

# NAFLIC

*National Association For Leisure Industry Certification*

## Standards & Related Documents Committee

### TECHNICAL BULLETIN - MARCH 2002

#### 229. Roll Forward

We are grateful to G K Thornton for informing us of an accident at the end of May 2001 involving a Ghost Train car manufactured by Modern Products.

The drive from the motor was transmitted via a chain drive and differential gear to two half shafts. The wheels were driven from their respective half shafts via individual chain drives. The design relied on the braking effect of the overrunning motor to limit the acceleration of the car when travelling forwards downhill. The car had a ratchet to stop roll back but no secondary protection against forward runaway.

The drive chain to the left hand wheel had been rubbing from new and had eventually worn the split link to failure. Once the left hand wheel was free to rotate unchecked and, bearing in mind the differential gear, there was no longer any braking from the motor and the car accelerated down hill to a sharp bend.

It is to be noted that this design arrangement allowed runaway if failure occurred in any of the three chain drives.

Designers and Design Review Inspection Bodies are very aware of anti-rollback arrangements, but this accident reminds us not to forget risks associated with runaway in the forward direction. Multi-level ghost trains and monorails with forward inclinations may possibly be affected. Derailment has to be considered but negotiating bends at higher speeds than normal is also one of the important hazards that needs to be assessed if the risk of primary failure is significant and protection against runaway is not provided in the design.

Committee Members :- Dr Garry Fawcett (Chairman), Mr Richard Barnes, Mr Peter Smith, Mr Ian Grant, Mr David Geary, Mr Steve Parker, Mr Eddy Price and Mr Mike Preston

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