

InControl

MANUFACTURING



CNA

We can show you more.®

STATE-OF-THE-INDUSTRY REPORT: IDENTIFYING RISKS AND IMPROVING SAFETY AND PRODUCTIVITY IN MANUFACTURING

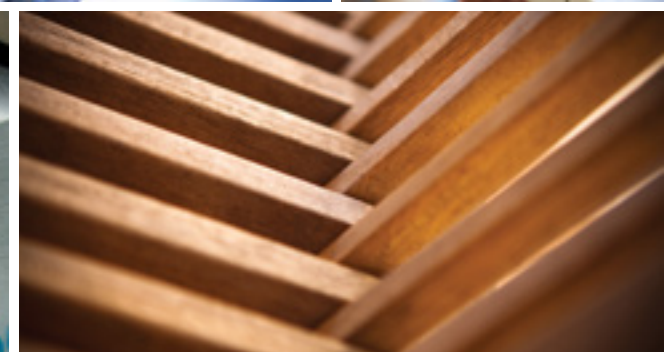
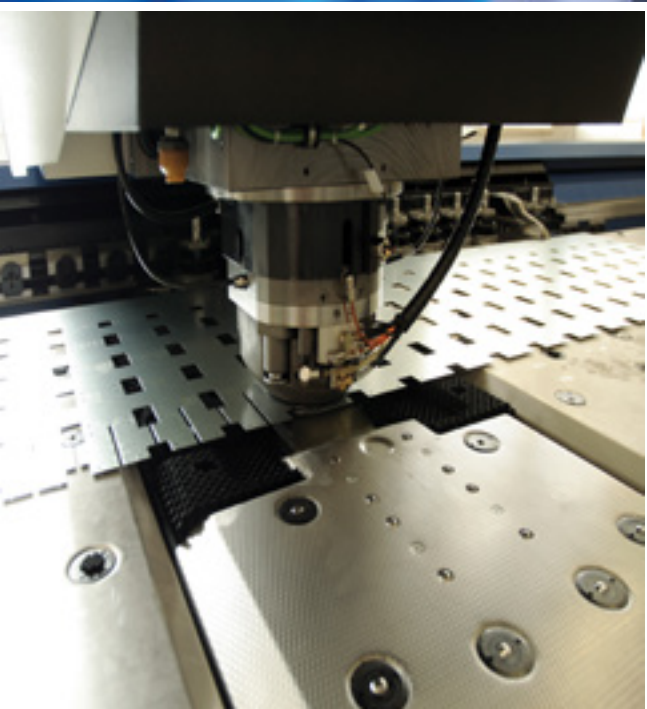
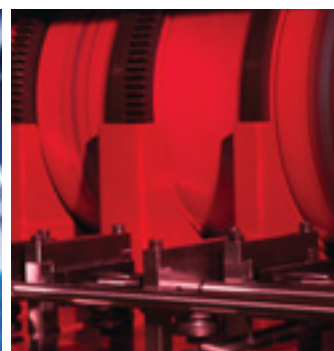
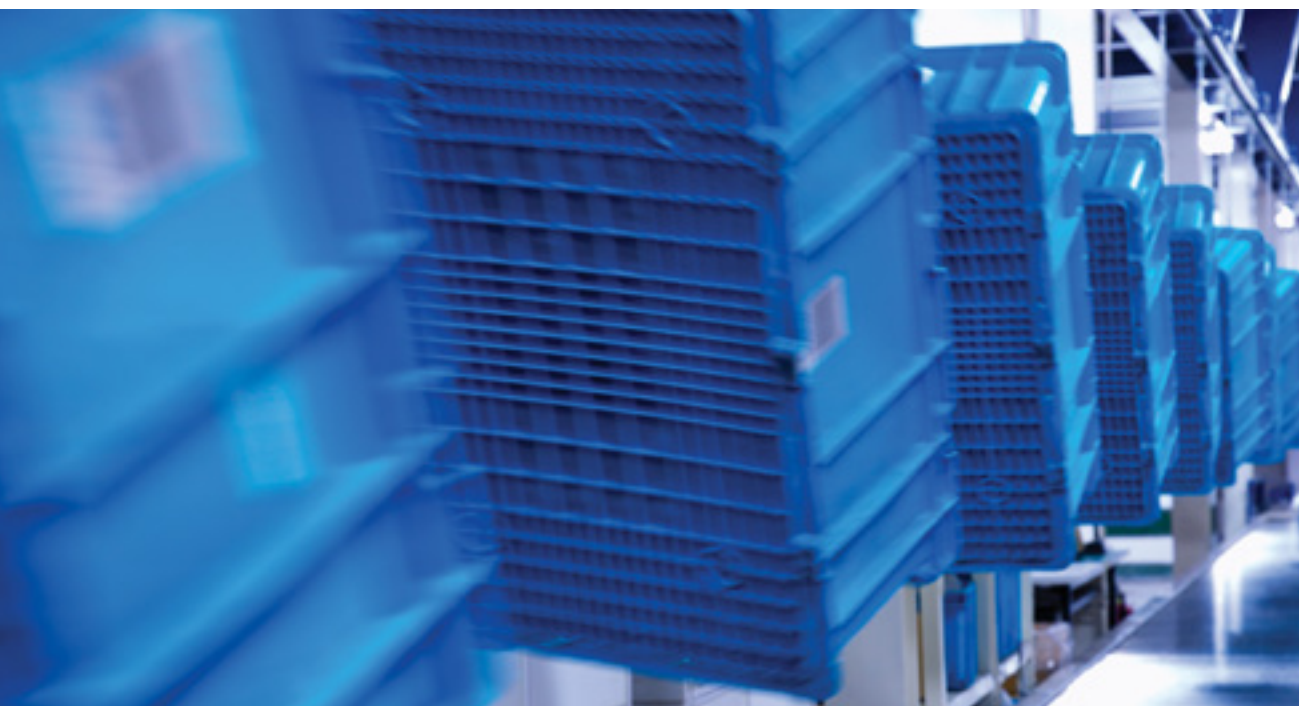


TABLE OF CONTENTS

4 EXECUTIVE SUMMARY

5 OPTIMIZING EMPLOYEE EFFICIENCY

Risks and Exposures:

5 OPERATIONAL EFFICIENCY

5 IMPROVING EMPLOYEE SAFETY

6 Emerging Risks: Mechanization and Process Flow

7 INJURY TYPES

7 Manual Material Handling

8 Slips and Falls

10 Unsafe Acts and Unsafe Conditions

11 Emerging Risks: Utilization of Nanoparticles

12 DRIVER PERFORMANCE

12 Driver Selection

13 Distracted Driving

Risk Mitigation:

15 RETENTION OF SKILLED AND QUALIFIED EMPLOYEES

15 RETURNING INJURED EMPLOYEES TO WORK

17 MANAGEMENT CULTURE

18 MANAGING OPERATIONAL RISKS

Risks and Exposures:

18 SUPPLY CHAIN

18 Emerging Risks: Cyber Risk

19 PROPERTY

20 Weather

21 Explosions

21 Fires

22 Electrical Faults

22 Storage and Warehousing

23 Emerging Risks: 3D Printing/Additive Manufacturing

Risk Mitigation:

24 BUSINESS CONTINUITY

25 CUSTOMERS, SUPPLIERS AND BUSINESS PARTNERS

26 PRODUCT LIABILITY

27 CNA RISK CONTROL RESOURCES

About CNA's InControl Guides

InControl: Manufacturing analyzes loss and risk control data from CNA's manufacturing sector to provide risk management solutions for today's challenges and tomorrow's emerging trends. This report should help to better understand manufacturing common risks, managerial controls and the financial impact of losses for the industry.

EXECUTIVE SUMMARY

InControl: Manufacturing

Traditionally, the manufacturing industry has focused on using technology to enhance business processes by three primary techniques: optimizing production costs and customer service; managing operational risks associated with the supply chain; and fostering innovation throughout the enterprise in products and services.

But in today's challenging market, manufacturers must become more responsive at every level — whether it's inside the business or throughout the supply chain.

Controlling exposure to risk is key to increasing competitive edge. It impacts employees' health and safety as well as increases the productivity, efficiency, and ultimately, profitability of business operations.

Since 2009, CNA Risk Control professionals have performed more than 20,000 manufacturing risk assessments, and the data from the years 2012 to 2013 will be used for this report. The risk control, claim and other industry safety data that follows provide a snapshot of employee health, safety and prevention programs in the manufacturing industry, and outline a number of industry challenges — an aging workforce, employee illness and injury and property losses, to name just a few.



+ Did You Know?



2.09
TRILLION

In 2014, manufacturers contributed \$2.09 trillion to the economy, up from \$1.73 trillion in 2009. This was 12 percent of the gross domestic product (GDP). For every \$1 spent in manufacturing, another \$1.37 is added to the economy — the highest multiplier effect of any economic sector.¹

¹ <http://www.nam.org/Newsroom/Facts-About-Manufacturing/> (According to the National Association of Manufacturers)

Operational Efficiency

Manufacturers depend on the expertise and efficiency of their employees as well as the reliability of machinery, a skilled workforce and facilities to maintain product quality and timely delivery. When production is interrupted or delayed, customer satisfaction suffers — and with it, a company's reputation.

CNA understands how operational efficiency affects manufacturers and, more importantly, that people and equipment matter to every part. Managing the risks that threaten employees, capital equipment and productivity is an essential part of maintaining a competitive advantage and overall sustainability.

