

# CIM System



## Installation Manual

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intelitek▶▶



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CIM System Installation Manual  
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# Overview



Figure 1: CIM System

This manual provides instructions for installing the CIM System and is intended for an experienced qualified technician that has previous experience with the installation of automatic systems, such as robotic systems and CNC machines. In addition, the installation technician should be familiar with the operational procedures of the equipment.

**Note:** Issues such as the floor setup, electricity, network, pneumatic pressure, ventilation and so on are not described in this manual. Refer to the layout plans for your system and the documentation for each component.

This guide includes the general unpacking, assembly and installation procedures for the various hardware and software components in a CIM system.

This general description together with the specific setup of your system will enable you to install the entire system.

This manual includes the following:

- **Hardware Installation**, page 5, describes how to assemble and install the hardware components in your CIM system, such as Conveyor & Pallet Tracking System, ASRS, FMS and more.
- **PC Network Connections**, page 47, describes how to set up the PC network in your CIM system.

- **OpenCIM Software Installation**, page 49, describes how to install the OpenCIM software on the PC Manager as well as the workstation PC.
- **Acceptance Testing Procedures**, page 53, describes the testing procedures required to verify that the CIM system is working properly,

**Safety first:**

Please carefully read this manual and the user manual of each component, and ensure that you fully understand them before you start the unpacking or installation of the system. Read and observe all safety instructions for each component of the system.

If needed, contact Intelitek technical support.

This installation assumes familiarity with the installation, configuration and operation of each specific module. This information is generally found in the user manual specific to each product. This manual concentrates on the integration of the specific machine into a working CIM system.

To assemble, configure and operate the specific equipment, you will need to review the user manual provided with each specific equipment as well as your CIM system layout drawings.

According to your configuration, the documentation provided by Intelitek is detailed in the list below:

- *OpenCIM User Manual*
- *Conveyor and Pallet Tracking System Operational Manual*
- *ASRS-36 with Controller-A Operational Manual*
- *ASRS<sup>2</sup> Training Material*
- *ASRS-36/36x2 with Controller-USB Operational Manual*
- *Controller-A User Manual*
- *Controller-B User Manual*
- *Controller-USB User Manual*
- *Barcode Reader Operational Manual*
- *proLIGHT 1000 Machining Center User's Guide*
- *proLIGHT 3000 Turning Center User's Guide*
- *SpectraLIGHT 0200 Machining Center User's Guide*
- *SpectraLIGHT 0400 Turning Center User's Guide*
- *SCORBOT-ER IX User's Manual*
- *SCORBOT-ER 4u User's Manual*
- *SCORA-ER 14 User's Manual*
- *Motoman HP3 User Manual*
- *Belt Driven Slidebase (Controller B) Technical Note*

- *Belt Driven Slidebase (Controller A, USB or PC) Technical Note*
- *ViewFlex User Manual*
- *Maintenance Manual for PN-2800*
- *Maintenance Manual for PS-2800*
- *ACL Off-line User Manual*
- *ACL for Controller-A Reference Guide*
- *ACL for Controller-B Reference Guide*
- *ATS for Controller-A Reference Guide*
- *ATS for Controller-B Reference Guide*
- *Electronic Calipers Technical Note*
- *Gluing Station Assembly Instructions Technical Note*
- *ER-400 AGV Mobile Robot User Manual*
- *Wireless Internet Camera for ER-400 Installation Guide*

Additional descriptions and operational instructions are available in the curriculum for each module. These curriculum modules (in hard copy or electronic format) are usually supplied with the system.

You may also contact Intelitek to acquire access to our on-line e-Learning system.

The documents listed above are shipped together with the components which they refer to. In addition, installation of your integrated system requires further customized documentation which is delivered under separate cover. Ensure that you fully understand these documents and if any changes are made to your system, be sure to update these documents accordingly. These documents should be available during installation and operation, and also for technical support requests from Intelitek.

The documents provided are as follows:

- **Layout Drawings:** Describes the position of each machine and station.
- **Infrastructure Requirements:** Describes the requirements of the electric power line, LAN infrastructure, compressed air outlets and more.
- **PC and Table Requirements:** Describes the required computers and tables.
- **Test Application Description:** Describes the application to be performed for demonstration and acceptance test procedures.
- **Position Table:** Defines the positions used by the robotic program. Defined for each robot in each station.

- **I/O Table:** Describes the various input/output connections (digital I/O, RS-232) between different machines in a station (e.g., robot to CNC machine, etc).

If any of the documents listed here are missing, or if any further information is required, please contact Intelitek's technical support.

# 2

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## Hardware Installation

This chapter describes the basic assembly and installation procedures of each of the hardware components in the CIM system. Your system may include all or a portion of the components described in this guide. For details on installation and configuration procedures, refer to the relevant user manual provided with each component.

- **General Unpacking and Installation Procedure**, page 6, describes the general unpacking and installation procedures for the CIM system.
- **Conveyor & Pallet Tracking System**, page 8, describes the operational overview and installation procedure for the conveyor and pallet tracking system.
- **ASRS**, page 10, describes the operational overview and installation procedures for the ASRS.
- **Barcode Reader**, page 13, describes the operational overview and installation procedure for the Barcode Reader.
- **FMS**, page 14, describes the operational overview and installation procedure for the FMS.
- **Assembly Station**, page 27, describes the operational overview and installation procedure for the Assembly Station.
- **QC System with Electronic Calipers**, page 30, describes the operational overview and installation procedure for the QC System with Electronic Calipers.
- **Vision System**, page 31, describes the operational overview and installation procedure for the Vision System.
- **Pneumatics System (PN 2800)**, page 32, describes the operational overview and installation procedure for the Pneumatics System (PN 2800).
- **Process Control System (PS 2800)**, page 33, describes the operational overview and installation procedure for the Process Control System (PS 2800).
- **Hydraulic System (HYD 2800)**, page 35, describes the operational overview and installation procedure for the Hydraulic System (HYD-2800).

- **AGV (Automated Guided Vehicle) ER-400**, page 36, describes the operational overview and installation procedure for the ER-400 Automated Guided Vehicle.
- **Light Barrier**, page 37, describes the operational overview and installation procedure for the Light Barrier.

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## General Unpacking and Installation Procedures

Since the equipment in each CIM system varies, please refer to the specific packing lists for your location. This section describes the general unpacking and installation procedures.

### Visual Inspection of Boxes

To perform a visual inspection:

- 1 Check that all the boxes at the customer site show a label with the name and address of the correct customer.
- 2 Check with the shipment papers that all big boxes are present.
- 3 Check for any visible damage on the boxes. If there is any visible damage, please document the damage.
- 4 Fill out a report and send it to Intelitek.

### Unpacking the Boxes

To unpack the boxes:

- 1 Open each box separately and carefully remove the contents. Arrange the contents of each box on the tables in an organized manner.
- 2 Identify and mark every item in the packing list of each box. If you have problems identifying certain parts, contact Intelitek. Confirm all received parts in the packing list. After the check is complete, report any missing part to Intelitek.
- 3 Check the parts for any visible damage. If any damage is found, please inform Intelitek immediately.
- 4 Fill out a report and send it to Intelitek.

### **Organizing the Parts According to Products**

- 1 Organize the parts according to the products (modules) that they belong to. **Note:** For efficiency in packing and handling, sometimes parts belonging to different stations are packed together in the same shipping container.
- 2 Check again with the part list for each product that all required parts can be identified. If in doubt, contact Intelitek.

- 3 Fill out a report and send it to Intelitek.

### ***Installing Each Product***

- 1 Install each hardware and software product. The installation order of the components is important. It is normally recommended that you first install the conveyor, then the storage system (ASRS) and then the various stations. However, in your installations, you may encounter various limitations. For example, if a big machine is located in a defined location, build the conveyor first in order to reach the destination and then install the other stations around the conveyor according to your system layout drawings.
- 2 Check and report missing or damaged items and any problems during hardware and software installation.
- 3 Fill out a report and send it to Intelitek.

### ***Function Test for Each Product***

- 1 Please check each product for its basic functionality. (Refer to the user manual provided with the product.)
- 2 Report any problems that you find in hardware or software at this point.
- 3 Fill out a report and send it to Intelitek.

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## Conveyor & Pallet Tracking System

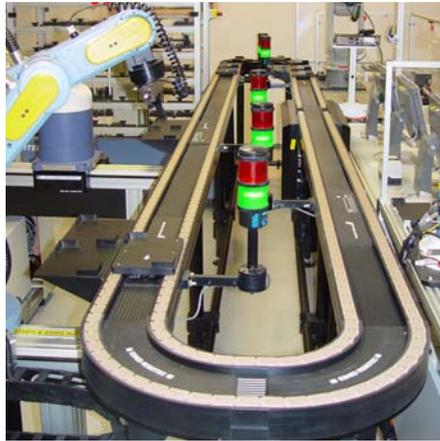


Figure 2: Conveyor



Figure 3: MicroCIM Conveyor

### Operational Overview

The general operation of the conveyor is as follows:

- Pallets travel on the conveyor continuously. Each pallet is identified by a magnetic code.
- At each station, the pallet is stopped by a piston. The PLC receives the pallet ID and decides whether or not this pallet is required at this station.
- If the pallet is not required at this station, it is released immediately. If it is needed, a message is sent from the PLC to the PLC device driver and then to the CIM Manager.
- The pallet is released when a message returns from the CIM Manager to the PLC device driver and then to the PLC.

## Installation

Install the Conveyor and Pallet Tracking system according to the following guidelines:

- 1 Two people (at least) are required to assemble and install the conveyor.
- 2 The following tools are required for the assembly and installation process:
  - 13mm wrench
  - 5mm Allen wrench
  - 6mm Allen wrench
  - Water scale (A level)

The location of the conveyor determines the location of all the other stations in the CIM setup. When deciding on the final station position, ensure that all stations will fit around the conveyor according to the layout drawings of your CIM system provided.

To unpack the conveyor pallet tracking system:

- 1 Ensure that the floor is solid and level and that the electric power and compressed air outlets are ready at the installation site.
- 2 Unpack all conveyor parts, sort them and identify all major components with the help of the layout and packing list.
- 3 Place all components in their approximate location on the floor. Verify that the feet of the conveyor are completely inside the shaft.
- 4 Begin assembling the conveyor and pallet tracking system as described in the *Conveyor and Pallet Tracking System Operational Manual* provided.

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## ASRS



Figure 4: ASRS-36



Figure 5: ASRS<sup>2</sup>



Figure 6: ASRS-36x2



Figure 7: Micro ASRS

The ASRS in your configuration may be one of the following systems:

- **ASRS-36 (with Controller A)**
- **ASRS-36 (with Controller USB)**
- **ASRS<sup>2</sup> (with Controller B)**
- **Micro ASRS**

### Operational Overview

The general operation of the ASRS is as follows:

- 1 The operator places the parts on the templates in the ASRS bays.
- 2 When an empty pallet arrives at the station, the ASRS takes the template with the part and places it on the empty pallet on the conveyor.

