

**Sales Specification.**

**for**



**Supply of Parcel Handling Conveyors for Croydon.**

**GAVIN MATERIALS HANDLING LTD**

## About Us.

**Gavin Materials Handling (GMH Ltd.) offers an extensive range of bespoke materials handling solutions. Our systems managers, engineers and operatives have over forty years experience within the industry and have provided material handling solutions to a diverse range of customers including the electronics sector, warehousing and distribution, parcel handling, automotive industry, tyre manufacturing, food manufacturing and countless others.**

**From design concept to realisation GMH offers its customers the complete solution to their material handling needs and offers all of the following in-house capabilities;**

- **System design.**
- **Equipment manufacture.**
- **Control system design and manufacture.**
- **Mechanical and electrical installation.**
- **Software development.**
- **Full after sales service.**

**From the delivery of basic transportation conveyors to sortation systems capable of sorting at rates of 150 items per minute, GMH offers the complete turnkey solution.**

**Each customers material handling requirements can be very different. We offer an extensive product range that can satisfy the majority of customers requirements.**

**GMH Ltd strives to meet and exceed all of our customers expectations by providing the highest quality products and services with projects completed on time and offering exceptional value for money. Our organisation is committed to offering a professional but also personalised service to our customers and can always guarantee an established point of contact.**



**Heavy duty Belt Conveyor (Belt on Roller) for Parcel Sortation Hub running at 35m/min 70kg/metre capacity. In production since 2013.**



**Heavy duty Belt Conveyor (Belt on Deck) for Parcel Sortation Hub running at 25m/min 50kg/metre capacity. In service 24 hours a day 7 days a week in production since 2006.**



**Heavy duty Belt Conveyor (Belt on Deck) for takeaway from Tyre Trim Machine. One 35kg is launched from the machine every 45 seconds 24 hours a day 6 days a week, this has been in service since 2003.**



**Very Heavy duty Belt Conveyor (Belt on Deck) for takeaway of HOT tyres from presses fitted with a special heat resistant low friction belt 1000mm wide. In service since 1998 running six days a week 24 hours a day.**



**Heavy duty Belt Conveyor (Belt on Deck) being loaded cases of wine (see above photo) and general parcels (see photo below),in service since 2010 7 days a week.**



## **Project Implementation.**

**In order to satisfy your requirement for a parcel handling system for your hub in Southampton, GMH Ltd. has included to carry out the following;**

- **Carry out a detailed site survey.**
- **Prepare detailed mechanical layout drawings for customer approval.**
- **Prepare a detailed functional specification for customer approval.**
- **Prepare detailed electrical layout drawings.**
- **Prepare control panel schematics.**
- **Manufacture control panel.**
- **Manufacture, supply and install the conveyor system as shown on our drawing number GMH 9718A.**
- **Write all necessary PLC software.**
- **Deliver the new conveyors to site.**
- **Install the new conveyor system.**
- **Test and commission the new system.**
- **Provide twenty days production standby after final acceptance, this will be carried out by one engineer. We have included for six ten hour shifts per week.**
- **Provide a full documentation package on completion.**

## **Project Management.**

**The project will be managed by an office based project manager who will be responsible for the day to day management of the project and will be the main point of contact for the customer for the duration of the project.**

**The site installation will be supervised by a full time site supervisor who will report directly to our project manager.**

## **Site Installation.**

**GMH Ltd will assume responsibility for the role of principal contraction and will be responsible for CDM for the duration of the project. GMH Ltd will provide this service free of charge.**

**We have included to provide the following items of plant for the duration of the project.**

- **Three fork trucks.**
- **Eight scissor lifts.**

**All installation work will be carried out by time served tradesmen who are directly employed by GMH Ltd.**



## Amazon Logistics Product Handling Characteristics.

### Parcels to be handled.

	<i>Minimum</i>	<i>Maximum</i>
<i>Length (mm)</i>	100	1200
<i>Width (mm)</i>	100	800
<i>Height (mm)</i>	5	800
<i>Weight (Kg)</i>	0.5	25

### Typical parcels include

- Plastic bags
- ‘Jiffy’ envelopes
- Rigid Cartons
- Shoe type boxes
- Board Boxes
- Cartons – Reusable and single trip

