Software Requirement Specification

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Project ID: SAR-SRS-210624-001

Project Name: VCT- Phase 3

Customer: DENSO HARYANA

SATO Argox India is a pioneer and leading global provider of integrated Automatic Identification and Data Collection (AIDC) solutions that leverage barcode and RFID technologies to provide real-time visibility into organisations' assets, people, and transactions.

SATO manufactures innovative, reliable auto-identification systems and offers complete solutions to businesses by integrating hardware, software, media supplies and maintenance services.

We empower those on the front-line in manufacturing, retail, healthcare, transportation and logistics, and other industries to achieve a performance edge and enhanced profitability.

Our products, software, services, analytics, and solutions are designed to connect people, assets and data. We design with front-line users and their work environment in mind, enabling them to adopt best practices to optimize operations and make critical decisions intelligently.

SATO Argox India offers a wide range of marking, tracking, and computer printing technologies designed for manufacturing supply chain, retail, healthcare, and government industries. Products include thermal barcode label and receipt printers, RFID smart label printers, fixed and handheld readers, that are used for barcode labelling, personal identification, and specialty printing.

SATO provides quality repair and maintenance services that will ensure customers are operating SATO products at the optimal level.

Revision History

This document is subject to the version management. Each change has to be entered into following table:

SL No.	Description	Release Version	Release Date	Created By/On	Approved By/On
1	Software Requirement Specification	R1	01-09-2024	Eshant Kapoor	Ramesh Jain
2					
3					
4					

Contents

Introduction

Purpose

The purpose of this document is to explain the system architecture of SATO's Automation Solution (SaaS) throughout the life cycle of the project. This document communicates the justification of software process & application module specification in detailed manner to understand the brief of it. SATO is pleased to submit this document to understand the application solution on customer requirement.

Document Convention

Acronym, Abbreviation or Convention	Description
SRS	Software Requirements Specification
SAR	SATO Argox India Pvt. Ltd
HHT	Handheld Terminal (Mobile Device)
SaaS	SATO's Automation Solution

Product Scope.

The purpose of this project is to develop a system that captures and manages child part lot details used during production. This will facilitate the identification and tracking of specific lots in the event of quality issues or recalls.

1. **Objectives:**
    - **To implement a robust system for capturing child part lot details.**
    - **To enable efficient searching of suspected lots when quality issues arise.**
    - **To enhance traceability in the production process.**
2. **Inclusions:**
    - **Development of a user-friendly interface for entering and viewing child part lot details.**
    - **Database management for storing lot information, including part numbers, production dates**
    - **Search functionality to quickly identify suspected lots based on various criteria.**
    - **Reporting features to generate insights on lot usage and issues.**

The entire solution consists of Scanner, Wireless Access Points, and SATO's Automation Software. All the solution components are integrated to Denso network and will also have Performance Check interfaces data sync with VCT DB or customized application.

Product Perspective

System Interface

- The application runs in the latest version of Win OS & Android

User Interface

- The application GUI provides menus, toolbars, buttons, containers, grids allowing for easy control by a keyboard and a mouse.

Hardware Requirements

- Intel Xeon E5-2690 2.60 GHz. (2 vCPUs) or Higher
- RAM: Minimum 32 GB RAM
- 1 GB or high-speed redundant LAN card.
- Hard Disk: 50 GB Space for database and Application

Software Requirements

- Microsoft Windows 2022 or higher version Server operating system with IIS
- MS SQL Data Server 2022 Enterprise Edition or higher version.
- Dot Net Framework 4.8 or later