- 3 When a finished product arrives at the ASRS station, the ASRS removes the template containing the part from the conveyor and places it into an empty storage bay.
- 4 If a barcode reader exists, the ASRS may place the template next to the barcode reader to enable testing the template ID.

**Note:** The ASRS only handles templates and does not handle parts.

## Installation

According to your system layout drawings, determine whether the ASRS is parallel or horizontal to the conveyor and set it up properly, ensuring that the gripper of the ASRS can reach, place and remove templates to and from the conveyor station. If the Barcode reader is installed, the ASRS should also reach the Barcode reader.

This section describes the unpacking and assembly procedures. For further details on the installation of the ASRS available in your system, refer to the provided documentation, as follows:

- *ASRS-36 with Controller-A Operational Manual*
- *ASRS<sup>2</sup> Training Material*
- *ASRS-36/36x2 with Controller-USB Operational Manual*

The ASRS contains 2 boxes and 1 pallet, as follows:

- ASRS 36 Controller Box
- ASRS 36 Shipping Box
- Templates and Pins Box.

To unpack and assemble the ASRS:

- 1 Unpack the controller. Refer to the following documentation for further details:

- *Controller-A User Manual*
- *Controller-B User Manual*
- *Controller-USB User Manual*

- 2 Unpack the ASRS from its shipping box, as follows:

- Place the ASRS shipping box close to the required location of the ASRS.
- Cut the straps securing the cover of the cardboard box and remove the cardboard cover.
- Using a knife, cut the sides of the cardboard cover from top to bottom and remove the cardboard box from the wooden base.
- Remove the nuts securing the ASRS to the wooden base. Then, at least two persons should lift the ASRS and place it in its required location.

- 3 Unpack the Templates box, as follows:
  - Open the box containing the templates. Place the templates on the bays of the ASRS. Ensure that the templates' **Gripper Location** is facing away from the door.
- 4 Install the ASRS as described in the required documentation, as follows:
  - *ASRS with Controller A Operational Manual*
  - *ASRS<sup>2</sup> Training Material*
  - *ASRS-36/36x2 with Controller-USB Operational Manual*

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## Barcode Reader

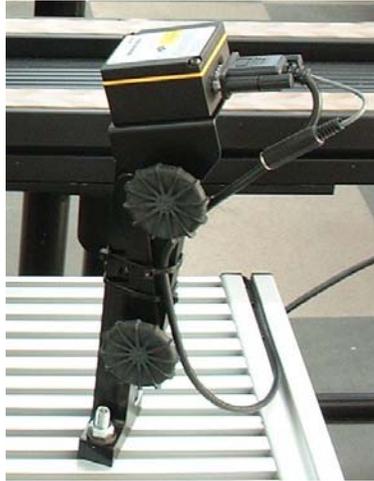


Figure 8: Barcode Reader

## Operational Overview

The CIM Manager instructs the ASRS robot to scan a template after removing it from the station and before placing it on the conveyor. The barcode reader is normally connected to conveyor near the ASRS.

## Installation

Assemble and install the barcode reader according to the process below. During the installation, ensure that the ASRS reaches the barcode reader and does not block the ASRS from fetching the templates.

The installation process of the barcode reader includes the following:

- 1 Assembling the barcode reader stand.
- 2 Assembling the barcode reader on the mounting plate.
- 3 Attaching it to the conveyor profile.
- 4 Connecting the communication cables and power supply.

Assemble and install the barcode reader according to these steps as described in the *Barcode Reader Operational Manual* provided.

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# FMS

## Operational Overview

The general operation of the FMS is as follows:

- 1 A pallet containing a template and part arrives at the FMS station.
- 2 The robot takes the template and places it on the buffer.
- 3 The robot takes the part and places it in the CNC machine's vise or chuck.
- 4 The robot returns the machined part to the template on the buffer and then to an empty pallet on the conveyor.

## Installation

Unpack the components according to the general unpacking procedures described in the *General Unpacking and Installation Procedures* section, page 6, and then assemble and install the FMS system. In addition, unpack and assemble the CNC table provided.

The FMS can include a robot on a linear slidebase and one or two CNC machines. In determining the proper placement of these components, note the following considerations:

- The robot on the slidebase should easily access the conveyor, the buffers and each of the machines.
- Ensure that there is easy access to each of the machines for standalone operation to load and unload parts in the machine.

Installation includes the following:

- **Milling Machines: Unpacking and Assembly**, page 15
- **Turning Machines: Unpacking and Assembly**, page 16
- **Robot: Unpacking and Handling**, page 18
- **Slidebase: Unpacking and Assembly**, page 19
- **Installing the Machining Center**, page 20

## Milling Machines: Unpacking and Assembly



Figure 9: proLIGHT 1000



Figure 10: SpectraLight 0200

This section describes the basic unpacking and assembly instructions for the proLIGHT 1000 or the SpectraLIGHT 0200. For further details, refer to the *proLIGHT 1000 Machining Center User's Guide* or the *SpectraLIGHT 0200 Machining Center User's Guide*.

### **Prepare Your Workplace**

Make sure you have all the items on hand necessary to perform the installation. To install the Machining Center, you must have a sturdy table to support the Machining Center and your computer. Placing the table against a wall provides more stability. Make sure the wall has a 120VAC, 15-Amp polarized outlet, or a 220VAC, 8-Amp outlet for international users.

**Note:** It is recommended that you use a voltage surge protector and line filter for your computer system.

### **Unpacking the Machining Center**

- 1 To unpack the machine center:
- 2 Position the wooden base near the table on which the Machining Center will be installed.
- 3 Remove the staples securing the bottom of the cardboard container to the wooden base.
- 4 Lift the cardboard container off of the wooden base.
- 5 Inspect the Machining Center chassis for visible signs of damage such as a broken shield, a dent in the chassis or damaged cables.

If any damage is noted, or if you find any discrepancies between the packing slip and the items received, call Intelitek's Customer Service Department.

- 6 From underneath the wooden base, use a 9/16" wrench to remove the four bolts holding the Machining Center base to the wooden base. Keep the bolts and other packaging materials.

**Note:** Ensure that you keep the wooden base and all the original cartons in which the proLIGHT Machining Center was shipped. Should any components need to be returned to the factory, re-pack them exactly as they were received. Light Machines will not be responsible for any damage caused during shipping when components are not returned to the original cartons.

### **Setting Up the Machining Center**

To set up the Machining Center:

- 1 Lift the Machining Center off of the pallet and onto the table.
- 2 Once on the table, position the Machining Center correctly for machining.
- 3 Remove the protective paper from the safety shield.

**Caution:** Lift the Machining Center carefully since it weighs approximately 365 pounds (proLIGHT 1000) or 80 pounds (SpectraLIGHT 0200).

## **Turning Machines: Unpacking and Assembly**

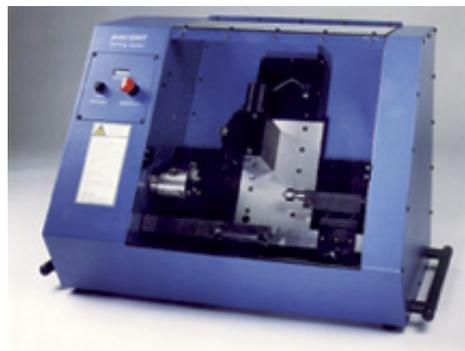


Figure 11: proLIGHT 3000



Figure 12: SpectraLIGHT 0400

This section describes the basic unpacking and assembly instructions for the Turning Center. For further details, please refer to the *proLIGHT Turning Center User's Guide* or the *SpectraLIGHT 0400 Turning Center User's Guide*.

## ***Prepare your Workplace***

Make sure you have all the items on hand necessary to perform the installation. To install the Turning Center, you must have a sturdy table on which the Turning Center and your computer will be installed. Placing the table against a wall provides more stability. Make sure the wall has a 120VAC, 15-Amp polarized outlet, or a 220VAC, 8-Amp outlet for international users.

**Note:** It is recommended that you use a voltage surge protector and line filter for your computer system.

## ***Unpacking and Setting Up the Machining Center***

For each standard Turning Center you order, you should receive two large cartons. One carton with a wooden base contains the Turning Center. The other carton contains the Controller Box, the Interface Card, the Control Program software, the documentation, and the Accessory Kit.

- 1 Unpack the Controller Box container and use the packing slips to confirm that you have received all the items listed.
- 2 Position the wooden base near the table on which you'll set the Turning Center.
- 3 Remove the staples that attach the bottom of the cardboard container to the pallet.
- 4 Lift the cardboard container off the wooden base.
- 5 Inspect the Turning Center chassis for signs of visual damage such as a broken shield, a dent in the chassis, or damaged cables.

If any damage is noted, or if you find any discrepancies between the packing slips and the items received, call Light Machines' Customer Service Department.

- 6 Using a 9/16" wrench, remove the four bolts holding the Turning Center base to the wooden base. Keep the bolts and other packaging materials.
- 7 Lift the Turning Center off of the wooden base and onto the table.
- 8 Once on the table, position the Turning Center correctly for machining.
- 9 Remove the protective paper from the safety shield.

**Caution:** Lift the Machining Center carefully since it weighs approximately 250 pounds (proLIGHT 3000) or 85 pounds (SpectraLIGHT 0400).

**Note:** Ensure that you keep the wooden base and all the original cartons in which the Turning Center was shipped. Should any components need to be returned to the factory, re-pack them exactly as they were received. Light Machines will not be responsible for any damage caused during shipping when components are not returned to the original cartons.

## Robot: Unpacking and Handling



Figure 13: SCORBOT ER IX



Figure 14: SCORBOT ER-4u

This section describes the basic unpacking and handling instructions for the robotic arm. For further details, please refer to the *SCORBOT-ER IX User's Manual* or the *SCORBOT-ER 4u User Manual*.

### **Unpacking the Robot**

The robot is packed in expanded foam.

To protect the robot during shipment, a metal plate holds the gripper mounting flange to the robot base. The plate is fixed to the flange with three bolts and to the base with two bolts. Use a 3mm hex socket wrench to detach these bolts.

**Save these bolts and the plate.** You will need them if you repack the robot for shipment. **Save the original packing materials** and shipping carton. You may need them later for shipment or for storage of the robot.

### **Handling Instructions**

The ER-IX robot arm weighs 83 pounds. Therefore, two people are required in order to move it. The ER-4u robot arm weighs 24 pounds.

**Lift and carry the robot arm by grasping its body and/or base.** Do not attempt to lift or carry the robot arm by its upper arm or forearm.

