

**Proposal Document**

**SECTION III**

**LANCO POWER AND FREE  
STANDARDS**

## **1.0 INTRODUCTION**

LANCO specializes in the design and installation of Flexible and Modular Manufacturing Systems for industries requiring light duty parts handling, assembly, and testing. Successful automation requires proper product design, equipment integration and operator training. LANCO is committed to maintaining the highest standards in these areas. Our choices in equipment are based on state-of-the-art technologies and performance records. Our engineers are trained and experienced in the design and manufacture of automated workstations. This experience extends to the areas of component manufacturing, computer communications, precision machining and field-proven assembly techniques.

We are proud to be part of the emerging industry of modular automation and appreciate the opportunity to present our technical solution for your consideration. We are confident that our approach will offer you a simple and successful solution to your automation needs.

## **2.0 MISSION STATEMENT**

To develop and deliver the best assembly and test solutions with our multinational customers through innovation and integrated operations worldwide.

## **3.0 GENERAL REMARKS**

**3.1** Excluding special agreements, customer supplied parts are subject to the following requirements:

- Grease free
- Low burr (maximum 0.1 mm)
- Clean and dry
- Bulk material must be free of foreign material
- Molded parts must not be coated
- Material must conform with samples and drawings submitted to Lanco

NOTE: Any performance problems that arise due to non-conformance with the above requirements are not the fault of the machine. The customer is to supply sufficient production intent parts for the design, debug and acceptance phases of the project.

**3.2** For control and set-up purposes, pneumatic actuation may be simulated by individual manual activation of the valves.

**3.3** All electronic components are set up using PNP format, unless expressly stated differently in the proposal.

**3.4** Unless otherwise indicated, standard material as described in the "LANCO Standard Material List" will be used for the entire machine. LANCO standard material will always be used for standard LANCO products (handling devices and transfer system).

**3.5** Most machine structural elements are clear anodized aluminum profile.

**3.6** During the design review at LANCO, the customer will be informed of the size of the machine footprint, floor load and connection location of utilities (air and electricity). Air and electrical connections will have a single "drop" point on the machine.

**3.7** LANCO is not responsible for manual cycle times, but will provide MOST analysis for manual operations if requested. The customer must review and approve these manual station cycle time estimates or bear sole responsibility to manual operation. As such the customer is responsible to meet these manual cycle times and train its operators to do so.

**3.8** LANCO reserves the right to make Lanco standard product improvements if necessary; and therefore, some specifications may be changed without prior notice.

**3.9** LANCO must be notified in writing of any customer component part changes until the machine is accepted at the customer facility. The notification must include what part has changed, how the part has changed and when production parts will be available. Drawings must be supplied (with a prototype part if possible) before change orders will be processed.

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- 3.10 All customer supplied component parts are to be shipped pre-paid to Lanco with a packing slip identifying the quantity, part number and revision level of each part.
- 3.11 The final selling price of the system is subject to change pending receipt of individual parts, drawings, operating specifications and parameters.
- 3.12 The customer is responsible for all the equipment they supply to LANCO including equipment manufactured by a third party. The evaluation and proper function of said equipment will also be the responsibility of the customer. LANCO will assume no costs incurred by the transport, insurance, taxes, or duties of said equipment.

#### 4.0 **PLATFORM - LANCO PALLET SYSTEM**

Systems that feature the modular Lanco HFL-2002-S Transport System, which incorporate proven designs used by Lanco, may contain some or all of the following:

##### **Transfer Pallet**

Workpieces are transported through the system by aluminum transfer pallets. The pallet leading edge is maintained through the system. Guide pins on the pallet underside provide guidance in turns and precise positioning at stops. Tooling is mounted to the pallet surface and pallet-coding devices are available. Lanco transports allow operation access to the bottom of the pallet.



##### **Pallet Coding – Induction Tags**

Pallets may include induction tags that can be read-from and written-to. Normally, Induction Tags are used to identify or number pallets. This allows product information stored within the controllers to be matched with the pallet number for decisions at various stations. Induction tags can identify certain conditions on the pallet such as: part rejects, pallet origination (from main line or a spur), etc. Tag readers/ writers are required at stops to recognize or create this information.



##### **Track Modules**

Single Track Modules are conveyor sections used to convey a pallet in a linear direction and are typically connected to corner modules, gating systems or other single-track modules. They come completely assembled with table or leg mounts, all conveyor belts, connection brackets and drive. The leg sets are designed to mount to table modules for automatic stations or directly to the floor for manual or semi-automatic operations. Standard speed: 250mm/s in lengths up to 3 meters.



