

Training in Budapest, Hungary

Risk of misunderstanding of signaling by the driver in Belgium

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Purpose of the presentation

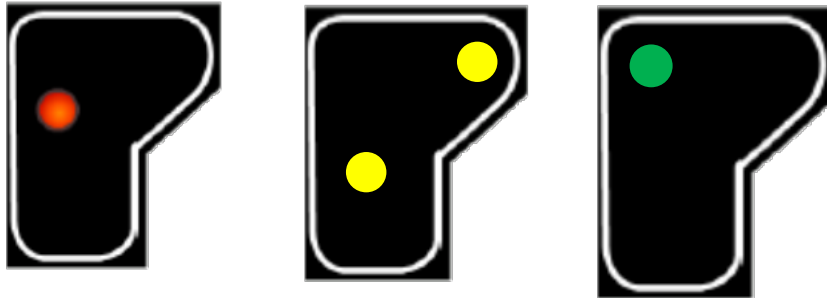
- Illustrate, by an example, the complexity of signaling systems and possible effects on the train drivers.

Key points of the presentation

- Some aspects of the signaling system in Belgium
- Impact on complexity
- Effect on train drivers

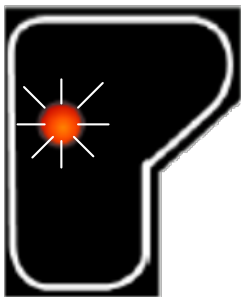
Side signals in use in Belgium

- In Belgium, for increasing flexibility and availability, the tracks may be run in both directions on daily normal operations.
- Normal direction on track: Side signals with fixed light on the left.



Next signal red

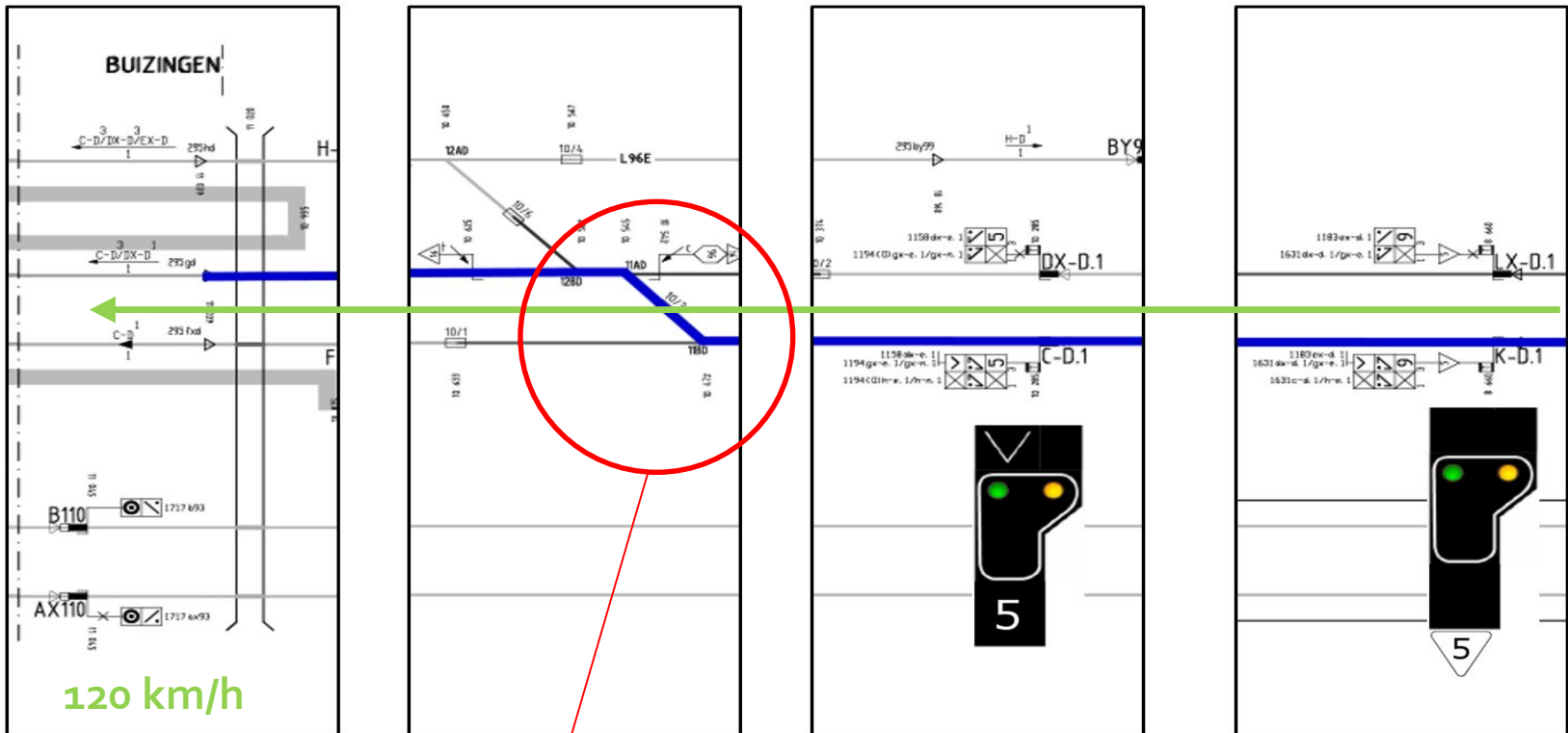
- Deviated direction: Side signals with flashing light on the right.



Operations on normal and deviated directions

Normal direction on left track, deviated direction on right track.

Nominal speed 120 km/h in the example here below but in transition speed limited to 50 km/h.



Transition normal-deviated directions often at reduced speed.

Operations on normal and deviated directions

- Use of normal or deviated directions decided by:
 - Temporary situation: e.g. Maintenance work on the infrastructure
 - **Normal planned operations**: increasing of availability of lines. Registered in route and rule books.
- **Increased complexity** in normal planned operations:
 - Different operation patterns: e.g. in the working week, plan to run on normal direction. In Week-end, plan to run on deviated direction.
 - Number of transitions not limited; in particular on complex crossings (crossing lines).

→ Possibility of running in both directions in planned and unplanned operations increase complexity

Additional complexity (examples)

- Old infrastructure (>100 years) → numerous continual modifications of lines and tracks.
 - One effect: The side signals may be placed exceptionally on left or right side in normal direction depending appropriate space.
- CCS system: Class B (national) and ETCS
 - Transitions signal not protected ← → Class B system (national) ← → ETCS
- Limited annual budgets for modernization and maintenance
- Necessity to maintain huge traffic during modernization and maintenance work on infrastructure.
- Mixed traffic passenger-freight

→ Potential increase of complexity

- In many situations the train drivers have to manage transitions therefore **increase of necessary attention** (Am I in normal or deviated directions? Which CCS situation? Normal operation or temporary restrictions?)
- Accidents and incidents reports show that inexperienced drivers and drivers back after period of inactivity (e.g. holidays) are more often involved in accidents and incidents
- It seems that the complexity of the infrastructure system in which the train drivers work is an aspect to take into account for risk evaluations (and control of risks!)
- Maintaining the risks at acceptable levels implies the collaboration of RUs and IMs regarding the complexity.



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