

Lightrailanday

Copenhagen

08 November 2011

How to provide safety in rail transportation systems

Findings from 10 years of rail accident investigation

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Content

- What is safety ?
- Some proven rules
- Safety relevant incident \Leftrightarrow accident
- Investigation
- Practical examples

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Martin Will

- Consulting engineer
- 9 years head of rolling stock dept.
- rail vehicles / maintenance / power supply
 - international projects
 - assessment of market value / residual value
 - accident investigation

How to provide safety in rail transportation systems

What is „Safety“ ?

Absence of unacceptable risk

- to kill or injure persons
- to destroy or damage material values

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Safety

is not static but

- develops continually
- depends on national sight
- depends on public judgement

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E.g. working safety in Thailand

Bangkok Metro vehicle workshop ...



ห้ามสวมรองเท้าแตะ
NO SLIPPER

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Practical approach for
new light rail systems

Apply proven rules

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Proven rules available in Germany:

„Eisenbahn-Bau- und Betriebsordnung“
(EBO) for railways

„Strassenbahn-Bau- und Betriebsordnung“
(BOStrab) for light rail

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BOStrab

- is a legal ordinance issued by the German Minister of Transport
- is a framework of main technical parameters and interfaces
- doesn't cover too many technical details

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BOStrab is completed

- by „Technical Rules“
e.g. „Technical Rules for Brakes“
- by „VDV Recommendations“
and „VDV Notes“

providing technical details

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BOStrab already is applied in other countries e.g.

- Denmark (Metro Copenhagen)
- Norway (Bergen Light Rail)
- Turkey (Bursa and Adana Light Rail)
- ...

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... and it also works the other way:

Even in Germany foreign rules are applied:

Swiss rules for rack railways are applied
for all four German rack railway systems

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The rules should comprise

- staff
- infrastructure
- rolling stock
- operation
- interfaces between these fields

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Staff

- According to BOStrab the Operations Manager („Betriebsleiter“) is responsible for **overall safety**.
- He has to pass special training and examination
- He has to delegate work in a qualified way

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Staff

Qualified delegation of work consists of

- choosing (criteria for choosing)
- training (content of training)
- testing (check real outcome of training)
- supervision (check actual work from time to time)
- further training (update knowledge)

