SFM '21 | SHAPING THE FUTURE OF MOBILITY

COMBOIOS DE PORTUGAL | CRP CENTRO RODOFERROVIÁRIO PORTUGUÊS | Infraestruturas de Portugal | UIC INTERNATIONAL UNION OF RAILWAYS

#EUYearofRail

Equipment and Services in the Transport of the Future

GreenSpeed – Connected Driver Advisory System

João Salgueiro, THALES

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Theme of this pannel

Innovation and Sustainable Transports

The role of new systems and technical solutions

How startups can contribute

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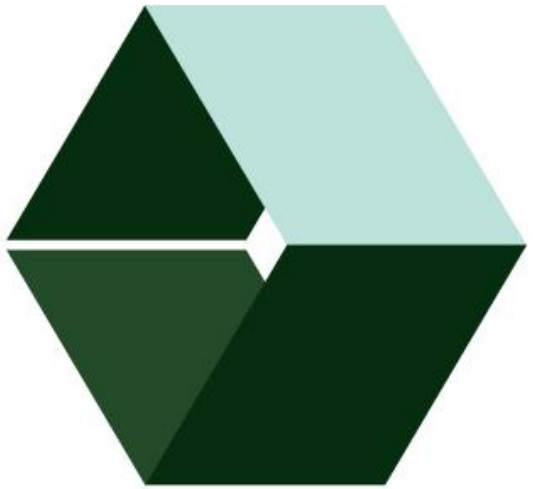


CUBRIS
a Thales Company

- Cubris is a Copenhagen based IT engineering company.
- Today with 30 persons of which 20 are hand picked developers from around the world.
- Was established in 2008 by Sune Edinger and Christian Hage, both with a Master of Science in Engineering and a proven track record of consultancy within railways and energy consumption.
- In 2009 established a partnership with the Danish National Railways (DSB) in order to invent and implement an innovative and eco-friendly Driver Advisory System.
- GreenSpeed DAS is operational and running since 2012 in DSB and now with a strong presence in train operators throughout Europe and is CUBRIS core product.
- In 2018 Cubris was integrated in Thales. WHY?

