Portage County Safety Council
Machine Safety Workshop Part 1 or 5
Manufacturing Safety and Productivity

Sept. 1, 2021

Integrated Mill Systems

Mark Eitzman

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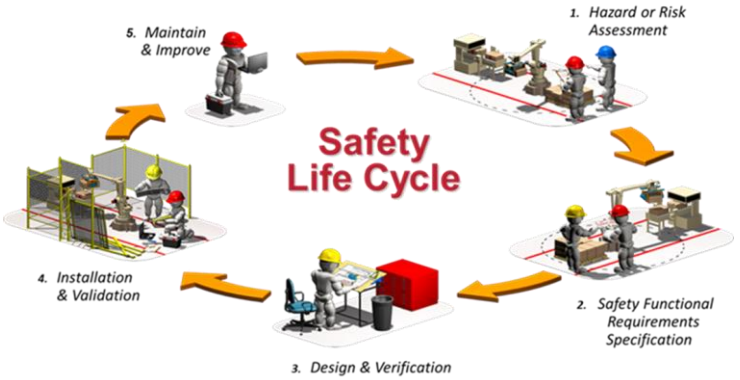
5 part series on Manufacturing Safety

PORTAGE COUNTY SAFETY COUNCIL

A Forum For Workplace Safety

1. **Societal Demands for Safety and Productivity - Sept. 1**
2. **Regulatory Compliance (laws and standards) and Risk Assessments - Sept 8**
3. **Risk Reduction Methods, Technologies and Techniques for Machinery Safety - Sept 15**
4. **Engineered Controls and Safety Circuits – Sept 22**
5. **Installation, Validation and Post Commissioning Management of Change – Sept 29**

OSHA®
Occupational Safety and Health Administration
www.osha.gov

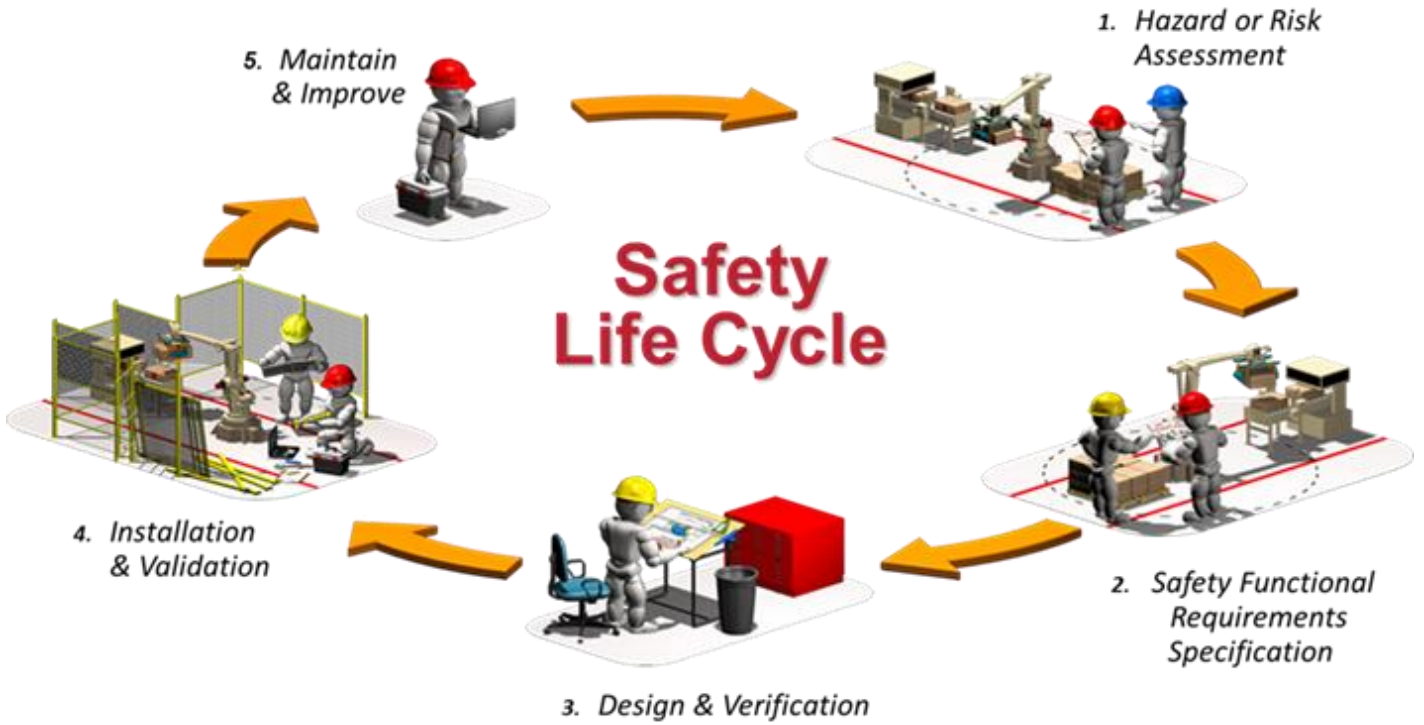


Integrated Mill Systems

Integrated Mill Systems (IMS) is a process automation solutions provider for the metals, mining, utility, petroleum, and process industries.

Integrated Mill Systems
Machine Safety Approach

- Risk Assessments
- Safety Functional Specification
- Design and Verification (to standards)
- Safety Hardware Engineering & Supply
- Safety Functions
  - PLCs, Sensors, Actuators (Drives, Contactors, Valves)
  - Machine Guards, Access Control
  - Hydraulic and Pneumatic Engineering
- Safety Programming
- Installation Engineering
- Installation Services
  - Commissioning
  - Validation
  - Training
- Safety Monitoring & Data
  - Machine or safety function used as intended?
  - Potential for improvements in safety and/or OEE?



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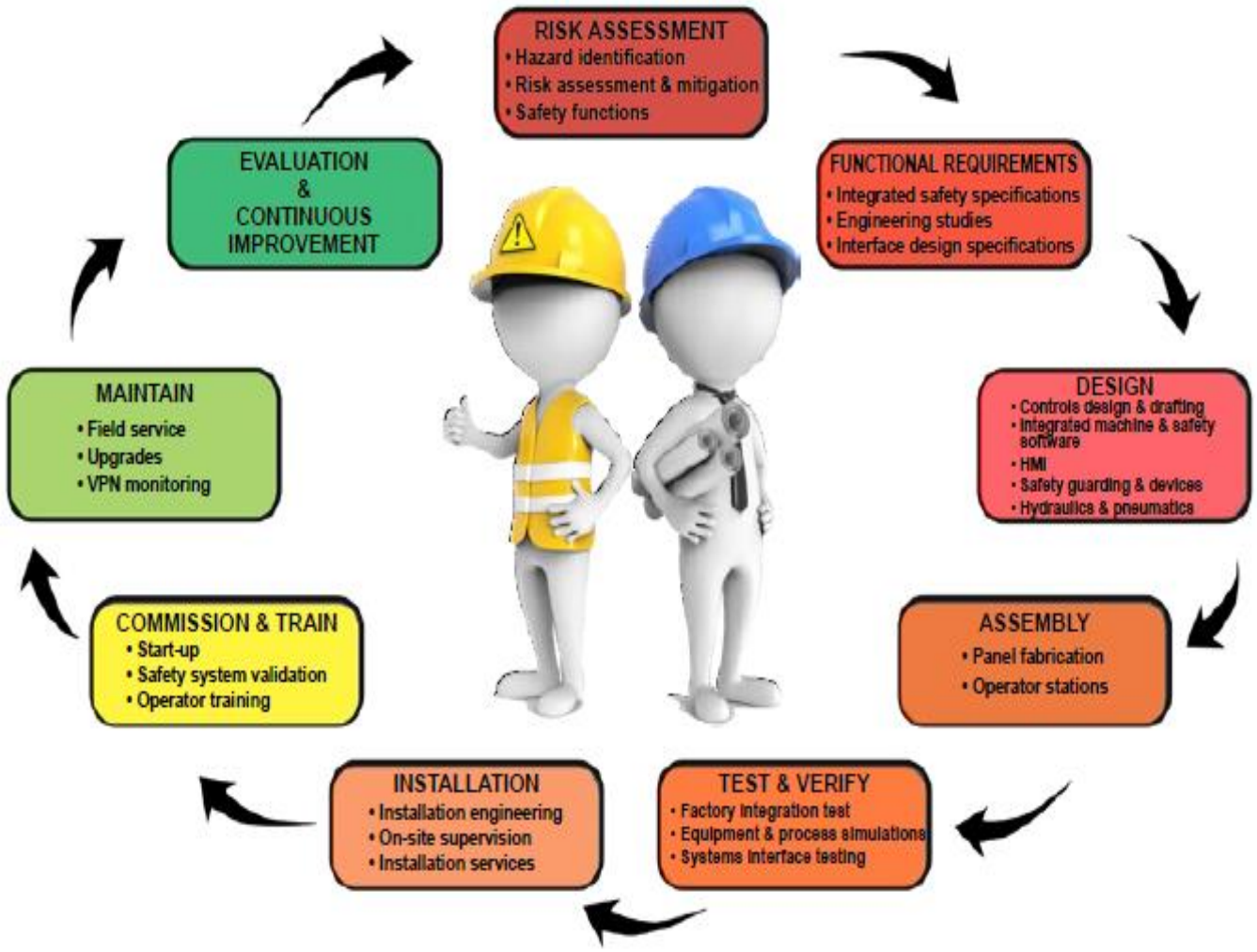


