

SHIELD

a quarterly publication on safety & risk management

**Return on investment for
employee safety programs**

**Autonomous vehicles:
The foundation for an
industry revolution**

**Stretch & strengthen
to avoid aches & pains**

**Why you should
avoid driving under the
INFLUENCE
OF PAIN**

FALL 2017

 **PROTECTIVE**
INSURANCE



Welcome to the Fall 2017 issue of *Shield*! In our last issue,

we discussed the emergence of autonomous vehicle technology and what needs to be done before self-driving trucks become the norm. This time, we take it a step further and look at all of the cutting-edge companies that are currently developing or testing

autonomous trucks. Get a glimpse into the future on page 10.

The recipe for good health is simple in nature—eat well, move frequently, avoid destructive habits—but can be difficult in execution when your job entails sitting for long periods of time. Keeping your body in tip-top shape by consistently stretching and making time to exercise goes a long way, especially when it comes to minimizing body aches and pains from sitting for too long. See page 8 for some stretches and exercise ideas to help jump-start your health journey.

Does your company have a strong safety program in place? Safety is the cornerstone of any thriving company's operations, and when you put forth the time and resources to invest in it, you will see your business prosper in more ways than you could ever imagine. Read more about the ROI of safety on page 13.

As always, your comments regarding the content and articles in *Shield* are very important to us. If there are any topics you would like to see covered in a future issue, please contact me at shield@protectiveinsurance.com, or (800) 644-5501 x2692.

Yours in safety,

Dennis Shinault, CDS
Loss Prevention & Safety Services Compliance

- **News & Notes** Pg. 2
- **OSHA Overview: Final Rule to Update General Industry Walking-Working Surfaces & Fall Protection Standards** Pg. 3
- **Why You Should Avoid Driving Under the Influence of Pain** Pg. 4
- **Stretch & Strengthen to Avoid Aches & Pains** Pg. 8
- **Autonomous Vehicles: The Foundation for an Industry Revolution** Pg. 10
- **Return on Investment for Employee Safety Programs** Pg. 13
- **Using Teamwork to Bolster Safety** Pg. 15



After reading this issue of *Shield*, we want to hear from you! Do you have a useful resource for educating your drivers that our readers should know about? Are there topics you'd like to see addressed in future issues? Send your feedback and ideas to shield@protectiveinsurance.com.



You can view every past issue of *Shield/The Quill* online at protectiveinsurance.com/shield-archive. To request additional hard copies of a particular issue, email your name, company name and address to shield@protectiveinsurance.com.



- ✓ **STRONG BALANCE SHEET**
- ✓ **OVERALL PERFORMANCE**
- ✓ **SOLID MARKET POSITION**
- ✓ **CONTINUED DIVERSIFICATION**

Protective Insurance's A+ Rating Reaffirmed by A.M. Best

Protective Insurance is proud to announce that our parent company, Baldwin & Lyons, Inc. had its A+ rating reaffirmed by A.M. Best in June 2017.

A.M. Best, a rating agency that focuses on the financial stability of insurance companies, has been reporting on insurers since 1899. A.M. Best issues ratings on approximately 3,400 companies in more than 90 countries worldwide each year. These ratings in turn allow businesses and consumers transparent insight into insurance companies' overall growth and strength.

A.M. Best cited our strong balance sheet, overall operating performance and solid market position in our core commercial trucking market in its reaffirmation. We also received accolades for continuing the diversification and expansion of our products and markets, including small fleet trucking programs and workers' compensation insurance, along with other coverages.

This is our 28th year in a row being ranked A+ by A.M. Best.

FMCSA offers relief on Crash Indicator (BASIC)

The Crash Indicator Behavior Analysis and Safety Improvement Category (BASIC) is one of seven categories that the Federal Motor Carrier Safety Administration (FMCSA) uses to determine how a motor carrier ranks relative to other carriers with a similar number of safety events, including inspections, violations or crashes.

However, many industry safety experts believe that motor carriers should not be penalized if a driver is truly not at-fault or if a crash could not be prevented.

These experts are rallying for a rule change that would exempt non-preventable crashes from being included on a carrier's Crash Indicator BASIC and heavily impacting the carrier's Compliance, Safety and Accountability (CSA) score.

Carriers now have the opportunity to participate in an FMCSA pilot project, called the Crash Preventability Demonstration Program, to see how removing non-preventable crashes could affect safety scores.

The ultimate goal of this project is to move toward a system that recognizes that all truck crashes are not the fault of the motor carrier.

