Manufacturing Safety: Learning from Expensive Lessons in American Industry

VIVID learning systems

An examination of recent OSHA violations at three American manufacturing facilities, with recommendations for improving safety conditions in your organization.

More than 12 million Americans work directly in the manufacturing sector, according to the American Manufacturing Association. While the U.S. manufacturing sector is the most productive in the world—by itself the ninth-largest economy on the globe—it remains today one of the most dangerous industries of employment.

And that is a hard truth to escape in any conversation about American manufacturing.

Contents

American Manufacturing Workers Are At Risk For...

Illness and injuries because due to repetitive physical stress

Contact with machinery and equipment

Slips, trips and falls

Musculoskeletal disorders

Hazardous exposure to toxic substances

Explosions and structural failures

Hearing damage

It seems that although the sector has experienced phenomenal growth, it remains bound by early 20th century notions of industrial safety, even though conditions have improved substantially. How else to account for the 480,000 injuries and illnesses annually attributed to the manufacturing sector? Federal law clearly states that employers are responsible for providing safe and healthy workplaces for their employees, yet there is widespread failure in the industry to comply with safety rules and best practices.

The fight to improve working conditions in manufacturing is a well-documented struggle, and one which produced advances in occupational safety made possible by a combination of public outrage, the activities of organized labor, and the passage of legislation that restricted child labor, shortened the workday, and created the mechanisms for industry regulation and enforcement.

Occupational injuries and illnesses in the manufacturing industry is holding study at around 4 incidents per 100 workers.

Yet for the last seven years, the rate of reported occupational injuries and illnesses in the manufacturing industry is holding study at around 4 incidents per 100 workers; that figure only accounts for incidents that have been reported. It appears a disturbing equilibrium has been reached with injury totals.

Safety Conditions At Manufacturing Operations

Why? At a basic level, manufacturing work involves human interaction with complex equipment and often hazardous substances in high-risk environments. Manufacturing facilities are inherently dangerous, and when humans are introduced to these environments accidents do happen. That may seem natural though today, we know exactly how to minimize the risk to workers either by engineering controls and establishing administrative controls, or through use of personal protective equipment—we know how to prevent preventable accidents.

The knowledge and tools to keep workers safe in industrial settings are readily available. We know this because operations that understand the value of safety in relation to quality and productivity use all available means for workforce protection. Examples of manufacturing operations with low injury and illness rates are numerous, and serve as a counterpoint to those that do not.

Here, we look at three actual, recent cases from OSHA to examine the safety conditions at manufacturing operations for insights into the problems plaguing American industry, with an eye for change, and looking to identify commonalities. Yet we're not just going to learn from each of our manufacturing operations struggling with safety challenges; we end with specific recommendations from top safety performers in the manufacturing industry.

Please remember that any experienced, high-level safety professional will tell you that when it comes to citations, there are two sides to every story. The cases here are real but do not account for the perspective of these employers or the workers and safety professionals associated with each facility.

Case:
The Mid-Western Auto Parts Manufacturer

Having received an inspection and subsequent fine from OSHA earlier in the month for failing to address fall protection measures for employees working at heights, this company was familiar with the federal inspection process. So when a 58-year-old worker lost the tip of his finger while servicing machinery later in the same month, federal inspectors once again came calling.

This time, inspectors at the facility, which manufactures auto parts for major automotive brands—Toyota, Mitsubishi, Honda—found several serious problems, most notably that the organization had failed to implement hazardous energy control and machine safety protocols.

As a result, "The worker caught his finger in a pinch point as he serviced the machine, which caused the injury," said OSHA. "Approximately one-half of all amputations occur in the manufacturing sector."

The dominant contributing factor to the incident—which took a man out of production, required immediate medical attention, and likely resulted in costs related to workers compensation along with possible litigation, in addition to heavy fines—was a simple inability to ensure that equipment remains de-energized during the performance of maintenance activity. Workers are incredibly vulnerable when servicing machinery; when equipment that should be turned off, unplugged, and tagged for service, suddenly becomes operational, accidents like this happen.