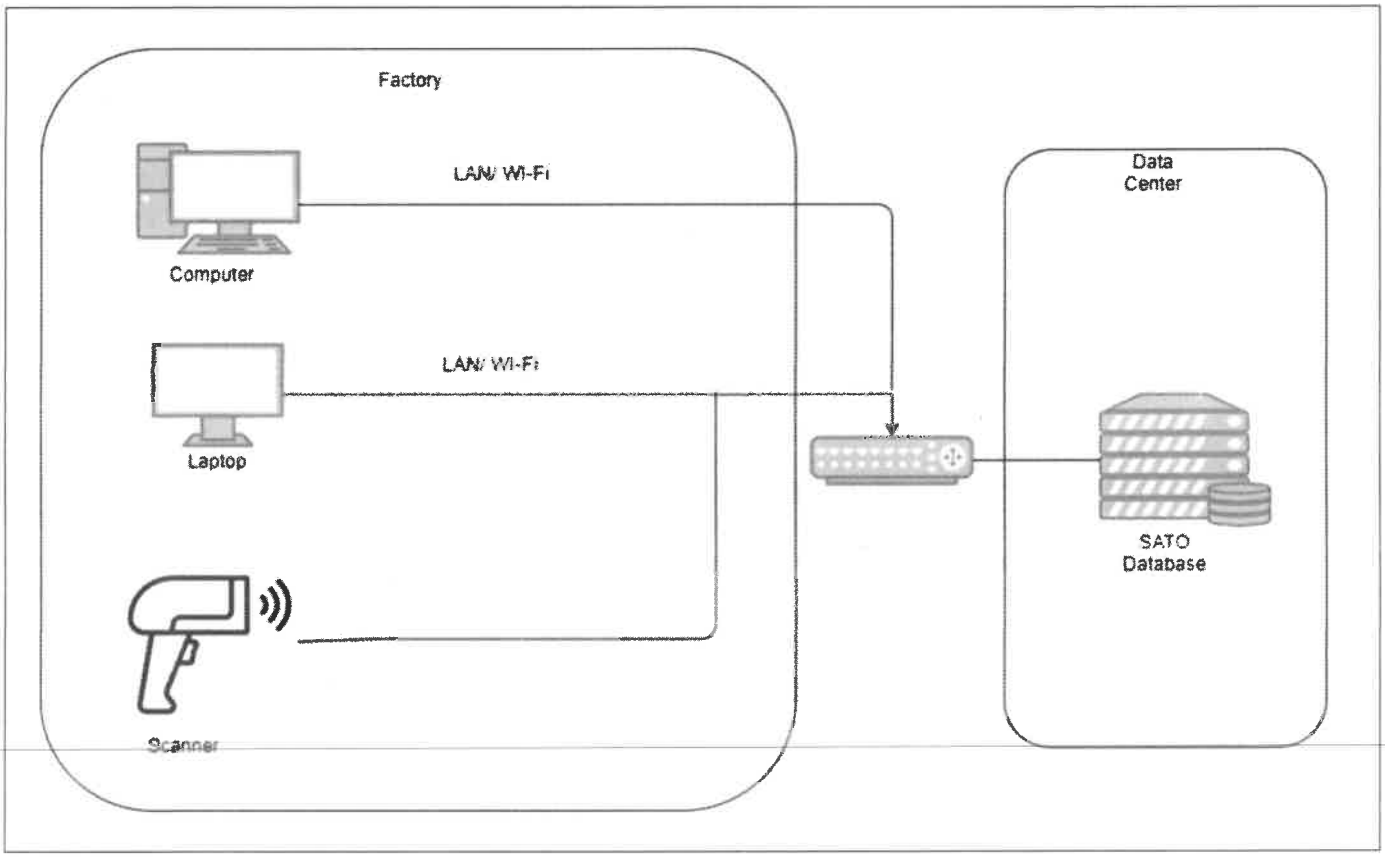
Database Requirements

- Microsoft SQL server
- Version should be decided by customer IT team; however, we would provide guidance.