Portage County Safety Council
Machine Safety Workshop Part 1
Manufacturing Safety and Productivity

- Societal and economic forces driving safety demands on industry
  - Safety and Productivity (OEE)

- The 3 elements of Safety Maturity
  - Culture
  - Policies and Procedures
  - Technologies and Techniques

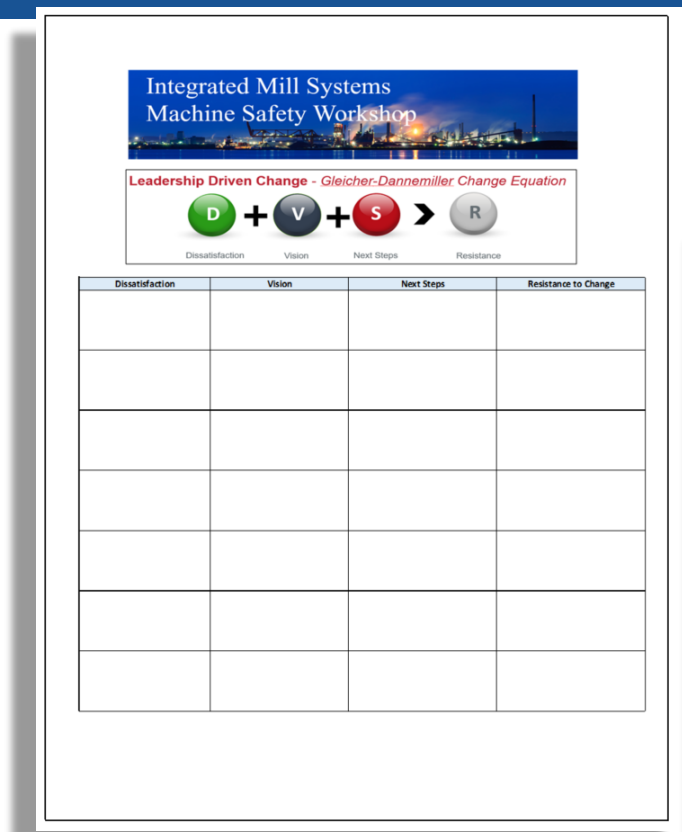
PORTAGE COUNTY SAFETY COUNCIL

A Forum For Workplace Safety

- Justifying and proving the *Return on Investment* (ROI) of safety and productivity
  - A calculator to generate real numbers for safety and OEE
  - How EHS can contribute to fiscal performance

Integrated Mill Systems
Machine Safety Workshop handouts

- D+V+S>R notes
- *Goals and business outcomes of an investment in machine safety solutions*

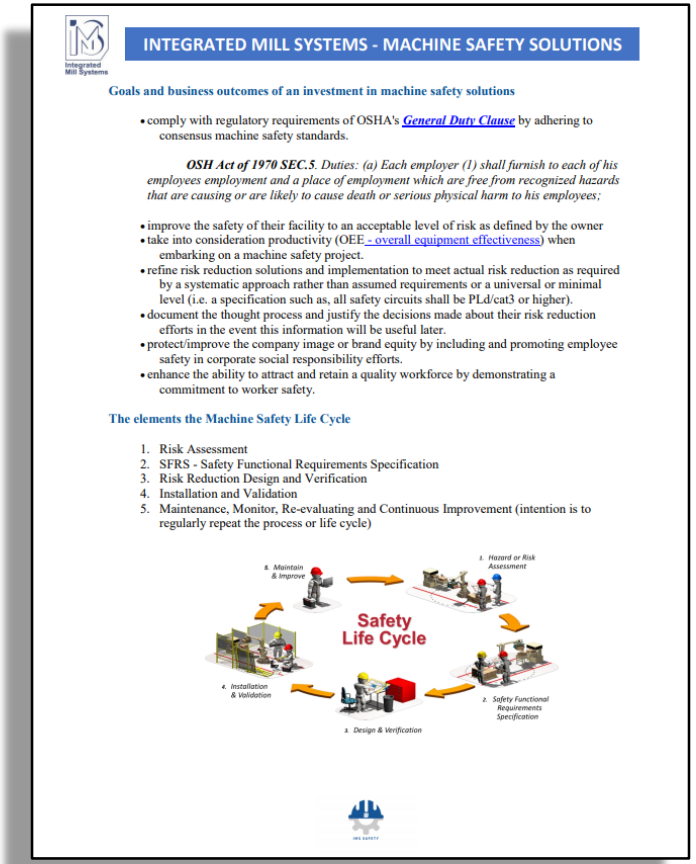

Integrated Mill Systems
Machine Safety Workshop

Leadership Driven Change - *Gleicher-Dannemiller Change Equation*

D + V + S > R

Dissatisfaction Vision Next Steps Resistance

Dissatisfaction	Vision	Next Steps	Resistance to Change


INTEGRATED MILL SYSTEMS - MACHINE SAFETY SOLUTIONS

Goals and business outcomes of an investment in machine safety solutions

- comply with regulatory requirements of OSHA's ***General Duty Clause*** by adhering to consensus machine safety standards.

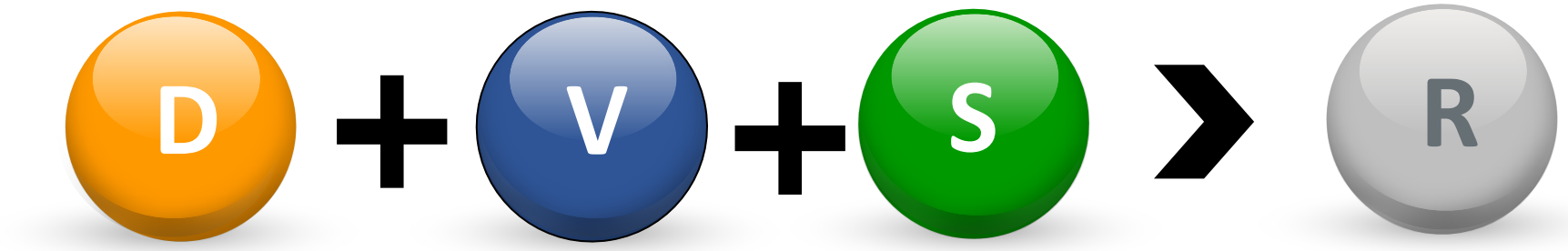
OSH Act of 1970 SEC.5*. Duties: (a) Each employer (1) shall furnish to each of his employees employment and a place of employment which are free from recognized hazards that are causing or are likely to cause death or serious physical harm to his employees;*

- improve the safety of their facility to an acceptable level of risk as defined by the owner
- take into consideration productivity (OEE - overall equipment effectiveness) when embarking on a machine safety project.
- refine risk reduction solutions and implementation to meet actual risk reduction as required by a systematic approach rather than assumed requirements or a universal or minimal level (i.e. a specification such as, all safety circuits shall be PLd/cat3 or higher).
- document the thought process and justify the decisions made about their risk reduction efforts in the event this information will be useful later.
- protect/improve the company image or brand equity by including and promoting employee safety in corporate social responsibility efforts.
- enhance the ability to attract and retain a quality workforce by demonstrating a commitment to worker safety.

The elements the Machine Safety Life Cycle

1. Risk Assessment
2. SFRS - Safety Functional Requirements Specification
3. Risk Reduction Design and Verification
4. Installation and Validation
5. Maintenance, Monitor, Re-evaluating and Continuous Improvement (intention is to regularly repeat the process or life cycle)

Leadership Driven Change - *Gleicher-Dannemiller Change Equation*



Dissatisfaction	Vision	Next Steps	Resistance
Enterprise Risk	+ Safety and Productivity	+ Comprehensive Roadmap	› Commitment to change
Injury/Fatality, Incident/Rate Corp. or Regulatory Compliance Company/Brand Image/Equity Employee Morale Union Relations	Fiscal Performance Compliance Brand Image & Awards Executive Recognition Best Place to Work	Trusted Resources 10 Step Program SMI Assessment Pilot Project Executive Leadership	No injuries/deaths…lately Fines are minimal (lax OSHA) No corporate mandates Fear costs or decreased OEE BTTWWADI

Integrated Mill Systems Machine Safety Workshop

- *Economic and Societal Forces*
- *Safety and Productivity*

LEVEL	FOCUS	CULTURE	COMPLIANCE	CAPITAL
		BEHAVIORAL	PROCEDURAL	TECHNICAL
SMI 4	Operational Excellence	Safety is a **value** – essential to the health of the business.	Standard processes established to design **safety and productivity** into machinery **throughout the supply chain.**	Use of **contemporary** safety technologies & techniques to optimize **safety and productivity.**
SMI 3	Cost Avoidance	Safety is a **priority** – important to the health of the business.	Standard processes established to design **safe machinery throughout the company.**	Use of safety technologies & techniques to **optimize safety.**
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Manufacturing Enterprise Risk Management

