

VPPPA National Conference Machine Shop Safety

Integrated Defense Systems

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AGENDA

- Introduction
- Raytheon Overview
- Machine Guarding Safety Project
 - Purchasing equipment/machinery process
 - New equipment installation approval
- Machine Guarding
- Coolant Management
- Questions



Jim Caulfield is an SGE and Facilities EHS Manager for the Raytheon IDS EHS organization with over 25 years of experience. Jim joined Raytheon in 1990 with a B.S. in Occupation Safety Studies from Keene State College NH. He is currently streamlining IDS's behavior safety program. In his current role, Jim also is responsible for standardizing the facilities EHS program in New England.

Who We Are

- Raytheon Company is a technology and innovation leader specializing in defense, security and civil markets throughout the world for over 92 years.
- 2015 net sales: \$23.2 billion
- 62,000 employees worldwide across 80 nations
- Headquarters: Waltham, Massachusetts



MISSION:
A WORLD OF INNOVATION



A global leader in technology and innovation

Business Headquarters



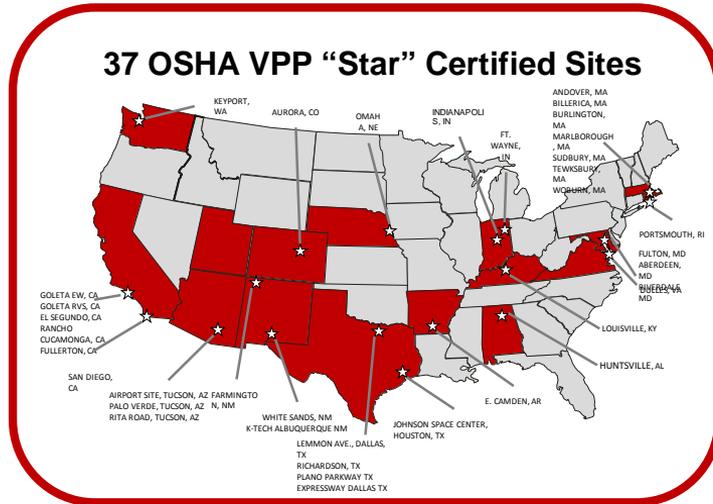
A global leader in technology and innovation

SERVING CUSTOMERS WORLDWIDE WITH AIR AND MISSILE DEFENSE, RADARS, C4I AND NAVAL SYSTEMS



- Integrated air and missile defense
- Battlefield, land- and sea-based radars
- Command, control, communications, computers and intelligence (C4I) for defense
- Sonar, navigation, integrated bridge and shipboard combat systems
- Systems integration and sustainment

Raytheon VPP Star Sites



- 37 VPP Star Sites
- 4 New sites in 2016
 - IIS Riverdale MD
 - RMS Albuquerque NM
 - SAS Plano TX
 - SAS Dallas TX
- 1 Additional Planned 2016
 - SAS McKinney TX
- 38,591 Employees at US Star Sites

67% of Raytheon employees are covered by VPP Star

Machine Guarding Safety Project

Machine Guarding

Business Case :

- Need to identify residual risks on new and older machines and eliminate them before they lead to an injury.

Problem Statement:

- Existing equipment that is lacking guarding needs to be identified and corrected before it causes harm to employees.

Goal:

- New equipment purchased needs to have adequate guarding that meets the current OSHA and ANSI standards as well as Raytheon EHS standards

- Team – EHS, Machinists and Maintenance Employees
- Key Stakeholders – All employees
- Resources Required: Audit Team, Checklist and tracking system
- Barriers to Completion:
 - Need buy in from stakeholders and top management support
 - Need process that is computer based and easy to implement

Schedule & Milestones

Project Scope - Audit team trained to identify and provide viable solutions to new and existing equipment safety risks, in accordance with current regulatory standards.

