

Welcome

- Tijmen Molema
- Liftinstituut: NOBO and AECO:
 - Worldwide Certification partner
- Product Specialist Certification
- Specialized in the IEC – 61508
 - Electronic safety

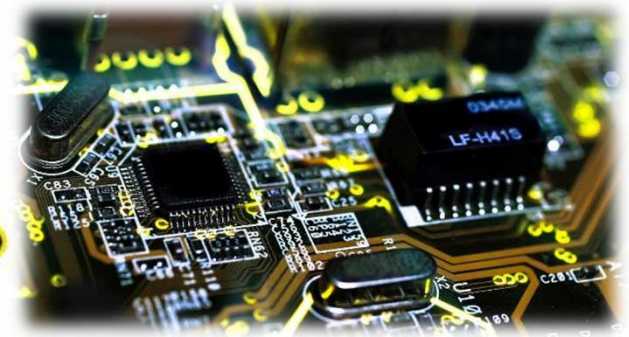
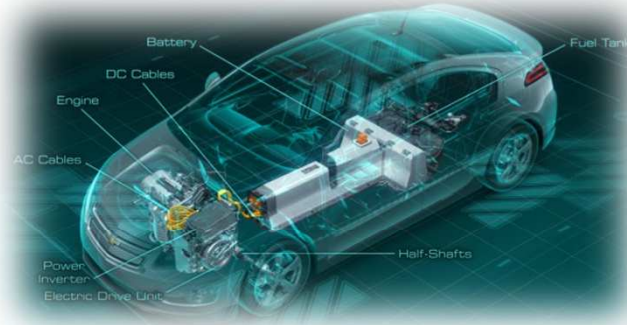
This presentation

- About **P**rogrammable **E**lectronic **S**afety **S**ystems: **PESS**
- Involves some new technology's,
- Sharing our experience of last years
 - Of course, Safety is the base line



- ...Is full of electronics
- ...Is connected to a network
- ...Self Diagnoses for any faults
- But can all this “touch” the safeties?

World v.s. Elevator



The modern lift

- Programmable **E**lectronic **S**afety **S**ystems: **PESS**
- Electronic components / Software make safety decisions
 - Cheaper
 - Faster
 - More flexible
 - Safer?

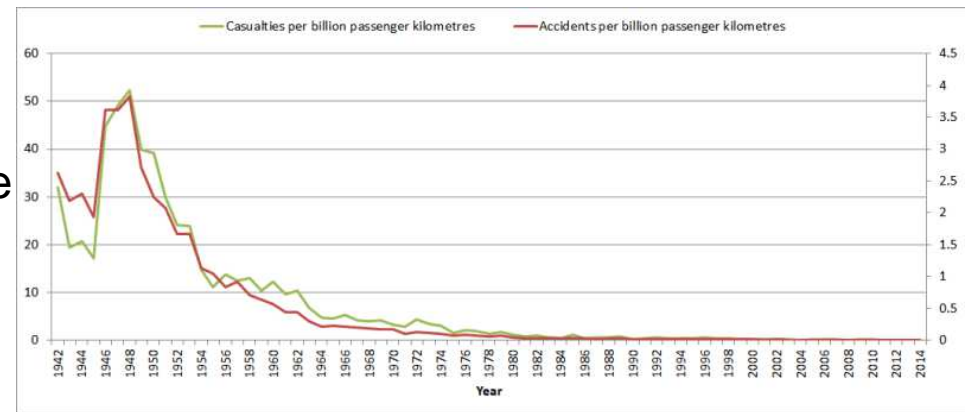
...Show with an example..

Example: overspeed gouvenor

- **Cheaper**
 - Electronics are very price competitive
- **Faster**
 - Detection in software, no “teeth” on governor which cause delay
 - Can also act on Jerk (v^3)
- **flexible**
 - Only 1 model needed for multiple speeds (configuration)
- **Safer?**

Other markets with PESS

- Self driving cars
 - Google: 2,1 million km driven before first accident
- Planes
 - More and more computers:
 - Hence, no good comparison possible
- For lifts, no data available



Trouble in paradise

- New technology's give new problems
 - Some due to minor understanding
 - Lift-cultural problems
 - Mixing of old and new thinking

UnderstandingLift culturalOld and new

Project planning

Old and new

- Normal projects: first drafts and end product differ a lot
 - Mechanics: uncluttered
- PESS, this is a safety hazard
 - Black Box: hard to test, impacts are hard to see

Think before you start! However...

