Agenda

▪ Risk Assessment & What You Need to Know

▪ Completed Risk Assessment Analysis

▪ Implementing a Siemens SIMATIC Safety Solution based on the Risk Assessment
White Horse Safety Introduction/ Overview

- White Horse Safety (an Applied Engineering Concepts Company)
- Safety Consulting and Integration Engineering, networked with a number of other individuals and companies
- Located in Georgetown, KY, but travel nationally as well as internationally
- Serving the Automotive and Discreet Manufacturing industries, as well as numerous other industries
- Provide Risk Assessment and Design/ Build/ Verify/ Validate Safety Systems
- Ted Sberna: Principal Owner/ Chief Consultant
Interpretation, Design Review and Training
Regulations, A, B, C Level Consensus Standards

NFPA 70:2015

ANSI B11.19:2010

ANSI /RIA 15.06:2015

ANSI B11.0:2015

Safety of Machinery – General Requirements and Risk Assessment
OSHA Lockout/ Tagout - The Control of Hazardous Energy

Section a.1 - Scope. - (i) This standard covers the servicing and maintenance of machines and equipment in which the unexpected energization or start-up of the machine or equipment, or release of stored energy could cause injury to employees.

The standard establishes minimum performance requirements for the control of such hazardous energy.
OSHA 1910.147 Lockout/ Tagout

- **Scope.** Section a.2 (ii)B

- **Note:** *Exception to paragraph (a)(2)(ii):*

- Minor tool changes and adjustments, and other minor servicing activities, which take place during normal production operations, are not covered by this standard.

- If they are *routine*, *repetitive*, and *integral* to the use of the equipment for production, provided that the work is performed using alternative measures which provide effective protection (See subpart O of this part).
OSHA 1910.212 (29 CFR) General Requirements

Quote from OSHA e-Tool web site:

“The basic regulation, in Section 1910.212, states that any machine that creates a hazard must be safeguarded to protect the operator and other employees.

OSHA can also cite violations by referencing other standards such as the ANSI (American National Standards Institute) B11 series

With the Occupational Safety and Health Act of 1970, Congress created the Occupational Safety and Health Administration (OSHA) to assure safe and healthful working conditions for working men and women by setting and enforcing standards and by providing training, outreach, education and assistance. OSHA sets out the rights and duties of all parties in the workplace. Its main purpose is to protect workers against health and safety hazards on the job. The Act establishes procedures for dealing with workplace hazards, and it provides for enforcement of the law where compliance has not been achieved voluntarily.
Training Provided and Design Services for Machine Safety Systems

Let's look at which components comprise a typical machine safety system...
A safety function generally comprises the subsystems exemplary listed below:

**Detecting**: using sensors and command devices

**Evaluating**: using signal evaluation, safe logic

**Responding**: using actuators
Risk Assessments –
What you need to know and are they required in the US?
OSHA ‘General Duty’ Clause (Section 5.a.1)

- Requires employers to keep the workplace “Free From Recognized Hazards”
  - “Recognized Hazards” are determined through the process of performing a Risk Assessment, assessing hazards associated with the tasks performed in the workplace

What is Safety?

ANSI B11.0 2010 defines Safe as:
- Safe is the state of being protected from recognized hazards that are likely to cause physical harm
- There is no such thing as being absolutely safe, that is, a complete absence of risk. In turn, there is no machine that is Absolutely Safe.
- All machinery contains hazards and some level of residual risk. However, the risk associated with those hazards should be reduced to an Acceptable Level
NFPA 79:2015

9.4 Control Functions in the Event of Failure. The electrical control circuits shall have an appropriate level of performance that has been determined from the Risk assessment of the machine.

ANSI /RIA 15.06:2015

4. A Risk Assessment shall be carried out on those hazards identified in the hazard identification.

ANSI B11.19:2010

6.2.1 The protective stop circuit shall conform to the requirements of 6.1 or shall be constructed to meet the safety performance level (risk reduction) as determined by a risk assessment.

