



Pulp & Paper Safety Association

June 21, 2011

San Antonio, TX

**Issues and
Developments in
OSHA Enforcement of
Box Plant Converting
Energy Isolation**

BIZARRO

This week's guest cartoonist: Wayno

If I can't talk you out of jumping,
at least give me a minute to grab
my slide whistle.



NON SEQUITUR

HE COULD NEVER RESIST
TAKING AN OPPOSING POSITION
ON AN OLD SAYING...



W
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DISCLAIMERS

- NOT A LAWYER
- NOT GIVING LEGAL ADVICE
- NOT MY COMPANY'S VIEWS
- MY OWN OPINION'S AND JUDGMENTS > 50 miles from home
- ONLY GOAL IS TO MAKE YOU AWARE



PURPOSE & WORDS

To make you aware of issues evolving around OSHA perspective, activity (e.g. citations) regarding machine energy isolation during routine production in corrugated converting.



KEY WORDS & PHRASES

- “Maintenance”
- “Maintenance and Servicing”
- “Normal Production”
- “Set-Up”
- “Routine, Repetitive and Integral”
- “Alternative Protective Measures”



Word Definitions in LOTO Std.

Servicing and/or maintenance. Workplace activities such as constructing, installing, **setting up**, adjusting, inspecting, modifying, and maintaining and/or servicing machines or equipment. These activities include lubrication, cleaning or unjamming of machines or equipment and making adjustments or tool changes, where the employee may be exposed to the **unexpected** energization or startup of the equipment or release of hazardous energy.



Corrugated Box Machine Minor Servicing **Important Terminology**

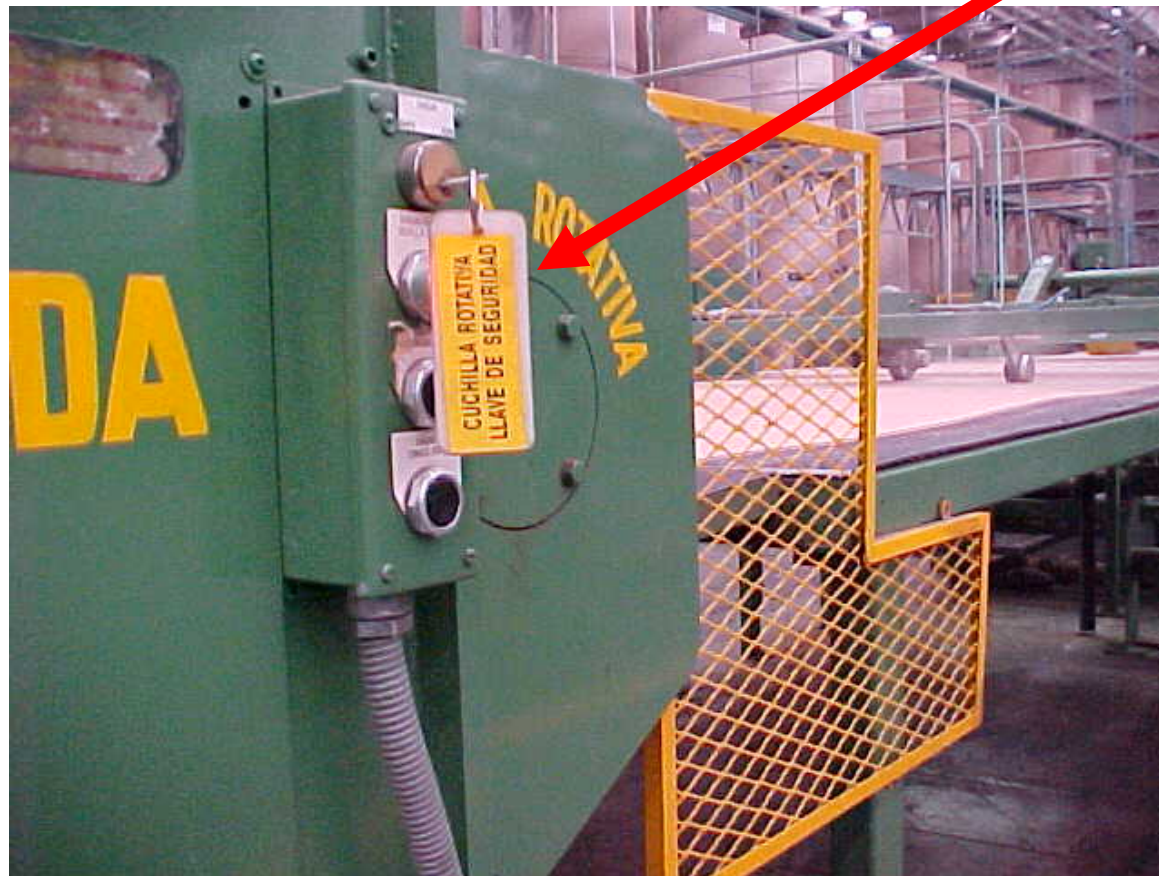
- **Lockout - Zero Energy State (ZES)**
Usually achieved through the use of personal padlocks and identification tags.
- **Intermediate Energy State (IES)**
Usually achieved through the use of a key switch in the machine control circuitry.

