



## THE FORENSIC ENGINEERING REPORT

I-ENG-A® [IN-JUH]

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### Equipment Hazards: *How Extreme Can it Get?*

The heavy equipment industry has created some incredibly effective equipment for earth moving, tree and brush clearing and site preparation during the past century, particularly over the past twenty five years. When compared to the days of mule and scraper before the radical and phenomenally successful earth moving equipment inventions by R.G. Le Tourneau, the efficiency improvements within this industry are truly remarkable.

These improvements have substantially increased the weight, volume and speed at which various site work tasks can be performed. Along with these improvements, however, often comes an increase in hazard exposure to equipment operators or bystanders.

During the course of the past two years we have provided comprehensive engineering assessment, code research and market survey with respect to a certain type of equipment used to knock down brush and small trees in large development sites. This equipment commonly referred to as brushcutters is available in three basic types. These types are:

- Flail (chains or cutters attached to a horizontal rotary drum often seen on road-side weed and light brush clean up)
- Rotary Bar (same principle as rotary lawn mower except much heavier duty for heavy brush and small trees)
- Rotary disk (very heavy duty rotating disk with cutter teeth, may masticate trees up to 18")

Our investigation came about as a result of an accident where the equipment operator was killed instantly by debris discharged from a rotary disk type brushcutter.



Rotary Disk Brushcutter

In this incident the rotary disk was angled in such a way that the debris ejection path was perfectly in line with the operator's cab. When the rotary disk came in contact with a piece of 1/2" steel pipe, the violent action of the rotary disk tore away a 19" long section of the pipe that was then discharged back toward the operator cab where it pierced a metal guard screen and the cab window, hitting the operator in the head killing him instantly.

In question following the accident was the sufficiency of the operator cab guard. In this case the guard was constructed of lightweight expanded metal.

This guard provided no effective protection for this type of incident. Our task was to determine what industrial safety codes, if any, were applicable to the guarding of the operator of this type of equipment.

We were also tasked with assessing the efficiency of the guard on the machine at the time of the incident and to search for a suitable guard that may have already existed on the open market.

With respect to code requirements we found that no code exists at either Federal



## EQUIPMENT HAZARD: HOW EXTREME CAN IT GET?

or State level that is directly applicable to this type of machinery. Further, we found that there is a code for guarding for distantly associated logging operations, however, the brushcutting using this type of machinery is inherently more dangerous and the code used for the screen guard that was on the machine at the time of the accident was woefully misapplied and inadequate for design of a guard that would have protected the operator.



**Metal Screen Guard & Window  
Penetrated by 19" Long Pipe**

Furthermore, we found that the safety instructions for use of the brushcutter with respect to guarding was vague, and though the instruction passed from the manufacturer to the wholesaler, to the equipment assembler, to the owner, through the hands of several parties, safety instruction was "lost in translation" by the time the operator started the machine and commenced his work. We, of course, could do nothing about the unfortunate death of the equipment operator in this incident.

However, we could look at the history of this event and come to the following observations and conclusions:

- The rotary head brushcutter is inherently extremely dangerous to both the operator and bystanders.
- Potential failure, such as disintegration of the rotary head and

failsafe use of the equipment should be examined in order to prevent a re-occurrence of this event or even a worse accident.

- No specific design of an adequate guard was provided, and worse yet, no specific design for such a guard is in existence today. There is a continuing need to conduct a detailed engineering analysis of the workings of the rotary brushcutter and its use. This analysis must result in effective design and construction criteria for guarding the operators and bystanders. The guard design is a logical responsibility of the brushcutter manufacturer whether he is the installer or this is done by others.
- The operation of this equipment is so inherently dangerous that use of the equipment should be halted until suitable guarding is developed, thoroughly tested and made commercially available.
- Safety instructions from the manufacturer should extend straight through to the equip-

ment operator. Issue of a vague safety manual to the operator with the expectation that he will fully understand the safe use of the equipment is not adequate to ensure safe operation of the equipment.

- A certificate of operator competency and equipment owner safety plan should be required prior to every set and use of the rotary brushcutter.

Ultimately, in conference with the case attorney, we provided more detailed recommendations for submittal to industry and state safety personnel in the interest of assuring a much higher level of safety to operators of brushcutter equipment.

Article by: TRNKA Engineers  
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For assistance with similar issues, visit [www.ienga.net](http://www.ienga.net) for member firm locations throughout the country. I-ENG-A provides its members with additional resources such as its online projects database for research to avoid cost duplication and provide timely reporting.

## COMEDY RELIEF CORNER

An engineer dies and reports to the pearly gates. Saint Peter checks his dossier and says, "Ah, you're an engineer...you're in the wrong place."

So the engineer reports to the gates of hell and is let in. Pretty soon, the engineer gets dissatisfied with the level of comfort in hell, and starts designing and building improvements. After a while, they've got air conditioning, flush toilets, and escalators; and the engineer is a pretty popular guy.

