



## FALCON's Proposal to Burjeel Holdings for the Supply of Fulfilment Centre Automation

June 14, 2025



Doc. No. - Sales/FR/PT/007/R0



**Kind Attention –**

**Mr. Chetan Kumar  
Mr. Ravinder Sharma  
Mr. Vineet Kumar Pant  
Mr. Nikhil Devadas PV**

**M/s Burjeel Holdings**

**Offer Ref: F25-00201; Date: 14-06-2025**

**Subject – Detailed Techno -Commercial Offer for Fulfilment Centre Automation for Burjeel Holdings**

We are pleased to submit our revised Techno-Commercial Offer in response to your requirement for Fulfilment centre automation for UAE, Abu Dhabi facility.

As you will note, we have done an in-depth data analysis and evaluated various solution options best suited for your requirements, along with the information collected during the meetings and discussions with you, we have put together a detailed technical proposal laid out in various sections and sequenced to enable you to understand our proposed solution and to re-enforce our commitment to being your partner in this strategic initiative.

In subsequent sections, we have highlighted the capabilities and experiences of Falcon Autotech with sections on our Intra-logistics Automation Technologies and references.

To conclude, I would like to add my personal commitment on behalf of Falcon Autotech. As we move through the RFP process, please do not hesitate to contact me and my team. We will be pleased to assist you with any further information or clarifications that you might have.

**Best Regards,**

**Sandeep Bansal**

**Chief Business Officer**

## Response to requirement for Fulfilment Centre Automation



Proposal Reference – F25\_00201

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## 1. Glossary

S. No.	Term	Description
1	RFQ	Request For Quotation
2	PPH	Shipments Per Hour
3	ICR	Intelligent Character Recognition
4	MEZZ	Mezzanine
5	FWD	Friction Wheel Drive
6	ECDS	Empty Carrier Detection System
7	AC	Alternating Current
8	DC	Direct Current
9	PLC	Programmable Logic Controller
10	IT	Information Technology
11	BOQ	Bill Of Quantity
12	I/O	Input/ Output
13	PDP	Power Distribution Panel
14	PC	Personal Computer
15	UPS	Uninterrupted Power Supply
16	CBS	Cross Belt Sorter
17	MDR	Motor Driven Roller
18	VDS	Volume Distribution System
19	IPP	Individual Productivity Potential
20	VM	Virtual Machine
21	MENA	Middle East North Africa
22	FOC	Free of Cost
23	CBS	Cross Belt Sorter
24	CEP	Courier Express Parcel
25	GTC	Goods to Conveyor
26	WCS	Warehouse Control Software
27	PTL	Pick/ Put to Light
28	DAP	Design Approval Phase

## **2. Executive Summary**

Falcon Autotech is pleased to confirm its great interest in responding to this Burjeel Holdings requirement of fulfilment centre automation for UAE, Abu Dhabi. Our team has been working closely with the relevant stakeholders, with a clear commitment to listening, understanding your needs, and ensuring this project's success.

Following the same objective, we are happy to offer a compliant solution meeting all technical and operational requirements at competitive price, delivering key results.

Our solution is based on the following key characteristics:

### **3D ASRS System with Conveyor Automation and Outbound Sorter:**

- *ASRS NEO with 6,302 bin positions with 28 robots*
- *8 Goods to conveyor stations (1 Robotic pick station as option)*
- *248 Put to Light destinations*
- *Inbound and Outbound Conveyor Automation*
- *Pop-up & Swivel wheel diverters, with automatic Print & apply and strapping machines*
- *Telescopic belt conveyors for Loading and unloading of the material*

### **1. Falcon's reliable Automation Systems**

*Falcon Autotech has installed multiple systems globally* which are used by most innovative brands such as Flipkart, Amazon, Delhivery, noon, Aramex, Asendia, Fastway and many more. The main and critical components of the Falcon Autotech system building blocks, like wheels, motors, belts, bearings, Bus Bars, Communication platforms, PLCs etc., are sourced from industry leading suppliers in the world, such as SEW, Siemens, SICK, Vahle, Forbo etc. This strategic baseline of sourcing policy allows Falcon's customers to be fully confident in the systems' robustness and reliability.

### **2. Commitment to quality systems**

Demonstrating Falcon's clear commitment to the Burjeel's satisfaction, the Automation system, parts and services will be under warranty for 12 months from installation go-live and 1 Year Comprehensive Maintenance plan is provided as an option post warranty. Our expertise in executing world-class, projects across the MENA region has been thoroughly demonstrated and validated. We offer:

- A proven history of success and broad experience in implementing and maintaining automated systems.
- ISO 9001 Quality Assurance certification, ensuring consistent quality across our products, processes, and outcomes.
- Falcon Warehouse Control System (WCS) is designed to meet the real-time operational needs of automated materials handling systems. WCS can be molded based on the client's requirements to enhance operations.
- Comprehensive service and warranty programs. We deliver both operational and emergency support with unmatched responsiveness and availability throughout the region.
- Strong financial stability, backed by a long-standing track record.

### 3. Company Profile

Falcon Autotech (Falcon) is a global intralogistics automation solutions company. With over 12 years of experience, Falcon has worked with some of the most innovative brands in E-Commerce, CEP, Fashion, Food/FMCG, Auto and Pharmaceutical Industries. With our proprietary software and robust hardware integration capabilities, Falcon designs, manufactures, supplies, implements, and maintains world-class warehouse automation systems globally. Falcon's strong research and development team and the continuous focus on innovation reflect our strong solution line around Sortation, Robotics, Conveying, Vision Systems and IOT. Falcon has done over 1,800 installations across 15 countries on four continents.

### Falcon 2.0

 Operational since in 2012, Falcon is a global intra-logistic automation solution provider handling parcels, bags, cartons and pieces

 Falcon has five key solution lines: 3D Robotics, Sortation systems, Dimensions & Weight Systems, Put/pick To Light & Conveyors, along with rapidly scaling proprietary software called FACTS

 Work with leading E-Commerce, CEP, Fashion, Food/FMCG, Auto and Pharmaceutical brands



5 Product Lines
15+ Countries with Live Installations
1800+ Total Installed Systems Globally
1Million+ Sorts Per Hour
600+ Employees

**Long-standing Relationships with industry leaders**

 Flipkart				
				
				

**News & Articles**



**FALCON AUTOTECH EXPANDS PRESENCE IN THE MIDDLE EAST WITH NEW OFFICE OPENING**  
Falcon Autotech is pleased to announce the opening of its new office in Dubai, UAE, marking a significant milestone in the company's expansion into the Middle East market.



**FALCON AND ALSTEF GROUP ANNOUNCE GLOBAL TECHNOLOGY PARTNERSHIP**  
Falcon Autotech and Alstef Group Announce Global Technology Partnership for Parcel Sortation Solutions  
Published - Sept 2022

Falcon Autotech is currently among the top 15 intralogistics automation company; our vision is to become top 10 intralogistics automation company in our focused product lines.

### Our Vision

To be amongst the Top 10 global intra-logistics automation companies in our focused product lines

The team started out in 2004 solving special purpose automation problems for clients and later established Falcon Autotech in 2012 with strong focus on building standard technology stack spanning across Hardware, Firmware and Software to tackle bigger Supply Chain problems around warehouse automation and material handling. Over the decade, Falcon has made rapid strides and has carved out a niche in some of the world's most cutting-edge technologies: Sortation, Robotics, Conveying, Vision Systems and IOT.

## Our Journey

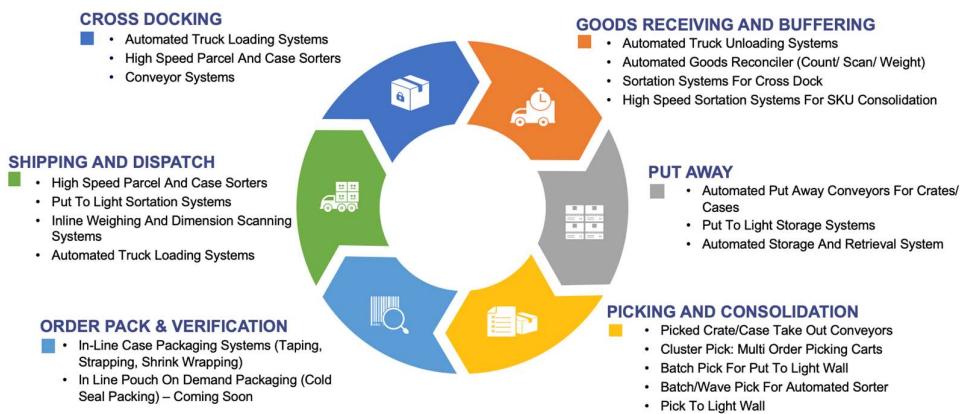
*Redefining Intralogistics Automation since 2012*

- |  |   |   |
|--|---|---|
| <ul style="list-style-type: none"> <li>Established Falcon Autotech in 2012, as a standard warehouse technology stack company.</li> <li>Team grows to 50 people</li> <li>Acquired multiple clients in Auto, Pharma and CPG</li> </ul>   | <ul style="list-style-type: none"> <li>Expands global operations in the Americas, APAC, MEA, and China.</li> <li>Launches a series of products: CCBS, Tilt Tray Sorter, Linear Arm Sorter, PTL System.</li> <li>Automated multiple warehouses for leading companies like Blue Dart, DHL, Delhivery, Aramex, Flipkart</li> </ul> | <ul style="list-style-type: none"> <li>Global sales agreement signed with Alstef group for Six countries</li> <li>Opens India's largest warehouse automation plant in G. Noida</li> <li>Expands operations in the UK market</li> <li>Team size continues to grow, with 550+ on-roll employees.</li> </ul> |
| <b>2012</b>  | <b>2015-17</b>  | <b>2020-22</b>  |
| <ul style="list-style-type: none"> <li>First order of Sortation System and Put to Light System from a leading Express Logistics player in India.</li> <li>First DWS installed at Jabong.com (now a subsidiary of Walmart FlipKart group).</li> <li>Launched a series of products like DWS, Sorters, PTL</li> </ul> | <ul style="list-style-type: none"> <li>Sets up first sorter in Europe</li> <li>Expands its manufacturing footprint by 4X.</li> <li>Orders booked for some of the largest projects being executed in India.</li> <li>Ranked amongst the top 20 Global players in Sorting Automation Market</li> </ul>                            | <ul style="list-style-type: none"> <li>Launch of Robotics solution- India's 1st 3-dimensional ASRS system named NEO and Robopik</li> <li>Launch of XL size sorter for B2B parcel sortation requirements</li> <li>Opening Falcon's offices in ME, ANZ, the Netherlands and US.</li> </ul>                  |
| <b>2012-14</b>   | <b>2018-20</b>  | <b>Road Ahead</b>   |

As a leading player in the intra-logistics automation space, Falcon continuously strives to improve the operational efficiencies and accuracies for its clients through its domain knowledge and experience in addition to its wide range of products and solutions. In order to be able to live up to the high expectations set forth by our clients, the team at Falcon realizes the importance of taking up selective applications in focused Industries and delivering world class projects in return.

## Industry Process Solutions

*Delivering a multitude of game changing process automation solutions to our customers*



## Product and Solutions

With 100% focused on Parcels, Boxes, Totes, Bags, Cartons



### SORTATION SOLUTIONS

- Cross Belt Sorter
- Linear Arm Sorter
- Swivel Divert Sorter
- Tilt Tray Sorter
- Popup Sorter
- Sweep Sorter
- Pusher Sorter



### PICK/PUT TO LIGHT SYSTEMS

- PTL Module
- Racks
- Conveyors
- Hand Scanners
- Printers
- Peripheral Displays



### DIMENSIONS & WEIGHT SCANNING SYSTEMS

- Cubizion Series
  - R, R-Eco, R-Thru, R-Cross
- Dynamic Profilers
  - Mini (600MM)
  - Jumbo (1200MM)



### CONVEYOR SOLUTIONS

- Belt Conveyors
- Roller Conveyors
- Modular Conveyors
- Special Application Solutions



### ROBOTICS

- NEO
- Robopick

Powered by  
**FACTS** | **SORT IT** | **Control IT**

Falcon Autotech has successfully delivered warehouse automation solutions based on smart and innovative combinations of above product lines for effective materials handling, sortation and movement. The process is controlled in real-time by our In house WCS applications. These solutions considerably cut the need for manual operations, improve working conditions and ensure the highest accuracy of the entire process up to final delivery to the recipient.

Over the last 10 years, Falcon has worked with some of the most innovative brands worldwide and has established long standing partnerships. These brands are testimony of our strong focus on delivering superior customer satisfaction and offering end-to-end intralogistics solutions.

## Select Key Clients

Some of world's most innovative brands trust us with their intra-logistics warehouse automation requirements



With over 1,800 installations, today Falcon's systems are used all over the globe. Falcon has highly motivated team of 600+ employees supported by over 15 global partners who help us design, manufacture, deliver and maintain automation solutions globally.

## Global Market Presence



## Customer Engagement Model

*Engaging and supporting the customer throughout the solution lifecycle*



#### 4. Falcon's Experience and Achievements in Automation Space Globally

- Ranked among **Top 20 Sortation System Suppliers** globally.
- Currently possess one of **the World's largest portfolios in Sortation Technologies**: 7 In-house technologies.
- Total installed capacity of **10 million Shipments per day** worldwide.
- Only company to be able to offer a **Fully Integrated AMS**.



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## FALCON AUTOTECH

**Falcon Autotech expands its wings by opening its office in The Netherlands, Europe**

April 15, 2024 03:32 ET | Source: [Falcon Autotech Private Ltd](#)

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NEW DELHI, India and AMSTERDAM, April 15, 2024 (GLOBE NEWSWIRE) -- Falcon

Autotech (Falcon), a leading global intralogistics automation solutions provider, opens its



### **Breaking Barriers and Optimizing Efficiency – Journey of Delivering India's Largest Sortation System**

"It was a bold decision. If it didn't work, our company would have shut down," says Naman Jain, founder and CEO of warehouse automation startup Falcon Autotech, referring to a big gamble he had taken more than a decade ago. The year was 2013, Jain and his team were negotiating a deal with a major e-commerce logistics company that had just placed an updated order for a sorter with a capacity of 6,000 parcels per hour. That was 4x the specification earlier agreed upon.

"All the founders came together, and we took a calculated risk," recalls Jain. At the time, Falcon did not have the technology to develop such sorters, and hence, the said client refused to pay any money upfront and offered to pay the machine's price in monthly installments. However, there was a caveat: if it failed even once, Falcon would simply take the machine back and refund the entire amount. Falcon's 'calculated risk' paid off. The machine worked flawlessly and was handed over to the parcel company after 36 months. "We are now doing projects worth INR100 crore. That was unthinkable 10 years back," says Jain.

Falcon Autotech has covered a lot of ground since that big bet. Last month, it installed India's largest sortation equipment at



### **Economic Times Features Falcon Autotech**

**Naman Jain**  
Chief Executive Officer

**From sorters to conveyors & robot based systems, here's the top tech warehouses are investing in**

India's warehousing industry has travelled a long distance from "godowns" to modern storage facilities called Grade A warehouses.

Warehouse automation is a gradual process. India started off late, but that may actually help it bypass some of the mid-age technologies and adopt the latest ones. While several players are still warming up to automation, which are the



### Falcon Announces Successful Go-Live of Automated Parcel Sortation Solution at DTDC's Chennai Facility

New Delhi, India – 2<sup>nd</sup> Aug 2023: Falcon Autotech, a leading supplier of intralogistics automation solutions, has been selected by DTDC Express Ltd, one of India's leading integrated express logistics company, to automate its parcel sorting operations at its super hub of 1,75,000 sq ft in Chennai, Tamil Nadu. Using its cross belt sorter technology, Falcon has designed DTDC's parcel sorting system, which can handle 6,000 parcels per hour, operate in a 24 X 7 environment, and can be expanded to cater to future growth.

The new linear cross-belt solution leverages cutting-edge technology to automate key sorting processes in DTDC's warehouse, including parcel profiling and sorting. This solution is designed to optimize the space requirements for sorting operations, increase efficiency, and reduce operational costs.

"We are thrilled to see our warehouse automation solution go live with DTDC, this solution is a testament to our commitment to providing innovative intra-logistics solutions that meet the evolving needs of our customers," said Falcon's CEO Naman Jain.



### Transforming Indian Retail: The Impact of ASRS on Warehousing Operations

In recent years, the Indian retail industry has experienced unprecedented growth, propelling the nation to become the fifth-largest global retail destination. The industry, marked by its resilience and adaptability, went through significant transformations during the pandemic. While online shopping saw a remarkable surge, the reopening of physical stores ushered in a resurgence of the multi-sensory shopping experience. As a testament to this growth, shopping malls now encompass an astonishing 23.25 million square feet of retail space. However, the evolving consumer preferences have placed substantial pressure on businesses, necessitating the seamless integration of e-commerce and in-store experiences, which, in turn, has led to complex logistics challenges. The traditional warehousing systems struggled to cope with the demand for faster processing and the requirement for expanded storage capacities.

Historically, retailers had heavily relied on manual labor for their warehousing operations. However, the dynamism of today's retail market demands a shift towards automation. Enter Automated Storage and Retrieval Systems (ASRS), a technological

## 5. Reference Projects

Falcon has a strong legacy in **Warehousing Automation** solutions and references-

1. Expertise in Shipment Sortation, Piece Picking and Handling, Case Picking and Handling.
2. Lifecycle services (maintenance, spares supply chain, support).
3. Full **in-house** expertise (Hardware/Software).
4. Turn-key **tailored** solutions.

The references list presented below focuses on Sortation Solution –

### 5.1. Project 1- (CEP Client, India)

The System is equipped with two fully automated and interconnected Sub-systems. Sub-System 1 is designed for handling large B2B boxes and E-commerce shipment bags while the Sub-System 2 is designed to handle Small E-commerce packages.

#### Solution Specifications –

- 48,000 PPH (Double Deck CBS- Shipment Sorter)
- 17,000 PPH (Double Deck CBS- Bag Sorter)
- Building Size: 700,000 Sq. Ft

#### Key Technology Modules –

- |  |   |
|--|---|
| <ul style="list-style-type: none"> <li>• 2 Sets of Double Decker CBS Sorters</li> <li>• Mezzanine Structures</li> <li>• Automated Singulators</li> <li>• Fully Automatic Inductions</li> <li>• Semi-Automatic Inductions</li> <li>• Telescopic belt conveyors</li> <li>• PVC Belt Conveyors</li> <li>• Modular Belt Conveyors</li> </ul> | <ul style="list-style-type: none"> <li>• Spiral Chutes with Braking rollers</li> <li>• 5-Sided Scanning Tunnels</li> <li>• High speed weighing conveyors</li> <li>• Direct Bagging Chutes</li> <li>• Put to Light Chutes</li> <li>• Volume Distribution systems</li> <li>• High Availability Server Systems</li> <li>• WCS</li> </ul> |
|--|---|

#### Site Pictures –



## 5.2. Project 2- (Client – E-Commerce, India)

Use Case – Destination Sorting of Packed Shipments.

In 2019, Client was looking for a potential automation partner for design and development of a new automated sortation system for B2C shipments. The system should be able to provide maximum uptime with reduced dependency on skilled manpower, and space optimization.

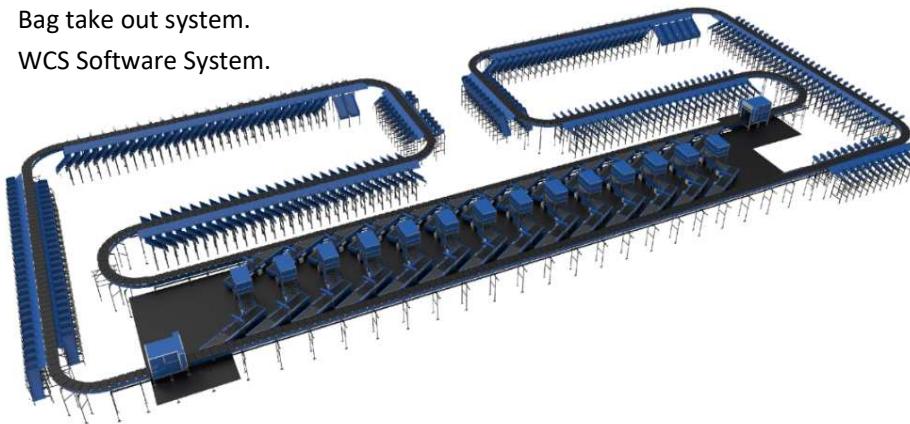
The customer chose Falcon Autotech based on its unique design which could cater to all their pain points, capability of seamless integration with WMS and life cycle support services.

### Solution Specifications –

- Throughput: 27,600 PPH
- End Destinations: 410 Direct Outputs
- Building Size: 200,000 Sq Ft

### Key Technology Modules –

- Bulk Infeed Conveyors.
- ARB based Volume Distribution System
- Integrated Presort System.
- Irregular Ejection System.
- Automatic Induct Lines.
- Automatic Barcode Scanner with Image Capture.
- Automatic Weight & Volume Measurement System.
- Loop Cross Belt Sorter.
- Smart Sliding Chutes for Direct bagging and Cage Sorting.
- Bag take out system.
- WCS Software System.