##### **Lift Gate Module**

Lift Gate Modules allow access to the inside of a transport system loop. The Lift Gate takes the place of a standard 1.0 meter Single Track Section between two other Track Sections and shares one of the Track's drives. The hinge hardware mounts to one track section and the latch hardware mounts to the other track section.



##### **Dual Belt Drive**

Shown with the drive cover removed, the dual belt drive provides simple, continuous conveyance of pallets on each transport track. Belts are 20 mm wide x 1.5 mm thick, come pre-welded and can be changed within 1 minute. Standard speed is 250 mm/s or variable up to 350 mm/s and payload limit is 60-kg/drive.



##### **Corner Module**

Corner Modules are used to change the pallet direction by 90 or 180 degrees to the left or right and are typically connected to single or double track modules to create custom configurations of end modules, as well as serpentine systems. They mount to the adjacent modules and include an additional drive.



**Magazine Spur Track Module(s) – if applicable**

Spur Track Modules are used for off-line pallet accumulation to perform manual or automatic operations. A Switching Gate system is included, with proper stops and sensors, to direct the pallet off-line or allow it to continue along the main transport loop.



**Auto Pallet Stop - Standard**

This device automatically stops a pallet by a positioning pin on the underside of the pallet. By adding positioning pins, multiple stops of a pallet can be made. The stop mounts to the transport track profile and holds repeatability in the X and Y directions of +/- 0.02 mm (0.0008”). This can be used in conjunction with supplemental guides to position a second pin simultaneously.



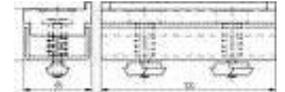
**Supplemental Pallet Guide**

This device precisely positions the second pin of a pallet as the first pin is positioned in a Pallet Stop. The guide mounts to the transport track profile and holds repeatability in the transverse direction of +/- 0.02 mm (0.0008”) for automatic operations.



**Passive Stop & Drop Rollerway**

This device is a spring-loaded replacement for the standard rollerways used to support the transfer pallet and belts on a section of track and allow a load to be applied downward on the pallet at a station stop, without the need for a pallet lifting device. Non-actuating, load-supporting anvils (by customer) are positioned with their top surface 0.5mm below the pallet underside and transmit the applied load to the station table without pinching the conveyor belts.



**Pallet Lift 500kN (56 Ton)**

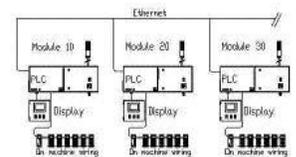
This high precision lifting device works in conjunction with the Pallet Stop to lift a pallet off of the conveyor belt. It is typically mounted to an existing station table and provides up to 12mm (0.5”) of stroke using a cam slide and ball bushings with guide rods. Custom tooling plates are added for each application to engage the pallet.



**5.0 SYSTEM CONTROLS**

**System Architecture:**

Lanco controls architecture is based on a modular approach. Each module gets its own control system. A control system consists of a PLC, display, safety circuits and boxes to enclose them.



**Machine Wiring:**

Physical inputs and outputs are connected using a modular on-machine wiring system. The on-machine wiring system communicates to the Compact Logix controller via Ethernet/IP. This system utilizes a master and 16-point IP67 boxes. The boxes are placed along the station module for ease of connections. The physical inputs and outputs are labeled and terminated to the boxes.



**PLC Enclosure:**

The PLC enclosure mounts to the top of a module for ease in access and viewing. The enclosure houses the PLC (Compact Logix is LANCO’s standard), 24 V power supply, Safety Hardware for Doors and Station Stop, Ethernet/IP communications and other components necessary to run the module.



### Power Distribution:

For assembly systems with more than one module, a Main power distribution enclosure is typically included unless the customer uses multiple power drops to modules. This enclosure distributes power to all the modular control systems on the assembly line.

- Enclosure: Brushed aluminum
- Beacon: Low air Pressure
- Main Disconnect: Typically 60Amps
- Safety: Master E-stop With Safety Relay
- Reset MCR lighted pushbutton
- Motor On/Off: Selector switch



### HMI Touch Screens:

A touch screen display is attached to each PLC. Typically one display per module is used.