Business Goal: ***Attain production goals at <u>an acceptable level of risk</u>***

Business Performance

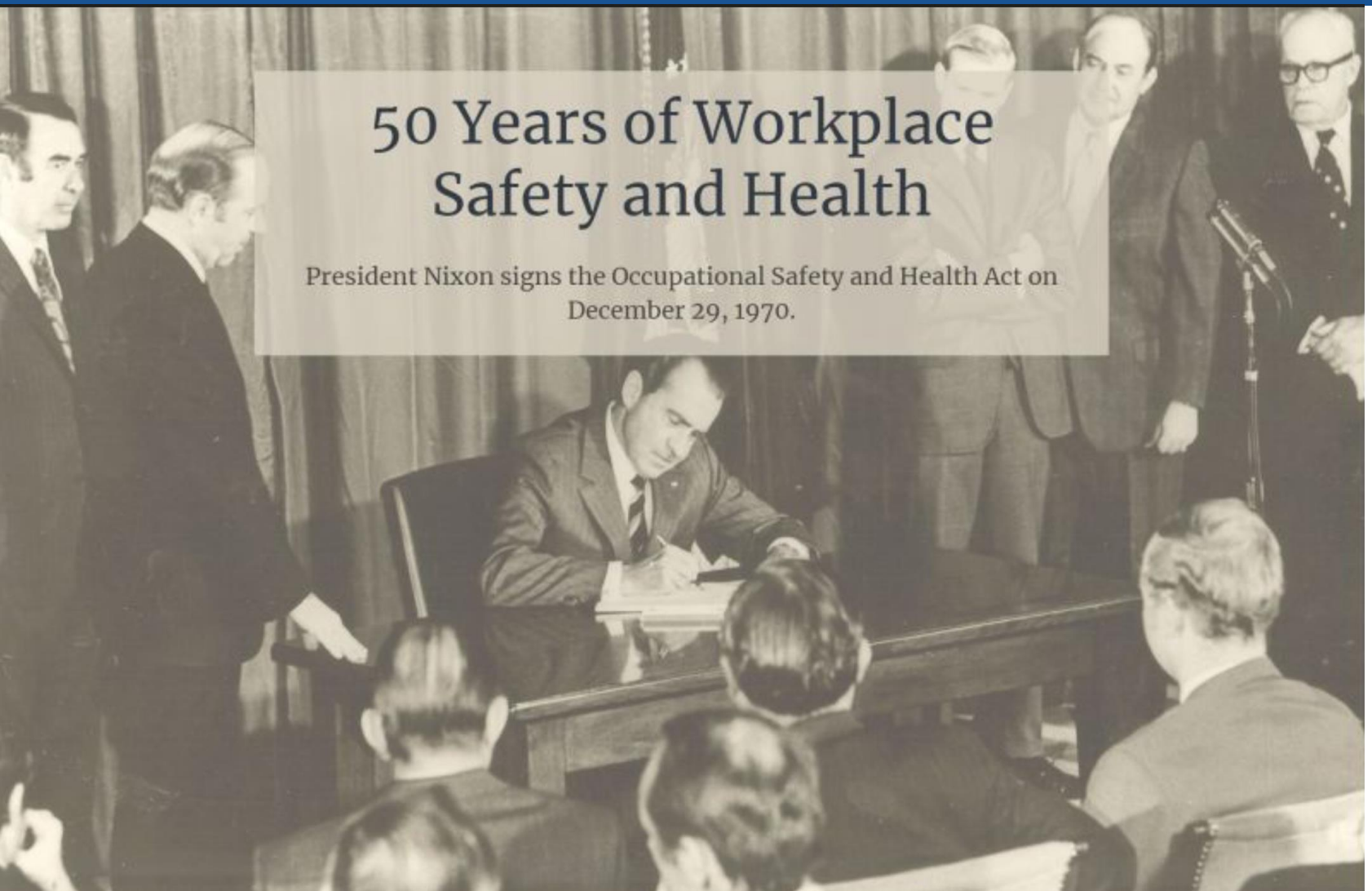
Employee Health & Safety

"What is your company's appetite for risk"?

Cal Beyer – Vice President, Zurich NA

United States Legislative Standard
Accountability for safety in the in USA

UNITED STATES
DEPARTMENT OF LABOR



OSHA®
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Obsolete and Less Mature Perspective of Safety

Reduced Healthcare costs

Reduced Litigation costs

Reduced Labor grievances

Reduced Machine Utilization

Reduced Operational Efficiency

Increased Labor Costs

Increased Mean Time To Repair

Increased Nuisance Shutdowns

Safety and Productivity are Mutually Exclusive

Workers' continuous dilemma

safety *vs* *productivity*

Lucky or Safe?

Is the work environment free of risk or just appears so due to acceptable lagging indicators?

Is there “normalization of deviance”?

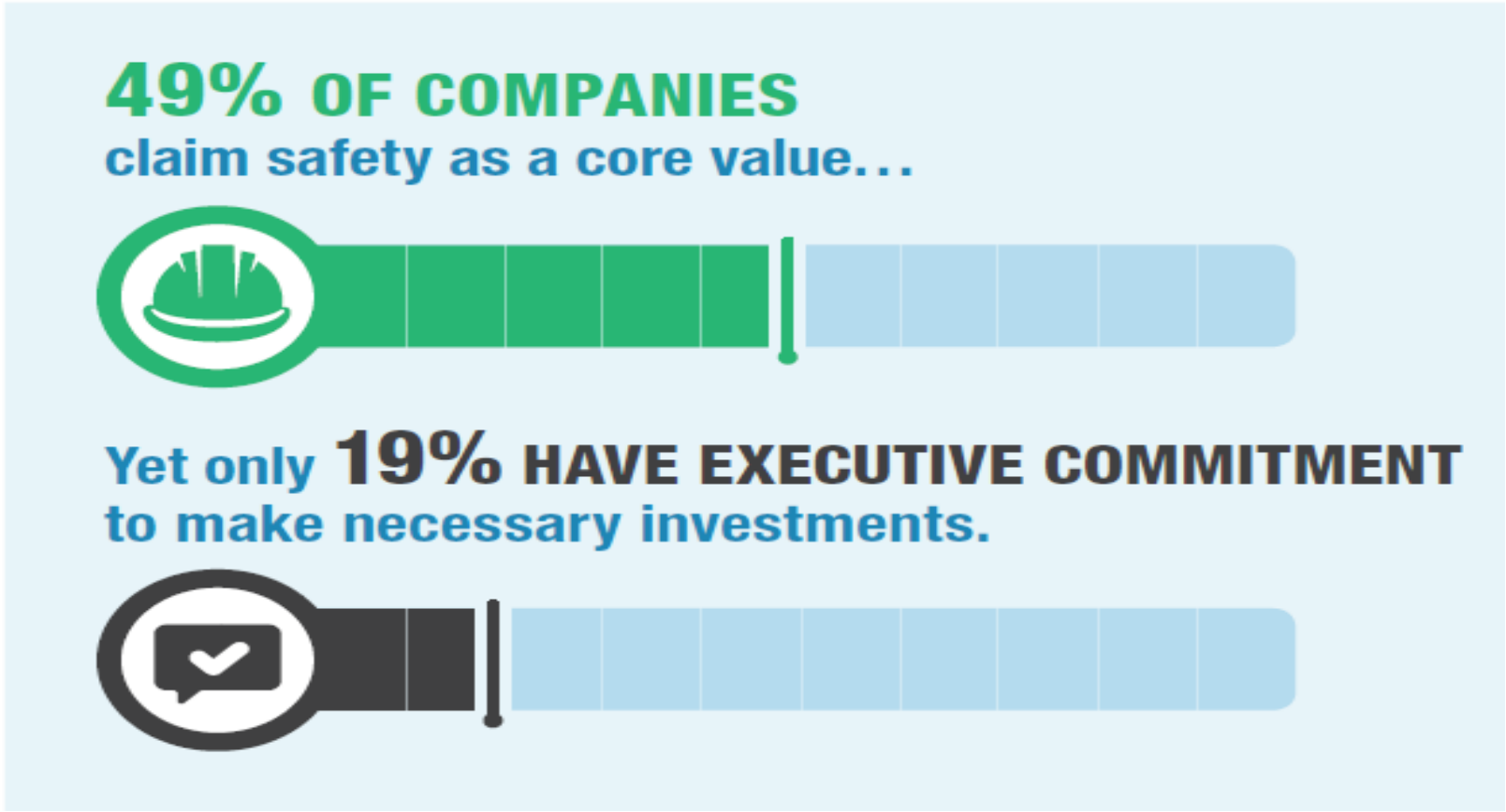
Normalization of Deviance

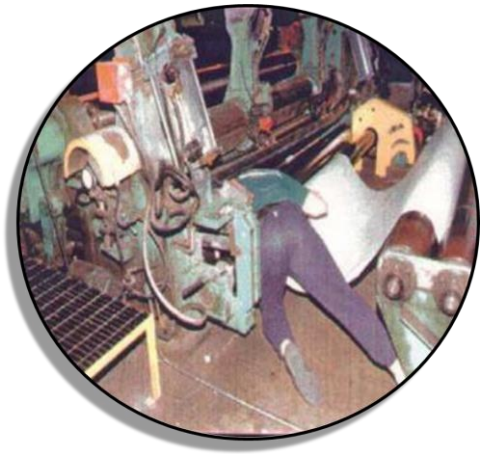
Transparency – *Sunlight is a great disinfectant on the affairs of people*

