TYRE SIDEWALL INSPECTION

1. OBJECTIVES

This document describes the procedure on the usage for the Tyre Side Wall Stamping Inspection Application.

The 3D Camera is mounted to the Robot 6th Axis and Scan the Sidewall of the Tyre to capture the 3D Data of the Sidewall of the Tyre.

The 3D Data will be Inspected and the Application will shows the Results.

HARDWARE:

1. MONITOR:

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Connectivity: HDMI or DisplayPort

Aspect Ratio: 16:9

Resolution:

[Full HD (1920x1080) with 100% Display Scaling] or

[4K (3840x2160) with 200% Display Scaling]
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2. DESKTOP PC:

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Processor: Intel or AMD

Cores: Minimum 8 Cores with Minimum 16 Logical Processors

Generations: Intel (12th Gen or Above); AMD (Ryzen5 or Above)

Integrated Graphics: Intel UHD/XeGraphics or AMD Ryzen with Radeon Graphics

SSD: 1TB; RAM: 16GB DDR4

Ethernet: Intel Gigabit Ethernet Port (I219-V or Equivalent)

USB3.0: Intel USB3.0 xHCI Compliant Host Controller Type-A
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SOFTWARE:

OPERATING SYSTEM:

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Windows 10 Pro or Windows 11 Pro; 64-Bit (x64)
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QUALITY INSPECTION APPLICATION:

SI	Package Name	Manufacturer
1	MVC++ 2008 SP1 Redistributable Package MFC Security Update	Microsoft
2	VC++ Redistributable Packages for VS2015-2022-x64	Microsoft
3	.NET Framework 4.8 for x64	Microsoft
4	MachineVisionLibrary for x64	Supplier-Licensed
5	TyreSidewall Inspection Application for x64	Supplier-Licensed

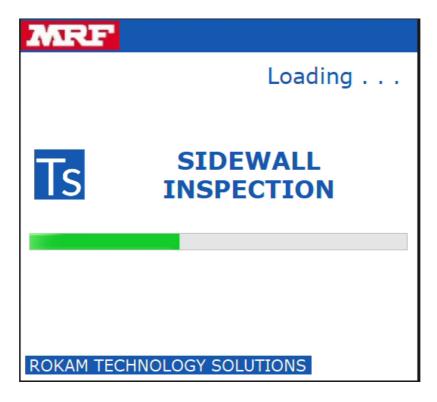
The full installation, including the operating system, will require approximately 50 GB of space on the C drive for the new PC.

2. SOFTWARE APPLICATION

Open the Application which is located in Desktop.

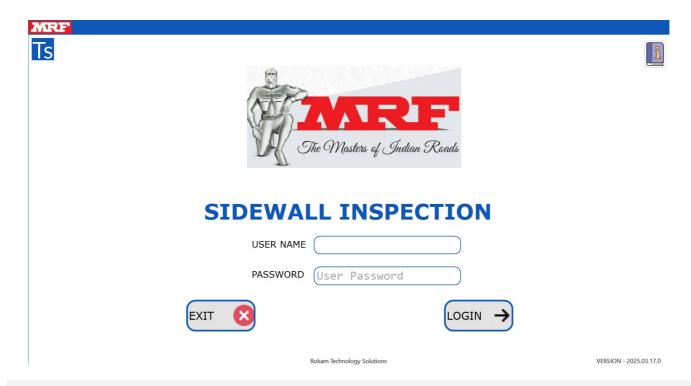


Once the Application is opened, then Application will start. The Below Screen will appear for few seconds which will load all the settings required for the application.



If there are any warnings or error, the respective dialog box will be shown. After this screen is completed, the Login Screen will open.

2.1 LOGIN



1.Click the i icon to open the User Manual.

2. View the application version number in the bottom-right corner of the screen.

Enter your username and password on the login screen.

SIDEWALL INSPECTION



1.Click the Login button to access the application.