### 5.3. Project 3- (Client – E-Commerce, India)

Use Case – Destination Sorting of Packed Shipments.

The customer chose Falcon Autotech based on its unique design, capability of seamless integration with WMS and life cycle support services.

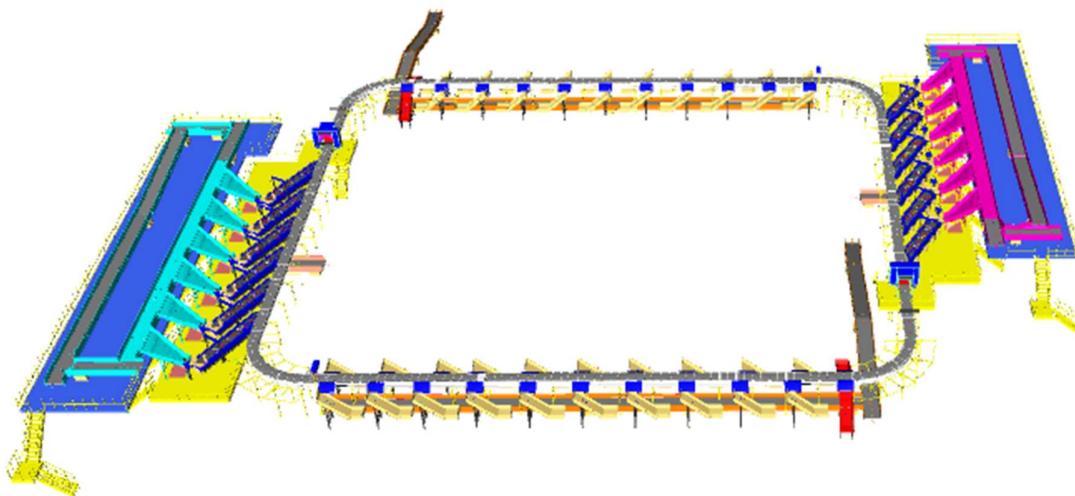
**Solution Specifications –**

- Throughput: 24,000 PPH
- End Destinations: 40 Collection Type Chutes

**Key Technology Modules –**

- Bulk Infeed Conveyors.
- ARB based Volume Distribution System.
- Irregular Ejection System.
- Automatic Induct Lines.
- Automatic Barcode Scanner with Image Capture.
- Automatic Weight & Volume Measurement System.
- Loop Cross Belt Sorter.
- Smart Collection type chutes
- Bag take out system.
- WCS Software System.

**Layout and Site Pictures -**



#### 5.4. Project 5- (CEP Client, UK)

This Solution is designed to handle a volume of 7200 shipments per hour. The system is equipped with three infeed conveyors integrated with an automatic label applicator before shipments enter the sortation system. The shipments are sorted using Falcon's Loop Cross Belt Sorter equipped with automatic barcode scanning, dimensioning, weighing and image capture capabilities. The sorter is installed on the mezzanine floor and sorts directly to 58 end destinations.

##### Solution Specifications –

- Throughput: 7200 PPH
- End Destinations: 58 Nos

##### Key Technology Modules –

- Powered Belt Conveyors.
- Automatic Induct Lines.
- Automatic Barcode Scanner with Image Capture.
- Automatic Weight & Volume Measurement System.
- Loop Cross Belt Sorter.
- WCS Software System.

##### Site Picture –



### 5.5. Project 5- (CEP Client, Sydney)

Solution is designed for handling a throughput of 16,000 shipments per hour with the help of Falcon's Loop Cross Belt Sorter. The system consists of 2 feeding zones with a total of 10 feedlines. Sorter design enables the van drivers to directly drop the shipments at the dock doors. It has a total of 369 end destinations that are achieved with a combination of direct drops and PTLs. System is integrated with 5 side automatic barcode scanning, weight and volume measurement and automatic detection of oversize and overweight shipments.

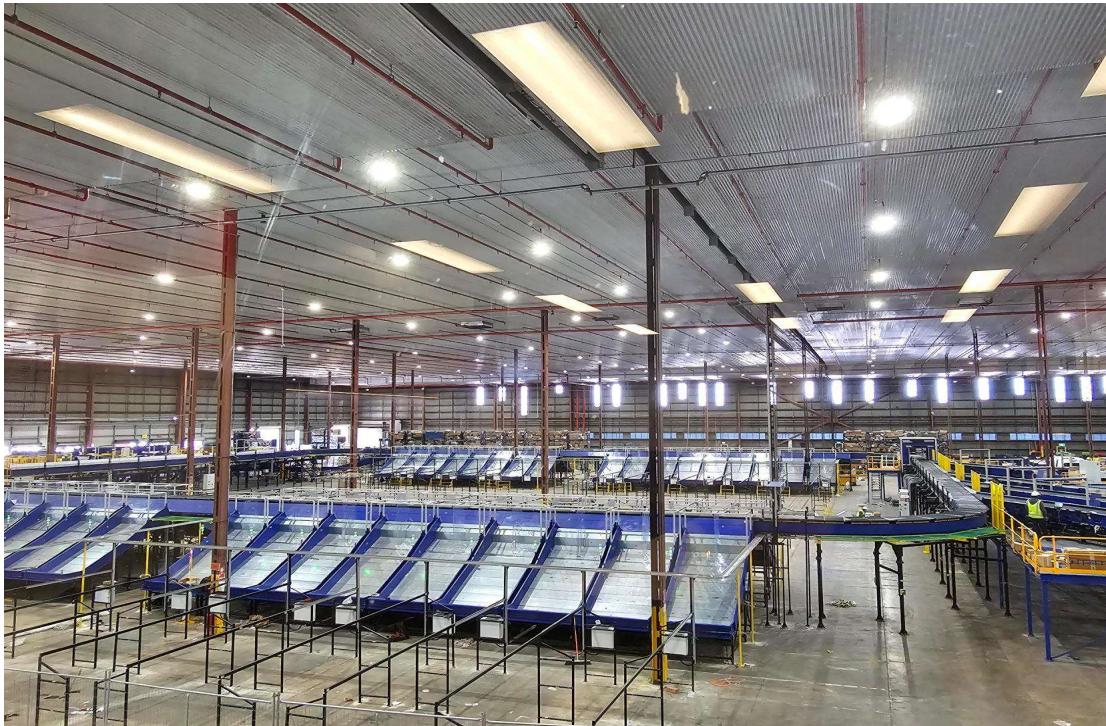
#### **Solution Specifications –**

- Throughput: 16000 PPH
- End Destinations: 369 Nos

#### **Key Technology Modules –**

- Powered Belt Conveyors.
- 2 Induct zone.
- 5 side Automatic Barcode Scanner.
- Automatic Weight & Volume Measurement System.
- Automatic detection of oversize shipment.
- Loop Cross Belt Sorter.
- WCS Software System.

#### **Site Picture –**



### 5.6. Project 6- (CEP Client, Riyadh)

In 2019, customer selected Falcon Autotech as a preferred supplier for its airport hub to supply linear cross belt sorter for processing of shipments arriving via Air from different states and countries to distribute them locally. The customer chose Falcon Autotech based on its strong track record of success in providing intralogistics automation solutions, optimized design, software integration capabilities and life cycle support services.

#### Solution Specifications –

- Throughput: 4800 PPH
- End Destinations: 52 Nos

#### Key Technology Modules –

- Powered Belt Conveyors.
- Automatic Induct Lines.
- Automatic Barcode Scanner with Image Capture.
- Automatic Weight & Volume Measurement System.
- ARB Conveyor.
- Automatic Label Applicators.
- Linear Cross Belt Sorter.
- Specialized Chutes for Gentle Shipment handling.
- FOCR Engine.
- WCS Software System.

#### Site Picture –



### 5.7. Project 7- (Client – E-Commerce, UAE & Saudi Arabia)

This Solution is designed to handle the bulk volumes through Launchpads and induct them into Falcon's Linear Arm Sorter. This system is designed for a throughput of 3000 shipments per hour equipped with automatic barcode scanning, dimensioning, weighing and image capture capabilities to into a total of 480 end destinations with a combination of primary and secondary sortation system. The secondary sortation is achieved by integrating put to light system.

#### Solution Specifications –

- Throughput: 3000 PPH
- End Destinations: 480 Nos

#### Key Technology Modules –

- Powered Belt Conveyors.
- Linear arm sorter.
- Automatic Barcode Scanner.
- Automatic Weight & Volume Measurement System.
- WCS Software System.

#### Site Picture –



## 5.8. Project 8- (Client – E-Commerce, Riyadh)

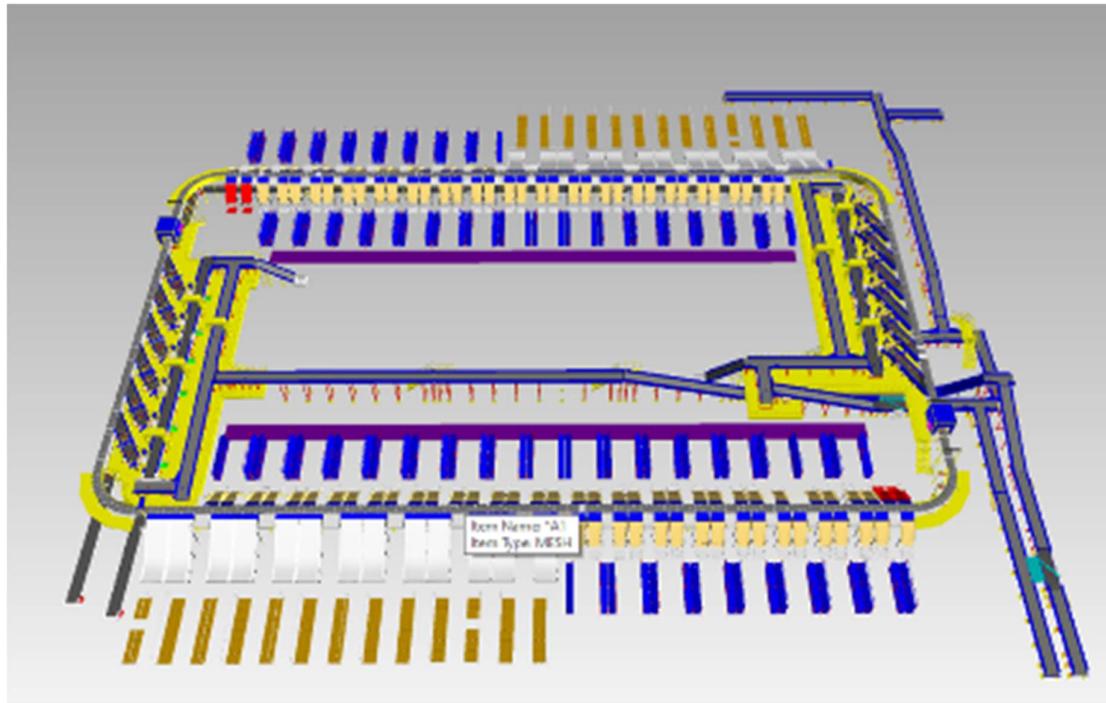
This Solution is designed to handle the bulk volumes through Infeed Conveyors and inducted into Loop Cross Belt Sorter. This system is designed for a throughput of 24000 shipments per hour equipped with automatic 5- sided barcode scanning, dimensioning, weighing and image capture capabilities to into a total of 2500 end destinations with a combination of primary and secondary sortation system. The secondary sortation is achieved by integrating put to light system.

### Solution Specifications –

- Throughput: 24,000 PPH
- Primary Destinations: 126 Nos.
- End Destinations: 2500 Nos.

### Key Technology Modules –

- Loop Cross Belt Sorter
- Powered Belt Conveyors.
- 5-Sided Automatic Barcode Scanner.
- Automatic Weight & Volume Measurement System.
- Put to Light System
- WCS Software System.



## 5.9. Project 9- (Client – CEP, Egypt)

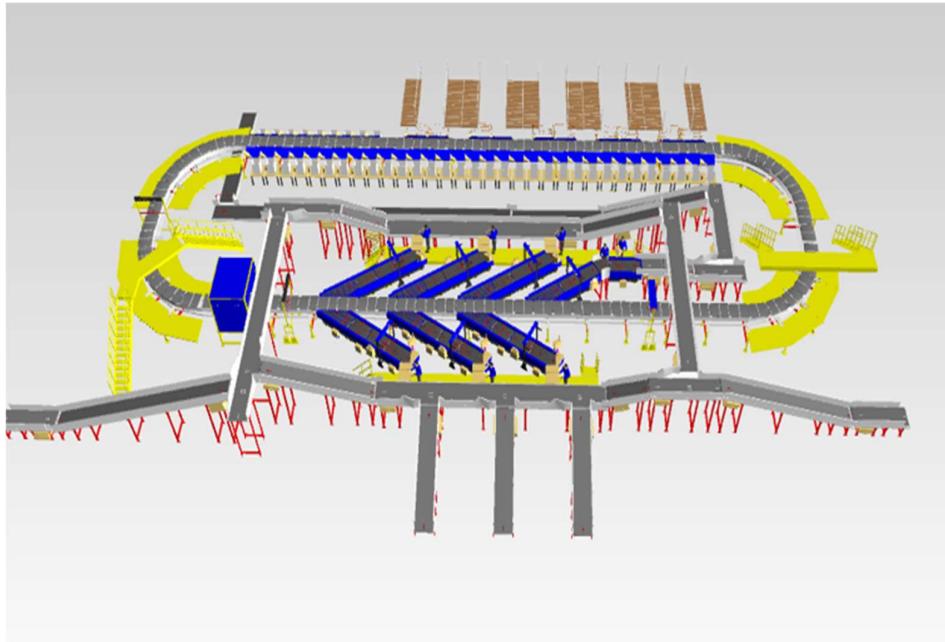
This Solution is designed to handle the bulk volumes through Infeed Conveyors and inducted into Cross Belt Sorter. This system is designed for a throughput of 12000 shipments per hour equipped with automatic 5- sided barcode scanning, dimensioning, weighing and image capture capabilities to into a total of 2500 end destinations with a combination of primary and secondary sortation system. The secondary sortation is achieved by integrating put to light system.

### Solution Specifications –

- Throughput: 12,000 PPH
- Output Chutes: 51 Nos.

### Key Technology Modules –

- Heavy Duty Loop Cross Belt Sorter
- Powered Belt Conveyors.
- Automatic Barcode Scanner.
- Automatic Weight & Volume Measurement System.
- WCS Software System.

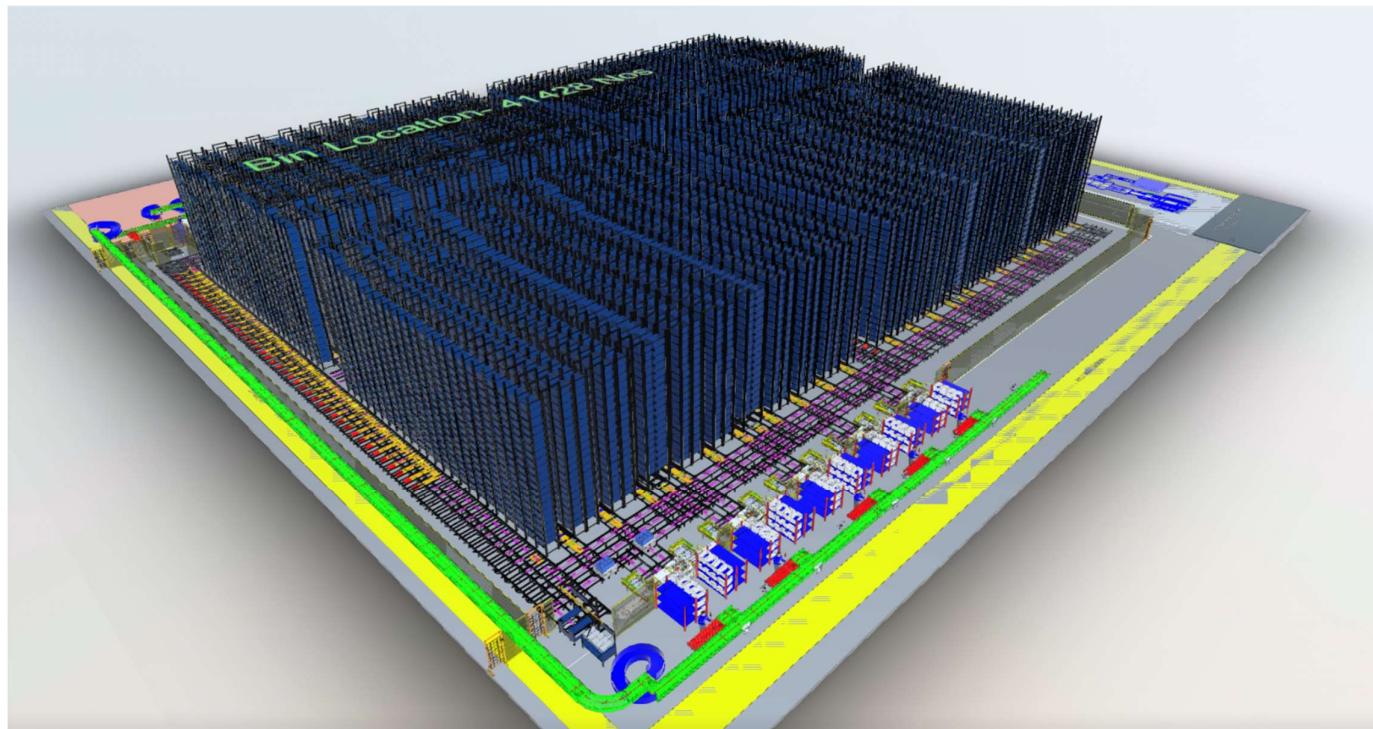


### 5.10. Project 10- (Large French Sports Good Retailer)

This cutting-edge NEO ASRS solution has revolutionized the activewear retailer's fulfillment operations. The system boasts a **40,000-bin location** capacity, providing ample storage for diverse inventory. The system is equipped with **16 ergonomic pick/put stations**, allowing operators to efficiently interact with the automated system. Each station is supported by **24 put-to-light locations** for order consolidation. A fleet of **85 advanced robots** operates within the system to handle bin transport, ensuring rapid and reliable movement between storage and picking stations. Bots are guided by intelligent software, optimizing paths for minimal travel time and maximum productivity.

#### Key Technology Modules –

- 40,000 Bin Locations
- 16 Pick/Put Stations
- 24 put to light locations
- 85 Robots

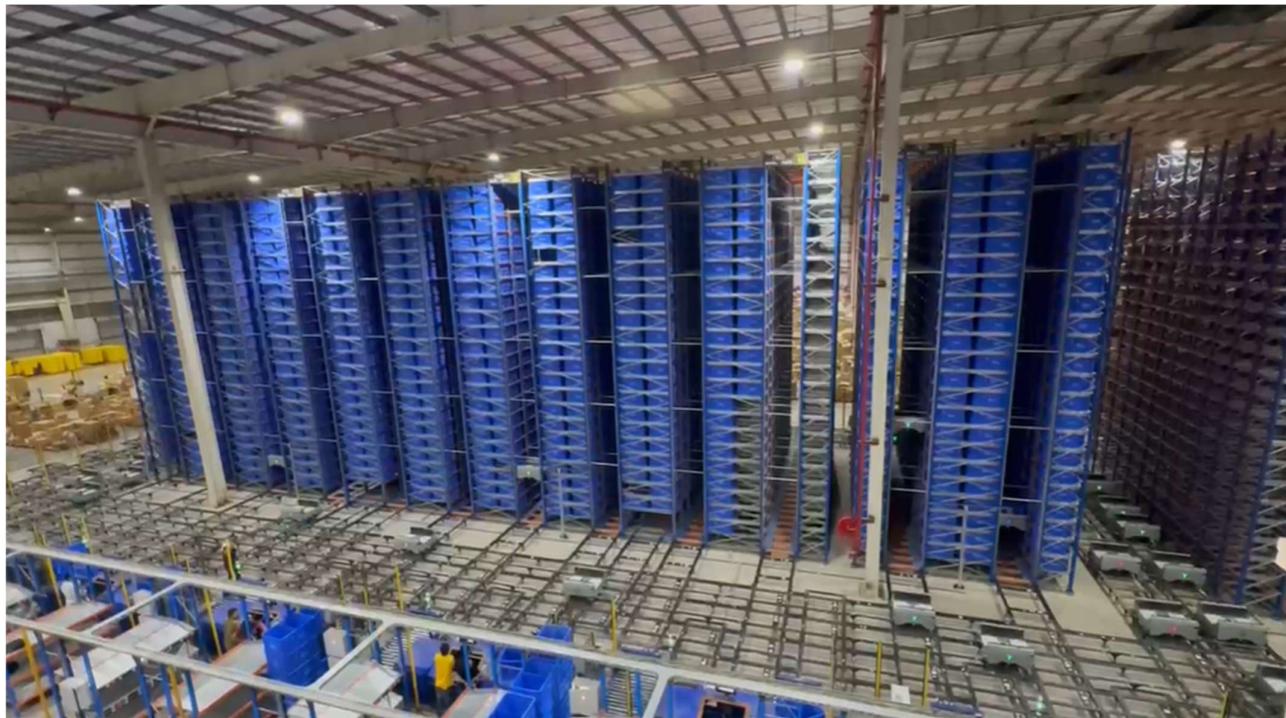


### 5.11. Project 11- (Fastest Growing Indian Q-Commerce Company)- 5 Sites across India

A state-of-the-art warehouse automation NEO system is deployed to revolutionize order fulfilment for a grocery quick commerce store. The solution features a storage capacity of 10,500 bin positions, seamlessly integrated with 48 NEO Bots and 12 ergonomic picking stations, delivering unmatched efficiency and scalability. The deployment of this system has led to a four-fold increase in productivity, significantly accelerating order processing speeds. This innovative system has redefined the fulfilment process, creating a highly efficient operation capable of meeting the rapid turnaround demands of the quick commerce sector.