In order to participate, carriers may submit a Request for Data Review (RDR) through FMCSA's DataQ system. Eligible crashes must have occurred on or after June 1, 2017, and crashes must be identified as non-preventable. The program is expected to last for a minimum of two years.

Please refer to the FMCSA website <https://dataqs.fmcsa.dot.gov> for complete information.

FINAL RULE TO UPDATE GENERAL INDUSTRY WALKING-WORKING SURFACES & FALL PROTECTION STANDARDS

This article originally appeared on OSHA.gov.

Falls from heights and on the same level (a working surface) are among the leading causes of serious work-related injuries and deaths. OSHA has issued a final rule on Walking-Working Surfaces and Personal Fall Protection Systems to better protect workers in general industry from these hazards by updating and clarifying standards and adding training and inspection requirements.

The rule affects a wide range of workers, from painters to warehouse workers. It does not change construction or agricultural standards.

The rule incorporates advances in technology, industry best practices, and national consensus standards to provide effective and cost-efficient worker protection. Specifically, it updates general industry standards addressing slip, trip and fall hazards (subpart D), and adds requirements for personal fall protection systems (subpart I).

OSHA estimates that these changes will prevent 29 fatalities and 5,842 lost-workday injuries every year.

BENEFITS TO EMPLOYERS

The rule benefits employers by providing greater flexibility in choosing a fall protection system. For example, it eliminates the existing mandate to use guardrails as a primary fall protection method and allows employers to choose from accepted fall protection systems they believe will work best in a particular situation—an approach that has been successful in the construction industry since 1994. In addition, employers will be able to use non-conventional fall protection in certain situations, such as designated areas on low-slope roofs.

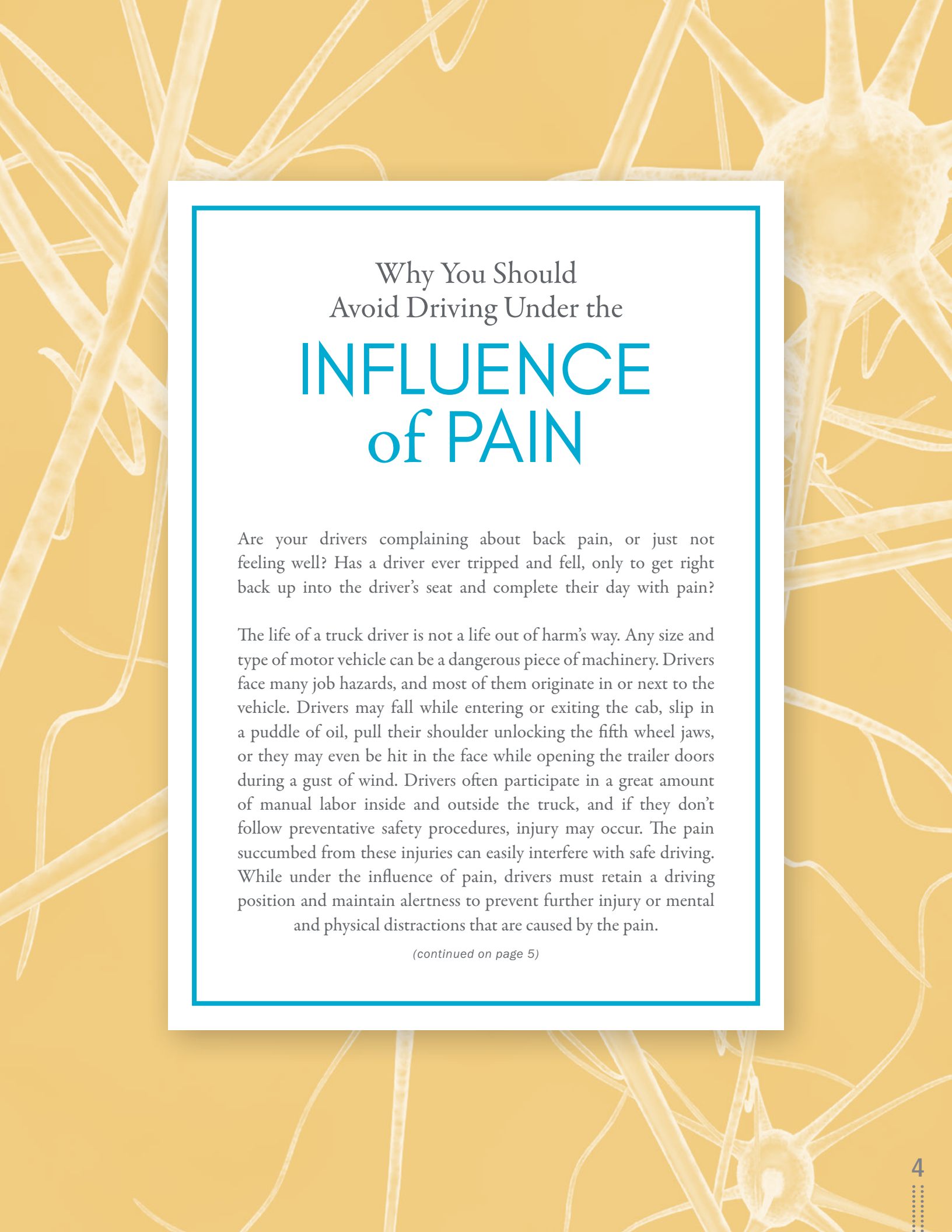
As much as possible, OSHA aligned fall protection