## Linear Slidebase: Unpacking and Assembly



Figure 15: Floor-Mounted Linear Slidebase



Figure 16: Table-Mounted Linear Slidebase

The Linear Slidebase (LSB) is provided in a long cardboard box. It may be either table-mounted or floor-mounted, and may be either 1.0 or 1.8 meters long, making a total of 4 different possible configurations. In order to assemble the Linear Slidebase, the following tools are required:

- 5 mm Allen hex wrench with a ball point.
- 24 mm wrench.

To unpack and assemble the Linear Slidebase:

- 1** Release the three straps securing the cardboard box and holding it closed.
- 2** Assemble the LSB as described in the documentation provided with the hardware:
  - *Belt Driven Slidebase for Controller B, Technical Note*
  - *Belt Driven Slidebase for Controller A, USB or PC, Technical Note*
- 3** Place the robot on top of the LSB and bolt it using the three M8 bolts provided. (Make sure that the robot reaches all of its intended work envelope.)
- 4** Insert the robot cable through the IGUS and connect it to the controller. For connection details refer to the user manual for the specific robot which is part of the FMS station.

## FMS: Installing the Machining Center



Figure 17: FMS with Prolight 1000, LSB 1.8 and ER-IX

After unpacking the FMS which consists of one robot, one or more milling or turning machines, and an optional Belt Driven Linear Slidebase, the next step is to install each machining center and each turning center, as described in the following sections.

### ***Installing the Machining Center***

Install each machining center according to the instructions in the appropriate documentation:

- *proLIGHT 1000 Machining Center User's Guide*
- *SpectraLIGHT 0200 Machining Center User's Guide*

### ***Mounting the Pneumatic Vise***

- 1 Insert two T-bolts into the slot in the right clamp, align and fit the T-heads into the grooves in the cross-slide, and attach the right clamp to the cross-slide. Do not tighten the T-bolts.
- 2 Repeat step 1 for the left clamp. Do not tighten the T-bolts.
- 3 Extract the 3/4" piston about half-way. (It can be pulled out manually.)
- 4 Place a 2"x3" wax block into the space between the two clamps.
- 5 Push both clamps together, until the wax block securely fits between the two diagonally opposed corners of the clamps. (Be careful that the piston does not retract.)
- 6 Adjust the position of the two clamps so that the left edge of the vise is approximately 3" from the left edge of the cross-slide.
- 7 Tighten all four bolts.

When the vise is mounted and full open, the clearance (space between the front right corner of the workpiece and the head of the piston) should be in the range 1/2" to 5/8".

- 8 Plug the power cord from the solenoid valve on the vise into the receptacle end of the accessory port adapter cable.

Remove the protective cap from the other end of the accessory port adapter cable, and then plug it into the receptacle labeled ACC2 on the rear panel of the Controller-B.

- 9 Connect the air line from the pneumatic vise to the air supply line and regulator.

### **Machining Center Cable Connections**

Connect the machining center components to each other according to the instructions in the appropriate documentation:

- *proLIGHT 1000 Machining Center User's Guide*
- *SpectraLIGHT 0200 Machining Center User's Guide*
- *proLIGHT 3000 Turning Center User's Guide*
- *SpectraLIGHT 0400 Turning Center User's Guide*

### **Robot-CNC Input/Output Connections**

The I/O connections between the robot and CNC controllers enable synchronization between the two machines.

Synchronization includes:

- 1 Machine output is connected to a robot input, signifying that the machine is in operation.
- 2 Other operations, such as program change, opening and closing the door and opening and closing the vise or chuck are performed via a RS-232 line connected between the robot controller and the machine PC.
- 3 Using the interface cable (9-pin connector on one end and exposed wires at the other end) connect the robot and mill.
- 4 Connect the 9-pin connector to the TTL I/O connector on the rear of the mill Controller. Connect the exposed wires to the CNC machine Controller's I/O terminals as follows:

| <b>Cable</b> | <b>Robot Controller Terminal</b> |
|--------------|----------------------------------|
| Green        | Input # 2 (source configuration) |
| Black        | Common ground                    |
| Red          | +24 volts                        |

For more information, refer to the documentation supplied with the machining center and vise.

## **WPLM or WSLM Control Software Installation and Activation**

Install the WPLM or WSLM control software according to the instructions in the appropriate documentation:

- *proLIGHT 1000 Machining Center User's Guide*
- *SpectraLIGHT 0200 Machining Center User's Guide*

## **Testing Robot-Mill Input/Output Communication**

When the mill and robot controllers are connected, the LED for Input 2 on the robot controller is constantly turned on. Due to reverse logic in the proLIGHT controller, I/O responses in this FMS differ from typical responses. Note the following:

- When proLIGHT output Rob1 (blue button) emits a LOW signal, SCORBOT input 2 turns ON.
- When proLIGHT output Rob1 emits a HIGH signal, SCORBOT input 2 turns OFF.



To check the I/O connections between the mill and the robot:

- 1 Make sure none of the inputs or outputs are turned on in the robot controller, except Input 2. Confirm this by checking the LEDs on the robot controller.

In the WPLM toolbar, the blue **Rob1** input button should be off (not depressed).

- 2 In the WPLM toolbar, click on the blue Rob1 output button and notice the robot controller LED for input 2 on the robot controller. (Button on.)

Click on this button again. (Button off.)

## **Testing the Pneumatic Vise**

In the WPLM toolbar, click on the Acc2 (lower) output button. The vise should open.



Click on this button again. The vise should close.

## **Inspection**

In addition to a safety check and an inventory check at the start of every working session, a routine inspection of the system should also be performed regularly, in the following order:

- 1 Before you power on the system, check the following items:
  - The installation meets all safety standards.
  - All devices and equipment are positioned properly and securely in place.

- All cables and I/O wires are properly and securely connected. Cable connector screws are fastened.
  - No people are within the robot's working range.
- 2** After you have switched on the PCs and the controllers, check the following items:
- The power and motor LEDs light up.
  - No unusual noises are heard.
  - No unusual vibrations are observed.
  - There are no obstacles in the robot's working range.
- 3** Activate the robot homing procedure. Check the following items:
- Robot movement is normal.
  - No unusual noise is heard when robot arm moves.
  - Robot reaches home position in every axis.
- 4** Home the milling machine and initialize a workpiece. Check the following items:
- Cross-slide and spindle movement is normal.
  - No unusual noise is heard when the cross-slide and spindle move.
  - The machine home and workpiece home are successfully set.

## FMS: Installing the Turning Center



Figure 18: FMS with Prolight 3000, LSB 1.8 and ER9

After installing the machining center, the next step is to install the turning center, as described in the following sections.

## ***Lathe and Lathe Controller***

Install the proLIGHT or SpectraLIGHT lathe and controller according to the instructions in the appropriate documentation:

- *proLIGHT 3000 Turning Center User's Guide*
- *SpectraLIGHT 0400 Turning Center User's Guide*

## ***Installing the Pneumatic Chuck***

The Pneumatic chuck is a factory-installed option.

To install the pneumatic chuck:

- 1 Plug the power cord from the solenoid valve on the chuck into the receptacle end of the accessory port adapter cable.
- 2 Remove the protective cap from the other end of the accessory port adapter cable, and then plug it into the receptacle labeled ACC2 on the rear panel of the Controller.
- 3 Connect the air line from the pneumatic chuck to the air supply line and regulator.

## ***Turning Center Cable Connections***

Connect the machining center components to each other according to the instructions in the appropriate documentation:

- *proLIGHT 3000 Turning Center User's Guide*
- *SpectraLIGHT 0400 Turning Center User's Guide*

## ***Robot-Lathe Input/Output Connections***

Using the interface cable (9-pin connector on one end and exposed wires at the other end) connect the robot and lathe.

- Connect the 9-pin connector to the TTL I/O connector on the rear of the lathe Controller.
- Connect the exposed wires to the Controller I/O terminals as follows:

| <b>Cable</b> | <b>Robot Controller Terminal</b>  |
|--------------|-----------------------------------|
| Green        | Output # 3 (source configuration) |
| Black        | Common ground                     |
| Red          | +24 volts                         |

For more information, refer to the documentation provided.

## **WPLT 3000 Lathe Control Software Installation and Activation**

Install the WPLM or WSLM control software according to the instructions in the appropriate documentation:

- *proLIGHT 3000 Turning Center User's Guide*
- *SpectraLIGHT 0400 Turning Center User's Guide*

## **Testing Robot-Lathe Input/Output Communication**

When the Lathe and robot controllers are connected, the LED for Input 3 on the robot controller is constantly turned on. Due to reverse logic in the proLIGHT controller, I/O responses in this FMS differ from typical responses. Note the following:

- When proLIGHT output Rob1 (blue button) emits a LOW signal, SCORBOT input 3 turns ON.
- When proLIGHT output Rob1 emits a HIGH signal, SCORBOT input 3 turns OFF.



To check the I/O connections between the lathe and the robot:

- 1 Make sure none of the inputs or outputs are turned on in the robot controller, except Input 3. Confirm this by checking the LEDs on the robot controller.

In the WPLT toolbar, the blue Rob1 input button should be off (not depressed).

- 2 In the WPLT toolbar, click on the blue Rob1 output button. See the blue Rob1 output button, robot controller LED for input 3 on the robot controller
- 3 Click on this button again. (Button off.)

## **Testing the Pneumatic Chuck**

In the WPLT toolbar, click on the Acc1 (lower) output button. The door should open.



Click on this button again. The door should close.

In the WPLT toolbar, click on the Acc2 (lower) output button. The chuck should open.



Click on this button again. The chuck should close.

## ***Inspection***

In addition to a safety check and an inventory check at the start of every working session, a routine inspection of the system should also be performed regularly, in the following order:

- 1** Before you power on the system, check the following items:
  - The installation meets all safety standards.
  - All devices and equipment are positioned properly and securely in place.
  - All cables and I/O wires are properly and securely connected. Cable connector screws are fastened.
  - No people are within the robot's working range.
- 2** After you have switched on the PCs and the controllers, check the following items:
  - The power and motor LEDs light up.
  - No unusual noises are heard.
  - No unusual vibrations are observed.
  - There are no obstacles in the robot's working range.
- 3** Activate the robot homing procedure. Check the following items:
  - Robot movement is normal.
  - No unusual noise is heard when robot arm moves.
  - Robot reaches home position in every axis.
- 4** Home the lathe and initialize a workpiece. Check the following items:
  - Cross-slide and spindle movement is normal.
  - No unusual noise is heard when the cross-slide and spindle move.
  - The machine home and workpiece home are successfully set.

---

# Assembly Station

## Operational Overview

The general operation of the Assembly Station is described as follows:

The Assembly Station assembles parts that may arrive from one of the following locations:

- ASRS
- Other Stations in the CIM System
- Feeders at the Assembly Station

All parts needed for a specific assembly are temporarily stored on a palletizing rack. After all parts are available at the station, the robot begins the assembly process by placing the part on the jig according to the Part Definition. The robot then returns the part to the template on the buffer and then to the conveyor.

