## Towards emission-free rail maintenance



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#### **Strukton Power**



**Power Electronics** 



**Traction Drives** 







**Digital Twin** 



**Grid solution** 

#### **Track maintenance by Strukton Rail**





Track renewal equipment









**Tamping machines** 



Ballast cleaning machines





Strukton

EVERT 2022

# Electric future of Track maintenance (2)

• Currently diesel LOC required for non-electrified locations





## **The Challenge**

- NS-locserie 1700
  - Supply voltage (nom.)
  - Traction power
  - Tractive effort
  - Weight
  - Length

1500 V 5 MW 260 kN 86 t 18 m

- Low speed track maintenance
  - Speed
  - Load
  - Catenary free operating time

300 t >1 h

25 Km/h





#### Locomotive power and energy



#### LOC (86t) + Load (300t)



- Power demand: >500 kW
  - 150kN @ 2.5 m/s (9 km/h)
- Energy demand:
  - Accelerate to 25 km/h ~5 kWh
  - Maintain 25 km/h 1h ~80 kWh
  - Auxiliary loads 1h ~20 kWh
  - Reference use case ~125 kWh
    - 60 min operation
    - 12 accelerations
    - 30 min constant speed

#### ~250 kWh battery storage required





High energy battery – 5s3p		
Voltage	Nominal	661 V
	Operational	540 -738 V
Energy	Nominal	138 kWh
Power	Charging cont.	138 kW
	Discharging cont.	273 kW
	Discharging peak	416 kW
Temp	Operating temp.	-25 – 40 C



#### **Strukton Battery Locomotive**





Operating modes: 1. Loc Only 2. Loc + ESS charge 3. Loc + ESS supply



#### **Electrical Architecture**



#### **Traction battery converters**





ER



#### 400Vac auxiliary converter



24V battery

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#### **24V LVPS Battery charger**





#### **Converter realization**

• Using standardized power modules





## **System Realization (1)**

- Battery systems
- Converter cabinets
- Input cabinet
- Magnetics
- Damper floor
- Cooling





### **Carriage for ESS**

• European Railway standards



#### **Project timeline**



#### For more information visit us at booth 15



**Questions?** 

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