SINTRA
ENGINEERING INC

SPRING EDITION NEWSLETTER

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IN THIS ISSUE

BIOMECHANICAL RESEARCH

New Low Speed Impact Injury Symptom Threshold PUBLISHED

In a peer reviewed paper published in April 2005 at the Society of Automotive Engineers World Congress in Detroit, Sintra Engineering has redefined the injury symptom threshold for occupants involved in motor vehicle rear impacts.

Convention within the accident reconstruction industry has been to adopt a single threshold to define the point at which symptoms can be expected in a low speed collision. That threshold, represented as the change in velocity that a vehicle experiences during a collision, is 8 km/h. It was based on studies conducted in 1993 and 1994 that included a small pool of test subjects. Since that time, although considerable research has been conducted in the field, no attempt has been made to examine the validity of the 8km/h threshold.

Until now, that is. Entitled *Injury Risk Curves for Occupants Involved in Rear End Low Speed Motor Vehicle Collisions*, the Sintra Engineering paper is the culmination of a year and half of research. We undertook a statistical analysis of staged human volunteer and real world collisions and applied a biomechanical engineering risk curve to the data. The result is a prediction curve for when WAD I and II symptoms of any duration are expected from a particular change in velocity experienced in a rear end collision.

THE RESULTING INJURY RISK CURVE DEMONSTRATED A GOOD ABILITY TO PREDICT THE INCIDENCE OF SYMPTOMS OF ANY DURATION

Our paper establishes that what was once thought to be a simple injury symptom threshold - a change in velocity of 8 km/h - is better represented as a range: from 7.8 to 11.1 km/h with a 95% confidence interval. This means that within this range the likelihood of experiencing injury symptoms begins to switch from unlikely to likely. The range reflects the variability among individuals. Furthermore, at changes in velocity lower than 7.8 km/h, symptoms are not expected.

This threshold range is based upon a large sample that includes both human volunteer tests and real world collisions. All of the over 200 subjects represented in the data set were exposed to a single rear impact. The resulting injury risk curve demonstrates a good ability to predict the incidence of symptoms of any duration.

If you have any questions about these results or would like more information regarding the results of our study, please contact our Edmonton or Calgary offices.

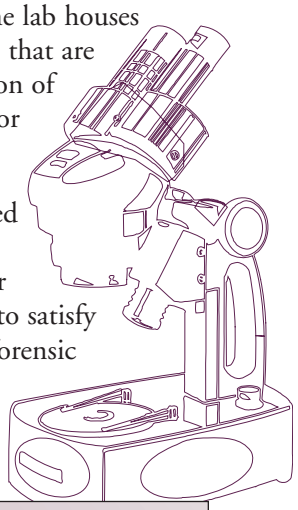
OFFICE NEWS

Edmonton Office Undergoes Expansion

Sintra Engineering's Edmonton facilities have expanded to ensure the highest level of service to our clients. Key parts of the expansion include a significantly enlarged evidence storage area, a training area for client seminars, a new lab area, and a new test/storage bay. The expansion increases the size of Sintra Engineering's Edmonton facilities to about 10,000 sq. ft. (located across the street from the downtown campus of Grant MacEwan College).
The expanded storage area provides almost 1000 sq. ft. of evidence storage for material from different types of investigation. Storage is provided at no charge (provided the item is part of an investigation) and all evidence is tracked in a database that records access to the storage facility. Any time evidence is removed from Sintra Engineering, change of custody forms are used to ensure the continuity of that evidence.

The new conference/training area allows for larger groups to have individualized training or meetings. The facility has multi-media capability and represents continuing development of Sintra Engineering's provision of training for its clients in areas of specific interest.

The lab features a collection of different tools and instrumentation that can be used for a wide range of investigations. Sintra Engineering has a comprehensive data acquisition system that can be used to collect data from staged crashes, record temperatures generated in burn tests, and measure forces applied to equipment in failure tests. The lab is also equipped with a 135 psi air supply that can be used to test equipment for leaks, asses the functionality of regulators or otherwise investigate the integrity of components. Our stereo microscope is connected to both a monitor and a digital camera, facilitating the examination of small components by more than one person at a time, as well as the recording and distribution of images in digital form. The lab is equipped with a separate electrical distribution system that allows us to test equipment under different electrical voltages (to simulate swells and sags). Finally, the lab houses DNA collection kits that are used for the collection of biological material for DNA comparison.



With these expanded facilites, Sintra Engineering is better equipped than ever to satisfy our clients' diverse forensic engineering needs.

CALGARY OFFICE GROWS
PROFILE OF DEREK BRANDSCHWEI

Sintra Engineering is getting larger... but there is no need to go on a diet! Our Calgary office welcomed Derek Brandschwei last October as our newest employee. Derek is a recent graduate from the University of Calgary's Faculty of Mechanical Engineering.

A steady increase in workload over the last year has warranted the new arrival. "Turnaround time on files is very important to us and our clients, so with an increasing workload, we needed to add another employee," said Mike Peck, the office manager.

Asked how he has adjusted to becoming the newest member of the Sintra team, Derek replied, "I've been interested in Forensic Engineering for awhile, so it's a great start to a career that I know I will love and find rewarding."

Derek has already learned a lot over the past few months and is managing many of his own files. "I've been able to meet several people in the industry already, and look forward to getting to know more of the clients we deal with on a regular basis," said Derek. Going from a university environment to a paying job has brought about some big changes for Derek but he has welcomed them with open arms. "If there is one thing that is similar to my university days, it's the game of cribbage at lunch!"