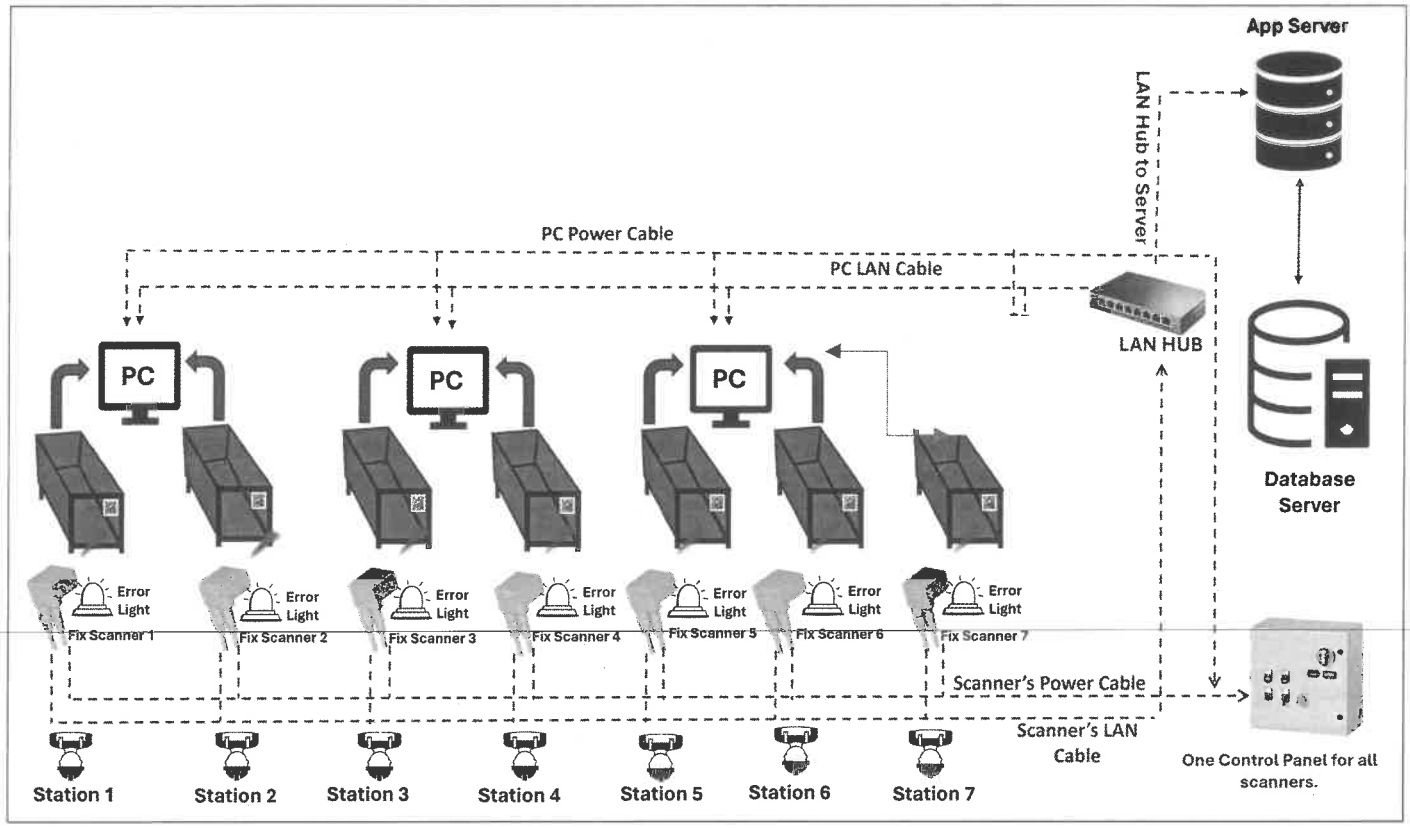
Other Requirements

NA

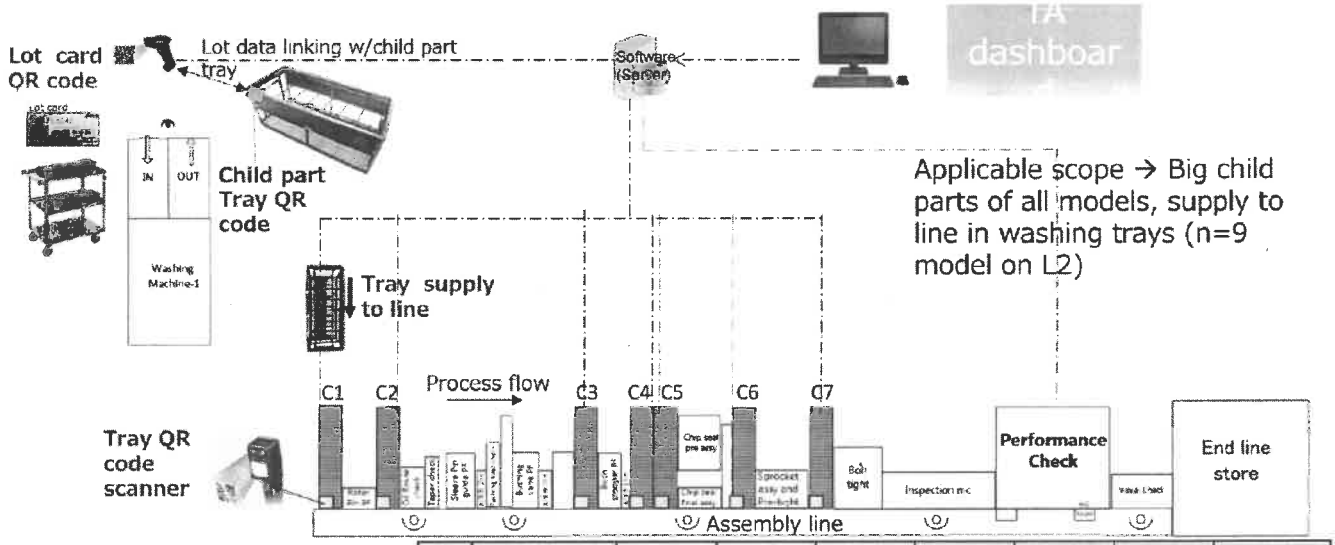
System Architecture



Scanning Line Layout Design



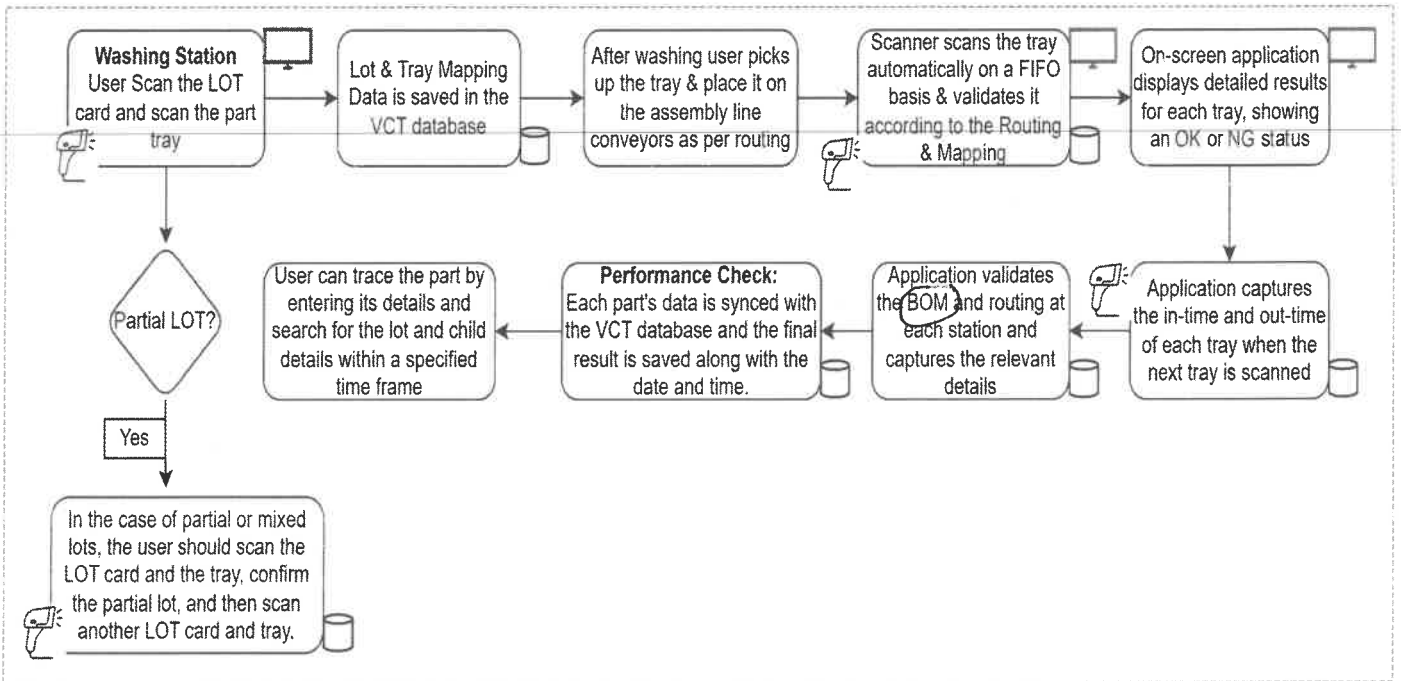
Application Process Flow



Basic logic to search suspected → Time base FG made & lot scan time for child part and cycle time combination Concerned lot used in how many assy S/n (trace forward).

S/n	Model	C1	C2	C3	C4	C5	C6	C7
1	KC-IN	-	O (Rotor)	O (Housing)	-	-	O (Sproket)	-
2	KC-EX	O (Rotor)	-	O (Sproket)	-	O (Housing)	-	-
3	KC-EX (JP)	O (Rotor)	-	O (Sproket)	-	O (Housing)	-	-
4	KB-IN	-	O (Rotor)	O (Housing)	-	-	O (Sproket)	-
5	TNGA-IN (45°)	O (Rotor)	-	O (Rear plate)	-	O (Housing)	-	O (Housing plate)
6	TNGA-IN (70°)	O (Rotor)	-	O (Rear plate)	-	O (Housing)	-	O (Housing plate)
7	TNGA-EX	O (Rotor)	-	O (Sproket)	-	O (Housing)	-	-
8	ZE-EX	-	-	O (Rear plate)	O (Rotor)	O (Housing)	-	O (Housing plate)
9	ZE-EX (JP)	-	-	O (Rear plate)	O (Rotor)	O (Housing)	-	O (Housing plate)