- U.S. Supreme Court Justice Louis Brandeis

- Financial Risk
- Reputational Risk
- Sustainability
- Supply Chain Risk
- Legal Risk

The Gap Between Good Safety Intentions and Execution





Proven Business Value of Safety

Turn to Aberdeen for Research with Results™

Aberdeen Group
A Harte-Hanks Company

Defining Best-In-Class Performance

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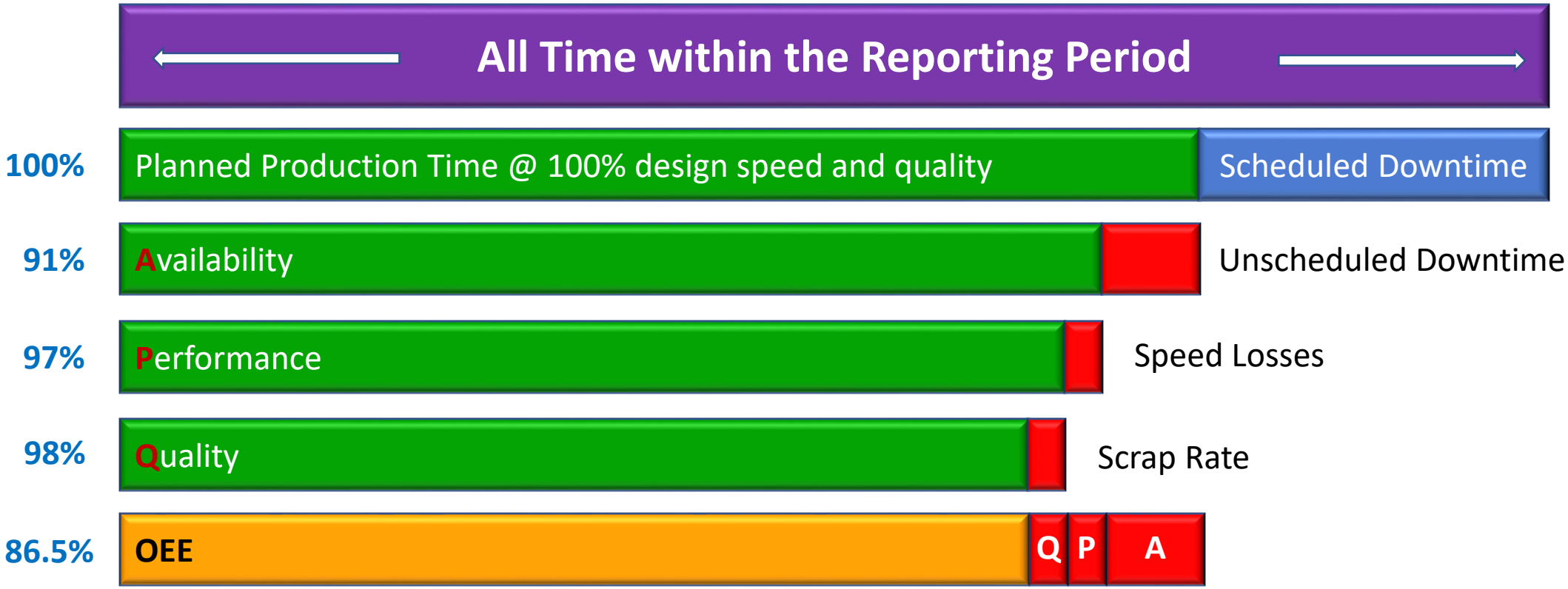
- 5%-7% Higher OEE
- ½ the injury rate

Average

- 9% Lower OEE
- 3X higher injury rate

Safety is the Barometer of Manufacturing Excellence

OEE – *Overall Equipment Effectiveness*



1 x .91 x .97 x .98 = 86.5%

A P Q OEE

Definition

SAFETY is…. Freedom from unacceptable **RISK**

RISK is… a combination of **SEVERITY** and **PROBABILITY**

ACCEPTABLE RISK is… **UP TO YOU!**

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Contemporary - Maturing Perspective of Safety

Improved Machine Speed & Utilization

Improved Operational Efficiency / Labor Costs

Improved Maintenance Downtime / Efficiency

Reduced Nuisance Shutdowns

Regulatory Compliance

Reduced Healthcare costs

Reduced Litigation costs

Reduced Labor grievances

More sophisticated controls

More educated staff

May require a culture shift

New policies/procedures/standards

Safety and Productivity are Complementary

Machine Safety Evolution

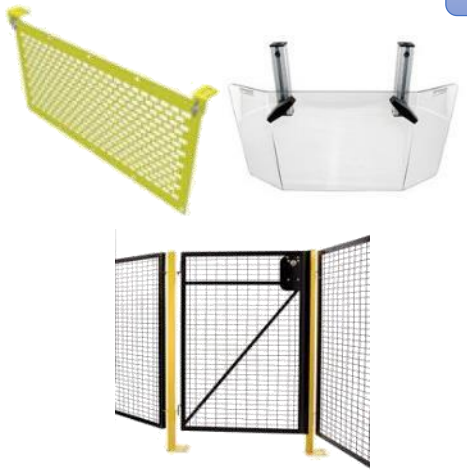
1970 1980 1990 2000 2010 2020

LOTO

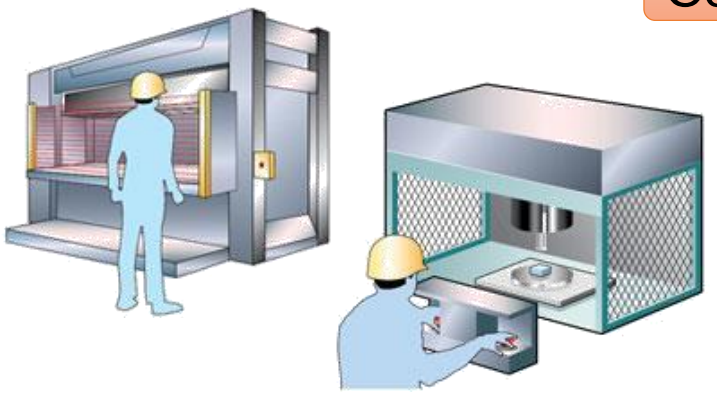
Preventing Access

Detecting & Controlling Access

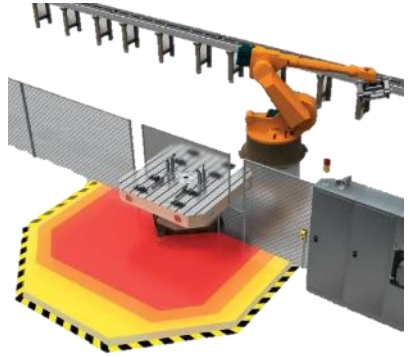
Collaborative Access



Guards



Safeguards



Integrated Safety

Integrated Mill Systems
Machine Safety Workshop

Manufacturing Safety Maturity

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Proven Business Value of Safety

What differentiated Best-in-class Manufacturers from their Peers?

Defining Best-In-Class Performance

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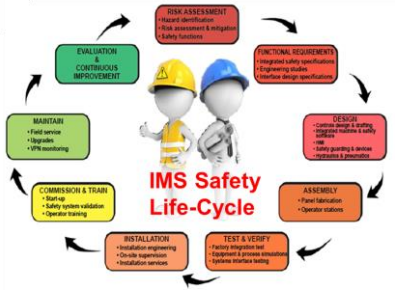
Safety is the Barometer of Manufacturing Excellence

“3Cs” – Culture, Compliance, Capital

- **Culture: attitudes, accountability, and compliance**
  - An enterprise value (more than a priority) emanating from leadership throughout the organization. It is observable and uncompromised.



- **Compliance: use of effective processes and procedures**
  - Establish a formalized risk management strategy, standards and procedures to identify, prioritize and mitigate risks.

- **Capital: investments in technologies**
  - Contemporary safety solutions and technologies that improve both safety and productivity and are seen as a viable investment with an ROI.

What differentiated Best-in-class Manufacturers from their Peers?