ZES Example Lockout of Corrugator Cut Off Knife

(Note: Recommended Lock ID & Hazard Tags not Used)



Example IES Key Switch





LOTO History Events Time Line

- **1977– OSHA published Request for Information**
- **1980 – OSHA issued ANPRM -- Developing LOTO Std. for “Maintenance”**
- **April 29, 1988 – NPRM – LOTO – few industry comments made – “Maintenance & Servicing”**
- **June 1989 - Std. approved by DOL and sent to OMB for review and approval**
- **Aug. 3, 1989 – United Technologies petition to reopen rulemaking – concern that rule would require routine adjustments, clearing of jams and set up activities be performed under LOTO -- inadequate notice provided to industry**



LOTO History - Continued

- **Aug. 1989** – OMB inserts minor servicing exemption into std. with the following criteria:
 - **Routine**
 - **Repetitive**
 - **Integral to use of machine for production**
 - **Takes place during normal production operations**
 - **Alternative measures provide effective protection**



LOTO History - Continued

- **Sept. 1, 1989** – final rule issued. OSHA unclear on interpretation of minor servicing exemption written by OMB Industry recognizes potential burden of application to “Servicing & Maintenance”.
- **Nov. 1989** –NAM & other major trade associations file suits challenging rule with Chocolate Manufacturers and National Confectioners focusing on application of minor servicing exemption to clearing jams. Unions challenge minor servicing exemption.
- **Jan 31, 1990** – Std. went into effect
- **2/1/90 – 2/13/90** – No apparent compliance problem for paper industry

LOTO History - Continued

- **Feb. 14, 1990** - OSHA visits Westvaco - Eaton, OH box plant cites for LOTO while setting the slotter section without LOTO of drive motor
 - “During normal production operations”
 - “-” ALJ – means machine is running
 - “+” Review Commission later reverses on that point
 - “-” ALJ & Review Comm. - “Set-Up” performed to prepare for rather than “during normal production operations” and not included in “minor servicing”
 - “?” Case settled on appeal; decision stands although largely ignored by OSHA until 2008 CPL
- **Sept. 16, 1992** – Printing Industries of America receives an “interpretation” letter saying certain “make ready” (a/k/a/ “set up”) activities on printing presses were “minor servicing” and their “Inch Safe” procedure provided effective protection to workers



LOTO History - Continued

- **Sept. 1992** –(Same time period) OSHA Nat'l Office issues “Inch Safe” interpretation, Regional Solicitor is asserting before Review Commission that “set up” was not performed “during normal production operations”.
- **1994** - Westvaco Case settled on appeal with sole requirement to lock out open/close motor. Key switch implemented and OSHA Area Director testified it provided effective protection.
- **April 26, 1995** – GM-Delco Div. – LOTO not required if no “unexpected energization”

LOTO History - Continued

- **April 4, 2004** – OSHA issues 2nd letter of interpretation for Printing Industries of America – confirming certain “make ready” (a/k/a “set up”) activities are “minor servicing” performed “during normal production operations”.
- **Feb. 11, 2008** - CPL 02-00-147 OSHA Compliance Directive on LOTO. Some inspectors assert that “minor servicing” exemption only applies when machine is running!