Energy in any form becomes hazardous when it builds to a certain level, or is released inadvertently or unexpectedly. Lock Out/Tag Out procedures are the primary precaution to prevent such an event. Compliance with the Lock Out/Tag Out standard (29 CFR 1910.147) prevents an estimated 120 fatalities and 50,000 injuries each year. Workers injured on the job from exposure to hazardous energy lose an average of 24 workdays for recuperation.

> ***"The worker caught his finger in a pinch point as he serviced the machine, which caused the injury"***

The Mid-Western Auto Parts Manufacturer

And if you've ever seen the gruesome result of a complex machinery accident, then you will appreciate the need for machine safeguards, the lack of which resulted in another citation for this auto parts manufacturer. When we talk about safeguards, we're talking about simple devices that make it difficult for workers to injure themselves while working on a machine, like a shield or guard to protect from sparks, or a grate that keeps them away from the churning part of a rotary blade.

OSHA Statement:

"Machine hazards are among the most frequently cited by OSHA. Manufacturer-installed guards and industry-standard locking devices protect workers from the dangers of operating machinery. Yet, each year thousands of workers are injured because employers ignore machine hazards and do not train workers on safety procedures."

Fines:

- $89,000 | 10 Citations
- $7,000 | 1 Citation

Citations:

- Lack of machine guards
- Failing to establish procedures, such as using locking devices to prevent unintentional machinery operation during service and maintenance
- Not training workers on machine safety procedures
- Failure to implement safe electrical work practices for employees troubleshooting energized circuits
- Failure to provide electrical protective equipment, including gloves and face protection
- Failure to protect workers from fall hazards

Case: The Oklahoma Industrial Fluids Manufacturer

OSHA's Severe Violator Enforcement Program (SVEP) was created to "... effectively focus enforcement efforts on recalcitrant employers who demonstrate indifference to the health and safety of their employees through willful, repeated, or failure-to-abate violations of the OSH Act."

How does a company end up there? Officially...

Every case that meets the SVEP criteria is considered a severe violator enforcement case. A case meets the SVEP criteria if it meets one of the following criteria:

> Is a fatality or catastrophe inspection with one or more willful or repeated violations or failure-to-abate notices (SVEP-fatality);
>
> Is a non-fatality/catastrophe inspection with two or more willful or repeated violations or failure-to-abate notices that are high gravity violations related to High-Emphasis Hazards (SVEP-HEH);
>
> Is a non-fatality/catastrophe inspection with three or more willful or repeated violations or failure-to-abate notices that are high gravity violations related to the potential release of a highly hazardous chemical (SVEP-PSM);
>
> Is an egregious (e.g., per-instance citations) case (SVEP-egregious)

This operation, where 220 workers were regularly exposed to serious hazards, was relegated to the SVEP because it met those last two criteria; investigators found five repeated violations, and the situation at the facility was deemed egregious because the company had failed to correct conditions that resulted in citations several years earlier.

The Oklahoma Industrial Fluids Manufacturer

Having been previously cited for serious health and safety violations, this international supplier of fluid handling products—annual sales reported at $4.2 billion— was aware of serious hazards in certain working environments, yet did little or nothing to change the situation, unnecessarily exposing workers to risk.

The SVEP isn't a program any manufacturer wants to be assigned to; in addition to substantial fines, the program basically forces companies to make safety changes they've previously been instructed by OSHA to make, or, do what they should've been doing all along, forcing compliance through heightened scrutiny. Notable violations common to manufacturing operations include non-existent hazardous energy control protocols, insufficient machine guarding, and lapses in chemical safety hazard mitigation.

This facility exposed workers daily to hazardous chemicals and toxic substances, yet failed to provide even basic hazard communication training, which is critical for any employee working with chemicals that require a Safety Data Sheet (Safety Data Sheets were nowhere to be found on the premises).

Working with chemicals always involves risk. Carelessness and ignorance of the dangers chemicals present greatly increases the risk of exposure, or property damage and personal injury. Ignorance is a factor commonly cited in chemical related accidents, and the inspection of this manufacturing operation identified many precursors associated with industrial catastrophes—it was merely a matter of time.

