APTA RAIL CONFERENCE, JUNE 13TH 2017

Best practices for maintaining critical Traction Components over the lifetime of a vehicle

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Agenda

Maintenance through the ages

Drivers for Mid-Life Overhaul

Refurbishment solutions

Maintenance through the ages

EMD F7 Locomotive, build 1949-1953,
Photography credit: Wikimedia Commons

SBB Re460 Locomotive, build 1991-1996
Photography credit: bahnbilder.ch

Past

- High demand for preventive maintenance
- Low complexity
- High portion of mechanical components
- Continuous maintenance without major changes in design over very long time
- Maintenance fully realized by the operator

Today

- Reduced preventive maintenance
- High complexity
- Components as “Black Boxes” from suppliers
- Obsolescence issues on electronic components
- Cost and time pressure in workshops

Drivers for Vehicle Refurbishment

Life Cycle Costs Reduction

Obsolescence and maintenance issues

Reliability

System Improvement

Energy savings

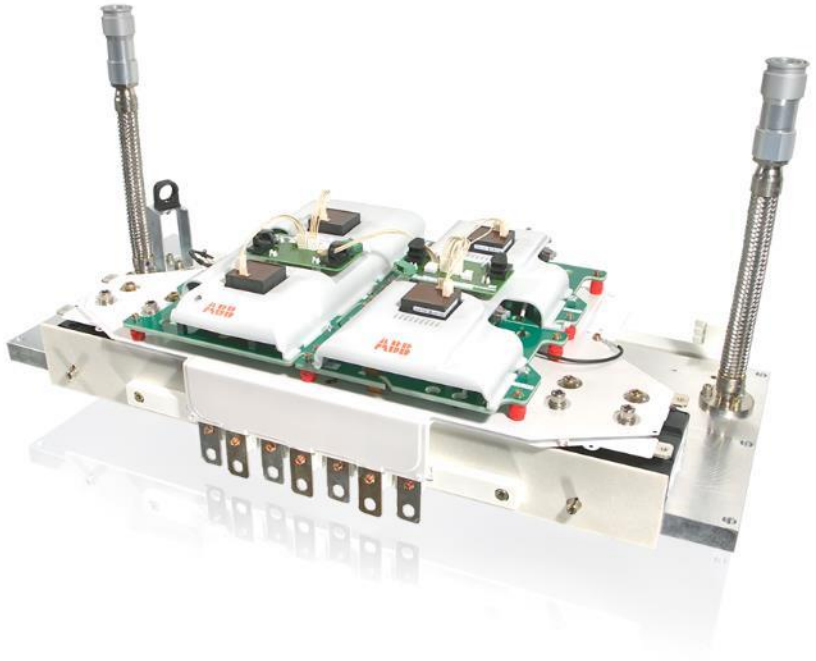
Drivers for Vehicle Refurbishment

Obsolescence – Solve Spare Parts availability issues

Standardized building blocks

Simplified Maintenance

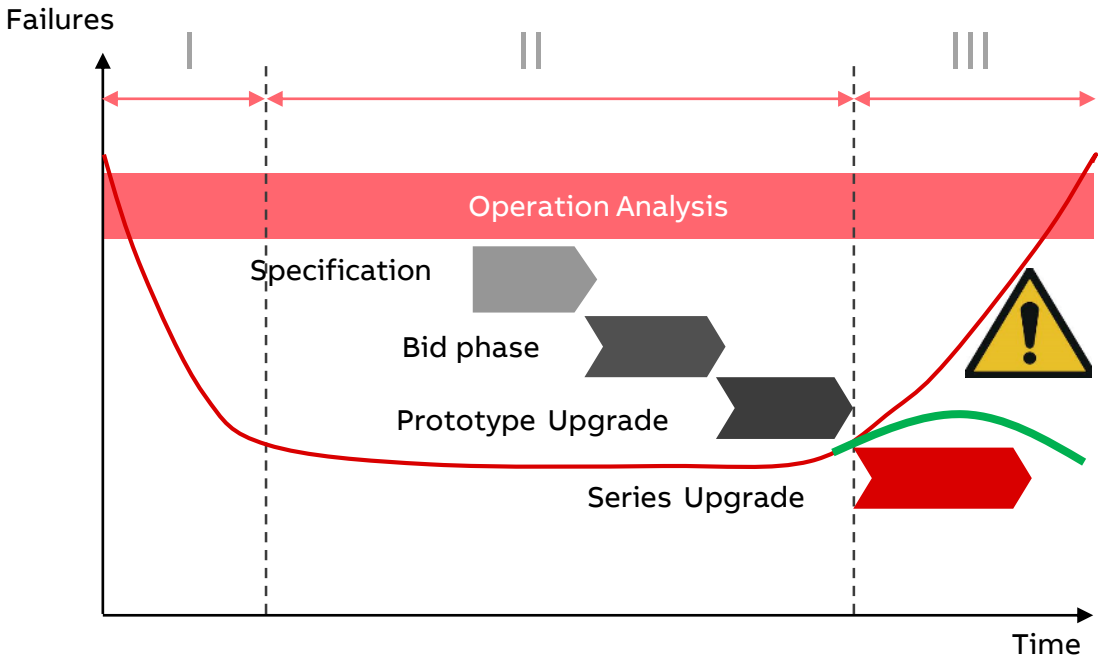
Increased availability



Water cooled IGBT phase leg.
Standardized building blocks provide long term availability of spare parts

Drivers for Vehicle Refurbishment

Reliability – Don’t miss the right time to start!



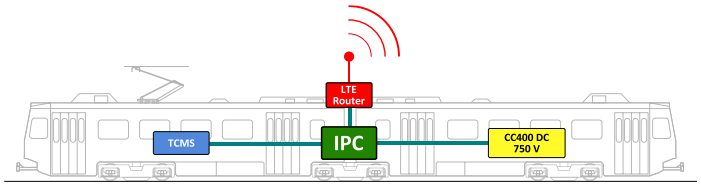
Drivers for Vehicle Refurbishment

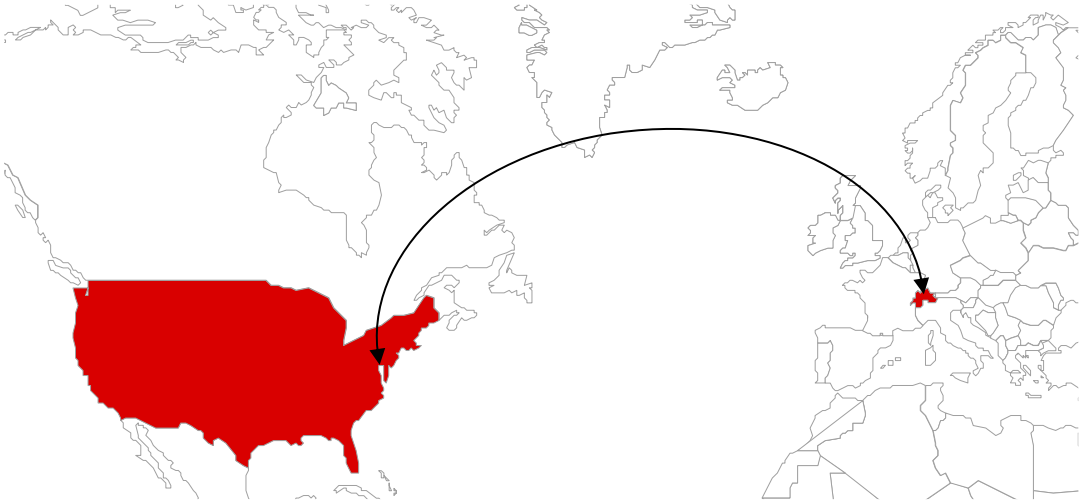
System Improvement – Seize the Opportunity