ANSI B11.0:2015

Safety of Machinery – General Requirements and Risk Assessment.

ANSI ASSE Z244.1:2003 - Control of Hazardous Energy, Lockout / Tagout and Alternative Methods: 5.4.1 Selection of an alternative control method by the user shall be based on a risk assessment of the machine, equipment or process.
Which Risk Assessment to Follow?

ANSI B11.0 – 2010 has been harmonized with International (ISO) & European (EN) Standards

- This standard integrates the requirements of ANSI / ISO 12100 parts 1 and 2, and ISO 14121 (now combined into a single standard – ISO 12100), as well as selected U.S. standards. It also incorporates the bulk of ANSI B15.1-2000 (R2008) and ANSI B11.TR3

- Suppliers meeting the requirements of this ANSI B11.0 standard may simultaneously meet the requirements of these three ISO standards.
Outcome of a Risk Assessment?

The outcome of completing the risk assessment process should be:

- A clear understanding of risk(s) including the potential severity of harm and the probability of the occurrence of harm;
- Machinery with risks reduced to an acceptable level;
- Risk reduction measures appropriate to the circumstances;
- Documentation of the risk assessment, reviewed with all parties.
Risk & Hazard Terminology Review
**Risk & Hazard Terminology Review**

**Acceptable Risk:** A risk level achieved after risk reduction measures have been applied. It is a risk level that is accepted for a given task (hazardous situation) or hazard. For the purpose of this standard, the terms —acceptable risk and— tolerable risk are considered to be synonymous.

**Risk reduction:** That part of the risk assessment process involving the elimination of hazards or selection of other appropriate risk reduction measures (protective measures) to reduce the probability of harm or its severity.

**Safe-work procedure(s):** Formal written documentation developed by the user that describes steps that are to be taken to safely complete tasks where hazardous situations may be present or hazardous events are likely to occur.

**Risk reduction measure(s):** Any action or means used to eliminate hazards and/or reduce risks.
Risk Reduction Terminology

Risk reduction: That part of the risk assessment process involving the elimination of hazards or selection of other appropriate risk reduction measures (protective measures) to reduce the probability of harm or its severity.

Safe-work procedure(s): Formal written documentation developed by the user that describes steps that are to be taken to safely complete tasks where hazardous situations may be present or hazardous events are likely to occur.

Risk reduction measure(s): Any action or means used to eliminate hazards and/or reduce risks.

Informative Note 1: Risk reduction measures can include but are not limited to:

- inherently safe design
- guards
- safeguarding devices
- complementary equipment
- awareness devices including warnings
- safe work practices / procedures
- training or other administrative controls and
- personal protective equipment (PPE).
ANSI B11.0: 2015 Risk Assessment Process

1) Prepare for & set limits (see 6.2)
2) Identify tasks and hazards (see 6.3)
3) Assess initial risk (see 6.4)
4) Reduce risk (see 6.5)
5) Assess residual risk (see 6.6)
6) Achieve acceptable risk (see 6.7)
7) Validate solutions (see 6.8)
8) Document the process (see 6.9)

*Taken from ANSI B11.0:2010
Reasonably foreseeable misuse:
The use of a machine in a way not intended by the supplier or user, but which may result from readily predictable human behavior.
## Relationships Between Levels