Milestones:

- Have outside consultant review our current state of machine guarding
- Create process/checklist based on Raytheon acceptable risk
- Obtain approval by EHS Director
- Present at VPP Meeting
- Obtain approval by stakeholders
- Train participants
- Implement schedule
- Track results

Red Tag Installation Approval

- Industrial Engineers/Project Coordinators are responsible for the process
- Red Tag is placed on equipment once new and/or moved equipment is in place
- Experts in their field are required to initial and date tag
- EHS are the last signatures on the form.
- LOTO procedures and JHA's (if applicable) must be in place before equipment is approved for use

Raytheon

Installation Sign-Off
SP0134-1 (9/2014); Ref. IDS SP0134

No. _____

Equipment Description: _____

New _____ Relocation _____ Process Modification _____

Location: _____

Resp. IE/Project Coordinator: _____

Approvals:

N/A is acceptable if no impact Except for ESD, Security, FOE POC, and Safety.

1. IE/Proj. Coordinator	_____	Date _____
2. Electrical	_____	Date _____
3. Plumbing	_____	Date _____
4. Machine Maint.	_____	Date _____
5. ESD Site Coord.	_____	Date _____
6. FOD POC	_____	Date _____
7. Security	_____	Date _____
8. IS Security	_____	Date _____
9. Energy Champ	_____	Date _____
10. HVAC	_____	Date _____
11. Environmental	_____	Date _____
12. Safety	_____	Date _____

CAUTION – DO NOT USE THIS EQUIPMENT!
This equipment shall not be used until installation has been completed and all required signatures have been received. This tag shall be removed only by the EHS Department.

AREA OF CONCERN
Do the topics listed below conform to the appropriate installation guidelines found in Appendices A through J of IDS SP0134. Equipment/Process Installations? If no, then comment.

	YES	NO
Ergonomics	<input type="checkbox"/>	<input type="checkbox"/>
Guarding	<input type="checkbox"/>	<input type="checkbox"/>
Ventilation	<input type="checkbox"/>	<input type="checkbox"/>
Noise	<input type="checkbox"/>	<input type="checkbox"/>
Labeling	<input type="checkbox"/>	<input type="checkbox"/>
Fire Protection	<input type="checkbox"/>	<input type="checkbox"/>
Radiation	<input type="checkbox"/>	<input type="checkbox"/>
Lockout/Tagout Procedure	<input type="checkbox"/>	<input type="checkbox"/>
Other	<input type="checkbox"/>	<input type="checkbox"/>

Comments _____

Date _____

INSTALLATION APPROVED AND SIGN-OFF TICKET No. _____

Equipment Description: _____

New Relocation Process Modification

Location: _____

Resp. IE/Project Coordinator: _____

Only Environmental, Health, and Safety can detach this ticket.

Ensure Key Stakeholders are Involved

Machine Guarding

Machine Guarding

- One or more methods of machine guarding shall be provided to protect employees from hazards such as those created by (29 CFR 1910 Subpart O - Machinery and Machine Guarding):
 - Point of operation
 - Nip points
 - Rotating parts
 - Flying chips
 - Sparks
- Examples of guarding methods
 - Physical barrier guards including distance
 - Light curtains
 - Two-hand tripping devices
 - Interlocks
 - Trip mats



Never Operate Equipment Without Guards

Machine Guarding

- Guards must be attached to the machine where possible - guards can be secured elsewhere if attachment isn't possible.
- Machines which usually require point of operation guarding
 - Shears, power presses, milling machines, power saws, portable power tools
- Fan blades less than seven (7) feet above the floor or working level must be guarded.
- Machines designed for a fixed location must be securely anchored to prevent walking or moving.

Never Operate Equipment Without Guards

Methods of Safeguarding

- Guards
 - Fixed, interlocked, adjustable, self adjusting
- Devices
 - Presence sensing
 - Photoelectrical, radio-frequency, electromechanical
 - Pullback
 - Restraint
 - Safety controls
 - Pressure sensitive body bar, tripwire
 - Two hand controls, two hand trip
 - Gates

Never Operate Equipment Without Guards

Methods of Safeguarding (Cont.)