Safety Maturity Index™
for Machinery

LEVEL	FOCUS	CULTURE BEHAVIORAL	COMPLIANCE PROCEDURAL	CAPITAL TECHNICAL
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Characterization of SMI levels

- **SMI 4** – *Demands both safety and productivity*
- **SMI 3** – *Safety above all*
- **SMI 2** – *Interest is primarily "compliance"*
- **SMI 1** – *No current interest in safety*

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Safety Maturity Index – Cultural Attributes

Attitude:

- Safety is considered vital to the health of the business and its employees – a key indicator of business optimization.
- Safety is a value. No exceptions to safety are acceptable in pursuit of other goals
- Employees would rank priorities as: Safety, Quality, Production, Cost Reduction
- Safety is a prominent part of the business and strategic plans, including being considered a key element of brand image.

Accountability:

- Upper management is held accountable, including compensation, for safety metrics.
- All safety incidents are reported appropriately with total transparency.
- Leaders/managers are constantly on the floor asking about, coaching about or observing opportunities for improving safety.
- Employees view leader/manager adherence to safety as 100% on board, caring about worker safety.

Commitment:

- Anticipatory, pre/during/post-incident accountability exhibited by employees for their safety and the safety of others, aligned with systemic process or procedure.
- >90% of employees are committed to actively managing their own safety behavior, and coaching others regarding workplace safety, to specified behavior standards and expectations.
- >90% of employees are involved and participating in safety improvement initiatives.

Defining Best-In-Class Performance

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Safety Maturity Index – Policy/Procedural Attributes

EH&S:

- Entire supply chain required to meet safety standards.
- Clearly defined appropriate roles and activities for all levels of employees.
- Rigorous Management of Change process in place, and functioning.
- Accountability though performance management process established.
- Formalized risk assessment process for EHS impacts in place, based on established standards.

Engineering:

- Documented safety assessments performed throughout the machinery life cycle steps including
  - concept/design, fabrication, installation, validation, operation/maintenance, decommissioning.
- Functional safety specifications developed to improve safety *and* productivity.
- Design considerations for safety *and* productivity.
- Safety system design using safety rated products.
- Design and verification of safety system to ensure risks are mitigated.
- Safety system validation and documentation to ensure functional safety by a qualified safety engineer.
- Perform regular maintenance and modification assessments of safety systems.
- Requires machinery suppliers to provide proof/documentation of risk assessment, design verification, and system validation to ensure that all machines meet requirements.
- Provides standardized global specification of safety performance or integrity level.

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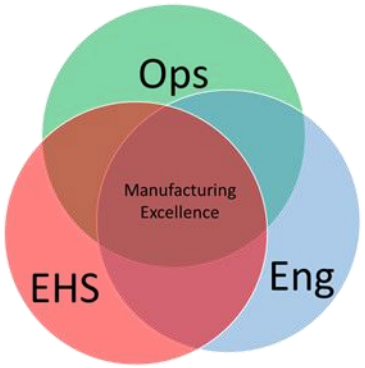

Safety Maturity Index – Technology Attributes

Effective use of contemporary safety techniques and technologies

- Optimize safety and productivity
- Reduce unscheduled downtime
- Investments in safety technology is perceived as an investment with an ROI
- Machines are *Inherently Safe by Design*
- Use of *alternative measures* to lock-out/tag-out for tasks deemed to be routine, repetitive, and integral to the process (*OSHA's minor servicing exception*) to optimize productivity.
- Integration of safety, discrete and motion control systems diagnostics to reduce unscheduled downtime (MTBF, MTTR).
- Use of advanced safety technologies and techniques (safe speed, safe direction, safe torque off, safe position, zone control, presence sensing, etc.) to optimize productivity.
- Use of manufacturing intelligence to monitor safety system performance (MTTFd), diagnostics, and ensure proper safety system use, maintenance and validation.

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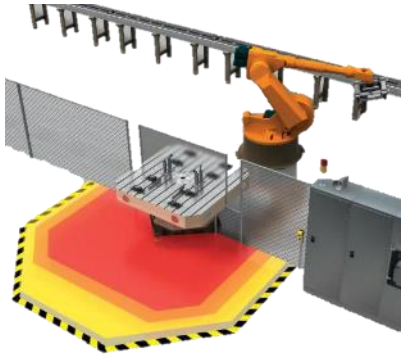

Safety Maturity Index™
for Machinery

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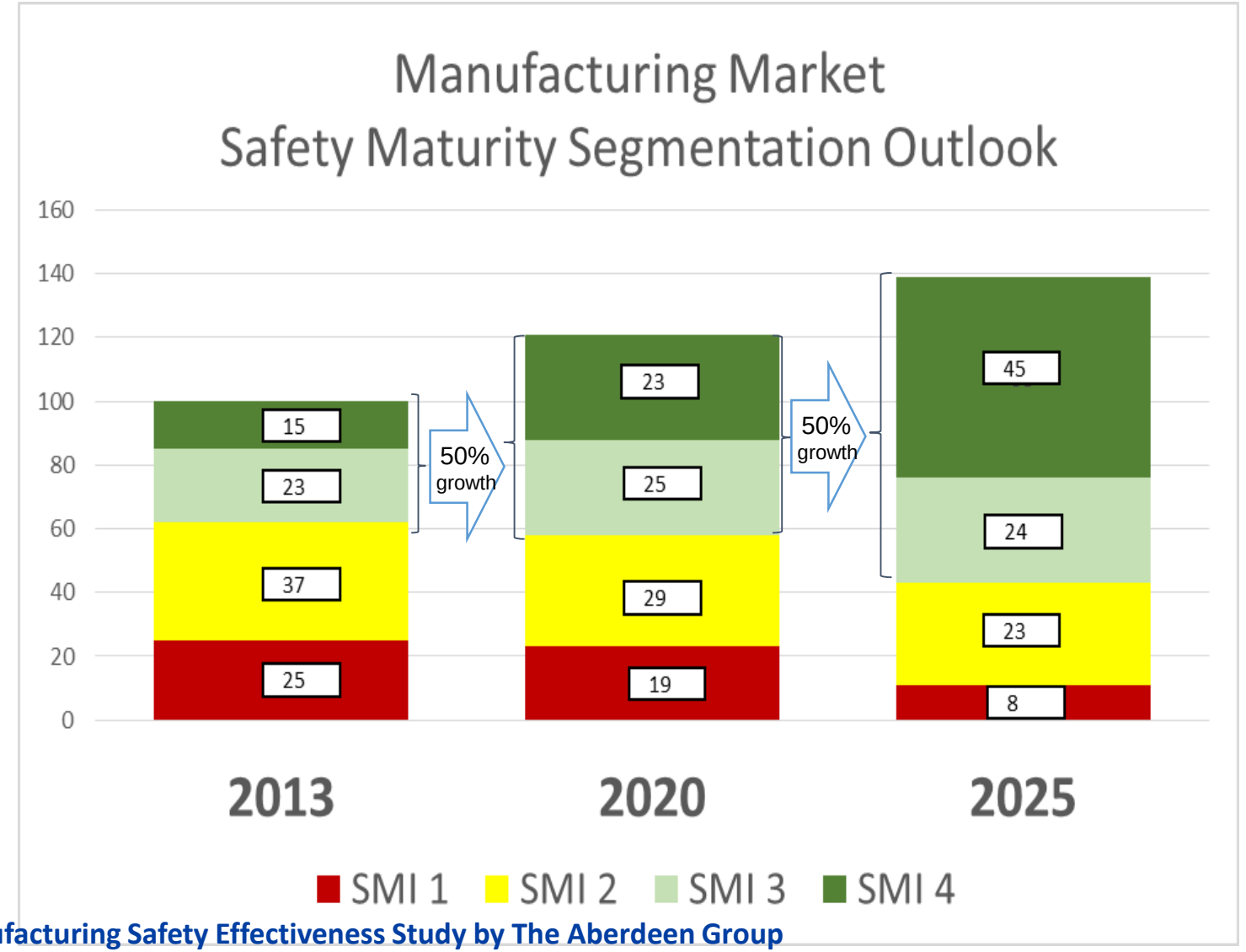
Safety Maturity Index™ for Machinery

Global Market Segmentation

LEVEL	FOCUS	Safety Technology Utilization
SMI 4	Operational Excellence	80%
SMI 3	Cost Avoidance	15%
SMI 2	Attaining Compliance	5%
SMI 1	Minimizing Investment	0%