## **Throughput rates.**

**The system will have the ability to sustain an operational throughput as follows;**

**Each Goods In *Finger* will be capable of a throughput of 3000 parcels per hour based on an average length parcel of 400mm and a 500mm window.**

**This is based on a product length as described earlier and ignores operator influences. Due to the fact that the system will be loaded manually by operators ultimately the performance of the system will be dictated by the performance of the operators loading the system.**

**Several factors beyond the control of GMH Ltd can create gaps in production and may have a significant effect on system productivity. Special attention should therefore be given to such factors as:**

*personnel breaks cause disruption to the uniform loading of the system*

*product availability e.g. efficient product movement*

*minimise non conveyables, for the best results parcels should have a rigid flat bottom*

*product length – must not exceed the sizes quoted in this specification*

*destination line availability*

*correct staffing and training*

## **Mechanical Equipment Description.**

**The majority of the mechanical equipment we have included to supply is manufactured in our UK based factory and is tried and proven over a number of years.**

**Our design has taken into consideration the parcel weights and we have assumed that all conveyors will be required to start and stop whilst fully loaded with product.**

### **Belt Conveyor.**

**All belt conveyors will be of heavy duty construction and will be capable of handling loads of 50kg per metre and will include the following standard features;**

- All belt conveyor side sections will be manufactured from 3.0mm mild steel and will be finished in BLUE to RAL 5017.**
- Side guards will manufactured from 3.0mm mild steel and will be 300mm high. The side guards will be finished in BLUE to RAL 5017.**
- There will be a total of FORTY TWO motors required for the belt conveyors. All motor drives supplied will be manufactured by SIEMENS with G110M variable speed drives with Profinet Interface and built in remote i/o.**
- All belt conveyor sections below 2000 mm will be supplied fully under guarded using pre galvanised mild steel mesh.**
- The four infeed belt conveyor lines will be supplied with 950mm wide belts with vulcanised joints.**
- The takeaway belt conveyor lines will be supplied with 1150mm wide belts with vulcanised joints.**

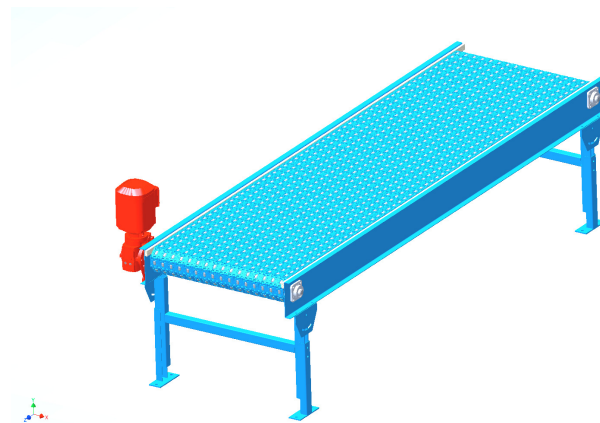
## **Interroll Belt Curve Type BC4312.**

- **Bend Angle 45° & 90°**
- **1010mm & 1210mm LW**
- **1000mm inside radius**
- **Belt twin ply polyester covered with Black PVC, structured surface Laced joint.**
- **Siemens G110m motor gearbox, 3/400/50, shaft mounted on the outside radius, the belt is positively driven on the outside radius by a side bow chain.**
- **Speed 0.42m/s.**
- **DOT – 4 off Clockwise & 4 off Anti Clockwise**
- **Conical end pulleys.**
- **Welded mild steel side frame, 260mm high.**
- **Mild steel side guides 300mm high both sides.**
- **Steel mesh underguarded.**
- **Support frame 800mm TOB.**
- **Side frame RAL9005**

## **Manual Sort Conveyor.**

**At the SECONDARY SORT POSITION there will be installed a Manual Sort Conveyor (MSC) manufactured by GMH Ltd.**

**The MSC has a state of the art roller top modular belt (RTB). The RTB is fitted with low friction rollers fitted at 90° to allow the sideways transfer of products with minimum effort. The MSC will be variable speed to allow Amazon to set the speed to suit the operation. If the products require sorting one or two associates will stand alongside the MSC to guide the products to the appropriate line any products going straight on will not require guiding by the associates.**



### **Operator Sort Platform.**

The sort platform consists of four operator positions each operator position will be equipped with its own access stairway and spring loaded gate.