requirements for general industry with those for construction, easing compliance for employers who perform both types of activities. For example, the final rule replaces the outdated general industry scaffold standards with a requirement that employers comply with OSHA's construction scaffold standards.

TIMELINE

Most of the rule became effective January 17, 2017, 60 days after publication in the Federal Register, but some provisions delayed effective dates, including:

- + Ensuring exposed workers are trained on fall hazards (May 17, 2017)
- + Ensuring workers who use equipment covered by the final rule are trained (May 17, 2017)
- + Inspecting and certifying permanent anchorages for rope descent systems (November 20, 2017)
- + Installing personal fall arrest or ladder safety systems on new fixed ladders over 24 feet and on replacement ladders/ladder sections, including fixed ladders on outdoor advertising structures (November 19, 2018)
- + Ensuring existing fixed ladders over 24 feet, including those on outdoor advertising structures, are equipped with a cage, well, personal fall arrest system, or ladder safety system (November 19, 2018)
- + Replacing cages and wells (used as fall protection) with ladder safety or personal fall arrest systems on all fixed ladders over 24 feet (November 18, 2036) ■

The background of the entire page is a microscopic image of neurons, showing cell bodies and long, branching axons in a light orange or yellowish hue. The neurons are scattered across the page, with some larger cell bodies and others as thin, elongated fibers.

Why You Should Avoid Driving Under the **INFLUENCE** of PAIN

Are your drivers complaining about back pain, or just not feeling well? Has a driver ever tripped and fell, only to get right back up into the driver's seat and complete their day with pain?

The life of a truck driver is not a life out of harm's way. Any size and type of motor vehicle can be a dangerous piece of machinery. Drivers face many job hazards, and most of them originate in or next to the vehicle. Drivers may fall while entering or exiting the cab, slip in a puddle of oil, pull their shoulder unlocking the fifth wheel jaws, or they may even be hit in the face while opening the trailer doors during a gust of wind. Drivers often participate in a great amount of manual labor inside and outside the truck, and if they don't follow preventative safety procedures, injury may occur. The pain succumbed from these injuries can easily interfere with safe driving. While under the influence of pain, drivers must retain a driving position and maintain alertness to prevent further injury or mental and physical distractions that are caused by the pain.

(continued on page 5)

A large issue with injuries on the road is that drivers are often far away from their destinations or homes. They are incentivized by their paycheck to stay on the road to avoid losing time and money. Management must make their position on driver injuries clear so drivers do not feel overly pressured to finish a haul when they are under the influence of pain.

The most common injuries occur from slips, trips and falls. The number one way to prevent these injuries is to require non-slip shoes for your employees. There are certain parts of the job that are more dangerous than the rest.

Drivers must be aware of the hazards and be familiar with the safety protocols for these procedures:

1. Use of a proper 3-point system while entering/exiting a tractor and trailer
2. Safe lifting/carrying
3. Cranking trailer landing gear/moving trailer dollies
4. Using proper walkways, and paying attention to the terrain to prevent slips, trips and falls

PROBLEMS FROM DRIVING

Most people underestimate the extent to which small issues can build into lasting injuries. For this reason, a driver must focus on the actions they do the most while operating the vehicle. The action of sitting behind the wheel is one drivers have done likely thousands of times before. This action causes many soft-tissue injuries that may compound into larger pain. Training and maintaining their lower backs in the driver's seat, an ongoing action, will make it much easier for them to deal with larger tasks such as bending and lifting. Drivers must focus on their

driving position and eliminate any pain associated with driving however minute it might be, because the pain will augment and eventually cause lasting problems.