Typical Standard Display:

- A/B Panelview 600+
- Power: 24v
- Physical Controls: Station Stop, Control Power On Pushbutton
- Communication: Ethernet/IP
- Color: RAL 7035



Typical Station screens:

- Start/stop mode pushbutton
- Auto/manual mode pushbutton
- Single cycle step pushbutton
- Reset pushbutton
- Station status descriptions like "Door open"

Typical Setup screens:

- Display process limits and make adjustments to the limits
- Calibration procedures
- General timer adjustments
- Air dump pushbutton
- Pallet release pushbutton
- Station Bypass pushbutton

Typical Data screens:

- Good counts/Bad counts/Totals
- Last 5 Cycle times of each station
- Last 5 data points of process information like force or distance

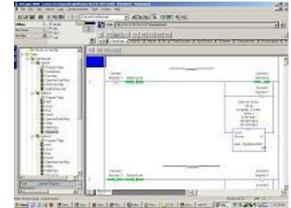
Typical Fault Screens:

- Display which station faulted
  - Display descriptive reason for fault
  - Display Input and output associated with fault
  - Reset pushbutton
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**Programming:**

LANCO programs in relay ladder logic format. All programs follow the same basic format using a latch and unlatch step style for any chosen PLC. The following routines are found in all system programs.

- Main: Deals with anything module specific
  - Display logic
  - Beacon logic
  - Module specific pushbutton logic
- Station: Deals with anything station specific
  - Station specific display logic
  - Station specific pushbutton logic
  - Reset logic
  - Air-up logic
  - Station sequence logic
  - Pallet release logic
  - Fault logic
  - Component specific subroutines



**Data Collection:**

Process measurement data for each station process if available, is displayed on the Module HMI as described in the HMI section. Each time the station cycles, the newest information is displayed and the oldest reading is dropped.

Requirements for long-term storage must be defined in the LANCO Proposal and will be achieved through one of the following unless otherwise agreed to:

LineSight – A high speed machine performance and reporting product that stores machine “health” data in an SQL database for real-time or historic analysis. This product can be provided with PC/Server hardware, or can be installed on a customer supplied PC. Details of this application are available in a separate document.



DataView – A full featured process/product data collection application that stores serialized data in a relational SQL database for historic retrieval of the “Birth Certificate”, production capacity visibility, and process trending. This product can be provided with PC/Server Hardware, or can be installed on a customer supplied PC. Details of this application are available in a separate document.

**PC Anti-Virus:**

When Lanco supplies a PC we will verify that it is clean of viruses before we ship it but do not include Anti-Virus software. Lanco will install customer supplied Anti-Virus software if it is available.

## 6.0 LANCO STANDARD SYSTEM PROCESSES

### **Mistake Proofing**

Where indicated, sensors will verify all part placement functions. Otherwise, the presence and final position of all parts automatically assembled is verified by sensing the end-of-stroke into the mating part and confirming the presence of the part in the gripper jaws. Any failure of these sensors assumes a failure of the station function and the station will fault accordingly.

### **Station Fault Detection/Recovery**

In the event of a reject condition from a probing, monitoring, or testing failure, a red beacon light will be illuminated at that station. The cause of the failure will be displayed at the operator control panel. The operator must correct the failure and then reset the station. Station faults will be displayed on the operator control panel.

### **Product Changeover**

LANCO systems are built to facilitate assembling “families”; therefore, changeover from one product to the other must be quick and simple.

- **Manual:** A manual changeover is required when the customer desires to run a different part type/number. Production of one product is stopped completely. Pallets are cleared of all parts. Station changes, as required, are done manually. No lead pallet is used.
- **Semi-Automatic:** A lead pallet is manually introduced to the line before Station 1. Pallets for assembling the new product can follow the lead pallet. When the lead pallet enters Station 1, the station recognizes that it is a lead pallet and stops work. The operator selects the new part number at the station, and the display indicates what changes are required. After these changes are made, the operator acknowledges this fact and the station releases the lead pallet. This process (station change/ acknowledgement) is repeated for each station on the line. The lead pallet must be manually removed from the line as it exits the final station. Production will occur on all pallets following the lead pallet through the process.
- **Automatic:** A lead pallet is manually introduced to the line before Station 1. The operator selects a new part number at the station designated for this purpose. Pallets used to assemble the new product can follow the lead pallet. When the lead pallet enters Station 1, the station recognizes that it is a lead pallet and automatically changes over to the new part type, then releases the pallet. This process repeats at each following station until it reaches the last station or returns to the first station where it must be manually removed. Production will occur on all pallets following the lead pallet through the process.

### **Force/Distance Measurement**

- **Standard Force and Distance Measurement – single point:** The press force (f) is measured at or just beyond a defined and adjustable distance into the pressing operation (usually approximately 50% into the process). The part is rejected if the force is outside the upper or lower limit values. The final press position is verified using a press end-of-stroke sensor and/or a distance-measuring device.
- **Standard Force and Distance Measurement – multiple point:** During each control scan, the press force (f) and distance (d) are monitored. If the force (f) is outside the limits set for any particular distance (d) measured, the part is rejected.