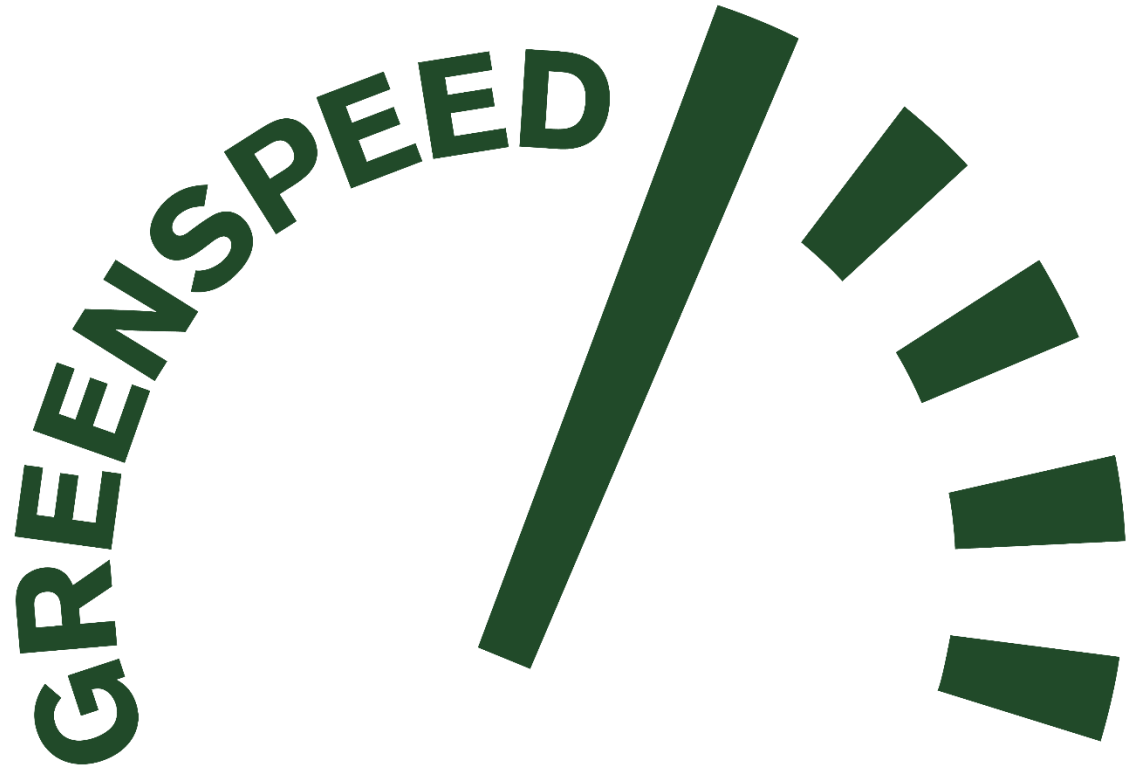
CUBRIS
a Thales Company

With CUBRIS

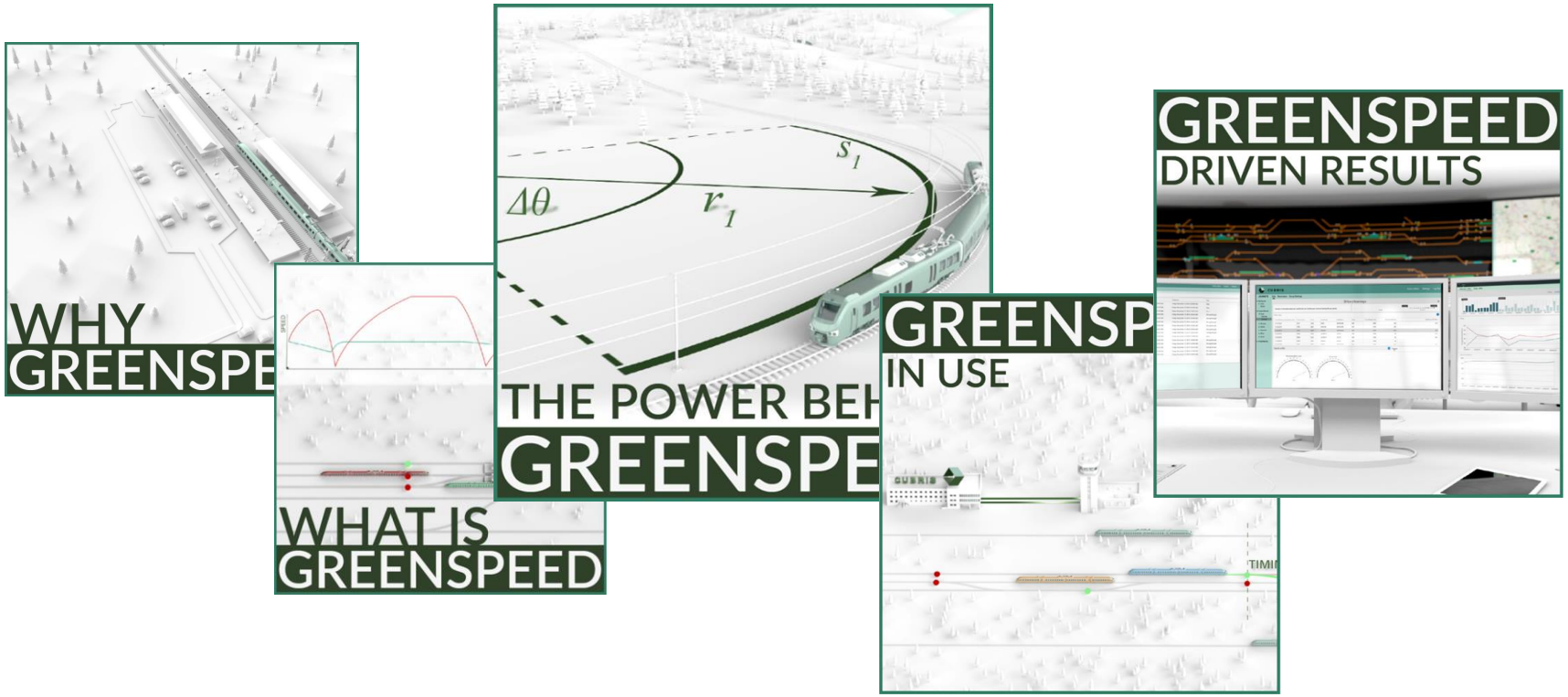
Thales boosts its Digital Transformation

towards more efficient and ECO-friendly

Transport Solutions


GREENSPEED

- GreenSpeed uses digitalization and clever software to support the continued modal shift towards sustainable and CO2 emission free transportation of people and goods via Railways
- Railways are already by far the most eco-friendly transportation mode but, with GreenSpeed we can do better…
- The goal of GreenSpeed is simple… keep a smooth traffic flow
- Smooth flow improves punctuality, energy saving, CO2 emissions reduction, infrastructure capacity and more…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DRIVEN RESULTS

Why GreenSpeed?