> ***Ignorance is a factor commonly cited in chemical related accidents***

The Oklahoma Industrial Fluids Manufacturer

Fines:

$477,900 | 45 Citations

$7,000 | 1 Citation

Citations (too numerous to list):

Combustible dust hazard exposure

Fall hazards from open pits and trapdoors; failure to provide guards

Failure to equip confined spaces with exhaust and ventilation systems where noxious fumes are frequently present

Open flame and spark equipment not adequately distanced from flammable airborne contaminants

Electrical equipment used in locations where readily ignitable residues and explosives vapors are present

Failure to provide schedule for respirator maintenance, exposing employees to hazardous chemicals

Failure to train employees on chemical and other hazardous substances

Employees found consuming food in areas where toxic material is present

Failure to implement a written hazard control program at facilities

OSHA Statement:

The company, "...has no excuse for repeatedly exposing workers to dangerous conditions," said OSHA. "A continued failure by the company to make needed changes to its safety program may well result in severe injuries or worse."

Failure to provide copies of hazardous chemical safety data sheets

Hazard communication program excluded chromium (VI); toxic welding byproduct

Defective ladders

Obstructed exit routes; failure to mark exits with signage

Damaged scaffolding

Written emergency action plans unavailable

No alarm system

Gaps in forklift training; failure to maintain forklift equipment

Numerous machine safety hazards; failures in machine guarding

Lock Out/Tag Out Violations

Lack of hazardous energy control protocols

Case: Death at the Global Paper Products Manufacturer

After a 57-year-old mechanic was burned to death while preforming routine maintenance in the facility's power plant, this international paper supplier—with manufacturing operations in Europe, Latin America, Asia and North Africa—was promptly placed in OSHA's Severe Violator Enforcement Program.

This worker died while replacing filter bags used for collection of combustible dust, when the dust ignited explosively, and he sustained severe burns. OSHA found that the worker was not supplied with fire resistant clothing, was not trained on the hazards of combustible fly ash dust, and that the collection system he was servicing was neither compliant with National Fire Protection Association standards, nor maintained appropriately.

This tragic accident was symptomatic of the dangerous conditions workers were asked to confront each day at the company's different facilities, and revealed the true extent of chronic safety failure. Several years earlier, the company had received a citation for failing to annually inspect hazardous energy control procedures related to the 'fly ash bag house' at a separate manufacturing plant; the last inspection at the facility in question was performed by the company two years prior to the accident.

The unfortunate event underscores the importance of annual safety audits for manufacturing operations, a critical best practice for high-risk work environments, and one that could've prevented the death of our mechanic. Safety audits are about accountability, such as ensuring that equipment presents no uncertain hazard to workers.

> ***This worker died while replacing filter bags used for collection of combustible dust,***

Death at the Global Paper Products Manufacturer

Regular safety audits help identify, eliminate, or control hazards that could result in serious harm to employees. Conducted properly, these audits reduce injury and illness rates, lower workers compensation and other business costs, and empower employees by involving them in activities affecting their own safety and health.

Ultimately, the nature of the accident, the fact that it was preventable, along with the "repeat" and "willful" violations, combined to form the justification for SVEP designation.

OSHA Statement:

"This worker's death was preventable. International Paper knew of these hazards and deficiencies and did not address them...While nothing can return this man to his daughter and co-workers, the company can and must take prompt and effective steps to ensure that this never happens again."

Fines:

$211,000 | 3 Citations

Citations:

Insufficient hazardous energy control protocols

Problems with exhaust/ventilation systems; lack of explosion venting

Personal protective equipment not provided, used, or maintained in a sanitary condition; failure to provide fire resistant clothing

Insufficient training on recognized chemical hazards

Failure to regularly audit energy control procedure

Failure to furnish a place of employment free from recognized hazards likely to cause death or serious physical harm; combustible dust

Balancing Safety, Quality, and Production

Here are four safety tenets from another successful manufacturer, recognized for its safety program:

> Nothing we do is worth risking injury.
>
> All injuries are preventable.
>
> Safety is an important business advantage.
>
> Safe actions are a condition of employment.