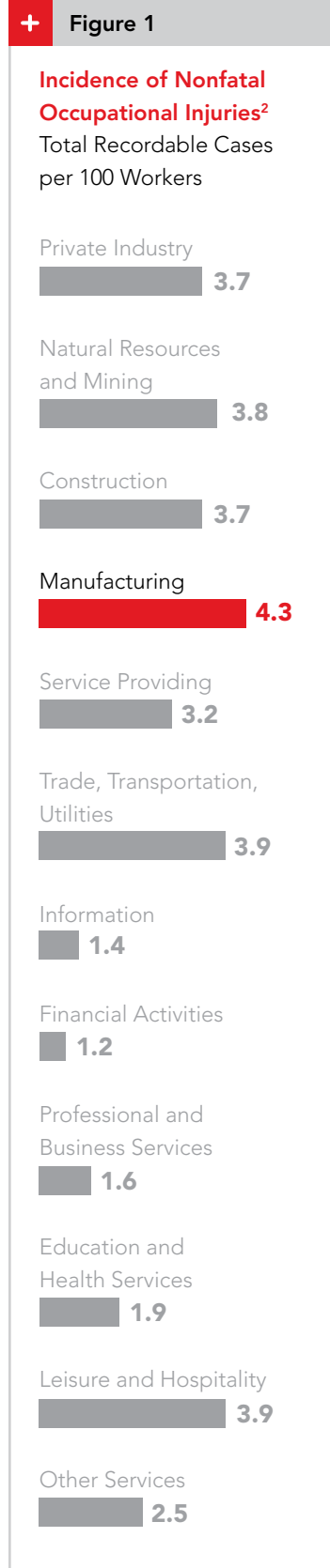
Improving Employee Safety

Employee health and safety is vital to maximizing operational efficiency, but remains a challenge for the manufacturing industry.

Private industry employers reported slightly more than three million nonfatal workplace injuries and illnesses in 2013, according to The Survey of Occupational Injuries and Illnesses conducted by the U.S. Bureau of Labor and Statistics and released in December 2014.² That's an incidence rate of 3.3 cases per 100 full-time workers, which is down from 3.4 cases in 2011 and 2012. The rate has declined each of the last 11 years with the exception of 2012.

The total recordable incident rate of injury and illness also declined for cases of a more serious nature involving days away from work, job transfer or restriction — commonly referred to as DART — marking the first decline in the DART rate since 2009.

That overall downward trend also played out in the manufacturing industry where the combined illness and injury incidence rate dropped from 4.2 cases to 4.0 cases from 2012 to 2013. Still, that makes manufacturing second — behind only education and health services — in combined illness and injury incidence rates. Manufacturing also continued a 16-year trend as the only private industry sector in which the rate of job transfer or restriction-only cases exceeded the rate of cases with days away from work. The rates for these two case types declined by 0.1 case in 2013 to 1.2 cases and 1.0 case per 100 full-time workers, respectively.



² Bureau of Labor Statistics, U.S. Department of Labor, Employer-Reported Workplace Injuries and Illnesses - 2013, <http://www.bls.gov/news.release/pdf/osh.pdf>



Emerging Risks: Mechanization and Process Flow

The increasing use of mechanization and automation of processes present risk management challenges to manufacturers and affect how they operate safely. Additive manufacturing, or 3D printing, is another trending technique expected to change the landscape of how automation affects manufacturing process flow.

For example, so-called “collaborative robots,” where employees work next to one another inside of a robot’s operating space, have become more commonplace. These sorts of work arrangements require that a “safety distance calculation” be used to determine where the device should be appropriately placed to adequately protect a worker from reaching into the robot’s operating space. This is very similar to the safety distance calculations required for power press safeguarding.

IMPROVED SAFETY CONTROL DEVICES CAN LIMIT THE AMOUNT OF POWER, FORCE AND SPEED PLACED ON AN EMPLOYEE’S ARM, REDUCING INJURIES.

Studies are underway to determine the acceptable level of low-impact injuries when there is human-robot arm interaction. This will place a much greater emphasis on the completion of a “Task Based Risk Assessment” now required in the ANSI/RIA R15.06-2012 Robotic safety standard.

But, in addition to the challenges, there are also benefits. Improved safety control devices can limit the amount of power, force and speed placed on an employee’s arm, reducing injuries such as strains, sprains and tears commonly caused by repetitive motion.

Companies that subcontract out the building of robotic work cells should include receipt of a written risk assessment conducted by the integrator as part of the requirement in their request for a quote or terms and conditions for purchase.

+ CNA Solutions

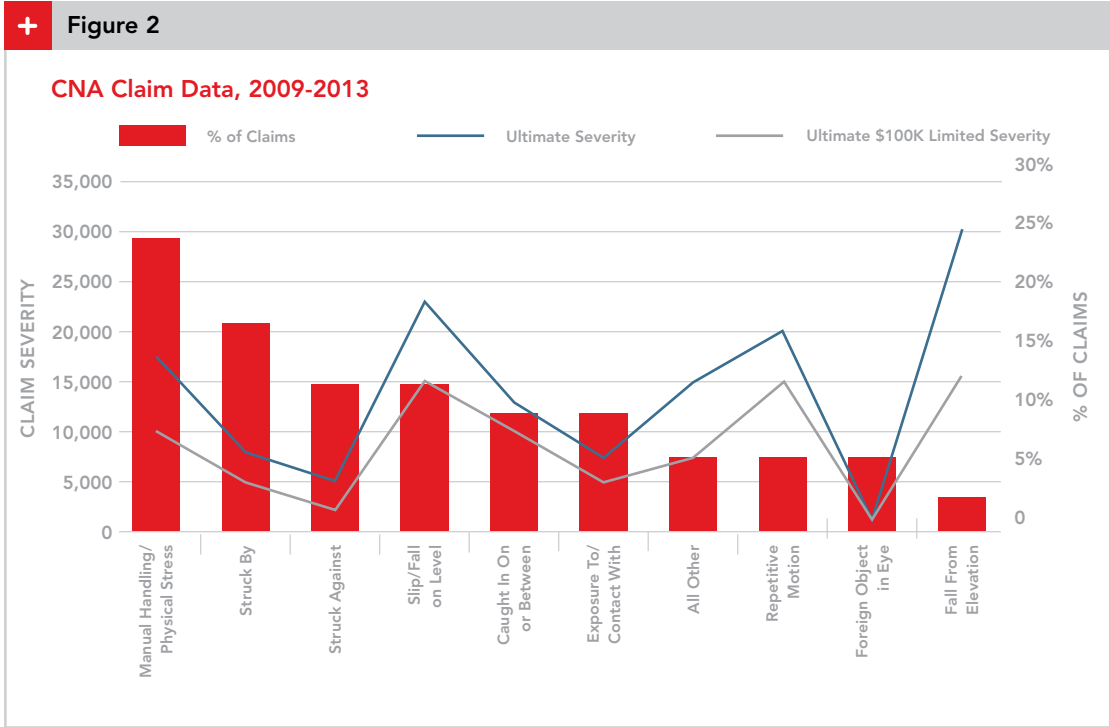
CNA’s unique risk control approach to providing casualty solutions starts with our deep understanding of the business of our customers. Our UL Recognized Risk Engineers³ have decades of experience in helping the manufacturing community manage risk and have expertise in productivity management disciplines, such as Six Sigma and Lean. **Our unique return-to-work and injury management programs assist employers to return workers to full productivity on average 50 percent faster than the industry standard and replaces 94 percent of all injured workers back on the job in less than 90 days.**

We maintain a network of specialists who can assist on everything from slip and fall assessments and workflow process evaluations to drug testing program management and robotic ergonomic analyses.

³ CNA is the only insurance carrier with professionals awarded the UL Recognized Risk Engineer designation

Injury Types

Manufacturers have significant challenges with three types of accidents that continue to drive losses: manual material handling, struck by and struck against, and slips and falls. Most of these claims arise from either unsafe acts or unsafe conditions.



Manual Material Handling (MMH)

Manual material handling (MMH) has consistently been the most frequent type of injury in the manufacturing segment and has been identified as the cause of the highest portion of employee injuries. Between 2009 and 2013, MMH injuries represented 25 percent of the overall CNA claims by frequency and 14 percent of overall claims by severity for CNA manufacturing customers. The estimated average manual material handling out-of-pocket claim cost for customers after insurance was applied was \$12,798.

MMH includes movement of raw material, work in progress, finished goods, handling of scrap and packing material. These materials are of different shapes and sizes, as well as weights, and thus pose many musculoskeletal risks to employees. It is essential for manufacturing companies to identify material handling issues as a critical step in promoting the job improvement process. Advancements start with looking at the human interface with tools, material, equipment and products as well as process flow.

CNA Risk Control assessments have found that, on average, an effective MMH program can assist in reducing claim rates by as much as 17 percent. In addition to reducing accidents, MMH programs improve employee productivity and efficiency.

CNA studies also found these key steps were important to preventing unsafe activities and conditions that lead to an increase in MMH injuries:

- Design jobs for the physical capabilities and age of the workforce; ideally 90 percent of the population should be able to perform the physical requirements of tasks without stress
- Plan process flow and task designs with ergonomics utilizing correct postures and motions
- Use equipment to assist with lifting and moving products, thus reducing high-force lifting
- Design workstations to reduce unnecessary or unsafe movements

+ Did You Know?