- Feeding mechanisms
 - Automatic feed
 - Automatic ejection
 - Robot
- Miscellaneous aids
 - Awareness barriers
 - Protective shields
 - Hand-feeding tools and holding fixtures
- Location/distance

Never Operate Equipment Without Guards

Horizontal Carousel Guards



- Rotating shelves are pinch points
- Railing, walls, light curtains and trip mats can control access
- Post a sign warning of risk

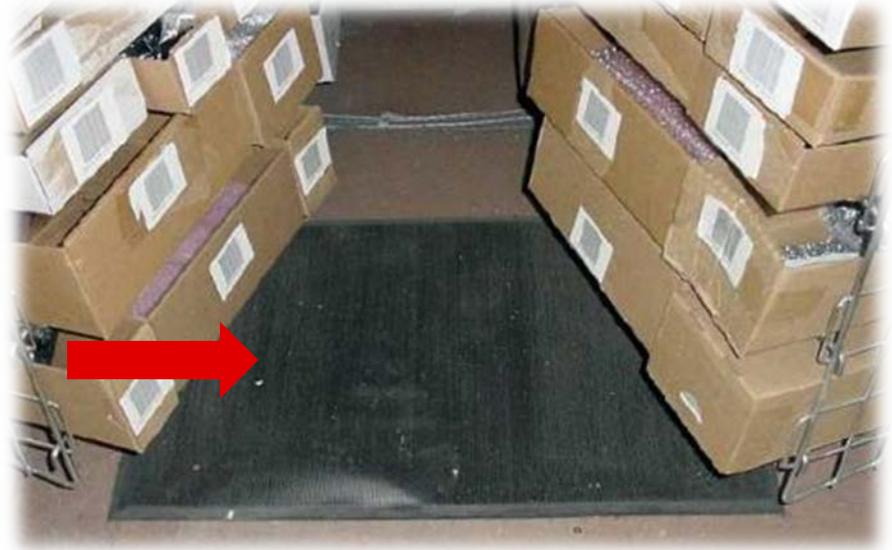
- Distance between carousel and rails must be at least 12 inches
- Walls must be at least 28 inches from the carousel



Additional Guards



Light Curtain



Pressure Sensing Mat

Vertical Carousels



- Rotating storage shelves present a pinch point hazard
- Light curtains are used as interlocks to shut off power to protect the employee
- Remember that interlocks must be tested quarterly

Surface Grinder

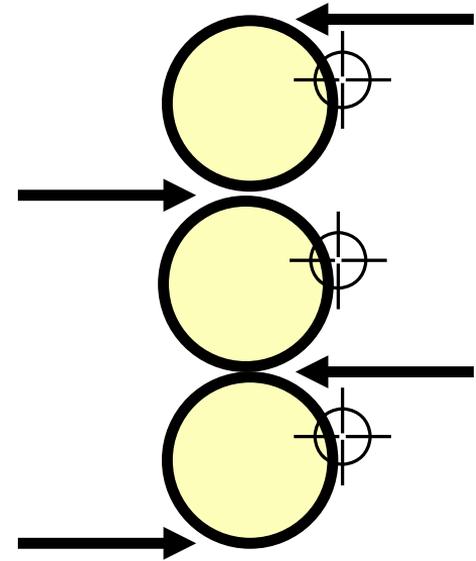


- Top portion of the machine moves
- Mounting a guard to the machine was not possible
- Limited access to the machine