- **We want all drivers to do the best possible job for the benefit of the:**
  - Passengers
  - Railway Operator
  - Infrastructure Manager
  - Environment

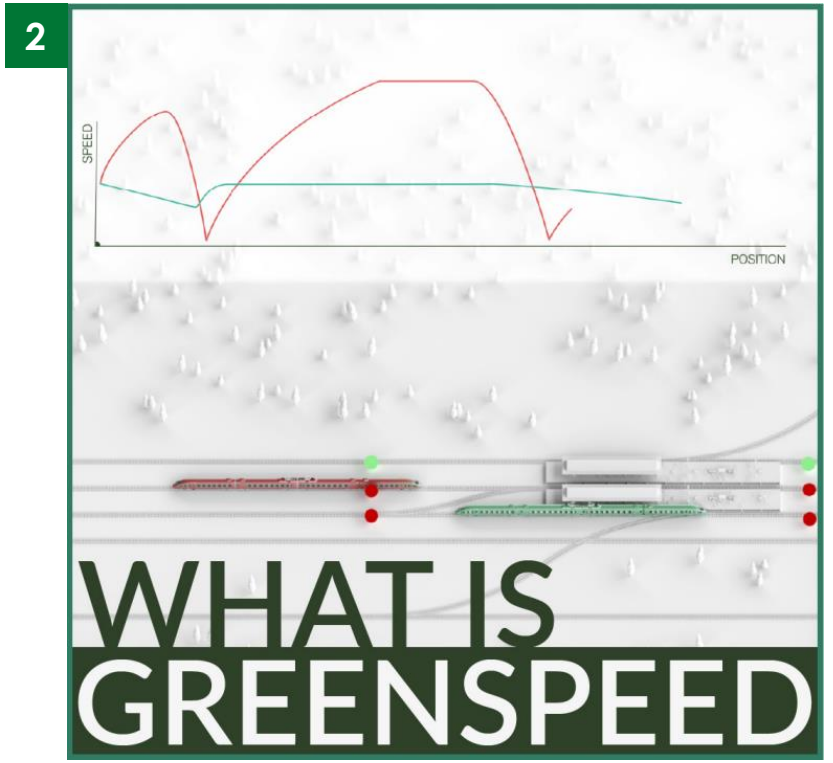
GreenSpeed, because…

- GreenSpeed supports drivers to meet the objectives of all the stakeholders, whether focused on:
  - Ride quality,
  - Punctuality,
  - Operational costs,
  - Reliability,
  - CO2 emissions
  - Capacity

- But with GreenSpeed drivers themselves benefit from GreenSpeed as a:
  - Intuitive User Interface
  - Easy-to-follow driver advisory, therefore reducing their level of stress.

What is GreenSpeed?

- **Is a SaaS that:**
  - Avoids unnecessary stops
  - Improves punctuality
  - Saves traction power
  - Improves reliability and capacity
  - Delivers the best possible feed for PIS/PAS



