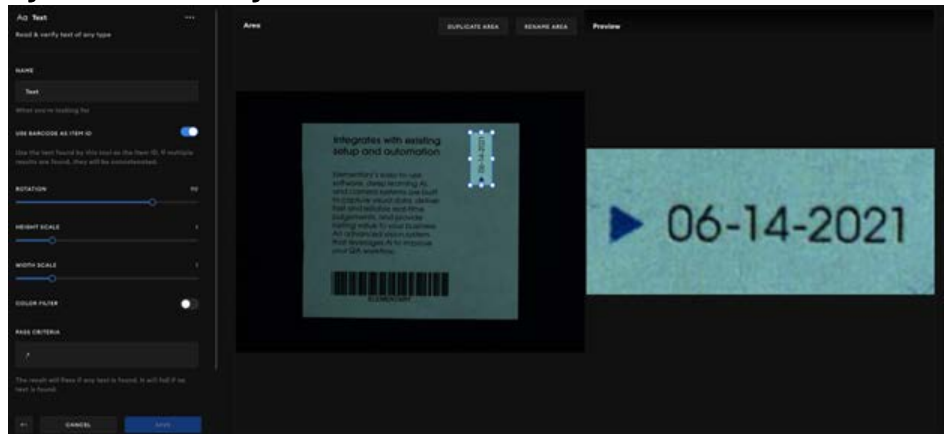
Once a trained model has been deployed, the Pass Criteria Threshold allows the inspector to define the model score thresholds for red, amber, and green results. The inspector can configure a range of scores that will be considered "amber". Any scores lower than this range will be considered "red," and any scores higher than this range will be considered "green." Generally, it is expected that green images are considered as Pass, red images are considered as Fail, and amber images are considered near-Pass/near-Fail.

This amber notation allows the inspector to easily find images with defects that are relatively less severe. The inspector will be able to configure whether an amber result is considered a Pass or Fail for the purpose of reporting and analysis.

## Text

The Text tool allows an inspector to read and verify text utilizing optical character recognition (OCR) in a single defined area. When the area is defined, a preview of what will be sent to the OCR engine will be shown. Various transformations, including rotation, height scale, and width scale, can be applied to the defined area, which will be reflected in the preview.

**Figure 51 - Text Tool Configuration**

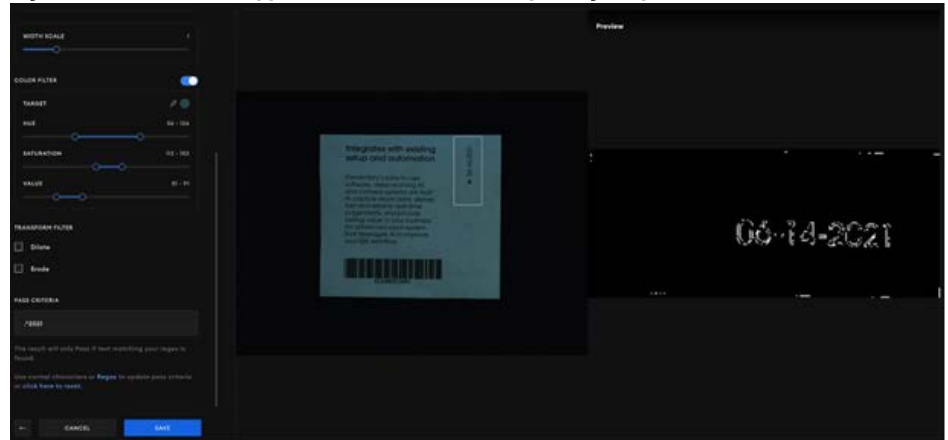


The Text tool provides an option to override the Item ID value. If this is enabled, Item ID values will be set as the detected text, instead of using the default Item ID naming convention

(timestamp). This will allow users to search for specific items in the Visual Inspection System via real-world text information from the item.

Additionally, a color filter can be applied, which will cause the system to only consider areas of the image that are within the specified color range. The eyedropper tool can be used to automatically configure the filter to match a specified color from the image. The preview will show the areas which pass the filter in white.

**Figure 52 - Color filter is applied with the text's color, updating the preview**



Pass criteria is defined using plain text or through a regular expression pattern match.

