Maintenance

- Tamping
- Grinding

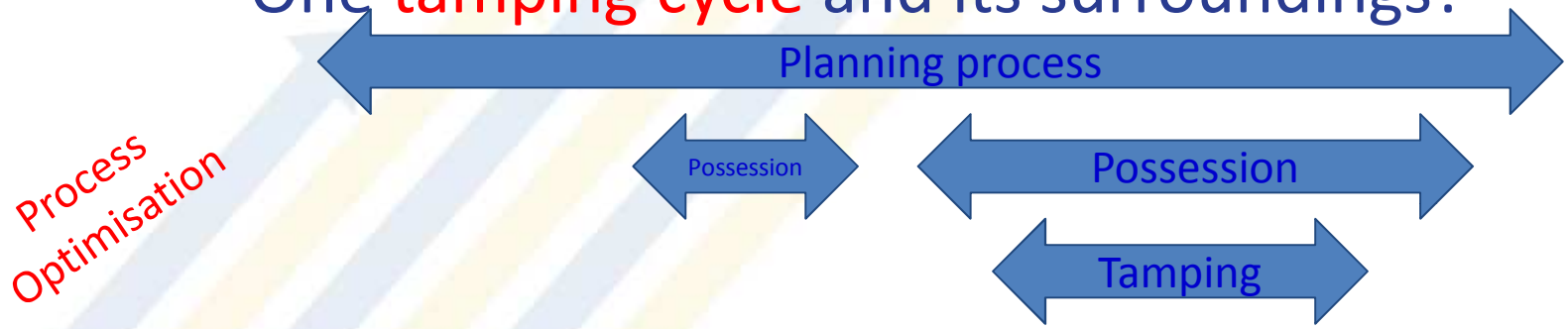
Tamping

High ~~Speed~~ Performance Tamping

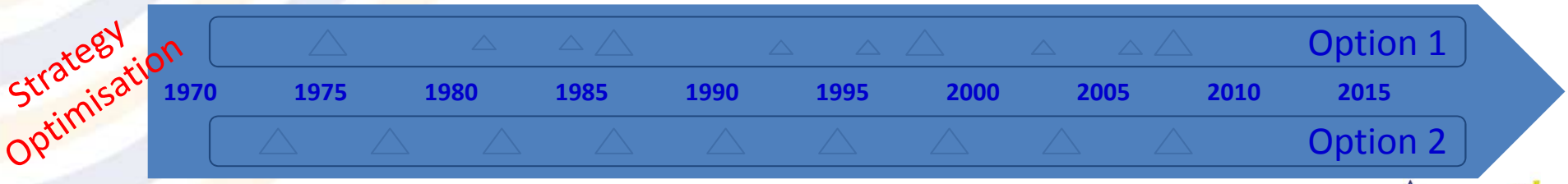
A Joint Research Project funded under the Seventh Framework Programme (FP7) of the European Commission

Tamping

- Tamping Process: which perspective
  - One tamping cycle and its surroundings?



  - Tamping during the complete life cycle
    - How often do we need to tamp during complete life cycle



Tamping

- Tamping Strategy
  - Looking at the best tamping strategy in order: To reduce total time needed for tamping during whole life cycle
- Tamping cycle
  - Machine capacity and the use of it
  - Other aspects: measuring track alignment
  - Optimum length of possessions

Tamping Strategy

- Combination of preventive and corrective strategy
  - Preventive
    - predetermined interval for tamping cycles
  - Corrective:
    - repair spot failures in between the tamping cycles
- Is this effective and what about the cost
    - Long term strategy needs to monitored over long period
    - LCC model: confidential, work carried out by DB