SURPRISE!

OSHA'S INITIAL PERSPECTIVE FROM 1990

➤ **MACHINE GUARDING**

- Provides protection to employees during normal production operations

➤ **LOCKOUT/TAGOUT**

- Provides protection to employees during maintenance and servicing activities when:
 - **Bypass machine guarding OR**
 - **Place body part in zone of operation**





OSHA'S EVOLVING PERSPECTIVE

➤ **MACHINE GUARDING**

- Provides protection to employees during normal production operations
- May also provide effective protection to employees during certain servicing tasks so that LOTO is not required

➤ **LOCKOUT/TAGOUT**

- Provides protection to employees during maintenance and servicing activities when machine guarding does not



OSHA'S EVOLVING VIEW OF LOTO/MG

OSHA 2-11-2008 LOTO Directive

- “As a general principle, the LOTO standard does not apply to: “... servicing and maintenance activities when employees are not exposed to hazardous energy. Therefore, employees can be protected from these ... incidents by ... Effective machine guarding, in compliance with Subpart O, that eliminates or prevents employee exposure from the hazardous energy associated with the machines or Equipment....”
- **“Methods, such as machine guarding, may be effective alternatives to LOTO, if the alternative eliminates employee exposure to the hazardous energy.”**



Relevant Exemptions from the Lockout/Tagout Standard

- **No Potential for “Unexpected Energization” to Cause Injury**
 - 1910.147 (a)(1)(i)
 - GM Delco and related cases, 2008 CPL
- **Minor Servicing Activities**
 - Note to 1910.147 (a)(2)(ii)(b)
- **Testing & Positioning Activities**
 - 1910.147(f)(1) – overlooked in *Westvaco*
- **Infeasibility and greater hazard**



EXCEPTIONS TO LOTO REQUIREMENT

➤ **No Potential for “Unexpected Energization” to Cause Injury**

- GM Delco and related cases
- Mere existence of hazardous energy does not mean LOTO is required
- Must be demonstrated exposure to “unexpected energization”
- Likely to be decided on case by case basis



“MINOR SERVICING” ACTIVITIES

➤ **Criteria**

- Routine
- Repetitive
- Integral to use of machine for production
- Takes place during normal production operations
- Alternative measures provide effective protection

➤ **Printing Industries Letters** – OSHA cites and apparently relies on industry determination as to what is minor servicing activity



“NORMAL PRODUCTION OPERATIONS”

- The utilization of a machine or equipment to perform its intended production function.
- Preamble to proposed LOTO rule included routine set-up activities
- *Westvaco*: Set-up activities fall outside the scope of tasks performed during “normal production operations”; therefore not minor servicing
- Despite *Westvaco*, OSHA enforcement practice has generally treated routine set-up activities as minor servicing



TESTING AND POSITIONING

➤ **Technical Infeasibility Provision**

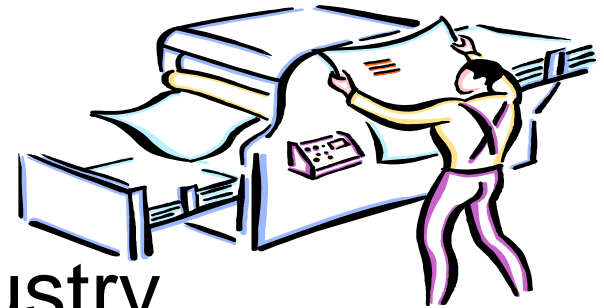
- Need power to perform task

➤ **Scope**

- Overlooked by *Westvaco* decision
- Narrowly interpreted by 2-2008 OSHA CPL issued by OSHA HQ
- Field Exercises Discretion