17%

CNA Risk Control assessments have found that, on average, an effective MMH program can assist in reducing claim rates by as much as 17 percent.

+ CNA Solutions

Since 2006 when CNA introduced Motion is Money®, we've been experts at reducing MMH injuries by:

- 1** Determining the appropriate distance a particular object can be safely moved, reducing body fatigue
- 2** Reducing excess body movement by minimizing awkward and unnecessary movements
- 3** Reducing overall manufacturing time by designing efficient material movement, like flow throughput processes
- 4** Improving productivity and efficiency with better use of MMH equipment

Effective MMH programs implemented and maintained by CNA customers represent an estimated average per incident savings of \$3,261 out of pocket costs for the customer.

+ Did You Know?



Slips and Falls

Slips and ground-level falls combined with falls from elevation accounted for 13 percent of CNA's manufacturing customers' workers' compensation claims, with estimated average out of pocket customer costs of \$20,658 and \$31,063, respectively, for the two categories.

THE AVERAGE COST FOR AN INJURY OF AN EMPLOYEE BETWEEN AGE 55 AND 60 IS ALMOST THREE TIMES GREATER THAN THAT OF AN EMPLOYEE BETWEEN 20 AND 25 YEARS OLD.

Employees over age 55 are especially susceptible to these injuries and have higher rates of falls with fractures and hip injuries compared to younger workers, according to the Center for Disease Control and Prevention.⁴ CNA claim experience also shows that the average cost for an injury of an employee between age 55 and 60 is almost three times greater than that of an employee between 20 and 25 years old. Because of this, employers must observe their facilities and processes with their older workforce in mind.



⁴ <http://www.cdc.gov/homeandrecreationalafety/Falls/adultfalls.html>

+ CNA Solutions

As one of the leading property and casualty insurers in the nation, CNA has decades of experience in helping companies address issues around slips and falls in the workplace and business sites.

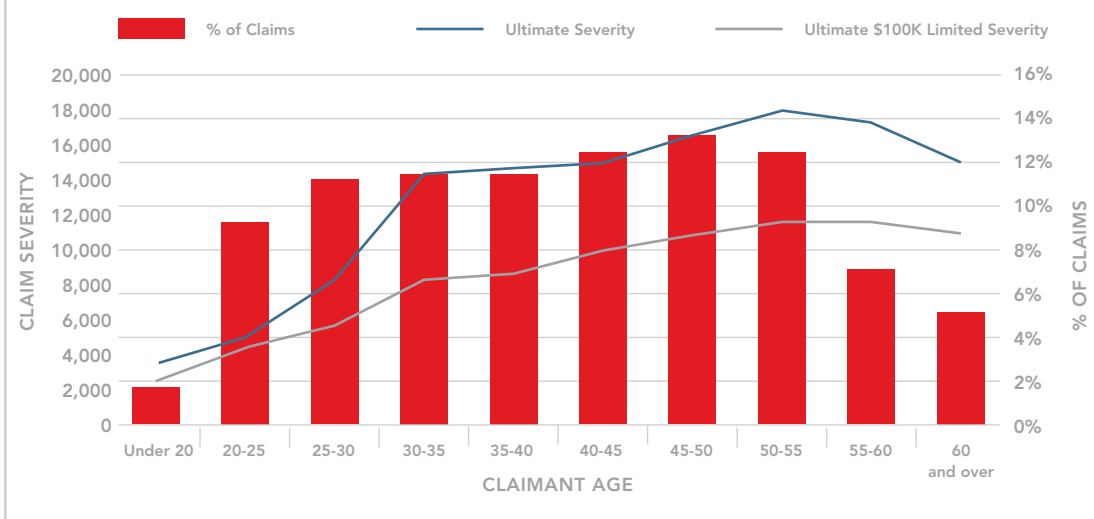
Removal of foreign matter or obstructions on the walking surface, including immediate cleanup of spills, is basic to preventing these types of claims. Good walkway surfaces don't just involve the interior of your facility. Snow removal and ice treatment of sidewalks and parking lots is critical to protecting your customers and workforce.

CNA Risk Control is also leading the way in guiding manufacturers in maintaining floors with proper slip resistance testing. Manufacturers should test the coefficient of friction (COF) of their flooring under both wet and dry conditions. For example, many manufacturers place porcelain tiles in lobbies and vestibules because they offer good slip resistance. While vinyl, which is often used due to its inexpensiveness, has significantly less COF when wet. Terrazzo, a type of flooring commonly found in retail stores and airports typically has a COF of 0.64 when dry and 0.16 when wet. CNA can help manufacturers check the COF of their flooring by using Tribometry and then work to develop plans for cleaning, repairing and maintenance practices based on the specific flooring properties.



+ Figure 3

CNA Claim Data, 2009-2013



Also, while the most frequent risk of injury inside manufacturing facilities is to employees, in many instances third parties such as independent contractors, customers or delivery people are also admitted. Those third parties could slip and fall, be struck by moving equipment, injured by machinery, hurt while helping load or unload materials or while engaged in other activities at the manufacturing facility. Third parties who are on the premises for the first time or infrequently may not be aware of potential risks. In 2013, for customers in the manufacturing segment alone (excluding product liability claims), CNA resolved more than 400 third-party bodily injury claims. On average, those claims resulted in more than \$160,000 in legal expenses and loss payments for the customer.

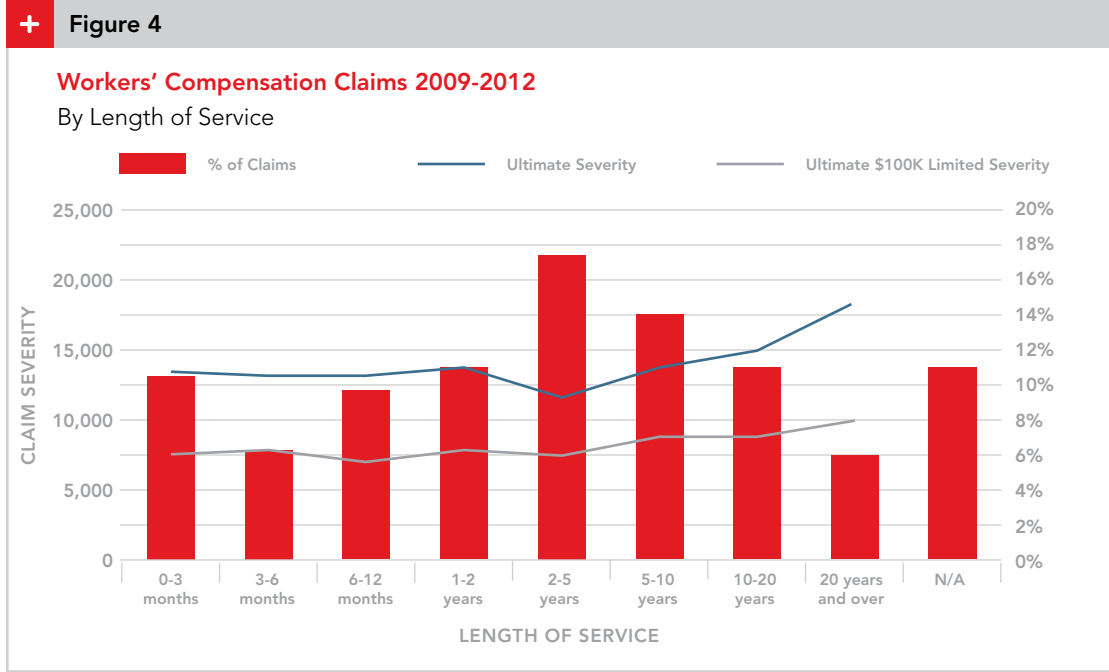
Unsafe Acts and Unsafe Conditions

Unsafe acts in the workplace cannot only lead to workplace injuries, but also to serious disruptions in workflow and production. Broken machine parts, improper understanding of the operations or “cutting corners” can lead to accidents and injuries. For example, if a machine is not working properly, but an

UNSAFE ACTS ARE FOUR TIMES MORE LIKELY TO OCCUR IN A MANUFACTURING FACILITY THAN IN OTHER BUSINESS SECTORS.

employee continues to use it, an accident can occur. What contributed to the accident: the improperly working machine or the employee’s failure to notify a supervisor? In this example, we have a dual cause of the accident. According to the National Association of Manufacturers, unsafe acts are four times more likely to occur in a manufacturing facility than in other business sectors.⁵

Unsafe acts are especially common among new employees. As you can see from the figure below, between 2009 and 2012, CNA claims data for the manufacturing industry revealed that approximately one-third of all employees’ injuries occurred within the first year of employment. Proper training and on-boarding of new employees can help reduce the potential for injury during this first critical year of employment.



CNA claim data also shows an increase in claim frequency after employees have been with a company two to five years, as seen above. As an employee becomes familiar with a job task and performs it on a routine basis, they become more complacent, reducing their awareness of risks and potentially leading to an injury. Safety oversight and management is critical here as well.

Finally, when workers have been on the job for 20 years or more, accident severity increases. As we age, it takes longer for the body to heal, especially with soft tissue injuries of the back, shoulders and legs. In addition, the cumulative trauma of reaching, bending, twisting, standing and walking becomes a major risk factor as the employees age and affects the severity of injuries.

+ Did You Know?

1/3

Approximately one-third of all employees’ injuries occurred within the first year of employment.