Back issues can stem from an improper driving position. In order to best prevent back pain and strain, follow these guidelines when adjusting your position in the driver's seat:

- Ensure as much of your thighs are supported by the seat as possible.
- Don't sit too far away from the pedals, as this may put additional strain on the upper back and neck.
- Adjust the steering wheel so you can reach it with bent arms with the hands in the 10 and 2 position.
- If you have lumbar support in your seat, adjust it so it presses gently on the lower back at belt height.

Once your seat is properly adjusted, consider these techniques to minimize and avoid lower back pain while driving:

- If the truck seat does not supply enough lumbar support, the driver could consider an appropriate lumbar support device.
- Consider sitting on a pillow made for a chair to provide extra cushioning between you and the road.
- Keep an ice pack/cold pack in the fridge of your cab or pick up ice at a truck stop and apply to the lower back to reduce inflammation and numb/sore tissues. Use a barrier between the skin and the ice to avoid ice burn.

"THE PENALTY FOR DRIVING UNDER THE INFLUENCE OF IMPAIRING MEDICATIONS IS THE SAME AS AN ALCOHOL DUI IN MOST STATES."

- When possible, stop regularly. Get out of the truck and move around.
- Avoid heavy bending and lifting immediately after driving. This is when the back and other joints are most susceptible to injury. Drivers should see a physician or a personal trainer for ideas on simple stretches to warm up and prepare muscles for activity after a prolonged sitting.

Back pain is not the only pain that can be caused by driving. Shoulder or neck pain can also be caused by gripping the steering wheel too tightly. Avoid this by trying to relax the muscles while driving, keeping elbows bent and sitting closer to the wheel. The more you have to reach to steer, the more strain you put on the shoulders and neck.

One way drivers cope with pain is with pain medications, either prescription (Rx) or over-the-counter (OTC). Some medications, when taken alone or in combination with others, can have the same impairing effects as alcohol or illicit drugs. The penalty for driving under the influence of impairing medications is the same as an alcohol DUI in most states. The dangerous effects that can directly impair a trucker's ability to drive include anxiety, blurred vision, chest pain, confusion, dizziness, disorientation, drowsiness, muscle cramps, nausea, irritability and fatigue. Before taking any medication, especially before driving, understand the potential side effects and consult with a physician or pharmacist to determine if there are

other medications that will not affect driving. Even standard OTC cough and cold remedies can impair driving.

The AAA Foundation for Traffic Safety created a program called Roadwise Rx (www.roadwiserx.com). This is a free, informative tool that motorists can use to see how their medication can affect safe driving. Roadwise Rx highlights the potential driving effects of medications, in addition to showing users the potential interactions their medications may have with other medications or with common foods. Print and keep a copy of your medication list so it's available in the event of an emergency. Discuss Roadwise Rx results and your list of medications with your doctor, who can help optimize medication dosage and timing to ensure safe driving will not be affected.

The table on the next page demonstrates basic driving functions that are affected by injury or pain to certain body parts. Even if a box is not checked, there could be secondary reasons that could be affected because of the mental alertness that is affected when pain is involved.

(continued on page 7)



Basic Driving Functions Affected by Pain

Origin of Pain	Pressing in Clutch	Shifting Gears	Applying Brakes	Turning Steering Wheel	Reaching for Operating Controls	Entering & Exiting Vehicle	Vehicle Inspections	Refueling	Mental Alertness
Back/Hip	X	X	X	X	X	X	X	X	X
Torso	X	X	X	X	X	X	X	X	X
Leg, Knee, Foot, Ankle	X		X			X	X	X	X
Shoulder, Arm, Wrist, Hand, Finger		X		X	X	X	X	X	X
Head									X
Neck	X	X	X	X	X	X	X	X	X
Mouth, Tooth Ache									X
Being a Hypochondriac	X	X	X	X	X	X	X	X	X
Constant Complainer	X	X	X	X	X	X	X	X	X

Bottom line: Drivers and their managers must understand how pain can affect drivers by causing decreased physical or mental alertness. Driving under the influence of pain **IS** distracted driving.