Process Flow

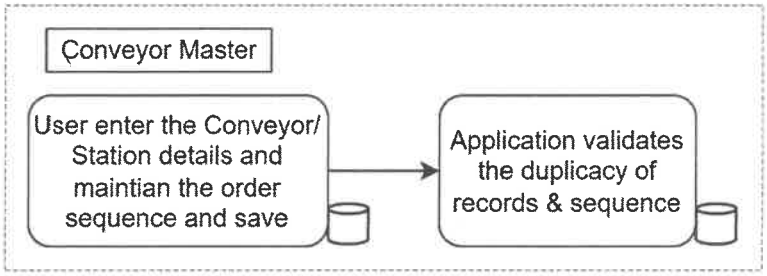


- User can create & setup the master data in application like (Admin Master, Conveyor Master, Tray Master, Camera IP Master etc.)
- As per model production Lot Scanning & Tray mapping done in PC application, application validates the LOT as per model selection
- After Tray mapping user feeds tray for washing
- After washing user input the trays on conveyor for child part assembly as per routing
- Scan the SIL and application will display the Items for scanning
- Trays are being scanned automatically on the conveyor on FIFO basis by fixed mount scanner, application validates the tray as per BOM & Routing master & display the details on the PC screen installed between the conveyors
- Application captures the IN time & Out time of each tray on every station
- Performance Checker data synced automatically into VCT Database
- User can back trace & forward trace the part as per the Logic & formula master
- During Model Change Application validates the Tray and detect the Model mapped with the Tray

Masters – Creation

MASTERS	FREQUENCY	SOURCE	REMARK
Admin Master	Create/Modify as & when required	User Creation	
Model & Child Master	Create/Modify as & when required	User Creation	
Conveyor Master	Create/Modify as & when required	User Creation	
Tray Master	Create/Modify as & when required	User Creation	
Routing Master	Create/Modify as & when required	User Creation	
Camera IP Master	Create/Modify as & when required	User Creation	
Conveyor & Camera Mapping Master	Create/Modify as & when required	User Creation	
NG Lot Master	Create/Modify as & when required	User Creation	
PC & Conveyor Mapping Master	Create/Modify as & when required	User Creation	

Conveyor Master



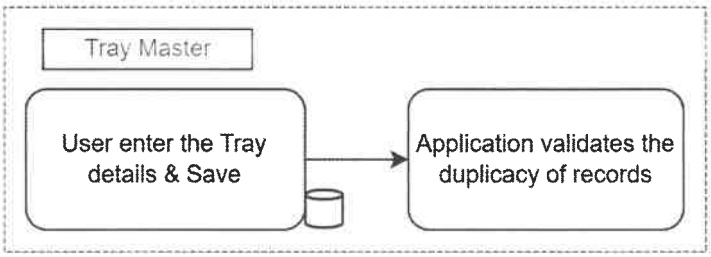
Functional Point

1) Conveyor/Station ID will be created to uniquely identify the stations/conveyors on the line
2) Sequence of the station/conveyor can be updated as per routing.
3) Loging of Last Created By, Last Updated By/Updated On for User modification.

Validation Points

1) No Duplicate Station/Conveyor – Unique validation
2) No Duplicate Sequence ID

Tray Master



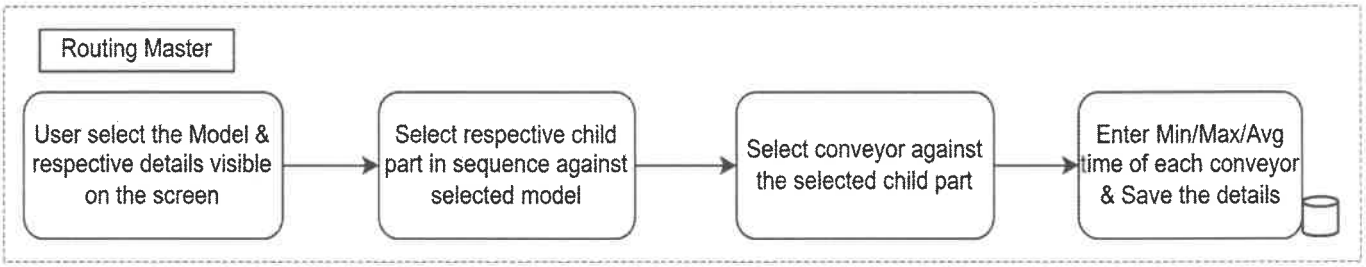
Functional Point

1) Tray ID's will be created to uniquely identify the tray in the application while scanning
2) Blocking of Tray
3) Loging of Last Created By, Last Updated By/Updated On for User modification.