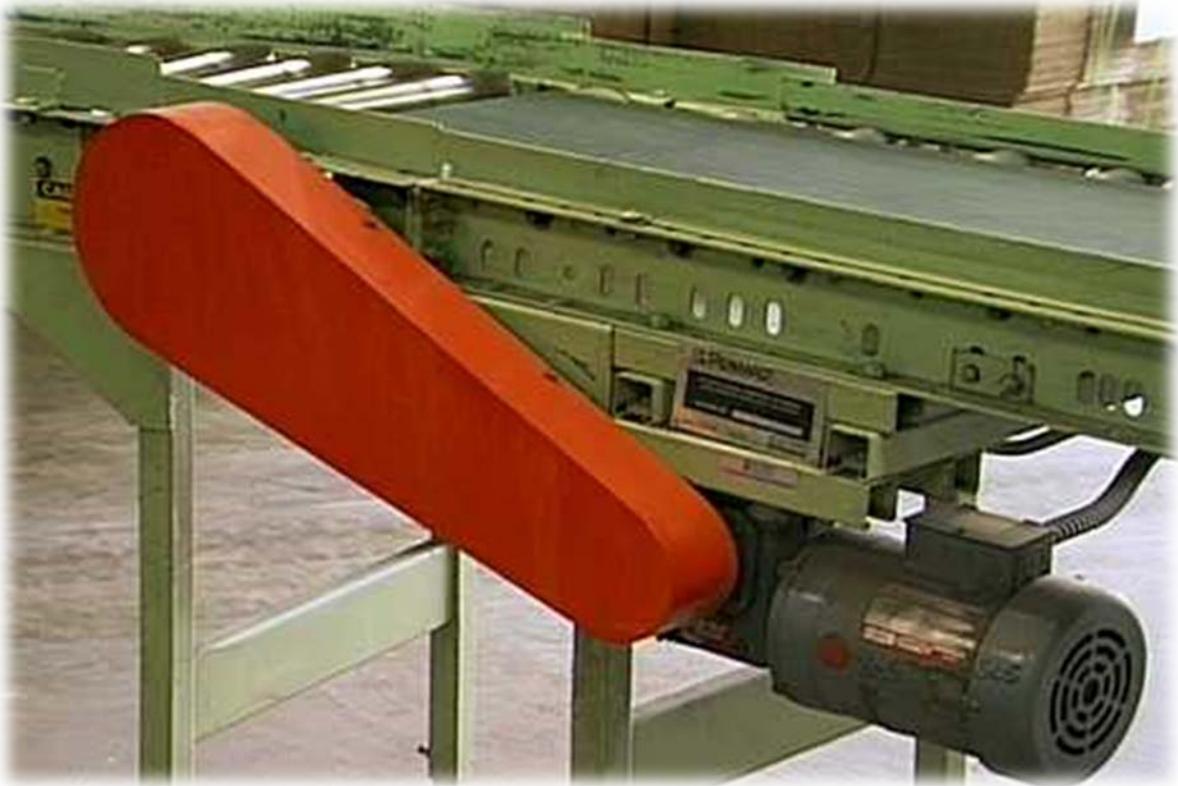
Where Mechanical Hazards Occur

Other Moving Parts: Any part of the machine which moves while the machine is working.

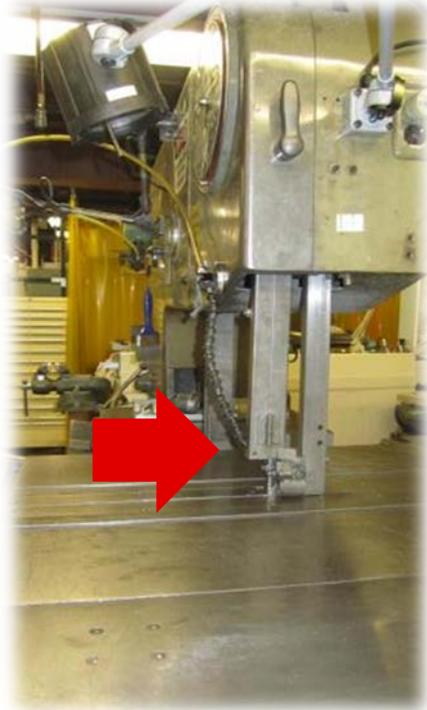
- ✓ Rotating parts
- ✓ Feed mechanisms
- ✓ Reciprocating parts
- ✓ Transverse moving parts
- ✓ Auxiliary parts of the machine



