Rollover Prevention Devices

April 24, 2014

Fort McMurray, AB
Common gap on mandatory elements in Shell’s 7- Pillar Road Transport Assessment.

“Has there been a risk assessment completed to determine whether the vehicles require a roll over prevention system? If a risk assessment determines that the vehicles require a roll over prevention system, do all vehicles have such a system?”

- Expectations for Risk Assessment
- Active and Passive roll over prevention systems
# Rollover Risk Assessment

1) Have you had a rollover incident in your fleet within the last 5 years?  
   - Yes (10 points)  
   - No (0 points)

2) Do you haul a product that if properly secured will not affect the stability of the vehicle?  
   - Liquid w/o baffles 10 points  
   - Liquid with baffles 5 points  
   - Secured commodities 0 points

3) Are the vehicles equipped with IVMS and is the information collected used in coaching driver behaviour?  
   - No (10 points)  
   - Yes but coaching is inconsistent (5 points)  
   - IVMS and regular coaching (0 points)

4) What is the road type the majority of travel will occur on?  
   - Unmaintained bush road (20 points)  
   - Maintained bush road (15 points)  
   - 50/50 bush roads and paved hwy (10 points)  
   - 100% paved or government maintained roads (0 points)

5) Are the roads used controlled for speed compliance?  
   - No (10 points)  
   - Yes (0 points)
6) Are the trailers or tanks designed to have a lower center of gravity when loaded? Center of gravity is less than or equal to track width (width between centre of duals side to side) when loaded.

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No (10 points)    Yes (0 points)
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7) Do the trailers have stiff suspension systems?

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Air ride (10 points)    Spring (0 points)
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8) Are vehicles equipped with ABS?

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No (10 points)    Yes (0 points)
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9) Do all drivers have a minimum of 3 years experience operating the type of vehicle concerned?

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No (10 points)    Yes (0 points)
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10) Have all drivers received defensive driving training within the past 2 years?