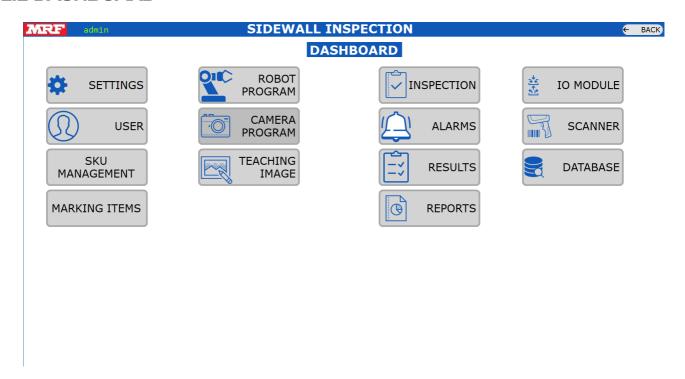
2.Click the Exit button to close the application.

3. The logged-in username will appear in the top-left corner of every screen from Dasboard.

Contact the administrator for a valid username and password if needed.



2.2 DASHBOARD



Settings: All the Settings for the Application are editable.

User: Add/Delete/View the users for this application.

SKU Management: Add/Delete/View the SKUs for this application.

Marking Items: Add/Delete/View the Marking Items for each SKU

Robot Program : Configure the robot for each SKU based on the requirement. The robot program for each SKU will be created automatically.

Camera Program: Configure the Camera for each SKU based on the requirement

Teaching Image: Add/Edit the Inspection Parameters for each SKU

Inspection: Inspect the Components based on the configured Settings for each SKU.

Alarms: View/Export the Alarms that are logged in this Application.

Results: View the Result (PDF, Image, Individual Results) for each inspection Components

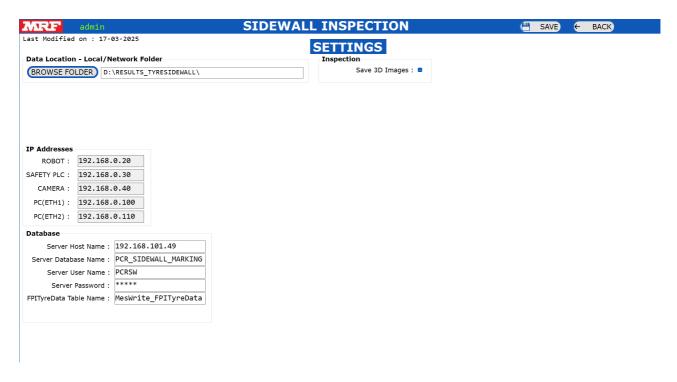
Reports: View all the Results in a Single View with Statistical Analysis.

IO Module : Monitors and controls the input and output signals, ensuring proper communication between external devices and the system.

Scanner: A barcode device used to scan the barcode present on the tyre sidewall, enabling identification of the tyre.

Database: A structured collection of data used to store and manage tyre inspection details.

2.3 SETTINGS



Data Location: Click on BrowseFolder Button and Select the Folder where we need to save the Inspection Results.

Inspection: Enable or Disable this Functionality, so that if we need to save the original image which is been captured during inspection for every component.

IP Addresses: ROBOT: IP address of the robotic system used for sidewall inspection.

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SAFETY PLC: IP address of the safety PLC (Programmable Logic Controller) responsible for safety operations

CAMERA : IP address of the camera capturing inspection images.

PC(ETH1) : IP address of the primary Ethernet-connected PC for processing.

PC(ETH2) : IP address of the secondary Ethernet-connected PC for backup or communication.
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Database: Server Host Name: IP address of the database server used to store inspection data.

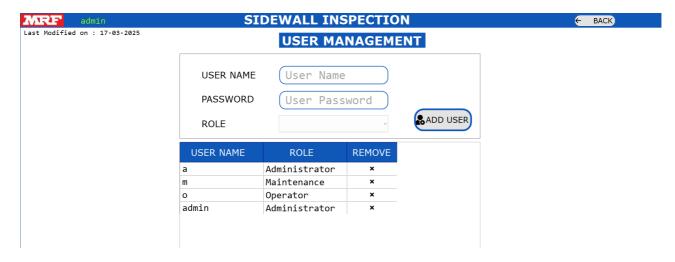
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Server Database Name : Name of the database handling sidewall marking data.

