



MSCI's Safety Best Practices and Success Study

In collaboration with Washington University's Olin Business School
and The Boeing Center for Technology, Information and Manufacturing

Introduction

MSCI is a member of Boeing Center for Technology and Information Management (BCTIM), a research facility that is part of the Olin Business School at Washington University in St. Louis. Through the Boeing Center, MSCI pursues industry research projects on supply chain, information management, eCommerce and logistics. It sponsors one project in each calendar year. Project teams are comprised of graduate students from the Olin School of Business and are advised by Panos Kouvelis, director of BCTIM and Emerson Distinguished Professor of Operations and Manufacturing Management.

BCTIM creates value through collaborative research on technology, information and supply chain management, focusing on the proprietary challenges member companies face. Together, MSCI and BCTIM advance supply chain management paradigms and practices with a shared goal of optimizing firms' global enterprise processes. BCTIM serves as a catalyst for supply chain innovation and global enterprise optimization. Their mission is to foster mutually beneficial interactions between industry and academia. They help organizations build competitive advantage through strategic supply chain management and technology-based process reengineering. Partner organizations help deepen BCTIM's understanding of effective business operations through shared projects, research and best practices.

Each year's project is sponsored by MSCI's Research Committee. Projects are chosen to be topical and of interest to a large percentage of MSCI's members. The Committee reviews or suggests project topics and monitors projects while they are progress.

The metals industry project for 2013 is about safety practices in the metals industry. The series of case examples that follows forms just a part of the Boeing Center Safety Study of 2013. The rest of the study will be published later in the year.

Benefits of Safety

- A successful safety program can give a competitive advantage and have a positive impact on the entire organization.
- Safety is an issue executives and union leaders agree on
- A good safety track record leads to:
 - Better inter-company and societal relationships
 - Improved employee satisfaction/reduced turnover/increased productivity
 - Cost savings – reduced medical expense, insurance premiums, fewer sick days
 - Strategic cost reduction for survival and future growth is part of any business; safety can accomplish these goals while also improving profitability

Tools for a Successful Safety Program

6 Safety Elements Framework

Designed by the BCTIM project team and tested during site visits to several MSCI member companies, these are the six primary elements the project team found to be important to all safety programs:

1. Management leadership and employee participation
2. Work place analysis
3. Accident and record analysis
4. Hazard prevention and control
5. Emergency response
6. Safety and health training

Comparing safety standards

The team also created a framework by which to compare and measure the effectiveness of safety programs:

Identify and compare the proficiency of an organization using the six elements listed above plus a metric for level of proficiency in each primary element of a safety program, as follows:

Level 1: Initial – Chaotic, ad hoc, individual heroism

Level 2: Repeatable – Documented, same steps may be attempted

Level 3: Defined – Defined/confirmed as standard business process

Level 4: Managed – Quantitatively with agreed-upon metrics

Level 5: Optimized – Deliberate process optimization and improvement over time

A standardized matrix of safety program attributes can thus be created that can be used to measure the effectiveness of a safety program. This matrix is listed below and was used by the project team as a way to compare and contrast the safety programs across the participating companies.

	1: INITIAL	2: REPEATABLE	3: DEFINED	4: MANAGED	5: OPTIMIZED
PURPOSE	The starting point for use of a new or undocumented repeat process	The process is at least documented sufficiently such that repeating the same steps may be attempted	The process is defined/confirmed as a standard business process, and decomposed to levels 0, 1 and 2 (the last being Work Instructions)	The process is quantitatively managed in accordance with agreed-upon metrics	Process management includes deliberate process optimization/improvement
MANAGEMENT LEADERSHIP AND EMPLOYEE PARTICIPATION		5S, Kalzen	Well defined responsibilities for the safety manager; Regular feedback from employees	Regular follow up of critical metrics by top management, Cross departmental teams to discuss safety issues	Boardroom discussions on improving safety standards, management spending on R&D related to safety
SAFETY AND HEALTH TRAINING		Having safety documents in place	Periodic training for each employee; Basic safety training to be provided to new joinees; Maintaining training logs	Training based on latest near misses/trends	Benchmarking across industries
EMERGENCY RESPONSE		Detailed set of rules specifying emergency response	Emergency response team in place	Automated systems in place	Adapting modern emergency response mechanisms
WORKPLACE ANALYSIS		Well defined checklist for each activity; Ensure use of safety equipment	Regular audits and monitoring	Tracking key performance metrics	Monitoring through an IT system, Benchmarking with the industry, Audit by external consultants
ACCIDENT AND RECORD ANALYSIS		Accident investigation form in place, near misses form in place	Maintaining a database of accidents and near misses and prepare key metrics to be analyzed	Accident investigation team in place; Defined procedure to do root cause analysis	Monitoring through an IT system
HAZARD PREVENTION AND CONTROL		Job Safety Analysis; Ensure availability of safety equipment	Regular employee feedback and audit programs like safety week	Proactive monitoring of near misses and regular discussion with employees	Monitoring through an IT system, Benchmarking with the industry
STAGE FOCUS		Managers take responsibility for managing and developing their people	Competency-based practices	Team-based and quantitatively managed	Continuous improvement