GreenSpeed is…

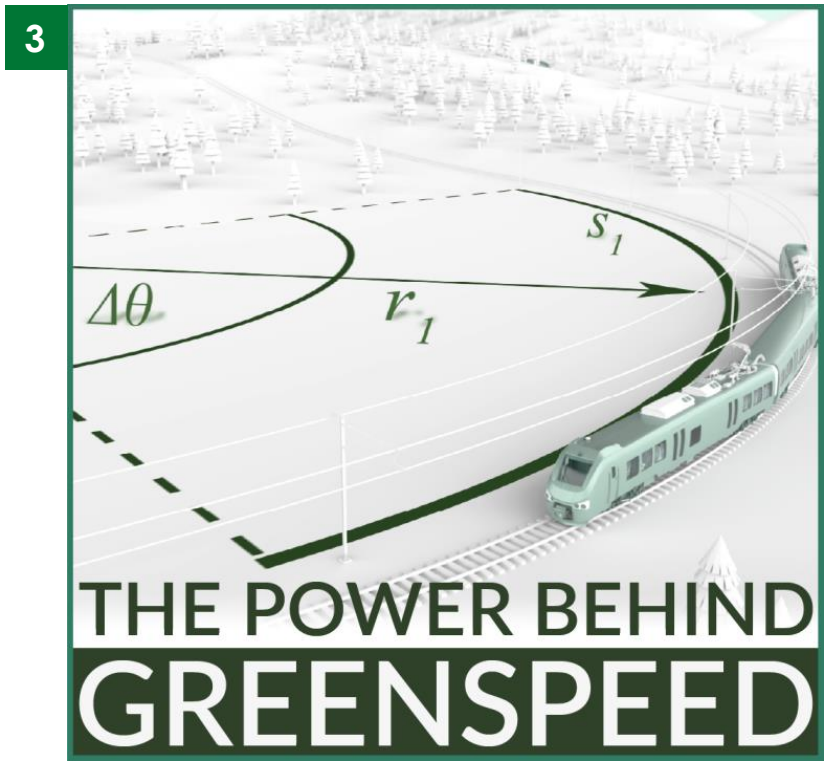
- **GreenSpeed allows drivers to *surf* "the green wave"**, using the available slack in the timetable to **cruise** and **coast** as much as possible. With this flexibility:
  - Not only **saves traction power**
  - But also ensures a **smoother and comfortable** ride experience
  - While **reducing wear and tear on traction and braking systems and also in the infrastructure** – an additional upside.

- GreenSpeed executes **constant logging of journey data** from all the trains offering both IMs and Railway Operators a truly unique insight into the operational efficiency.

- GreenSpeed software **is platform independent**:
  - Will even run on one backbone across different platforms such as tablets, dedicated as well as shared screens.
  - GreenSpeed simply uses the tablet GPS for positioning and the internal modem to exchange small data packages. It´s an easy and fast way to get going with minimum investment.

The GreenSpeed algorithm

- **Required data:**
  - Infrastructure model
  - Train characteristics
  - Timetables
  - Speed restrictions



The GreenSpeed algorithm

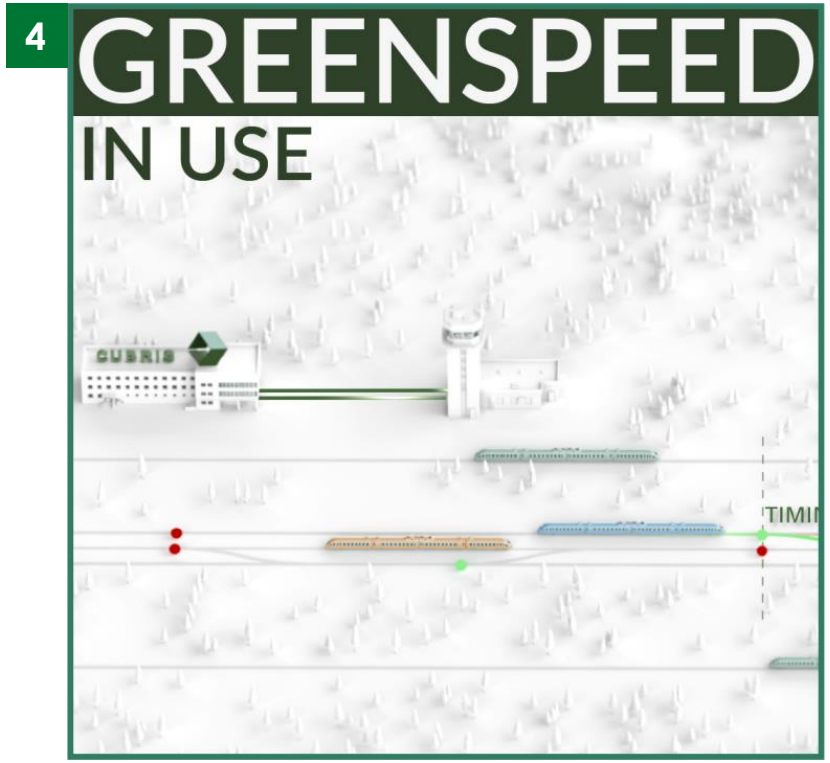
- The **operational data is stored on the on-board device** and as soon as the driver logs into GreenSpeed and parameters for the planned journey are known, the **algorithm is ready with the optimal speed profile**.