Server User Name : Username used for database authentication.

Server Password : Password for database access (hidden for security).

FPITyreData Table Name: Table used to write tyre inspection data into the database
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2.4 USERS



You can add new users, delete existing users, and view existing users.

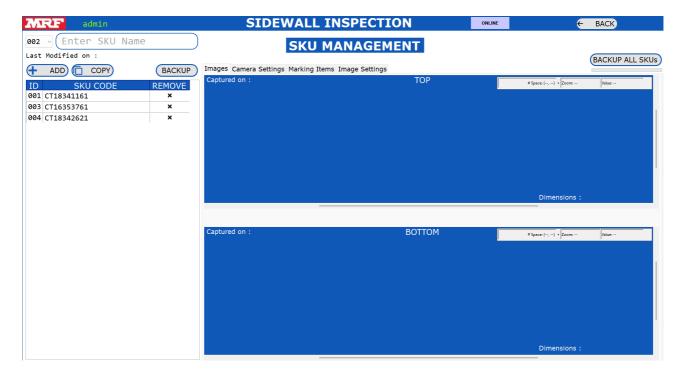
To add a **new user**, enter a username (up to 8 characters), a password (up to 8 characters), and select a role: **Administrator**, **Maintenance**, or **Operator**.

Then, click the **Add User** button.

Role Accessibility:

Option	Administrator	Maintenance	Operator
SETTINGS	YES	NO	NO
USER	YES	NO	NO
SKU MANAGEMENT	YES	NO	NO
MARKINGITEMS	YES	NO	NO
CAMERA PROGRAM	YES	NO	NO
ROBOT PROGRAM	YES	N0	NO
TEACH ING IMAGE	YES	NO	NO
INSPECTION	YES	YES	YES
ALARMS	YES	YES	YES
RESULTS	YES	YES	YES
REPORTS	YES	YES	YES
IO MODULE	YES	YES	N0
SCANNER	YES	YES	NO
DATABASE	YES	YES	NO

2.5 SKU MANAGEMENT



Accessible for: Administrator

You can create, delete, copy, or view an SKU.

SKU ID: This ID is used as Short-Code for SKU Name to access SKU using PLC, etc.

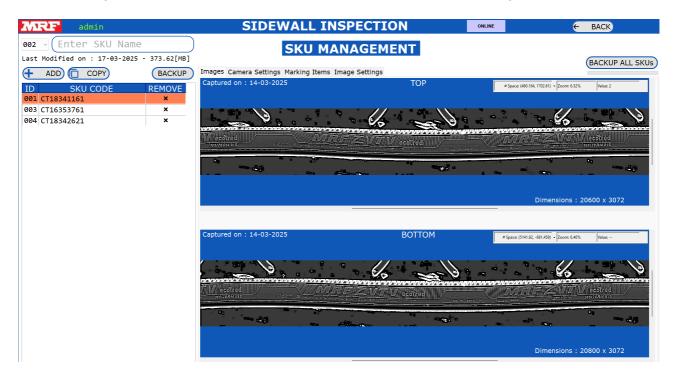
SKU Name: This is used as the name of the Item that has to be inspected.

Create: Select the SKU ID and enter the new SKU Name and click on **ADD** button. Special Characters and Existing SKU Names are not allowed to create new SKU.

Delete: Select the SKU. Click on the '**x**' mark. It will prompt dialog box to accept for the deletion of the SKU. Once it is deleted, it is deleted permanently and it is not possible to recover it back.

Copy: Select the new SKU ID and Enter the New SKU Code. Select the Existing Job and Click on **COPY** Button. After Copy is completed, the newly copied Job is appeared in the list.

View: All the Settings relative for the SKU will be visible in the main screen of this SKU Management.