## Installation

Unpack the components according to the general unpacking procedures, described in the *General Unpacking and Installation Procedures* section, page 6, and then install the Assembly Station. In addition, unpack and assemble the Slotted table provided.

The Assembly Station can include one or more of the following:

- XY-Table
- Robot (SCORA ER-14, Performer SV3, Scorbot ER-IX, Scorbot ER-4u)
- Part Feeder
- Palletizing Rack
- Automatic Gluing Machine
- Vision System

In determining the proper placement of these components, note the following considerations:

- The robot should easily access the conveyor, the buffers and each of the components.
- Ensure that there is easy access to each of the components for standalone operation.

## Assembly Station with SCORA ER-14

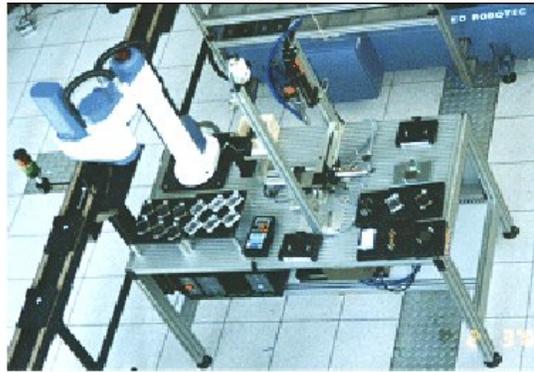


Figure 19: Assembly Station with SCORA ER-14

### ***Operational Overview***

This assembly station includes the SCORA-ER 14 robot system and palletizing racks for assembly operations.

A number of optional add-on application packages enable more sophisticated assembly operations as well as automated quality control inspections.

### ***Installation***

Install and set up the SCORA-ER 14 robot as described in the *SCORA-ER 14 User's Manual* provided.

## Assembly Station with SCORBOT ER-IX



Figure 20: Assembly Station with SCORBOT ER-9

### ***Operational Overview***

This assembly station includes the SCORBOT ER-IX robot system and palletizing racks for assembly operations.

A number of optional add-on application packages enable more sophisticated assembly operations as well as automated quality control inspections.

### ***Installation***

Install and set up the SCORBOT ER-IX robot as described in the *SCORBOT-ER IX User's Manual* provided.

## **Assembly Station with Automatic Glue Dispenser**

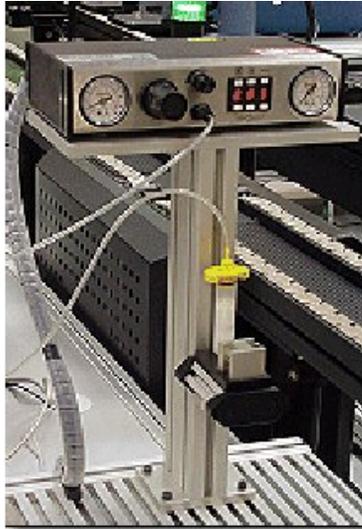


Figure 21: Automatic Glue Dispenser

### ***Operational Overview***

The assembly application package may include several components to enable automated gluing operations.

The package includes an automatic glue dispenser adapted for use in an automated robotic workcell.

### ***Installation***

Install and set up the Automatic Glue Dispenser according to the *Gluing Station Assembly Instructions Technical Note* provided.

---

## QC System with Electronic Calipers

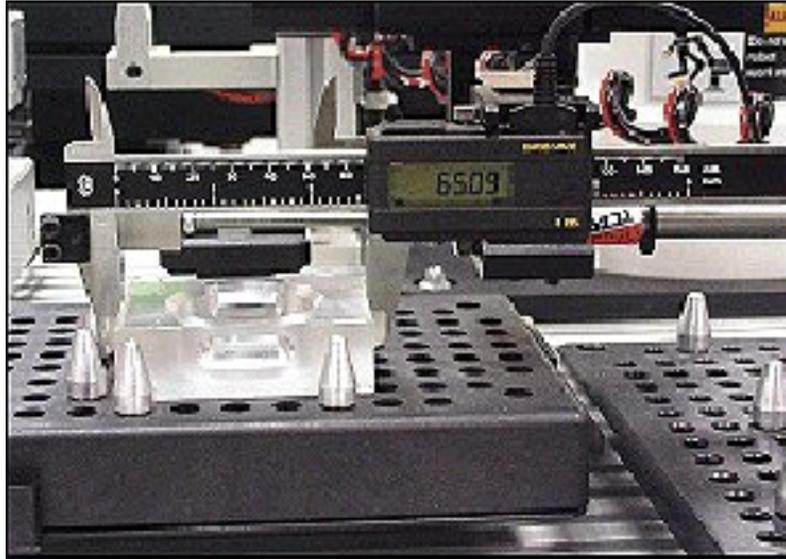


Figure 22: Electronic Calipers

### Operational Overview

The QC system may include an electronic caliper for automatic and precise measurement of parts of up to 150 mm (6"). The gauge is manipulated by a robot and driven by a double-acting pneumatic cylinder. The unit includes an adapter for the robot gripper and a holder for the gauge when at rest.

### Installation

Install and set up the Electronic Calipers according to the *Electronic Calipers Technical Note* provided.

---

## Vision System

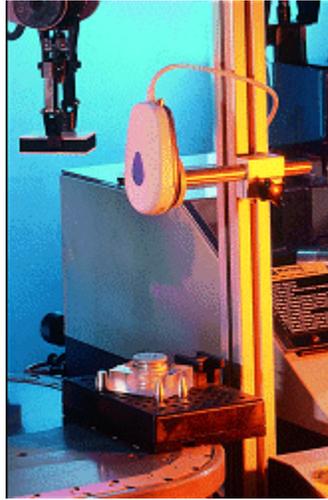


Figure 23: Vision System

## Operational Overview

The vision system usually performs a part inspection in the manufacturing process. The following must be taken into account:

- **Part Handling:** A part is placed in the vision field view, the vision system snaps a picture, analyses it and returns a pass or failed command.
- **Light Conditions:** Depending on the part determine the appropriate stable light conditions.
- **Field View/Height:** Adjust the camera's field view to ensure the best view of the various parts that need to be inspected.

According to your system layout drawings determine the location of the vision system, as follows:

- The robot brings the part to the vision field view. In this case ensure that the robot reaches the surface under the camera without *bumping* into the camera or stand.
- A Linear Position Table or XY Positioning Table brings the part under the field view.
- The camera is located directly above the conveyor station and the part is inspected on the template on the conveyor.

## Installation

Unpack the components according to the general unpacking procedures described in the *General Unpacking and Installation Procedures* section, page 6, and then assemble and install the Vision System, as follows:

- 1 Assemble the camera stand.
- 2 Connect the software protection key.
- 3 Install the ViewFlex Software.
- 4 Install the Camera Software.
- 5 Connect the Camera to your Computer.

A description of each of these steps is described in the *ViewFlex User Manual* provided.

---

## Pneumatics System (PN-2800)

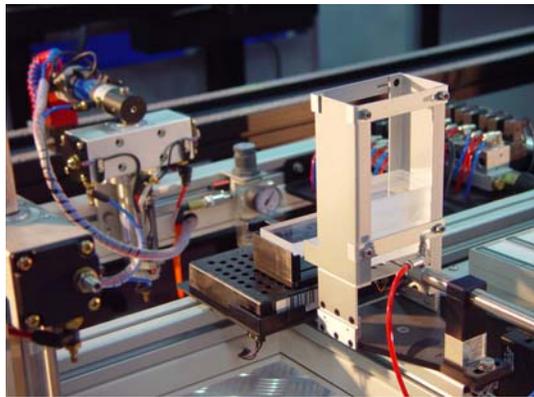


Figure 24: Pneumatics System (PN-2800)

### Operational Overview

The pneumatic station operates as a storage device in CIM. It receives an empty template from the conveyor and places one of three raw materials on the template and returns the part and template to an empty pallet on the conveyor. Position the pneumatics system enabling easy access to the conveyor station according to the layout drawings of your system.

### Installation

Unpack the components according to the general unpacking procedures described in the *General Unpacking and Installation Procedures* section, and then assemble and install the Pneumatics System (PN-2800), as follows:

- 1 Set up and install the Pneumatics System (PN-2800), according to the information described in the *Maintenance Manual for PN-2800*, provided.
- 2 Install the Vuniq software installation (required for this system), as described in the *Pneumatic Device Drivers* section in the *OpenCIM User Manual* provided.

---

## Process Control System (PS-2800 with MODICON PLC and VUNIQ HMI Software)

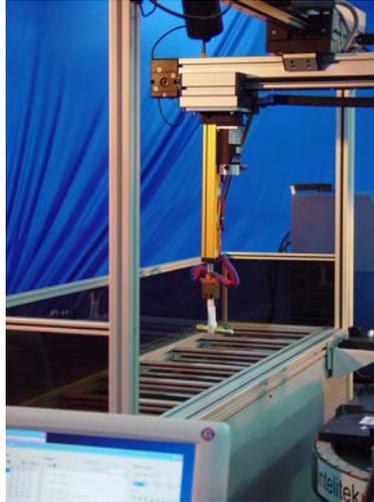


Figure 25: Process Control (PS-2800)

### Operational Overview

The process control station receives a part on a template. It takes the template containing a part from the conveyor and places it on the buffer and then removes the part from template and moves it between the various process compartments according to the predefined program. The processed part is then returned to the template and the template is placed on the conveyor. Position the process control system enabling easy access to the conveyor station and buffer according to the layout drawings of your system.

### Installation

Unpack the components according to the general unpacking procedures described in the *General Unpacking and Installation Procedures* section, and then assemble and install the Process Control System (PS-2800), as follows:

- 1 Set up and install the Process Control System (PS-2800), according to the information described in the *Maintenance Manual for PS-2800*, provided.
- 2 Install the Vuniq software installation (required for this system), as described in the *Process Control Device Drivers* section in the *OpenCIM User Manual* provided.

---

## Process Control System (ER Automated Process Station with Siemens PLC and WINCC Flexible HMI software)

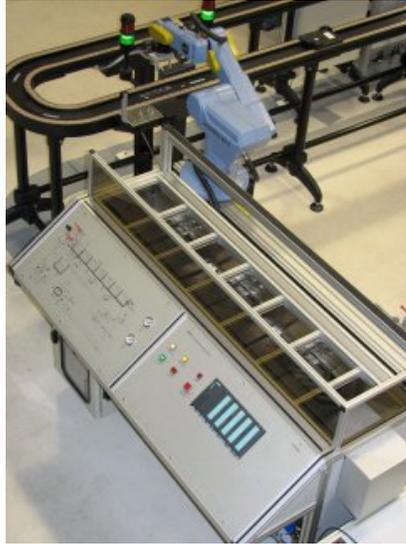


Figure 26: ER Automated Process Station with Siemens PLC

### Operational Overview

The ER automated process control station consists of a process control unit and a tending robot on a linear slide base. The control station receives a part on a template. The robot takes the template containing a part from the conveyor and places it on the buffer. It then removes the part from template and moves it between the various process compartments according to the predefined program. The processed part is then returned to the template and the template is placed on the conveyor. Position the process control system so as to enable easy access to the conveyor station and buffer according to the layout drawings of your system.