<table>
<thead>
<tr>
<th>Risk Reduction</th>
<th>System Architecture</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Column 1</strong></td>
<td><strong>Column 2</strong></td>
</tr>
<tr>
<td>Highest: Requirements of B and the use of well-tried safety principles shall apply. Safety-related parts shall be designed, so that a single fault in any of these parts does not lead to a loss of the safety function, and the single fault is detected at or before the next demand upon the safety function, but that if this detection is not possible, an accumulation of undetected faults shall not lead to loss of the safety function.</td>
<td>Highest: Redundancy w/ continuous self-checking (e.g., Dual channel w/ continuous monitoring)</td>
</tr>
<tr>
<td>Intermediate / High: Requirements of B and the use of well-tried safety principles shall apply. Safety-related parts shall be designed, so that a single fault in any of these parts does not lead to the loss of the safety function, and whenever reasonably practicable, the single fault is detected.</td>
<td>Intermediate / High: Redundancy w/ self-checking upon start-up (e.g., Dual channel w/ monitoring at cycle/start-up)</td>
</tr>
<tr>
<td>Low / Intermediate: Requirements of B and the use of well-tried safety principles shall apply. Safety function shall be checked at suitable intervals by the machine control system.</td>
<td>Low / Intermediate: Redundancy that may be manually checked (e.g., Dual channel w/ optional manual monitoring)</td>
</tr>
<tr>
<td>Lowest: Requirements of B shall apply. Well-tried components and well-tried safety principles shall be used.</td>
<td>Lowest: Single channel</td>
</tr>
<tr>
<td>B: SRP/CS and/or their protective equipment, as well as their components, shall be designed, constructed, selected, assembled and combined in accordance with relevant standards so that they can withstand the expected influence. Basic safety principles shall be used.</td>
<td>R3B / R4 (Simple)</td>
</tr>
</tbody>
</table>
### Example: Evaluate the Risks

#### Simplified Representation

**Risk Assessment – Lowest to High Risk**

<table>
<thead>
<tr>
<th>Level of performance for Risk Reduction Measures based on Initial Risk Estimation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low Risk</td>
</tr>
<tr>
<td>SIL 1</td>
</tr>
<tr>
<td>PL b</td>
</tr>
<tr>
<td>Low Risk</td>
</tr>
<tr>
<td>Preventable, minor injury</td>
</tr>
<tr>
<td>Lowest probability of occurrence</td>
</tr>
</tbody>
</table>

The **Necessary Safety Level** can be determined by criteria specific to the assessment.
Document the Measures

Risk Reduction

Steps Often Forgotten During RA Process

Verification: The act of verifying system performance to the Risk Assessment

Validation: The process of confirming that a system design performs to a pre-defined confidence level. Validation may be performed by the supplier, user or a third party.
Example Risk Assessment
Steps

- Set Limits of the Assessment
- Identify the Tasks
- Apply risk reduction measures
- Evaluate residual risks
- Verify, Document and Validate
Identify Tasks

- Load Parts / interaction with Robot
- Robot Teaching
- Servicing the fixtures within the Cell
- Interaction with Fork Truck
- Interaction with next cell
### Hazard - Risk

#### 1.1

**Title:** Document the Assessment

<table>
<thead>
<tr>
<th>Hazard No.</th>
<th>Hazard Type &amp; Description</th>
<th>Evaluation</th>
<th>Countermeasure</th>
<th>Safety Device</th>
<th>Check</th>
<th>Control Level</th>
<th>ANSI/OSHA/ESD</th>
</tr>
</thead>
<tbody>
<tr>
<td>STRIKING HAZARD ROBOT TEACH MODE</td>
<td>Interlocked access doors / barriers at all points</td>
<td>Safety Device</td>
<td>Interlocked</td>
<td>Exp F1</td>
<td>DM</td>
<td>ANSI/IS/O 10210</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No high speed teach APV</td>
<td>Exposure</td>
<td>Control</td>
<td>Prob F1</td>
<td>DDM</td>
<td>ANSI/IS/O 10210</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Robot teach speed 200nm/min at max</td>
<td>Probability</td>
<td>Control</td>
<td>Sev B2</td>
<td>DM</td>
<td>ANSI/IS/O 10210</td>
<td></td>
</tr>
<tr>
<td></td>
<td>5 position enabling switch on robot teach pendant for servo control</td>
<td>Device</td>
<td>Manual</td>
<td>Result L</td>
<td>DM</td>
<td>ANSI/IS/O 10210</td>
<td></td>
</tr>
<tr>
<td></td>
<td>TM training procedure for entering teach mode and controlling hazardous motion in robot cell</td>
<td>Procedure</td>
<td>Procedure</td>
<td>Procedure</td>
<td>DM</td>
<td>ANSI/IS/O 10210</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No ability to initiate Auto Mode while in Teach Mode</td>
<td>Control</td>
<td>Control</td>
<td>Sev B2</td>
<td>DDM</td>
<td>ANSI/IS/O 10210</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Follow standard work procedures</td>
<td>Training</td>
<td>Training</td>
<td>Training</td>
<td>DM</td>
<td>ANSI/IS/O 10210</td>
<td></td>
</tr>
</tbody>
</table>