MFG. INDUSTRIES PERVASIVE CONCERN OVER LOTO REQUIREMENT FOR ROUTINE “SET-UP” OR “MAKE READY” TASKS

- Horizontal Injection Molding Industry
- Packaging operations
in numerous industries
- Printing and Binding Industry
- Paper Converting Industry
- Metal Forming industry





CONCERN OVER LOTO FOR “SET-UP” OR “MAKE READY” TASKS

- **Horizontal Injection Molding Machines**

- Tasks: Mold changes
- Impact of LOTO
 - Loss of heaters and computer memory
 - Need power to move clamp and position molds
 - Significant loss of productivity
- **Two-pronged solution relying on safeguarding and control circuitry**
 - ANSI/SPI Machine Safety Standards (ANSI B151.1)
 - Michigan OSHA Standard

CONCERN OVER LOTO FOR “SET-UP” OR “MAKE READY” TASKS

Printing and Binding Industry

- Tasks: changing plates and blankets; paper webbing and changing paper rolls
- Impact of LOTO:
 - Loss of heaters, computer memory, ink system
 - Need power to position drums to change plates and blankets
 - Many presses rely on single main drive motor rather than auxiliary motors
 - Significant loss of productivity
- Substantial reliance on safeguarding and control circuitry rather than LOTO



CONCERN OVER LOTO FOR “SET-UP” OR “MAKE READY” TASKS

- **Printing and Binding Industry Two-pronged approach**
 - **Went to OSHA with existing industry standards.**
 - OSHA Letters described “certain make ready activities” as minor servicing activities, and that controls in *ANSI B65.1-1985 and ANSI B65.2-1988 provided effective protection*
 - **Continued development of industry standards**
 - *ANSI Printing Press Safety Standard, ANSI B65.1-1985 (revised in 1995, and 2005)*
 - *ANSI Binding Equip Safety Standard, ANSI B65.2-1988 (revised in 1999 and 2005)*
 - *Evolving design criteria appears to be influenced by EU standards*



CONCERN OVER LOTO FOR “SET-UP” OR “MAKE READY” TASKS

- **Paper Converting Machinery**
 - **Tasks: changing blankets, printing plates, etc.**
 - **Impact of LOTO**
 - Loss of heaters, ink circulation, and computer memory
 - Need power to open machine (open/close) and position drums (aux motors) to change plates and blankets.
 - Significant loss of productivity
 - **OSHA generally seemed to following guidance of Printing Industries letters**
 - **2008 LOTO CPL indicates OSHA HQ continuously reinterpreting its standards to “raise the bar” based on updated national consensus standards such as ANSI B11.19, which is generally tracking or chasing new and updated EU standards**

OSHA's PERSPECTIVE ON THE MACHINE GUARDING ALTERNATIVE

- **Primary Safeguarding**

- *Guards*
- *Safeguarding devices*

- **Secondary Safeguarding**

- *Awareness devices*
- *Safe work procedures*





THE MACHINE GUARDING ALTERNATIVE

Safeguarding device is a control or attachment that:

- *Restrains the operator*
- *Prevents normal or hazardous operation*
- *Automatically withdraws the operator's hands*
- *Maintains the operator or the operator's hands at a safe distance.*



THE MACHINE GUARDING ALTERNATIVE

- **OSHA CONSTRAINTS ON THE USE OF SECONDARY SAFEGUARDING**
 - Devices that detect, but do not prevent employee exposure do not comply with Subpart O when guards or safeguarding devices are feasible.
 - Standing alone, safe work procedures do not constitute compliance with the Subpart O when guards or safeguarding devices are feasible.



ENERGY CONTROL OPTIONS

- **Eliminate energy source**
- **Control energy source**
 - LOTO
 - Safeguarding
- **Areas of Uncertainty**
 - What is effective safeguarding?
 - OSHA pushing Category 3 now.
 - What will be next? ISO 13849?
 - Old machines v. rebuilt/new machines
 - Responsible risk management of the issue requires a balanced approach



Recent OSHA Enforcement History

2006 - Citation Ward Die Cutter

- Serious Citation – LOTO not used to disable the open and close motors of the Ward Die Cutter
- Local management agreed to the citations but had no plan for abatement.
- OSHA was pushing for installation of Category 3, “Control Reliable” electrical circuits.
- Management decision to subsequently remove the machine eliminated the issue.