#### Key Technology Modules –

- 10,500 Bin Locations
- 12 Pick/Put Stations
- 48 Robots



## 5.12. Project 12- (Middle East Courier Company)

NEO system installed with Middle east largest Courier companies in the region, the system is tailored to support e-commerce returns management. This solution features a storage capacity of **2,000 bins**, powered by **05 NEO robots** and integrated with **03 pick/put stations**. The configuration is specifically designed to streamline reverse logistics, optimizing efficiency and accuracy in handling returns. By incorporating vertical storage and an optimized layout design, the solution maximizes **space utilization**, enabling the storage of more inventory within the same physical footprint.

### Key Technology Modules –

- 2,000 Bin Locations
- 3 Pick/Put Stations
- 5 Robots



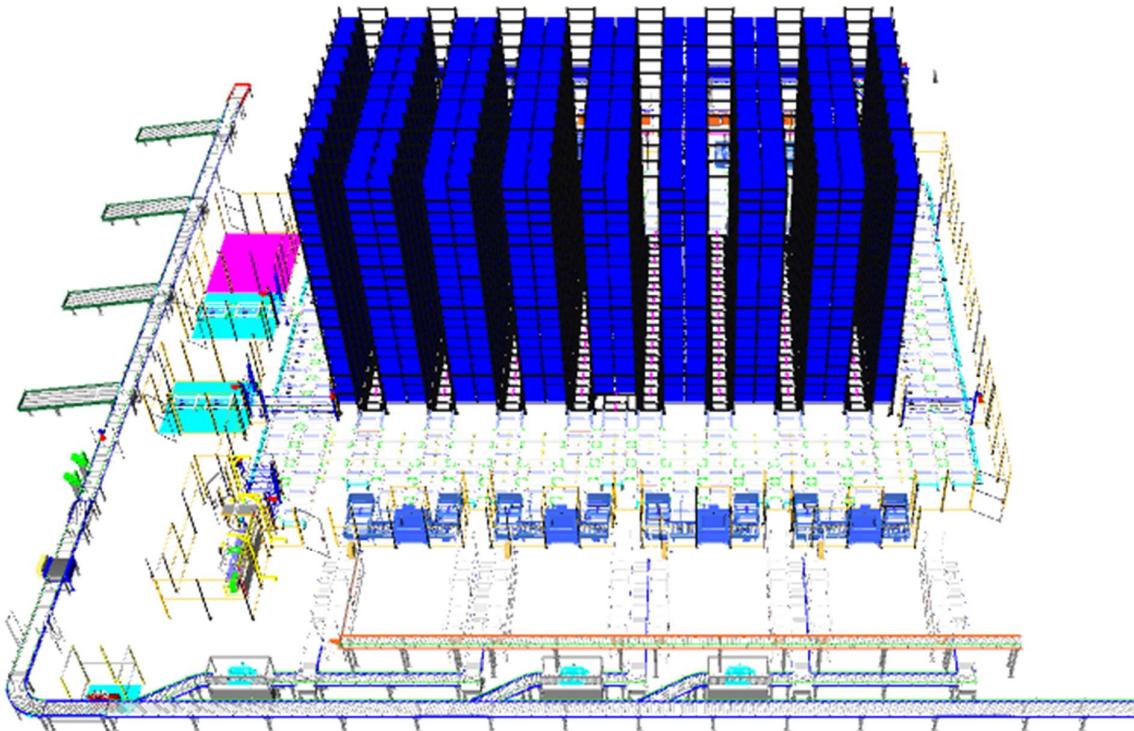
### 5.13. Project 13- (Health and Wellness Company in Australia)

NEO system installed in Australia for a Health and Wellness Company, the system is tailored to support FMCG retail processes. This solution features a storage capacity of **4,224 bins**, powered by **24 NEO robots** and integrated with **6 pick/put stations**. An integrated automated pack-line equipped with check weighing, taping, label printing, and courier partner-wise sorting ensures a seamless and efficient packaging workflow.

Additionally, the inclusion of an empty carton line from the carton erector, along with dedicated conveyors to return empty totes, enhances operator efficiency by streamlining material flow and reducing manual handling.

#### Key Technology Modules –

- 4,224 Bin Locations
- 6 Pick/Put Stations
- 24 Robots



## 6. Handled Item Spectrum

As per the spectrum data provided in the RFP documents, Falcon has studied and analysed the product spectrum in detail.

### 6.1. Pharma and non-pharma products

Falcon's system is designed to handle below mentioned Boxes and Tote sizes and weight on conveyors and diverters.

**Boxes-**

Specification	Unit	Value
<b>Max Length</b>	mm	820
<b>Max Width</b>	mm	460
<b>Max Height</b>	mm	590
<b>Max Weight</b>	Kg	20
<b>Min length</b>	mm	250
<b>Min Width</b>	mm	250
<b>Min Height</b>	mm	250
<b>Min Weight</b>	gm	200

**Totes-**

Specification	Unit	Value
<b>Max Length</b>	mm	600
<b>Max Width</b>	mm	400
<b>Max Height</b>	mm	400
<b>Max Weight</b>	Kg	20
<b>Min length</b>	mm	600
<b>Min Width</b>	mm	400
<b>Min Height</b>	mm	400
<b>Min Weight</b>	gm	200

## 6.2. Items to be loaded on the Conveyor system shall have the following characteristics:

1. Centre of Gravity of item must not move during conveyance or sorting.
2. Items must not have magnetic content, otherwise their behavior cannot be guaranteed.
3. Liquid or fragile material, to avoid breaking, spillage or leakage, such as wine bottles, metal cans of paint are designated as non-conveyable items.
4. Cartons should be perfectly and safely packaged: protrusion or open surfaces are not allowed.
5. Plastic ropes shall be perfectly adherent to the surface of the package.
6. All items with the risk of being damaged during the transport on an automatic sorting system must be robust enough to avoid disintegration of container material and loose of content in the conveying or sorting process.
7. Item packaging shall have enough grip during the acceleration and referencing phases.
8. Items shall not have slippery surfaces and must be able to withstand acceleration of the items.
9. The items must have at least one flat and a regular surface providing enough stability during delivery.
10. All shapes are permitted except spherical, cylindrical, or alike unstable items & shapes.
11. All usual packaging materials are permitted (including paper, carton, plastics, plastic foil, rope, tape, textile, and wood)

## 6.3. Items not loadable on the Conveyors and Diverters

All products that are not within the range as described here, are considered non- conveyable products, and must be taken out of the main sorter flow by the operators.

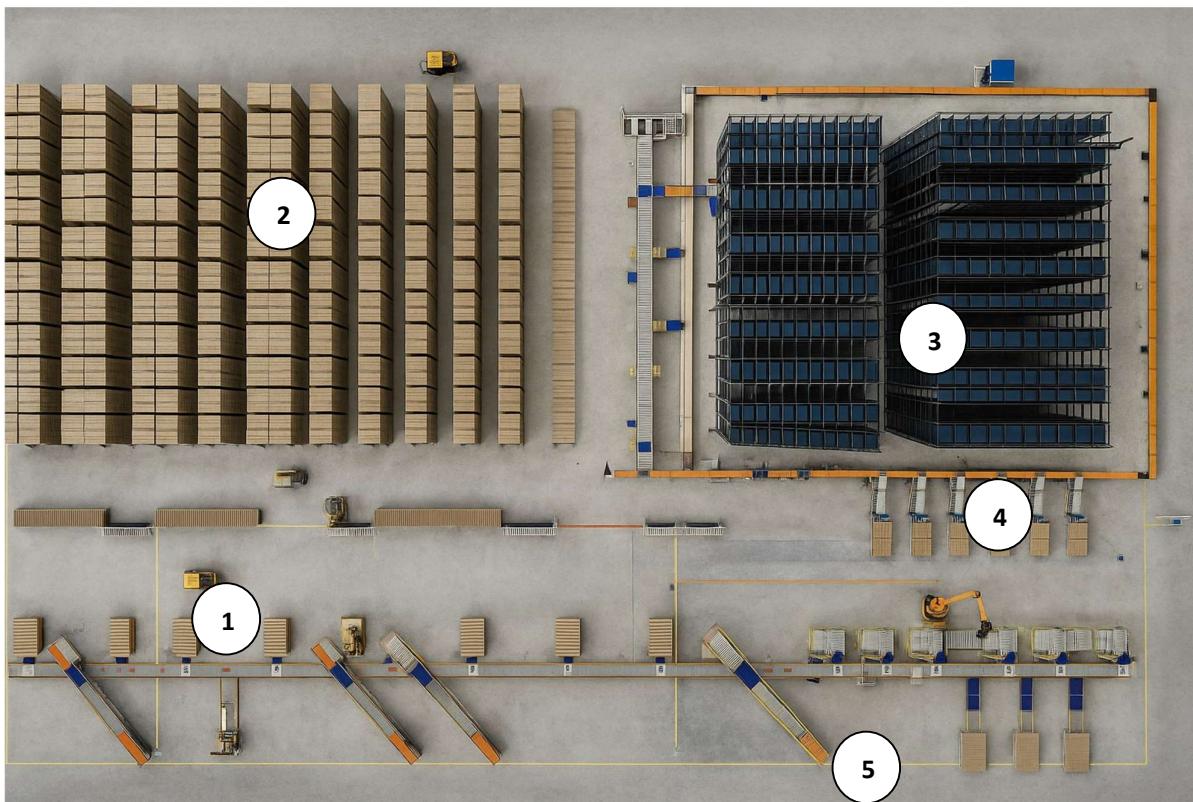
1. Unstable items with a risk to roll or tumble on the system, such as spherical or cylindrical items.
2. Items that are packed in material that can damage the conveyors.
3. Items that have sharp points (e.g., Nails) or sharp edges, that can damage the system.
4. Fragile shipments with content not sufficiently secured.
5. Items that have been classified as dangerous are designated.
6. Wet items as designated.
7. Items with anti-slip treatment.
8. Items with protruding parts.
9. Inadequately packed items that could be damaged during automatic transportation.
10. Electrostatically loaded items.

## 7. System Overview

The process commences with *Inbound operations*; wherein pharmaceutical and non-pharmaceutical products are received from various Burjeel Holdings suppliers. These items are unloaded efficiently using telescopic belt conveyors. Following unloading, the goods undergo the necessary quality inspection procedures to ensure compliance with predefined standards. Post-verification, the items are systematically stored in the Pallet Racking System.

Subsequently, order fulfilment is carried out based on demands received from Burjeel's network of hospitals and medical centres. The orders are processed in three distinct batches. For bulk items, picking is executed directly from the pallet racking in the form of full pallets or cartons. Meanwhile, picking of loose items/ mono-cartons is handled via the NEO automated system, using totes.

Cartons from racking area and totes from NEO system are directed to the Outbound Sorter, which performs both consolidation and route-wise sorting to ensure accurate delivery sequencing. The final stage involves transferring the consolidated orders, comprising both pharma and non-pharma products, to the Outbound Staging Area. Here, the goods are loaded onto dispatch vehicles using telescopic belt conveyors, marking the completion of the dispatch cycle



**Legend:**

1. Inbound Staging and Telescopic Belt Conveyor
2. Pallet Racking (Not in Falcon's Scope)
3. NEO System
4. Outbound Sorter
5. Outbound Staging and Telescopic Belt Conveyor

## **8. Proposed System Capacity Calculations**

### **8.1. System Capacity**

The following table shows the calculation for the system designed capacity based on Burjeel's RFP requirements.

System Capacity		
<b>Storage- NEO Bins</b>	6302	Nos.
<b>NEO Bots</b>	28	Nos.
<b>B2B Outbound</b>	7	Station Qty
	77	Order per Day
	3	Batches per day
	183,785	Mono Cartons per day
<b>B2C Outbound</b>	50	Orders per hour
	1	Station Qty
	150 - 250	Units per hour
<b>System Inbound</b>	All stations will be used for inbound in separate hours during peak.	

### **8.2. Operating Hours**

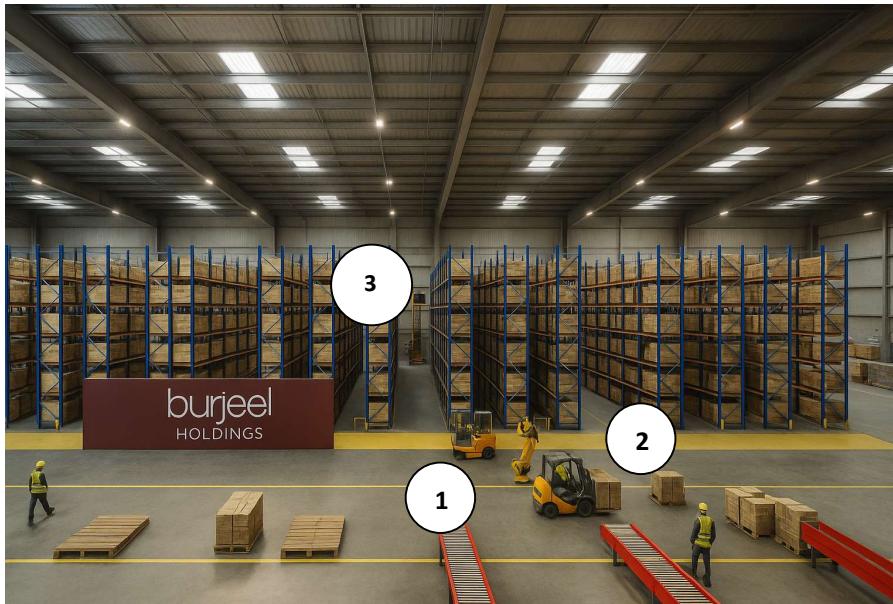
The system can run on multiple shifts depending on the load. Above calculations are based on the outbound capacity for eight working hours with load distributed across three batches.

## 9. Proposed System Description

### 9.1. Process flow of the System

The purpose of this proposal is to present the design, manufacturing, installation, commissioning, testing, and acceptance testing of the fulfilment centre automation for handling Pharma and Non-pharma products, as per Burjeel Holding's requirements.

#### A. Inbound Receiving and Put away

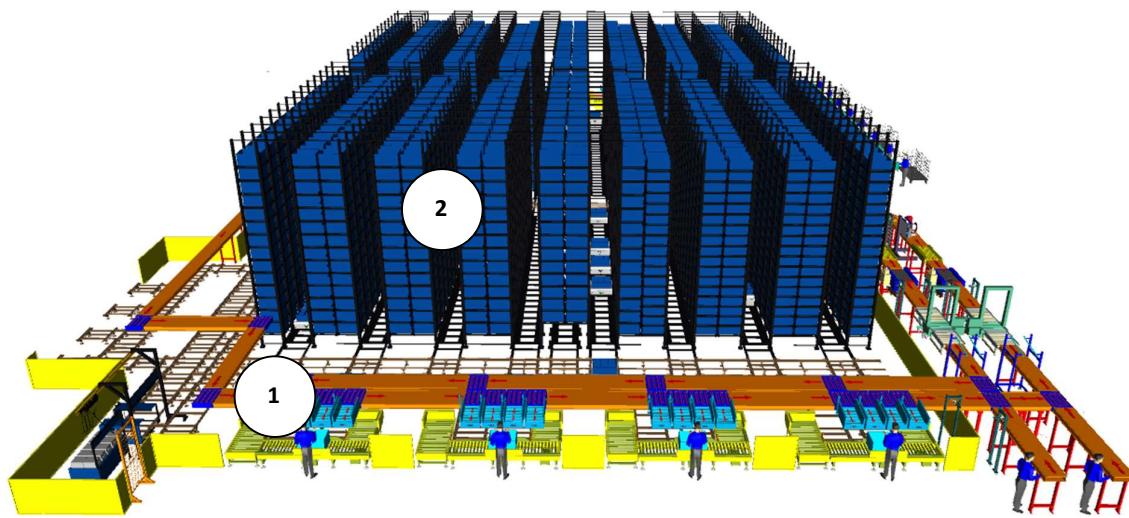
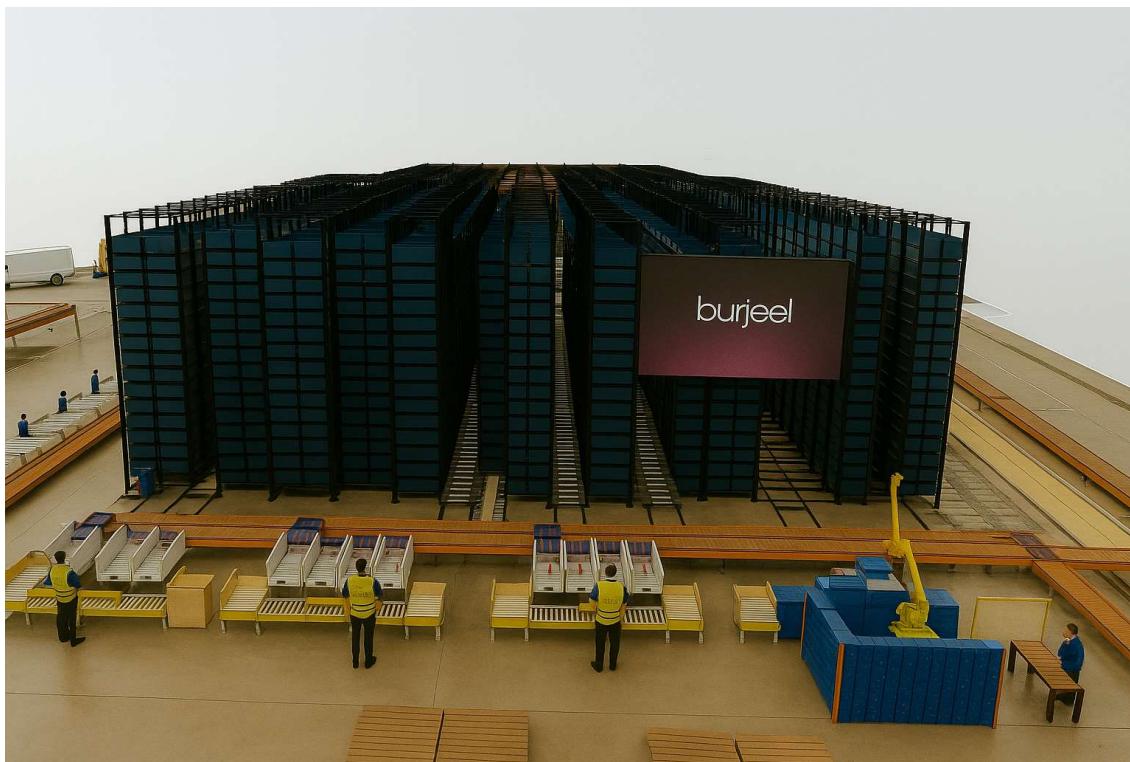


#### LEGEND:

1. Inbound Telescopic Belt Conveyor
2. Forklift (not in Falcon's Scope)
3. Pallet Racking (Not in Falcon's Scope)

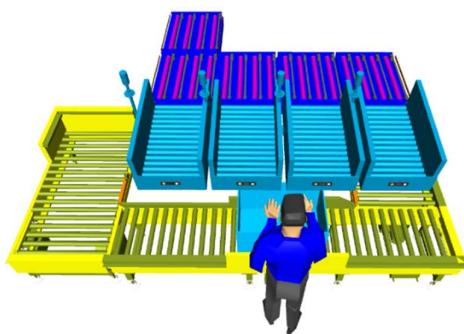
- *The pharmaceutical and non-pharmaceutical products are received from various Burjeel Holdings suppliers.*
- *These items are unloaded efficiently using telescopic belt conveyors.*
- *The items are transported out of the truck via the conveyors and are then stacked onto pallets.*
- *Following unloading, the goods undergo the necessary quality inspection procedures to ensure compliance with predefined standards.*
- *Post-verification, the items are systematically transported through forklifts and stored in the Pallet Racking System.*
- *NEO ASRS system used for loose items picking can be replenished either from Bulk Pallet storage or directly from Inbound.*

## B. NEO Storage and Put Away



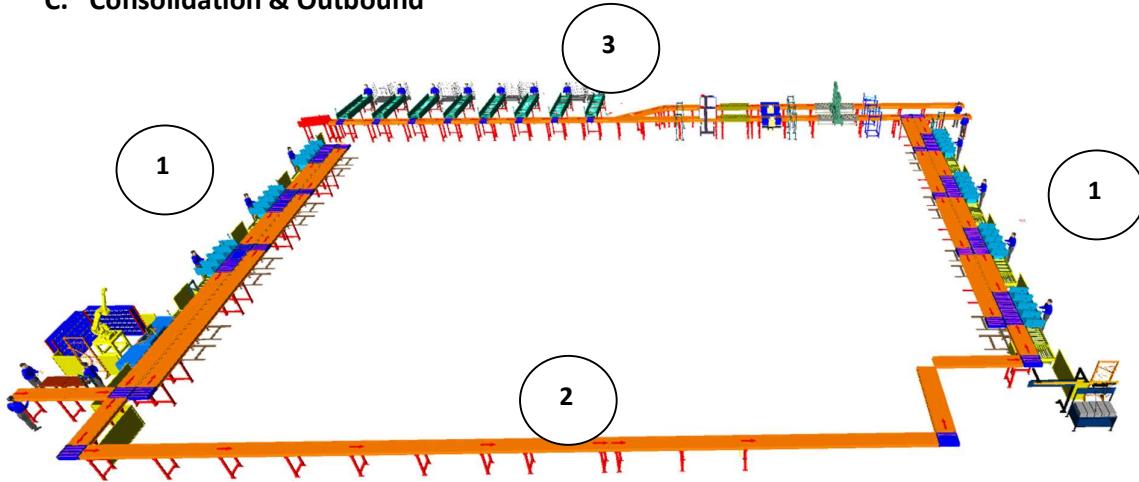
**LEGEND:**

1. Goods to Conveyor station
2. NEO Grid with Bins



- Pharmaceutical and non-pharmaceutical products are stored in NEO bins. Fast-moving or high-consumption SKUs can be allocated per bin. Alternatively for other items, each bin, which is designed with four partitions, can accommodate up to four different SKUs.
- During replenishment, the put wave will be pushed into Falcon's WCS (NEO-IT) and NEO bots will bring bins for replenishment at NEO GTC stations.
- The operators will break open the boxes and place the loose pharma and non-pharma products into NEO bins as per the defined put wave.
- NEO GTC stations can handle cartons with single and mixed SKUs during put away.
- The NEO bots will then transport and store the consolidated bins at their designated storage locations.