#### 1.2

**Title:** Document the Assessment

<table>
<thead>
<tr>
<th>Hazard No.</th>
<th>Hazard Type &amp; Description</th>
<th>Evaluation</th>
<th>Countermeasure</th>
<th>Safety Device</th>
<th>Check</th>
<th>Control Level</th>
<th>ANSI/OSHA/ESD</th>
</tr>
</thead>
<tbody>
<tr>
<td>STRIKING HAZARD ROBOT AUTOMATIC MOTION</td>
<td>Interlocked access doors / barriers at all points</td>
<td>Safety Device</td>
<td>Interlocked</td>
<td>Exp F1</td>
<td>DM</td>
<td>ANSI/IS/O 10210</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Presence sensing devices where opening exist</td>
<td>Exposure</td>
<td>Control</td>
<td>Prob F1</td>
<td>DDM</td>
<td>ANSI/IS/O 10210</td>
<td></td>
</tr>
<tr>
<td></td>
<td>X-step with Master On Circuit (UL enabling power)</td>
<td>Probability</td>
<td>Control</td>
<td>Sev B2</td>
<td>DDM</td>
<td>ANSI/IS/O 10210</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ACS LOTO for routine entry, with appropriate control circuit</td>
<td>Procedure</td>
<td>Procedure</td>
<td>Procedure</td>
<td>DM</td>
<td>ANSI/IS/O 10210</td>
<td></td>
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</tr>
</tbody>
</table>

#### 1.3

**Title:** Document the Assessment

<table>
<thead>
<tr>
<th>Hazard No.</th>
<th>Hazard Type &amp; Description</th>
<th>Evaluation</th>
<th>Countermeasure</th>
<th>Safety Device</th>
<th>Check</th>
<th>Control Level</th>
<th>ANSI/OSHA/ESD</th>
</tr>
</thead>
<tbody>
<tr>
<td>TM could become entrapped between cell guarding and robot tooling in Teach Mode</td>
<td>TM training procedure for ensuring teach mode and controlling hazardous motion in robot cell</td>
<td>Procedure</td>
<td>Procedure</td>
<td>Procedure</td>
<td>DDM</td>
<td>ANSI/IS/O 10210</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Awareness barrier usage for areas where teach is not appropriate</td>
<td>Procedure</td>
<td>Procedure</td>
<td>Procedure</td>
<td>DM</td>
<td>ANSI/IS/O 10210</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Use position hard stops and or DCS to limit robot travel position</td>
<td>Device</td>
<td>Manual</td>
<td>Result L</td>
<td>SM</td>
<td>ANSI/IS/O 10210</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>
## Document the Assessment

### Risk Assessment Sheet

**White Horse Safety**

<table>
<thead>
<tr>
<th>Machine Name/Number</th>
<th>Evaluated by Ted Sharma Sr. and Ted Sharma Jr.</th>
<th>Date: 2/29/16</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Signatures:***

---

**Reminder:** Evaluation conducted as if zero guarding is present on machine.

### Task/Hazards: During adjustment tasks, contact with nip points from next cell rotating machinery

<table>
<thead>
<tr>
<th>Who's Injured?</th>
<th>Initial Evaluation</th>
<th>Counter Measures</th>
<th>Safety Function</th>
<th>ANSI/OSHA, etc</th>
<th>Post Counter Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td></td>
<td><strong>Fixed Perimeter Guarding</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Exposure F1</td>
<td>Interlocked access doors/barriers at all entry points</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Prod F2</td>
<td>ACM/LG for routine entry, with appropriate control circuit</td>
<td>pressure control</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>RISK LEVEL: VH</strong></td>
<td><strong>E-Stop with Master On Circuit (V/L enabling power)</strong></td>
<td>Control</td>
<td></td>
<td><strong>MFA 19</strong></td>
</tr>
</tbody>
</table>