CLAIMS CORNER

CLAIMS CASE STUDY: PUSHING THE PHYSICAL LIMITS

Pushing the body to the breaking point of exhaustion happens much more often than employers are aware. Typically they end in a close call, but sometimes collisions with injuries occur. In this case a delivery driver fell asleep at the wheel, admitting to his employer after the fact that he was exhausted just before the motor vehicle collision had occurred. The employee was operating a full-sized cargo van that veered off the road, striking a utility pole head-on. The driver was taken via ambulance for facial abrasions, a fractured nose and a concussion.

This claim is still ongoing and costs have not been finalized, but the driver is now alleging permanent damage and disability. In addition, the vehicle was a total loss, and a physical damage claim was paid out as well. Luckily, both the workers' compensation and physical damage claims were minimal in comparison to many other claims we manage. However, under different circumstances the same facts of loss could equate to much greater injury, physical damage and even loss of life. If this had been a tractor-trailer with team drivers and the vehicle had rolled, or if the vehicle had struck a pedestrian or another vehicle, the cost of these claims could be in the millions of dollars.



SQUATS



PUSHUPS



SIT UPS



JUMPING JACKS



LUNGES



CALF RAISES



RUNNING/WALKING



STEP UPS



BICEP CURLS
SHOULDER LATERAL RAISES
AND FRONT SHOULDER RAISES

SIT UPS

TIP: If you don't have room in your cab, use a towel or exercise mat to help cushion you on grass or concrete.

SET YOUR GOAL:

REPS:__ SETS:__

PERSONAL BEST:

REPS:__ SETS:__

PUSHUPS

TIP: Use your truck to make this movement easier. Raise your arms to shoulder level and place your palms against the truck. Keep your hands on the truck and back up your feet until your elbows are bent and your body is at an angle with the truck. Push off the truck until your arms are straight then go back to the starting position.

SET YOUR GOAL:

REPS:__ SETS:__

PERSONAL BEST:

REPS:__ SETS:__

SQUATS

SET YOUR GOAL:

REPS:__ SETS:__

PERSONAL BEST:

REPS:__ SETS:__

CALF RAISES

SET YOUR GOAL:

REPS:__ SETS:__

PERSONAL BEST:

REPS:__ SETS:__

LUNGES

TIP: Increase the difficulty by holding dumbbells or similarly heavy objects in each hand as you lunge.

SET YOUR GOAL:

REPS:__ SETS:__

PERSONAL BEST:

REPS:__ SETS:__

JUMPING JACKS

SET YOUR GOAL:

REPS:__ SETS:__

PERSONAL BEST:

REPS:__ SETS:__

BICEP CURLS

SHOULDER LATERAL RAISES
AND FRONT SHOULDER RAISES

TIP: If you don't have dumbbells, use jugs of water or similarly heavy objects in your cab.

SET YOUR GOAL:

REPS:__ SETS:__

PERSONAL BEST:

REPS:__ SETS:__

STEP UPS

TIP: Use the driver's side step for this exercise. If you need help balancing, hold the grab-handle. However, try to keep the power driving from your legs, not your arms.

SET YOUR GOAL:

REPS:__ SETS:__

PERSONAL BEST:

REPS:__ SETS:__

RUNNING/WALKING

TIP: 30 laps around an average-sized semi-truck is equal to approximately one mile.

SET YOUR GOAL:

REPS:__ SETS:__

PERSONAL BEST:

REPS:__ SETS:__

STRETCH & STRENGTHEN TO AVOID ACHES & PAINS



We all know about the risks associated with sitting for too long, including an increased vulnerability for heart disease, diabetes and other ailments. But it's not just your inner organs at stake—the sedentary nature of a trucking lifestyle makes drivers very susceptible to muscle aches and pains.

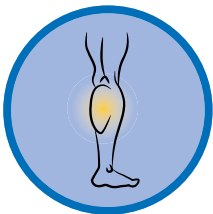
Fortunately, it only takes a little bit of mindfulness and consistency to reap the benefits of exercise, and help your body function ache- and pain-free. Take care of your body by making time to stretch and exercise, and begin feeling the difference!



STRETCH

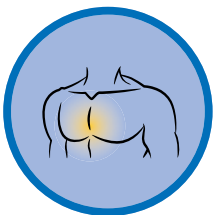
Stretching is an incredibly easy and low-impact way to instantly feel re-energized, more flexible and less sore.

Failure to stretch is a major contribution to muscle stiffness and soreness; however, taking even just several minutes per day to focus on stretching the major muscle groups will make a huge difference. These stretches are simple, effective and can be done just about anywhere—including inside or right outside your cab.