The sort platform will have the following features:

- Free-standing Braced Mezzanine Floor Structure.
- Length 16,196mm
- Width 1000mm
- Height to topside 5,280mm
- Decking 38mm High-density Particle Board
- 2.no. Open Steel Utility Staircase Units with Mid-landing
- 5.no. Open Steel Utility Staircase Units with landing at 3750mm
- All columns fixed to the floor will be painted yellow.

### **Safeglide curves/chutes.**

Our proposal includes for SafeGlide spirals manufactured by Broadwater Moldings and as shown on General Assembly Drawings SQ1826-4B and SQ1826-5B.

The safeglide curves are manufactured from GRP and have been specified to the parcel dimensions as detailed in this specification.

### **Scanner/Camera support brackets.**

GMH Ltd will manufacture and install scanner/camera support brackets at each of the four induct stations.

## **Controls overview.**

### **Introduction.**

**In this chapter a general overview of the controls system is given in respect of the proposed electronic components.**

### **Configuration**

**The system will be controlled using a Siemens S7-1500 programmable logic controller.**

**All PLC software will be fully commented and will be written in such a way as to be easily understood by maintenance personnel.**

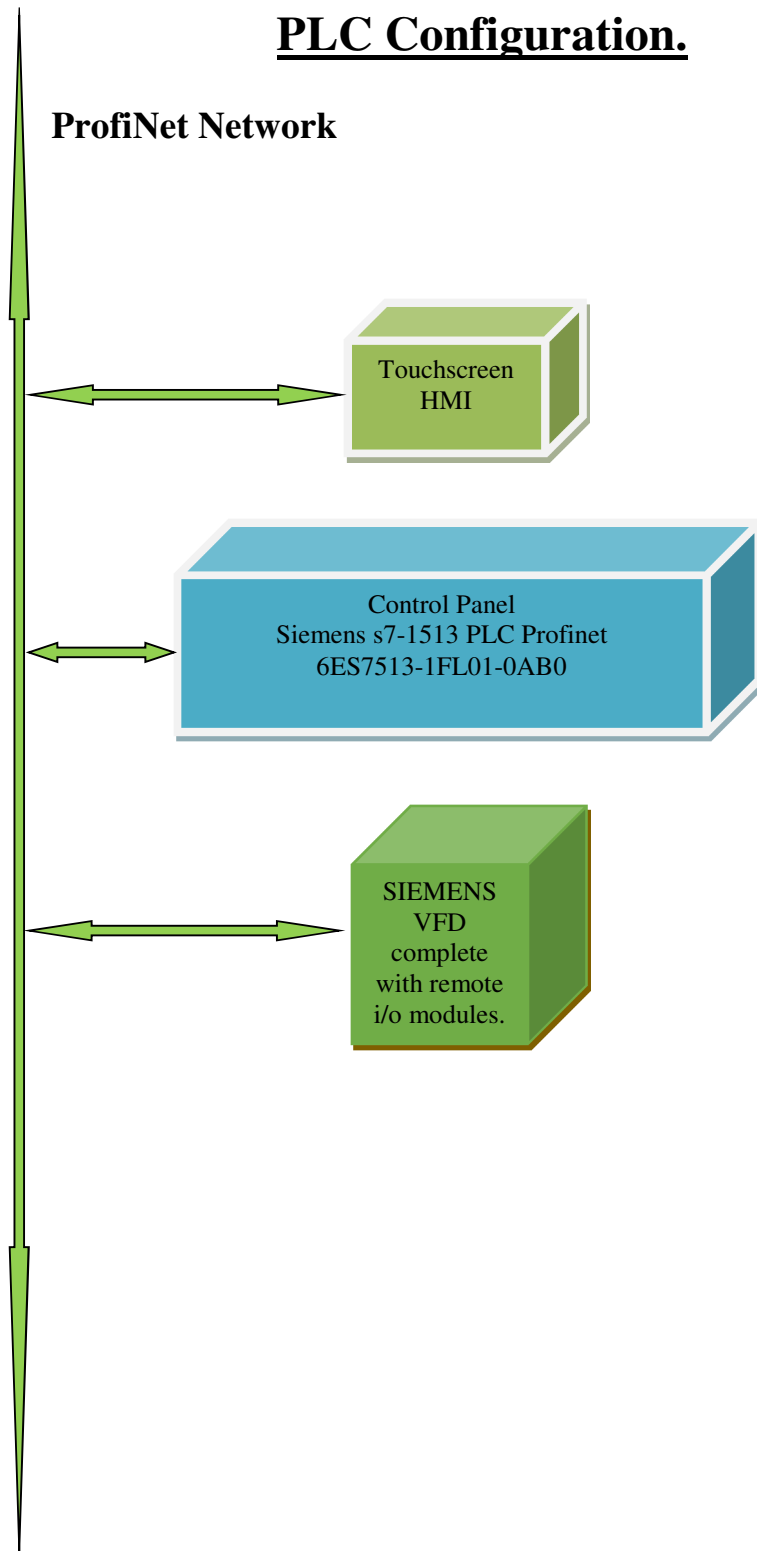
**The PLC software will be written to be common across ALL of the Amazon Logistics sites.**