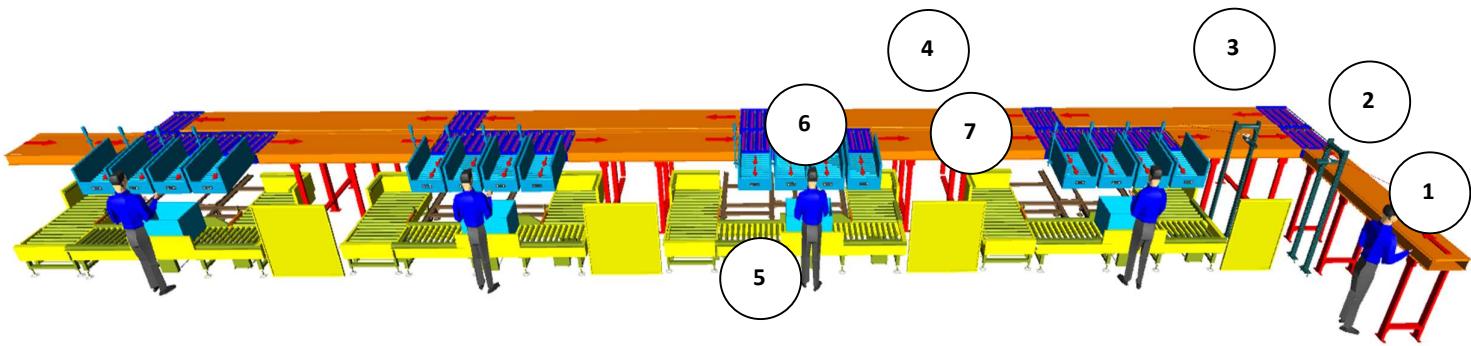
### C. Consolidation & Outbound



#### LEGEND:

1. GTC Stations
2. Order Tote takeaway conveyor
3. Outbound Sorter

#### D. B2B Consolidation

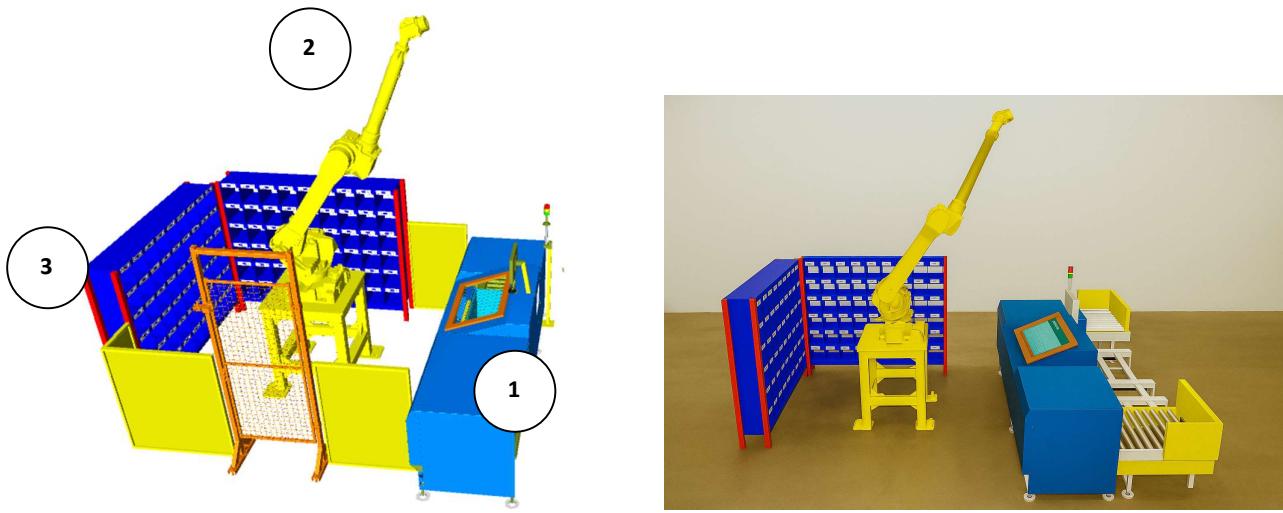


**LEGEND:**

1. Empty tote Feeding Conveyor
2. Side Barcode Scanner
4. Pop-Up diverts
5. Empty tote Carrying Loop Conveyor
6. Goods to Conveyor Station
7. Bi-direction Conveyors
8. Order Tote takeaway conveyor

- *Order received from Burjeel's network of hospitals and medical centres are processed in three distinct batches on a given day.*
- *For bulk items, picking is executed directly from the pallet racking in the form of full pallets or cartons. Meanwhile, picking of loose items/ mono-cartons is handled via the NEO system, using totes.*
- *Order data is pushed to NEO system from Burjeel's WMS and Falcon's WCS will analyse the data and allocate orders to different GTC stations.*
- *The NEO bots will be activated and bring the bins with SKUs required to fulfill the orders and drop them on the GTC conveyor.*
- *NEO Bots will bring bins containing Pharma and Non-Pharma products to the goods-to-conveyor stations, where operators will consolidate the products into Order totes buffering on the conveyor running over the station. Empty order totes will be automatically supplied to this conveyor.*
- *Barcodes of empty totes will be scanned using side barcode scanners, after which they will be merged into a loop via a pop-up divert unit. These empty totes will keep circulating in the loop.*
- *Once the order is filled or order is complete, operator will notify the system and totes on the bi-directional conveyor, will merge to the order tote takeaway conveyor line.*
- *B2B stations of both the zones are connected through order tote takeaway conveyor, which eventually takes the totes to outbound sorter after automatic strapping and labelling.*

## E. B2C Consolidation

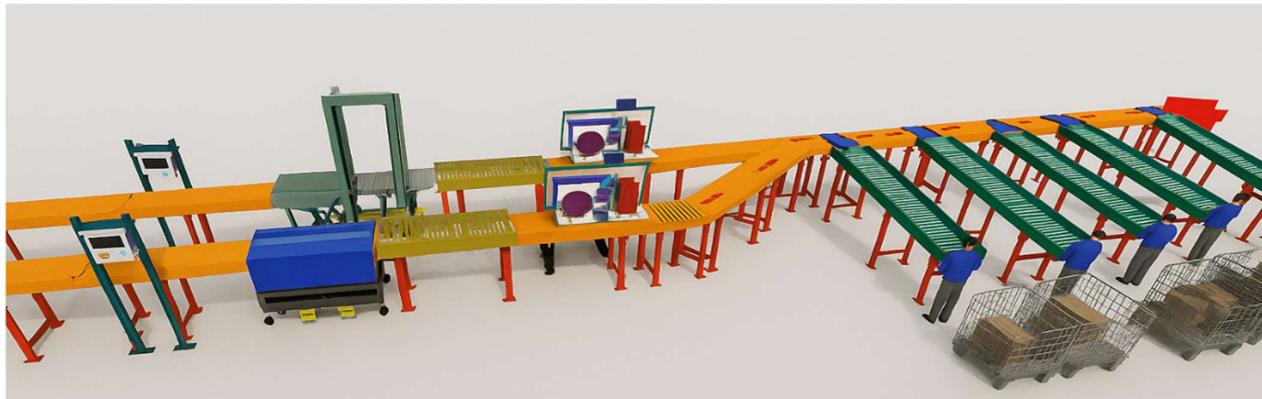
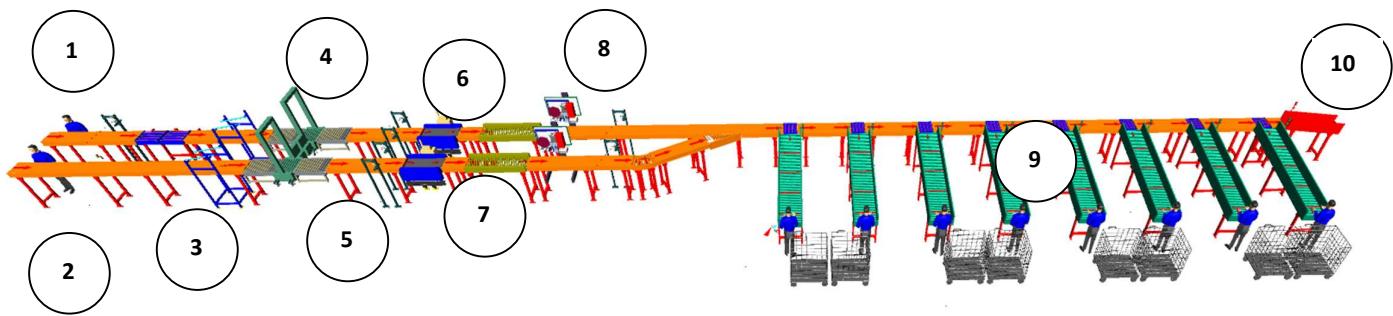


### LEGEND:

1. B2C Outbound Station
2. Robotic Arm (Optional)
3. Put to Light with Pigeonholes

- Dedicated station is provided to cater B2C orders.
- B2C orders pick wave will be pushed to Falcon's WCS and orders will be mapped on the pigeonholes of the put to light racks.
- NEO bots fetch the Bins with required SKUs and deliver them to the dedicated B2C picking station.
- At the station, the Robotic Arm automatically picks products from the bins and scans their barcodes.
- Based on the scanned barcode, the corresponding Put-to-Light (PTL) location illuminates, indicating the correct bin for item placement. Each PTL is linked with their respective order ID.
- The Robotic Arm places the item into the PTL location, enabling efficient and accurate sorting.
- The PTL rack is designed such that operators can pick items from the rear side. Once the order items are picked, operators consolidate them into a tote and place the tote onto the takeaway conveyor.
- The barcode on the tote is scanned, and the tote is diverted via pop-up diverters onto the order tote takeout conveyor, which routes it to the outbound sorter.
- Robotic Arm is provided as an option, and this station can be handled by operator by default.

## F. Outbound Process



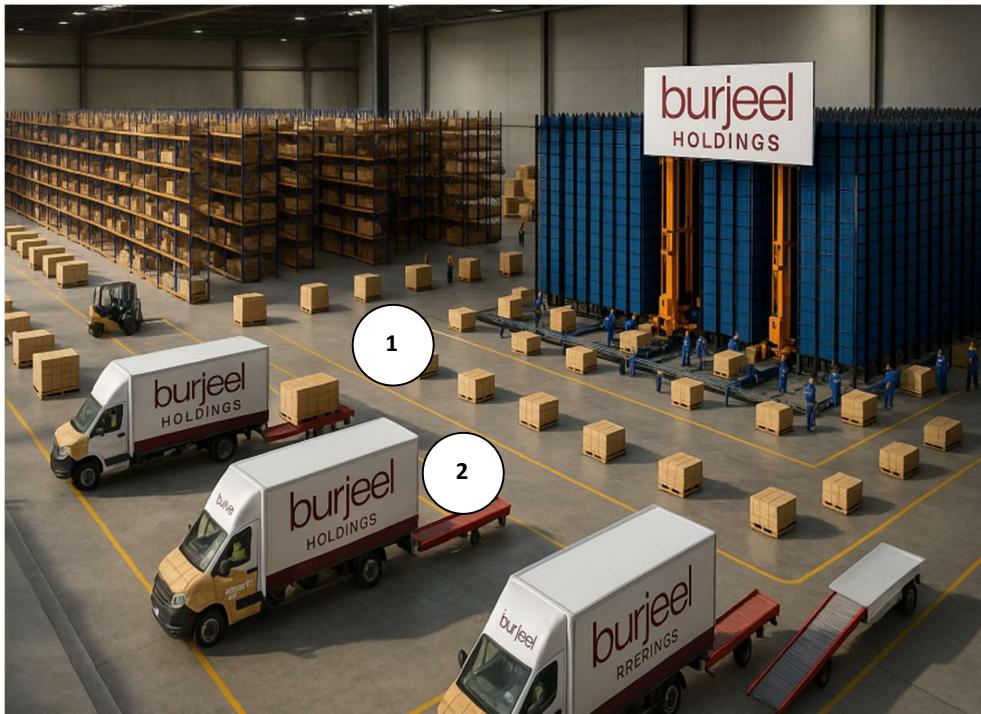
### LEGEND:

1. Bulk Load Takeaway Conveyor
2. Order Tote Takeaway Conveyor
3. Automatic Tote Closure system
4. Automatic Strapping Machine
5. Side Barcode Scanner
6. Weighing Conveyor
7. Aligning Conveyor
8. Automatic Print and Apply System
9. Outbound Sorter
10. Rejection Gravity Chute

- Cartons retrieved from the Pallet Racking storage, required for order fulfilment, will be placed onto the Bulk Load Takeaway Conveyor.
- Parallelly running Tote Takeaway Line, will carry consolidated B2C/B2B order totes for downstream processing.

- These totes will undergo a sequence of automated operations including lid closure, parallel strapping, barcode scanning, weighing and automatic Label application.
- Cartons will follow the same process, excluding the lid closure step.
- After labelling, the barcodes on both totes and cartons will be re-scanned for label verification and sorted route-wise using Swivel Wheel Diverters.
- Totes and cartons belonging to the same order will be consolidated manually onto pallets/collection trolleys through scanning.
- The system is equipped with a rejection chute to divert any totes or cartons with barcode mismatches or other sorting issues.
- In the event of a failure on the Tote Takeaway Line, the Bulk Load Takeaway Conveyor can function as a contingency line to process totes.

## G. Outbound Staging and Dispatch



### LEGEND:

1. Staging Area
2. Telescopic Belt Conveyor

- Consolidated pallets/ collection trolleys will be transferred to the designated outbound staging area for dispatch preparation.
- In case a truck is positioned at the loading dock, totes or boxes will be directly loaded into the vehicle using a telescopic belt conveyor system to facilitate efficient and ergonomic material handling.

## 9.2. Conveyor BOM

S No.	Name	ANGLE	EL_1	EL_2	Length (m)	Width (m)	Set
1	Accumulation Roller	0	1400	1400	2.0	500	1
2	Accumulation Roller	0	1400	1400	0.8	500	1
3	Accumulation Roller	0	1400	1400	2.0	500	1
4	Accumulation Roller	0	1400	1400	1.2	700	1
5	Accumulation Roller	0	1400	1400	0.9	600	1
6	Accumulation Roller	0	1400	1400	0.9	600	1
7	Accumulation Roller	0	1400	1400	0.9	600	1
8	Accumulation Roller	0	1400	1400	0.9	600	1
9	Accumulation Roller	0	1400	1400	0.9	600	1
10	Accumulation Roller	0	1400	1400	0.9	600	1
11	Accumulation Roller	0	1400	1400	0.9	600	1
12	Accumulation Roller	0	1400	1400	0.9	600	1
13	Accumulation Roller	0	1400	1400	0.9	600	1
14	Accumulation Roller	0	1400	1400	0.9	600	1
15	Accumulation Roller	0	1400	1400	0.9	600	1
16	Accumulation Roller	0	1400	1400	0.9	600	1
17	Accumulation Roller	0	1400	1400	0.9	600	1
18	Accumulation Roller	0	1400	1400	0.9	600	1
19	Accumulation Roller	0	1400	1400	0.9	600	1
20	Accumulation Roller	0	1400	1400	5.0	700	1
21	Accumulation Roller	0	1400	1400	3.1	700	1
22	Accumulation Roller	0	1400	1400	3.1	700	1
23	Accumulation Roller	0	1400	1400	9.9	700	1
24	Accumulation Roller	0	1400	1400	5.0	700	1
25	Accumulation Roller	0	1400	1400	3.1	700	1
26	Accumulation Roller	0	1400	1400	4.1	700	1
27	Accumulation Roller	0	1400	1400	2.2	700	1
28	Accumulation Roller	0	1400	1400	2.5	700	1
29	Accumulation Roller	0	1400	1400	3.7	700	1
30	Accumulation Roller	0	1400	1400	3.8	500	1
31	Accumulation Roller	0	1400	1400	3.2	500	1
32	Accumulation Roller	0	1400	1400	0.8	500	1
33	Accumulation Roller	0	1400	1400	2.0	500	1
34	Accumulation Roller	0	1400	1400	3.2	500	1
35	Accumulation Roller	0	1400	1400	2.8	500	1
36	Accumulation Roller	0	1400	1400	1.8	600	1
37	Accumulation Roller	0	1400	1400	2.0	700	1
38	Accumulation Roller	0	1400	1400	2.7	600	1
39	Accumulation Roller	0	1400	1400	4.0	500	1
40	Accumulation Roller	0	1400	1400	3.1	700	1
41	Accumulation Roller	0	1400	1400	5.0	700	1
42	Accumulation Roller	0	1400	1400	3.1	700	1