CALF STRETCH

Stand on the edge of a raised surface, ensuring that you have a railing or something sturdy to hold. Rise up on your toes to lift your heels and then lower them, bringing the toes up as you lower. Hold each position for two to three breaths. Repeat four to six times.



CHEST RELEASE

In a seated or standing position, press your shoulders down and slightly back. Relax your arms and clasp your hands together behind your back. Gently bring your shoulder blades together and raise your arms several inches to the back, breathing into the stretch. Hold for three to four breaths.



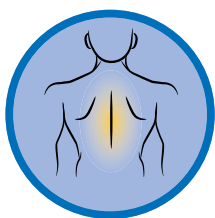
STANDING QUAD STRETCH

Stand with feet hip-distance apart. Soften your right knee and reach for your left foot or ankle. The left knee should be bent to point straight down to the floor. Hold for four to six deep breaths. Release and repeat on the other side.



STANDING HAMSTRING STRETCH

Rest your right foot straight up on a chair or a bench. Keeping your spine straight, hinge forward at the hips to increase the stretch. Hold for four to six breaths, and repeat on the other side.



SEATED SPINAL TWIST

Sit on the edge of a chair or bed with your legs together. Place one hand behind you, and the other on your other thigh for support. Inhale and rotate your spine from the waist to the right. Hold for two to three deep breaths, and repeat on the other side.

For a deeper stretch of the neck, you may turn your gaze to look over your shoulder as well.

EXERCISE

At a minimum, the American Heart Association recommends **at least thirty minutes of moderate-intensity aerobic activity** at least five days per week.

You don't need access to a fancy gym or health club in order to do a workout. Oftentimes, all you need is your own body weight and a small 4' x 6' space.

There are a plethora of bodyweight exercises and routines available on the internet. There are several reputable health and wellness websites, including RollingStrong.com, that provide healthy tips. Rolling Strong is focused on truck drivers.

Alternatively, see the attached cards for quick exercises that target all major muscle groups. Mix and match these exercises to create your own circuit workout.

Keep track of your progress by **writing down** the number of sets and repetitions you completed of each exercise, along with how you felt overall after the workout. As you feel yourself progressing and getting stronger, you will be more motivated to keep going and make fitness not just an afterthought, but an essential part of your life.

AUTONOMOUS VEHICLES:

THE FOUNDATION FOR AN INDUSTRY REVOLUTION

This is a follow-up piece to The Future of Freight: Driver Assist & Self-Driving Trucks from the Summer 2017 issue of Shield.

A world in which massive trucks travel down the highway with no one in the driver's seat seems like a scene from a science fiction movie, but it is much closer to reality than people may think. While fully driverless trucks may still be several decades in the future, many lower levels of automation are already in use.

The Society of Automotive Engineers classifies levels of automation in six levels. The levels range from Level 0 to Level 5, with each level containing increasing levels of automation. Levels 3, 4 and 5 do not require the driver to be constantly looking at the road. Levels 4 and 5 do not even require a person to be present in the driver's seat.

In addition to driving functions, autonomous vehicles are capable of communicating with other vehicles and infrastructure, including smart roads, bridges and traffic signs. This allows vehicles to be aware of other cars, pedestrians and road hazards before the driver can detect them. The advanced warning helps avoid crashes and reduce congestion on roads.

An early use of vehicle-to-vehicle (V2V) communication is platooning technology. Linked through V2V communication, trucks drive in teams of two or more. The braking and acceleration of trailing trucks are controlled by the lead truck. Because reaction time is no longer a factor when braking, the trucks are able to follow at a much closer distance. The close following distance reduces drag and fuel used, and the connected braking and acceleration reduces driver fatigue in the following trucks.

Major Manufacturers Developing Autonomous Technology

Due to the potential for massive cost savings, many large trucking companies are pursuing this technology at a frenetic pace. Paccar, Daimler and Volvo, which are the three major manufacturers accounting for 90 percent of the market share for trucks in the United States, are all working to develop an autonomous version of their commercial trucks.

Paccar, which currently possesses 18 percent of the US market share for commercial trucks, recently announced a partnership with Nvidia. Nvidia is a Silicon Valley company that specializes in graphic chips, and they have used that technology to start an autonomous division. This partnership confirms that Paccar is also pushing to develop a self-driving version of their trucks. Paccar has announced that they have developed a Level 4 prototype using Nvidia's autonomous vehicle software, called Drive PX.