⁵ <http://www.nam.org/Newsroom/Facts-About-Manufacturing/>



Emerging Risks: Utilization of Nanoparticles in the Manufacturing Process

Health and environmental issues are combined in the workplace of companies engaged in producing or using nanomaterials in the laboratory or production area. Current workplace exposure standards for dusts will need to be modified so they can be applied directly to nanoparticle dusts. To properly assess the health hazards of engineered nanoparticles the whole life cycle of these particles needs to be evaluated, including their fabrication, storage and distribution, application, potential abuse and disposal. The impact on humans or the environment may vary at different stages of the life cycle.

+ CNA Solutions



CNA is a proud sponsor of the annual Manufacturing Day held every October, and sees the event as an important way to fight the manufacturing skills gap. Co-produced by the Fabricators & Manufacturers Association, National Institute of Standards and Technology, the National Association of Manufacturers and the Manufacturing Institute, Manufacturing Day was designed to expand knowledge about and improve general public perception

of manufacturing careers and manufacturing's value to the U.S. economy. Manufacturing Day participants learn about real career opportunities, training and resources. In addition, manufacturers learn about business improvement resources and services delivered through manufacturing extension partnerships.

CNA assists customers with training programs for newly hired workers that will assist in new employee training, focusing on injury prevention and employee education. Through such programs, new hires will be introduced to a variety of job-related topics and hazards focused in the manufacturing world.

Driver Performance

Manufacturers, by-and-large, work hard to keep commercial auto use controlled and safe. According to CNA Risk Control assessments:



In addition to commercial auto property exposures, manufacturers need to understand that liability is inherent whenever drivers are critical to their operations. Controlling liability exposures in today's marketplace requires more than just mastering the rules of the road, and it's important for manufacturers to take driver performance seriously to help achieve business goals.

Driver Selection

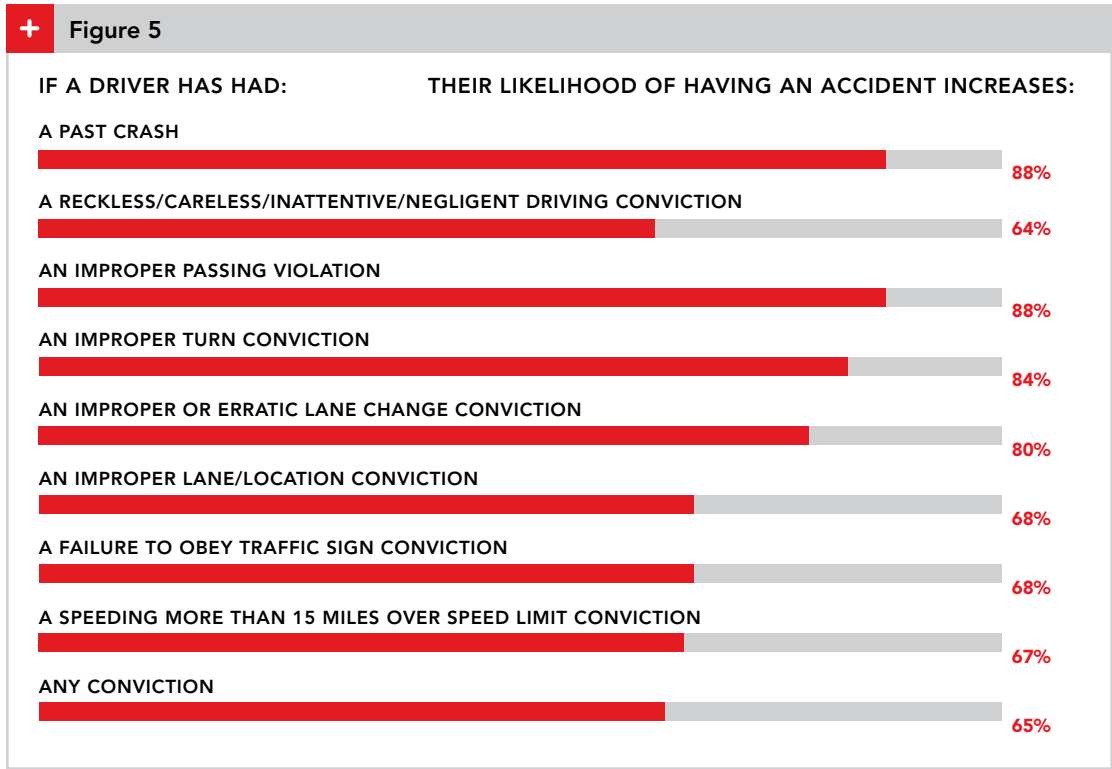
CNA data shows customers who employ drivers with serious moving violations perform more than 20 points worse in loss ratio results — costs for property damage and bodily injuries — than customers whose employees have clean driving records. On top of that, a company potentially faces more than four times their loss cost amount in indirect costs from business interruptions, such as lost productivity or administrative costs.

CUSTOMERS WHO EMPLOY DRIVERS WITH SERIOUS MOVING VIOLATIONS PERFORM MORE THAN 20 POINTS WORSE IN LOSS RATIO RESULTS.

In order to verify an applicant's/employee's driving history, employers should obtain Motor Vehicle Record (MVR) reports for all drivers of company owned vehicles, as well as employees who rent or use their own vehicle on company business. Additionally, employers should establish written MVR criteria to evaluate acceptability for driving

positions. MVR reviews should take place annually to assure acceptable driver performance. These qualifications can be included in job descriptions as well as new hire postings to indicate that a current license, driver performance history and/or vehicle class certifications are essential to a particular job.

Drivers that have had prior violations are more likely to cause accidents or have future violations.⁶



+ Did You Know?

26%

26 percent of highway crashes involve the use of a cell phone.

Five percent of all crashes involve texting.

21 percent of all crashes involve cell phone conversations.

Distracted Driving

Distracted driving accidents continue to be a leading concern for manufacturers. Cell phone use is a big part of this problem. Research by the National Safety Council, show that five percent of all crashes involve texting, and another 21 percent involve cell phone conversations. All told, 26 percent of highway crashes involve the use of a cell phone. Cell phone distracted drivers have slower reaction times and were more likely to crash than drivers with a .08 blood alcohol content level.⁷

Traditional methods to reduce distractions outside and within the vehicle include driver training and restrictive policies by employers. Recently, mobile phone blocking technology has emerged and where permitted, may be a means to enforce phone policies for drivers.



⁶ American Transportation Research Institute. Predicting Truck Crash Involvement: Developing a Commercial Driver-based Model and Recommended Countermeasures Alexandria, VA. October 2005
⁷ http://www.nsc.org/safety_road/Distracted_Driving/Pages/Hands-free-is-not-risk-free.aspx

+ CNA Solutions

Effectively managing any size fleet involves more than just selecting the right drivers and checking their driver's licenses. CNA assists manufacturers in managing driver and fleet exposures by providing the critical elements of a driver performance success three-point strategy:

1 Build an effective motor vehicle record program. Hire and retain top quality drivers

2 Monitor your drivers. Keep them focused by focusing on their behaviors

3 Understand your coverages, risks and exposures. Make sure your insurance program addresses your unique needs

Available to CNA customers is the CNA Driver Account Profile. Based on proprietary CNA underwriting driver performance data, the CNA Account Driver Profile Tool provides you with a snapshot of the overall driver selection process, which can then lead to quality benchmarking and safety improvement programs of fleet driving performance. Through this exclusive assessment, CNA Risk Control consultants can advise and assist you in managing the effectiveness of the driver selection process.

Our highly experienced Risk Control consultants understand how to help evaluate and manage your company's fleet to maximize productivity and efficiency as well as focus on avoiding the primary causes of motor vehicle accidents, such as distracted driving. In addition, CNA Risk Control offers programs, such as cell phone policy kits through the National Safety Council, that provide training, learning materials and example policies for limiting mobile phone use risks.



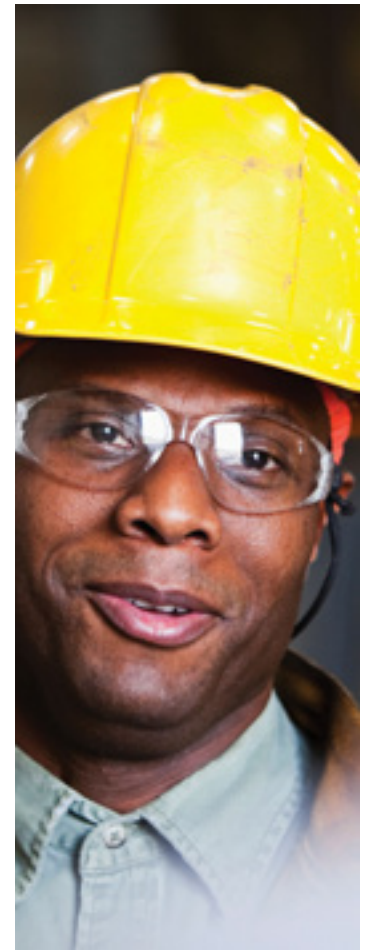
Retention of Skilled and Qualified Employees

Manufacturing is facing a critical workforce skills gap. In a recent Manufacturing Institute survey, the majority of manufacturing companies reported a moderate to severe shortage of available, qualified workers, with some even reporting jobs remaining unfilled due to a lack of capable candidates.⁸ With an entire generation of baby boomer workers poised to retire, this skills gap is set to worsen; older employees take skills and intellectual knowledge with them as they leave the industry — a phenomenon also known as “brain drain”. Manufacturing also suffers from a perception issue: people do not see it has having technically sophisticated jobs and assume the work is dirty and unappealing.