Recent OSHA Enforcement History

2007 - Flexo Folder Gluer

- Serious citation.
- Local management accepted citation through informal conference, but was unclear on required abatement.
- Negotiated abatement led to upgrade machine electrical control circuits to Category 3, “Machine Reliable” circuits.

Recent OSHA Enforcement History

2007 – Proposed Citations Settlement - Late 2008 Flexo Folder/Gluer

- | | |
|--|-----------|
| • Performing set-ups | • Dropped |
| • Unjamming machines and conveyers | • Dropped |
| ◦ Entering counter ejector; | - |
| ◦ Entering folding section; | - |
| ◦ Reached into or climbing under the die cutter. | - |
| • Putting transfer belts back on rollers | • Dropped |
| • Cleaning and adjusting folding rails | • Dropped |
| • Changing glue tab knives | • Dropped |

Recent OSHA Enforcement History

continued from previous slide

Proposed Citations Late 2007

- Cleaning printing dies and cylinders
- Removing/replacing ink pans
- Cleaning anilox and printing rollers
- Cleaning the print cylinders
- Entering the pit under the EMBA FFG
- Installing die cutter anvil impression pads on die cutter

Settlement Late 2008 – Retained b/c NOT Minor Servicing

- Cleaning impression cylinders
- Removing/replacing ink pans
- Cleaning anilox and rubber rollers
- Cleaning the print cylinders
- Working in the pit under the EMBA FFG
- Installing die cutter anvil impression pads on die cutter



Recent OSHA Enforcement History

2008 – Serious Violation – While rethreading the corrugator, “Operators adjusting feeds, cleaning rolls and performing other procedures used a local switch to turn the power off to stop a specific section of the corrugator rather fully locking out the equipment to achieve zero energy state.

- At informal conference the location convinced the OSHA office that power was needed to perform the minor servicing tasks at hand even though the machine was moving at a “crawl” speed during rethreading.



Recent OSHA Enforcement History

2009 - Serious Citation – Print Die/Anilox Injury

- **“29 CFR 1910.147 (a)(2)(ii):** Minor tool changes and adjustments, and other minor servicing activities, which took place during normal production operations, were not provided with using alternative measure which provided effective employee protection.”
- **“CONVERTING DEPARTMENT:** The employees, engaged in normal routine set up of the Langston Mini Flexo Folder Gluer (FFG) by removing/replacing of the printing plates at the first and second down were not provided with “Alternative Safety Measures” or an equivalent and were exposed to in-running nip point created by the top and bottom printing cylinders/rolls.”



Recent OSHA Enforcement History

2010 - Serious Citation – “All Converting Machines”


- Serious citation of 1910.147 throughout the plant for using control circuit isolation key switches during toll changes, die changes machine adjustments and unjamming.
- Appealed, mounted aggressive defense and solicitor's office withdrew citations six months later.
- Another office recognized accepted practice



Recent OSHA Enforcement History

2011 - Serious Citation – Paper Machine

- Serious citation of 1910.261(b)(1) for not applying LOTO or alternative measure apparently based on Category 3 circuitry when removing paper tail on an overfeed discharge conveyor. 1910.261(b)(1) allegedly preempts minor servicing activity exemption of 1910.147.