Volvo, which currently holds 20 percent of the market share for US trucks, is also working on developing autonomous vehicle and platoon technologies. The company is currently testing autonomous commercial trucks, as well as self-driving garbage trucks in Europe. They are also working to develop platooning technology, and have already sent a platoon of trucks from Stuttgart to Rotterdam as a part of the European Truck Platooning Challenge.

German auto group Daimler is currently working on developing the Freightliner Inspiration Truck, a self-driving version of their popular Freightliner truck. It has Level 4



automation, and two working prototypes are being tested on public roads in Nevada. Per state law, a driver is still required to be in the driver's seat in case of an emergency, but the truck is able to perform all driving functions without human assistance. Daimler currently possesses the largest market share of commercial trucks in the United States, with the Freightliner truck representing 37 percent of the current market. If the Freightliner Inspiration Truck becomes ready for commercial use, this would be a major step for the integration of autonomous vehicles into society. Daimler is also working on developing platoon technology, having also participated in the European Truck Platooning Challenge.

Start-Ups Revolutionizing the Industry

Of all the new technologies, platoon technology is the most likely to be seen in the immediate future. Peloton, a truck platooning and automation start-up based in Mountain View, California, has already accumulated over 15,000 miles of testing and has demonstrated the massive potential benefit of implementing this technology on a large scale. Through their tests, the company has reported an estimated 7 percent savings on fuel costs, roughly 4.5 percent for the lead truck and 10 percent for those trailing.

Uber Advanced Technologies Group and its recently acquired start-up OTTO are currently testing trucks with Levels 3 and 4 automation on public roads in various states across the

country. One of these prototypes was used to make the first ever commercial delivery using an autonomous vehicle. An OTTO truck transported a truckload of Budweiser 120 miles from Fort Collins, Colo. to Colorado Springs. The driver remained in the sleeper department of the vehicle for the duration of the trip, and the vehicle was in command the entire way.

Nikola is another start-up that is developing a truck with Level 4 automation. Their truck comes with a unique zero emission value proposition. While their trucks are not yet in production, over 7,000 interested parties have already paid to preorder a Nikola truck.

Starksy Robotics is another California-based start-up currently developing autonomous vehicle technology. Using this technology, trucks drive autonomously on a highway, but are controlled remotely by a human operator. Each driver will monitor several trucks, likely in the range of 10 – 30, at once. The remote driver will be ready to take over at any time, but will not need to be actively driving the truck until the vehicle exits the highway. Upon exit, the remote driver will take full control of the vehicle until it reaches its final destination.

Barriers to Full Adoption

Companies developing Level 4 or 5 autonomous vehicles

must solve several crucial technical problems before the vehicles will be available for the public. Driverless vehicles with Level 4 automation are capable of handling most situations on their own; however, difficult road conditions can cause systems to fail, and need a human driver to intervene. Precarious conditions include weather, nonexistent or inconsistent road lines, construction, unpredictable human behavior and cybersecurity. Most lane-keep technology currently uses the lines on the road to keep the vehicle centered in the lane. If these lines are absent or obscured by bad weather, the system may struggle to keep the vehicle in its lane. Road construction or poorly mapped roads can disrupt the navigation software used by autonomous vehicles. In reality, many human drivers do not follow some traffic laws, so developers will need to find a way to prepare the vehicles for human errors that are difficult to predict.

Finally, there is the issue of cybersecurity. If these vehicles are being operated by software systems and communicating wirelessly, there is a possibility that these controls can be tampered with or hacked. When it comes to freight, this is especially concerning because of the value of cargo being transported.

Another dilemma faced by manufacturers is the need to make moral decisions as part of the programming of the vehicle. In some cases, it will be impossible to avoid a crash,

and developers will need to decide if it is important to protect the driver first, or make the decision that will avoid as many injuries as possible.

Test Beds for AV Technology

In order to solve these problems, autonomous vehicles are put through extensive tests. These tests are already occurring, in closed facilities and public roads. The largest closed facility for autonomous vehicle tests is located in Ypsilanti, Michigan. This former WW2 B-24 bomber factory was purchased by the state of Michigan and gives researchers 335 anchors to test the AV technology's performance in a multitude of situations. This facility is not expected to be open until the end of 2018, but some areas will be available for use as early as December 2017.