- By constantly **relating the actual position of the train to the underlaying data**, the **speed profile will immediately be updated** if circumstances **change**.

- As mentioned, the **algorithm can favor either punctuality or reduced energy consumption**.

Connected GreenSpeed

- **From DAS to C-DAS**
  - Connected = TMS integration
  - Changes immediately communicated
  - All drivers adhere to changed plans
  - Optimal conflict resolution
  - Minimal disturbance



Connected GreenSpeed

- Where a **DAS working with static timetables** avoids conflicts by respecting timing and stopping points, a **connected Driver Advisory System** (known as C-DAS) **goes a step further and handles situations** where the original plan is not feasible anymore.

- The **C-DAS will receive *on-the-fly* information** directly from the **Traffic Management System** with new operational plans and act accordingly giving to the driver the best driving profile.

- **GreenSpeed C-DAS** is the best tool to ensure efficient operations until ready for **ATO GoA2**.

BackOffice and OnTrack

- **Journey data**
  - Logged and stored
  - Available on-line
  - Targeted reports
  - Decision support data to Informed decisions
  - On-Track service by experts

BackOffice and On-Track

- The obvious **benefits of DAS and C-DAS** relates to **helping TMS avoiding and solving conflicts** to run a reliable, cost efficient and environmentally friendly railway operation.

- What is realized by more and more Railway Operators and Infrastructure Managers is, however, the value of the data generated by GreenSpeed:
  - **Aggregating data from multiple journeys**, allows RO's and IM's to **understand where the schedules are challenged in real life**.
  - Relevant information about **performance of operators, fleets and drivers** can be extracted therefor **improvement potentials** can be identified, matching **actions taken**, and subsequently document the **result of improvement initiatives**.

- The **basic data logged** allows to **reconstruct the operational situations** in detail for analysis and **compare the ideal with the realized**.

Summary

- **GreenSpeed = DAS**
  - ✓ Best possible driving strategy
  - ✓ Intuitive Driver Machine Interface
  - ✓ Punctual and eco friendly driving
  - ✓ Accurate data feed for PIS/PAS
- **GreenSpeed on top of TMS = C-DAS**
  - ✓ Driver Advise based on dynamic scheduling
  - ✓ Drivers performing according updated plans
  - ✓ Paving the way to ATO
- **GreenSpeed management tool**
  - ✓ Strong web based back office
  - ✓ Analysing and understanding Big Data
  - ✓ Optimising and documenting achievements

Digital Platform
Empower all users by using GreenSpeed as the single point of work related information

Operations APP
Empower platform staff and train guards with assisted train departures as part of Operations APP

Inventing tomorrow's products today

Before conclusions – GreenSpeed References

- **Danish Railways (DSB)** 33 locos + 188 trainsets in operation since March 2012;
- **Stagecoach South West Trains, UK** 249 trainsets in operation since 2013;
- **Transdev, Sweden** 159 trainsets in operation since 2014;
- **VR, Finland** 453 locos + 175 trainsets in operation since 2016;
- **Lokaltog, Denmark** 29 trainsets in operation since 2017;
- **Transdev, Germany** 76 trainsets in operation since 2017;
- **South West Railway, UK** 270 trainsets in operation since 2017

Total aprox: 486 locos + 1.146 trainsets in operation

Conclusions

- **DAS** brings **punctuality and energy savings on Railway Operator level**.
- **Connected DAS** extends the benefits the railway eco-system – **bringing IMs and the Railway Operators closer** together, to **ensure optimal performance on network level**.
- **CO2 reduction** depends on the type of operation but, typically in GreenSpeed running operations there are evidences of reduction in the consumption of traction power by:
  - Commuter: 4-8%
  - Regional: 6-10%
  - Long distance: 8-15%
  - Freight: 10-25%
- **Unique footprint** in Driver Advisory Systems

GreenSpeed – from Green to Greener Railways

From Green to Greener

Thank You