We've reviewed three cases of manufacturing operations where workers were subjected to risk, where known protective measures and hazard mitigation strategies were ignored, thus placing people in peril.

Why was worker safety so compromised at these major manufacturing organizations? What circumstances contribute to "serious" and "repeat" violations, and citations considered "willful"? What is the root cause?

Imbalance.

Here's an uncommon view of safety from one company in the manufacturing industry that's highly regarded for its safety record:

> ***"…safety is not our #1 priority. As a matter of fact, safety is not a priority at all…We view safety as a core value. The difference is the approach. When safety is a priority, it competes with other priorities and can be shifted based on the current needs. When safety is a true core value, it is always there serving as a guide for our thoughts and actions.***

When Productivity Is Prioritized Over Quality

Let's start by considering the simple purpose of a manufacturing facility—to produce or make things. There's a plain relationship between productivity, quality, and safety for any manufacturing operation. And there's a balance in play with each of those priorities, which are sometimes viewed (incorrectly) as competing interests.

For example, when productivity is prioritized over quality, the manufactured product may not be built to a standard sufficient to satisfy the market, as quality checks and balances are forgone in the interest of expediency. Or, if quality is prioritized over productivity, a manufacturing facility may not generate enough of its product to satisfy the demands of the market, falling further behind and creating a host of complications.

How does safety enter the equation? A basic level of safety must be attained in support of both quality and productivity: to perform quality work and sustain productivity, there must be safe working conditions.

Quality work and safe work are in fact complimentary; for each, reliability and consistency are process goals. One of the goals of safety is to ensure reliable, consistent operational integrity. Meaning that operating processes are not marred and interrupted by accidents, injuries, or incidents causing property damage or

personal harm to workers needed in support of productivity. Reliability in safety programs is achieved using many of the same tools used to ensure quality production; inspections and audits, performance metrics, recordkeeping and documentation, along with goal obtainment (consider defect rates in quality; injury rates in safety). In fact, injuries can be viewed as defects in a safety program, just as defects in a quality control program hinder product quality, performance, and reputation.

The balance of quality, safety, and productivity for manufacturing operations comes down to fundamental company values, or culture. Many corporate mission statements give equal weight to the importance of quality and safety, and either is capable of embellishing a company's brand image or causing it damage. Senior leaders are ultimately responsible for this balancing act, which will be executed by employees. The culture of the organization, shaped by senior leaders and defined by "the way we do things around here" should reinforce the ties that bind quality to safety.

The relationship between productivity and safety is often viewed superficially: production is about manufacturing goods at a rate to satisfy hungry markets and achieved profitability, and safety, associated with caution and protocol, hinders the goals of productivity. Yet injured workers and accidents interrupt productivity, the degree to which scales to match the severity of incidents. There are also financial implications linked to increased workers compensation costs and penalties, which jeopardize profitability.

Bottom line: organizations that have achieved a near state of a "world class safety" understand the value of a balance between production, quality and safety.

Safety Recommendations from Successful Manufacturing Operations

In each of our three cases, we are able to identify common safety issues that all manufacturing operations must confront and successfully resolve. And many operations do, with much more success than our given examples. Here, we offer real best-practices from companies that place employee safety above profit, and enjoy success in highly competitive manufacturing environments.

Training

All three of the manufacturing operations we examined demonstrated a failure to provide training to workers on critical basic safety concepts. Now, we'll look to one operation known for its comprehensive and successful training program.

With multiple facilities across a wide geographic region, and thousands of workers to train, this manufacturer of complex food processing equipment still manages to run one of the most dynamic workforce training programs in the country.

How? The company places a heavy focus the training experience, training diversity and continuous improvement, and accountability.

Top level management recognized that traditional live training at each facility—an invaluable tool for practical knowledge attainment—contributed to a growing gap in standardization of safety training; as the company grew, and from facility to facility, critical basic safety concepts were being imparted differently. So the company 'doubled down' on its training investment by moving a significant part of the training program online. The move created efficiencies by allowing workers to train at any facility, anytime, providing flexibility to plant managers and reducing the exclusive reliance on live training and the out-of-production time associated with it. The online training program offered engaging safety courses with interactive media, to reach workers in a new way, while placing accountability for training in the hands of the workforce.