**SIX Converting IES –
Alternative Protective
Measures – With
Varying Levels of Use**



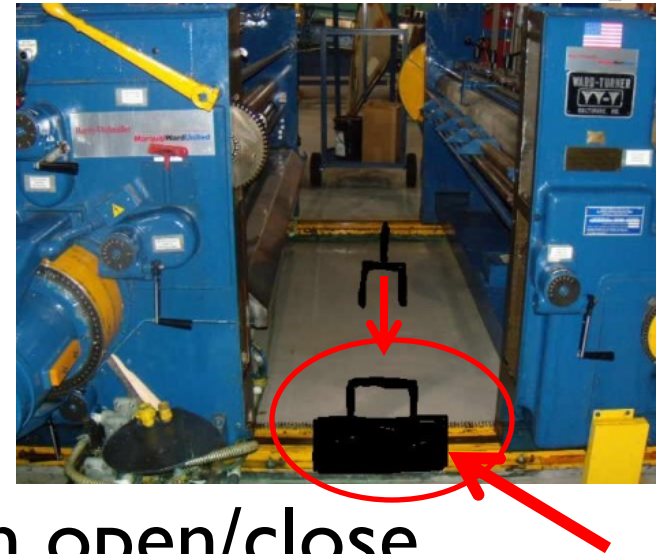
SIX Converting IES – Alternative Protective Measures – Varying Levels of Use

- **#1** - Mechanical open/close blocking – watch for clear SOP's – Category “B” or I circuits.
- **#2** – Key Switch in Control Circuit – Std. Wiring convention – Category I&2 circuits
- **#3** – #2 with Light Indicator while in safe position
- **#4** – #3 with “control reliable” interface components – Category 2+ circuits
- **#5** – Local disconnect on open/close motor and/or local disconnect on drive power. Cat 2
- **#6** – Category 3 “control reliable” components and circuits, redundant wiring.

Example #1

Category “B” or “I” Circuitry

- Off switch hold down
- Steel “U” channel block on open/close rail
- May have Pre-Start up alarm
- SOP to observe “all clear” before closing machine





Example #2 - IES

Key Switch Safe System – Basic Category 1 & 2 circuits

The Key Switch System includes:

- Individual key switches, wired in “series”, in control circuits for all employees exposed to minor servicing tasks such as die change, minor jams and machine adjustments for customer order change.
- A company policy that every exposed employee must have a key on their person at all times when exposed.
- No indicator light for “safe” condition.