15%	SMI 4
23%	SMI 3
37%	SMI 2
25%	SMI 1

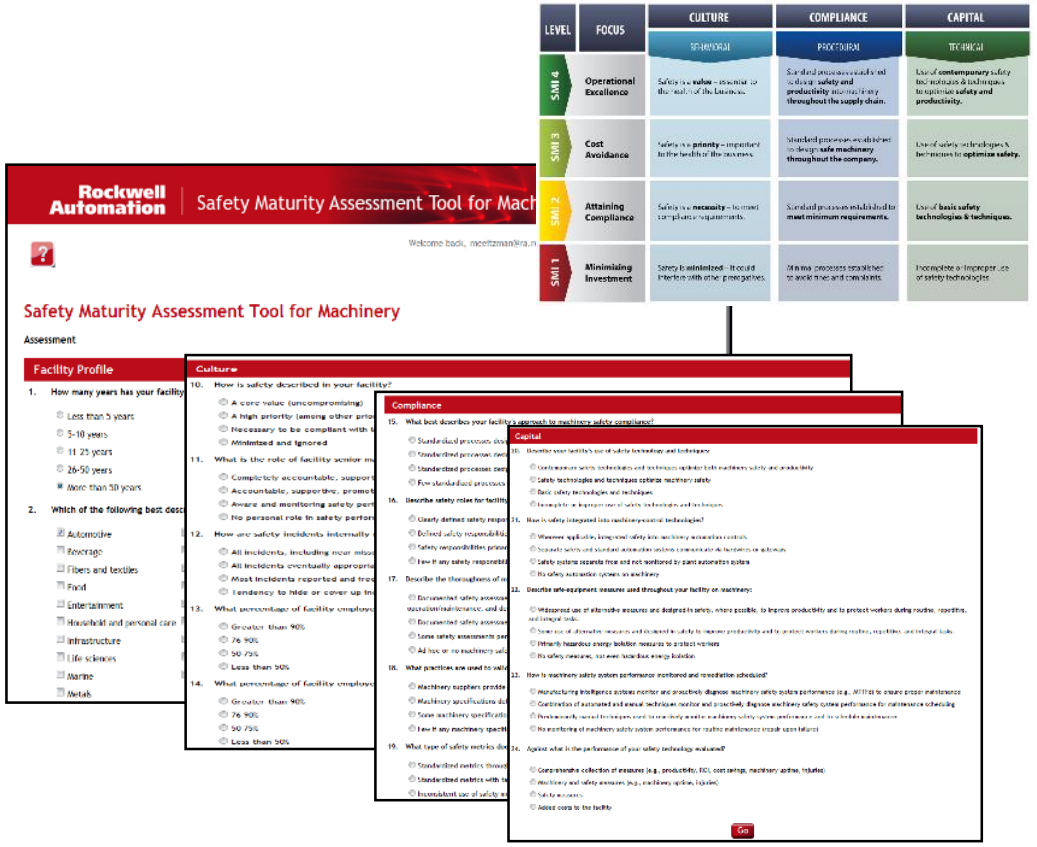


Source – Rockwell Automation, 2013 Manufacturing Safety Effectiveness Study by The Aberdeen Group

Safety Maturity Index™ for Machinery

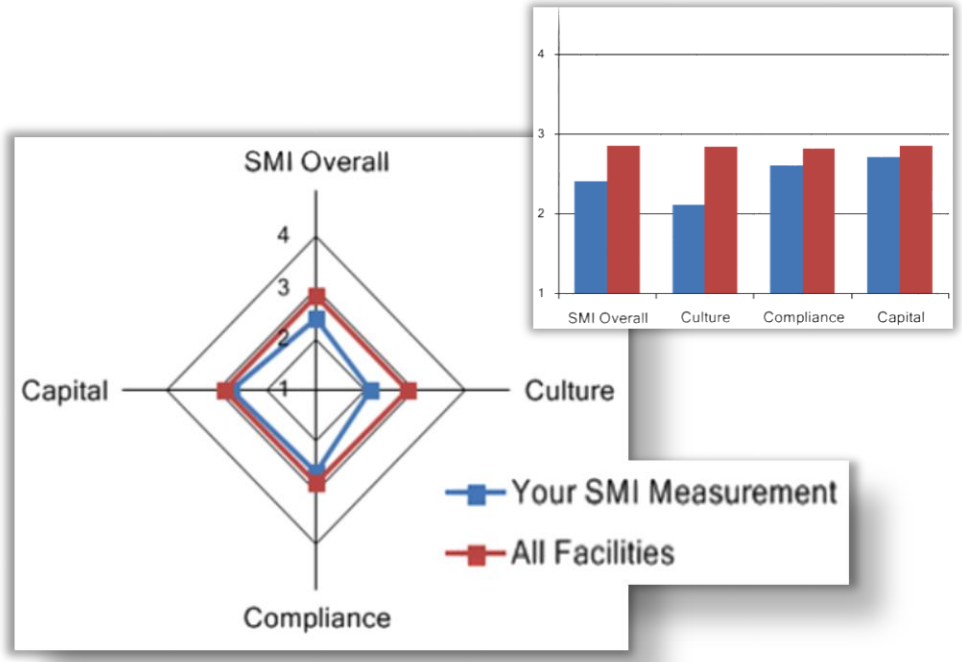
[link to Safety Maturity Index page, white paper and tool]

1. **Assess your Manufacturing Safety Maturity**
   - **C**ulture (behavioral)
   - **C**ompliance (procedural)
   - **C**apital (technical)
2. **Determine where to invest**
   - Develop the Roadmap by collaborating with expert resources
3. **Benchmark your organization**
   - Track your progress on the journey to safer more productive manufacturing
   - Compare yours to similar organizations



Safety Maturity Index™ for Machinery

- **SMI assessment database**
  - Completely anonymous
  - Will compile industry and market data
  - Generate a report (.xls or pdf)
- **Allows users to compare results by;**
  - Product/Industry
  - Geo. Region
  - Size (emp. & revenue)
  - Years in operation



Comparison Report

SMI MEASUREMENTS	Your Facility	Comparison
SMI Overall	2.4	2.8
Culture	2.1	2.8
Compliance	2.6	2.8
Capital	2.7	2.8

Integrated Mill Systems Machine Safety Workshop

The ROI of Investments in Safety

Definition of Maturity Class	Mean Class Performance
Best-in-Class: **Top 20%** of aggregate performance scorers	• 90% OEE • 0.2% Repeat Accident Rate • 0.05 Injury Frequency Rate • 2% Unscheduled Asset Downtime
Industry Average: **Middle 50%** of aggregate performance scorers	• 85% OEE • 2.4% Repeat Accident Rate • 0.9 Injury Frequency Rate • 6% Unscheduled Asset Downtime
Laggard: **Bottom 30%** of aggregate performance scorers	• 76% OEE • 10% Repeat Accident Rate • 3.0 Injury Frequency Rate • 14% Unscheduled Asset Downtime

Machine Safety Evolution

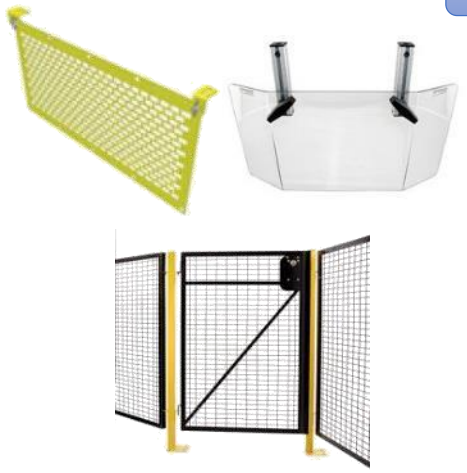
1970 1980 1990 2000 2010 2020

LOTO

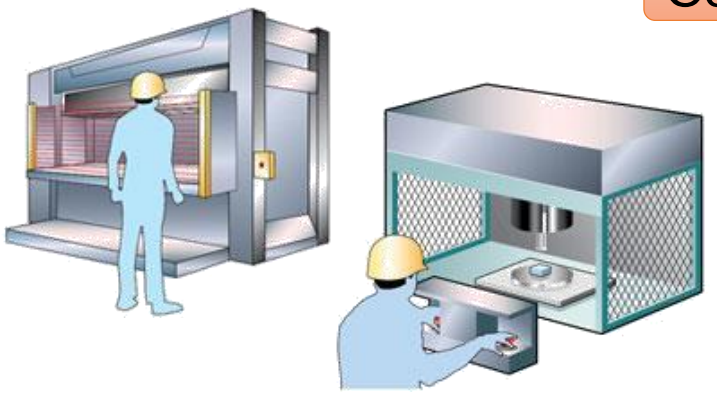
Preventing Access

Detecting & Controlling Access

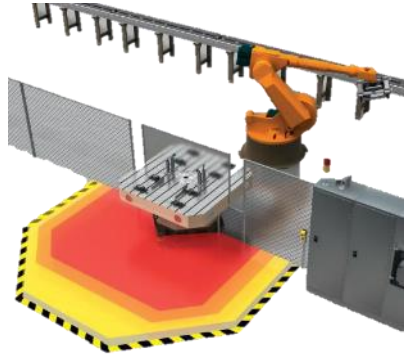
Collaborative Access



Guards



Safeguards



Integrated Safety

Contemporary - Maturing Perspective of Safety

Improved Machine Speed & Utilization

Improved Operational Efficiency / Labor Costs

Improved Maintenance Downtime / Efficiency

Reduced Nuisance Shutdowns

Regulatory Compliance

Reduced Healthcare costs

Reduced Litigation costs

Reduced Labor grievances

and expen$ive

More sophisticated controls

More educated staff

May require a culture shift

New policies/procedures/standards

Safety and Productivity are Complementary

Do we have an “opportunities”?

- Are poor safety system designs inducing people to bypass them just to do their jobs?
  - Are safety procedures being followed?
  - Are “short cuts” taken to expedite maintenance?
  - Is LOTO (lock out/tag out) always followed?
  - Are safety systems or technologies ever bypassed?
  - Are people using a “cheater key”?