Validation Points

1) No Duplicate tray – Unique validation

Routing Master



Functional Point

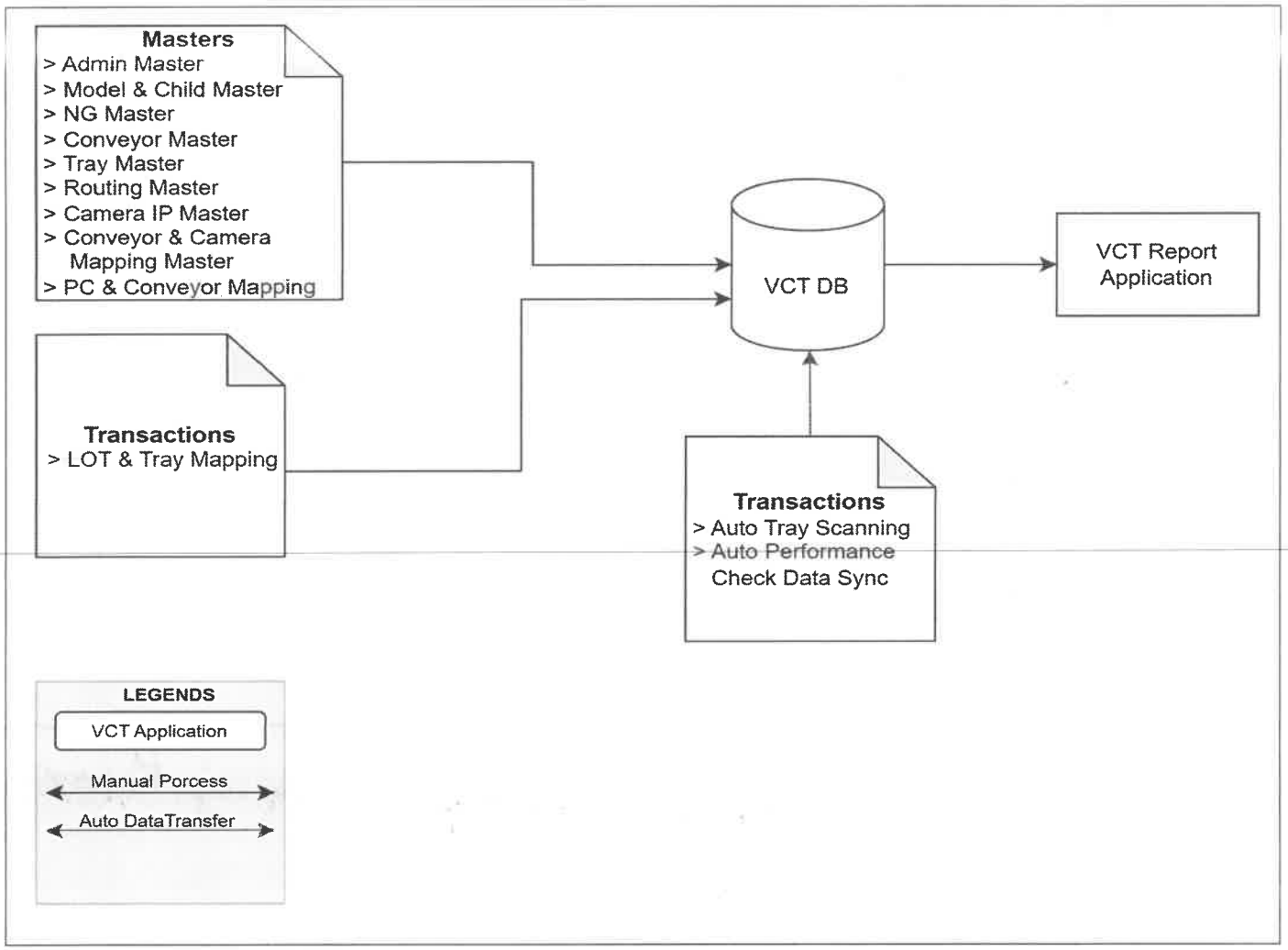
1) Routing will be created for each part model, so that system can validate each child part scanned / feeded in correct conveyor.
2) Min/Max/Avg time is required to calculate the time during traceability
3) Loging of Last Created By, Last Updated By/Updated On for User modification.

Validation Points

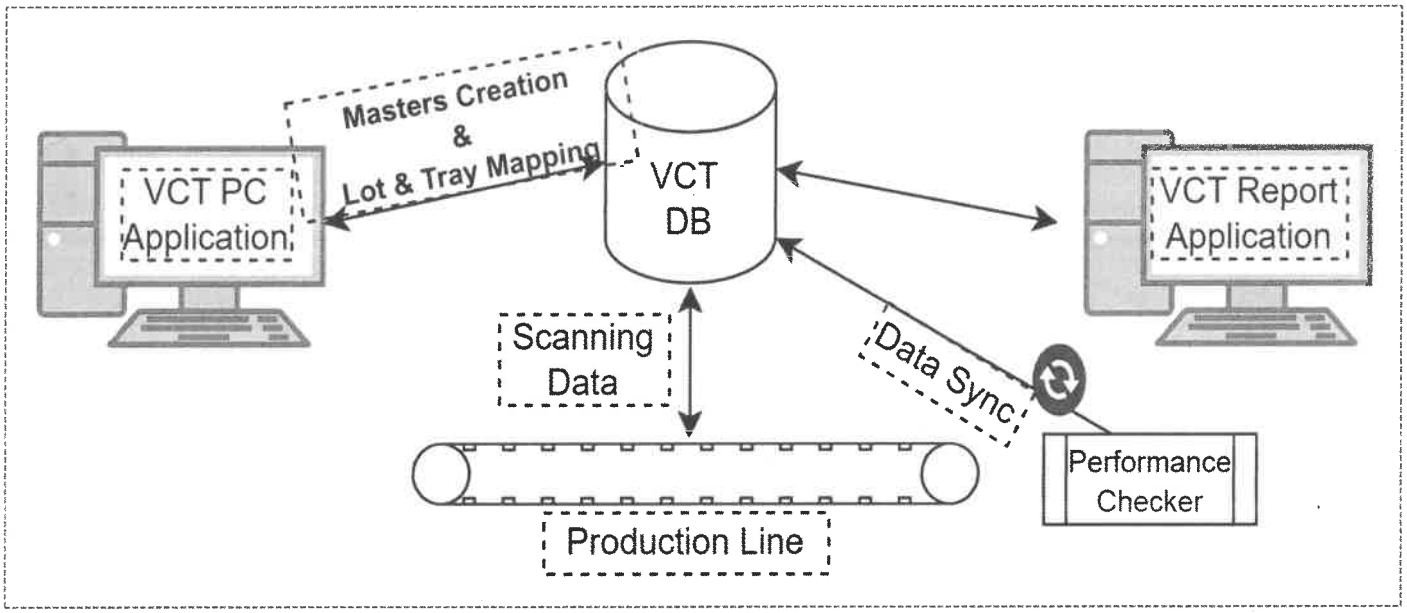
1) No Duplicate routing for the part can be saved – Unique validation
2) No duplicate child part & conveyor can be selected in the routing BOM.

Application Modules

Following are major setup of master & transaction modules details mentioned here required to implement the SaaS.



Application System Architecture



The defined flows may change depends on the implement scenario.

Major Section and their modules are mentioned in document are.