Multiple IES Key Switches with Identification Tags



Control Panel with Keyed E-Stop

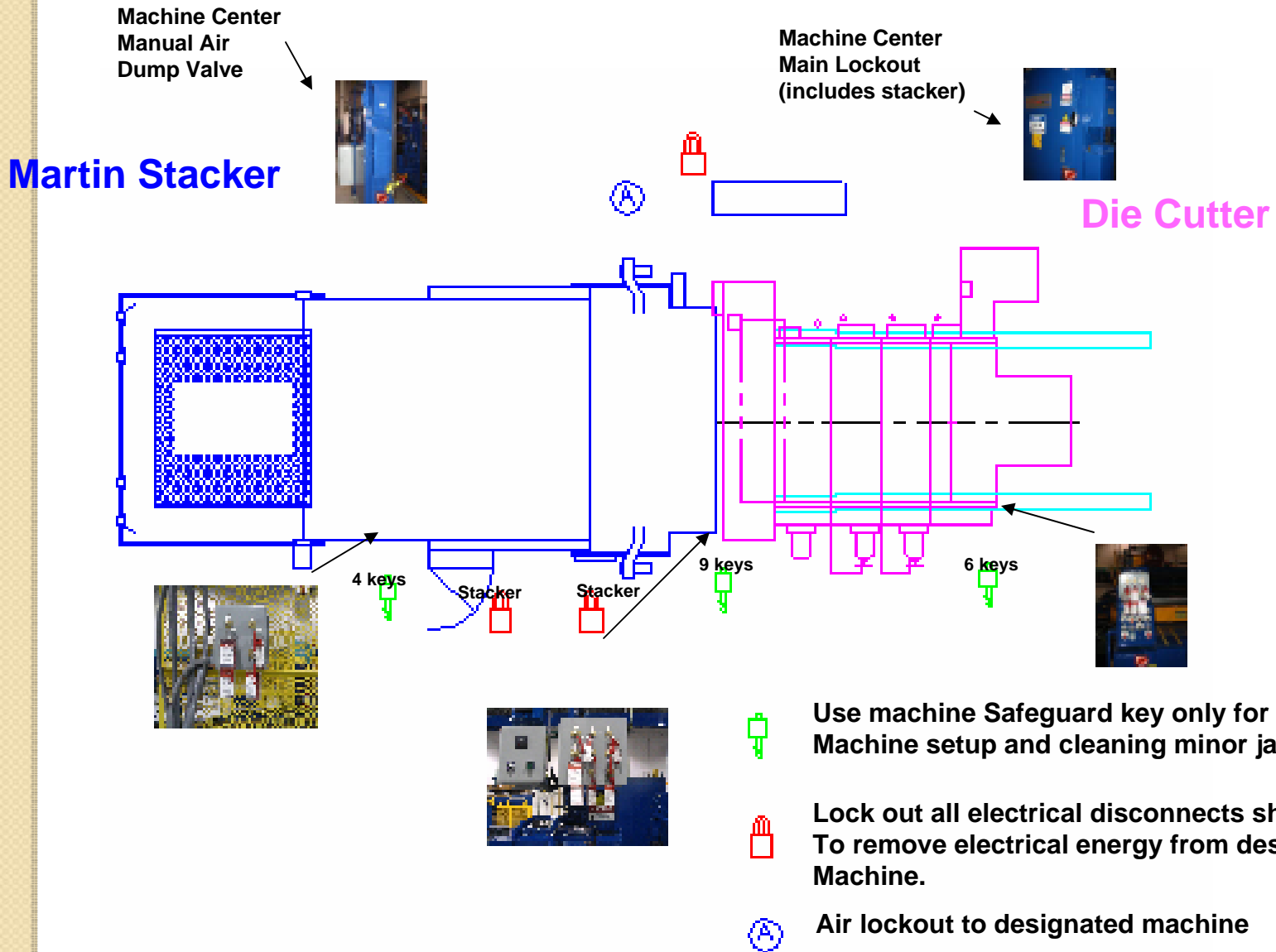
This is NOT usually a **feasible** safeguard as power needed for set up may be interrupted.



Good Idea - Slitter Pit Lighting tied to IES Key in “SAFE” position. (If its dark, it’s not safe)



Example – Combining diagram, pictures and text box notes. Document is kept at machine operator console.





Pre-feeder IES Key



Pre-feeder Safeguard Pin



Load Former Disconnects & Safety Pins

Example #3

IES - Key Switch System with Indicator Light Category 2 Circuits

- Individual keys in control circuits for all employees exposed to minor servicing tasks such as die change, minor jams and machine adjustments for customer order change.
- A coiled strap to be kept on the wrist or elbow.
- **A light indicator with red or green.**
Green = Safe. [To Play Video – Click Here](#)

Example #4 - IES - Key Switch System - Indicator Light & Safety Relay Category 2+ circuit

- Individual keys in control circuits for all employees exposed to minor servicing tasks such as die change, minor jams and machine adjustments for customer order change.
- Individual Key to be kept on all exposed personnel.
- A light indicator with red or green. Green = Safe
- **High integrity relay used in the key switch control circuit**



Example #5

IES/ZES Combination – Lock Out System Category 2 circuits

- **Local IES electrical disconnects** are wired near the operator station and traditional LOTO methods used to isolate drive and movement hazards during minor servicing tasks such as die change, minor jams and machine adjustments for customer order change.
- Power needed for die mounting knife and slot changes remain active and energized.
- All exposed employees are protected with individual locks on the local IES disconnect.

