

ISSUE

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this issue

2011, Comes to a Close!...P.1

Leg Up on Crane Safety...P.2

Fuel Contamination Breakdown...P.3-4

On The Fire Scene...P.5

"Can You Name It?"...P.6

Professional Development

System Engineering And Laboratories (SEAL) offers CE classes in various forensic engineering subjects. To receive more information contact marketing@sealcorp.com.

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Frank Johnson, P.E., CSP
President / CEO

2011, Comes to a Close! 2012, Welcomes New Challenges...

System Engineering And Laboratories welcomes a new look for the new year.

The idea of the logo "look" came about as a answer to our national and international presence in the field of forensic engineering, while still paying homage to our roots and our 30 plus year history in Texas.

We celebrate this new year with you and look forward to providing superior engineering services.

Frank Johnson, P.E., CSP
President / CEO
Founder



OSHA Aerial Lift Inspection Guidelines

Pre-start Inspection

Prior to each work shift, conduct a pre-start inspection. Follow the manufacturer's recommendations and include a check of:

Vehicle components

- Proper fluid levels (oil, hydraulic, fuel and coolant);
- Leaking fluids;
- Wheels and tires;
- Battery and charger;
- Lower-level controls;
- Horn, gauges, lights and backup alarms;
- Steering and brakes, Lift components;
- Operating and emergency controls;
- Personal protective devices;
- Hydraulic, air, pneumatic, fuel and electrical systems;
- Fiberglass and other insulating components;
- Missing or unreadable placards, warnings, or operational, instructional and control markings;
- Mechanical fasteners and locking pins;
- Cable and wiring harnesses;
- Outriggers, stabilizers and other structures;
- Loose or missing parts;
- Guardrail systems.

What to Do While Operating an Aerial Lift

Fall Protection:

- Ensure that access gates or openings are closed.
- Stand firmly on the floor of the bucket or lift platform.
- Do not climb on or lean over guardrails or handrails.
- Do not use planks, ladders, or other devices as a working position.
- Use a body harness or a restraining belt with a lanyard attached to the boom or bucket.
- Do not belt-off to adjacent poles or structures while in the bucket.

Operation/Traveling Loading:

- Do not exceed the load capacity limits. Take the combined weight of the worker(s), tools and materials into account when calculating the load.
- Do not use the aerial lift as a crane.
- Do not drive with the lift platform raised
- Do not operate lower level controls unless permission is obtained from the worker(s) in the lift (except in emergencies).
- Do not operate an aerial lift in high winds above those recommended by the manufacturer.
- Do not override hydraulic, mechanical, or electrical safety devices.



Gary L. Jackson, P.E., CSP
Senior Consulting Engineer

Leg Up on Crane Safety.....

loading cranes, hydraulic cranes, off road and gantry cranes along with bridge cranes are all equipment involved in incidents I have investigated. Most crane incidents involve a dropped load and tip over, but I have seen several fatalities and significant failures from improper

lattice boom assembly and disassembly. Understanding the terminology and familiarity with the ANSI standards gives us a leg up on crane incidents.

The tip over scenario (probably the most common crane incident) occurs when the load (overturning) moment exceeds the stabilizing (righting) moment. Except for really old (or really small) cranes, the cab is fitted with a load moment indicator that will aid the operator with his lift. The load chart is the basis for determining whether a lift is capable with a particular crane. Structural failures of crane lifts are not as common as tip overs but can happen with improper rigging or using equipment that hasn't been properly maintained.

Climbing scaffold, delimeter, feller buncher, excavator, pallet maker, milk jug filler, recycled battery conveyor, alligator shears, scissor lifts, hay bailers, combines, forklifts and pallet jacks are some of the industrial and commercial equipment incidents I have investigated. These resulted in fires, amputations, serious injuries and fatalities; some were caused by user error, some were maintenance and modification related, and some were from bad design or defective parts.

Material handling equipment is responsible for approximately 80% of the effort involved in retail product sales; from harvesting or manufacture, too distribution and sale to the consumer. ☆





Brian Haygood, P.E.
Consulting Engineer

Fuel Contamination Breakdown?

If there is water in the fuel system, and the vehicle breaks down, is that a fuel contamination problem? How about particles of dirt in the fuel, or rust in the fuel? In this article, we'll discuss fuel contamination in general terms. In the next issue, we'll look at Dodge, Ford, and GM diesel trucks and explain why you have seen more fuel contamination claims in those particular vehicles, and what the manufacturers are doing about it.