Tamping itself

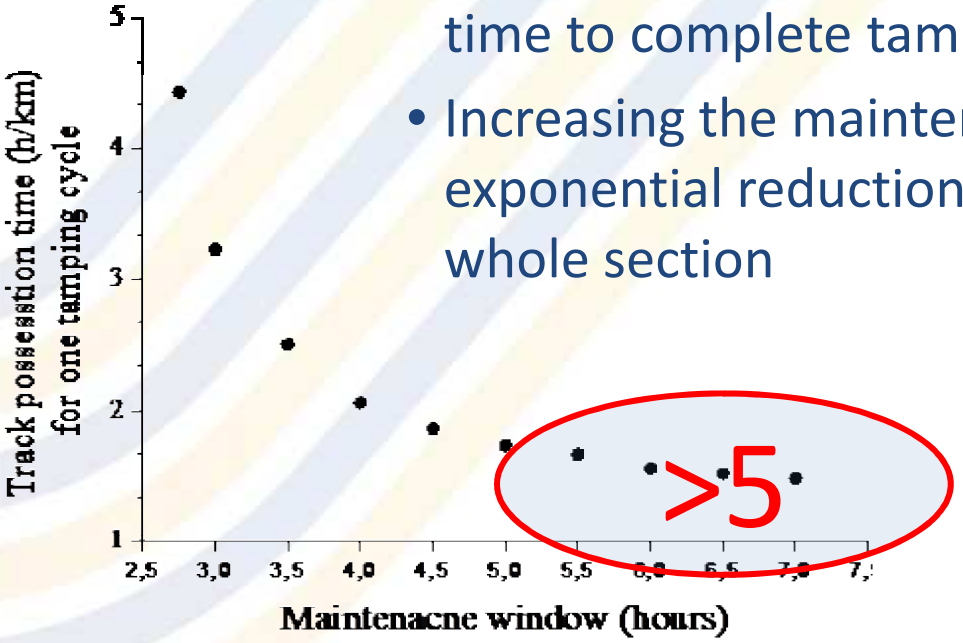
- Machine capacity

Line Tamper					
	Lift	0-30mm	30-60mm	60-80mm	
Type	Sleepers	1x	2x	3x	Insertations
09-16	1x	800	600	300	m/h
09-32	2x	1100	800	400	m/h
09-3x	3x	1500	1100	800	m/h
09-4x	4x	2000	1600	1300	m/h
Normal sleeper distance = 580-620mm					

Universal (Both Line and Switch Tamper)					
	Lift	0-30mm	30-60mm	60-80mm	
Type	Sleepers	1x	2x	3x	Insertations
Unimat 08-475-4S	1x	500	300	150	m/h
Unimat 09-16-4S	1x	800	600	300	m/h
Unimat 09-32-4S	2x	1100	800	400	m/h
Normal sleeper distance = 600mm					

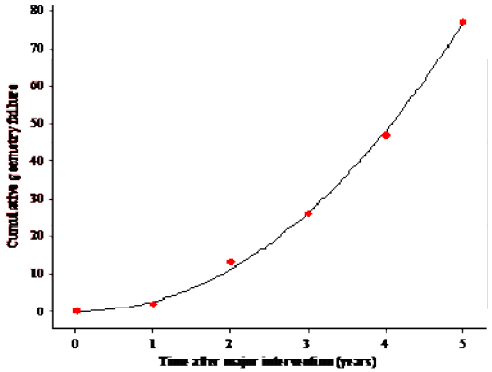
Optimum Possesion Time

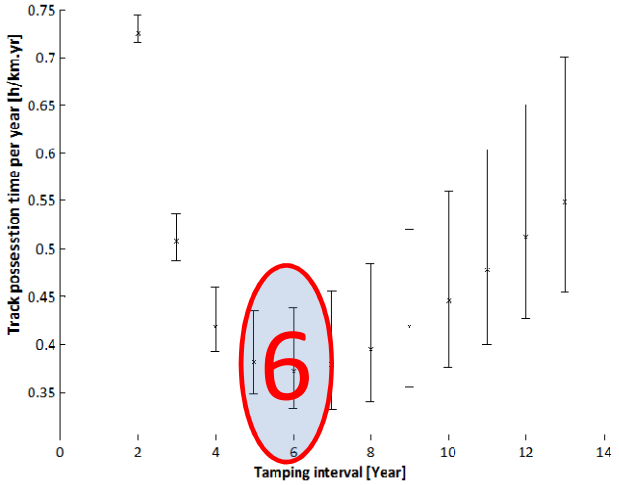
- Effect maintenance window / length of shift on track possession time needed for tamping whole track length
- Exponential decay function: short maintenance window requires several shifts & excessive total track possession time to complete tamping cycle track section
- Increasing the maintenance windows leads to an exponential reduction of the time required to tamp the whole section



Tamping Conclusions

- (tamping) Machine capacity is far less important
  - Measuring track alignment consumes more time
- High Speed versus High Performance
  - Focusing on high track quality more effective
  - Therefore: tamping strategy interval 6 years
- Optimum Possession Time





High performance grinding

Grinding with less possessions

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Introduction

- Instead of Willem van Ginkel, ProRail
- The objective: reduction of possession time
- Actual numbers of possessions
  - Ca 250 possessions for big grinding train
  - Ca 750 possessions for small grinding train

Grinding at 80 km/h

Actual ProRail way:

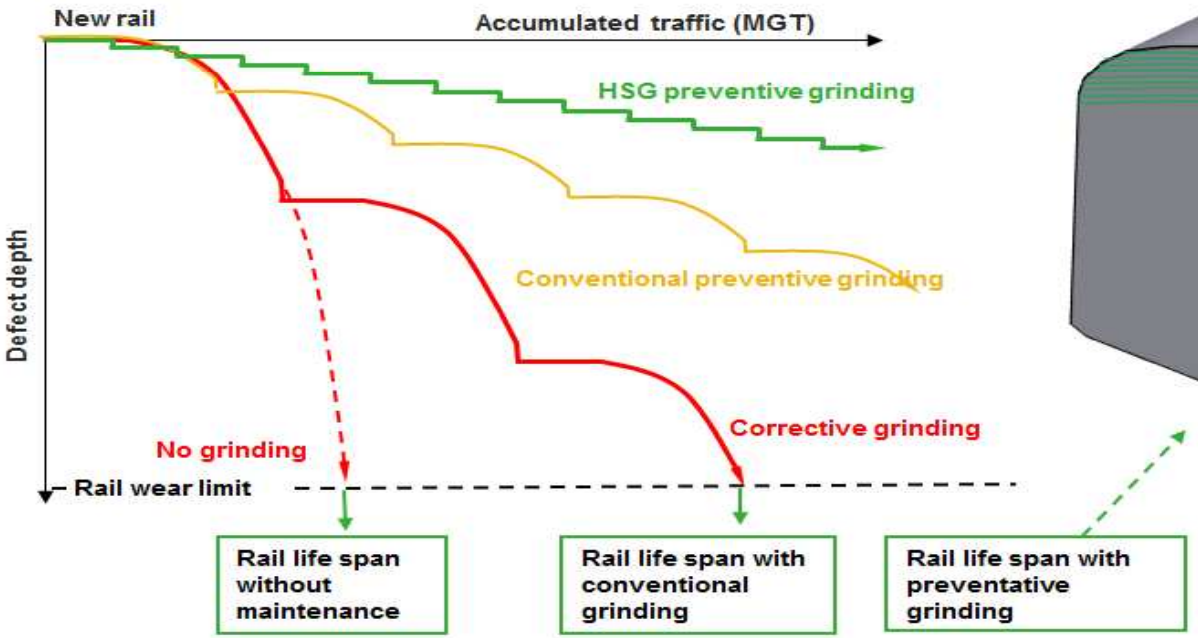
Potential future:

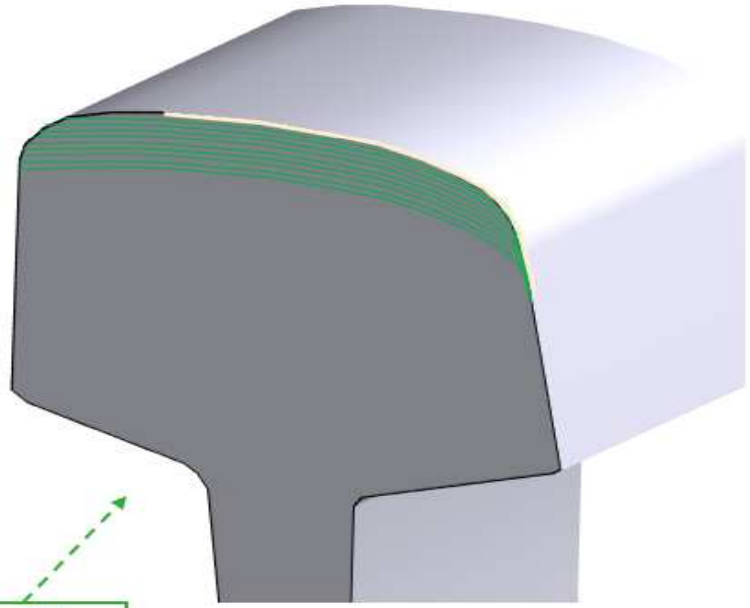
Are we doing the right things?

- Grinding the wrong way does not deliver benefits

Are we doing the right things?

- Cyclic grinding is the chosen policy
- This policy has been confirmed in Automain





Are we on time?

- Grinding if necessary
- Cyclic grinding > after 15 MT or after 20 MT?
- Research of progression of Squats (Van Dijk, Dollevoet)
- Research of progression of Headchecks (Dollevoet)
- Continuous monitoring

What did Automain contribute?

- Optimal policy defined.
- High Speed Grinding always in combination with conventional grinding.
- Executed tests in The Netherlands
  - Combinations of grinding trains
  - Grinding at 20 km/h as a train (still in possessions)
  - Double grinding train in tunnels (Hemtunnel)
  - Faster slag collection (operational issue)

Short term innovations (1/2)

- Track train (VB) from 10 km/h to 12 /15 km/h, 10-20% less possession time and 10% less costs.
- Special location train (WOB) doubled in tunnels, 30-40% less possession time and 10% less costs.

Short term innovations (2/2)

- Special location train (WOB) doubled at level crossing, 10-30% less possession time, cost reduction depends on the number of crossings.
- Grinding in possessions of 28/54 hours (planned to start in 2016).

Long term innovations

- HSG tests / application in The Netherlands?
- Application of the big grinding train at min 40 km/h, planned as a regular train (closing time of level crossings from 4,5 min to 2 min)
- Shift to permanently installed safety switches, profit 2 mio€ annually for grinding and safety
- Application of big grinding train in tunnels

Grinding at 80 km/h

Thank you