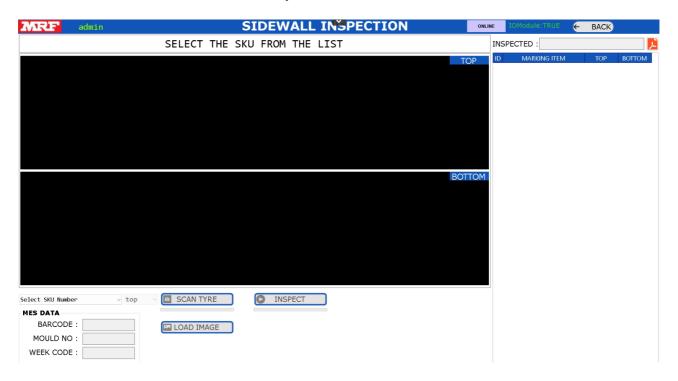
The Settings that are visible for every SKU are:

- · Images: Delete/View the Images which are captured as reference by the Camera.
- Image Settings: The inspection parameters are displayed in this section.
- \bullet Camera Settings: The camera settings for each SKU, such as the serial number , $\,$ IP address, etc., are displayed in this section.
- \bullet Marking Items: The naming conventions for the inspection parameters that have been configured are displayed in this section.

You can also delete individual settings by clicking the **DELETE** button.

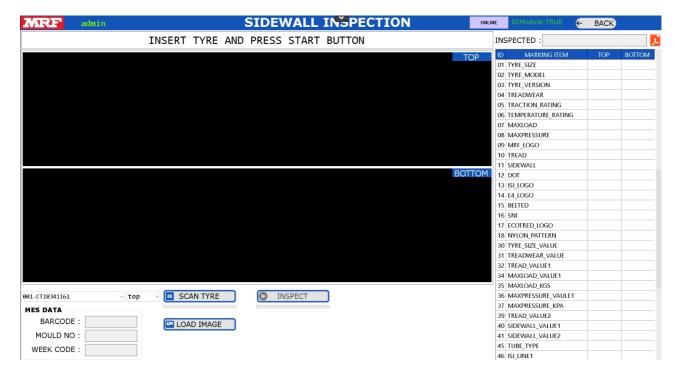
2.6 INSPECTION

Accessible for: Administrator, Maintenance and Operator.

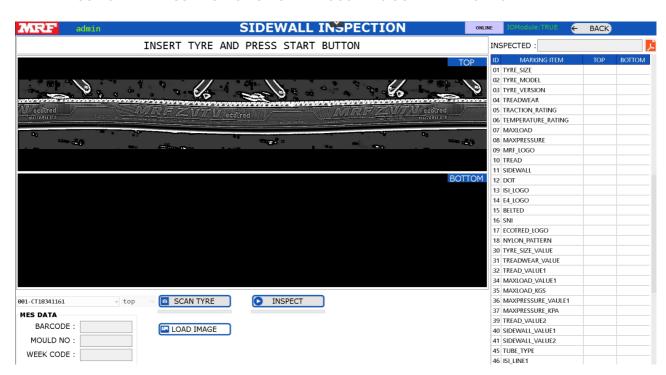


- Scan the Barcode present on the top side of the tyre to load **SKU number**.
- The settings linked to the selected SKU will be loaded into the application
- Administrator/Maintenance: Will have an option to manually load the image to inspect the image.
- Operator: Must press both the push button simulataneously to trigger the camera and inspect the image.
- Check the two options on the top right side of the screen indicating the **ROBOT** and **IO-module** status. Both should be **Online** and **True** before inspecting the tyre.
- While selecting the **SKU**, the **Top** Side option will be automatically selected during the first scan of the tyre. Once the image is ready, the inspection will occur for the top side and update the following:
- o $\,$ A new image with graphics will appear in the TOP of the screen for top side and BOTTOM of the screen for bottom side of the tyre.
- $\ensuremath{\text{o}}$ The inspection results for all tools will be updated on the right side of the screen under the TOP section.
- o $\,$ The PASS/FAIL counter will be updated on the right side of the screen under the TOP section.