Masters

- Model & Child Master (Washing App)
- Conveyor Master (Washing App)
- Tray Master (Washing App)
- Routing Master (Time Limits Master) (Washing App)
- Scanner IP Master (Washing App)
- Conveyor & Scanner Mapping Master (Washing App)
- Display & Conveyor Mapping Master (Washing App)
- NG Lot Master (Washing App)
- Admin Master(Washing App)

Transaction

- Lot Mapping
- Auto Tray Scanning
- Performance Check Data Syncing

Reports

1. Lot Forward & Backward Traceability
2. To create Parameters
3.
4.

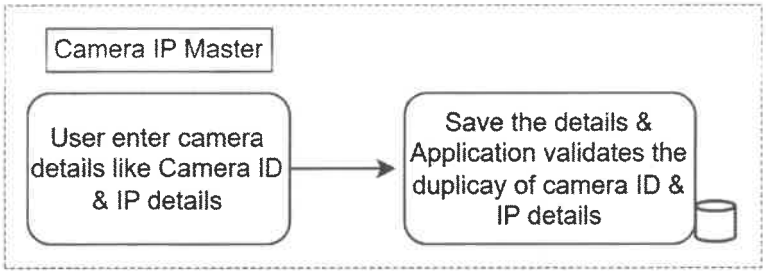
Existing Dashboard should not vanish,

Below Table is Configurable in the Master Routing Program

VCT STEP-3 Traceability Time Limit						
S/N	**Model Name**	**Part name**	**Part no.**	**Conveyor no.**	**Limit-1(nearest time to performance) in sec**	**Limit-2 (second Range as per PRD Data) in sec**
1	KC-IN(3240)	Rotor		C2	124	332
		Housing		C3	92	282
		Sproket		C6	74	220
2	KB-IN(1200)	Rotor		C2	126	332
		Housing		C3	93	282
		Sproket		C6	74	220
3	KC-EX(3250)	Rotor		C1	159	644
		Sproket		C3	109	453
		HSG		C5	100	388
4	KC-EX-JP(4630)	Rotor		C1	159	644
		Sproket		C3	109	453
		HSG		C5	100	388
5	TNGA-IN(4590)	Rotor		C1	152	523
		Rear Plate		C3	138	502
		Housing		C5	125	487
		Housing Plate		C7	98	220
6	TNGA-IN(4580	Rotor		C1	164	523
		Rear Plate		C3	150	502
		Housing		C5	138	487
		Housing Plate		C7	100	220
7	TNGA-EX(4600)	Rotor		C1	160	644
		Sproket		C3	132	453
		Housing		C5	126	388
8	ZE-EX(4670)	Rear Plate		C3	123	547
		Rotor		C4	128	396
		Housing		C5	126	396
		Housing Plate		C7	79	262
9	ZE-EX-JP(4640)	Rear Plate		C3	123	547
		Rotor		C4	118	396
		Housing		C5	116	396
		Housing Plate		C7	79	262

Model	Conveyor	Child part	Time in sec										Max	Min	Avg
KC-IN (3240) /KB-IN(1200)	C2	ROTOR	269	331	332	218	217	228	226	313	311	309	332	217	275.4
	C3	HSG	258	254	258	259	282	279	282	278	280	261	282	254	269.1
	C6	SPROKET	148	150	198	195	209	210	220	215	219	220	220	148	198.4
	C3	REAR PLATE	448	546	464	536	547	529	359	357	360	358	547	357	450.4
ZE-EX(JP)-4640 /ZE-EX-4670	C4	ROTOR	341	330	285	299	340	335	322	298	396	235	396	235	318.1
	C5	HSG	341	330	285	299	340	335	322	298	396	235	396	235	318.1
	C7	HSG PLATE	262	268	230	231	222	223	142	143	156	162	268	142	203.9
TNGA-EX-4600	C1	ROTOR	625	624	586	585	640	644	640	592	593	567	644	567	609.6
	C3	SPROKET											0	0	#DIV/0!
	C5	HSG	355	332									355	332	343.5
TNGA-IN(70)-4580 /TNGA-IN(45)-4590	C1	ROTOR	448	448	447	523	521	521	523	512	512	511	523	447	496.6
	C3	REAR PLATE	583	590	587	496	502	469	471	474			590	469	521.5
	C5	HSG	334	360	361	365	332	337	335	484	484	487	487	332	387.9
	C7	HSG PLATE	199	205	204	215							215	199	205.75
KC-EX(JP)4630	C1	ROTOR											0	0	#DIV/0!
	C3	SPROKET											0	0	#DIV/0!
	C5	HSG											0	0	#DIV/0!

Camera IP Master



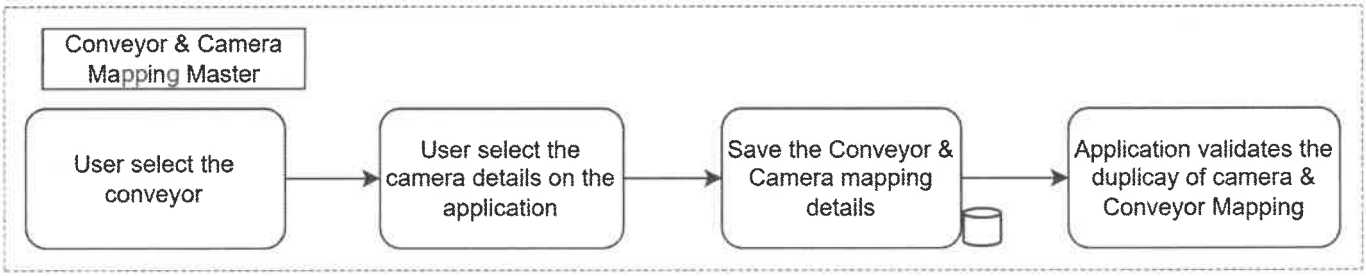
Functional Point

1) Camera details will be saved in the system to validate the tray & child part data at each respective station against the routing & to display the details on the PC screen respectively installed on the line stations.
2) Loging of Last Created By, Last Updated By/Updated On for User modification.