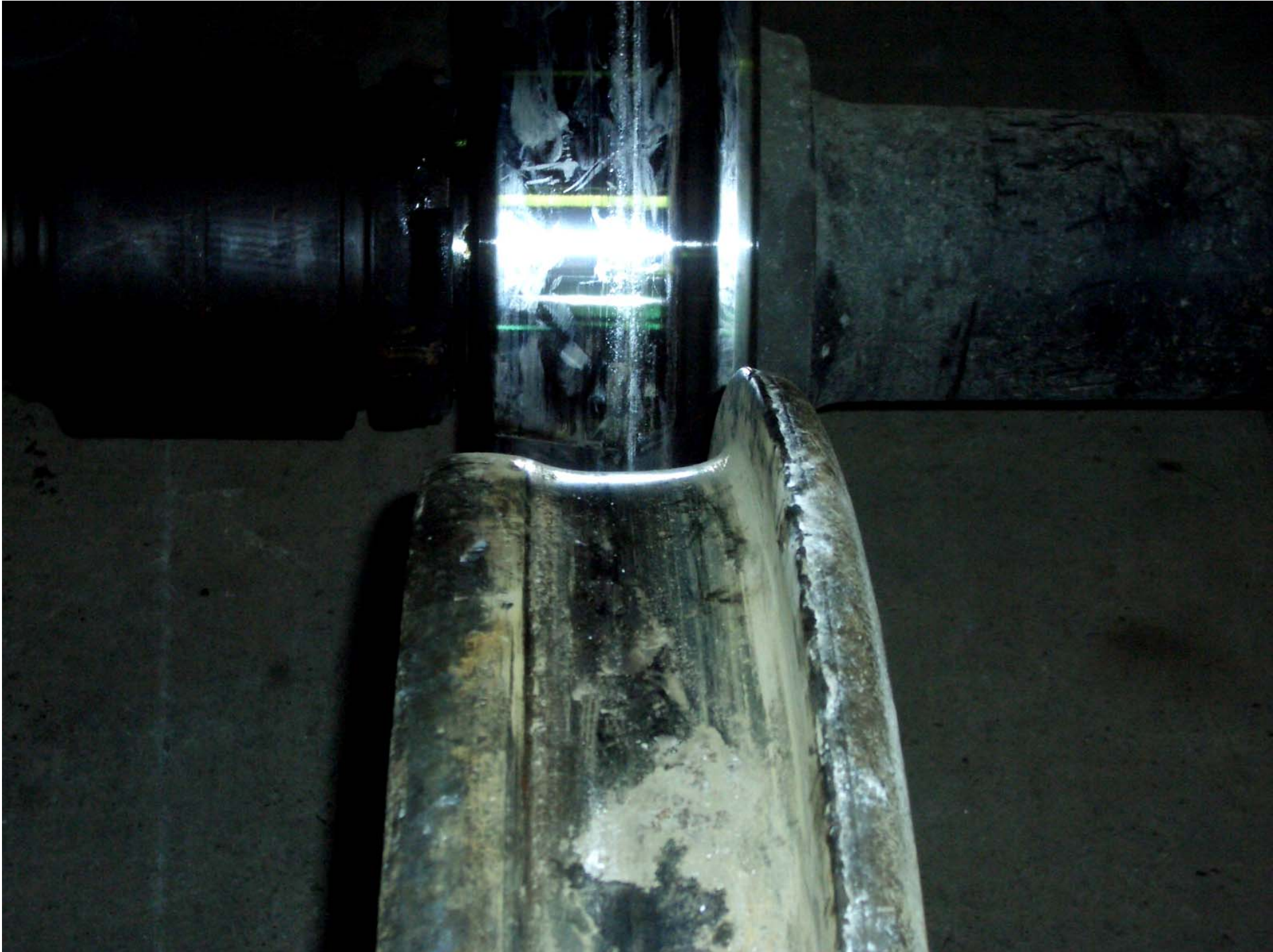
of your employees. Documentation !

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Infrastructure and rolling stock

- design
- construction
- maintenance

Documentation is essential.



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Interfaces between infrastructure and rolling stock

- e.g. track – vehicle
- pantograph – overhead wire

The operations manager is responsible to manage these interfaces as well.





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Operation

- rules (e.g. driving, braking, speed)
- signals
- timetables
- communication
- ...

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Main differences between heavy rail and light rail

relevant for accident investigation:

- speed
- driving on sight / operational rules
- braking behaviour / braking distances

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Accident investigation

Safety-critical incident \Leftrightarrow Accident

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Safety-critical incident

A safety-critical incident is always
a violation of at least one rule

e.g. passing a red signal
without permission

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Safety-critical incident

The consequences of a safety-critical incident depend on actual conditions

- a) no further consequences („good luck“)
- b) injuries or damage = accident

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Visible consequences (= accidents)
are only the top of the iceberg.

Qualified investigation demands
examining any safety relevant incident
regardless of the consequences.