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No (10 points)    Yes (0 points)
```
### Rollover Risk Assessment

**11) Is rollover prevention training provided to all drivers?**

<table>
<thead>
<tr>
<th>No (10 points)</th>
<th>Yes (0 points)</th>
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</table>

**12) Do you have a fitness to work program in place which includes fatigue management?**

<table>
<thead>
<tr>
<th>No (10 points)</th>
<th>Yes (0 points)</th>
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</thead>
</table>

**13) Do you operate in winter driving conditions?**

<table>
<thead>
<tr>
<th>Yes (10 points)</th>
<th>No (0 points)</th>
</tr>
</thead>
</table>

**14) Do you use Journey Management to assess and control for driving hazards?**

<table>
<thead>
<tr>
<th>No (10 points)</th>
<th>Yes (0 points)</th>
</tr>
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</table>
# Rollover Risk Assessment

<table>
<thead>
<tr>
<th>Question</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Question 1</td>
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<td>Question 2</td>
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<td>Question 3</td>
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<td>Question 10</td>
<td>Points</td>
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<td>Question 11</td>
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<td>Question 12</td>
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<td>Question 13</td>
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<td>Question 14</td>
<td></td>
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<tr>
<td>Total</td>
<td></td>
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</tbody>
</table>

60-150 points: Rollover prevention system is required  
30-60 points: Rollover prevention system recommended  
0-30 points: Rollover risk is tolerable and prevention system is not required
Rollover Prevention Device – Passive System

- Capacitive accelerometer sensor
- Wireless transmission
- Receiving unit
- Lateral stability indicator
Strengths of RWD

- Simple, low-cost device.
- Can be retrofitted on existing vehicles.
- Influences driver behaviour positively.
- Calibration specific to the type of trailer used.
- Acceleration sensor is installed where rollover normally starts.
- Ability to monitor drivers behaviour through vehicle data analysis.
- Reckless drivers may be more easily identified and appropriate corrective measure can be taken.
- Hazardous spots can be better identified (cross-check with existing GPS data.)
- Eventually a smoother driving behaviour will result in lower fuel consumption and less maintenance costs.
Challenges

- Not an active system (i.e. does not activate the braking system)
- Not currently integrated with other devices (e.g. GPS, IVMS, etc…)
- Drivers may adapt their driving to the high amber thresholds, if monitoring is not done.
- It will be replaced by the new EBS systems in the long term.
Examples of data analysis

Load and analyse data (overview)

Report

Rollover Warning Device

Number of exceedances of 1st threshold (Warning) 2
Number of exceedances of 2nd threshold (Danger) 1
Time exceeding 1st threshold (Warning) 6 seconds
Time exceeding 2nd threshold (Danger) 0.5 seconds
Max. lateral acceleration has exceeded the "Danger" threshold by 7.6%

Bertocco
Rollover Prevention Device – Passive System

The RWD is now available for fleet operators to order through Bertocco. The device can be fitted within hours on road tankers of any type, shape, configuration or age, and is relatively inexpensive.

- Units will cost apx. 500 Euro each.
- Installation is very easy and can be done in less than 1 hr.
- Bertocco has installation procedures ready to apply.

http://fleetowner.com/trucking_around_world/archive/shell-chemicals-rollover-prevention-0831
Electronic Stability Control – Active System

- Systems are now available from the most major truck/tractor manufacturers
- Video of 2 examples can be found at the following links:
  - [http://www.youtube.com/watch?v=l6JRm9jAiog&](http://www.youtube.com/watch?v=l6JRm9jAiog&)
  - [http://www.youtube.com/watch?v=DFbBRVUFCLo](http://www.youtube.com/watch?v=DFbBRVUFCLo)
ESC PREVENTS

• 40% of single vehicle crashes
• 43% of all crash fatalities
• 56% of single vehicle fatalities
• 80% of rollover fatalities

ESC saves lives

<table>
<thead>
<tr>
<th>FATALITIES</th>
<th>BC</th>
<th>CANADA</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005 Fatalities</td>
<td>460</td>
<td>2923</td>
</tr>
<tr>
<td>ESC could save</td>
<td>197</td>
<td>1256</td>
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</tbody>
</table>

Insurance Institute of Highway Safety - 2006

ESC could save 43%
<table>
<thead>
<tr>
<th>SAFETY DEVICES</th>
<th>LIVES SAVED</th>
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</thead>
<tbody>
<tr>
<td>Seatbelts</td>
<td>1,457</td>
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<tr>
<td>ESC</td>
<td>1,256*</td>
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<tr>
<td>Side Door Beams</td>
<td>994</td>
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<tr>
<td>Steering Columns</td>
<td>266</td>
</tr>
<tr>
<td>Front Air Bags</td>
<td>247</td>
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</tbody>
</table>

*ESC could prevent 43% of 2923 fatalities
ESC Endorsements

- Transport Canada
- Canadian Automobile Association
- BC Automobile Association
- Canada Safety Council
- Canadian Association of Road Safety Professionals
- BC Forest Safety Council - Trucksafe
- BC Safety Council
- RoadHealth
- Insurance Corporation of BC
- BC Wildlife Collision Prevention Program
- United Nations
- National Highway Traffic Safety Administration (US)
- Insurance Institute for Highway Safety (US)
- Federation Internationale de l’Automobile (Europe)
- Swedish National Road Administration
- UK Department of Transport
- Australian New Car Assessment Program
- Consumers Union (US)
- …and many others
Rollover Prevention Training

- In order to continue reducing the number of rollovers on our path to goal zero Shell has implementing a Rollover Intervention Training Program.
- The course is approximately 20 minutes in length and taught online through the contractor portal website. This is the same website that all drivers currently take their online orientations for Shell.
- The link is [www.contractorportal.ca](http://www.contractorportal.ca) the driver can use the same login that they created for the Upstream America’s (UA) and Heavy Oil (HO) orientations. The course is named “Vehicle Rollover Intervention Program”. New users will have to register.