<b>43</b>	Accumulation Roller	0	1400	1400	5.0	700	1
<b>44</b>	Accumulation Roller	0	1400	1400	8.0	700	1
<b>45</b>	Accumulation Roller	0	1400	1400	5.0	700	1
<b>46</b>	Accumulation Roller	0	1400	1400	12.7	500	1
<b>47</b>	Accumulation Roller	0	1400	1400	20.0	500	1
<b>48</b>	Accumulation Roller	0	1400	1400	0.8	600	1
<b>49</b>	Accumulation Roller	0	1400	1400	7.1	600	1
<b>50</b>	Gravity Roller conveyor with brake roller	-6	1400	1109	2.8	600	1
<b>51</b>	Gravity Roller conveyor with brake roller	-6	1400	1109	2.8	600	1
<b>52</b>	Gravity Roller conveyor with brake roller	-6	1400	1109	2.8	600	1
<b>53</b>	Gravity Roller conveyor with brake roller	-6	1400	1109	2.8	600	1
<b>54</b>	Gravity Roller conveyor with brake roller	-6	1400	1109	2.8	600	1
<b>55</b>	Gravity Roller conveyor with brake roller	-6	1400	1109	2.8	600	1
<b>56</b>	Gravity Roller conveyor with brake roller	-6	1400	1109	2.8	600	1
<b>57</b>	Gravity Roller conveyor with brake roller	-6	1400	1109	2.8	600	1
<b>58</b>	Bidirectional Roller Conveyor	-5	1400	1320	0.9	500	1
<b>59</b>	Bidirectional Roller Conveyor	-5	1400	1320	0.9	500	1
<b>60</b>	Bidirectional Roller Conveyor	-5	1400	1320	0.9	500	1
<b>61</b>	Bidirectional Roller Conveyor	-5	1400	1320	0.9	500	1
<b>62</b>	Bidirectional Roller Conveyor	-5	1400	1320	0.9	500	1
<b>63</b>	Bidirectional Roller Conveyor	-5	1400	1320	0.9	500	1
<b>64</b>	Bidirectional Roller Conveyor	-5	1400	1320	0.9	500	1
<b>65</b>	Bidirectional Roller Conveyor	-5	1400	1320	0.9	500	1
<b>66</b>	Bidirectional Roller Conveyor	-5	1400	1320	0.9	500	1
<b>67</b>	Bidirectional Roller Conveyor	-5	1400	1320	0.9	500	1
<b>68</b>	Bidirectional Roller Conveyor	-5	1400	1320	0.9	500	1
<b>69</b>	Bidirectional Roller Conveyor	-5	1400	1320	0.9	500	1
<b>70</b>	Bidirectional Roller Conveyor	-5	1400	1320	0.9	500	1
<b>71</b>	Bidirectional Roller Conveyor	-5	1400	1320	0.9	500	1
<b>72</b>	Bidirectional Roller Conveyor	-5	1400	1320	0.9	500	1
<b>73</b>	Bidirectional Roller Conveyor	-5	1400	1320	0.9	500	1
<b>74</b>	Bidirectional Roller Conveyor	-5	1400	1320	0.9	500	1
<b>75</b>	Bidirectional Roller Conveyor	-5	1400	1320	0.9	500	1
<b>76</b>	Bidirectional Roller Conveyor	-5	1400	1320	0.9	500	1
<b>77</b>	Bidirectional Roller Conveyor	-5	1400	1320	0.9	500	1
<b>78</b>	Bidirectional Roller Conveyor	-5	1400	1320	0.9	500	1
<b>79</b>	Bidirectional Roller Conveyor	-5	1400	1320	0.9	500	1
<b>80</b>	Bidirectional Roller Conveyor	-5	1400	1320	0.9	500	1
<b>81</b>	Bidirectional Roller Conveyor	-5	1400	1320	0.9	500	1
<b>82</b>	Bidirectional Roller Conveyor	-5	1400	1320	0.9	500	1
<b>83</b>	Bidirectional Roller Conveyor	-5	1400	1320	0.9	500	1
<b>84</b>	Bidirectional Roller Conveyor	-5	1400	1320	0.9	500	1
<b>85</b>	Bidirectional Roller Conveyor	-5	1400	1320	0.9	500	1
<b>86</b>	Gravity Roller conveyor	-6	1400	1191	2.0	600	1

<b>87</b>	Side Aligner Conveyor	0	1400	1400	1.5	500	1
<b>88</b>	Side Aligner Conveyor	0	1400	1400	1.5	500	1
<b>89</b>	Side Aligner Conveyor	0	1400	1400	1.5	600	1
<b>90</b>	30 Deg Roller Merge	0	1400	1400		600	9
<b>91</b>	30 Deg Roller Turn	0	1400	1400		600	1
<b>92</b>	60 Deg Roller Turn	0	1400	1400		600	8
<b>93</b>	TBC (4/12)						6
<b>94</b>	Weighing Conveyor						2

### 9.3. Main benefits of the proposed solution

Falcon's Automated Storage and Retrieval System (ASRS) NEO offers a multitude of benefits over traditional storage systems, revolutionizing the way goods are stored and retrieved within warehouses.

- **Enhanced Productivity:** NEO enhances your operator productivity by 4-5X. By eliminating the wait time, walk time and search time from picking operations.
- **Space Optimization:** NEO storage grid can maximize vertical space utilization in your warehouse, allowing you to store more products in a smaller footprint and significantly increasing your warehouse's storage capacity.
- **Fast and Accurate Retrieval:** With automated picking and retrieval, NEO ensures lightning-fast and error-free order processing. This means you can meet tight delivery schedules with confidence and exceed your clients' expectations.
- **Inventory Management:** Gain real-time visibility into your inventory levels, helping you make informed decisions.
- **Scalability:** Whether your warehouse is small, large, or somewhere in between, NEO is scalable to adapt to your evolving business needs.

## **10. Description of System Components**

### **10.1. Powered Roller Accumulation Conveyor**

Falcon's Accumulation conveyors are highly energy efficient and require negligible maintenance leading to very minimal Operating costs and thus lower cost of ownership.

Some Salient Features of Falcon's accumulation conveyor:

- Low Noise
- Maximum uptime.
- High safety standards.
- Fastest ROI
- It comes with MS frame.



Specification	UOM	Remark
Manufacturer Name	Name	Falcon Autotech
Material of Roller	Type	MS Rollers with Zinc Plating
Overall Width	Mm	500/700
Conveyor Height	Mm	As per Layout requirement
Drive Power Rating	Watt	40
Type of Motor	Type	DC Rollers (MDR)
Ingress Protection	Type	IP 54
Type of Drive System	Type	Round/Poly V Belt Drive
Insulation Class	Type	Yes
Conveyor Speed	m/s	Variable speed to meet TPH requirements
Load capacity per unit length of Conveyor	kg/m	50
Roller Span	Mm	Approx. 600
Roller Diameter	Mm	Approx. 50
Pitch of Rollers	Mm	75
Type of Mounts	Type	Fixed Heights Legs with Grouting Provisions
Type of Guides	Type	Steel guides at 50mm height basis the position of conveyor on both sides from Conveyor Belt Surface.

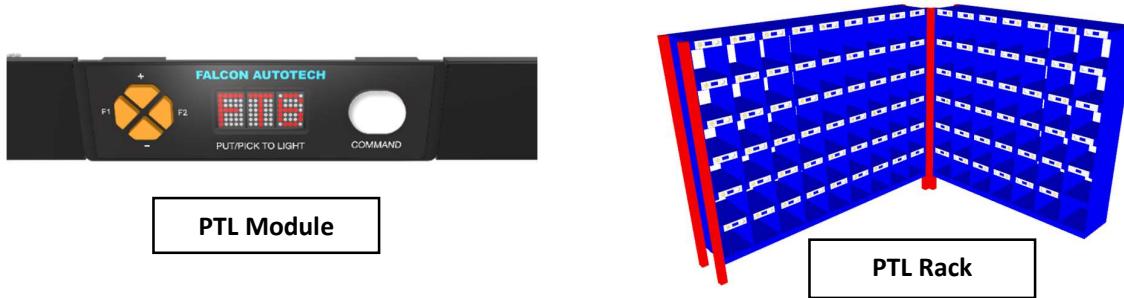
## 10.2. Pick/Put to Light Modules and Racks

PTL system is Falcon's in house developed modular light hardware modules and a connected software platform to ensure a flexible, robust, seamless, and easy to setup PTL solution which is fully integrated with Client's WMS/ERP Systems.

The Software platform is powered by a deep artificial intelligence engine that continually mines the data generated by operations and keep on altering the PTL configuration to increase the system productivity and give you the extra competitive edge.

The System involves a collection of physical sorting locations representing B2B or B2C order. Each physical location is mapped to a light module which glows on the event of scan of a product. It is a paperless technology provide high throughput with single operator with high accuracy.

The PTL racks are a supporting structure on which the PTL modules are mounted



Specification	UOM	Remark
Manufacturer Name	Name	Falcon Autotech
Dimensions	Mm	Around 165 X 50
PTL location	Nos	As per Layout requirement
LED Display	Type	3 Digit Alpha numeric Rotating Display
LED Size	Mm	~ 25 X 20
LED Indicator	yes/no	YES
Acknowledgment Button	yes/no	YES
Function keys	yes/no	4 Keys
Power Requirements	Type	3 Phase UPS Power
Communication	Type	TCP/IP and Serial
Operating temperature	Deg.	45 Degrees
Software Interface	Type	Over APIs or other methods
Type of mount	Type	Clip On Type on Rails

### 10.3. Pop-Up Diverts

Belt Popup device is used in system for 90° transfer of products.

Some Silent Features of Pop-Up:

- Low Noise
- Maximum uptime.
- Electric based popup.
- Minimal maintenance
- High safety standards.



Specification	UOM	Remark
Manufacturer Name	Name	Pulse/ Itoh Denki
Type – Equipment	Type	Stand Alone
Type – Operation	Type	Yes
Mechanism for Pop-Up	Type	Electric
Drive Power Rating (Lifting)	Watt	40
Type of Motor	Type	DC
Drive Power Rating (For Rollers)	Watt	40
Type of Motor	Type	DC
Ingress Protection type	Type	IP 54
Provision for Carton Box / Carton Detection Sensors	Yes/No	Yes
Load Capacity of Carton Box	Kg	20
Sorting Capacity	PPH	900 to 1200

#### 10.4. Swivel Wheel Divert Unit

Falcon's Swivel wheel divert is used in system for the smooth transfer of products.

Some Salient Features of Falcon's Swivel Wheel Divert:

- Low Noise
- Maximum uptime.
- Electric based rotation of wheels.
- Minimal maintenance
- High safety standards.



Specification	UOM	Remark
Manufacturer Name	Name	Falcon Autotech / Pulse
Type - Equipment	Type	Merge/Sorting
Type - Operation	Type	Sorting
Mechanism for Swivel	Type	Electric servo motor
Roller drive	kW	Powered smart wheel
Roller pitch (L x W)	Type	110 x 120
No. of divert sections	Yes/No	1 or 2
Max. product weight (kg/m <sup>2</sup> )	kg/m <sup>2</sup>	20
Throughput	PPH	Upto 1500
Type of Mounts	Type	Fixed Heights Legs with Grouting Provisions

### 10.5. Side Barcode Scanner

System is integrated with automated inline side barcode scanning system capable for scanning 1D barcodes with high accuracy.



Specification	UOM	Remark
Manufacturer Name	Name	Cognex/Sick
Barcode Type	Type	1D
Module Size	Mils	12
Tote/Boxes Sizes	Mm	<b>Boxes –</b> Min: 250 x 250 x 250 mm Max: 820 x 460 x 590 mm <b>Totes –</b> 600 x 400 x 400 mm
Number of Codes	Nos	1
Location	Side	Left
Orientation	Type	Omnidirectional
Colour of bars	Colour	Black
Under Foil	yes/no	No
Code Length	Mm	50
Code Height	Mm	15

## 10.6. Weighing Scale

High Accuracy weighing scale for inline weight scanning.



Specification	UOM	Remark
Manufacturer Name	Name	Mettler Toledo/Bizerba
Minimum Weight	Gram	200
Maximum Weight	Kg	20
Weighing Accuracy	Kg	+ - 0.06 or 0.5% of product weight, whichever is higher

## 10.7. Automatic Print & Apply Machine



Specification	UOM	Remark
Manufacturer Name	Name	Domino
Totes	Mm	<b>Boxes –</b> Min: 250 x 250 x 250 mm Max: 820 x 460 x 590 mm <b>Totes –</b> 600 x 400 x 400 mm
Suitable Carton Weight	Kg	Min 5, Max 25
Print Width	Mm	108
Print Technology	Type	Thermal Transfer/Direct Thermal
Orientation	Type	Left or Right Side
Resolution	Dots/mm	12 (300 dpi)
Label Size	Mm	100 x 100
Communication	Mm	2 x RS243, 1 x USB2.0, Ethernet

## 10.8. Strapping Machine



Specification	UOM	Remark
Manufacturer Name	Name	Ferag/ Signode
Speed	Totes Per Minute	20
Strap width	mm	5
Tension range for 5mm strap	Kg	3 to 30
Arch	mm	650x 500
Motor	Type	Servo Motor
Sealing method	Type	Heating Element
Table height	mm	805
Power consumption	KW	1.2

### 10.9. Powered Roller Turn and Merges



### 10.10. Roller Aligning Conveyor



### 10.11. Gravity Roller Conveyor

Falcon's Roller conveyors require negligible maintenance leading to very minimal Operating costs and thus lower cost of ownership.

Some Salient Features of Falcon's idler roller conveyor:

- Low Noise
- Maximum uptime.
- Minimal maintenance
- It comes with MS frame.



Specification	UOM	Remark
Manufacturer Name	Name	Falcon Autotech
Material of Roller	Type	MS Rollers with Zinc Plating
Overall Width	mm	500/ 700
Conveyor Height	mm	As per Layout requirement
Load capacity per unit length of Conveyor	kg/m	50
Roller Span	mm	approx. 600
Roller Diameter	mm	approx. 50
Pitch of Rollers	mm	75
Type of Mounts	Type	Fixed Heights Legs with Grouting Provisions
Type of Guides	Type	Yes
End Stopper	yes/no	Yes

### 10.12. Telescopic Belt Conveyor

A Telescopic Belt Conveyor is a specialized conveyor system designed to extend and retract, making it ideal for loading and unloading goods directly from trucks or containers. It consists of multiple nested sections that slide within each other, allowing the conveyor to reach deep inside the vehicle and retract when not in use, saving space.



Specification	UOM	Remark
Manufacturer Name	Name	Falcon Autotech
Tote/Boxes Sizes	Mm	<b>Boxes –</b> Min: 250 x 250 x 250 mm Max: 820 x 460 x 590 mm <b>Totes –</b> 600 x 400 x 400 mm
Suitable Carton Weight	Kg	Min 5, Max 25
Base Length	Mm	6000
Extended Length (Total Length)	Mm	18000
Conveyor Belt Running Speed	m/min	18-30
Motor Rating	Type	0.75 Kw, 415V AC, 50 Hz
Load Capacity	Kg/m	50
Communication	Mm	2 x RS243, 1 x USB2.0, Ethernet

### 10.13. NEO Bot

NEOBot is your ultimate warehouse companion that never sleeps or is on leave. A powerful machine with minimum moving parts, NEObot is always ready to deliver at its best. Exquisitely designed and engineered, the bot requires no monitoring while at work. Using advanced Lidars and AI algorithms, it moves independently in the storage grid without continuous control from the software.



#### 10.14. NEO Bin

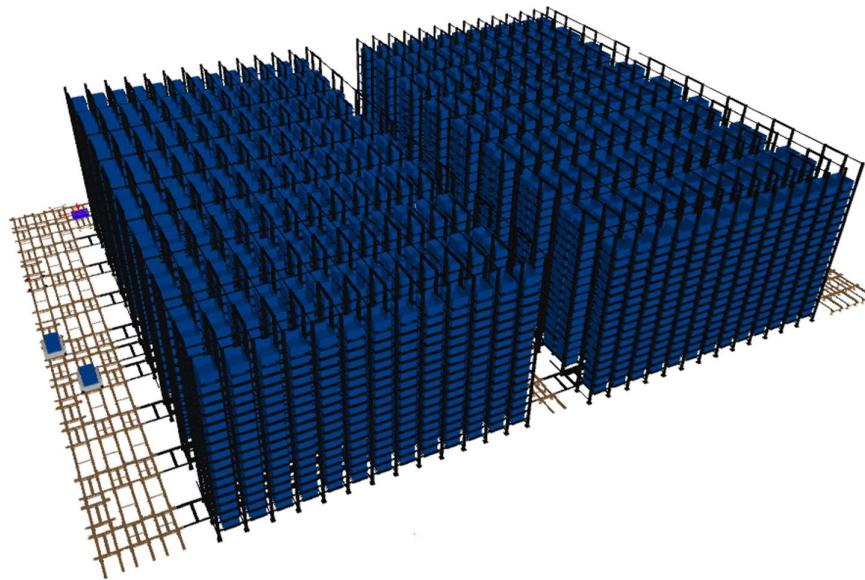
Products are stored and moved in specialized bins or totes designed to be handled by NEO system. Each bin can be partitioned into 2/3/4/6/8 sub-sections for better product segregation.



#### 10.15. NEO Grid

NEO grid is the steel structure which stores all your goods. With carefully crafted racks and tracks, the grid provides easy access to bots for storing and retrieving bins, cartons or trays. Based on the urban city layouts, NEO grid combines interior tracks, highway tracks and superhighway tracks inside aisles for bot's movement between blocks to the grid and workstations.

When a NEObot picks up a NEO bin (which is waiting at the pick station), the system automatically assigns an appropriate rack inside the system, and NEOBots proceed to that rack position to store the chosen bin.



### 10.16. NEO Goods to Conveyor Station (GTC Stations)

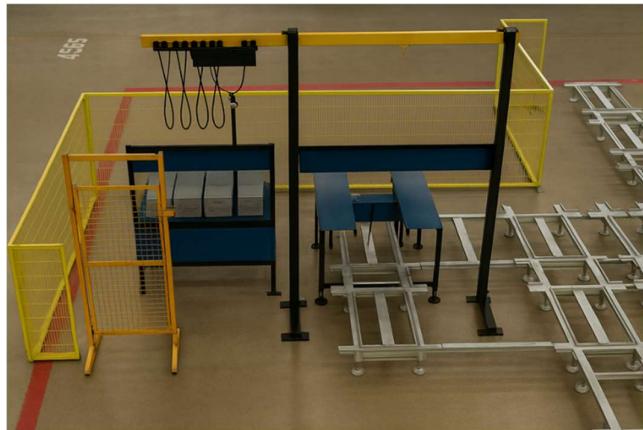
A customized goods-to-conveyor station has been integrated into this system, which includes a provision for a bi-directional conveyor. The operator at the station will create totes and place them on the upper conveyor. These totes will then automatically merge onto the highway conveyor.



### 10.17. NEO Charging Station

The NEO battery charging and Swapping Area is a designated zone within the automated storage and retrieval system (ASRS) where the batteries used by bots are monitored, swapped, and recharged. NEO bots used for high-speed retrieval and storage of totes or cartons—are electrically powered and rely on rechargeable batteries for uninterrupted operation.

In this area, depleted batteries are removed from the shuttles and fully charged batteries are installed, ensuring that the shuttles can return to operation with minimal downtime.



## 11. Proposed System Technical Details

### 1.1. Mechanical Equipment

S. No	Component	Value	UOM
1	Powered Roller Accumulation Conveyor	157.3	meters
2	Bi-Directional Roller Conveyor	25.76	meters
3	Gravity Roller Conveyor	24.24	meters
4	30 degree roller merge	9	sets
5	30 Deg Roller Turn	1	sets
6	60 Deg Roller Turn	8	sets
7	Automatic Print and Apply System	2	sets
8	Side Aligning Conveyor	3	sets
9	Side Barcode Scanners	10	sets
10	Weighing Conveyor	2	sets
11	Automatic Strapping Machine	2	sets
12	Telescopic belt Conveyor	6	sets
13	Automatic Tote Closure System	2	sets
14	Pop-Up Divert units	44	sets
15	Swedi Units	8	sets
16	Robotic Arm	1	sets
17	PTL Racks Bin Type (Pigeonhole)	216	sets
18	PTL Modules	248	sets
19	PTL Control Box	12	sets
20	NEO Bins (410mm Height)	3140	sets
21	NEO Bins (310mm Height)	3162	sets
22	NEO bots	28	sets
23	Goods to Conveyor Stations	8	sets

## 1.2. Electrical Equipment

Electricals			
1	1	<b>Consists of</b> <ul style="list-style-type: none"> <li>Main Power Distribution panel</li> <li>Main Control Panel</li> <li>Feedline Control Panels</li> <li>Network Switches</li> <li>Field Cabling</li> </ul>	Included

## 1.3. Control System

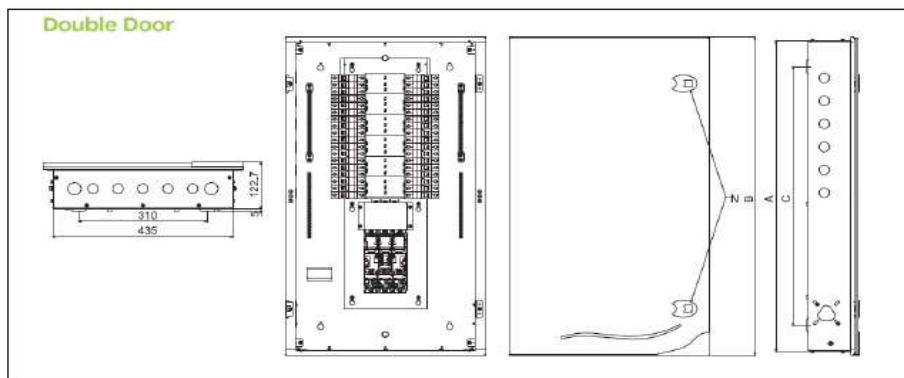
Components			
1	1	<b>Consists of</b> <ul style="list-style-type: none"> <li>Siemen's PLC based Control System with SCADA</li> <li>Industrial Switch</li> </ul>	1 Nos. As per requirement

## 12. Electrical System

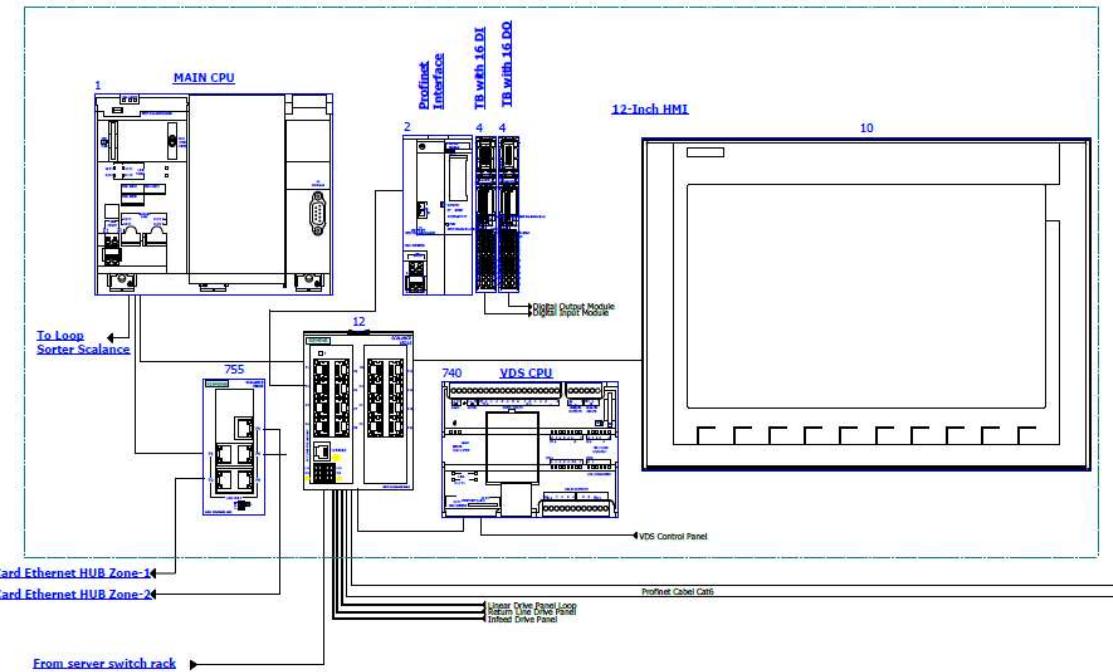
Main power supply will supply Falcon's PDP (Power Distribution Panels) electrical cabinets. PDP cabinets supply the entire system via secondary cabinets:

- Main Control Cabinet
- Induct Control Panels
- Remote Cabinets for Sorter I/O
- Scanner Control cabinets

### 12.1. Reference Picture of Power Distribution Panel



## 12.2. Main Control Panel (Reference)



### Engines

Three-phase alternating current motors (Induction) will be used through a frequency converter. The engines will be coupled with a converter to improve consumption and reduce the carbon footprint. All motors will have appropriate IP ratings

### Sensors

The sensors will be supplied, standardized by type, with connector, with a cable length suitable for easy extraction, suitably protected from possible impacts.