So, how do manufacturers rebuild the workforce to meet the productivity goals of the 21st century?

- Various manufacturers within the community can band together to better understand the needs and skills to develop a workforce pipeline
- Work together with the local educational institutions to help design curriculum and programs that meet specific workforce skills for regional manufacturing
- Engage middle and high school counselors to influence their perception of manufacturing and how they can collaborate with local manufacturers to develop the workforce
- Participate in local and state associations, speak out on the skills gap issue and advocate for individual manufacturers to all play a role to resolve this problem
- Contemplate bringing in military veterans to learn advanced skill sets as they have decision-making skills, advanced analytical thinking and good communication skills

There is no quick fix to this workforce skills gap issue. It requires creating a systematic change to how manufacturers think and do business as well as an on-going commitment from the manufacturing community.



Returning Injured Employees to Work

Historically, return-to-work (RTW) processes have been the responsibility of a company's safety or human resources department. Today, with an increase in automation, the aging workforce and a skills set gap in manufacturing, senior management should put as much emphasis on returning employees back to work as they do on quality and production.

**THE PRINCIPLE OBJECTIVE
OF A RTW PROCESS IS
STRAIGHTFORWARD:
ZERO DAYS AWAY
FROM WORK.**

The principle objective of a RTW process is straightforward: zero days away from work for an occupational injury or illness when medically appropriate. Manufacturers may be skeptical of achieving such a lofty goal, but many employers have done so, while even more operate close to it.

Striving for this objective can help manage costs and positively impact the productivity of an organization. For example, if a company operates at a 10 percent profit margin, paying \$100,000 per year in workers' compensation premiums requires sales of \$1 million to offset that expense in the case of a loss.

⁸ <http://www.themanufacturinginstitute.org/-/media/827DBC76533942679A15EF7067A704CD.ashx>

Still, despite the benefits, internal barriers can prevent organizations from implementing an effective RTW process. Potential barriers include:

- Lack of senior management support
- Internal procedures and policies
- Supervisor resistance
- Employee expectation
- Regulatory requirements

With minimal time and effort, though, manufacturers can outline a plan to manage these barriers and, ultimately, help improve their organization’s bottom line, evident by these statistics:

- According to the Washington Business Group on Health, companies can expect to realize a return on investment of \$8 to \$10 for every dollar invested in RTW⁹
- The RTW process is effective at reducing medical costs, improving productivity and reducing the likelihood of attorney intervention. When an employee is unable to return to work, psychosocial stresses often emerge, which can increase overall costs and days away



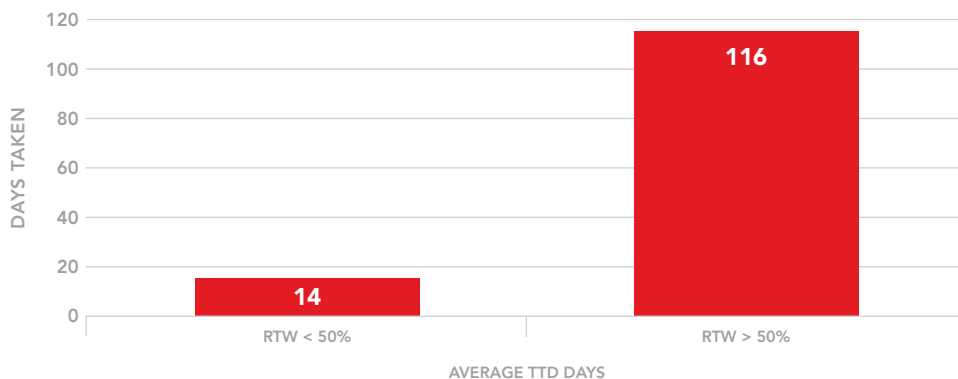
+ CNA Solutions

CNA subscribes to the Official Disability Guidelines (ODG).¹⁰ These guidelines provide evidence-based return-to-work benchmarking data that covers every reportable workers’ compensation condition. CNA recognizes a worker’s duration of disability based off the total days away from work and assists manufacturers in reducing the count of those days based off the worker’s age, gender and co-morbidity.

The ODG is based on an aggregate of over 10 million lost-time cases. Its RTW guidelines allow CNA to obtain the information necessary for effective management, helping injured workers get back to work safely in a reasonable amount of time supported by the evidence. Utilization of the guidelines reduces delayed recovery rates and provides clear targets for forecasting and reserving workers’ compensation claims.

In 2014, CNA compared its manufacturing customers’ claim data with effective RTW programs against benchmarked data provided in the ODG. Forty-eight percent of all workers reporting claims returned to the job within an average of 14 days, placing the CNA customers within the highest performing quartile of ODG standards. The average lost time for a manufacturer without an effective RTW program is 116 days.

CNA Manufacturing Customers Days Taken to Return-to-Work vs. Industry Standard Without RTW Program

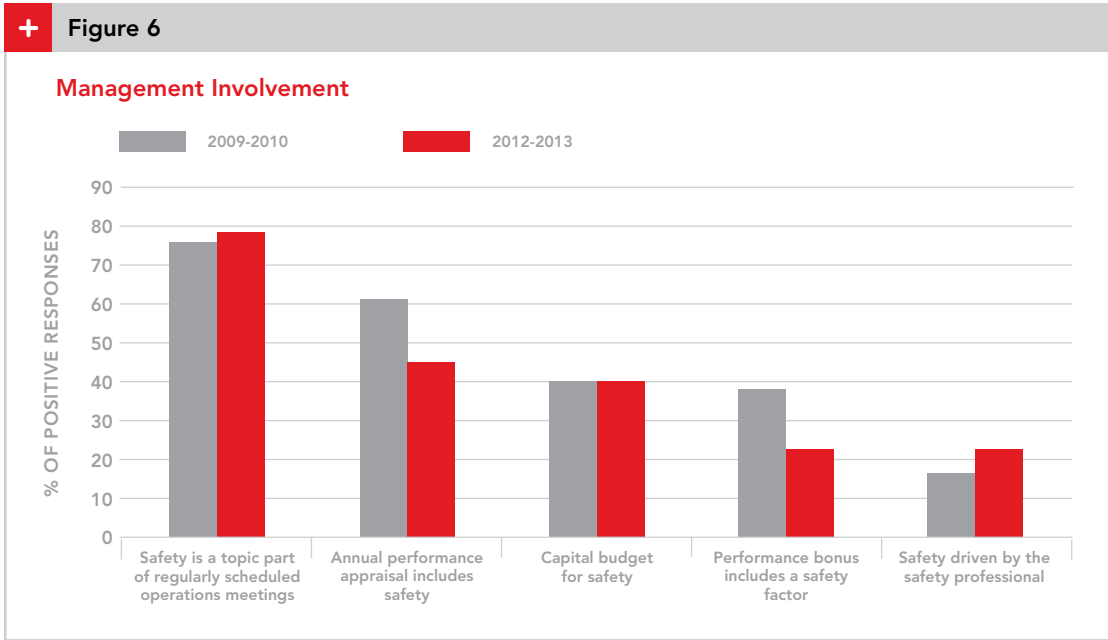


9 Hafre, Patricia F, "Evaluating the Practicality of RTW Programs: Increasing Costs and Legislative Changes Make Disability Related Problems Too Costly To Ignore," Crawford & Company, Atlanta, GA
 10 <http://www.worklossdata.com/return-to-work-guidelines.html>

Management Culture

Management plays an important part in forming and reinforcing safe employee behaviors, with good orientation, mentoring and consistent follow-up playing a critical role. Once an employee joins a company, annual performance appraisals that include safety as a performance topic, safety and production talks and proper allocation of safety resources aid in the promotion of effective work habits and in reducing accident frequency and severity.

When management places a higher level of visibility on the importance of safety, associated programs, policies and procedures are much more effective in reducing employee injuries and accidents.



Source: Risk assessments

+ Did You Know?

9%

More than 12 million Americans (nine percent of the workforce) are employed directly in manufacturing. Manufacturing supports an estimated 17.6 million jobs in the United States — about one in six private-sector jobs.¹¹



¹¹ <http://www.nam.org/Newsroom/Facts-About-Manufacturing/> (According to the National Association of Manufacturers)

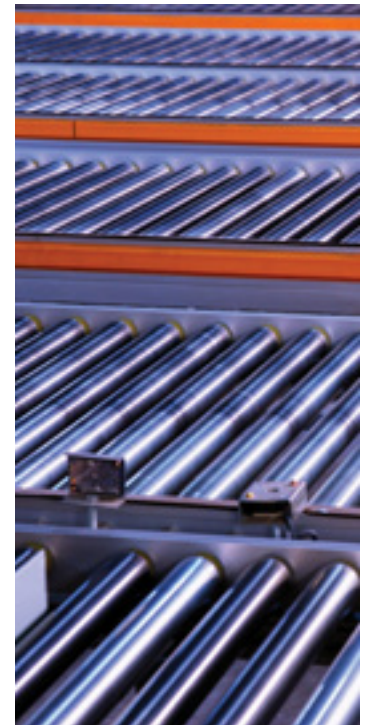
Supply Chain

Supply chains are becoming highly sophisticated and vital to the competitiveness of the manufacturing community. They are highly interlinked, global in nature and increasingly vulnerable to a wide array of risks.