Water will always be present in fuel. When fuel in the fuel tank is used, air is brought into the fuel tank. If a gallon of fuel leaves, a gallon of air has to replace it, or the fuel tank would collapse. Air contains moisture, or humidity. Just as dew forms on the grass after a cool evening, as the air inside the tank cools, moisture from the air will condense into water droplets that will end up at the bottom of the fuel tank. This can happen in the tanker truck that delivers the fuel, in the underground storage tank from which the fuel is sold, or in the vehicle's fuel tank. Pilots know all about this. Aircraft are usually filled up with fuel when they land so no air will be left in the tanks to cool overnight. Before each flight, fuel from the bottom of the tanks is drained and inspected so any condensed or contaminating water will be washed out.

Water can also enter the fuel tank more directly. In some vehicles (*see the next issue, where we will discuss them in detail*), the same vents intended to allow air to come in and out of the tank are very likely to pull in rainwater.

Since at least some water will be present in a fuel tank, the amount of damage it causes, if any, depends on how susceptible the fuel system is to water damage, and how successfully it filters the water out. The same

is true for dirt. At least a small amount of dust or a few solid particles can easily be expected to make it into the fuel. It is the job of fuel filters and water separators to clean the fuel.

What kind of damage can it do?

Water alone, and in small amounts, doesn't do as much harm as the things that go along with it. A large gulp of water through the fuel system may do nothing more than cause the engine to sputter or stall until the water has passed out the exhaust and fuel flow resumes. However, not all vehicles fare so well. Bacteria can grow in the fuel tank. These bacteria, which need the fuel to eat and the water to drink, typically grow into a fluffy off-white layer with water below them and fuel above them. In extreme cases of bacterial contamination, the bacteria colony can overwhelm the fuel filter and cut off the fuel supply to the vehicle. You'll know it when you see it, and it isn't pretty. Removal of these nasty bugs requires a bactericidal chemical





Symptoms of Diesel Contamination

- Frequent replacement of fuel filters and blocked filters
- Frequent cleaning or replacement of fuel injectors
- Total engine failure
- Premature wearing of rings and liners
- Excessive blow-by or oil consumption from worn rings
- Increased fuel burn - high fuel consumption
- Fuel discoloration: dark khaki color
- Fuel has bad odor: sulfuric smell of rotten eggs
- Black exhaust emission

Fuel Contamination cont'd

to be flushed through the system, and will likely require replacement of the fuel pump, accumulator, and other places where the infection can hide. Computers don't get actual viruses, but your truck can get a bacterial infection!

Contrary to popular belief, algae cannot form in fuel. Dark bits of debris are often described as algae, but no known form of algae can survive in a fuel tank.

Water also causes rust to form, as we all know. Many manufacturers use stainless steel or plastics for all of the components of a fuel system so the fuel won't get contaminated with rust particles. Those manufacturers that don't, make their vehicles susceptible to rust. Even if particles are filtered out of the fuel perfectly, relatively large chunks of rust can form downstream of the filter and clog injectors or, worse, keep the injectors from closing.

So, how much is too much?

When a vehicle is used regularly, only small amounts of water can condense into the fuel at any one time. When fuel filters are properly maintained, they should allow good fuel flow

while keeping dirt and water out of the engine. When a fuel system is made from rust resistant materials, and uses injectors that don't easily clog, a well maintained vehicle will likely never suffer fuel contamination. However, one massive dose of bacteria could ruin anyone's day. If a claim involves sudden engine failure that can be paired with a recent fuel fill-up and there is a large accumulation of water in the tank, particularly with a bacterial layer between the fuel and water, it might be time to look at the fuel station before whatever is in their fuel gets washed out (and sold to everyone else). On the other hand, you may be looking at a vehicle that likes a nice drink of rainwater now and then. Engineers at SEAL can help you spot the difference.

What happens then when a fuel system is built so that it drinks in water every time it rains? What if that system doesn't have the quality of filter on it that the fuel injector supplier told the manufacturer to use? What if that fuel system has parts made of plain old steel? How about injectors that are more susceptible to clogging or being stuck open? ☆

Tune in next quarter to find out...

This Quarter's Q&A

Q: Which Agency came first: OSHA or ANSI?

A:
The Occupational Safety and Health Administration is a federal agency within the U.S. Department of Labor that oversees safety practices in the workplace and in educational settings. OSHA was created in 1970.



The American National Standards Institute is a private, non-profit organization that creates quality and safety standards for a wide variety of products, including safety eye wear.

OSHA has adopted the safety eye wear standards established by ANSI for its regulations.

ANSI was originally established in 1918 as the American Engineering Standards Committee (AESC). It adopted its present name in 1969.



Gabriel Moreno, CFEI Proctor
Special Investigator

As a fire fighter and a fire investigator, I have the advantage of seeing a fire from two different perspectives. First, I see the fire in its raging fury from the eyes of a firefighter. Secondly, I see the fire as a trained fire investigator trying to determine the cause and origin of the fire, while digging through the debris to reconstruct the scene and find the heart and origin of the fire, two worlds collide, and it is the same whether it is a small kitchen fire or a house totally engulfed in flames.