“A historical lack of accidents does not imply a current presence of safety. It simply means you’ve been faster than the machine.”

Bill Hilton, Director of Health and Safety

GP Georgia-Pacific

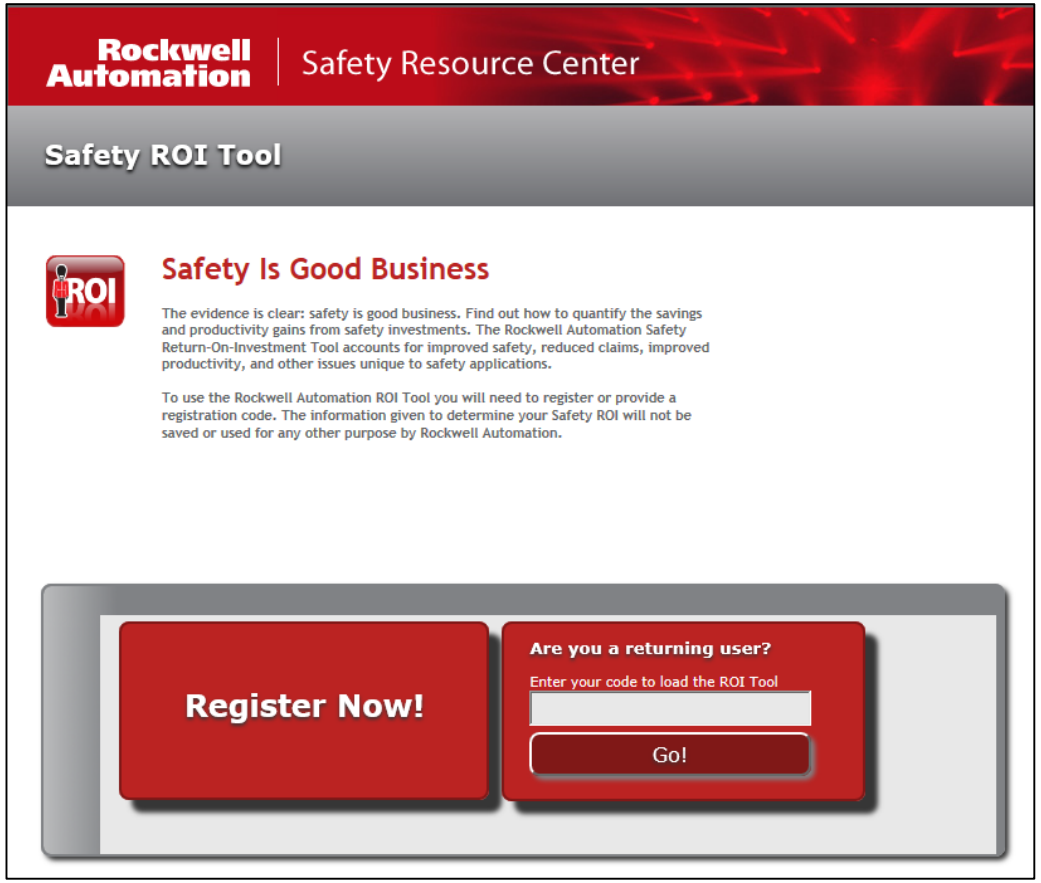
Safety ROI Tool to justify safety solution investments

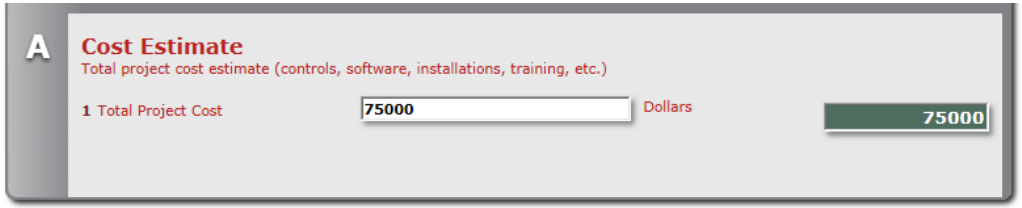
- Calculate safety project ROI based on related **productivity enhancements** and **injury cost avoidance**
- Allows a manufacturer to create a business case for safety investments
- Use defaults or populate with own data regarding specific projects
- Available on;
  - rockwellautomation.com > capabilities > safety solutions
  - Link to Safety ROI tool on rockwellautomation.com

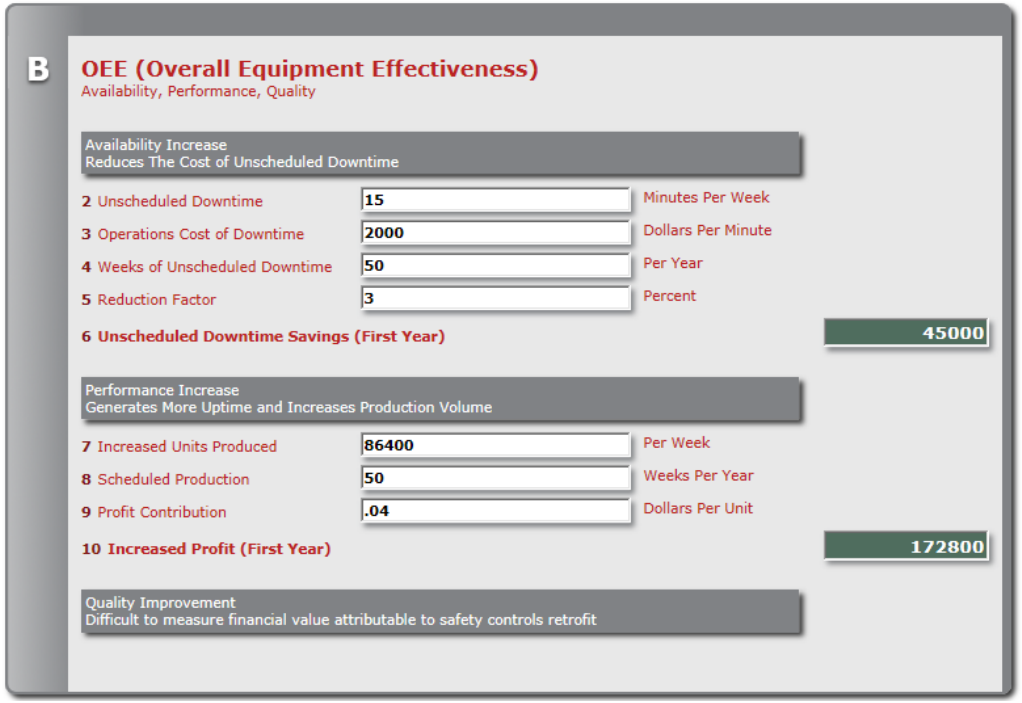
Cost Avoidance $$ + OEE Improvements $$ = Fiscal and Social Responsibility ROI

Safety ROI Tool

Is safety only a cost, or can a safety project show a return?







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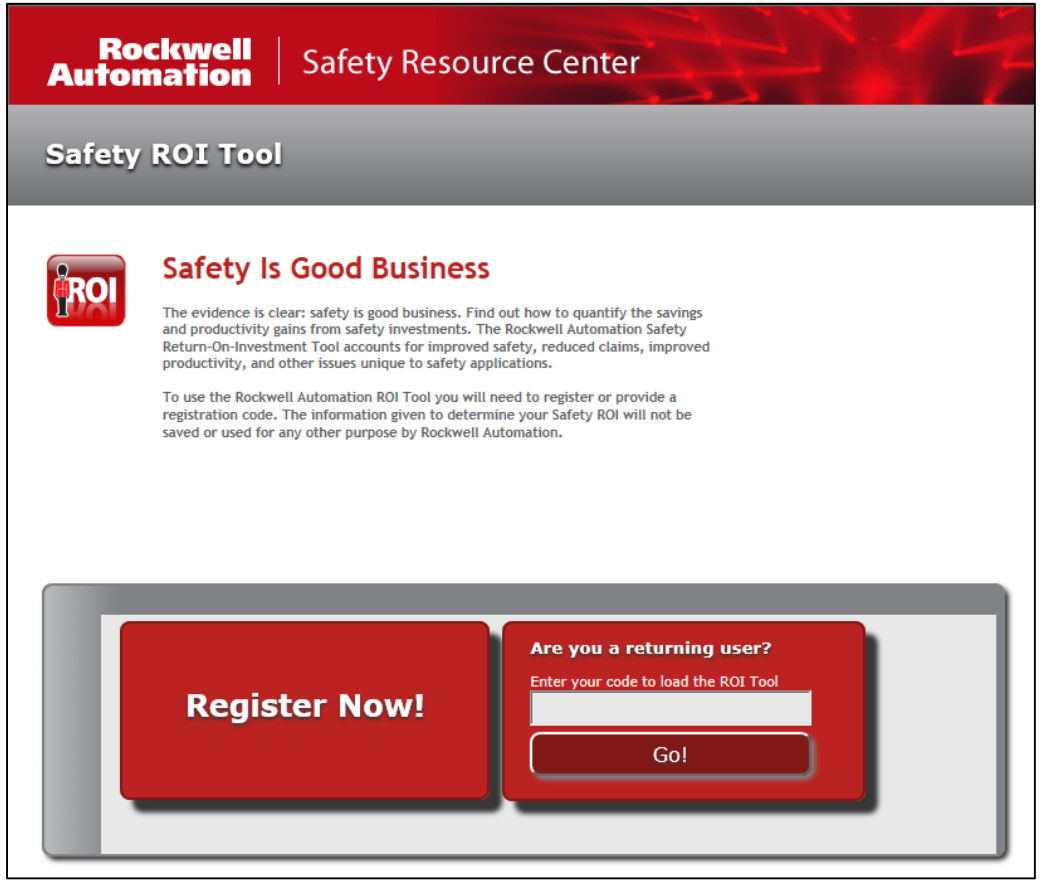