Case Study 1: Producer 1

Current Status

- Safety is a core aspect of culture/well-defined system in place
- Regular updated safety training
- Facility visited incident free

Continuous Monitoring and Improvement

- Team audits facility daily; priority list for week
- Activities analyzed for issues
- On a monthly basis, group visits another of company's facilities to analyze safety
- Promote best practices across facilities
- Different teams perform safety audits

Unique Practices

Has own Fatality Prevention Standards (FPS)

- Safety guidelines – level proficiency of plant ranked according to a standard scale
- Benchmarks all facilities
- Know areas to improve
- Standardization across plants

Five levels:

1. No Formal rules/ procedures to control risks/ emergency situations
2. Gaps evaluated to comply with law/Producer 1 standards
3. All preparedness & response activities in compliance with defined procedures – law and standard
4. Complies with law and with Producer 1 standard (necessary by Producer 1 to operate)
5. Monitoring system defined with precise criteria to evaluate safety process for emergency preparedness & response
6. Excellence -- Plan-Do-Check-Act

Hazard Identification and Risk Assessment defined as:

- 1. Hazard:** any situation, substance, activity, event, or environment that could potentially cause injury or ill health
- 2. Risk:** the chance, high or low, somebody could be harmed by hazards.

Risk combines potential event, its probability and potential severity.

It asks two future-oriented questions:

- a. What is probability hazardous event or exposure will actually occur?
- b. How severe would impact on health/safety?

Two types of risk assessment used:

- 1. Formal for well-defined routine tasks:** Prepared following a defined method that foresees risk assessment/ evaluation/valuation and included in site risk map.
- 2. For exceptional/non routine tasks:** identify hazards/ risks and put in place adapted controls without any risk valuation. If concerning activities are repeated they undergo a formal risk assessment.



Case Study 1: Producer 1 Continued...

Measuring Success

Review premiums paid for workers' compensation insurance.

Lower premiums equate to better performance of the program. Premiums paid have been decreasing.

OSHA recordable incident frequency or first aid frequency.

Evaluation of Producer 1

	1: INITIAL	2: REPEATABLE	3: DEFINED	4: MANAGED	5: OPTIMIZED
MANAGEMENT LEADERSHIP AND EMPLOYEE PARTICIPATION	Yes	Yes	Yes	Yes	Yes - through FPS - Yearly corporate meeting to discuss changes in FPS
SAFETY AND HEALTH TRAINING	Yes	Yes	Yes	Yes	Yes - Training modules are updated as per latest standards and requirements
EMERGENCY RESPONSE	Yes	Yes	Yes	Yes	
WORKPLACE ANALYSIS	Yes	Yes	Yes	Yes	Yes - through FPS
ACCIDENT AND RECORD ANALYSIS	Yes	Yes	Yes	Yes - through monthly meetings and visit other plants	
HAZARD PREVENTION AND CONTROL	Yes	Yes	Yes	Yes	Yes - through hazard ID and risk assessment



Case Study 2: Producer 2

Current Status

- Producer 2 was certified as OSHA-18001 in 2011
- Presently performing internal audits to keep safety standards up to date

Continuous Monitoring and Improvement

- Team audits facility daily; priority list for week
- Activities analyzed for issues
- Group visits another of company's facilities to analyze safety
- Promote best practices across facilities
- Different teams perform safety audits

Unique Practices

Safety Training

- Conducts hands on "new employee safety orientation" for each employee
- Monthly training via DVD with test; passing is required to qualify for work
- 4-hour quarterly safety training for each employee

Accident Reporting

A completed investigation form records major or minor accidents/near misses and property damage incidents. Details immediate corrective actions, root cause analysis and short term vs. long term solutions.