Manufacturers face supplier insolvency and supply disruption due to natural hazards, such as flooding, hurricanes, earthquakes and more. More importantly, through a ripple effect, manufacturers can face damages to reputation and image due to non-compliance, quality and performance risks.

Faced with these challenges, manufacturing organizations should consider:

- How long it would take to respond to a major disruption in supply or spike in demand
- Where the most important vulnerabilities are in their supply chains and operations
- If they have a formalized supply chain risk and resilience governance process in place
- If they have the ability to continuously monitor the supply chain and provide proactive and predictive capability
- If their organization is prepared to respond quickly when unforeseen events occur
- The ability to anticipate and react to supply chain disruptions is essential to successful operations



Emerging Risks: Cyber Risk in Manufacturing



Manufacturers are not immune to the increasing hyper-connectivity of a world driven by technology trends such as the rapid migration to “the cloud”, expanding automation of “things” both in their processes and products — increasingly described as the “Internet of Things” — and the rising uses of “Big Data” analysis of processes and design of products. In a recent data breach study conducted by Verizon¹², the leading incidents reported by manufacturers are cyber espionage and denial of service. Impacts of these incidents may include liability for the intellectual property of others and system outages that shut down production operations. Protecting

assets both physical and virtual is essential in the modern world of the globally extended supply chain. CNA Risk Control not only provides tools and techniques to help you protect and insure your data, but also have cyber professionals readily available to integrate into your manufacturing risk program. With numerous professional designations, including the coveted Certified Information Protection Professional (CIPP), our consultants develop state-of-the-art training programs in emerging trends.

¹² Verizon's 2014 Data Breach Investigations Report, <http://www.verizonenterprise.com/DBIR/2014/>

Property

Property losses tend to be a rare occurrence. However, when they do happen, they can have devastating impact for a manufacturer — often causing losses in excess of \$1 million (see Table 1). For example, fires are the second most frequent cause of loss (behind weather) for property and also have one of the highest average severity of loss cost at \$1.5 million.

+ Table 1

Manufacturing Customer Property Losses over \$100,000, 2008-2013

	INCURRED LOSS	INCURRED COUNT	PERCENT OF CLAIMS	AVERAGE SEVERITY
Fire	\$ 132,665,325	91	28%	\$ 1,457,861
Wind/Hail/Snow/Ice Damage*	\$ 79,581,824	112	34%	\$ 710,552
Water Damage	\$ 36,587,026	44	13%	\$ 831,523
Explosion (Natural Gas)	\$ 19,637,700	9	3%	\$ 2,181,967
Lightning (No Fire)*	\$ 988,485	4	1%	\$ 247,121
All Other	\$ 27,180,272	69	21%	\$ 393,917
Total	\$ 296,640,632	329	100%	\$ 5,822,941

*Weather-related losses



+ Did You Know?



**\$1.5
MILLION**

Fires are the second most frequent cause of loss (behind weather) for property and also have one of the highest average severity of loss cost at \$1.5 million.

Weather

According to the Insurance Institute of America, the United States saw a seven-fold increase in severe thunderstorm activity during the 10-year period ending in 2013.¹³ Manufacturers were not immune

THE UNITED STATES SAW A SEVEN-FOLD INCREASE IN SEVERE THUNDERSTORM ACTIVITY DURING THE 10-YEAR PERIOD ENDING IN 2013.

to this increase, seeing more than \$80 million in weather-related losses over that same time, according to Table 1. In addition, a certain percentage of “Water Damage” claims were due to severe weather, increasing total losses to close to \$100M.

With the increase in severe weather events, it becomes even more important for manufacturers to properly maintain roofs and the physical structure of the building. In one reported event,

a blocked drain at the loading dock prevented both inbound and outbound shipments for more than 36 hours. In another event, a blocked roof drain resulted in the partial collapse of the roof over a parts supply room.

While it may seem counterintuitive, many manufacturers have found that maintaining or even increasing preventative maintenance budgets can help defer major capital expense after an event occurs. Perhaps the best example of this is hiring a qualified roofing contractor to conduct periodic roof inspections; this recurring, but relatively small, preventative cost can help identify and correct problems before a major failure of the roofing system.

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As part of its support for manufacturing customers, CNA visits customers to assess risk and provide advice tailored to the manufacturing industry. These risk assessments can help find property protection issues before a loss occurs. As a result of its customer visits, CNA found that 75 percent of manufacturing facilities were equipped with a sprinkler system or special extinguishing system. Unfortunately, almost 20 percent had critical issues¹⁴ impacting the system’s ability to control a fire.

Your CNA representative can help you evaluate the adequacy of your fire sprinkler system by comparing them to nationally recognized codes and standards.

+ Did You Know?



There are hail-resistant and wind-rated roof coverings. Many times the additional expense is minimal for a replacement roof covering and protection of roof-mounted equipment.

¹³ <http://www.iii.org/fact-statistic/tornadoes-and-thunderstorms>

¹⁴ Critical Issues include things such as deferred maintenance and inadequate system design

Explosions

While explosions, particularly natural gas, are extremely rare occurrences, they typically cause extensive physical damage and place employees at risk for severe injuries or death. The most common exposures in manufacturing include boilers, ovens, dryers and heat-treating machinery.

To minimize the possibility of a natural gas event, a manufacturer should follow nationally accepted standards when working with flammable gases and be sure all piping is purged before it is opened. Limit or eliminate ignition sources in all areas where flammable gases are being used — this includes using properly rated electrical devices in areas where combustible gases or liquids are used.

Fires

Fire Suppression Systems

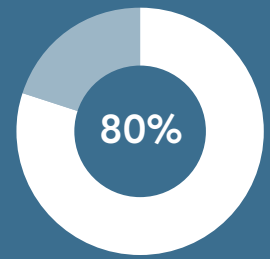
Many manufacturing buildings are protected by automatic sprinklers. Sprinklers (and other fire suppression systems) are designed around the specific types of combustible materials present and how those materials are stored. If the type of combustible materials or the storage arrangement changes, the suppression system may no longer provide satisfactory protection. This means that a relatively small incident can rapidly spread, resulting in a major loss.

Flammable and Combustible Liquids Use

According to the National Fire Protection Association (NFPA), one of the most commonly ignited materials in manufacturing fires is combustible or flammable liquids. CNA risk assessments found that 56 percent of manufacturing facilities use some form of combustible or flammable liquids.

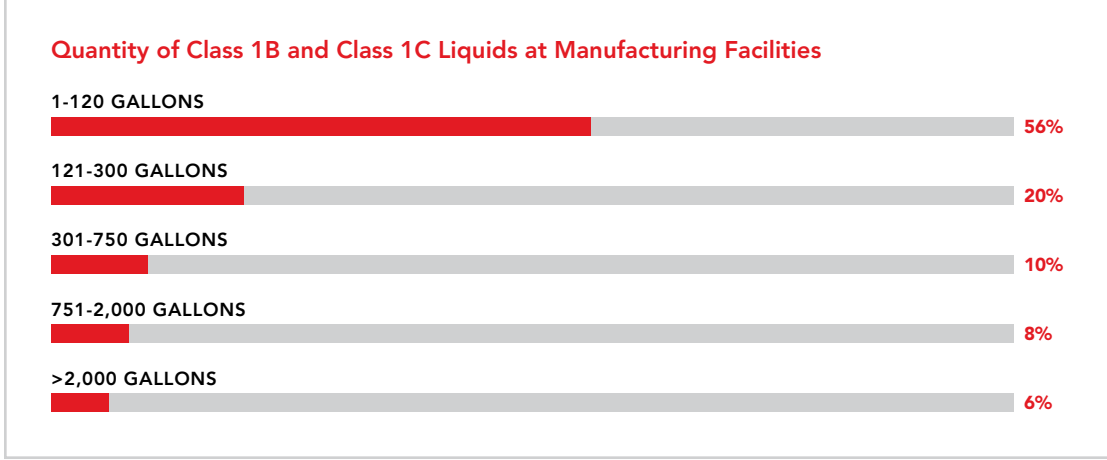
CNA data also found that approximately 80 percent of manufacturers that use flammable or combustible liquids use Class 1 liquids.¹⁵ Typically, these liquids are solvents or coatings used in the manufacturing process. Manufacturers commonly use and store these liquids in smaller quantities (as illustrated in the figure below) — an important safety step.

+ Did You Know?



CNA data also found that approximately 80 percent of manufacturers that use flammable or combustible liquids use Class 1 liquids.¹⁵

+ Figure 7



But even in small quantities, these liquids can present a serious fire hazard. CNA risk assessments related to combustible and flammable liquids found problems with one out of 10 manufacturers' storage of liquids. These problems either significantly increase the possibility of a fire or increase the severity of a loss if a fire were to occur, or both.

¹⁵ According to NFPA 30 The Flammable and Combustible Liquids Code, Class 1 liquids have a flash point below 100° F which means they give off enough vapors at ambient temperatures to ignite

Electrical Faults

According to NFPA’s “U.S. Industrial and Manufacturing Properties” report¹⁶, electrical systems are one of the leading causes of fires in the manufacturing industry.

Most manufacturing organizations are heavily dependent on the reliability and performance of their electrical systems and critical equipment. Interruptions and breakdowns in the electrical system can shut down production machinery and reduce operational efficiency. Electrical failures may also cause major damage to production equipment and facilities.