IES (Secondary Disconnect) – Lock Out System – Example #5 continued



IES Disconnects



ZES
Disconnect

Example #5 continued

Guide Chart for Each Machine Showing IES (Secondary Disconnect) Versus ZES Isolation Points

DANGER ELECTRICAL HAZARD **DANGER HIGH VOLTAGE**

CORRUGATOR C1

Corrugator C1 Flute

5/2009

ELEC HAZ

CORRUGATOR C1

Corrugator C1 Flute

5-A - Splicer IES - Lock Out Required to Thread Up Liver/Splicer - Turn Key Switch to Thread Up position & Remove Key

5-A - Splicer IES - Lock Out Required to Thread Up Liver/Splicer - Turn Key Switch to Thread Up position & Remove Key

28/05/2009

C1	SINGLEFACER (SF)				WATER	SPLICER	ROLLSTANDS			
TASK	5-A C-Drive Motor Drive Power	5-B SingleFace Drive Power	5-C SingleFace Control Power	5-D Steam	5-E Medium Water	5-A Medium Splicer	5-B Splicer	5-A GAH Stand Stand	5-B G II Stand Stand	5-C Stand Stand
Energy Type	STEAM	ELECT	ELECT	STEAM	ELECT	ELECT	ELECT	ELECT	ELECT	ELECT
TASK	215	19	19	22	215	22	22	22	22	22


Example #6

IES - Key Safe System – Indicator light, Safety Relay & Cross Monitoring

Category 3 Circuits


- Individual keys in control circuits for all employees exposed to minor servicing tasks such as die change, minor jams and machine adjustments for customer order change.
- Individual Key to be kept on all exposed personnel.
- A light indicator with red or green. Green = Safe
- High integrity “self monitoring” relay used in the key switch control circuit
- **Two wire Control Circuits assure system cross monitoring.**





Energy Isolation Issues – Corrugated Box Plants - Opinion (Not Advice) of what a company could do.

- Perform a risk analysis of routine “minor servicing” tasks for “customer order changes.”
- What redundant alternative protective measures safeguard the employee? E.g. key switches, multiple interlocks, “try step”, start up delay, start up protocol, etc.
- Is the task routine, repetitive, integral to the operation of the machine?



Energy Isolation Issues – Corrugated Box Plants - Opinion (Not Advice) of what a company could do. (cont.)

- Review your company production & safety records to determine if your system has been historically reliable in protecting employees.
- Review company PM procedures to assure routine testing of safety devices is performed.
- Review tasks in which IES protection is used and define when ZES line is crossed.
Document and communicate in JSA's to EE's.



Misc. Issues - Snap Shot Private Survey of OSHA Citations issued to Corrugated Box Plants 2005-2009

- Of the 155 violations issued, 23% (35) were reclassified or deleted from informal conferences or formal contests.
- Of the 155 violations issued, 2% (3) were Repeat*, 61% (95) were Serious and 37% (57) were Other than Serious. **Repeat violations were deleted or reclassified in all three cases.*
- In general, sections cited were: Machine Guarding 28% (42); Electrical 20% (31); and Lockout/Tagout 13% (19).

Misc. - Box Plant Employee Hazards and OSHA Issues

- Openings in *Electrical Panels* (CFR 1910.303 (g)(2))
- Die Cut Stacker Guarding
- Transfer Car/ Stationary Conveyor Nip Points
- Lift Truck Vs. Pedestrian Safety
- Sky Light Guarding (CFR 1910.23 (a)(4) & (8))
- Corrugator Wet End Ladder Gates (CFR 1910.23 (a)(2 & 10))
- Dust Citations for accumulation $> 1/32^{\text{nd}}$ Inch
(NPFA 68, 654 & 664 & GDC 5(a)(1))
- “Minor Servicing” Vs. LOTO Issues (CFR 1910.147 (a)(2)(ii))
- “Annual Inspection” of LOTO “Procedures” -
1910.147 (c) (6)



Misc. - IES & Paper Mills

- Review risk analysis of winder areas or any other job task which is not isolated with ZES to determine if IES energy isolation will enhance employee safety.
- Be aware of relief from a 1996 Gilbert Paper vs. Dept. of Labor decision on 1910.147 (c) (6) “Annual Inspections” of the LOTO procedures. It offers a protocol option to utilize a sample of “machine specific checklists” to verify generic energy isolation “procedures”.



Group Discussion

- Participant show of hands on the “Set Up” Energy isolation system employed by their company. System #1, 2, 3, 4, 5?
- Group Comments on OSHA citations received for LOTO and Machine Guarding in their companies.