Incident investigation team surveys each incident site to find root cause of an incident; follow-up meetings to implement corrective measures.

Incentive Programs

Motivates employees to pursue safety:

No longer awarding based on lagging indicators to encourage reporting.

Hazard Prevention and Control

Job safety analysis: document which outlines standard steps and expected results of a job; contains potential hazards of job/methods used to mitigate and PPE hazard assessments.

Hazard identification team: team performs monthly audits of each department to check for potential hazards/ takes corrective action

Review of job safety analysis: periodic review to check if safety requirements or risk profile of job has been changed; documentation is modified accordingly.

Housekeeping teams: housekeeping teams conduct monthly audit and report the housekeeping score of each area as calculated on a standard template; these scores are used as a leading indicator to predict/prevent incidents

Focus on contractors: expects its contractors to comply with internal safety standards; contractors rated as red/green based on compliance; action plan is set up for contractors in red zone

Management Involvement

High level management involvement pushes safety culture from top to bottom. Provides all necessary support to ensure safe environment. Some steps taken:

- Frequent meetings between plant and department heads to discuss safety of individual departments and at cross-departmental level
- Safety always discussed in board room meetings
- Every incident report must be presented to senior management with root cause analysis and corrective action plan
- Weekly safety reports published to ensure cross-departmental learning. Best practices/findings shared on company intranet
- Publishes individual achievements on intranet to boost employee confidence



Case Study 2: Producer 2 Continued...

Safety in Action

Management team philosophy: Ensure every activity is **performed with focus on quality, safety will follow**. Safety is a part of behavior through education and communication. Observable practices:

- Safety islands: Consist of basic equipment needed for safety, strategically positioned so each worker is within a minimum distance to nearest one
- Mill well marked, clear pathways for walking and signs for no entry zones
- Safety-specific motivational quotes displayed
- Departments marked with number of years without an accident
- Cameras cover most portions of mill for surveillance

Measuring Success

Safety metrics currently used are:

The Total Case Incident Rate (TCIR): Total number recordable injuries/illnesses x 200,000 / man-hours worked.

Days Away Restricted Time (DART): Total number injuries/illnesses resulting in Lost Time or Restricted Duty x 200,000 man-hours worked.

Producer 2 is planning to move to “leading indicators”, as opposed to “lagging”, to promote a proactive safety culture rather than a reactive one.

Evaluation of Producer 2

	1: INITIAL	2: REPEATABLE	3: DEFINED	4: MANAGED	5: OPTIMIZED
MANAGEMENT LEADERSHIP AND EMPLOYEE PARTICIPATION	Yes	Yes	Yes	Yes	Yes - Monthly meetings and boardroom discussions
SAFETY AND HEALTH TRAINING	Yes	Yes	Yes	Yes	Yes - Training modules are updated every year
EMERGENCY RESPONSE	Yes	Yes	Yes	Yes	
WORKPLACE ANALYSIS	Yes	Yes	Yes	Yes - Through shift management and housekeeping	
ACCIDENT AND RECORD ANALYSIS	Yes	Yes	Yes	Yes - Through accident investigation teams	
HAZARD PREVENTION AND CONTROL	Yes	Yes	Yes	Yes	Yes - Through use of leading indicators such as near misses and housekeeping scores



Case Study 3: Service Center 1

Current Status

The location has a very comprehensive safety program, prioritizing employee safety. To establish a culture of safety, facility incorporates safety practices such as personal protective equipment (PPE) standards, company-wide communication/ benchmarking, a Health and Safety Committee, branch level training, a stop program, and metrics using business intelligence analysis software.

Unique Practices

Personal Protective Equipment (PPE)

PPE policies are clearly described in a matrix matching unique job descriptions/environments to PPE required for each job. Examples: safety hats, protective eyeglasses, steel-toed shoes (with canopy on top), and Kevlar® arm guards.