One day God calls Satan up on the telephone and says with a sneer, "So, how's it going down there in hell?" Satan replies, "Hey, things are going great. We've got air conditioning and flush toilets and escalators, and there's no telling what this engineer is going to come up with next."

God replies, "What? You've got an engineer? That's a mistake. He should never have gotten down there; send him up here."

Satan says, "No way. I like having an engineer on the staff, and I'm keeping him."

"Send him back up here or I'll sue."

Satan laughs uproariously and answers, "Yeah, right. And just where are you going to get a lawyer?"



## NSHTA AUTOMOTIVE DEFECT INVESTIGATIONS JUNE 2008

The summaries herein have been shortened. Please visit [www.safecar.gov](http://www.safecar.gov) or contact NHTSA for complete information concerning any of the below defect investigations.

**Date Investigation Opened :** June 4, 2008

Make: BLUE BIRD  
Model: VISION  
Year: All Years

Summary: FIELD INSPECTOR'S ARE FINDING HYDRAULIC BRAKE HOSES THAT ARE BEING CUT OR CRUSHED BY THE SHARP EDGES OF THE BUS BODY. THEY ALSO SUPPLIED INFORMATION ON ONE BUS THAT EXPERIENCED TOTAL BRAKE LOSS DUE TO THE BRAKE HOSE BEING CUT. FURTHER FIELD WORK CONDUCTED BY ODI HAS SUPPLEMENTED THE NUMBER OF COMPLAINTS TO A TOTAL OF EIGHT.

**Date Investigation Opened :** June 12, 2008

Make: CADILLAC  
Model: ESCALADE  
Year: All Years

Summary: IN RESPONSE TO AN INFORMATION REQUEST LETTER SENT BY THE OFFICE OF DEFECTS INVESTIGATION (ODI) DURING PRELIMINARY EVALUATION PE08-010, GM PROVIDED ODI WITH 41 ALLEGATIONS OF NON-CRASH ENGINE COMPARTMENT FIRES INCLUDING 16 ALLEGATIONS OF FIRES ORIGINATING WITH THE IGNITION IN THE OFF POSITION. ONE OF THE FIRES WAS DETERMINED TO BE CAUSED BY AN ARSON EVENT.

**Date Investigation Opened :** June 18, 2008

Make: PACE AMERICAN  
Model: TRAILER  
Year: All Years

Summary: BY A PART 573 LETTER DATED NOVEMBER 8, 2007, PACE AMERICAN (PACE) NOTIFIED NHTSA THAT CERTAIN 2003 - 2006 PACE CARGO TRAILERS WERE MANUFACTURED WITH DEFECTIVE WHEELS SUPPLIED BY TREDIT TIRE & WHEEL CO., INC (TREDIT). PACE'S REPORT CITED ONE WARRANTY CLAIM, AND STATED THAT THE DEFECT COULD CAUSE A WHEEL TO BREAK APART, DEFLATING THE TIRE AND RESULTING IN PROPERTY DAMAGE OR PERSONAL INJURY (BODILY INJURY).

**Date Investigation Opened :** June 18, 2008

Make: SATURN  
Model: L SERIES  
Year: All Years

Summary: IN A NOVEMBER 7, 2007 LETTER, GENERAL MOTORS SUBMITTED A DEFECT INFORMATION REPORT TO ODI CONCERNING THE RECALL OF APPROXIMATELY 20,500 MY 2001 SATURN L-SERIES VEHICLES WITH 2.2L ENGINES THAT WERE BUILT BETWEEN NOV. 2000 AND FEB. 2001 TO CORRECT A PROBLEM WITH TIMING CHAIN LINK SEPARATION (RECALL 07V-519, ODI INVESTIGATION EA06-009). TIMING CHAIN FAILURE COULD RESULT IN ENGINE STALL WHILE DRIVING WITH NO CHANCE FOR A RESTART.

## INVESTIGATIVE ENGINEERS ASSOCIATION (I-ENG-A) NATIONAL CONVENTION 2008

Mark your Calendars! The I-ENG-A network, an international organization of engineering firms offering forensic services and litigation support to the insurance industry and attorneys, has announced its preliminary plans for its 2008 national meeting to be held **November 12-14, 2008** in Dallas, Texas.

Tentatively, topics on the agenda include Engineering CAT Response, Expert Witness Testimony, Heavy Equipment Investigations, IE New Technology, Evaluation of Cleaning and Restoration, Human Factors in Accident Reconstruction and Vehicular Black Box Technology.

Vendors and other interested parties may contact the **I-ENG-A Association Headquarters** directly at **(800) 523-3680** for more information.

## TRAINING AND MENTORING SAVES THE INSURANCE INDUSTRY TRAVEL COSTS

The **Investigative Engineers Association (I-ENG-A)** holds a training seminar monthly for its member firms. All firms are required to attend and they are welcome to send others from their office for training at any time.