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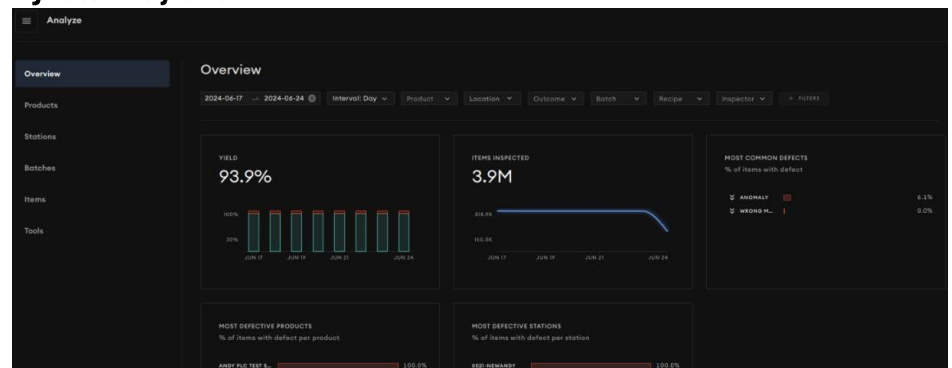
## Analyze Data

### Analyze Overview

To analyze your quality data, click on the navigation icon in the upper left corner of the UI to open the main menu. From the main menu, select **Analyze**.

The Overview view covers inspection amounts and failure amounts across the organization. The statistics provided cover common defect types, as well as products and stations with the most defects. Various filters are available at the top of the view and can be applied to all statistics and views. The date filters tend to be most widely used. The **Share** button can be used to generate links to specific pages/filters or generate PDF reports. This is useful for providing high-level executive-style reports. Additional pages are provided on the left-hand side of the screen to look at quality data by Products, Stations, Batches, Items, and Tools.

**Figure 53 - Analyze View**



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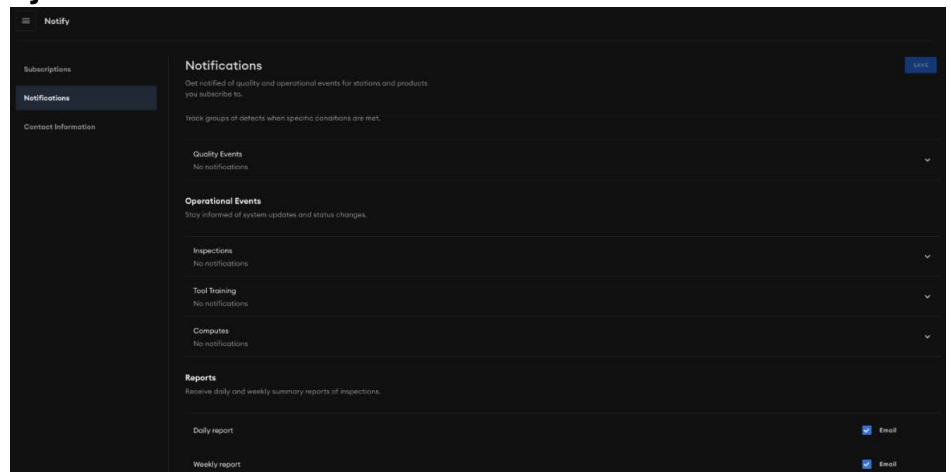
## Reports & Notifications

### Daily/Weekly Reports

To subscribe to notifications about your quality data and visual inspection stations, click on the navigation icon in the upper left corner of the UI to open the main menu. From the main menu, select **Notify**.

FactoryTalk Analytics VisionAI generates daily and weekly emailed reports that provide summaries of inspections across the organization. Users must individually opt-in to receive these reports, though the **Notifications** tab in the **Notify** interface.

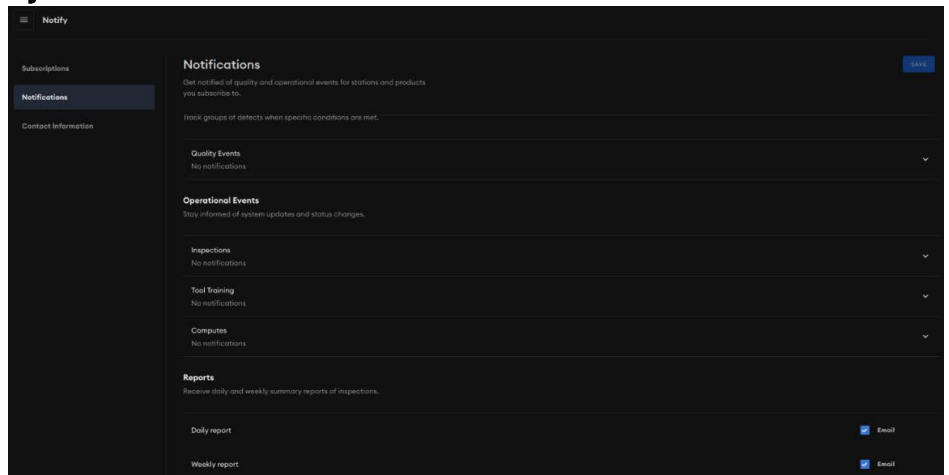
**Figure 54 - Notifications View**



### Event Notifications

- Users can receive SMS or email notifications when certain events occur in the FactoryTalk Analytics VisionAI system.
- Quality Events are custom events that administrators can set up, based on inspection results.
- Operational Events are universal events, such as inspection statuses changing or Stations becoming unreachable.
- Users must individually opt-in to receive these notifications, through the **Notifications** tab in the **Notify** interface.
- If SMS-based notifications are requested, a phone number must be entered into the **Contact Information** section.