Guarding Pinch Points Drive Belt



Old Band Saw



Blade guard part of
the machine



In-house manufactured blade
guard under the cutting table

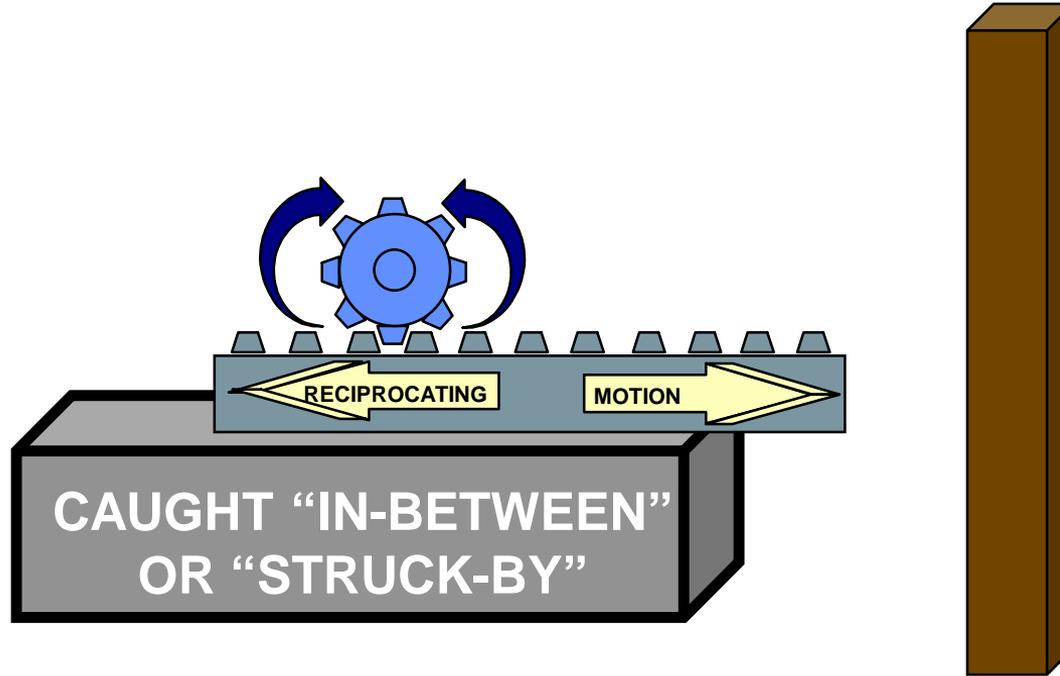
Grinder Guard Adjustment Tags



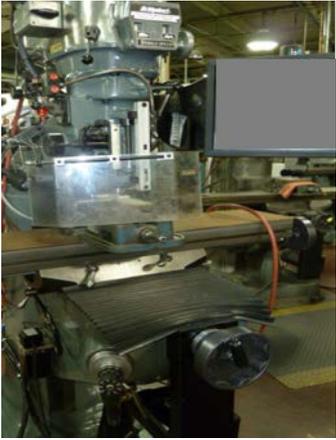
Don't forget to lag your equipment that may walk or move during use

Hazardous Mechanical Motions

- Reciprocating Motions



Bridgeport Mill



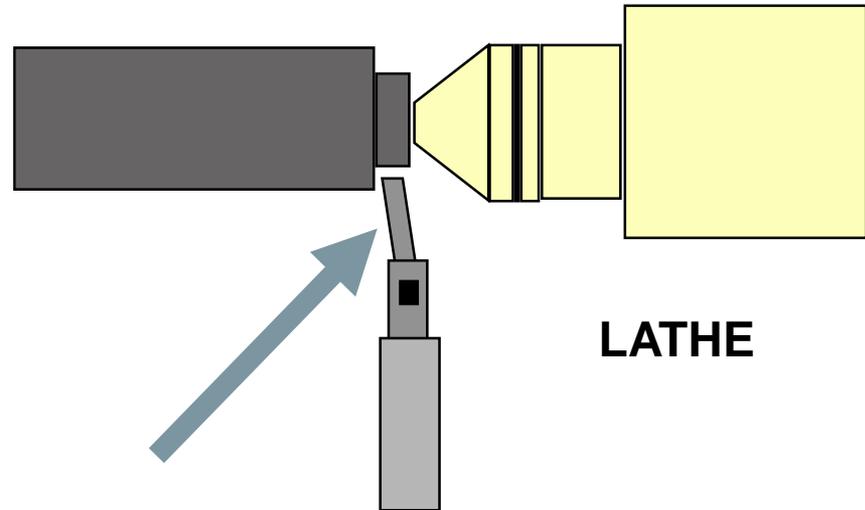
- Adjustable guards work just fine
- Make sure the guard is usable to the machinist
- If operators don't like the guard, they will not use it
- Many guards are only useful for flat materials
- Watch for flying metal or debris in electrical outlets
- Moving table so be cautious of being too close to fixed objects