In addition to closed facilities, the vehicles must be tested to see how they perform on public roads, where conditions are less predictable and much more in alignment with what will be seen when these vehicles are available for public use. Currently, self-driving vehicles can be tested on public roads in Nevada, California, Florida, Arizona and Michigan. Michigan, Ohio and Pennsylvania's DOTs have joined together to form the Smart Belt Coalition. This partnership helps to standardize regulations across the states and will allow tests to be conducted over much larger distances. With each successful test, the prospect of self-driving trucks transforming the freight industry gets closer to reality. ■

**FINALLY, THERE IS THE ISSUE OF
CYBERSECURITY. IF THESE VEHICLES
ARE BEING OPERATED BY SOFTWARE
SYSTEMS AND COMMUNICATING
WIRELESSLY, THERE IS A POSSIBILITY
THAT THESE CONTROLS CAN BE
TAMPERED WITH OR HACKED.**

RETURN ON INVESTMENT

for Employee Safety Programs

WORKPLACE INJURIES AND DEATHS ARE EXPENSIVE, with employers across the nation paying an estimated \$1 billion per week for direct workers' compensation costs alone, per OSHA. The direct cost of injury and replacement labor for a single incident can be upwards of tens of thousands of dollars.

However, this projection does not even account for all the indirect costs of a workplace injury, which can include but are not limited to:

- + Production downtime and effects on your business
- + Overtime to make up for said downtime
- + Damage to products or raw materials
- + Repairs to equipment
- + Sick pay
- + Loss of productivity

- + Retraining costs
- + OSHA fines and legal costs
- + Reputation damage and customer dissatisfaction

Combine several or all of these, and you will find your indirect costs soaring in comparison to direct costs.

The best way to prevent injuries and establish a culture of safety within your organization is to invest in an employee safety program. Time after time, the return on investment in safety has been proven to be worthwhile—studies demonstrate that every dollar invested in safety programs provides a return of four to six dollars in reduced costs.

But how do you convince your company leadership to place an increased emphasis on safety? For a financially strapped or growing

INDUSTRY STATISTICS

- + For every dollar spent on direct costs related to an accident, there are another three to five dollars spent on indirect costs.
- + U.S. workers experience more than one million injuries and 2.3 million cases of ill health in an average year, contributing to a loss of about 40 million working days.
- + More than 25,000 individuals are forced to give up work because of injury or ill health issues.
- + Nearly 50 workers are injured every minute of every work week.
- + A fatal injury carries an average cost of \$991,027, accounting for hospital costs only.
- + The actual cost of an accident with direct medical and compensation costs of \$15,000 is really between \$45,000 and \$75,000 after indirect costs are taken into account.

Source: National Safety Council

business, it may be hard to justify an increase in expenses. However, investing in safety can save your company thousands, if not millions, of dollars down the line.

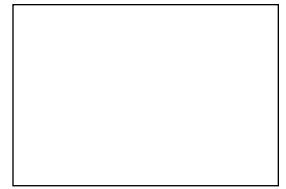
Instead of thinking of a safety program as an added expense, consider it to be an investment. Your decision to invest in safety will lead to an improved bottom line for your company for many years to come.

Here are some ways in which a commitment to safety will strengthen your company:

- + Workplace safety has a positive impact on a company's financial performance, including lowered insurance premiums, reduced medical costs, avoidance of OSHA penalties, and reduced costs to train replacement employees and conduct accident investigations.

- + The return on investment also shows itself in other areas that increase productivity, competitiveness and employee engagement. Typically, companies that implement a comprehensive safety and health program report improved employee morale, leading to increases in productivity, efficiency and overall company culture.
- + The cost of a safety program and its implementation is likely to be far less than what you would pay for a preventable accident.


It is not enough to simply make safety a priority—it should be one of your organization's core values. By taking the initiative to invest in a safety program, you are taking a vital first step in bringing safety to the forefront of your company's values. ■



USING TEAMWORK TO BOLSTER SAFETY

Developing a new safety or performance incentive plan, creating a safety culture, or even trying to identify safety risks and exposures is no simple task for an individual. These tasks flow much better when a group of people are assembled under an organized leader who stays on track and brings out the best in everyone. The greatest reward comes from collaboration, since the team can strengthen individual ideas. Even the best business leaders are not always the most intelligent people in the room, which is why they surround themselves with others to leverage each individual's talents. Many times, even a bad idea can trigger positive results and generate valued thoughts amongst the team.

Whether you are undergoing a brainstorming session or finalizing a product, surround yourself and take advantage of other's talent. As Helen Keller once said, "Alone we can do so little. Together, we can do so much."



**"ALONE WE CAN DO SO LITTLE.
TOGETHER, WE CAN DO SO MUCH."
- Helen Keller**