STEP-1: SCAN THE BARCODE TO LOAD THE RESPECTIVE SKU USING THE HANDLE SCANNER



STEP-2: PRESS BOTH THE PUSH BUTTON SIMULTANEOUSLY TO SCAN AND INSPECT THE TYRE



STEP-3: RESULTS WILL APPEAR ON THE RIGHT SIDE OF THE SCREEN



STEP-4: NOW FLIP THE TYRE TO SCAN THE BOTTOM SIDE

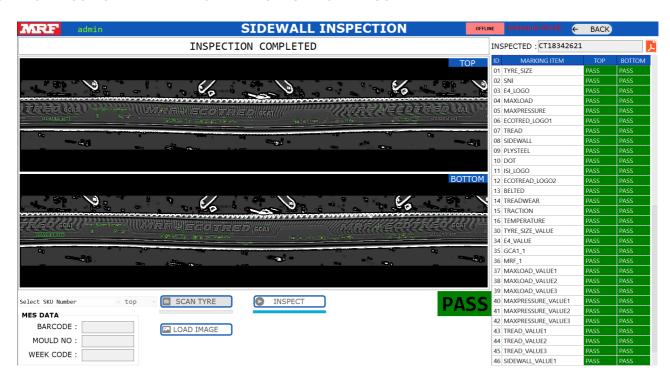


The respective dialog box will appear, saying: "Flip the tyre and press the Start button to scan."

STEP-5: PRESS BOTH THE PUSH BUTTON SIMULTANEOUSLY TO SCAN AND INSPECT THE TYRE



STEP-6: RESULTS WILL APPEAR ON THE RIGHT SIDE OF THE SCREEN



2.7 ALARMS

Accessible for: Administrator, Maintenance and Operator.

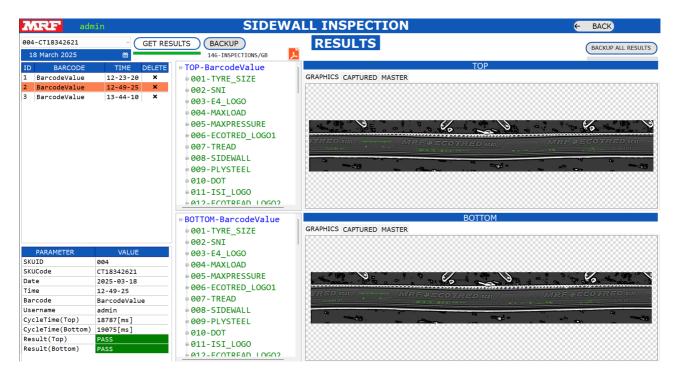


Alarms will display all log information for the application.

- Select Date and Select Type of Alarm
- Click on **GET ALARMS** Button.
- To export alarms, select the start date and end date, then click the Export Alarms button. The alarm data will be exported to the 'Data Location' folder.
- Click the **BACK** Button to return to the Dashboard.

2.8 RESULTS

Accessible for: Administrator, Maintenance and Operator.



- · Select the SKU Number.
- · Select the Date.
- Click on GET RESULTS Button.
- The Results will be Displayed in the List.
- Click on the trigger number to view the result of the inspected object.
- Click on PDF ICON to see the PDF report of the Inspection.



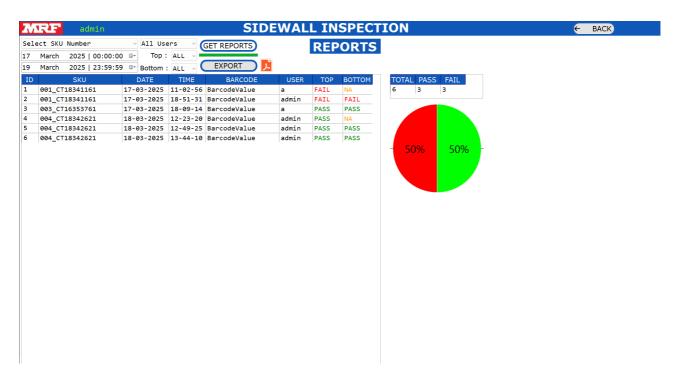
- Expand the Tree View to View the Full Inspection details of the inspected object.
- The graphic image will be displayed in the center of the screen.
- The metadata information about the inspected object is available at the bottom left corner of the screen.
- Click the **BACK** Button to return to the Dashboard.

