

PREVENTION OF ARTIC TRAY ROLLOVERS –

“working together to find
solutions”

Kevin Ball
EHS Manager
Penrith Lakes
0409 066 656
kevin.ball@pldc.com.au
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Site History



- Date: 15/1/04
- Vehicle: Caterpillar 740
- Injuries: none sustained
- Damage: nil
- Synopsis:
 - occurred when reversing over uneven ground
 - Did not feel the tray lifting

Site History



- Date: 23/3/06
- Vehicle: Caterpillar D300
- Injuries: none sustained
- Damage: nil
- Synopsis:
 - Travelling too fast through a winding section, was skidding towards a sign post and over corrected

Site History



- Date: 20/7/06
- Vehicle: Caterpillar D300
- Injuries: none sustained
- Damage: nil
- Synopsis:
 - Tried to avoid pothole by correcting at the last minute

Site History



- Date: 7/3/2007
- Vehicle: Volvo A30
- Injuries: none sustained
- Damage: nil
- Synopsis:
 - Was travelling too fast
 - Tried to avoid pothole?

Post Events

Brainstorming yielded the following possible controls:

- Lengthen acceleration and deceleration zones
- Review the potential of fitting an out of level alarm system on the trays
- GPS speed monitoring system
- Road Maintenance – keep a closer eye on conditions of minor roads
- Reduce speed limit on eastern tailings pond haul road from 30 to 25 km/h.
- Review authority to work in areas with multiple coinciding activities
- Speed limit all Artic's to 40 km/h
- Review operational aspects – can other equipment be used in medium to high risk areas
- Training plan – needs to developed describing minimum levels to be achieved (i.e. levels required for Grade 1, 2 and 3 operators)

Post Events cont.

Brainstorming yielded the following questions for OEM's:

- Centre of gravity (CG) – are there major differences between 30 & 40 tonne units
- Load limiting – look at reducing load sizes if CG between units is significant
- Dual rear wheels – can stability be increased by fitting dual rear wheels
- Rear wheelbase – can rims be offset to increase track width and stability
- Water ballast – can stability be increased by adding water to wheels
- Steering ratio – review potential of reducing sensitivity of the steering
- Speed alarms – can multiple point speed alarm systems be fitted to older units
- Driver response training – on how to handle machines in varying conditions

Speed Review – 10 km/h



Speed Review - 20 km/h



Speed Review – 30 km/h



Speed Review - 35 km/h



Electronic Stability System

In Cabin Alarm System employs:

- 2 stage tray alarm
- Self-check diagnostic on start up
- Visual lighting system
 - Green – active
 - Orange – Check slope
 - Red – Do Not Tip
- Audible alarm system
 - Check slope – Loud
 - Do Not Tip - LOUDER



Electronic Stability System

System Specifications:

- Monitors G-forces in all conditions
- Can adjust levels using a laptop in 5 minutes
- Can download data with proprietary software
- Robust in design
- Locally supplied
- 3 days delivery, 1 day to fit
- Cost Approx. \$3900
- Can be fitted to other machines



Electronic Stability System

Feedback

- Real time feedback, driver is alerted as soon as a condition is reached
- Owners and Operators believe there is less risk of rollover since the system has been employed
- Smoother equipment operation, due to reduced speed and less harsh braking when entering and exiting corners or driving over uneven terrain
- Conservative approach to driving prevents alarms from sounding:
 - A driver with 20 years experience, modified his driving technique, resulting in driving less aggressively and reduced production losses
 - Another driver who had been driving for only two months, had no choice but to drive more slowly, as the alarms annoyed him so much
 - Contractor dry hired a unit, the unit became bogged and the alarm was so annoying (due to the tray being out of level), they consulted with the head contractor rather than inflicting damage due to a hasty recovery

GPS Speed Monitor System

In Cabin System employs:

- Hidden under dash module
- Back to base monitoring
 - Via a inbuilt mobile phone module
 - Using a standard PC
 - Proprietary software to manage fleet movements

GPS Speed Monitor System

System Specifications:

- Back to base monitoring via the provider
- Comprehensive reporting system:
 - max, av, min speed
 - fuel usage
 - braking forces
 - Water, oil, trans pressure
- Supplied from Melbourne
- 2 weeks delivery
- 1 day to fit
- Cost Approx. \$5000
- Can be fitted to other machines

GPS Speed Monitor System

Feedback

- Able to monitor downtime of machines, when and where speeding was occurring (particularly straight after start up)
- Strong fleet (including individual machines) monitoring package
- Feedback to base station is 3 minutes after the fact, therefore not real time
- Requires someone to monitor PC at base and produce reports
- Drivers do not receive real time feedback (it is communicated at the end of a shift via a report), therefore, they felt like big brother was watching them
- Reports need to be sent via fax etc if running remote or multiple sites
- If PC not at site, then monitoring personnel are not aware of site based conditions and cannot make a direct judgement on data
- Data relay costs were \$30/month/machine

Speed Control System

In Cabin System employs:

- Supervisor sets and locks maximum speed limit
- Test Function
- Visual alarm system
- Audible alarm system
 - Will deploy when speed limit is reached
 - Will not disengage until speed is reduced



Speed Control System

System Specifications:

- Currently 2 set Speed options:
 - 20 km/h
 - 40 km/h
- Locally supplied
- 2 - 3 days delivery
- 3 – 4 hours to fit
- Cost Approx. \$900
- Can be fitted to other machines
- Additional speed modules can be fitted (i.e. 30, 60 km/h)



Speed Control System

Feedback

- Real time feedback, driver is alerted as soon as a condition is reached
- As the Supervisor selects the speed vehicles can travel at (based on operating conditions), the lower speeds have resulted in:
 - Reduced braking effort when entering and exiting corners or driving over uneven terrain
 - Less wear and tear on equipment
 - Better reaction time for operators to adapt to conditions
- Audible alarm sounds when pre-set speed has been met
- Reduced damage to haul roads, especially in wet conditions
- Possible tyre savings by reducing speeds on to suit conditions
- No complaints received to date with respect to drivers travelling at 40 km/h in 60 km/h zones, as duration on main haul routes has been minimal

Questions?

- Thanks for your time
- Q&A
- Contacts:
 - Electronic Stability System (ESS)
 - Andrew Gent – 0418 276 455
 - Speed Control System (FRED)
 - Daniel Galea – 0415 119 576