Company-Wide Communication

- Every Monday morning, all operations managers (all locations) discuss near misses/ accidents. The point is to dialogue about what went wrong/how to fix.
- This allows continuous monitoring/auditing/improvement of safety practices.
- Provides managers an opportunity to learn from insights/experiences of other locations.
- This benchmarking can result in standardization of best practices.

Health and Safety Committee

- Committee composed of 7 – 10 employees including an operations manager, a supervisor and even office employees.
- Meet 1x/month to review metrics for trends/areas for improvement.
- Analyzes data, creates action items with tentative timelines for completion.

Branch Level Training

- New employees given basic training relating to pathogens/first aid/general safety hazards/other OSHA mandated topics
- Receive specific job training regarding PPE policies/proper equipment use/ways to reduce ergonomic injuries, etc.
- New hires monitored by experienced managers/employees
- Additional training monthly to refresh regarding safety topics/ procedures.

Stop Program

- Quick comprehensive audit program initially developed by DuPont.
- An employee evaluates a peer's safety compliance: proper PPE, use of equipment, safe handling of materials, safe lifting, bending, etc.
- Findings are included on standardized "stop card".
- Each employee conducts two observations per month.
- Beneficial because this serves to quickly, accurately audit safety practices.
- Allows employees to audit coworkers non-dictatorially.
- Audits are anonymous, camaraderie/trust not compromised.
- Stimulates buy-in by employees.



Case Study 3: Service Center 1 Continued...

Measuring Success

- Most meaningful metric—Total Recordable Incident (TRI) rate.
- Comparing TRI rate across years gives important trend information on safety.
- Can compare rate across branches.
- Other important metrics: frequency/severity near misses, unsafe incidents through “Stop Program,” first aid, and lost time injury (LTI).
- Location inputs all metrics into a business intelligence analysis software program that generates graphs/tables to isolate data trends/outliers.
- Consolidates information into easy-to-use tool that helps managers interpret effectiveness of safety program.

Evaluation of Service Center 1

	1: INITIAL	2: REPEATABLE	3: DEFINED	4: MANAGED	5: OPTIMIZED
MANAGEMENT LEADERSHIP AND EMPLOYEE PARTICIPATION	Yes	Yes	Yes	Yes	Yes - Use Oracle BI. Monitoring of information by management and other plants
SAFETY AND HEALTH TRAINING	Yes	Yes	Yes	Yes	Yes - Identifies the type of training required through Stop Card
EMERGENCY RESPONSE	Yes	Yes	Yes	Yes	
WORKPLACE ANALYSIS	Yes	Yes	Yes	Yes - Analyzes OSHA recordables	
ACCIDENT AND RECORD ANALYSIS	Yes	Yes	Yes	Yes	Yes - Use of Oracle BI to store data and project team to analyze near misses
HAZARD PREVENTION AND CONTROL	Yes	Yes	Yes	Yes	Yes - Identifies near misses through Stop Card and takes action to prevent them



Case Study 4: Service Center 2

Current Status

Each facility visited takes a unique approach to safety, but common elements were in evidence across the organization: Management Leadership and Employee Participation, Inspection, Accidents & Record Analysis and Hazard Prevention and Control.

Excellent example of how organization can maintain an effective safety program while having its own unique approach.

Unique Practices

Commitment by Senior Management and Employee Participants

- Disciplined approach and strong commitment from management to imbue effective safety culture
- Management makes no compromises: in disciplinary and corrective actions, safety is the No. 1 policy emphasized
- Management clearly states the over-arching importance of safety
- Safety as priority emphasized in: new hire training, management policy, code of safe practices, discipline policy, etc.

Employee Participation

Actively engages employees in implementation of the safety program.

Hazard Prevention and Control

Takes initiative identifying/controlling probable accidents. Some key elements in preventing accidents:

- Job safety analysis/critical work analysis
- Documents what employees receive before starting a new position.
- Document that outlines basic job steps, potential hazards on job, and recommended actions/ procedures to prevent

Inspection

Strong inspection system ensures quality of program.