It’s important to take preventative measures to ensure electrical systems are functioning properly, including periodic maintenance and inspection. Over time, connections can loosen resulting in a non-continuous path for electricity to follow, which may lead to arcing, breakdown and even fire. Infrared testing can be a part of a comprehensive electrical preventive maintenance program and help improve the efficiency of your system, saving energy and reducing the probability of a fire.

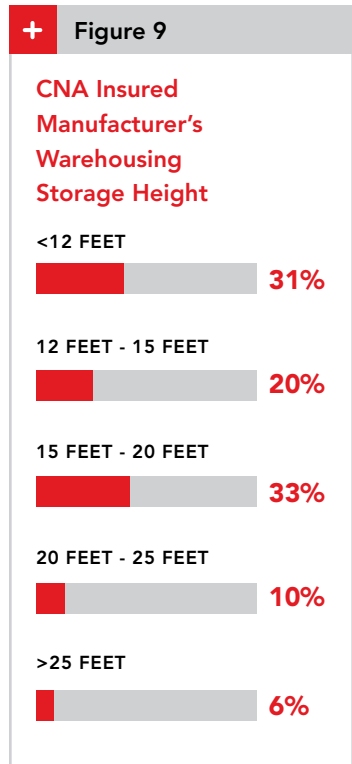
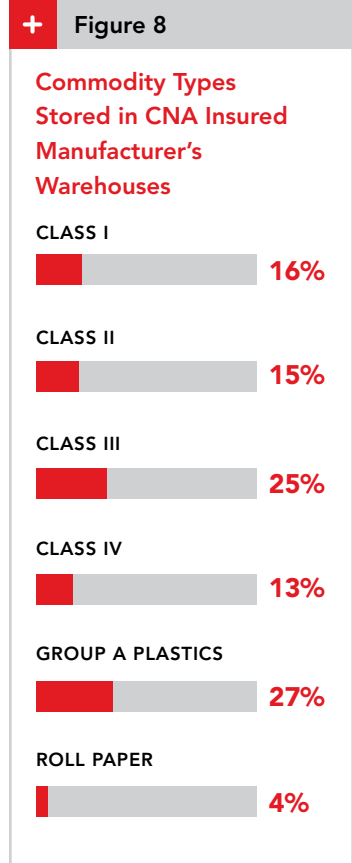
The good news is most manufacturers monitor and control equipment and power generation well. CNA Risk Control assessments conducted in 2012 and 2013 revealed that the manufacturing segment experiences roughly half as many electrical faults as like-sized companies in the non-manufacturing sector.

Storage and Warehousing

Virtually all manufacturing companies utilize a portion of their facilities for storage of raw materials and finished goods. These areas can have significant fuel-loading materials that can burn hot and spread heat and smoke throughout the building.

CNA risk assessments found that significant warehousing exposures are present at 69 percent of manufacturing facilities, and that only 65 percent of manufacturers with warehouse exposures had adequate or nearly adequate sprinkler protection based on current NFPA guidelines.

Storage height and the material being stored, along with its protection, are important factors in determining the extent of fire exposure. Plastics and products with higher commodity classifications¹⁷ are the most difficult type of materials to protect. In addition, higher storage heights increase the exposure that the warehouse area places on the facility.



¹⁶ Jennifer D. Flynn, “U.S. Industrial and Manufacturing Properties,” NFPA Fire Analysis and Research, October 2009

¹⁷ Commodity Classification are used in fire codes to help quantify combustible loading and are integral to ensuring fire protection systems are adequately designed. For general commodities, Class I are lower hazard, class IV are higher hazards. Some other commodities present a significantly higher hazard such as plastics, roller paper and rubber tires

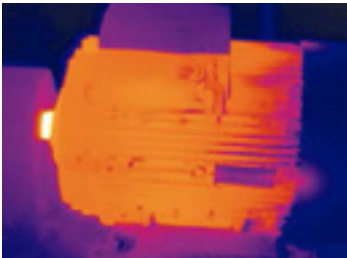
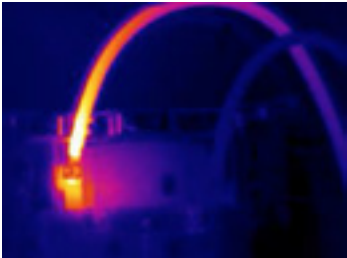
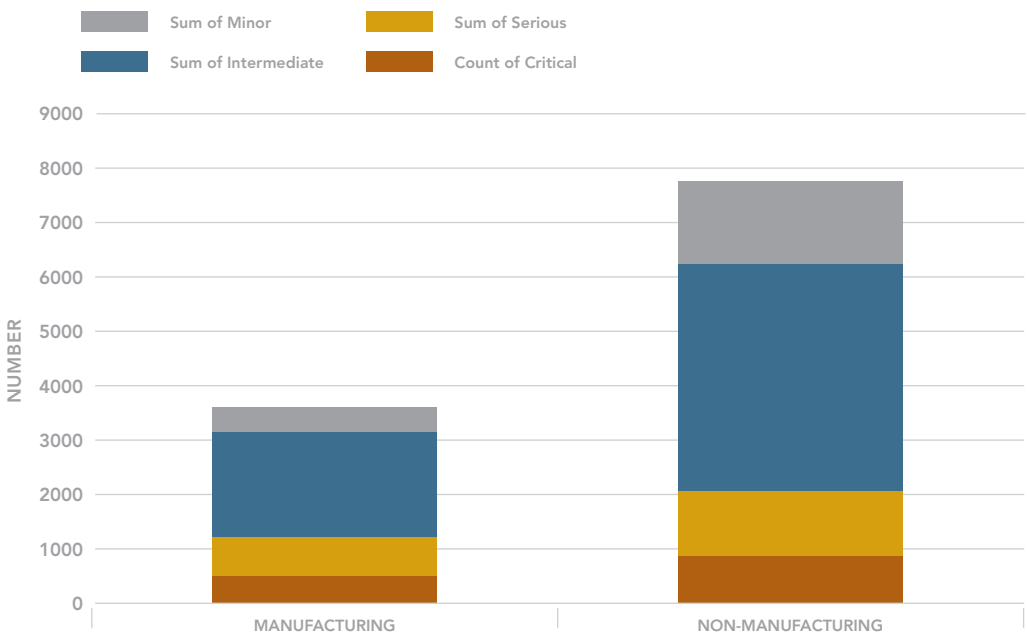
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Infrared Thermography

In 2012 and 2013, CNA performed more than 1,416 inspections to detect infrared energy emitted from power sources, objects and equipment. The results of these assessments yielded 466 critical issues, including overloads, poor connections, faulty contacts and other serious defaults that could cause a fire. The estimated savings to manufacturers through early detection and preventive maintenance utilizing our infrared thermographs was projected to be more than \$15.3 million.

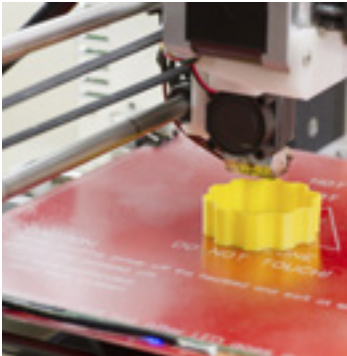
Electrical repair cost savings are estimated at \$500 for minor or intermediate faults and \$3,000 for serious or critical faults. These estimates are based on typical industry experience. The four fault categories are based upon temperature differentials from the norm. Minor faults are 1-9°F above the norm. Intermediate faults are 10-34°F; serious faults are 35-74°F.

Infrared Emitted Energy



Emerging Risks: 3D Printing/Additive Manufacturing

The additive manufacturing market is expected to increase at a compound annual growth rate of nearly 30 percent over the next 10 years¹⁸, and this explosive growth is expected to radically affect certain manufacturing segments. CNA through its association with the National Association of Manufacturers and industrial safety promotion efforts with UL has taken the lead in studying the evolving risk landscape associated with additive manufacturing and how it affects manufacturers' supply chain.



18 Krampitz, Chris, "Additive Manufacturing Risks - CNA Additive Manufacturing Summit," UL, 15 Jan. 2015. Presentation: 22 Jan. 2015

+ CNA Solutions

CNA Property Manufacturing Solutions

Consulting Services — CNA Risk Control consultants can assist in minimizing property losses that may negatively impact a business. Initially, an on-site assessment is performed by a property consultant. The results are used to establish a customized program based on specific business needs. This could range from providing one-time, risk-specific guidance to a longer-term program — such as a business continuity plan — with specific annual goals and activities.

Fire Protection Plan Review — This valuable service helps ensure that facilities are properly protected and that a company is getting the necessary fire protection from its service provider, before installation. CNA offers a complimentary fire protection plan review service to customers who are considering a new facility, a new process, an addition or simply an upgrade to their fire protection system.

Additional Services — CNA Risk Control consultants can provide guidance on the following services to help businesses manage their property exposures:

- Controlling risks from contractors working on premise
- Theft prevention
- Emergency planning
- Fire protection equipment inspection, testing and maintenance
- Management training
- Self-inspection programs
- Sprinkler systems analysis (technical review of new installations and existing system)



Business Continuity

Continuity of operation is essential to the manufacturing process. Critical machinery can change quickly from a flow point to a choke point if it's not managed well. And with the influx of automation in the industry, the management of critical processes relies heavily on software, making disruptions to data as important as other machinery. Besides loss of daily or monthly revenues, business interruption affects a manufacturer's staff and customers. What's needed is a systematic approach to business continuity with an emphasis toward minimizing risk.