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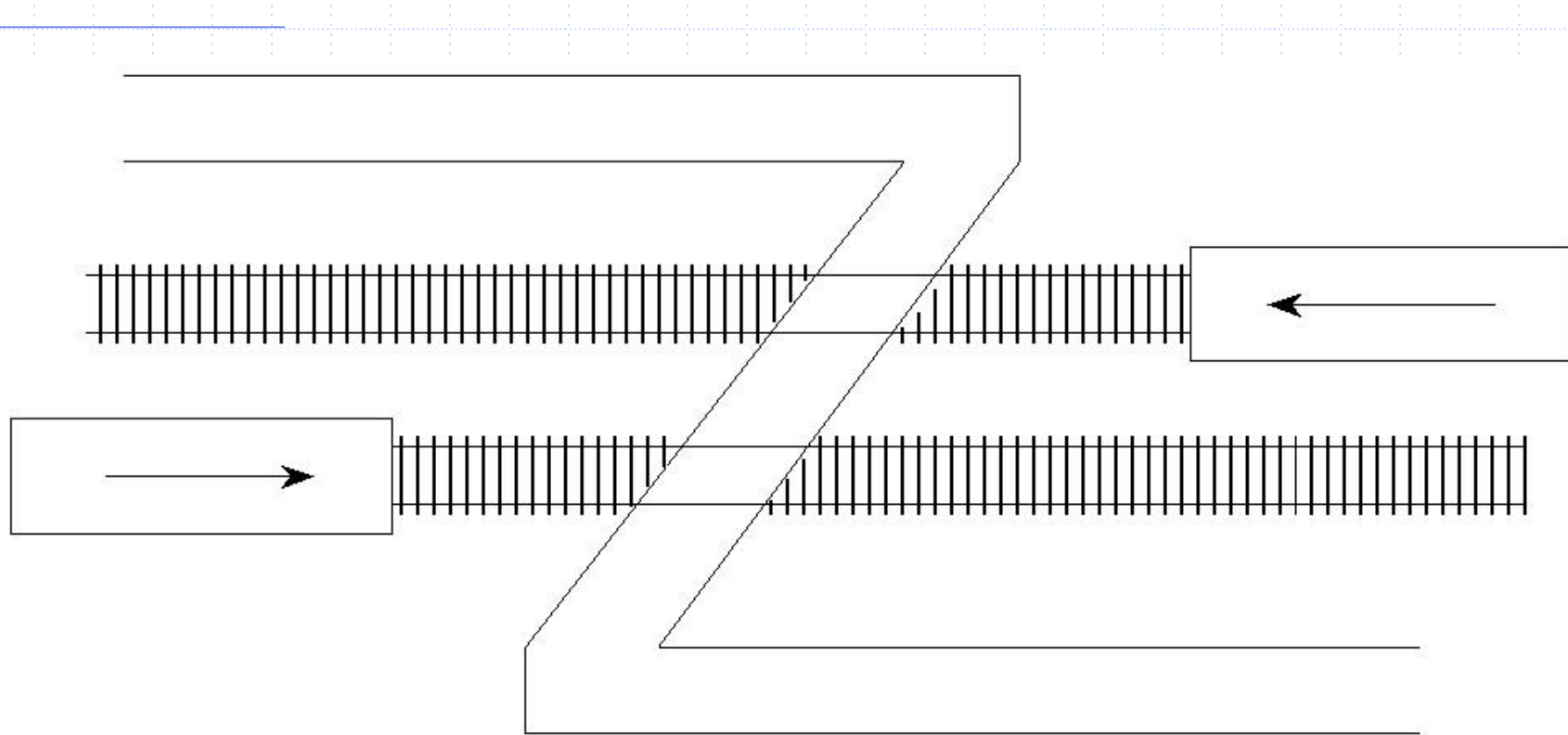
Injuries / fatalities in light rail systems

- only few victims inside the rail vehicle

Majority:

- pedestrians and car drivers crossing the rails at wrong time and wrong place
- misconduct of the victims

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"Z"-Crossing for pedestrians

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Most common reasons for derailments in light rail systems

- position of switches
- collision with road vehicles
- slanting collision with rail vehicles
- objects on the track

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Reduce accidents = increase safety ?

- ⇒ report and document any safety critical incident
- ⇒ find out the **real** reason
- ⇒ install remedial measure

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The **real** reason for an incident:

- A driver passes a red signal
- Investigation shows: He was sleepy
- Why was he sleepy ?
- Private problems ?
- Resting time since last shift ?

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Attention

Up to now one company and one „Betriebsleiter“ were responsible.

In case of outsourcing maintenance or driving, responsibility for supervision and installation of remedial measures should be clear





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Thanks for your attention

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Public appointment and adjuration as authorized expert on “Technically safe condition of rail vehicles and accident investigation” by the Chamber of Industry and Commerce, Stuttgart, Germany (2009)