### Installation

Unpack the components according to the general unpacking procedures described in the *General Unpacking and Installation Procedures* section, and then assemble and install the Process Control System (PS-2800) as follows:

- 1 Set up and install the Process Unit according to the information described in the *User Manual for ER Process Station*. During the installation, ensure that the robot on the linear slide can access all relevant areas of the process station and as well the buffer and conveyor stop station.

- 2 Install the WINCC flexible software required for this system as described in the relevant product documentation.
- 3 Open the relevant project (supplied by Intelitek) in the WINCC software. Test the basic system operation in MANUAL MODE.
- 4 Connect the COM1 port of the PC to the CP340 RS212 communication module of the Siemens PLC.
- 5 In WINCC, switch to ROBOT MODE and test the interface between the robot and the PLC using the supplied robot programs. Adjust the programs according to your requirements.

---

## Hydraulic System (HYD-2800)

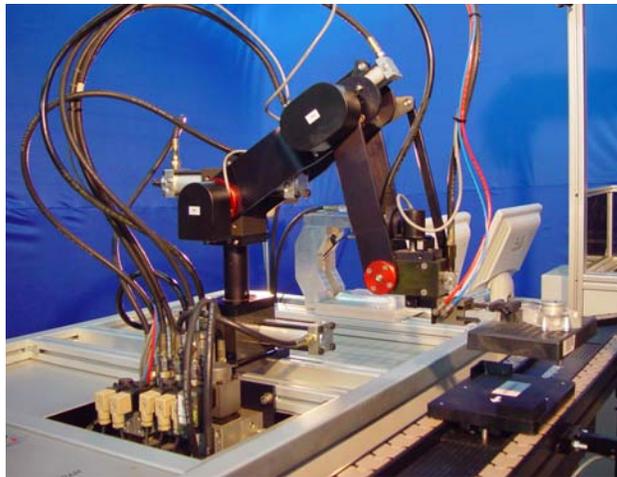


Figure 27: Hydraulic System (HYD-2800)

### Operational Overview

The Hydraulic system contains a Hydraulic Robotic Arm and Hydraulic Press. The Hydraulic Station receives a template carrying a part assembly. The Hydraulic Robotic Arm takes the template containing the part assembly from the conveyor and places it on the Hydraulic Press.

The Hydraulic Press compresses and combines the two parts and the Hydraulic Robotic Arm then returns the processed part assembly to the conveyor.

The processed part is then placed on the conveyor. Position the Hydraulic system enabling easy access to the conveyor station and buffer according to the layout drawings of your system.

### Installation

Unpack the components according to the general unpacking procedures described in the *General Unpacking and Installation Procedures* section,

and then assemble and install the Hydraulic System (HYD-2800), as follows:

- 1 Set up and install the Hydraulic System (HYD-2800), according to the information described in the *Maintenance Manual for HYD-2800* provided.
- 2 After you have set up the hardware, as described in the HYD-2800 Hydraulic Station Maintenance Manual, install Advantech's DLL driver software. This includes inserting the PCI-1711 card, installing the device driver and defining the settings. For additional details refer to the *Advantech DLL Drivers User's Manual and Programmers Reference* that was provided with the software.

---

## AGV (Automated Guided Vehicle) ER-400



Figure 28: AGV (ER-400)

### Operational Overview

The ER-400 automated guided vehicle (AGV) provides a means of transporting light parts between different areas within an industrial installation, such as a CIM conveyor system and a remote robot workstation. It can be fitted with an optional Internet camera system for guidance and/or surveillance operations.

### Installation

- 1 Set up the specified docking stations and path as designated on the site layout plans included with your shipment. Note the following guidelines:

- 0.5 meters should be clear on each side of the AGV for the entire length of the path.
  - The path should be no more than 5 meters in length
  - The path should not include more than one turn
  - If the path includes a turn, it should be 90 degrees
- 2 Install the control software on the AGV and the workstation PC, as specified in *ER-400 AGV Mobile Robot User Manual*.
  - 3 Calibrate the AGV, docking station camera and robot to ensure smooth docking operations. Note the following guidelines:
    - Orient the robot's X axis toward the point where the AGV will dock.
    - Mount the camera rigidly and aim it so that the center of the docking area is at the center of the camera's field of view.
    - Mount the camera as low as possible, without interfering with the operation of the robotic arm.
  - 4 Test the operation of the AGV as specified in *ER-400 AGV Mobile Robot User Manual*.
  - 5 If the AGV includes the optional Internet Camera, follow the instructions in the *Wireless Internet Camera for ER-400 Installation Guide*.

---

## Light Barrier



Figure 29: Light Barrier

## Operational Overview

The light barrier is a system of infra-red transmitters, reflectors and receivers that form an invisible fence to activate an alarm or stop system operation if a person enters a robot's work envelope or an AGV ventures outside its designated path.

## Installation

Place the transmitters, reflectors and receivers in the locations specified on the site layout plans provided with your system. Ensure that each component is mounted securely and is protected from traffic. For more information, refer to the documentation provided with the system.

---

## Industrial Robot Motoman-HP3



Figure 30: HP3 – Assembly and QC



Figure 31: HP3 – FMS

## Operational Overview

The Motoman HP3 is an industrial six-axis vertically articulated robot. Within Intelitek's CIM systems it can be used for machine tending, assembly, welding and other applications.

It is important to carefully study all the relevant safety instructions for this robot and to become familiar with the robot before planning and integrating the specific application.

## Installation

- 1 Set up the application as specified on the site layout plans included with your shipment or according to your own design. Note the following guidelines:
  - The HP3 should be mounted on a rigid stand or linear slide.
  - The HP3 must be able to reach all relevant areas of the application.
  - The layout should block human access to the robot workspace as much as possible
  - Depending on local safety regulations, the customer may have to add additional fail-safe safety systems to prevent human access to the robot's workspace while it is in use.
  - Install the relevant software (SCORBASE, MOTOCOM32, JOB EXCHANGER and SENTINEL DRIVER) on the workstation PC.
  - Setup the NXC100 controller for operation in CIM (this requires online support from Intelitek).
  - Write the required Jobs for the HP3 in INFORM language.
  - Teach the relevant robot positions.
  - Write the relevant SCORBASE control programs.

---

## Third Party Industrial Robots

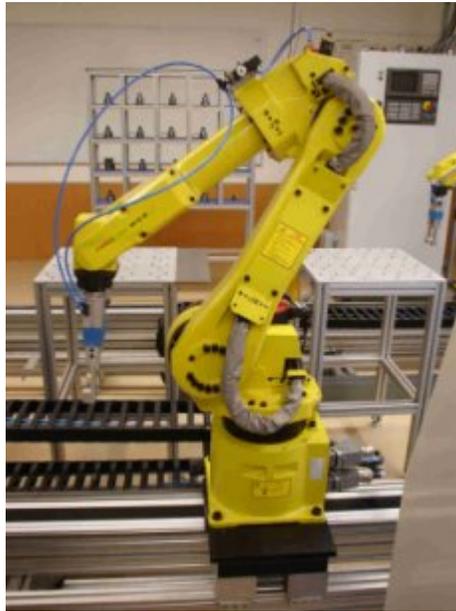


Figure 32: Third Party Robot

### Operational Overview

Most third party robots can be integrated into Intelitek's CIM systems using either an I/O interface, a RS232 interface or a network. Within Intelitek's CIM systems they can be used for machine tending, assembly, welding and other applications.

Carefully study all relevant safety instructions for the relevant robot and become familiar with the operation of the robot before planning and integrating the specific application. The type of communication integration required should be determined before the installation is started. If possible, it is advisable to test the desired interface with Intelitek in advance.

### Installation

- 1 Set up the application as specified on the site layout plans included with your shipment or according to your own design. Note the following guidelines:
  - The robot should be mounted on a rigid stand or linear slide.
  - The robot must be able to reach all relevant areas of the application.
  - The layout should block human access to the robot workspace as much as possible.

- Depending on local safety regulations, the customer may have to add additional fail-safe safety systems to prevent human access to the robot's workspace while it is in operation.
- Install the relevant software on the workstation PC.
- Set up the robot controller for operation in CIM (check with the manufacturer of the specific controller regarding requirements, such as the use of I/O's, RS232, remote control, messaging).
- Write the required Jobs for the robot in the relevant language.
- Teach the relevant robot positions.
- Write the relevant interface programs.

---

## Linear Slide Base with XtraDrive



Figure 33: XtraDrive Linear Slide Base – Type 1



Figure 34: XtraDrive Linear Slide Base – Type 2



Figure 35: XtraDrive Linear Slide Base – Type 3

## Operational Overview

XtraDrive controlled linear slides are intended for use with industrial type robots. Each linear slide is customized for the specific robot type. The controller (XtraDrive) and the control software (XtraWare) are the same for all robot types.

## Installation

- 1 Set up the specified application as designated on the site layout plans included with your shipment or according your own design. Note the following guidelines:
  - The linear slide should be mounted on a rigid and level concrete base. During installation, ensure that tensions are not built up in the slide when it is fastened to the base.
  - After the linear slide is adjusted and attached, the robot must be mounted on it.
  - The robot must be able to reach all relevant areas of the application.
  - The layout should block human access to the robot workspace as much as possible.
  - Depending on local safety regulations, the customer may have to add additional fail-safe safety systems to prevent human access to the robot's workspace while it is in operation.
  - Install the relevant software (XtraWare) on the workstation PC.
  - Set up the XtraDrive controller for operation in CIM. (Consult the user manual for the specific controller to determine the correct sequence).

- Write the required programs for the linear slide within the XtraWare environment.
- Write the relevant interface programs.

---

## Interfacing Third Party CNC Machines



Figure 36: Third Party CNC Machine

### Operational Overview

Most third party CNC machines can be integrated into Intelitek's CIM systems using either an I/O interface, a RS232 interface or a network.

Carefully study all relevant machine specifications and determine whether the particular CNC machine can be integrated into CIM and be tended by a robot, before proceeding with installation.

### Installation

- 1 Set up the specified application as designated on the site layout plans included with your shipment or according to your own design. Note the following guidelines:
  - The CNC machine should be mounted on a solid and level concrete base or other suitable base structure. (Follow the instructions provided by the machine's manufacturer).
  - The robot must be able to reach all relevant areas within the machine. Check that the reach of the robot extends to the machine's clamping device and that the gripper can assume the required orientation.