Machinists should never wear rings, watches, gloves, long sleeves, necklaces or lanyards, long earrings or have long hair that is not pulled back – these are all concerns around rotating equipment

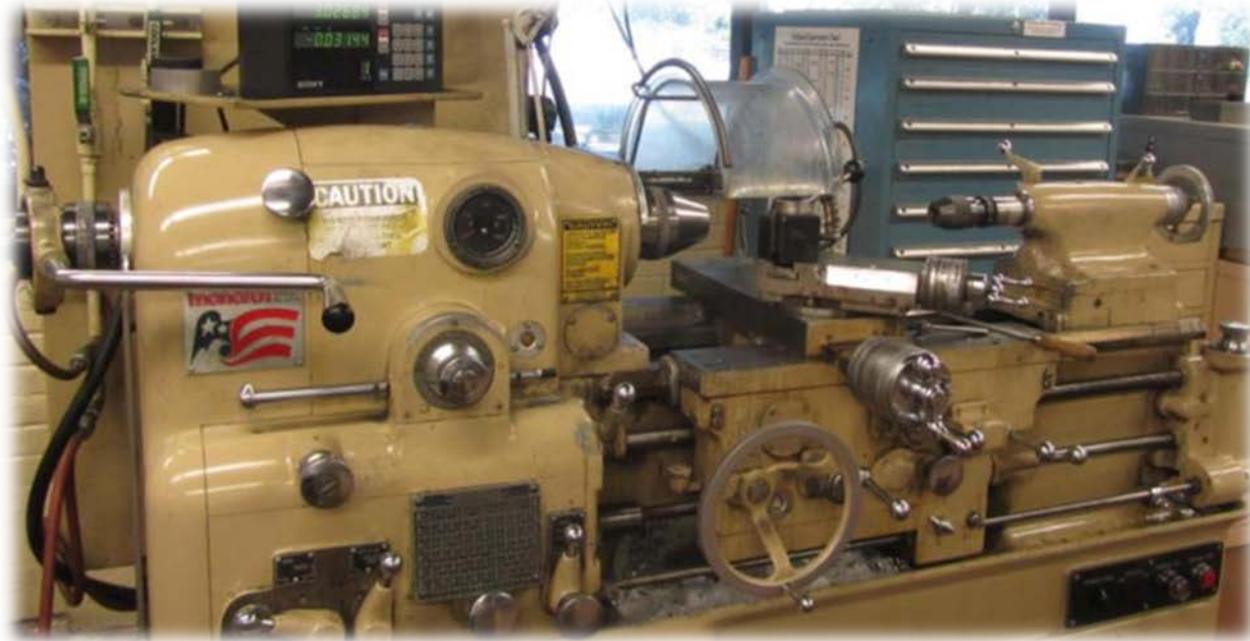
Where Mechanical Hazards Occur

The Point of Operation: Where work is performed on the material, such as:

- ✓ Cutting
- ✓ Shaping
- ✓ Boring
- ✓ Forming of stock

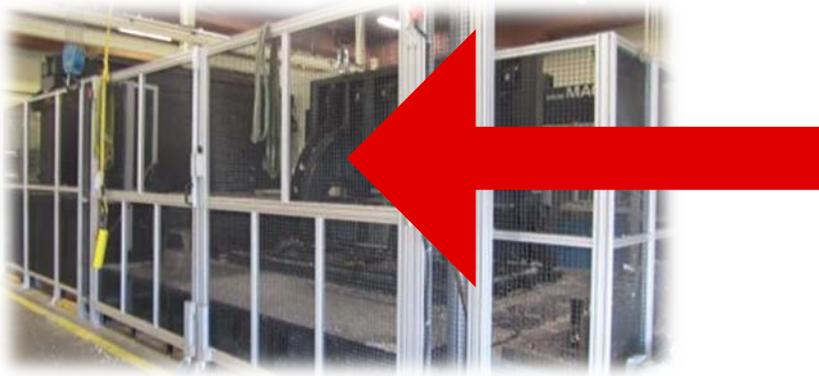


Lathe



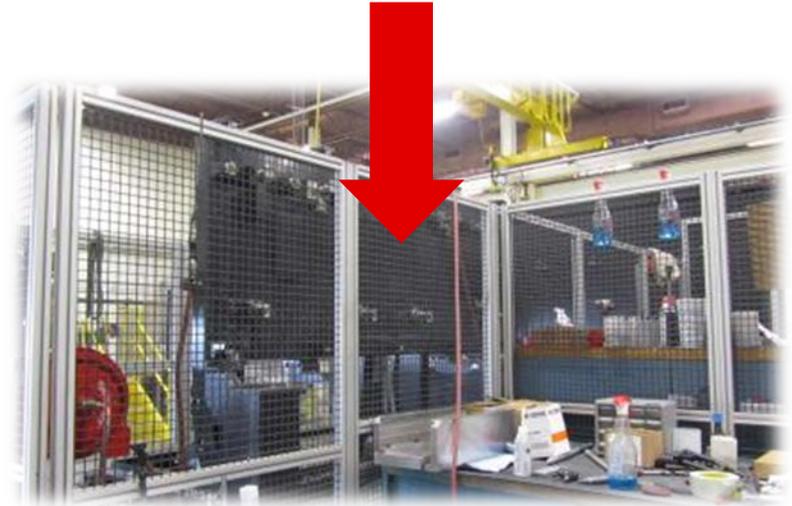
- Off the shelf guards available for many lathes – including old equipment
- Mount directly on the machine
- Need to be adjusted over the point of operation

Large CNC Machines



Large rotating pieces of equipment

- Equipment does not come with guards
- Include interlocked guarding as part of the capital package – get as many bells and whistles as you need to make it safe
- Think of pinch points but also fall hazards
- Keep in mind of access points for maintenance or oiling