Validation Points

1) No Duplicate Camera ID & IP details can be saved – Unique validation

Conveyor & Camera Mapping



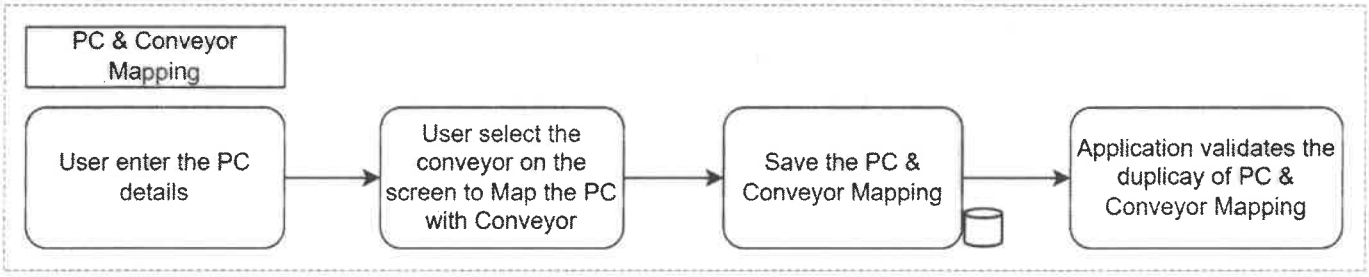
Functional Point

1) Conveyor and Camera mapping details will be saved in the system to validate the tray & child part scanned data at each respective station. Once mapping is created application will come to know data coming from each camera installed on the conveyor & system validates as per routing.
2) Loging of Last Created By, Last Updated By/Updated On for User modification.

Validation Points

1) No Duplicate Camera ID & Conveyor/Station ID details can be saved – Unique validation

Line PC & Conveyor Mapping Master



Functional Point

1) PC & Conveyor/Station ID will be mapped in the system to validate the tray at each station scanned with camera.
2) To display the details of each tray scan, need to save the mapping of PC installed between conveyors
3) Loging of Last Created By, Last Updated By/Updated On for User modification.

Validation Points

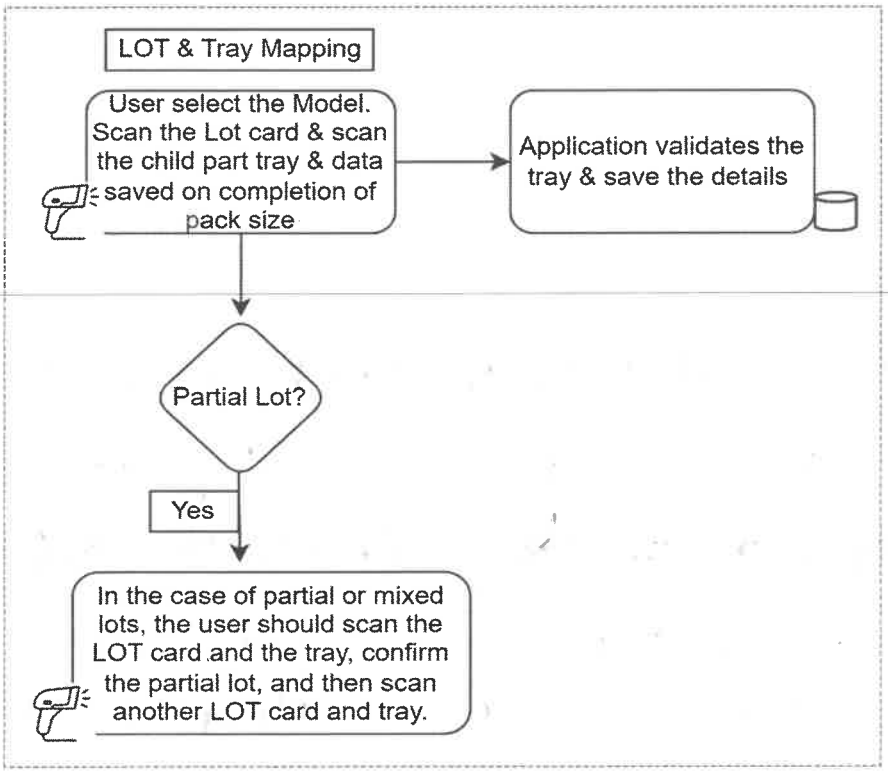
1) Application validates no duplicate mapping of PC & conveyor

Model Mapping ⇒ Now to enable so that respective scanner will be enabled & rest will be switch off. Now system of traceability will know this model is running & accordingle map (route master) will activate. Sato San Please think & provide solution.

Transactions

Transactions	FREQUENCY	SOURCE	REMARK
Lot & Tray Mapping	Transactional Data	Application	
Auto Tray Scanning	Transactional Data	Application	
Performance Check Data Sync	Transactional Data	Application	

Lot Card & Tray Mapping



For model change: Capture Model During Tray Mapping.

Functional Point

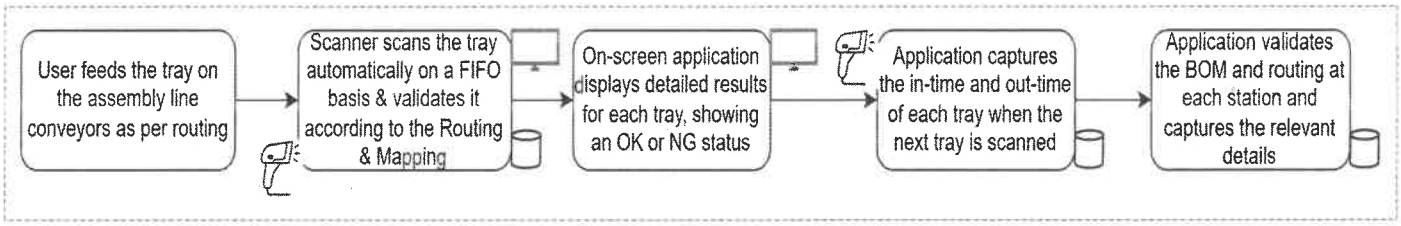
~~1)~~

Validation Points

1)

Transactions

Auto Tray Scanning



Reports

Reports

1. As per Denso provided Format

① Current Running Lot info <Refer attached document 01>
② LOT No. Search Datewise <Refer attached document 02>
③ LOT No. Search Timewise <Refer attached document 03>
④ Forward Trace using LOT ~~info~~ No. <Refer attached document 04>

Acceptance

Before Sign Off

Any changes in SRS need to be informed by Denso. Then it will be incorporated / confirmed only after doing detailed feasibility study by SATO Argox India Pvt. Ltd.