- The layout should provide maximum human access to the CNC machine for standalone use but should also ensure a safe workspace during automatic mode (CIM/FMS).
- Depending on local safety regulations, the customer may have to add additional fail-safe safety systems to prevent human access to the robot's workspace while it is tending the machines.
- Install the relevant CNC software on the workstation PC.
- Set up the robot for the CNC interface (check with the manufacturer of the specific controller regarding requirements, such as the use of I/O's, RS232, remote control, messaging). Standard functions that are required include open door, close door, open clamp, close clamp, cycle start, as well as their relevant status signals. Some machines also allow activation and status check of these functions via RS232 or TCP/IP.
- Write the required G-code for the CNC machine in the relevant language.
- Teach the relevant robot positions.
- Write the relevant interface programs for the robot.
- Test the CNC interface standalone.



# 3

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## PC Network Connections

This chapter describes how to set up the PC network. It includes the following sections:

- **Specifications**, below, contains the CIM system specifications which can be used as a guide.
- **Hardware Setup**, below, contains a general description for setting up the cable connections in the system.
- **Network Setup**, page 48, describes how to set up the PC network and define the names for the CIM Manager and Workstation PC's in the network.

---

### Specifications

Refer to the specifications for each component in the CIM system. The following specifications can be used as a guide to operate the CIM system:

- **Computer:** PENTIUM3/500MHz or higher for all PC's in the CIM system.
- **Internal Memory:** 128MB RAM or higher.
- **PC Available Ports:** BUS mouse and 2 available COM ports, with a LAN card installed on all PC's.
- **Hard disk:** Containing at least 2 GB, as well as a CD ROM drive and a floppy disk 3.5".
- **USB Port:** Required for operating the Vision System

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### Hardware Setup

To set up the hardware:

- Plug the HUB into to a power source.
- Plug the LAN cables from the HUB to each of the PC's in the system.

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## Network Setup

To set up the network:

- 1 Right click on **Network Neighborhood** icon on your desktop. A popup menu is displayed. Select **Properties** to display the properties dialog box and select the **Identification** tab. (This procedure may vary slightly depending on your operating system.)
- 2 Enter **CIM-MANAGER** as the manager's computer name.
- 3 Enter **CIM** as the workgroup.
- 4 Repeat steps 1 through 3 for each of the PC workstations, as follows:
  - **Station 1 PC:**
    - ◆ Enter **CIM-PC1** as the station 1 PC name.
    - ◆ Enter **CIM** as the workgroup
  - **Station 2 PC:**
    - ◆ Enter **CIM-PC2** as the station 1 PC name.
    - ◆ Enter **CIM** as the workgroup
  - **Station 3 PC:**
    - ◆ Enter **CIM-PC3** as the station 1 PC name.
    - ◆ Enter **CIM** as the workgroup

Repeat the above for the remaining workstations in your CIM system.

**Note:** Make sure that when selecting the **Network Neighborhood** icon on your desktop, you view the CIM workgroup in the browser tree, and in addition, all the PC names can be seen from all computers.

- 5 In each of the computers in the system, select **Network Neighborhood** and then select the **Configuration** tab.
- 6 Select the **TCP/IP Driver** option and then select **Properties**. The TCP/IP Properties window is displayed. Ensure that the **Obtain IP Address Automatically** checkbox is selected.

# 4

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## OpenCIM Software Installation

This chapter describes the basic installation procedures of the OpenCIM software and device drivers in the CIM system. For further details on the installation and configuration refer to the *OpenCIM User Manual* provided. It includes the following:

- **Installing the OpenCIM Software**, below, describes how to install the OpenCIM software on the Manager PC and PC workstations.
- **Installing the Project and Device Drivers**, page 50, describes how to import projects the OpenCIM Software and define the device driver shortcuts.

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### Installing the OpenCIM Software

This section describes how to install the OpenCIM software.

To install the OpenCIM Software and Device Drivers:

- 1 On the Manager PC, install the OpenCIM Software, by selecting the required option from the OpenCIM Installation CD.
- 2 On each workstation PC install the workstation environment from the OpenCIM Installation CD.
- 3 In the MANAGER P.C Desktop go to **MY COMPUTER**.
- 4 Go to **C:\PROGRAM FILES\INTELITEK**. Right click on the **OPENCIM** folder and select **Sharing and Security** from the popup menu. The OpenCIM properties window is displayed.
- 5 Select the **Sharing** tab, and select the **Shared As** option. In the **Share name** field enter **MANAGER-C**.
- 6 In the **Access Type** option select **Full**. A sharing sign will appear on the drive containing the OpenCIM folder.
- 7 On all the other PC's in the system right click on the **Network Neighborhood** icon on your desktop.

- 8 From the **Tools** menu, select **Map Network Drive**. From the **Drive** dropdown list select the available letter after the letter that represents your CD drive. For example **F**.
- 9 In the **Folder** line enter **//MANAGER C**, and select the **Reconnect at logon** check box and click **Finish**.
- 10 To verify that the drive was mapped accordingly, perform the following:
  - Shutdown all the PC's.
  - Turn on the manager PC. When the desktop appears, turn on CIM-PC1.
  - When desktop appears, click on **MY COMPUTER**. The MANAGER PC appears as a drive.

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## Installing the Project and Device Drivers

- 1 After installing the OpenCIM Software and Device Drivers the next step is to install the project and device drivers, described as follows.
- 2 To install the project and device drivers:
- 3 From the **Manager PC**. Click on the  **Project Manager** icon on the manager computer. The CIM Project Manager window is displayed.
- 4 From the **Projects** menu select **Import**. The Import window is displayed.
- 5 Select the drive from which you want to import from, and click **Open** to open the project folder and then select the displayed **\*.O2C** file.
- 6 The new project will appear in the project manager list.
- 7 Double click on the new project to activate the CIM Manager software. The CIM Manager window is displayed.
- 8 Click the  **CIM MODES** icon. The Modes window is displayed.
- 9 Select the **Simulation Mode** option and click **SAVE**.
- 10 On each workstation desktop, create the relevant loader shortcut to the Manager PC. The icons are situated in the new project folder, in a folder called **OPENCIM\_projectname**.

11 You can now test the device drivers are working properly, as follows:

- Click on the relevant device driver loader icon, such as . The **CIM DD Loader** window is displayed.
- In the CIM DDLoader window, ensure that the Load option is selected for the **ACLDRIVER** and click the green  **Run** button to test the Device Drivers. The **ACL Device Driver** window is displayed.
- In the **Send to Controller** field enter **RUN HOMES** to home all the robots.
- From the CIM Manager window, run the CIM system in Simulation mode.



# 5

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## Acceptance Testing Procedures

After installing hardware, connecting the PC network and installing the software components the final step is to verify that the CIM system is working properly. This includes:

- Standalone Testing Procedures, below, describes how to prepare the parts and programs, as well as the machine and station testing procedures and more.
- Testing the CIM System in Real Mode, page 57, describes how to power up the system, initializing the system devices, activating the device drivers and run a test production in real mode.

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### Standalone Testing Procedures

This section describes standalone testing procedures required before running the CIM system in real mode.

The machine and station testing procedures contains the following:

- Preparing parts and programs required for the demo and tests.
- Testing each hardware component separately using the machine operational environment (in standalone mode).
- Testing each station using the OpenCIM device drivers.
- Testing the Production cycle in simulation mode.
- Testing test the production in real mode, with the device drivers in simulation mode.
- Testing full cycle using a single part of each type in dry run.
- Testing full cycle using a single part of each type.
- Testing full cycle using multiple parts of different types (described in the *Testing the CIM System in Real Mode* section.)

Each of these standalone procedures is described in full in the following section.

To perform the standalone testing procedures:

- 1 According to your system layout drawings provided with your CIM system, first prepare the parts and programs required for the demonstration run as well as the tests required in each machine and in the PC manager station.
- 2 Test each hardware component (such as, Robot, Machine, Vision, Conveyor and so on) separately, using the machine operational environment (stand alone). Verify that the appropriate interface (hardware, communication and programs) exists between the stations.

Test the required hardware components, as follows:

- **To test the ASRS:**
  - ◆ Using the ATS software operate the ASRS-36
  - ◆ Home the robot
  - ◆ Run the test program that accesses each bay in the ASRS, to verify that all positions are correctly taught (see the **side1** ACL program).
  - ◆ Manually send the ASRS to the positions used to access the conveyor and barcode, verify that all positions are taught correctly. See the *Position Table* provided with your CIM system for details.
- **To test the conveyor:**
  - ◆ Operate the conveyor and PLC without pallets and verify smooth operation.
  - ◆ Place pallets on the conveyor and verify that they are stopped and released at each station. Notice the PLC led indication of each palette ID.

**Note:** Ensure that the pallet arrows are pointing in the direction that the conveyor is moving.

- **To test the robot:**
  - ◆ Using the ATS software, operate the robot.
  - ◆ Home the robot

- ◆ Manually send the robot to all relevant positions, first without using parts, and then using parts, as follows:
  - ◆ Take a template from the conveyer and place it on the buffer, and then take the part off the buffer and place it in the machine.
  - ◆ Take the part from machine and place it on the buffer, and then take the part off the buffer and place it on the conveyor.

**Note:** Be sure to test all positions by simulating a full production cycle

- ◆ Verify that the I/O connections exist between the machine and the robot (check the robot input is **ON/OFF** when the machine cycle starts and finishes.) See the provided *I/O Table* for details of your CIM system.
- ◆ Verify the RS-232 connection. (Start the CNC machine and use the **PLACE** or **CLEAR** programs in the ACL software to send RS-232 commands from the ACL software to the CNC.)
- **To test the CNC machine:**
  - ◆ Load the appropriate part and program into the CNC machine.
  - ◆ Run a production cycle.
  - ◆ Repeat for each part as described in the provided *Test Application Description*.
- **To test the Vision Station:**
  - ◆ Place the part to be inspected under the vision system.
  - ◆ Snap the picture and verify appropriate analysis by the vision system.

Repeat the previous steps for all parts as described in the *Test Application Description* provided with your CIM system.

**Note:** If light conditions (or any other conditions) may affect the vision, test all relevant scenarios. For example, day, night, open and close shades.

- 3 Test each station (such as, FMS, Storage) using the appropriate OpenCIM Device drivers, as follows:
  - **To test the robot:**

In the ACL device driver open the Pick and Place dialog box and send commands to the robot to move parts from one location to another (first running a cycle in dry run without using parts), as follows:

    - ◆ Take a template from the conveyer and place it on the buffer, and then take the part off the buffer and place it in the machine.
    - ◆ Take the part from machine and place it on the buffer, and then take the part off the buffer and place it on the conveyer.