Training is provided to ensure consistency nationwide. Member firms learn procedures in responding to claims, methods for cost-effective investigations and report writing skills. All of this is aimed at providing insurance companies with the ability to offer accurate claims settlement. Technical topics covered include handling: lightning claims, hail damage, water losses, product liability analysis, fire investigation including boat and automobile cause and origin, accident reconstruction, slip and falls, subrogation, evidence handling procedures, marine losses and effective expert witness testimony.

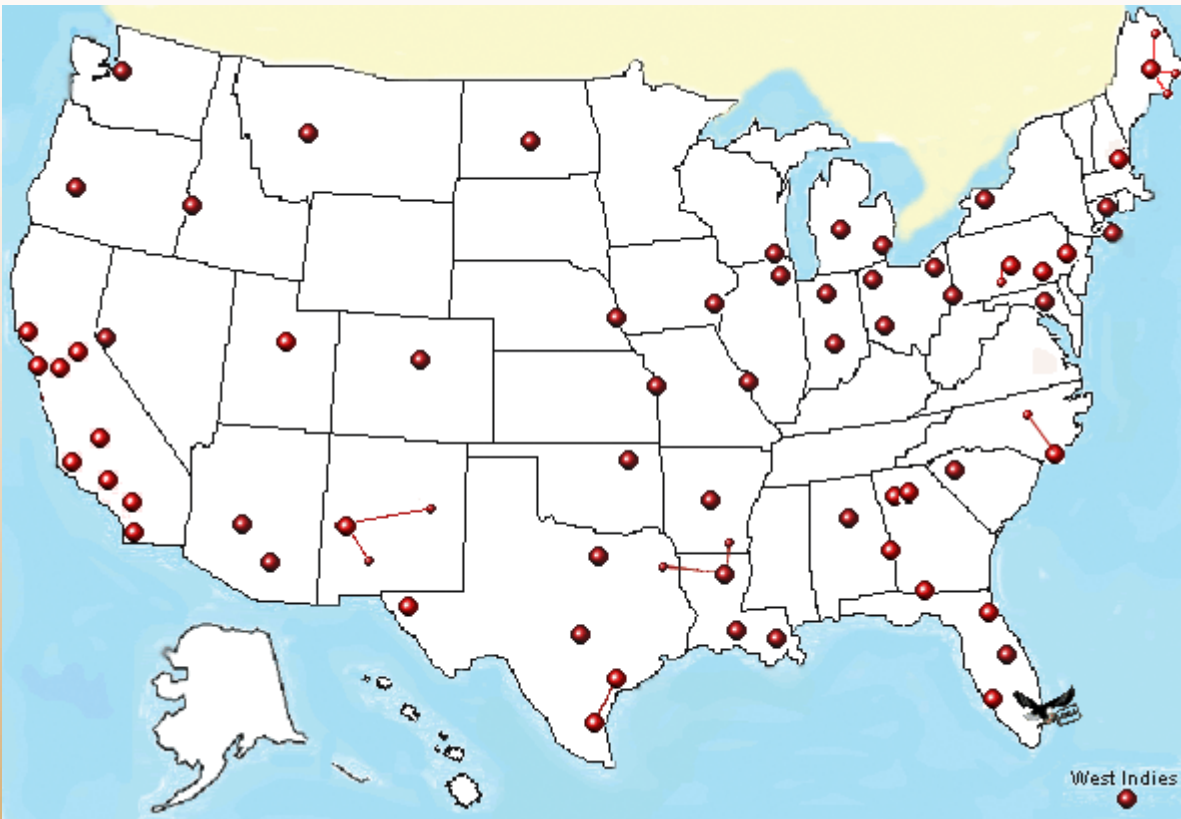
Member firms are also informed of the many tools available them as members of the network for research and mentoring. Experts and longstanding members with more experience are available to newer firms for report reviews and guidance as needed which helps to avoid costly travel. With today's technology, images and information can be shared, collaborated upon, and experts brought in on an as needed basis. Professional Engineers are trained in physics and can, therefore, apply many of the same principles by deductive reasoning across a broad spectrum of investigations.

The resources available through the I-ENG-A network are unmatched. This speeds up the investigative process while increasing the level of expertise available locally. This is why we can say, ***I-ENG-A, as a whole, is even greater than the sum of its parts.***



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THE PROPERTY AND CASUALTY  
INDUSTRY SINCE 1991**

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FORENSIC ENGINEERING  
[WWW.IENGA.NET](http://WWW.IENGA.NET)**



The Investigative Engineers Association consists of Professional Engineering firms providing thorough, timely and cost-effective investigations. Call (800) 523-3680 or visit our website for profiles of member firms, more information about the I-ENG-A Network, or to request investigations.

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The commentary contained in The Forensic Engineering Report is not intended, nor should it be relied upon, to replace specific professional advice. We recommend that readers consult their professional advisors regarding issues raised in this publication.