Worlds Collide...



Firefighters are a breed all their own. Most of us are either descendants of firefighters or had the influence of other firefighters in our life. Firefighters are family oriented individuals, who take their duties very seriously. Their main duty is to save lives and property, if at all possible. As we are responding to a fire, a checklist is running through our heads. Is anyone inside the structure, if so where are they located, and what are their ages? Are there any other structures in danger, and what type of material composes the structure? Also, is it a commercial building or single or multi-story residence? Are there any overhead utilities, or anything to obstruct us from performing our duties? Is there a fire hydrant located by the structure, or will we need tankers brought in to provide us with an adequate water supply? Is the structure fully involved, or a smaller "trash can fire"? Finally, what direction is the wind blowing and can we

utilize the wind to our advantage to ventilate the home? These are just some of the questions that aid in our mission as firefighters. We arrive on scene with all the information given to us in route. Then, we do a quick walk around to check for hazards and we

get to work. We make entry into the home or building from the best point to save as much of the structure as possible. We ventilate the home by cutting a section out of the roof or breaking windows to keep the fire from

moving to areas not currently involved as we are making our way to the source of the fire. We knock down walls with the force of our fire hoses and move debris or throw appliances and miscellaneous items out windows all in an effort to put the fire out. Our only goal and concern is extinguishing the fire. ☆

Tune in next quarter for the other side of the story...



FCI: On The Fire Scene.

ISSUE INDEX

Consultant Issue #1,
August, Sept., Oct.,
2011

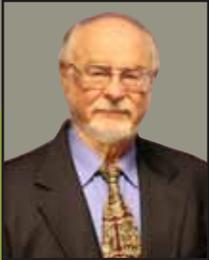
Consultant Issue #2,
Nov., Dec., Jan.,
2011-12

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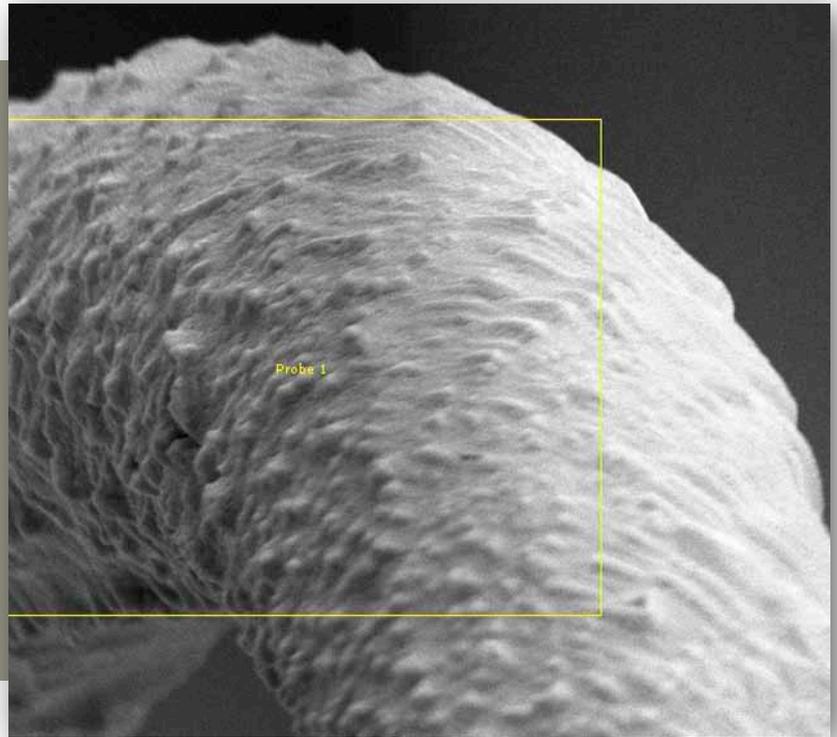


ANSWER to “CAN YOU NAME IT?”

No one was able to guess the mysterious object from last quarters issue. The hint was “Used everytime you drive your car?” and below is the answer.



Frank Johnson, P.E., CSP
President / CEO
Founder



It is an oblique view, magnified (1000x) of a used automotive tail light bulb filament. The tiny coiled filaments of the light bulb develop “bumps” on their surface after long periods of use. The “bumps” develop as a result of Tungsten (*Chemical symbol W*) atoms redepositing on the filament surface during operation. Analysis of auto filaments can often determine if auto lights were “on” or “off” at the time of an accident. The image was created using with one of our Scanning Electron Microscopes (SEM).

Occasionally, after a vehicle accident, a claim is made that the other vehicle’s lights were not operating. Light bulb analysis can at times confirm or refute the claim. ★

For more information on the subject contact us here at marketing@sealcorp.com

CAN YOU NAME IT?, returns next quarter!!