### Control command

The proposed solution is based on SIEMENS Programmable Logic Controller technology (PLC) platform. The entire system will be logically divided into Zones (Sorter/ Feed Line/ Loop), each managed by a PLC. The planned primary communication protocol is going to be Profinet.

### Conveyor interface

The frequency converter of each conveyor allows the acquisition of the signals of the sensors/actuators/GIOs associated with it (e.g. conveyor end detection photocells, blockage detection photocells). Each frequency converter will be connected in series by means of the Profinet field bus.

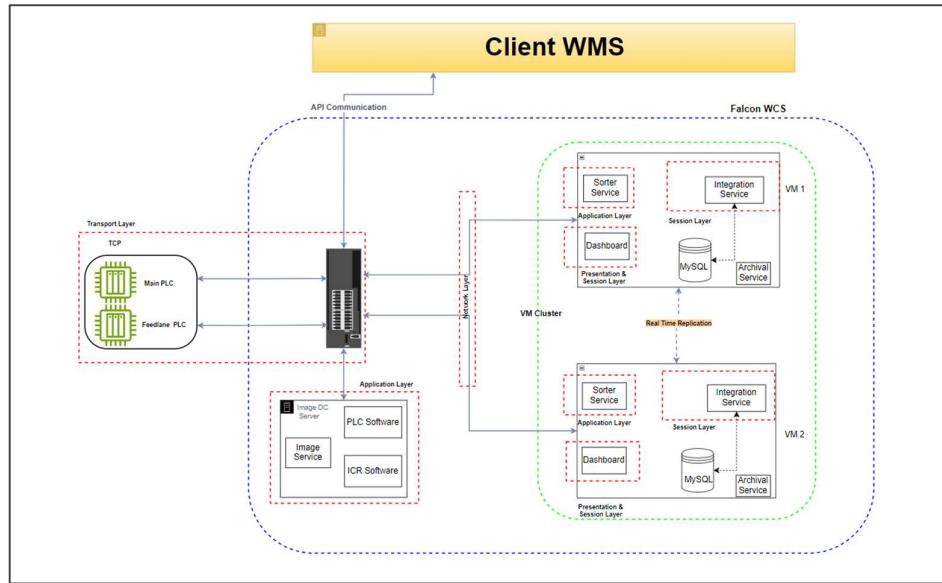
## 13. Falcon's WCS CONTROLIT

Falcon WCS (Warehouse Control System) is an in-house developed IT solution by Falcon Autotech, serving as the brain behind the company's sortation solutions. It manages the real-time movement of goods and data across the system, ensuring efficient operations in high-throughput warehouses. Falcon WCS integrates seamlessly with Warehouse Management Systems (WMS), Transport Management Systems (TMS), and other external applications via APIs to enhance operational efficiency.

### 13.1. System Architecture

#### High-Level Design (HLD) Overview

The Falcon WCS integrates with external systems like the Warehouse Management System (WMS) and Transport Management System (TMS). Communication occurs via **APIs/WSDL/MQ Communication Protocol etc.** ensuring smooth data flow for order management, shipment tracking, and other critical operations.



#### Key Components:

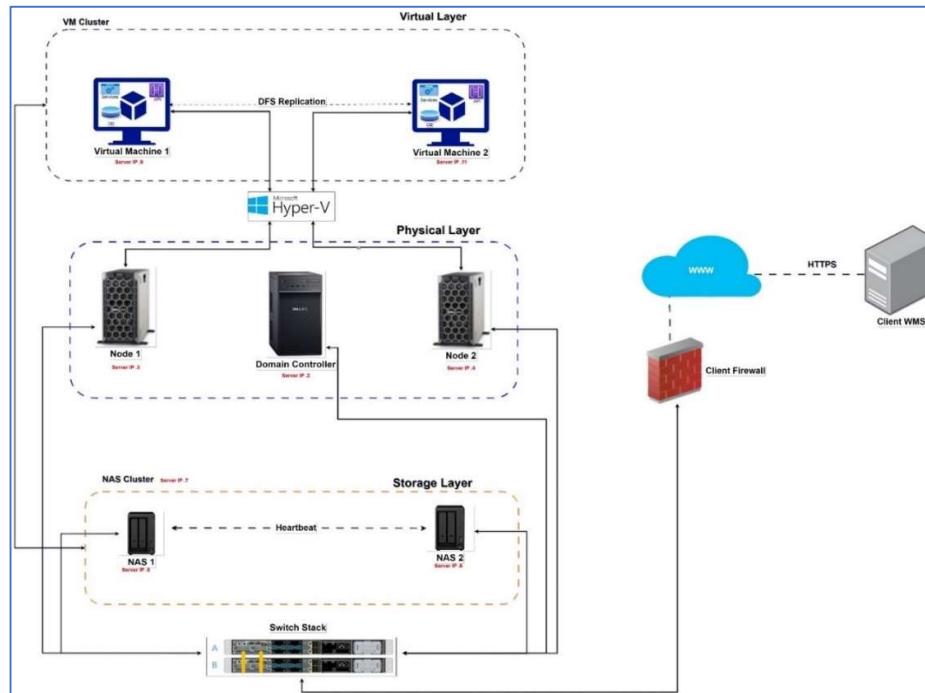
- **Presentation and Session Layer:**
  - MySQL Database: Stores operational data, shipment details, and sortation instructions.
  - Sorter Services: Responsible for managing sorting logic and directing parcels to appropriate destinations.
  - Dashboard: Provides a user interface for real-time monitoring of warehouse operations and performance metrics.

- Integration Services: Handles communication with external systems (e.g., WMS, TMS) and ensures data consistency across platforms.
- **Application Layer:**
  - Image Services: Processes and manages images captured during the sortation process.
  - ICR Software: Utilizes Image Character Recognition to read parcel labels and identify shipment information.
  - PLC Software: Interfaces with Programmable Logic Controllers to manage the physical movement of parcels and control sortation equipment.
- **Transport Layer:**
  - Sorter PLCs: Receive commands from the session layer (Sorter Services) and execute sorting operations based on real-time data.
- **System Communication:**

All layers are connected via a Stacked Switch, which provides internet and intranet connectivity. Communication between the sortation system and external systems for results or shipment data occurs through this switch.

## 13.2. High Availability Architecture

The Falcon WCS architecture ensures uninterrupted operations using a **High Availability (HA) Server setup**. The system is designed to handle both planned and unplanned downtime, providing robust mechanisms for failover, replication, and data redundancy.



## Key Components and Features of the High Availability Architecture:

### 1. Stacked Switch:

- Centralizes data exchange between **NAS**, **Nodes**, **Domain Controller (DC)**, and peripherals.
- Analyses packet headers to reduce unnecessary data transmission, enhancing LAN efficiency.

### 2. Domain Controller:

- **Heartbeat Monitoring:** Tracks the status of nodes and initiates VM failover when necessary.
- **Image Hosting:** Stores and manages images received from the ICR (Image Character Recognition).

### 3. NAS (Network Attached Storage):

- Centralized data storage providing access to connected devices and Virtual Machines.
- **Redundancy:** Two NAS boxes with mirrored drives ensure data protection and availability, offering a failsafe against hardware failure.

### 4. Node:

- **Hyper Terminals:** Nodes host and manage Virtual Machines (VMs) to run the warehouse control systems and related applications.
- **Clustering:** Nodes are clustered using **Microsoft Windows Cluster** to enable failover protection, ensuring continuous operation even in case of hardware failure.

### 5. Virtual Machine & InnoDB Cluster:

- **Primary VM:** Hosts Falcon WCS services, while a secondary backup on the node ensures failover through **Network Load Balancing (NLB)**.
- **InnoDB Cluster:** Ensures data replication using a **Master-Slave-Slave** setup for MySQL databases, maintaining consistency and availability.

### 6. NAS Cluster:

- **Unified File System:** NAS nodes share files across the cluster, ensuring no data loss during failover or disaster recovery.
- **Backup NAS:** Provides redundancy by replicating data between two NAS boxes, further safeguarding against failures.

### Disaster Handling:

- **Recovery Time Objective (RTO) & Data Loss Objective (RPO):**
  - **VM Cluster Failure:** RTO = 1 hour; RPO = 1 hour.
  - **Node Failure:** No impact with a single failure; RTO = 4 hours if both nodes fail.
  - **NAS Failure:** Backup NAS available with no downtime, ensuring continued operation.

## 13.3. WCS User Interface

### Overview

The Falcon WCS features a robust, user-friendly **Dashboard** that provides real-time visibility into warehouse and sortation operations. The Dashboard serves as the primary interface for monitoring key system metrics, tracking performance, and ensuring smooth operations.

### Dashboard Overview

The WCS Dashboard offers real-time data visualization, helping warehouse operators and IT teams make data-driven decisions. Users can monitor system health, performance, and detect anomalies through an intuitive graphical interface.

### Key Features of the Dashboard:

1. **System Health Monitoring:** Displays metrics such as CPU utilization, memory usage, disk performance, and system load across the infrastructure.
2. **Real-Time Sortation Monitoring:** Shows the real-time movement of parcels within the sortation system, including chute assignments and shipment statuses.
3. **Error Reporting:** Notifies users of system errors, network disruptions, and potential failures in real-time, allowing for quick resolution and minimal downtime.
4. **Performance Metrics:** Provides detailed reports on sortation throughput, parcel handling times, and system efficiency to ensure that warehouse targets are met.
5. **User Role Management:** The dashboard allows different levels of access based on user roles, ensuring that the right personnel can view or manage the system as needed.

In the context of this IT dashboard, the following user interactive screens are provided

- **Dashboard (Home Screen):** Provides an overview of important metrics, data visualizations, and summary information related to the IT system or processes.



Figure 1

### Dashboard

- Live Bags:** Displays real-time information and status updates regarding bags or parcels currently in transit or being processed.



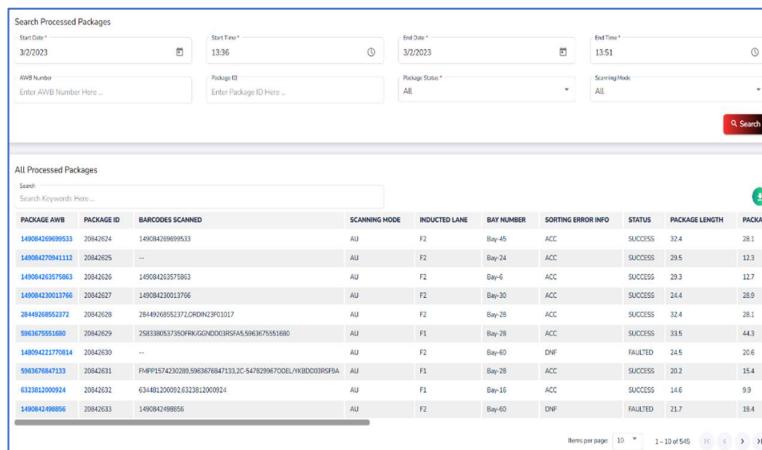
Figure 2 Live Bags

- Bay Status:** Offers insights into the status and availability of different processing bays or areas within the system.

Bay Status				
Search Search Keywords Here ...				
BAY ID	BAY STATUS	BAY TYPE	BAGGING MODE	SHIPMENTS SORTED IN BAY
Bay-1	ACTIVE	REGULAR	DIRECT	0
Bay-2	ACTIVE	REGULAR	DIRECT	0
Bay-3	ACTIVE	REGULAR	DIRECT	0
Bay-4	ACTIVE	REGULAR	DIRECT	0
Bay-5	ACTIVE	REGULAR	PTL	19
Bay-6	ACTIVE	REGULAR	DIRECT	0
Bay-7	ACTIVE	REGULAR	PTL	27
Bay-8	ACTIVE	REGULAR	PTL	7
Bay-9	ACTIVE	REGULAR	PTL	4
Bay-10	ACTIVE	UNMAPPED	DIRECT	0

Figure 3 Bay Status

- Processed Packages:** Shows details and statistics related to packages or items that have been successfully processed or handled by the system.



The screenshot shows a search interface at the top with fields for Start Date (3/2/2023), End Date (3/2/2023), Start Time (13:36), End Time (13:51), AWB Number (Enter AWB Number Here...), Package ID (Enter Package ID Here...), Package Status (All), and Scanning Mode (All). A red 'Search' button is on the right. Below is a table titled 'All Processed Packages' with columns: PACKAGE AWB, PACKAGE ID, BARCODES SCANNED, SCANNING MODE, INDUCTED LANE, BAY NUMBER, SORTING ERROR INFO, STATUS, PACKAGE LENGTH, and PACKAGE. The table lists 14 rows of data, each with a small green circular icon in the status column.

PACKAGE AWB	PACKAGE ID	BARCODES SCANNED	SCANNING MODE	INDUCTED LANE	BAY NUMBER	SORTING ERROR INFO	STATUS	PACKAGE LENGTH	PACKAGE
140084289699533	20842624	149084289699533	AU	F2	Bay-45	ACC	SUCCESS	32.4	28.1
140084270411113	20842625	--	AU	F2	Bay-24	ACC	SUCCESS	29.5	12.3
140084285579863	20842626	149084285579863	AU	F2	Bay-6	ACC	SUCCESS	29.3	12.7
140084230013766	20842627	149084230013766	AU	F2	Bay-30	ACC	SUCCESS	24.4	28.9
2844020955327	20842628	2844020955327.ZCRDNZ1P0127	AU	F2	Bay-28	ACC	SUCCESS	32.4	28.1
5093675551880	20842629	2591380537850494.GGAD003RSA5.5093675551880	AU	F1	Bay-29	ACC	SUCCESS	33.5	44.3
140084223770014	20842630	--	AU	F2	Bay-40	DNF	FAULTED	24.5	20.6
5093670471333	20842631	FMP1574230289.5963676847133.2C-54782967Q0EL/YK3D0030SF9A	AU	F1	Bay-28	ACC	SUCCESS	20.2	15.4
62238122000924	20842632	63440122000924.31238122000924	AU	F1	Bay-16	ACC	SUCCESS	14.6	9.9
1400842498856	20842633	1490842498856	AU	F2	Bay-40	DNF	FAULTED	21.7	18.4

Items per page: 10 | 1 - 10 of 545 | < < > >

**Figure 4 Processed Package**

- Configuration Setting:** Enables users to configure and customize various settings and parameters within the IT system or dashboard.



The screenshot shows a header with tabs: NDC Management (selected), Config Settings, RTVC Mode, and Regen Pattern. Below is a 'Check NDC Code' section with an input field 'NDC Code' and a 'Check NDC Code' button. To the right is an 'Upload NDC' section with a 'Select a file to upload or drag and drop it here' input area and a 'Sample Test' and 'Upload' button below it.

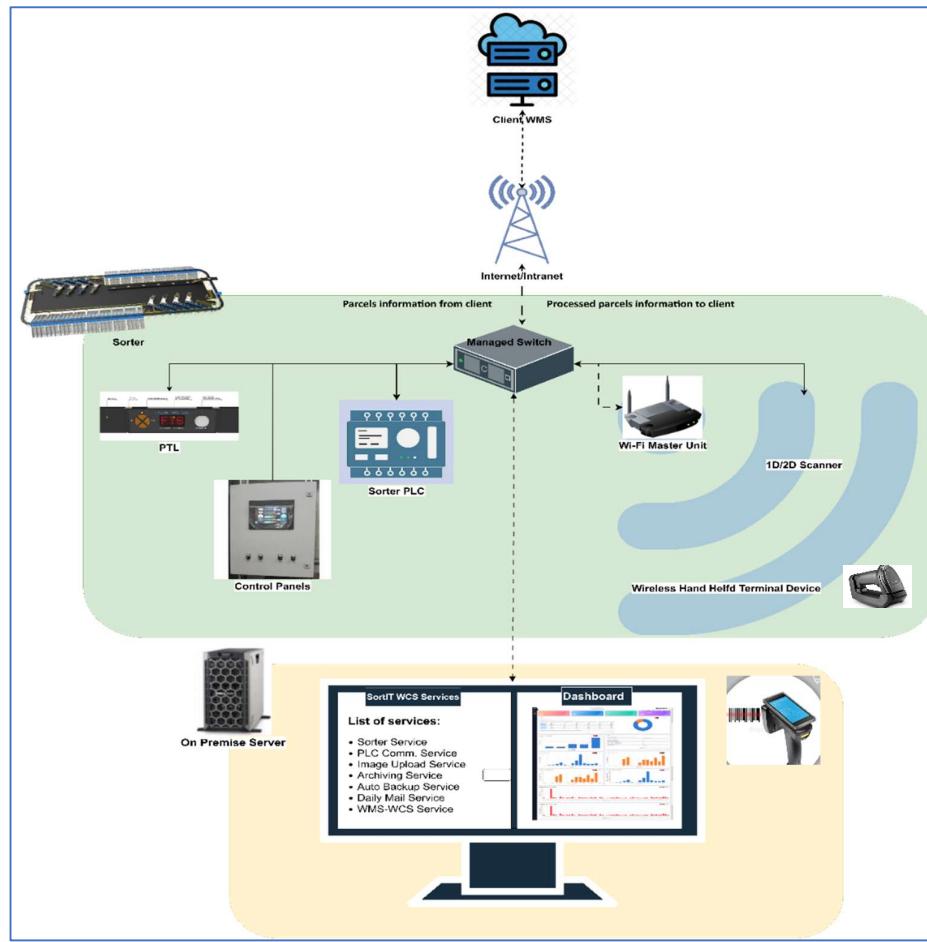
**Figure 5 Configuration Settings**

- Report & Analysis:** Allows users to generate and access comprehensive reports, analytics, and insights based on the data collected by the IT dashboard.
- Rejection Bay Mapping:** Provides functionality to map and manage rejection bays or areas where packages are deemed unsuitable for processing.
- Alarms:** Displays alerts, notifications, or alarms related to system events, errors, or anomalies that require attention or investigation.
- Calibration Settings:** Allows users to adjust and calibrate system settings, parameters, or sensors to ensure accurate and reliable performance.
- Operator Management:** Offers features and tools to manage and monitor the operators or personnel responsible for operating the IT system.
- User Management:** Provides functionality to manage user accounts, permissions, roles, and access levels within the IT dashboard.
- User Guide:** The "User Guide" page offers comprehensive documentation and instructions on how to use the IT dashboard effectively. It serves as a reference guide for users.