2.9 REPORTS



Accessible for: Administrator, Maintenance and Operator.

- Select the SKU Number.
- Select the Start Date and End Date.
- Select the User Name
- Select the Result PASS/FAIL/ALL.
- · Click on GET REPORTS Button.



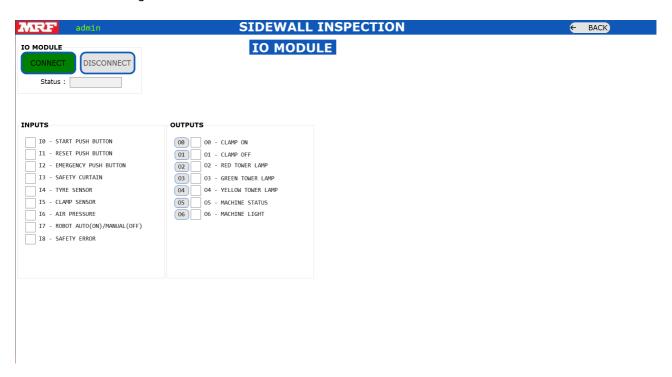
- The total, pass, and fail counts will be displayed in a table and also shown in a pie chart.
- The Failed Details will be shown in Table.
- The results of all inspection details will be updated in the list.
- Click the **EXPORT** button to export the list of all inspection details to a CSV file in the Data Location folder.

- Click on the **Trigger number** to view the result of the inspected object.
- \bullet Click on the $\mbox{\bf PDF}$ icon to view the PDF report of the inspection.
- Click on **BACK** Button to return to the Dashboard.
- Select the trigger details to view the history of all inspection results in graph form.

2.10 IO MODULE

Monitors and controls the system's inputs and outputs, including sensors, buttons, and lamps, ensuring proper machine operation during tyre inspection.

Click on connect button to get connected to the IO module.



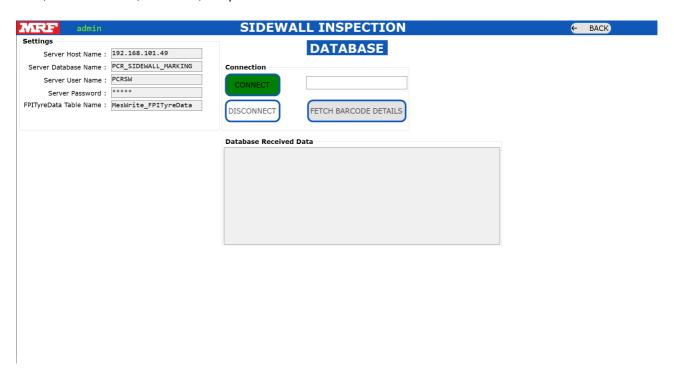
2.11 SCANNER

This option is used to establish connectivity with the scanner and retrieve barcode details.



2.12 DATABASE

This option is used to check the database connectivity based on the details entered in the Settings section, including the server IP, database name, username, and password.



3.MAINTENANCE and TROUBLESHOOTING

Maintenance:

• The inspection results are stored in the 'Data Location' folder.

Please ensure that at least 25% of free space is always available on the respective drive.

• If less than 5% of free space is available on the application installation drive (ideally the C drive) or on the 'Data Location' folder drive, the application will not open.

TROUBLESHOOTING:

- There are three types of messages that will appear in a dialog box.
- Information, Warning and Error
- When an error occurs, delete the SKU with the error through SKU Management and create a new SKU for it.
- Please read the camera user manual carefully for troubleshooting instructions.