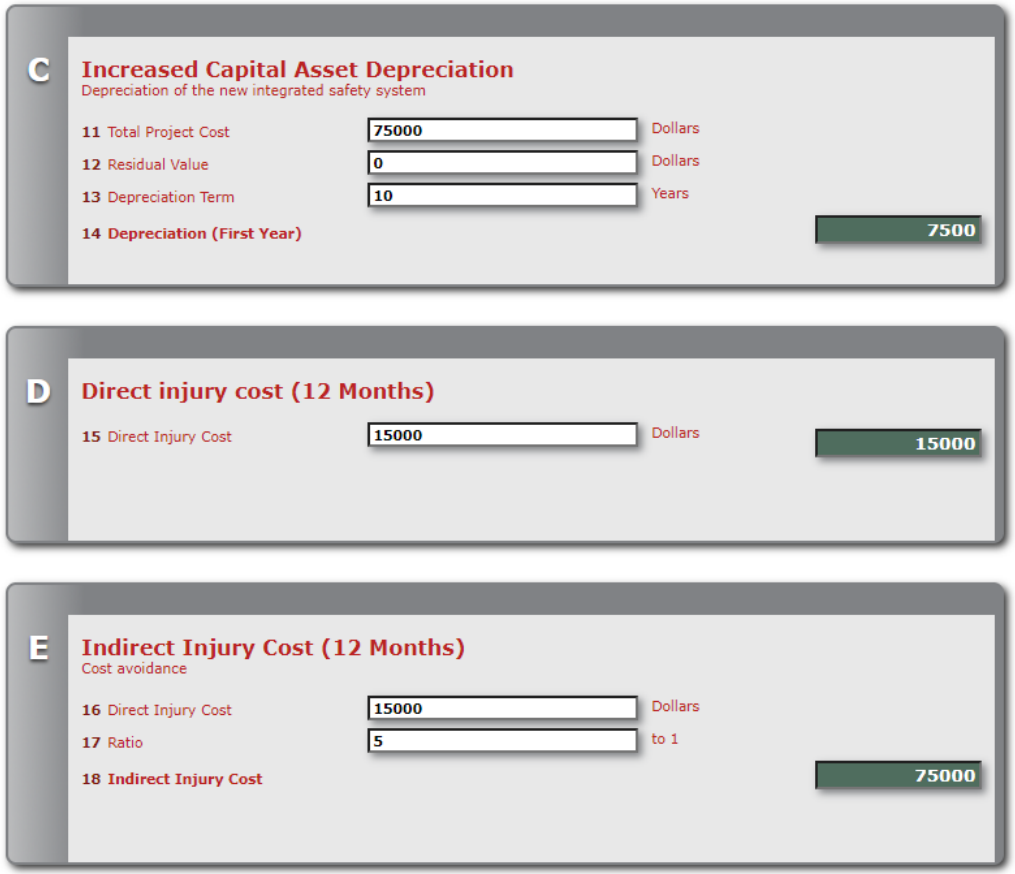

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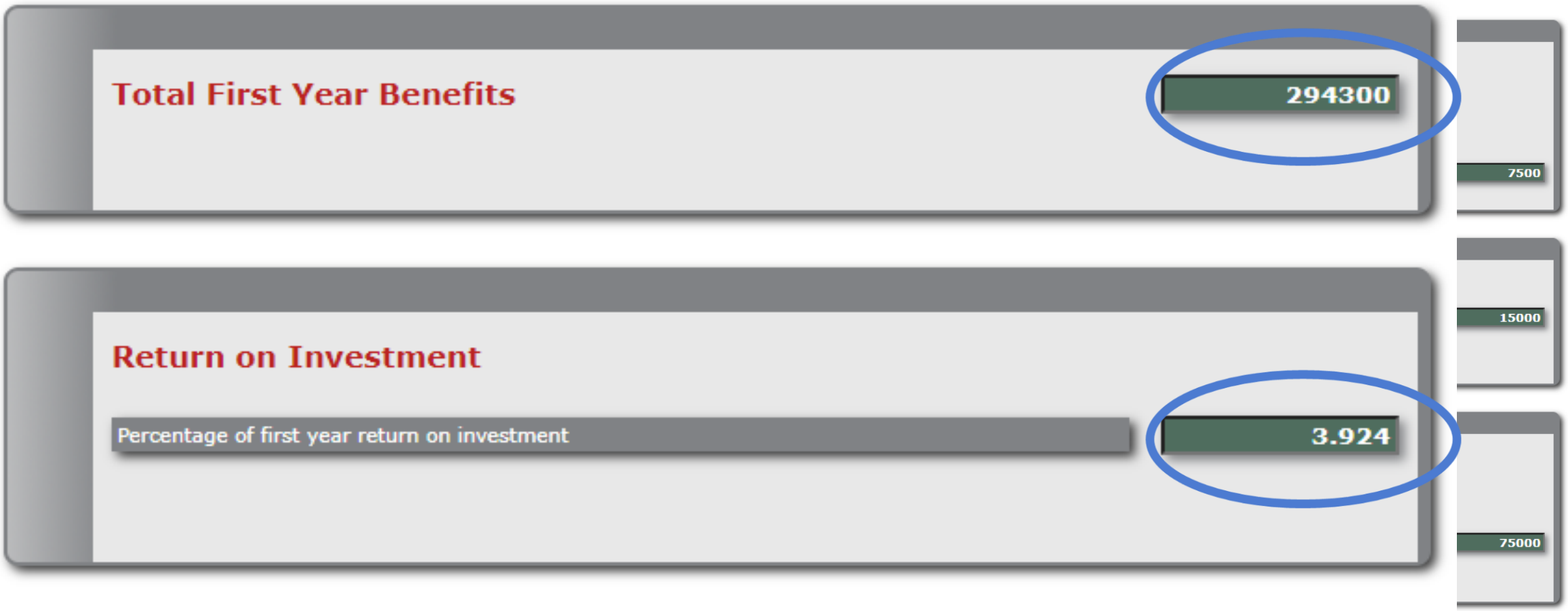


Why Safety…?

Corporate Social Responsibility

AND

Good Business

- **Contemporary approach improves the bottom line**
  - Best in class – 5-7% higher OEE and half the injury rate
  - Reduced financial risk – direct costs, civil/criminal liability, fines, supply chain disruptions
- **Safety improves your business**
  - “Best place to work”
  - Attraction/retention of high quality employees
  - Improves overall competitiveness
- **Worker safety is a corporate social responsibility**
  - Contributes to corporate image
  - Protects share holder value
  - Enhances of trust in company leadership

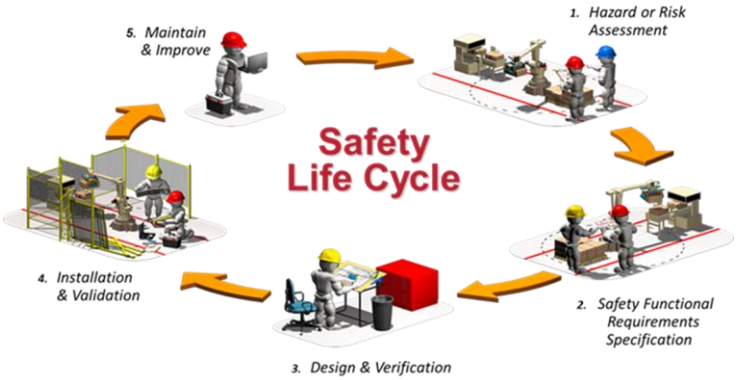
5 part series on Manufacturing Safety

PORTAGE COUNTY SAFETY COUNCIL

A Forum For Workplace Safety

1. **Societal Demands for Safety and Productivity - Sept. 1**
2. **Regulatory Compliance (laws and standards) and Risk Assessments - Sept 8**
3. **Risk Reduction Methods, Technologies and Techniques for Machinery Safety - Sept 15**
4. **Engineered Controls and Safety Circuits – Sept 22**
5. **Installation, Validation and Post Commissioning Management of Change – Sept 29**

OSHA®
Occupational Safety and Health Administration
www.osha.gov



Portage County Safety Council
Machine Safety Workshop Part 1 or 5
Manufacturing Safety and Productivity

Sept. 1, 2021

Integrated Mill Systems

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