**Hazard Type:** Nip Points

<table>
<thead>
<tr>
<th>Counter Measure</th>
<th>Safety Function</th>
<th>ANSI/OSHA, etc</th>
<th>Post Counter Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Procedure</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Valves</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Control</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Residual Risk:</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

**Hazard Type:**

1. SOP and Training for entry into cell
2. Interlock between machines to prevent hazardous motion
3. Monitoring for failure of strain contactors from next cell
4. Hazardous Energy Control Lockout for non-ACM tasks
**Document the Assessment**

<table>
<thead>
<tr>
<th>Task/ Hazards</th>
<th>Initial Evaluation</th>
<th>Counter Measures</th>
<th>Safety Function</th>
<th>ANSI, OSHA, ISO, etc.</th>
<th>Post Counter Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>Who's impacted?</td>
<td>Exposure P1</td>
<td>Interlock between machines to prevent hazardous motion</td>
<td>Control</td>
<td>B11.10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Prop P2</td>
<td>Monitoring for failure of dual contactors from next cell</td>
<td>Control</td>
<td>B11.10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>All</td>
<td>Hazardous Energy Control Lockout for Non-MCM tasks</td>
<td>Control</td>
<td>21441</td>
<td></td>
</tr>
</tbody>
</table>

**Risk Assessment Sheet**

**Machine Name/ Number:**

**Evaluated by:** Ted Sbema Sr. and Ted Sbema Jr.

**Date:** 2/10/16

**Signatures:**

**Reminder:** Evaluation conducted as if Zero Guarding is present on machine.
# Document the Assessment

## Risk Assessment Sheet

**White Horse Safety**

**Date:** 2/28/16

**Machine Name/ Number:** (Blank)

**Evaluation By:** Ted Sharma Sr. and Ted Sharma Jr.

**Signatures:** (Blank)

**Reminder:** Evaluation conducted as if Zero Guarding is present on machine.

### Task/ Hazards: Striking Hazard from Robot Motion for robot loading pallets

<table>
<thead>
<tr>
<th>Who’s Involved</th>
<th>Initial Evaluation</th>
<th>Counter Measures</th>
<th>Safety Function</th>
<th>ANSI/ OSHA, ISO, etc</th>
<th>Post Counter Measure</th>
</tr>
</thead>
<tbody>
<tr>
<td>All</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Exposure</td>
<td>P1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prob</td>
<td>P1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>RISK LEVEL: VN</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Risk Level:** VN

**Residual Risk:** (Blank)

#### Hazard Type: Striking Hazard

- Hazardous Energy Control Lockout for non-AC M tasks  
  - Pressure: 21441

- I/L Guarding with presence sensing devices to prevent door movement when entry into cell space, doors controlled by safety circuit via dual safety contactors  
  - Pressure: 2022

**Counter Measures:**

- Presence sensing devices where opening exist (other cell)
- Interlocked access doors/barriers at all entry points
- Presence sensing for opening existing when door is down
- E-Stop with Master On Circuit (I/L enabling power)

**Post Counter Measure:**

- Exposure
- Prob

### Diagram

![Diagram of machine](image-url)
Implementing a Siemens SIMATIC Safety Solution based on the Risk Assessment
A safety function generally comprises the subsystems exemplary listed below:

<table>
<thead>
<tr>
<th>Detecting</th>
<th>Evaluating</th>
<th>Responding</th>
</tr>
</thead>
<tbody>
<tr>
<td>using sensors and command devices</td>
<td>using signal evaluation, safe logic</td>
<td>using actuators</td>
</tr>
</tbody>
</table>

Safety Integrated: Remember the safety function(s)
Siemens Safety Integrated
Completed Risk Assessment – Architecture

Here's what the typical Safety Solution looks like:
Siemens Safety Integrated – What If…….