**Note:** Be sure to test a full production cycle
  - **To test the Barcode Reader:**
    - ◆ Using the Barcode reader device drivers test the operation of the barcode reader (in standalone mode).
  - **To test the CNC machine:**
    - ◆ Operate the CNC machine for each device driver using available commands such as **Open Door, Close Door, Open Chuck Close Chuck, Start Cycle** and more.
  - **To test the Vision System:**
    - ◆ Activate the vision system using the ViewFlex device driver as described in the *OpenCIM User Manual* and *ViewFlex User Manual* provided.
- 4 Test the production cycle using the CIM Manager application in simulation mode.
- 5 Test the production cycle using the CIM Manager application in simulation mode using device drivers.
- 6 Test a full production cycle using a single part of each type without using parts (dry run).
- 7 Test a full production cycle using a single part of each type.
- 8 Test a full production cycle using multiple parts of different types. (Described in detail in the *Testing the CIM System in Real Mode* section.)

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## Testing the CIM System in Real Mode

After performing the machine and station testing procedures, the next step is to power up the system and activate the devices and device drivers and run the production cycle in real mode.

This section includes:

- *Powering up the System*, below
- *Initializing System Devices*, page 58
- *Activating Device Drivers*, page 63
- *Preparing the System for Production*, page 66
- *Running the Manufacturing Process (Real Mode)*, page 67
- *Documenting Test Procedures*, page 68

### Powering Up the System

To power up the system:

- 1 Turn on the Main Power Switch of the System.
- 2 Activate the air compressor.
- 3 Power on the computers in the following sequence:
  - **CIM-Manager Computer** (must be booted first since it shares folders to other PC's).
  - **CIM-PC1**
  - **CIM-MILL**
  - **CIM-LATHE**
  - **CIM-PC2**
  - **CIM-PC3**
  - **CIM-PC4**

If you start from the CIM Manager and proceed counter clockwise around the system you will automatically follow this sequence.

After the computers are booted you need to login. Make sure the user displayed is identical with the PC-name listed above. The login must be in the same sequence as before.

## Initializing System Devices

Most of the devices will be powered on automatically by the Main Switch provided the device power switch was in **ON** position and the system was shutdown by the Main Switch. Please verify correct status for each machine, each of which is described in the sections that follow:

- **Robots**
- **CNC Machines**
- **ViewFlex system**
- **PLC**

### **Robots**

Test the robots, as follows:

- **ASRS36 (Station 1)**
  - Check that the controller (Controller Type A) is powered on and that the robot arm is approx. in the middle of the ASRS, fork gripper pointing towards the shelves.
  - Run the HOMES procedure by pressing RUN 1 on the Teach Pendant or by using the RUN HOMES command from the ATS software on the Station 1 computer.  
Refer to the relevant user manuals for further details (ATS 1.9, ACL Language for Controller A, ASRS-36 with Controller-A, for example).
- **ER9 with LSB 1m (Station 2)**
  - Check that the controller (Controller Type B) is powered on and that the robotic arm on the LSB is located between the conveyor and the CNC machine, pointing towards the conveyor or towards the free space.
  - Run the HOMES procedure by pressing RUN 1 on the Teach Pendant (Teach Mode) or by using the RUN HOMES command from the ATS software on the Station 2 computer. Make sure that after the homing procedure is finished the TP is in AUTO mode and the AUTO command was typed in the ATS.  
Please refer to the user manuals for further details (ATS 2.0, ACL Language for Controller B, ER9, Controller B, Teach Pendant B)
- **PN-2800 (Station 3)**
  - Check that the PN-2800 has the correct air pressure and power on the PLC (MODICON).  
Refer to the relevant user manuals of the PN-2800 for further details.

- **PS-2800 (Station 4)**
  - Check that the PS-2800 has the correct air pressure and power on the PLC (MODICON).

Refer to the user manuals of the PN-2800 for further details.

### **CNC Machines**

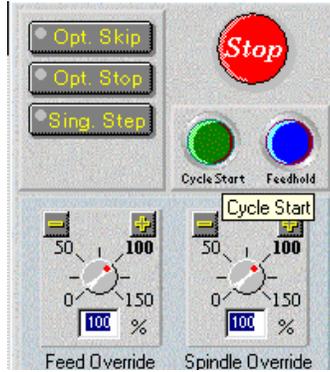
- **ProLIGHT 1000 (MILL1, Device ID 23)**
  - Ensure that the power to the control box is turned on. Turn on the Mill PC.

- Click on the **WPLM1000**  icon on the desktop to run the Mill software. The software loads automatically.
- From the **Setup** menu, select **Set/Check Home** to home the mill. The Machine **Home/ References Point** window is displayed.

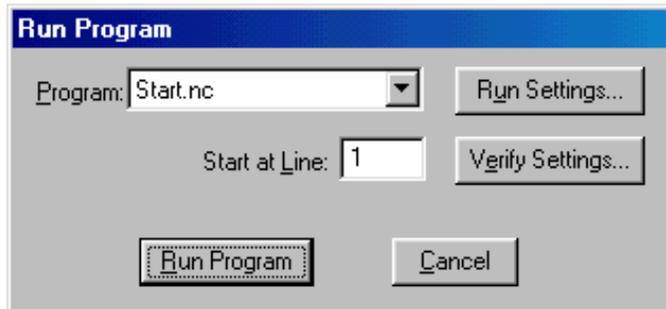


- Click the **Quick Home** button.

- From the **File** menu select the **Start.NC** program. The **START** program is loaded and displayed on the screen.
- On the Operator Panel click the green **Cycle Start** button.



- From the displayed Run Program window click the **Run Program** button.



The tool will move to the start position and wait for the robot to insert the part in the machine. The machine is now ready for operation in the CIM System.

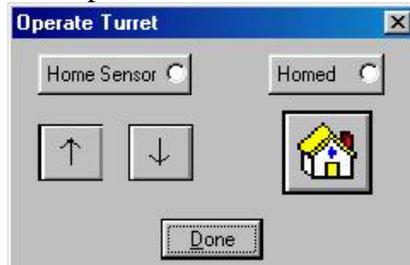
- **ProLIGHT 3000 (LATHE1, Device ID 24)**

- Ensure that the power to the control box is on.
- Turn on the lathe PC
- Click on the **ProLIGHT Lathe**  icon on the desktop to run the Lathe software. The software will be activated automatically.
- Home the lathe.
- From the **Setup** menu, select **Set/Check Home** to home the lathe. The Machine **Home/ Reference Point** window is displayed.



- Click the **Quick Home** button.
- To home the turret tool, select **Operate Turret** from the **Tools** menu.

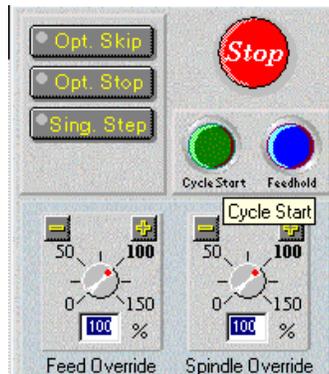
The Operate Turret window is displayed.



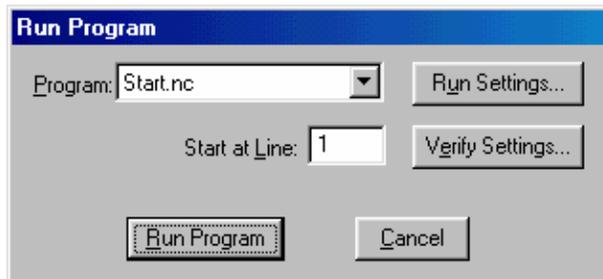
- Press on the home picture . The tool turret will home.
- Press the **Done** button.
- Click on the **File** menu and select the **START.NC** program.

The **START** program is loaded and displayed on the screen.

- On the Operator Panel click the green **Cycle Start** button.



- From the displayed Run Program window click the **Run Program** button.

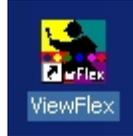


The tool will move to the start position and wait for the robot to insert the part in the machine. The lathe is now ready for operation in the CIM System.

## Vision System

Testing ViewFlex operation:

- Activate Viewflex by double clicking the icon on the desktop.



The ViewFlex toolbar is displayed:



- Select camera 1 and check if you see a picture. If not unplug the USB connector of the camera and plug it in again.
- Exit the ViewFlex application.

## Programmable Logic Controller (PLC) - Omron

Operating the PLC:

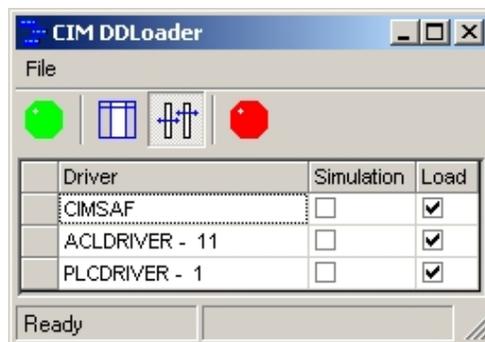
- Open the front door of the PLC cabinet on the right side of the manager table and press the green button. The PLC unit will begin to operate.

## Activating Device Drivers

Activate all Device Drivers (DD's) on Station PC's with the Loader Icon. The example below describes the procedure for Station 1 on CIM-PC1.

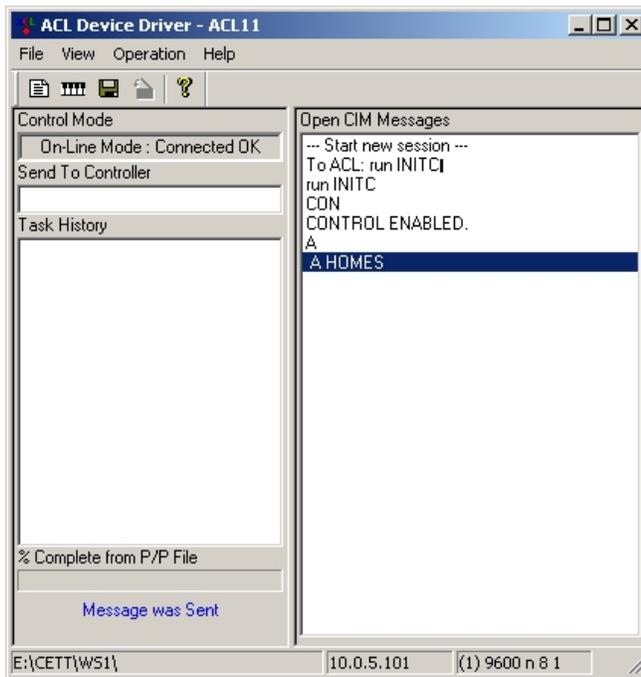
To activate the station 1 Device Drivers:

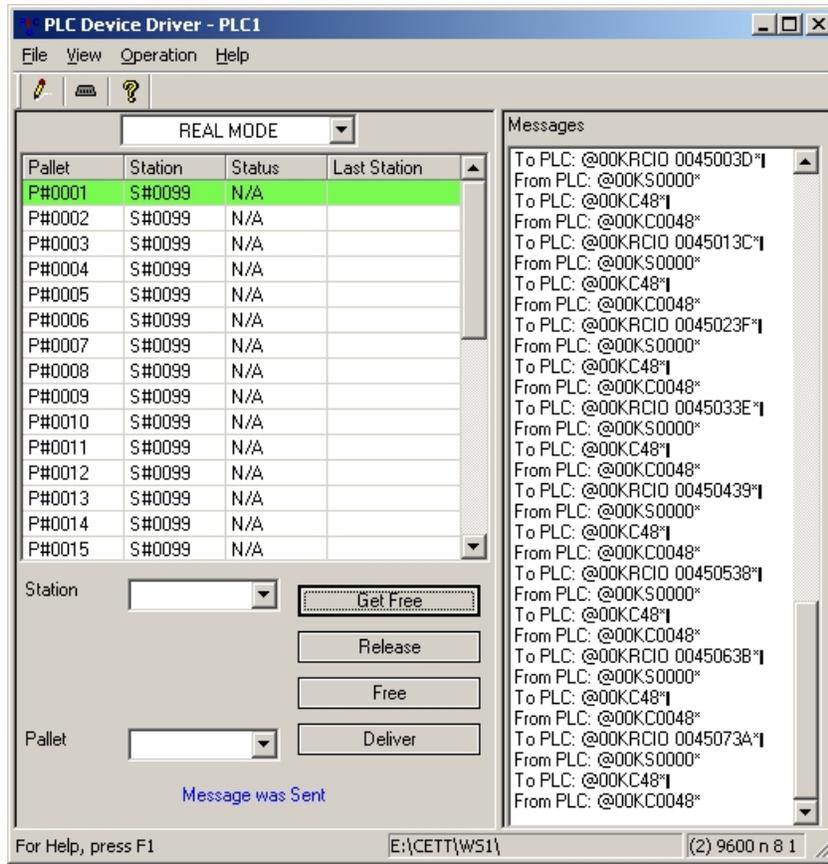
- 1 Double Click the  **Loader** Icon located in the lower right corner of the Desktop. The CIM DD Loader window is displayed.



- 2 Click on the green  **Start** button on the CIM DD Loader toolbar.

A CIM Safety message box and the Device Drivers will be displayed, as follows:





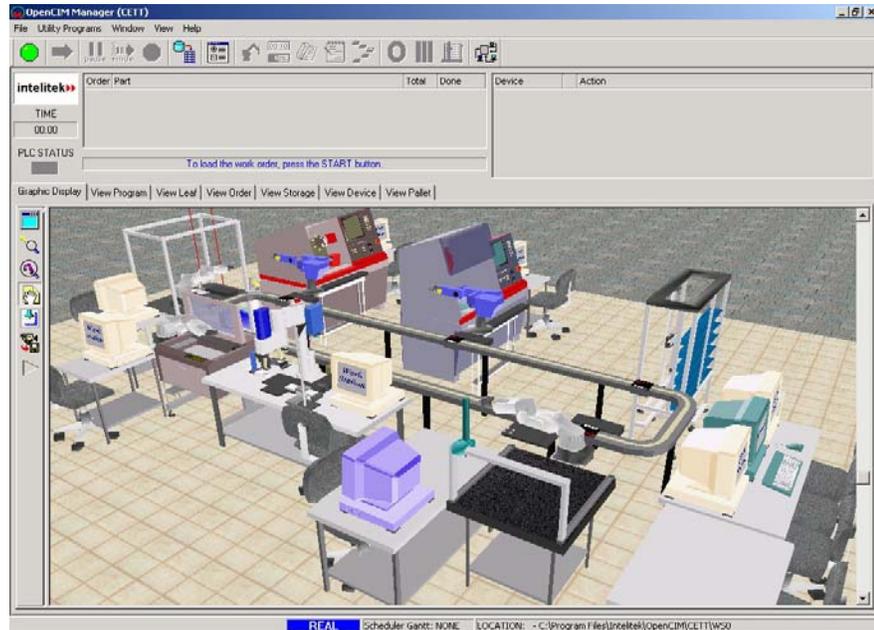
- 3 Repeat steps 1 through 2 for all stations.
- 4 Check the system for any visual for obstacles and return all parts/templates to their original location. Meaning, ensure the templates are empty, parts are in their original storage location and so on.

## Preparing the System for Production

Preparing the System for Production in CIM manager

To prepare the system for production:

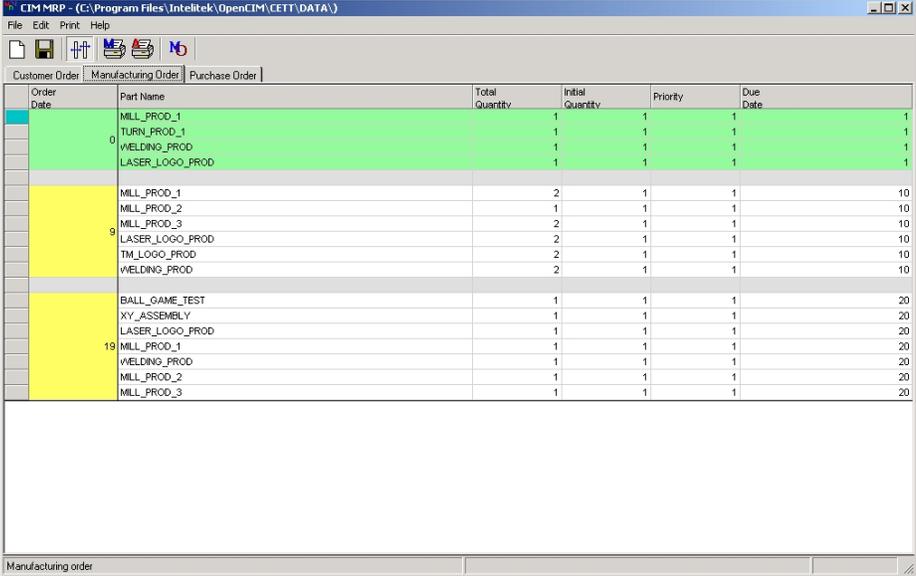
- 1 Activate the CIM Manager software on the PC Manager computer by double clicking on the **CIM Manager**  icon in the lower right corner of the desktop. The CIM Manager window is displayed.



- 2 From the **Utilities Programs** menu select the **MRP**. The CIM MRP window is displayed.

| Customer      | Part Name       | Required Quantity | Priority | Due Date |
|---------------|-----------------|-------------------|----------|----------|
| Termomecanica | MILL_PROD_1     | 1                 | 1        | 1        |
|               | TURN_PROD_1     | 1                 | 1        | 1        |
|               | WELDING_PROD    | 1                 | 1        | 1        |
|               | LASER_LOGO_PROD | 1                 | 1        | 1        |
| CIM_TEST      | MILL_PROD_1     | 2                 | 1        | 10       |
|               | MILL_PROD_2     | 1                 | 1        | 10       |
|               | MILL_PROD_3     | 2                 | 1        | 10       |
|               | LASER_LOGO_PROD | 2                 | 1        | 10       |
|               | TM_LOGO_PROD    | 2                 | 1        | 10       |
|               | WELDING_PROD    | 2                 | 1        | 10       |
| CIM_TEST_2    | BALL_GAME_TEST  | 1                 | 1        | 20       |
|               | XY_ASSEMBLY     | 1                 | 1        | 20       |
|               | LASER_LOGO_PROD | 1                 | 1        | 20       |
|               | MILL_PROD_1     | 1                 | 1        | 20       |
|               | WELDING_PROD    | 1                 | 1        | 20       |
|               | MILL_PROD_2     | 1                 | 1        | 20       |
|               | MILL_PROD_3     | 1                 | 1        | 20       |

- 3 In the **Customer Order** tab of the CIM MRP window you can create a new order or modify an existing order. Click the **MRP**  icon to create the order.
- 4 In the **Manufacturing Order** tab, select an order date and click the **MO**  icon to submit the manufacturing order.



| Order Date | Part Name       | Total Quantity | Initial Quantity | Priority | Due Date |
|------------|-----------------|----------------|------------------|----------|----------|
| 0          | MILL_PROD_1     | 1              | 1                | 1        | 1        |
|            | TURN_PROD_1     | 1              | 1                | 1        | 1        |
|            | WELDING_PROD    | 1              | 1                | 1        | 1        |
|            | LASER_LOGO_PROD | 1              | 1                | 1        | 1        |
| 9          | MILL_PROD_1     | 2              | 1                | 1        | 10       |
|            | MILL_PROD_2     | 1              | 1                | 1        | 10       |
|            | MILL_PROD_3     | 2              | 1                | 1        | 10       |
|            | LASER_LOGO_PROD | 2              | 1                | 1        | 10       |
|            | TM_LOGO_PROD    | 2              | 1                | 1        | 10       |
|            | WELDING_PROD    | 2              | 1                | 1        | 10       |
|            |                 |                |                  |          |          |
| 19         | BALL_GAME_TEST  | 1              | 1                | 1        | 20       |
|            | XY_ASSEMBLY     | 1              | 1                | 1        | 20       |
|            | LASER_LOGO_PROD | 1              | 1                | 1        | 20       |
|            | MILL_PROD_1     | 1              | 1                | 1        | 20       |
|            | WELDING_PROD    | 1              | 1                | 1        | 20       |
|            | MILL_PROD_2     | 1              | 1                | 1        | 20       |
|            | MILL_PROD_3     | 1              | 1                | 1        | 20       |

## Running the Manufacturing Process (Real Mode)

After submitting the order the next step is to run the Manufacturing Process with CIM Manager.

To run the manufacturing process:

- 1 From the CIM Manager window click the green **Start**  button on the toolbar to initiate the communication. On all the device drivers you should see a message indicating a proper communication with the manager. In the device view of the manager you should see a green led for each active device. (Devices that are not required in the order display a yellow LED without disturbing the production process.)
- 2 Review the PLCDD, wait until the initialization script has finished processing and then start the conveyor.
- 3 Wait until at least one pallet has passed Station 1 completely. Then click the green **Run**  button in the CIM Manager to start the production process.
- 4 Watch and study the manufacturing process. Take notes regarding the part flow and the manufacturing sequences.

- 5 The CIM Manager will send a message for each product group that has been completed. Once the entire order has been completed, the CIM Manager will display a message box.
- 6 Wait until all templates have returned to the ASRS and then press the red **Stop**  button to stop the production process.

## Documenting Test Procedures

Create the required testing documentation and define a test series that will check each of the available products and use each station at least once when running a manufacturing cycle.

Document your observations from each manufacturing cycle and report any irregular system performance to Intelitek Technical Support.