After Sign Off

Any changes in proposed solution after approval of this document by Denso are subject to confirmation from SATO Argox India Pvt. Ltd, taking feasibility constraints into account. These changes will be incorporated (if any) into the solution only after delivering proposed solution & may be charged as extra.

SATO Argox India Pvt. Ltd. reserves the rights to change Details of Application before & after Sign Off i.e., Fields on Screen, Reports, Database, etc. without changing the functionality or outputs assured for the project.

Agreed and Accepted by {Denso}

Name:

Designation:

Company:

Date:

Lot No Report

(Current Running Lot Info

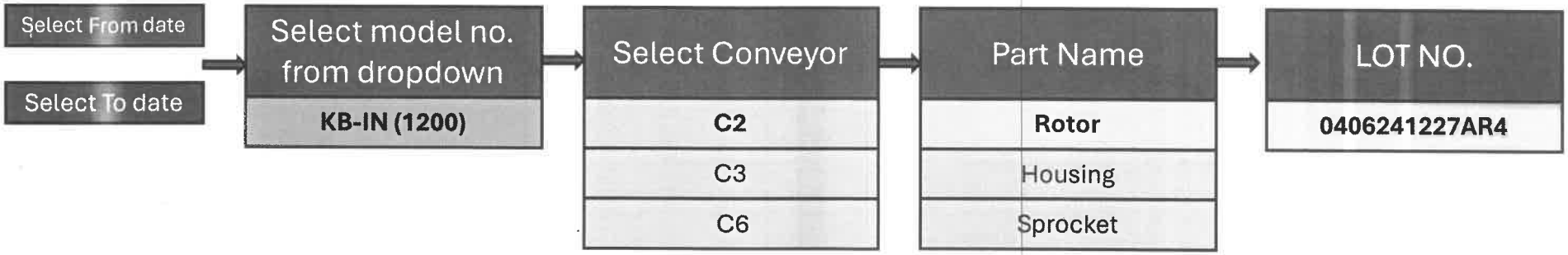
Date	Model No.	Conveyor	Part No.	Lot No.	Shift
Sat 14/9	KB-IN (1200)	C2	Rotor	**06241227AR4**	**A**

History

Date	Model No.	Conveyor	Part No.	Lot No.	Shift
Sat 14/9	KB-IN (1200)	C2	Rotor	**06241227AR4**	**A**
Fri 13/9	KB-IN (1200)	C2	Rotor	**06241227AR4**	**A**
Fri 12/9	KB-IN (1200)	C2	Rotor	**06241227AR4**	**A**

Lot No Report

LOT No. Search Datewise



From & To	Model No.	Conveyor	Part No.	Lot No.	Shift
Sat 14/9 & Sun 15/9	KB-IN (1200)	C2	Rotor	**06241227AR4**	**A**
Sat 14/9 & Sun 15/9	KB-IN (1200)	C2	Rotor	**06241227AR4**	**A**
Sat 14/9 & Sun 15/9	KB-IN (1200)	C2	Rotor	**06241227AR4**	**A**

Lot No Report

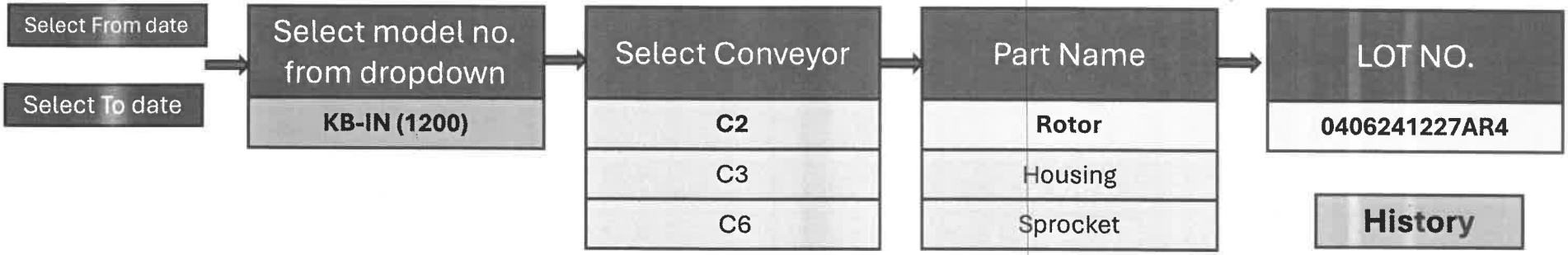
Lot NO. Search Timewise

From time	To Time	Model No.	Conveyor	Part No.	Lot No.	Shift
10:00 AM	11:15 AM	KB-IN (1200)	C2	Rotor	**06241227AR4**	**A**

History

From Time	To Time	Model No.	Conveyor	Part No.	Lot No.	Shift
11:15 AM	11:15 AM	KB-IN (1200)	C2	Rotor	**06241227AR4**	**A**
11:15 AM	11:15 AM	KB-IN (1200)	C2	Rotor	**06241227AR4**	**A**
11:15 AM	11:15 AM	KB-IN (1200)	C2	Rotor	**06241227AR4**	**A**

Forward Trace using Lot. No.



From & To	Model No.	Conveyor	Part No.	Lot No.	Shift
Sat 14/9 & Sun 15/9	KB-IN (1200)	C2	Rotor	**06241227AR4**	A
Sat 14/9 & Sun 15/9	KB-IN (1200)	C2	Rotor	**06241227AR4**	A
Sat 14/9 & Sun 15/9	KB-IN (1200)	C2	Rotor	**06241227AR4**	A

Forward Trace

Forward Trace will Provide us Serial Number