Seizing the opportunity to revamp its training program, this manufacturer also bolstered goal-setting efforts specifically around safety training, by requiring completion within stringent time frames and by factoring training into organizational evaluations, from the top down; workers were also to be tested on safety training knowledge and proficiency twice, annually. And the company also mandated participation in facility-wide monthly safety forums that addressed hazard recognition and training need.

Workers also began to receive onsite training in hazard recognition and mitigation by participating in team walkthroughs, taking the training program to a new, experiential level. These efforts, over time, combined to dramatically reduce injury rates to levels well below those of the manufacturer's industry peers.

Suggested Training for Manufacturing Operations:

- Emergency Response
- Fire Extinguisher
- Machine Guarding
- Hazard Communication
- Hearing Conservation
- Respiratory Protection
- Lock Out | Tag Out
- Electrical Safety
- Personal Protective Equipment
- Forklift
- Back Safety
- Industrial Ergonomics
- Confined Space (including Permit)
- Welding

Fundamental Elements of a Basic Safety Program

As a positive counterpoint to our three case examinations, let's look at one manufacturing business that exhibits an organizational commitment to providing a safe working environment at each of its facilities.

This prominent metal-products manufacturer, which actively involves employees in safety management, is empowered to 'stop work'—shutting down equipment or facilities—whenever a question of safety is raised. Each worker not only has the authority of to take this critical action, but is rewarded for doing and negatively evaluated for exhibiting a failure to take action in related circumstances. This system reinforces accountability. Across the organization, workers suggest an average of over 60 safety improvements annually, the majority of which are adopted.

This manufacturer runs competitive annual safety assessments at each facility, ranking operations on a host of criteria, and targeting continuous improvement measures across the spectrum. It is worth noting that even the company's lowest ranking facilities have occupational injury rates significantly lower than industry peers.

Through an organization-wide "wellness program", the company proactively addresses the risk of injury to workers associated with newly planned manufacturing processes, by periodically contracting with ergonomics professionals for assessments.

What's the return on the safety investments made by this operation?

Fundamental practices for successful manufacturing safety programs:

- Health & Wellness Programs
- Ongoing Method of Identifying Hazards and Unsafe Work Practices & Abatement
- Written Safety Procedures are in Practice, Not Sitting on a Shelf
- Strategic Planning for Safety Initiatives
- Safety is Annual Budget Consideration
- Onsite First Aid

Hazard Recognition and Abatement

All three of the manufacturing operations we examined failed to identify and correct known safety issues, or ignored said issues, suggesting a generally poor attitude to worker safety, and disregard for federal law.

Now, we look to one manufacturer that excels in the area of hazard recognition and abatement, with innovative strategies. This international airplane manufacturer is heavily focused on personalizing safety accountability and incentivizing what it considers to be vital safe-work practices.

Workers at this manufacturer begin each day with a safety briefing, and must take a formal safety assessment of personal worksite/ production areas before actually performing any real work. This process includes an evaluation of tools, personal protective equipment, and other factors associated with environmental health and safety.

Additionally, each employee receives job-specific training for hazard recognition. When workers recognize a hazard, the hazard is promptly reported to managing supervisors and work is stopped. Supervisors then work with those teams facing potential exposure to correct the issue before starting work again.

Workers and teams are rewarded at each level of management for meeting targeted safety goals, with monetary bonuses, paid leave, and catered lunches.

There's also a strong emphasis on prevention, with regular safety evaluations conducted by teams from visiting facilities, to bring fresh eyes to familiar work sites and equipment. And workers in each department receive a base level of safety training sufficient for completion of job-hazard analyses for any job, from the loading dock to the millwright, etc.

Hazard Identification/Mitigation Strategies for Manufacturing Operations:

- Employees Have 'Stop Work' Authority
- Safety as Top Performance Metric
- Immediate Hazard Response/Reporting Protocols
- Daily Safety Briefings
- Behavior-Based Safety Training
- Cross-Training Workers in All Departments for Hazard Recognition
- Routine Cross-Team Safety Inspections

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