## 13.4. Communication Architecture

### Overview

Falcon WCS operates within a highly interconnected system, ensuring seamless communication between the WCS server, on-premises devices (such as Sorter PLCs, PTL devices, 1D scanners, and HHT devices), and client systems. This communication architecture facilitates real-time data exchange and operational control, optimizing sortation processes and warehouse efficiency.



### On-Premises Communication

#### Sorter PLC Devices:

- **Protocol:** Falcon WCS communicates with Sorter PLCs using either the **Siemens S7** protocol or the **Omron communication** protocol.
- **Functionality:** The Sorter PLC devices receive sortation instructions from the WCS and execute the sorting process by directing parcels to the appropriate chute based on the system's real-time data.

#### PTL (Pick-to-Light) Devices:

- **Protocol:** PTL devices communicate with Falcon WCS using the **TCP/IP protocol**.
- **Functionality:** The system sends commands to the PTL devices for guiding manual picking operations by lighting up indicators at the appropriate bins or shelves, improving operational accuracy and speed.

#### **1D Scanners:**

- **Protocol:** These barcode scanners also use the **TCP/IP protocol** to communicate with the WCS.
- **Functionality:** The scanners capture barcode data from the parcels, and this information is sent to the WCS for processing, such as determining sorting destinations.

#### **HHT (Handheld Terminal) Devices:**

- **Protocol:** The wireless **HHT devices** communicate with Falcon WCS over **Wi-Fi**.
- **Functionality:**
  - The HHT devices send scan input data to the server over Wi-Fi.
  - The WCS processes this data and sends the required output instructions back to the HHT device and associated PTL devices.
  - The HHT device executes these instructions, facilitating real-time decision-making and execution for operators.

#### **13.5. Client Communication**

- **API:** Falcon WCS can communicate processed data to client systems through **API calls**, allowing for seamless integration with external software.
- **MQ (Message Queuing):** Falcon WCS can also send data via **message queues**, ensuring reliable delivery of messages even during network downtime.
- **WSDL/XML:** For structured data exchanges, Falcon WCS supports **WSDL** and **XML** formats for client communication.
- **Other Protocols:** Additional methods for data transfer may include customized protocols depending on client requirements.

#### **Purpose:**

- The data sent to the client can include sortation results, system performance reports, and operational analytics, which can be used for further processing or reporting within external systems like **Warehouse Management Systems (WMS)** and **Transport Management Systems (TMS)**.

### 13.6. HAA Server Specifications (In Burjeel's Scope)

SN	Description	Qty
<b>20Core Config with 128 GB RAM in T440 and 64 GB RAM in T40</b>		
1	<b>Synology_storage_DS723+</b> 2.6 GHz AMD Ryzen R1600 Dual-Core, 2 x Gigabit Ethernet Ports, 2GB ECC DDR4 RAM, 2 x 3.5/2.5" Bays   2 x M.2 2280 Slots E10G22-T1-Mini 10GbE RJ-45 network upgrade module for compact Synology servers.	2
2	<b>Dell Tower Model T440</b> -PowerEdge T440 Xeon Gold 6148 2.4GHz/20C/27.5MB/150 W 16 DIMMS 4 x32GB RDIMM Up to 8 3.5" Hot Plug Hard Drives Tower Configuration 2 x 1.2TB 10K RPM SAS 12Gbps 512n 2.5in Hot-plug Hard Drive PERC H750 Adapter Full Height 8GB Cache Dual Hot-plug PS495W iDRAC9Enterprise 3YR ProSupport Next Business Day Onsite/Dual Port Lan	2
3	<b>Dell PowerEdge T40</b> Intel Xeon E-2224G Processor 3.5GHz 8M Cache,4C/4T,Turbo,71W,TPM, 4*16 GB RAM (4 DIMM), 2x1TB SATA 3.5" 7.2k rpm HDD (3 Bay), 1Gbe LOM ,DVD Writer, Onboard RAID 01, Inbuilt PSU Standard (Max 1), 3 Year Onsite NBD,480 GB SSD,1 Gbe Dual Lan Card Extra	1
4	Windows Server 2019	3
5	Monitor	1
6	KVM Switch	1
7	Mouse	1
8	Keyboard	1
9	Lan Cable	10
10	Power Cable	8
11	VGA Cable	1
12	42 AC Server Rack	1
13	Net-gear 24 Port Giga Switch	2
14	2 TB SSD Micron	4
15	DP to VGA Convertor Cadyce Brand	1

#### Below pointers to be taken care by Burjeel for Servers-

- Burjeel should provide servers with the server operating system (OS) pre-installed (Windows Server 2019/2022).
- For optimal performance and reliability, we strongly recommend setting up Virtual Machines (VMs) over reputed VM software's like Hyper-V/VMWare etc. This will enable automatic failover, ensuring high availability and minimizing downtime in case of any issues with the primary server.
- Detailed architecture is mentioned in Server Architecture Document  
By providing a server with the OS and VMs configured, the deployment process will be more seamless, and Falcon team can focus on deploying WCS within minimal timelines.

## 14. Falcon's Visual Inspection System (SCADA)

SCADA stands for Supervisory Control and Data Acquisition. It is a system of hardware and software components that allows for remote monitoring, control, and data acquisition of industrial processes or facilities.

The Visualization system provided by FALCON (or SCADA) allows the monitoring and control of the different systems delivered for the Burjeel Dubai Hub. This SCADA system receives from each monitored sub-system all information on their operating status in real time.

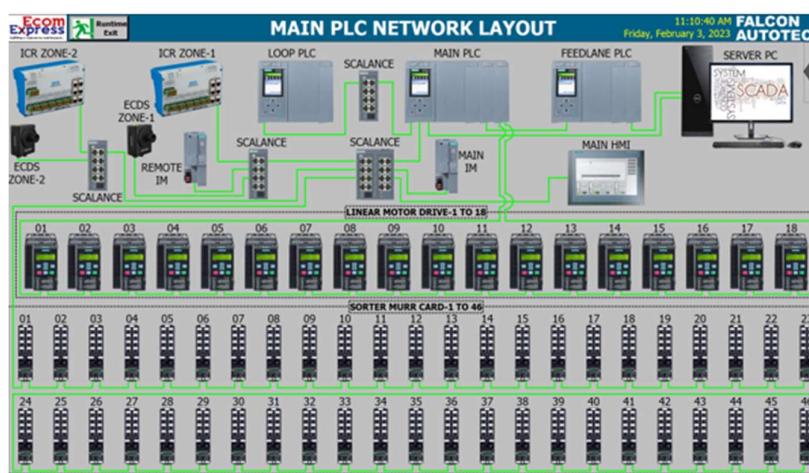
At the system monitoring level, the functions performed are:

- Field data acquisition.
- Animated visualization of equipment.
- Representation of the operating mode of the system (nominal, contingency, etc.).
- Alarm management.
- Alarm history management.
- Diagnostic help.
- Failure detection.
- Equipment control.
- Statistics on equipment operation.
- Historical Statistical Report.
- Recording and archiving.
- Safety operator interface.

### 14.1. Field Data Acquisition

The field data acquisition function is performed by the SCADA system connected to the sorters' PLCs.

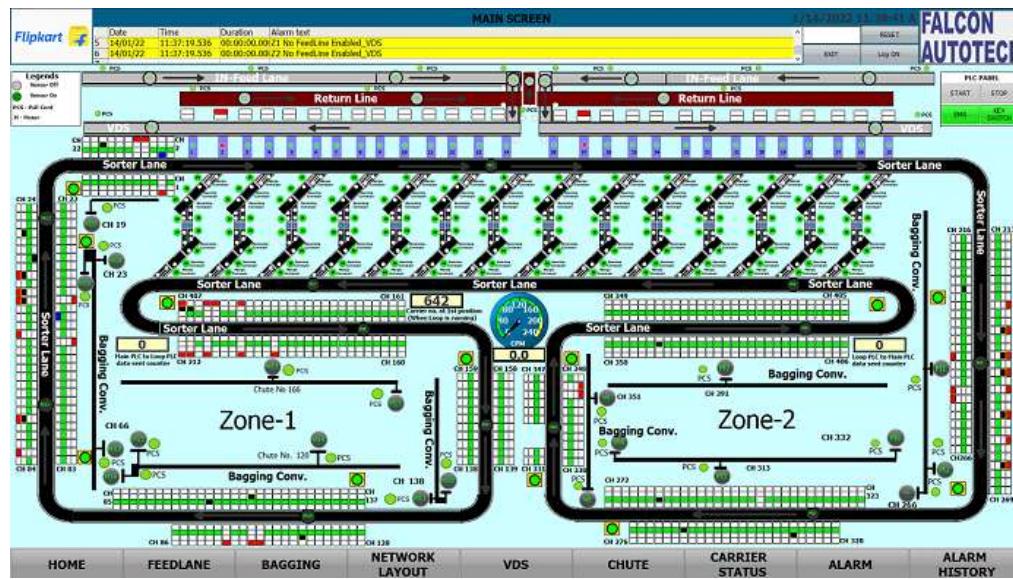
The communication with the PLCs is done using equipped CPU cards that are able to manage the communication with the PLC on the Industrial Ethernet network, without overloading the server. The acquisition of signals from external systems is carried out via the PLC, using dry contacts.



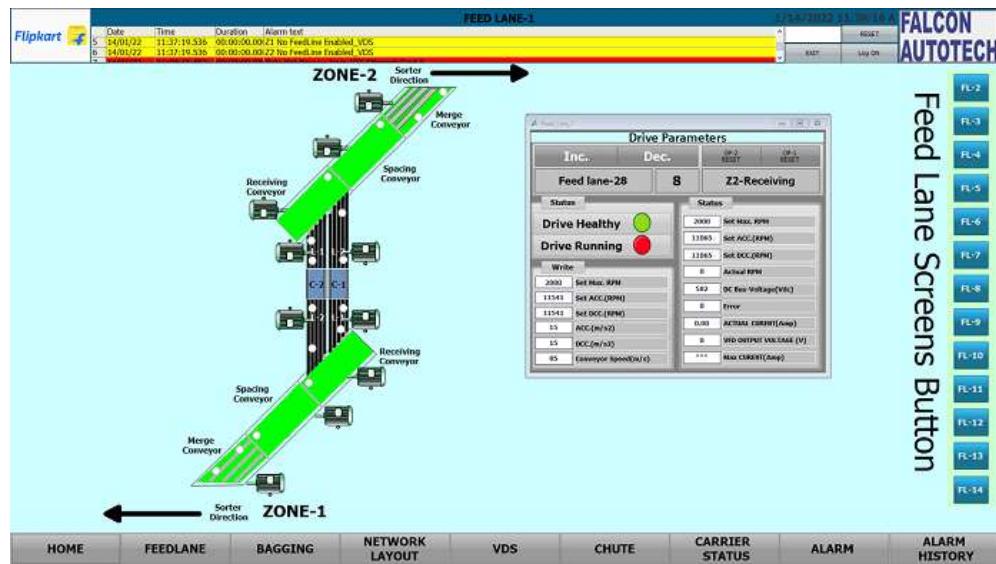
## 14.2. Animated system visualization

The animated view represents the dynamic graphical user interface that allows real-time monitoring of the controlled systems and the execution of their control procedures.

The various states of the digital signals are displayed on the screen by graphic symbols. All views are web based with responsive capabilities when required so that various devices can be used to display status and information on PC. The types of information that can be displayed on each type of device will be discussed during the design phase of the project.



Example of Synoptic View



### 14.3. Alarm management

The alarm pages display a series of information to identify the nature of the alarm or event, the elements involved and the time.

The alarm management includes:

- The Alarm name.
- The date on which the above-mentioned alarm was activated.
- The moment the alarm goes off.
- The date on which the alarm is activated again.
- The moment the alarm is activated again.
- The sub-system that activated the alarm.
- The area where the alarm was triggered.
- The name of the beacon that activated the alarm.
- The alarm state.
- The alarm value.
- A complete alarm description.

The historic data of each alarm is stored in the SCADA database. This type of fault detected includes:

- ✓ Sensors.
- ✓ Drive Fault.
- ✓ Lack of monitored equipment.
- ✓ Etc.

11:09:39 AM FALCON  
Friday, February 3, 2023 AUTOTECH

ALARMS					
Alarm Class	No.	Time	Date	Status	Alarm Name
BAG SORTER ALARM	3212	11:07:34 AM	2/3/2023	I	BAG SORTER-1 STATION1 IS NO SOCKET ERROR...
BAG SORTER ALARM	3265	11:07:34 AM	2/3/2023	I	BAG SORTER-1 ANGULAR FL HAND SCANNER SOCKET ERROR--
FEEDLINE	1918	11:07:43 AM	2/3/2023	I	Feedline Stop Due to Power Save Mode
FEEDLINE	1897	11:07:43 AM	2/3/2023	I	FL CKT TCP Error
FEEDLINE	1898	11:07:43 AM	2/3/2023	I	FL TCP_Disconnect_Error
FEEDLINE	1672	11:07:43 AM	2/3/2023	I	Feedline Stop Due to Power Save Mode
FEEDLINE	1626	11:07:43 AM	2/3/2023	I	Key Switch Off Error
FEEDLINE	1549	11:07:43 AM	2/3/2023	I	Feedline Stop Due to Power Save Mode
FEEDLINE	1528	11:07:43 AM	2/3/2023	I	FL CKT TCP_Error
FEEDLINE	1529	11:07:43 AM	2/3/2023	I	FL TCP_Disconnect_Error
FEEDLINE	1426	11:07:43 AM	2/3/2023	I	Feedline Stop Due to Power Save Mode
FEEDLINE	1405	11:07:43 AM	2/3/2023	I	FL CKT TCP_Error
FEEDLINE	1406	11:07:43 AM	2/3/2023	I	FL TCP_Disconnect_Error
FEEDLINE	1303	11:07:43 AM	2/3/2023	I	Feedline Stop Due to Power Save Mode
FEEDLINE	1180	11:07:43 AM	2/3/2023	I	Feedline Stop Due to Power Save Mode
FEEDLINE	1134	11:07:43 AM	2/3/2023	I	Key Switch Off Error
BAGGING ALARM	3829	11:07:24 AM	2/3/2023	I	Bagging Conveyor_MurCardNode 101 Error _Zone2...

Sample Alarm History Screen

## 15. Key Components Make

Items	Make
<b>Belts</b>	Forbo/ Dero/ Habasit
<b>Rollers</b>	Falcon
<b>Barcode Scanners</b>	SICK/ Cognex/ Similar
<b>Weighing Scales</b>	Bizerba/ Mettler Toledo
<b>Encoders</b>	SICK
<b>Sensors</b>	Sick/Leuze/ P&F
<b>PLC</b>	Siemens
<b>Control Panels</b>	Rittal/ BCH
<b>VFDs</b>	Siemens/Lenze/ AB/ Omron
<b>Cables</b>	LAPP/ Equivalent
<b>Switch Gear</b>	Schenider/Equivalent
<b>Bearings</b>	NTN/SKF
<b>HMs</b>	Siemens

## 16. Principle of Safety

E-stops, pull cords and safety fencing will be provided in the system as per Falcon Standards.

### a. E-Stops



### b. Pull Cords Switch-



### c. Safety fencing-



## **17. Infrastructure**

### **a) Fire Protection-**

Falcon's scope does not cover the design or provision of fire protection infrastructure, utilities, or related services. It is expected that the customer's sprinkler contractor will design and supply the in-rack sprinkler systems, including connectors and mounting brackets. These designs should be submitted to Falcon for review during the engineering phase.

Falcon will work in coordination with the chosen sprinkler supplier to determine the appropriate locations for the sprinklers and brackets. Modifications may be required to meet local fire safety regulations, which could influence storage capacity, timelines, and costs. Any additional sprinkler systems that might affect the overall design must also undergo review.

### **b) Power Supply-**

The Customer must provide temporary power for installation and permanent power for commissioning. Protected multi-gang power points for workstations and peripherals will be supplied by the Customer, with planning for their locations done with the operations and IT teams.

### **c) Floor Requirements-**

The Customer must provide flooring with appropriate loading strength and space at the site. Falcon assumes that the floor slab will not contain corrosive materials that could affect standard fixings.

### **d) Estimated Floor Load-**

Estimated floor loads, including distributed and point loads, will be provided during the detailed engineering phase of the project.

### **e) Staging, Laydown and Assembly Area-**

The Customer is required to provide sufficient space on the same floor, adjacent to the installation site, for staging, storage, and equipment assembly. If such space is unavailable, offsite locations or areas on different floors may be utilized; however, any related costs, including additional handling or transportation, will be the Customer's responsibility. This may also result in adjustments to the project timeline. Falcon will specify the necessary requirements for these areas during the design phase as part of overall project planning and coordination.

### **f) Site Access and Unloading-**

The Customer is required to allocate sufficient on-site space for parking and staging shipping containers to facilitate Falcon's delivery schedule.

Additionally, the Customer is responsible for ensuring proper access to the building for equipment unloading, including providing enough functional dock levellers on all floors during installation. It is expected that access to the site and installation areas will remain unobstructed and available around the clock, as needed, to support project operations.

### **g) Lightning-**

All lighting is excluded from Falcon's scope of supply and must be provided by the Customer or their contractor. This includes lighting for service areas, operational areas, and beneath platforms and walkways.

## 18. Program Organisation

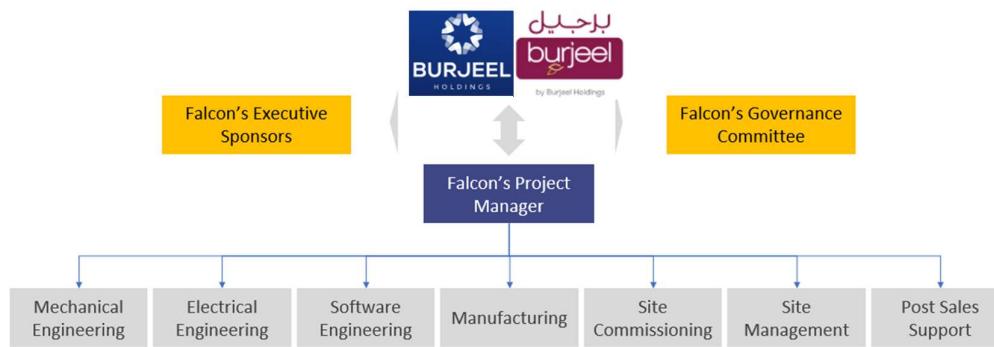
### a) Project Management

For this program, proposed approach covers the following aspects:

1. Creation and monitoring of the project plan.
2. Weekly/Fortnightly Meeting Burjeel to share the Project Status.
3. Scheduling resource management.
4. Management of risks and opportunities.
5. Management of the list of anomalies or reservations.

### b) Project Team

Team of 3 to 4 member from Projects team will co-ordinate on regular basis with Burjeel and Internal stakeholders for smooth execution of the project.