**The control cabinet will be equipped with a Siemens TP1200 12 inch colour HMI panel. The HMI will give the person on the factory floor responsible for operating the system the following controls and information.**

- **Start/stop system.**
- **Report Emergency Stops.**
- **Motor Overload.**
- **Low air pressure.**

## Control System Architecture.

The diagram below shows the elements and connectivity of the conveyor control system:





## **Functional controls description.**

**This chapter follows the product flow throughout the conveyor system describing the controls functionality.**

### **Sleep mode.**

**The system has a number of photocells which monitor the flow of parcels. In the event that the system detects no parcel flow sections of the system will go to “sleep”. The exact position of the photocells monitoring the parcel flow is yet to be finally determined.**

### **Emergency Stops**

**There will be SIXTEEN Emergency stop pushbuttons and FOUR Emergency Stop pullwires positioned around the system as shown on our layout drawing GMH 9718A. Each emergency stop button will be hard wired back to the control panel.**

**Each position where an emergency stop button is fitted will be fitted with a RED beacon to display the emergency stop button status.**

**Red Steady.....Emergency Stop button operated.**

**Red flashing.....Emergency Stop button reset panel awaiting reset.**

### **Load Conveyors.**

**Each of the five infeed conveyor lines is fitted with a photocell. In the event that the PLC detects that no parcels are present for a time the relevant infeed conveyor line will go to sleep and will only wake up again when the local start button is pressed. Each infeed conveyor position will also be equipped with a stop pushbutton to allow the operator to stop that particular infeed line. So that the loading operators can understand the current status of the system a three stage beacon is mounted on each of the FOUR loading conveyors.**

**Red Steady.....Emergency Stop button operated.**

**Red flashing.....Emergency Stop button reset panel awaiting reset.**

**Green steady.....Line running.**

**Green flashing.....Line sleeping.**

## **Functional controls description (contd).**

### **Operator Platform.**

Each of the FOUR load conveyors terminate at one of the operator platforms. Each of the gravity conveyors is fitted with two photocells, one for ½ line full and one for line full. Each operator platform is equipped with an emergency stop and a three stage beacon to show the operators the status of their line.

**Red Steady.....Emergency Stop button operated.**

**Red flashing.....Emergency Stop button reset panel awaiting reset.**

**Blue flashing.....Gravity Conveyor ½ full.**

**Blue steady.....Gravity Conveyor full.**

**Green steady.....Line running.**

**Green flashing.....Line sleeping.**

## **Touchscreen HMI.**

A Siemens TP1200 12 inch colour touchscreen will be fitted on the front of the control panel.

The HMI will have the following screens:

**Start/Stop Screen.**

**Fault Diagnosis Screens.**

## **Motor Tripped.**

A motor which trips its motor circuit breaker (MCB) due to overloading, (for example if there is a jam) will stop the relevant conveyor and prohibit further loads from transferring onto it.

The MCB and the motor number to which it relates will be displayed on the relevant HMI.

To restart, the MCB needs to be manually reset and the start procedure re-initiated.

## **Isolator Off.**

Each motor is fitted with a local Isolator. In the event that a motor Isolator is switched OFF the relevant conveyor will stop and prohibit further loads from transferring onto it.

The Isolator and the motor number to which it relates will be displayed on the HMI.

## **Emergency Stops.**

Each Emergency Stop pushbutton is monitored to allow the HMI to display which pushbutton has been operated. At every emergency stop position a Red status beacon is fitted at eye level to show the status of the emergency stop.