**Figure 55 - Notifications View**



## Quality Events

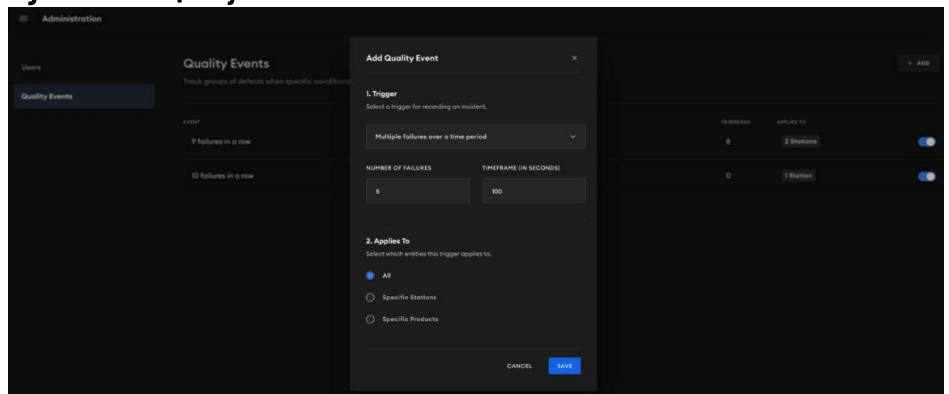
To create a Quality Event, navigate to the **Administration** view by clicking on the navigation icon in the upper left corner of the UI to open the main menu and selecting **Administration** from the menu.

1. Click **Quality Events**.
2. Click the **+ADD** button to start adding a new quality event.
3. Select a trigger from the provided list.
4. Specify the trigger parameters.

The Quality Event can be configured to apply to everything in an organization or narrowed down to specific Stations or Products.

Once the Quality Event is created and enabled, all users who subscribe to Stations or Products associated with the Event will receive notifications when the Event is triggered.

**Figure 56 - Add a Quality Event**



## Security

### Overview

The FactoryTalk Analytics VisionAI visual inspection system was designed with security in mind.

- Static anycast IP addresses
- Ephemeral tokens for edge<->cloud authentication
- Encrypted data at-rest and in-transit between edge and cloud
- Role based access control to user interface

Connection from the edge to the cloud is secure, utilizing industry standard TLS 1.2 or TLS 1.3 with AES-128 or AES-256 encryption to safeguard communications.

Data in the cloud is secured in private, per-customer data stores. Access to the data is granted only to role-based authenticated users of the interface with time-limited tokens granted from our servers.

### Network Requirements

Firewall rules should be configured to allow edge compute devices to communicate with the following DNS-based destinations:

TCP Port 443 (HTTPS and WSS) for the following domains:

Location	Item
North America	app.elementaryml.com
	elementary-robotics.s3.amazonaws.com
All Regions	hub.docker.com registry-1.docker.io production.cloudflare.docker.com
	*.snapcraftcontent.com api.snapcraft.io dashboard.snapcraft.io landscape.canonical.com serial-vault-partners.canonical.com

### Validating the Network Connection

To test the efficacy of the whitelisting, a computer should be connected to each network cable that will be used to deliver network access to the edge device. Once connected, the following netcat or PowerShell commands can be used to test the validity of the whitelisting:

```
nc -vz <destination> <port>
```

```
e.g. nc -vz app.elementaryml.com 443
```

or

```
Test-NetConnection -ComputerName <destination> -Port <port>
```

```
e.g. Test-NetConnection -ComputerName app.elementaryml.com -Port 443
```

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# Rockwell Automation Support

Use these resources to access support information.

<b>Technical Support Center</b>	Find help with how-to videos, FAQs, chat, user forums, Knowledgebase, and product notification updates.	<a href="http://rok.auto/support">rok.auto/support</a>
<b>Local Technical Support Phone Numbers</b>	Locate the telephone number for your country.	<a href="http://rok.auto/phonesupport">rok.auto/phonesupport</a>
<b>Technical Documentation Center</b>	Quickly access and download technical specifications, installation instructions, and user manuals.	<a href="http://rok.auto/techdocs">rok.auto/techdocs</a>
<b>Literature Library</b>	Find installation instructions, manuals, brochures, and technical data publications.	<a href="http://rok.auto/literature">rok.auto/literature</a>
<b>Product Compatibility and Download Center (PCDC)</b>	Download firmware, associated files (such as AOP, EDS, and DTM), and access product release notes.	<a href="http://rok.auto/pcdc">rok.auto/pcdc</a>

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