**NOTE:** The choice of using Potentiometers or LVDT's or linear encoders will be determined by the accuracy of the measurement required.

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## 7.0 LANCO ACCURACY/REPEATABILITY TOLERANCES (Defaults unless otherwise noted)

### Actuations:

#### Linear

Pneumatic cylinder	± 0.1 mm repeatability
Ball Screw Slide	± 0.05 mm repeatability
Linear Motor	± 0.05 mm repeatability

#### Rotary

Pneumatic Rotary	± 0.5° repeatability
Electric Rotary	± 0.5° repeatability

### Measurements:

#### Force

Design Safety Factor on press forces is 1.5 x @ 80 psig. Lanco sizes cylinders to function at 60 psig minimum, but normal operating pressure at 80 psig is required to achieve cycle time.

Applied Force:	± 10% of Target Force (repeatability of an actuator)
Measuring Force:	± 5% of Target Force

#### Distance

Linear Encoder	± 0.1 mm accuracy
Linear Pot	± 0.25 mm accuracy

#### Force/Distance Monitoring

Kistler maXYmos BL system w/ 5 kHz sample rate, Envelope evaluation.

#### Angular

Rotary Encoder	± 0.5° repeatability
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#### Torque

Torque Transducer	± 5% repeatability of Target Torque
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#### Temperature

Thermocouple/RTD	± 2°F accuracy
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#### Flow

Flow Transducer	± 5% of Target
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#### Resistance

Ohm Meter	± 5% of Target
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Vision: Field of view must allow for 10 pixels for any feature (resolution) to be detected

- Reject rates of vision systems in production are dependent on the following:
  - Availability of final Production parts during setup of system
  - Availability of all reject samples during setup of system
  - Lighting conditions to be identical at Lanco and final location
- Reject rates during the run off at LANCO could be as high as 10% if production quality parts and a complete set of reject samples are not available during setup. In order for Lanco to produce a system that is properly setup and debugged, component samples must be supplied per the project schedule. Failure to supply these components may result in a machine that does not meet OEE. Any additional setup time that is required as a result of incorrect or lack of components will be the responsibility of the customer.

## 8.0 LANCO STANDARD COMPONENT LIST (revised 1/07)

### Electrical Components (PNP format used for all inputs and outputs)

<b>Programmable Logic Controller</b>		Allen-Bradley Compact Logix
<b>Operator Interface Panel</b>	Color Touchscreen	Allen-Bradley 600+
<b>Control Elements</b>	Pushbutton Selectors Main Disconnect	Siemens Siemens Allen-Bradley ABB
<b>Indicator Elements</b>	Indicator Lamp Light Beacon	Patlite, Siemens Banner
<b>Switch Elements</b>	Photoelectric	Keyence Baumer
	Proximity	Baumer Balluff
	Vacuum Switch	SMC
	Door Safety	Schmersal
<b>Motors/Drives</b>	Asynchronous Conveyor Motor	Oriental
	Gear motor	Oriental
	Servo	Allen-Bradley
	Stepper Motor	Nanotech
	AC Variable Frequency Drive	Allen-Bradley
	DC Drive	Dart
	Stepper Drive	AMCI
<b>Enclosures</b>	Steel painted RAL 7035, aluminum clear coated	Rittal/Hammond
<b>Safety Devices</b>		Sick Safety/Pilz
<b>Safety Relays</b>		Sick Safety/Pilz
<b>Light Curtain</b>		Keyence
<b>Guard Door</b>		Schmersal

## Mechanical Components

<b>Air Preparation Unit (FRL)</b>		Numatics
<b>Solenoid Valve</b>	Directional Control Soft Start Valve	SMC/Festo Festo
<b>Regulator</b>		Numatics
<b>Air Cylinder</b>		Festo SMC
<b>Rotary Actuator</b>		Schunk SMC
<b>Linear Slide</b>		Festo SMC Intelligent Actuator
<b>Gripper</b>		Schunk SMC
<b>Fittings</b>		Festo SMC
<b>Tubing</b>		SMC
<b>Shock Absorber</b>		Enidine
<b>Vacuum</b>		SMC (Ejector) Becker (Pump)
<b>Vision System</b>		Cognex

**NOTE:** Lanco Assembly Systems reserves the right to modify this list at any time and without notification.