CNA Risk Control through its associate business continuity planners and network of allied vendors can assist in developing an adequate business continuity plan that can:

- Maintain business operations after a disaster occurs
- Ensure continuity for providing supplies or service to customers
- Uphold a good business reputation
- Uphold shareholders' interests
- Minimize legal liability and insurance costs

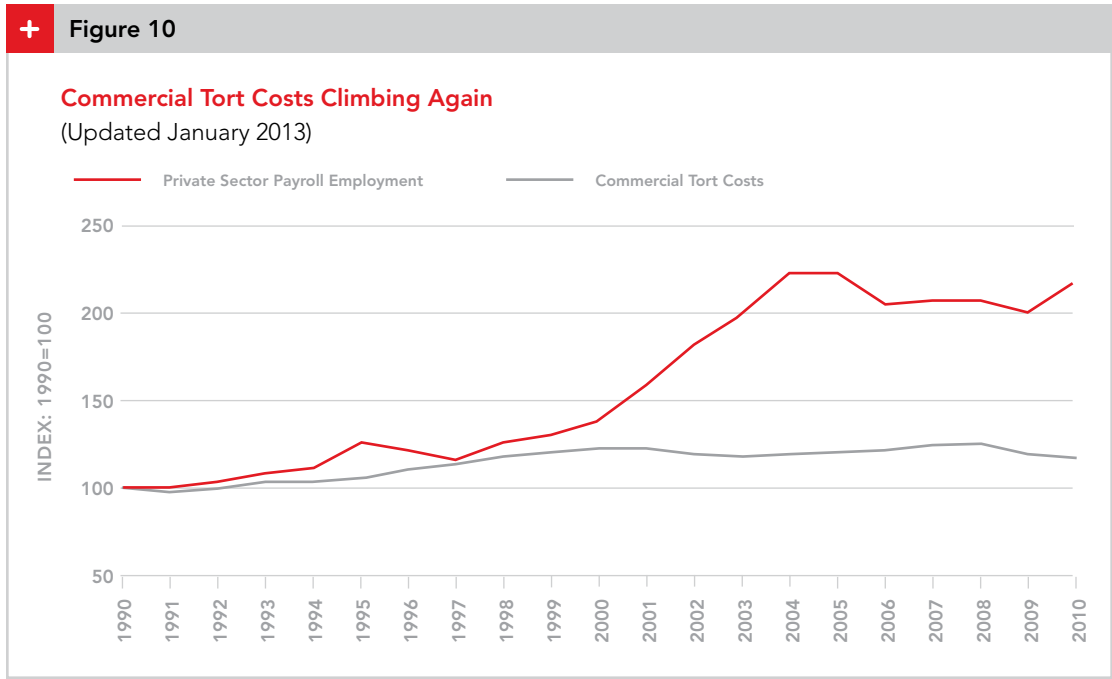
Whether it's minimizing hazards or maximizing available resources, CNA can help to get manufacturers back up and running, from ideas for promoting data security, managing employee communications or coverages that can help in compensating for loss of income.



Customers, Suppliers and Business Partners

Maintaining a high-quality reputation with their customers, suppliers and business partners is essential to sustainable financial success.

A recent study by the Manufacturing Institute¹⁹ estimates that a major impediment to manufacturing competitiveness is the expense of defending against tort claims. A tort is commonly considered a private wrong, independent of contract and committed against an individual, which gives rise to a legal liability. Overall, tort claims and the attendant litigation cost more than \$260 billion a year, or almost two percent of GDP. Almost two-thirds of this amount is for commercial tort claims.²⁰



Source: Towers Watson and U.S. Bureau of Labor Statistics

Manufacturers must control quality to sustain successful operations. CNA conducted over 4,000 risk assessments in 2011 and 2012 of the product quality controls in place in the manufacturing sector.

- Twenty-seven percent of those surveyed had formal periodic recall program testing with auditing
- Thirty-nine percent of those surveyed ISO 9000 Certification
- Fifty-one percent of those surveyed utilized formal product liability and/or quality training for their sales staff
- Fifty-nine percent of those surveyed had legal counsel review all contracts, purchase orders and written agreements
- Eighty-five percent of those surveyed conducted engineering reviews of instruction books, field failure reports, complaints and sales literature
- Eighty-nine percent of those surveyed had appropriate risk transfer strategies for suppliers

+ Did You Know?



**\$260
BILLION**

Tort claims and the attendant litigation cost more than \$260 billion a year, or almost two percent of GDP.



¹⁹ <http://www.themanufacturinginstitute.org/>
²⁰ <http://www.themanufacturinginstitute.org/Research/Facts-About-Manufacturing/Costs/Tort-Costs/Tort-Costs.aspx>



Product Liability

With tort reform minimally impacting the steady increase in product liability claims, manufacturers should take defensive action to protect their organization. Product liability avoidance starts with the consideration of the loss potential associated with the end use of any product and the risk associated with that product and its applications. In other words, view the severity potential and probability of an occurrence in light of the expected losses and worst case scenario. The loss potential associated with the end use should drive the criticality and robustness of a company's risk management program.

+ CNA Solutions

CNA Risk Control can assist in building and assessing product integrity and develop sound loss prevention and product liability claims prevention processes.

Critical components for a Product Integrity Program to focus on may include:

- The design process: What standards apply to development and testing? What is the design review process?
- How design processes are integrated with the QC program
- Ensuring design and engineering change control decisions are well documented, not unduly influenced by cost and have multiple sign-offs or approvals
- Supplier evaluation, selection and controls
- Traceability and recall preparedness: How do you learn about and deal with problems, returns and defects?
- Warnings and instructions
- Trademark, trade secret and copyright are considered with the sales and marketing piece guidelines and legal review
- Installation and acceptance testing of critical components
- Successor liability: What kind of due diligence was performed regarding the product exposures and hazards being assumed?

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In 2011, the Food Safety Modernization Act, was signed and considered the “most sweeping reform of our food safety law in more than 70 years,” as it shifts the FDA’s focus from “responding to contamination to preventing it.” This act allows, for the first time ever, mandatory recall authority by the FDA for all food products and has influenced food-manufacturing processes in a profound way. **In order to help manufacturers abide to these standards, CNA offers services for infrared thermography and ammonia refrigeration.**

These loss prevention processes can help manufacturers to control quality and deliver their product without disruptions to their operations. Focusing on the end application of the product allows risk control specialists to determine the extent of loss a manufacturer may face and reduce it in the production process.²¹

²¹ <http://www.fda.gov/Food/GuidanceRegulation/FSMA/ucm237934.htm>

Helpful Risk Control Tools

For growing manufacturers in an increasingly challenging marketplace, striving to keep plants operationally efficient, competitive and profitable isn't easy. And whether it's a facility, equipment breakdowns, supplier or distributor problems, product transmission or liability, or employee safety, nearly everything in manufacturing carries risk. As a world leader in advancing safety, CNA is focused on the dynamic needs of manufacturers small and large. From architectural woodworkers to metal manufacturers, we have the coverages and services to rely on to conduct operations and maximize productivity. We write coverage across 90 percent of all manufacturing classes, making us the preferred choice for thousands of manufacturers worldwide, with tailored risk control solutions to help keep business running strong.

School of Risk Control Excellence (SORCE®) and Resources

Access world-class training and resources to help minimize exposures and complement your risk practices. Browse our extensive library of tools, guides, checklists, webinars, online classes, third-party resources and more.

UL Recognized Risk Engineers (UL RRE)

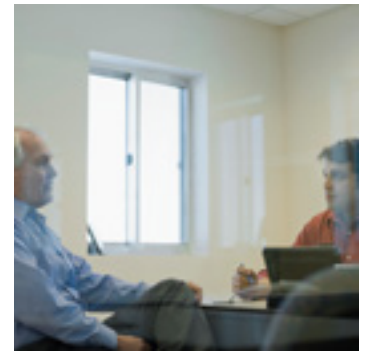
More than 200 of our worldwide Risk Control staff have been awarded the Recognized Risk Engineers (RRE) designation by UL, a leader in advancing safety. In fact, we're the only insurance carrier to have earned this distinction. With an "A" rating for financial strength, an established global presence, and vendor alliances and partnerships with trade associations and industry experts, we deliver the coverages growing businesses need.

Allied Vendors

CNA has identified companies offering services that may strengthen a company's risk control programs and help mitigate costly exposures and/or provide needed services outside of an insurance carrier's capabilities. The companies that participate in our Allied Vendor Program can assist in developing critical programs and procedures that will help create a safer, more secure work environment.

Effective and Supportive Claim Management

Our claim philosophy is simple — manage claims quickly, fairly and accurately. We strive to be the industry's best claim organization and, according to our clients, we are on the right track. Our customer survey results reflect our clients' satisfaction with our claim services. Our professionals are here to support your clients whenever they need us — across the country and around the clock. We also understand that business insurance isn't your only concern. That's why we offer exceptional claim handling, risk mitigation and safety and Hazard Analysis Critical Control Points (HACCP) resources. They all work together as a single manufacturing insurance solution to help you achieve your long-term objectives.



Did You Know?

94%

Companies with fewer than 100 employees make up more than 94 percent of all U.S. manufacturers. Taken alone, manufacturing in the United States would be the 9th largest economy in the world.²²

²² <http://www.nam.org/Newsroom/Facts-About-Manufacturing/> (According to the National Association of Manufacturers)



For more information on reducing and managing risks in the manufacturing industry, visit www.cna.com/manufacturing.



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