Options, options, options

Old and new

- If we have safe information about speed and position, we can make
 - Overspeed
 - Final limed switch
 - Inspection end
 - UCMP
 - Short head/ Pit
 -
- All plans start small, but with the immense potential...

Stick to your plan!

Documentation

Lift cultural

- We stick to our plan with documentation
- But as engineers, we don't like documentation
 - Value is not directly seen
- Requirements will get forgotten
 - And it was hard to test so...
 - Safety hazard!

Use requirement tracking!

Mixing safety and non safety

Lift cultural

- Safety controller has position information of the car
 - So I can use it for non-safety functions too! Or not?...

- It is possible, but:
- Non safety code can and will influence safety code (if not, **proof it**)
 - Interrupts
 - Death-locks

Mixing safety and non safety

Understanding

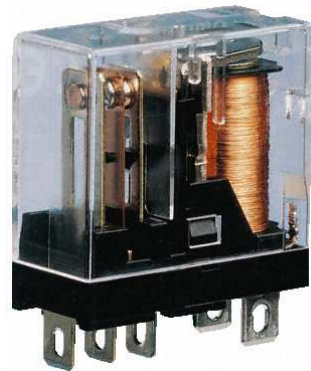
- All software becomes safety software...
- CRC of software is on certificate, so...
 - Every update: contact the NoBo
 - Long testing time for each update
 - Risk of hacking, security becomes a thing
- Only interesting in very big projects

Do not mix safety and non-safety software

Calculations

Lift cultural

- A safety system always consist out of:
 - Sensor
 - Processing
 - Actuator
- For PESS, it is the same:

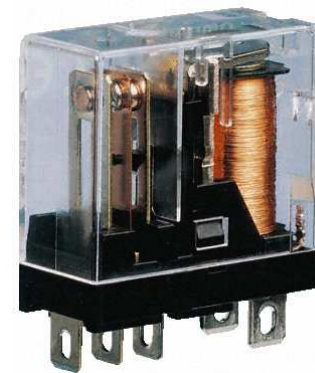


Calculations

Lift cultural

- In PESS we have to calculate safety value of our system
- Everything in safety function shall be put into the math...

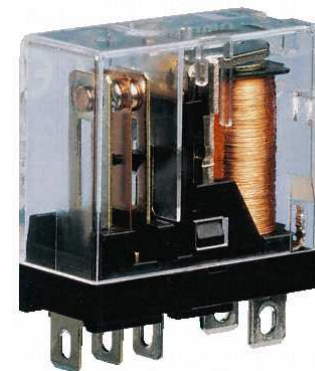
...Everything...



Calculations

Lift cultural

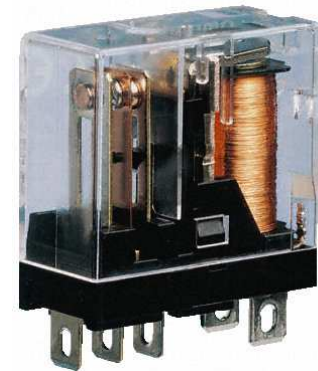
- With the Sensor Processor and Actuator we're not complete!
 - Power Supply is also part of safety!
- Is the actuator, really our actuator?



Calculations

- The actual actuator is... The brake!

Lift cultural



In the update of the EN81, you probably have to reserve a certain value for the brake

Conclusion

- Think before you start → Make a proper **plan**
- **KISS**, and stick to your plan
 - Use requirement tracking
- **Do not mix** safety and non-safety software
 - Or be very aware of the impact
- Reserve a certain value of your **safety factor** for the brake to satisfy the new EN81-20+A1
 - Stil under discussion

Thank you for the attention!