Key aspects:

- Safety Audits
- Process Audit
- Corporate Audits

Safety Audits

Safety audits used for thorough, objective measure of safety practices. Example: audit on forklift practices lists criteria to evaluate safe practices of employees and rate as Safe, At Risk, or No Observation (wasn't physically seen as unsafe during the audit).

Uses software and compilation of audits to determine if criteria can be removed from its audits and replaced with newer practices.

Process Audits

- Process Audit includes the heads of the safety departments and upper level management.
- Stresses importance of safety to employees/ continues to demonstrate commitment to top-down safety culture.

Corporate Audits

- Annually, corporate management has audits performed on the safety program
- Highlights things doing well, areas for improvement, and future processes that should be put in place
- Done throughout the organization so similar facilities can benchmark and see best practices



Case Study 4: Service Center 2 Continued...

Accidents and Record Analysis

Strong stance when investigating cause of incidents in regards to near misses, OSHA recordable, and first aid tracking. Primary methods are:

- “5 Why’s” Method & Safety Committees
- Safety Council

When an incident occurs, safety committee uses a Lean process to determine root cause (The 5 Why Method).

When an injury occurs, facility must present to safety council: causes for injury, practices to prevent future injuries, share company-wide knowledge for prevention methods for injury. Multiple stakeholders can assess/ prevent injuries.

Additional Unique Approaches to Safety Implemented by Service Center 2

Some unique processes different from typical safety programs:

- Third Party Use
- Safety Week
- 52 Weeks of Safety Program
- Continuous Improvement
- Emergency Response Team
- Published Safety Results

Third Parties

- Uses third-parties to evaluate effectiveness of safety programs and determine areas for improvement.
- Former OSHA professionals perform audits annually in addition to corporate audits from top-level management.
- Significantly improved corporate audit ratings.
- Uses third-parties to augment safety system; if lacks expertise in area of safety, employs expert to assess deficiencies and implement plan for improvement.

52 Weeks of Safety Program

- Management and employees train together on unique safety topic.
- Sets tone for employees/ demonstrates commitment of management to safety.

Emergency Response Team

- Demonstrates proactive approach/allows employees to be more involved.
- If incident occurs, a specific code is employed and emergency response team members go immediately to the accident site, 9-1-1 is contacted, and areas of the plant are highlighted and marked so emergency personnel know exactly where to go.

Safety Week

- Involves use of third parties/management/guest speakers to talk about best safety practices.
- Key events of program: live smart event, forklift rodeo, OSHA walkthrough.
- Includes family members – raises personal risk understanding and potential effect on family.

Continuous Improvement

Continual feedback loop for creating/making improvements to safety program.

Published Safety Results

Shares results with entire organization to instill pride in employees for following good safety practices.



Case Study 4: Service Center 2 Continued...

Measuring Success

Although many are used, the two main metrics for measuring safety performance are OSHA Recordable and Insurance Premium Tracking:

- Measures how many injuries have occurred within a month, cumulative injuries for the year, lost time injuries, and percentage of injuries per 200,000 hours worked at its facilities.
- Goal is 0, but takes time to study and evaluate data.
- Studies metrics over time for changes up or down; also reflected in insurance premium tracking.

Evaluation of Service Center 2

	1: INITIAL	2: REPEATABLE	3: DEFINED	4: MANAGED	5: OPTIMIZED
MANAGEMENT LEADERSHIP AND EMPLOYEE PARTICIPATION	Yes	Yes	Yes		Yes - Engages employees in continuous improvement program
SAFETY AND HEALTH TRAINING	Yes	Yes	Yes		Yes - Uses Third Parties, has Safety Week and 52 Weeks of Safety to improve upon safety and health training
EMERGENCY RESPONSE	Yes	Yes	Yes		Yes - Has extensive system in place to let employees know of processes, procedure in case of an incident, and uses Code Blue to manage process
WORKPLACE ANALYSIS	Yes	Yes	Yes		Yes - Uses job safety analysis, multiple systems of inspection and annual corporate audits.
ACCIDENT AND RECORD ANALYSIS	Yes	Yes	Yes		Yes - Uses 5 Why Method to determine direct, basic, and event facts/contacts, President Safety Council to prevent future incidents/ share best practices
HAZARD PREVENTION AND CONTROL	Yes	Yes	Yes	Yes	