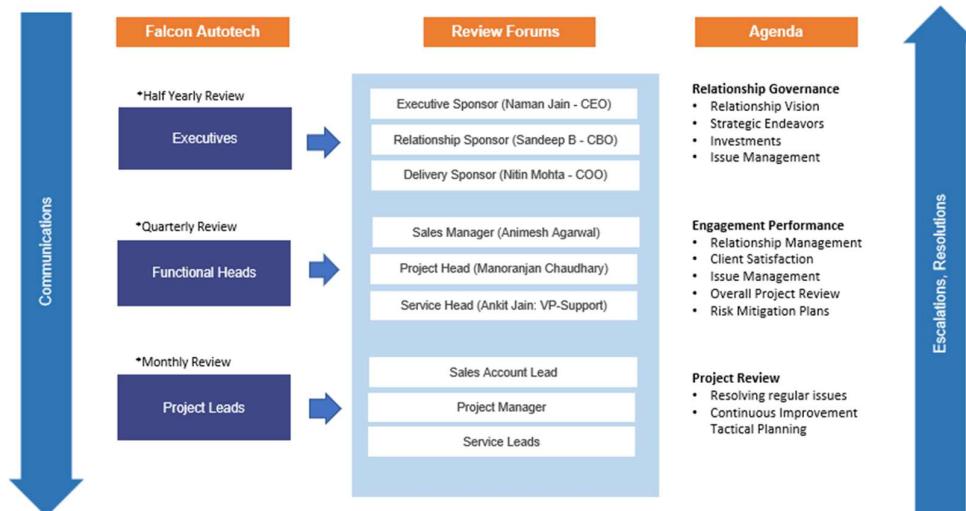
*Falcon Project Manager is overseen and supported by Executive Sponsors. The Project Manager leads a multi-disciplinary team of members from all Falcon departments necessary to deliver the project, as shown in the diagram above.*

### c) Program and Account Management

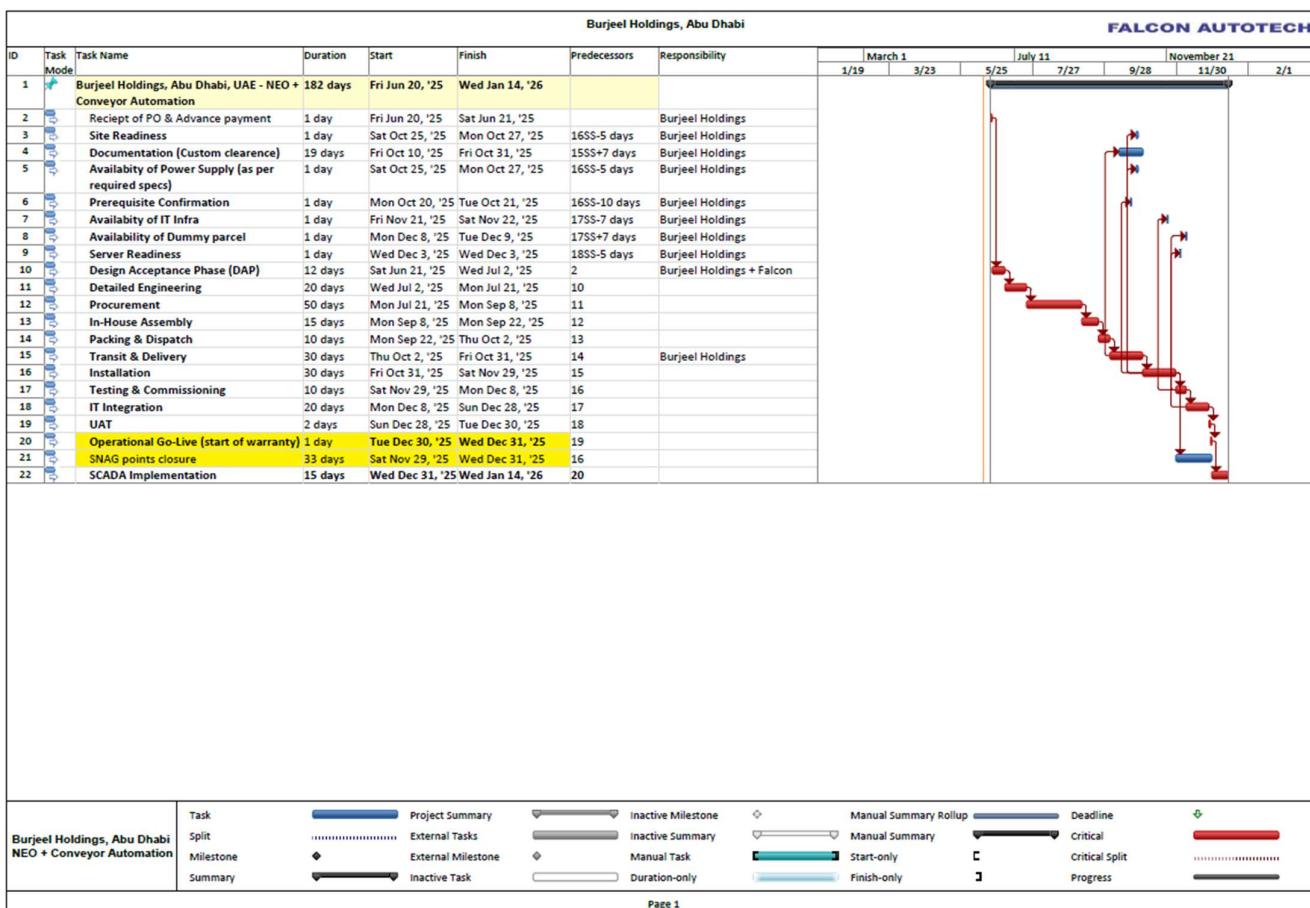
The Project will be closely monitored under Falcon's Governance model as structured below.

## Governance Model

*Building strong customer relationship foundations on trust, transparency & communication*



#### d) Program/ Project Schedule



\*Above plan is tentative, detailed plan will be shared post order confirmation. Plan prepared considering LOI by 20<sup>th</sup> of June'25 and Go-live by End of December'25.

## **19. Burjeel's Responsibility**

### **19.1. Burjeel Responsibilities During the Assembly and Commissioning Phase**

- Provision of the site complex and office area facilities.
- Burjeel to provide HOPT/BOPT (Qty - 4 nos.), Aluminum Scaffolding with extended height of 4 meters (Qty - 4 no.) and A type Ladder (Qty - 4 nos.) for entire project duration.
- Burjeel to provide Hydra/Forklift (Qty - 1 no.) for approx. 35 days during installation phase (1 day = 10 hrs.)
- The possibility of authorizing access to the site and the execution of the installation works up to 7 days a week and 24 hours a day if deemed necessary and if requested by FALCON.
- Free provision, during the installation phase, of the power supply necessary for the installation activities (estimated at 20 kW).
- Provision, during the commissioning phase, of the power supply necessary for the operation of the shipmentsorting system free of charge at the date of FALCON need.
- Provision of the IT system functionality in accordance with the specification at the date of FALCON need.
- The customer is responsible for a safe working environment.
- The customer decides for the working area('s) to be protected against direct weather influences.
- The customer provides adequate lighting, heating, and ventilation to create a normal working environment.
- The cost of temporary storage that may be required (other than in the immediate vicinity of the installationsite) is not included in the scope of delivery of this quotation. This also applies to temporary storage that may be required because materials are ready for delivery (in accordance with the schedule) but cannot be delivered due to hold-ups on the customer's side.
- The customer is responsible for the demarcation of aisles and danger zones with floor paint.

### **19.2. Responsibilities of Burjeel During the Tests**

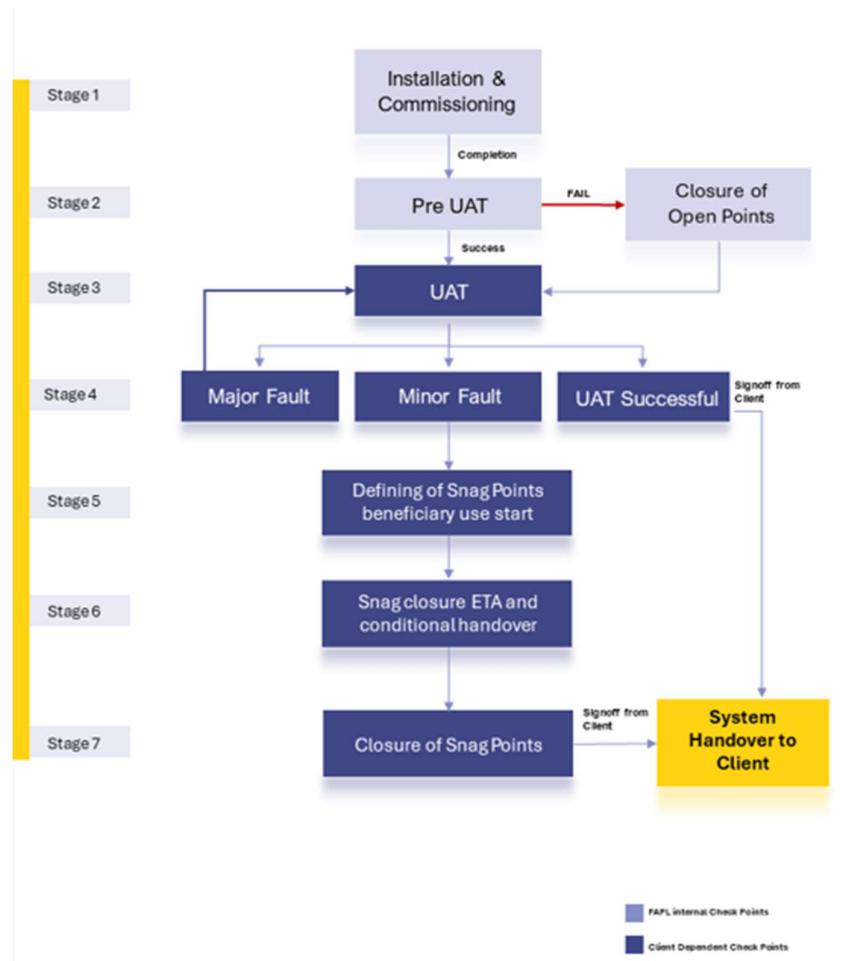
- Provision of the test loads and barcode labels required for the tests.
- Provision of personnel required for test activities (loading and unloading operations).
- Provision of the necessary information to sort the shipments correctly.
- Verify with Falcon the quality and conformity of the test loads (labels, cartons).
- Will need to provide the necessary staff to collect information on the tests and to verify and confirm testresults with Falcon.

### 19.3. Burjeel Responsibilities During the Training

- Free from their usual work, the employees participate in the training for the duration of the training.
- Provision of a list of participants for each available training course 3 days before the start of the course.
- Provision of a classroom equipped with a whiteboard, video projector, projection screen, and enough space for desks or tables and chairs for the trainer and trained staff.
- Check the prerequisites of the people who have to follow the training, e.g. the qualifications of the technical staff.
- The invitation of staff to attend the training courses will be at the expense of BURJEEL.

### 20. System Testing

The system handover will be following the shown below workflow. Each of the stages are defined in the document below.



## Installation and Commissioning

Completion of all the activities to get the system up and running.

### Pre-UAT

Pre-UAT (User Acceptance Testing) involves a series of preparatory steps and tests conducted before the formal UAT phase begins. This stage ensures that the system is ready for end-user testing and meets the necessary requirements and standards. Below are some key checks of Pre UAT:

- **Physical Verification:** Ensure all functional and non-functional requirements are clearly defined and understood. Verify that all the necessary specifications for the sorting system are documented.
- **Integration Testing:** Conduct integration tests to ensure all components (conveyors, scanners, sorters, control systems, etc.) work together seamlessly. Validate the interfaces between the sorting system and other warehouse management systems (WMS) and databases.
- **Performance Testing:** Test the system's performance with some dummy product to ensure it can handle the expected volume of parcels or items. This test also done to identify and rectify any performance bottlenecks or inefficiencies.
- **Functional Testing:** Execute test cases to verify that the system performs all required functions correctly. Include scenarios for different types of products, error handling, and edge cases.

By thoroughly conducting pre-UAT activities, Falcon team will ensure that the system is stable, efficient, and ready for the formal UAT phase, where end-users can validate its functionality and performance in a real-world scenario.

### UAT (User Acceptance Test)

User Acceptance Testing (UAT) for a Cross Belt Sorter System is the final phase in the implementation process where the end users test the system to ensure it meets their requirements and works as expected in a real-world scenario

Falcon will provide the UAT Plan to Client prior to the commencement of any tests. The UAT will include the following:

- Test prerequisites.
- Daily plan/schedule
- Personnel responsibilities
- Dashboard data and test loads required.
- Specific test procedures
- Expected test results.

#### 20.1. User Acceptance Test Parameters

Below are the parameters/test to be done at site during the UAT:

- Sorter Throughput Test
- Sorter Accuracy Test
- Barcode Reading Test

\*SOP for all tests will be shared during DAP stage. In case client require sample SOP for review, same will be shared during contract finalisation stage also.

**Note: In conducting this evaluation/UAT, Falcon team adhere to its Standard Operating Procedure**

### **Minor & Major Faults**

Any faults encountered during Testing will be categorized by Falcon as either Minor or Major faults as defined below.

- **Minor Faults** are defined as those affecting a limited area or single component that has no impact on the test. Minor Faults will be added to the System Snag point list and will not inhibit the continuation of testing.
- **Major Faults** are defined as those having impact that result in the inability to demonstrate the subject functionality. Major Faults may require re-starting of the test.

### **System Snag Point**

Once the UAT completed, all the minor faults will be considered as snag points. Falcon team will publish Snag Point List information to the client.

System Snag Point list information will include the following:

1. Issue.
2. Date identified.
3. Area and/or unit.
4. Category (mechanical, electrical, or software).
5. Remedy responsibility (responsible person[s] or organization[s]).
6. Target completion date.
7. Snag point completion verification and signoff.

Once the snag point list information's shared with client, client can start the beneficiary use of system and also Client needs to sign off on Start of System Warranty and conditional handover.

### **Practice for Snag Point Sign Off:**

1. Falcon personnel will maintain and distribute the System Sang List throughout UAT.
2. As each issue is corrected, Client will verify the resolution and provide sign-off for that issue on the System Snag Point List.

### **System Handover Letter**

After successful completion of Acceptance Testing or closure of all snags, Falcon will furnish Client a letter, which will address the following:

- The subject System has been installed and accepted by Client.
- The final payment amount that is required and the designated due date.

## **21. Training**

Training for the recently installed material handling system at Burjeel's facility is an integral part of the implementation process. Falcon employs a business-linked learning approach in the design, development, delivery, and evaluation of its training programs.

Falcon adheres to a well-defined process tailored to create learning content specific to Burjeel's installation and application of their systems.

### **21.1. Operations Training**

System Operations Training is provided to offer participants an understanding of their area from an operational perspective. Falcon targets critical operations in the assigned functional area, covering flow control, system operation, and control devices. Discussions also emphasize the impact of individual and area performance on upstream and downstream workers.

### **21.2. Maintenance Training**

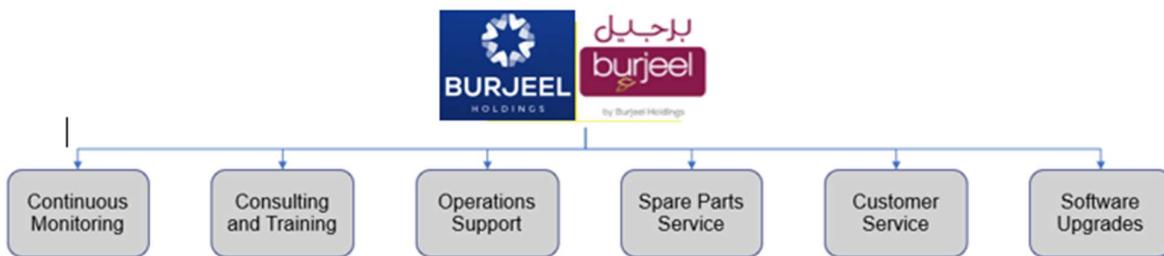
The Maintenance Training curriculum encompasses mechanical, electrical, and controls aspects of the installed system. Topics include safety, system construction and installation, system operation, maintenance and repair procedures, and technical documentation.

Falcon recommends assigning personnel responsible for system maintenance to work with the installation and commissioning crews during their final weeks on-site. Formal training courses for maintenance personnel will be conducted before system startup, featuring classroom lectures, audio-visual presentations, and hands-on demonstrations with the installed system. Site tours will be organized to highlight common operational issues affecting system uptime.

### **21.3. Information System Training**

Information System training covers the computer hardware and software aspects of the Automated Material Handling System.

## 22. Service Support



### Benefits of Falcon's Service and Support Plan:

- 24X7 Online Support from Falcon's global central team
- Critical Spares are supplied and retained on-site to ensure continuity and productivity
- Maintenance support from Falcon-trained partner technicians
- Proactive planning to minimise downtime with preventative maintenance and anticipation of future needs through ongoing operational assessments
- Optimise system uptime, continuity of throughput and production efficiency

- **Warranty**

The system will be covered under standard **1-year comprehensive warranty**.

- **Supply and management of spare parts.**

On completion of the DAP, when the configuration will be finalized a final and detailed list, which will be extended to include all spare and wear parts, will be presented to Burjeel. To maintain the required uptime spares will be maintained at site.

- **On Site Support**

Falcon proposes dedicated on- site team should be available at site covering all shifts if high uptime is required. Site team to be on Burjeel's Payroll and training will be provided by Falcon. If Burjeel requests, Falcon can provide On Site Support with its team at additional price.

- **Hotline Support**

The hotline service access is available 24 X 7. The main function is to dispatch the call to the proper qualified engineer for immediate answer. If the Falcon qualified engineer is not available, the call is transferred to a back-up qualified engineer and finally an answering machine. In the last case, the Burjeel personnel shall be contacted within the time frame described in the service level. The Falcon qualified engineer will support Burjeel maintenance personnel by using a remote access (via VPN) to the equipment/systems.

## **23. System Maintenance**

### **a) Daily Check-**

Detailed maintenance scheduled will be shared with Burjeel and daily checks to be performed by the Burjeel's site technicians.

### **b) Preventive Maintenance**

Regular preventative maintenance as per schedule will be conducted systematically throughout the system. Burjeel's Site technicians will manage all operational tasks and preventive maintenance for covered items, with additional assistance from Falcon trained local partner technicians.

### **c) Corrective Maintenance**

Corrective maintenance will be performed in conjunction with preventive maintenance activities. Any required corrective actions will be communicated to Burjeel for approval prior to execution, and scheduling will be coordinated accordingly. Charges will apply for any parts needed for corrective maintenance that are not covered by warranty.

## 24. Commercials

### 24.1. Price sheet for Falcon's Automation system

S. No	Components	Set	Price (USD)
1	NEO ASRS (Racks +Tracks +Bins +BOTs +Stations)	1	\$3,491,259
2	Conveyor Automation+ Diverters	1	
3	Put to Light System	1	
4	Software package + SCADA	1	
5	Project Management and Installation	1	
<b>Total (USD)</b>			<b>\$3,491,259</b>

### 24.2. Price for Onsite Spares Kit

S. No	Components	Set	Price (USD)
1	Onsite Spares Kit	1	\$142,770
<b>Total (USD)</b>			<b>\$142,770</b>

### 24.3. Optional price for Robotic Arm

S. No	Components	Set	Price (USD)
1	Robotic Arm at B2C station (optional)	1	\$73,171
<b>Total (USD)</b>			<b>\$73,171</b>

### 24.4. Optional price for 1-year extended warranty

S. No	Components	Set	Price (USD)
1	1-Year Extended Warranty (optional)	1	\$181,324
<b>Total (USD)</b>			<b>\$181,324</b>

The Total Price is to be understood.

- *Inco Terms- Ex-Works, India*
- *Freight- In Burjeel's Scope*
- *Taxes and Duties- In Burjeel's Scope*
- *Installation & Commissioning- Included*
- *Price is valid for 15 days from the date of proposal.*
- *Burjeel's branding and its associated equipment to be finalized along with Burjeel's marketing team and will be built on actuals.*

## **25. Warranty Period**

Falcon offers Comprehensive warranty for 1 year (Starts from the date of beneficiary use).

The warranty covers the following support:

- 24 X 7 Telephonic, Email and Remote Service Support when required.
- Regular Software updates and Bug Fixes.
- Supply of Mechanical and Electrical components in case of failure (excluding damages as mentioned in the Exclusion Clause)

The warranty does not apply to the replacement or repair of:

- Normal wear and tear.
- Consumables.
- Faulty articles continued:
  - Failure to comply with the manufacturer's recommendations (logistics documentation, Technical Information Note, retrofit document) and the rules of the trade.
  - Negligence or abnormal use of equipment.
  - Anomalies produced by an environment of use, storage or transport that does not comply with the specifications or recommendations of Falcon: packaging, temperature, hygrometry, sector, insulation, etc.
  - A defect due to a cause external to the supplies and services of Falcon.
- Equipment other than that is supplied by Falcon.
- Items that can be repaired exclusively by Falcon that have been repaired or attempted repairs other than those carried out by Falcon.
- Items that fail due to normal wear and tear of one or more of its components or whose tamper-evident seals (varnish, strip, etc.) have been broken or whose serial numbers have been removed or modified.

## **26. Exclusions**

The scope of supply includes all parts which are defined in the Supplier's quotation.

All other parts which are not defined in the Supplier's quotation do not belong to the Supplier's scope of supply and are excluded. The following parts are also excluded:

- **Server PC**
- **Selective Pallet Racking**
- **Forklifts**
- **Mobile Carts**
- **Construction Power**
- **Steel Works- If not specified**
- **Collection Bins**
- **Lightning**
- Building infrastructure; building structure, doors, fire exits, levelling devices, building extinguisher and fire alarm system, building heating and lighting system.
- Electrical power supply and wiring to the main control cabinets.
- UPS for Controls and Drives
- Network Cabling up to the Main Server Rack
- Intermediate wiring to parts which are to be supplied by the Purchaser/others.
- Emergency/Uninterruptable power supply
- Fire-alarm and fire protection devices.
- Traffic and route markings
- Unloading and Laydown Area
- Ram protection devices
- Cat walks, bridges, maintenance aisles and platforms
- Assembly tools like forklifts and hoisting machines
- All kind of network incl. Local Area Network (LAN/WLAN), exceeding the scope described in Scope of Supply
- Any Kind of Civil work
- Any adjustment of the Supplier's scope of supply to local rules and regulations
- X-Ray machines
- Roller cages/ Pallets
- **Simulation and 3D animation of the system.**
- Interface with other equipment not specified in this offer.
- Provision of facilities for the control room (furniture, air conditioning, heating, etc.).
- The supply and installation of fencing around the different corridors.
- Any item specifically indicated as not forming part of the subject matter of the Seller's supply in the offer documentation.