Custom Made is A-OK



Make sure operators and maintenance are involved with the design

Large Vertical



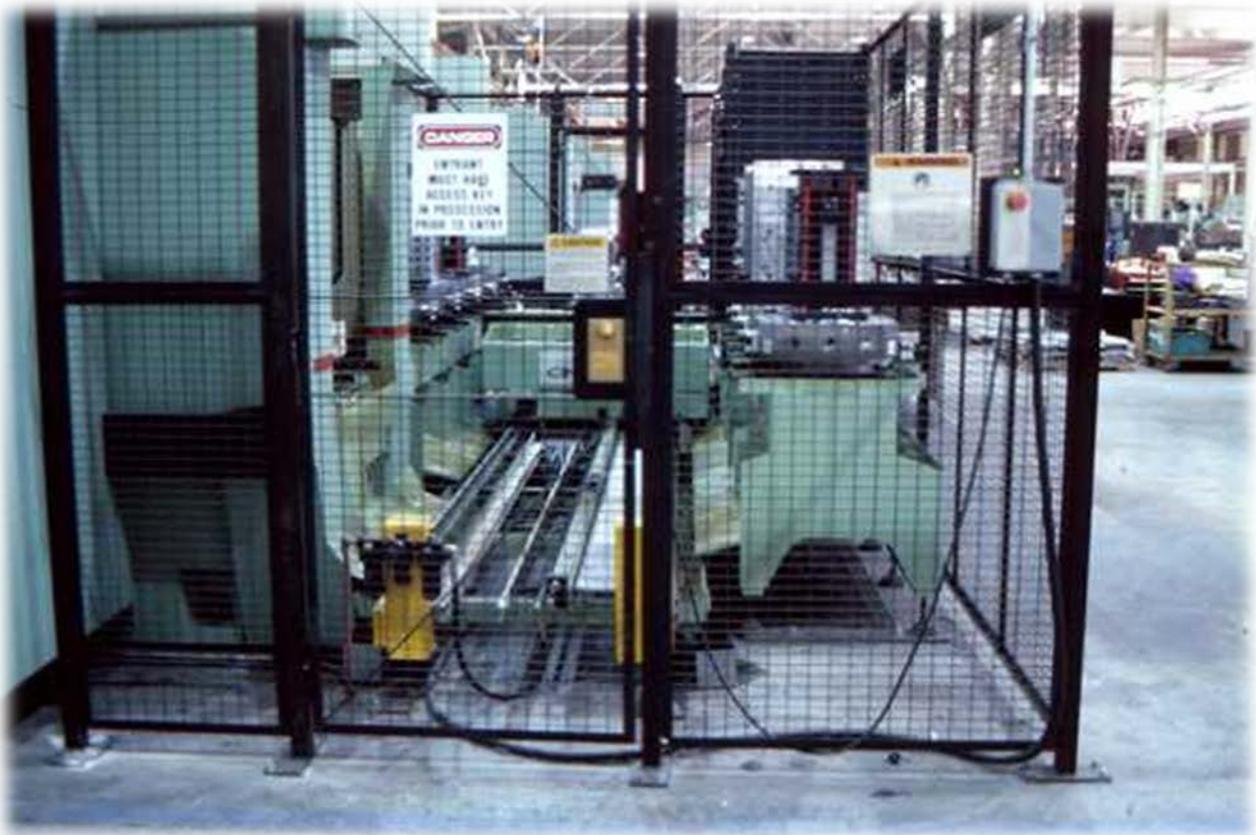
Without guarding



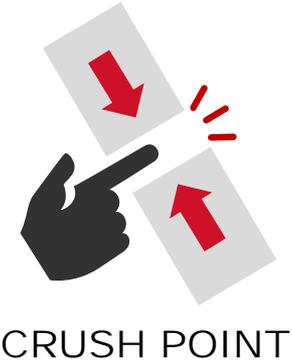
With guarding

Large/old equipment purchased prior to guarding requirements-guarding made in house

Full Enclosure Guard With Interlock



Mechanical Power Press



Two hand operation

Shrink Wrap Machine



Rotating equipment with pinch points

Tooling Guards



Cover sharp tooling when not in use

Coolant Management

It all started with an odor complaint...

- A site switched coolants in early 2015 due to foaming concerns with existing coolant
- In fall of 2015, started noticing “Monday Morning Odor”
 - Equipment idle over the weekend
- Significant odor issues after returning from Holiday shutdown
- OSHA received employee complaint – issued letter
- Consultant contacted to perform assessment for micro-organisms
 - Help identify equipment contributing to complaint

Odor Investigation & Response

- Biocide cycling
- Pre and Post remediation sampling
- Dip slides & coolant monitoring
- 3rd party coolant management review
- Updated procedures
- Benchmarking internal and external

Corrective Actions

- Develop a comprehensive coolant management system
- Check pH regularly
- Remove tramp oils
- Do not let coolant stay stagnant for too long
- Maintain correct coolant concentration

In Conclusion

- Never operate equipment without guards – Be prepared to have hard discussions with employees
- Guards don't have to be fancy or expensive – they have to work
- Always bring the operators/machinists into the guard planning
- Incorporate guard cost into capital packages
- Use consultants to perform a guarding assessments
- Look at the need for guards based on the risk, not if you can quote a specific law requiring the guard
- Have a system in place for new equipment to ensure proper machine guarding is in place
- Ensure you are properly maintaining machine shop coolants

Questions?