PROPERTY INVESTIGATION

Appliances - The Usual Suspects

As you read this article, you are probably surrounded by appliances and fixtures that could potentially cause a lot of damage. Admittedly, there are few cases of keyboards or electric pencil sharpeners bursting into flames or causing huge floods. But how often do we take for granted the smooth and trouble free operation of appliances like washers, dryers, and space heaters, not to mention the web of electrical wiring and fixtures in homes? That is where the Standards Council of Canada comes in. Probably one of the biggest reasons there aren't more appliance failures is that the Standards Council of Canada requires them to be manufactured to a particular standard.

The Standards Council of Canada has been around for over 25 years, and acts to develop standards for many different areas, including the safe and efficient operation of household appliances, especially ones that generate significant heat, or deal with large quantities of water. The Canadian Standards Association (CSA) is the council's right hand - they are responsible for developing many of the standards applicable to Canadian products. They also test and certify products to identify to consumers that they have been produced to a certain standard. If you turn over just about any appliance in your home, you are apt to see the CSA label looking back at you. But CSA is not the only organization that develops standards and certifies products. Chances are, if you did not find a CSA symbol on that appliance you just turned over, you will find an Underwriters' Laboratories (UL) label. Under the Standards Council of Canada, there are several bodies that can provide certification of products. Fittingly, the different certification companies must conform to a standard of quality for Certification Bodies.

These designations are very important to us as forensic engineers for finding out what requirements a product must conform to. Think of them like building or plumbing codes for pre-manufactured products. Anyone can identify the need for a new standard and once the need is identified, the responsible organizations form a committee of people from that industry, government, academia, and public interest groups. The standard is drafted and voted upon and, if accepted, represents rules for just about anything from manufacturing processes to required appliance safety devices. There are limits, however, to how useful these designations are when the standards are applied.

You may have noticed that it is rare to see both a UL and a CSA marking on a product. The testing at UL or CSA is paid for by the manufacturer of the product. The testing is expensive and generally manufacturers want to spend as little money as possible in the manufacturing of their products. To get the designation, the manufacturer submits appropriate technical documentation and a prototype of the product to a certified testing laboratory. The product is then tested to determine whether it meets the relevant standards, as determined by the type of product and the market in which it is intended to be sold. Although the requirements vary for different types of products, the goal is basically the same: to help ensure the product complies with local codes and regulations. Production facilities are also inspected regularly to ensure that they continue to comply with the standards.

So, although the certified testing laboratories are well equipped and familiar with the various product standards, they ultimately work for manufacturers. When they discover defects, representatives from CSA do not convey the results of their testing to consumers, but only to the manufacturers. As a consequence, you will never get information that would be helpful in pursuing a claim against a manufacturer. Often, insurers send the CSA damaged components, but those components are neither returned nor commented upon. The people at CSA appreciate the components because it assists them in the assessments and improvements of products being manufactured. But being nice to them will probably not be particularly helpful in figuring out the cause of a failure.

ACCIDENT INVESTIGATION

Like a Deer in the Headlights

Animals can play major contributory roles in motor vehicle collisions. Whether it is a large animal, such as a deer or a moose crossing a highway, or a loose dog crossing a residential street, drivers are often forced to make quick decisions in order to avoid a dangerous impact. From an insurance/legal perspective, one of the predominant issues in animal impact claims involves gathering evidence to support or refute a claim that an animal caused or contributed to a motor vehicle collision. An engineering investigation can help determine what role, if any, an animal played.

In most cases, smaller animals such as dogs, cats, rabbits or birds do not pose a direct threat to the motorist simply because the motor vehicle has a much greater mass than the animal. However, collisions with larger animals such as moose and deer can result in devastating damages. When a car strikes a relatively tall animal, it usually contacts the animal in its legs, which causes the body of the animal to rotate, slide along the hood and strike the windshield. The forces are often great enough to cause significant intrusion of the animal's body into the occupant compartment. Simultaneously, the collision forces experienced by the occupants can propel them forward, bringing their upper bodies closer to the windshield. The combination of these two reactions is often deadly.

In many cases, the evidence of an animal impact is obvious. If an animal is struck and killed by a vehicle, police or emergency crews attending the scene may find and document the existence of an animal carcass near the collision took place. Even if the presence of an animal carcass was not documented, there may still be evidence in the form of hairs or other body tissues located either on the vehicle itself or on the roadway surface, deposited as the animal tumbled from the point of impact into the ditch. In other cases, roadway surface markings may indicate that the vehicle left the roadway in a manner that was inconsistent with steering input from the driver but consistent with a collision with an animal.

Due to the nature of the evidence, it is critical that the investigator have timely access to as much information as possible. To that end, the vehicle(s) involved in the collision should be examined promptly so that any hair or blood samples from the exterior of the vehicle can be collected. Similarly, the site should be examined as soon as possible in order to identify any animal hair, blood deposits, carcasses or animal tracks leading to the collision area.

With a thorough and prompt investigation, an engineering analysis can determine how an animal contributed to a collision. Depending on the available information, it may also be possible to determine the speed of the vehicle when it struck the animal, the driver's perception-response time, the evasion potential for the collision and, with the aid of a visibility study, when the animal may have been visible as a hazard.

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