Lets expand and see where the Siemens safety components fit on the application:

**Diagram:**
- **Robot**
- **Safety Gate**
- **Light Curtain**
- **Turn Table**

**Diagram Elements:**
- **Station 1**
- **Station 2**
- **ET 200SP Drop**
- **S120 Drives**
- **19” Comfort Panel**
- **Rack 1**
- **Rack 2**
- **Upper & Lower Lightcurtain**
- **1516F**
- **PROFINET**

**Application Components:**

- Siemens safety components
- ET 200SP Drop
- PROFINET
- S120 Drives
- 19” Comfort Panel
Here's how the Safety Solution Network Layout looks like:
## Siemens Safety Integrated
Completed Risk Assessment – BOM

<table>
<thead>
<tr>
<th>Component</th>
<th>Qty</th>
<th>Location</th>
<th>Comment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety PLC 1, S7-1516F</td>
<td>1</td>
<td>Control Panel</td>
<td>Put Control Panel near Safety Gate</td>
</tr>
<tr>
<td>I/O – Failsafe, ET200MP</td>
<td>1</td>
<td>Control Panel</td>
<td>In Central Rack for local I/O</td>
</tr>
<tr>
<td>I/O – Failsafe, ET200SP/F</td>
<td>1</td>
<td>On Turn table</td>
<td>Turn Table Safety+Standard I/O</td>
</tr>
<tr>
<td>I/O – Failsafe, ET200SP/F</td>
<td>1</td>
<td>On Robot</td>
<td>Robot Safety+Standard I/O</td>
</tr>
<tr>
<td>I/O – Failsafe, ET200SP/F</td>
<td>1</td>
<td>Station 1</td>
<td>Station 1 Safety+Standard I/O</td>
</tr>
<tr>
<td>I/O – Failsafe, ET200SP/F</td>
<td>1</td>
<td>Station 2</td>
<td>Station 2 Safety+Standard I/O</td>
</tr>
<tr>
<td>I/O – Failsafe, ET200SP/F</td>
<td>1</td>
<td>Rack 1</td>
<td>Rack 1 Safety+Standard I/O</td>
</tr>
<tr>
<td>I/O – Failsafe, ET200SP/F</td>
<td>1</td>
<td>Rack 2</td>
<td>Rack 2 Safety+Standard I/O</td>
</tr>
<tr>
<td>S120 Drives</td>
<td>1</td>
<td>Turn Table</td>
<td>Drives the Turn Table Motor</td>
</tr>
<tr>
<td>HMI – 19” Comfort Panel</td>
<td>1</td>
<td>Control Panel</td>
<td>On the Control panel</td>
</tr>
</tbody>
</table>
Siemens Safety Integrated
Addition of Robot Palletizer Cell
Siemens Safety Integrated
Robot Palletizer Cell – Architecture

- ZONE 2B CARRY IN
  - MASTER ON
- ZONE 2A CARRY IN
  - MASTER ON
- ZONE 5 CARRY IN
  - CONTROL POWER
- ET 200SP Drop
- S120 Drives
- ZONE 3 PALLETIZE
  - MASTER ON
  - OUT LIGHT CURTAIN
- ZONE 4 CARRY OUT
  - MASTER ON
  - FILLED PALLET STA.
  - IN LIGHT CURTAIN
- ZONE 5 CARRY OUT
  - CONTROL POWER
- FILLED PALLET STA.
  - OUT LIGHT CURTAIN
- #2 CARRY IN
  - DP PANEL
- #2 CARRY OUT
  - DP PANEL
- CARRY IN
  - LIGHT CURTAIN
- CARRY OUT
  - LIGHT CURTAIN
Machine Safety

Documents & Web-Links of Interest

1) B11.26 FUNCTIONAL SAFETY FOR EQUIPMENT (ELECTRICAL/FLUID POWER CONTROL SYSTEMS) APPLICATION OF ISO 13849

2) http://webstore.ansi.org/default.aspx

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Thank You!