**Red Steady-** Emergency Stop button operated.

**Red flashing-** Emergency Stop button reset, panel awaiting reset.

## **The Control Cabinet.**

**The control cabinet will be situated as shown on our drawing number GMH 9718A. The control cabinet will house the PLC processor together with the HMI and all the necessary controls. Each of the cabinet doors will be fitted with a lockable handle.**

## **Start/Stop Transport System.**

**In general the following procedure has to be followed for the system to operate.**

- a. Apply mains power by operating the MAIN SWITCH.**
- b. Reset the emergency stop circuits by operating the EMERGENCY STOP RESET keyswitch.**

**The system can now be started and stopped by following the procedure described below.**

- a. Press the SYSTEM START push-button. Once the system start push-button has been pressed on the HMI the system start alarm will sound for a preset time as a warning that the conveyors are about to start.**
- b. Pressing the SYSTEM STOP push-button on the HMI will initiate a controlled stop of the system. When a controlled stop is initiated the system checks that no product is present on the infeeds and then stops. If there is product present on one of the infeeds the infeed will continue to run until all products have been delivered to their intended destination.**

### **Emergency Stop.**

**If an EMERGENCY STOP is activated the system will stop immediately. All moving parts of the system will be entirely immobilised in whatever state they happen to be in when the EMERGENCY STOP was activated. The HMI system will report the occurrence and give details of which stop has been activated.**

### **Power sockets for existing conveyors.**

**We have included for twelve 16amp single phase sockets to feed the existing conveyors. These power sockets will be controlled through the control panel emergency stop circuit.**

**We have also included for twelve two gang 13 amp RCD socket outlets positioned adjacent to the 16 amp socket outlets.**

### **Power Supply.**

**The customer will provide and connect a mains power cable to the control cabinet. A five core cable is required comprising three phases, neutral and earth.**

### **Power Requirements.**

**Voltage 400v AC  
Frequency 50 Hz.**

### **Connected Load.**

**236 amps per phase.  
164 Kva.**

## **Commissioning / Training / Documentation.**

This chapter gives a brief explanation of the commissioning period and the documentation provided within this project.

### **Commissioning.**

When the mechanical and electrical installation is completed the system will be started up in co-operation with Amazon Logistics. During this initial startup period the final adjustments and the first functional tests will be made for all the components used in the system. The commissioning is necessary to test all the individual components as described in this specification, together with the controls part of the system. During these tests the system will need to be stopped for periods of adjustments and changes.

### **Hardware commissioning**

- System on/off
- Emergency stop function
- Check motor direction and set up thermal overloads
- Test input signals
- Test output signals

### **Software commissioning**

All the functions as described in this functional specification will be tested. This will include all the necessary functions for a fully functioning system.

### **Training**

During commissioning it is advisable that maintenance personnel work together with GMH Ltd so that they gain experience of the system. This is also the most effective training method available for maintenance personnel.

## **Documentation**

**On completion of the project GMH Ltd will supply the following documentation.**

- **Two hard copies of the functional specification and one soft copy.**
- **Two hard copies of the mechanical layouts and one soft copy.**
- **Two hard copies of the control panel layouts and one soft copy.**
- **Two hard copies of electrical schematic drawings and one soft copy.**
- **Two hard copies of mechanical spare parts lists and one soft copy.**
- **Two hard copies of electrical spare parts lists and one soft copy.**
- **Test certificates for control panels.**
- **Test certificates for mechanical installation.**
- **Test certificates for site electrical installation.**
- **Certificate of Conformity for the complete system.**

### Prices.

May we offer to design, manufacture, deliver to site, offload and install one parcel handling conveyor system as detailed in this specification and shown on our drawing no. GMH 9718A.

FOR THE SUM OF ... .. £ 938,000.00 Nett  
Plus VAT.

### Payment Terms.

50% paid on delivery of equipment to site.

30% paid on completion of installation.

20% paid on final acceptance.

All payments to be made within 7-10 days of the invoice date.

### Bought in Equipment Prices.

The above price includes a number of bought in items, please see below for a list of the items together with their prices.

1. Interroll curves..... ..£ 40,904.00 nett plus VAT
2. Broadwater spirals..... ..£ 51,100.00 nett plus VAT
3. Plant hire.....£ 18,504.00 nett plus VAT