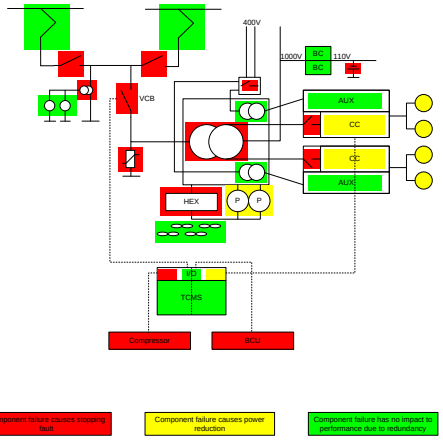
Elimination of weak spots

Remote Diagnosis

Multisystem/Hybrid operation





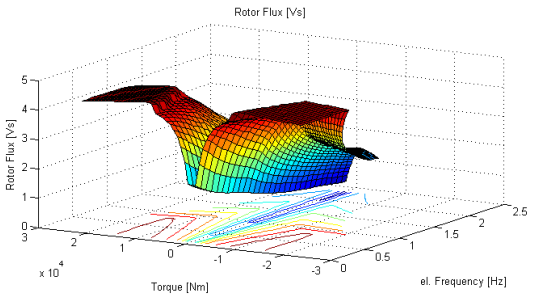


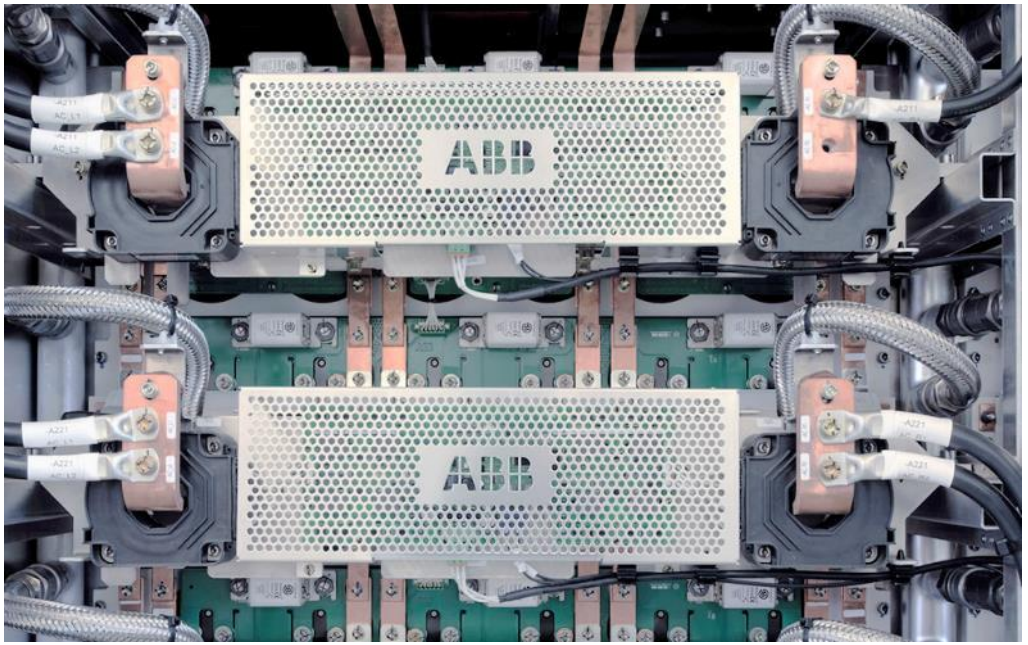
Drivers for Vehicle Refurbishment

Energy Savings – State of the Art technology for an optimized energy efficiency

State of the Art Technology

System optimization





Refurbishment Solutions

Find the right scope and project setup

		Scope		
		Retrofit Light Replace selected components	**System Upgrade** Replace complete Traction System e.g. DC to AC Motors	**Full Train Overhaul** Replace complete electrical system
Execution	On-Site *Replacement of Pre-Assemblies directly in Transit Authority Workshop*	- Less cost - Quicker execution - Operator- and Supplier-Staff work hand in hand		
	Off-Site *Upgrading the train in a third party rail workshop*		- Integrated Solution - Longer duration - Train needs to be transported off premise (Logistic Risks)	

Refurbishment Solutions

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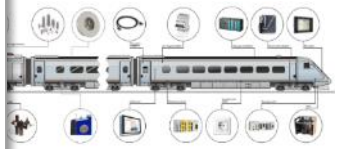
	Retrofit Light Replace selected components	**System Upgrade** Replace complete Traction System e.g. DC to AC Motors	**Full Train Overhaul** Replace complete electrical system
Execution			
On-Site *Replacement of Pre-Assemblies directly in Transit Authority Workshop*	**Commuter train, Germany** 2015, 70 Vehicles 	**SBB Re460** .5 – 2021, > 100 Locomotives  	
Off-Site *Upgrading the train in a third party rail workshop*	**Alstom, MTA, Baltimore** 2014 – 2015, 53 Light Rail Vehicles  	**SJ X2** 2015 – 2018, (1+) 35 HST 	

Refurbishment Solutions

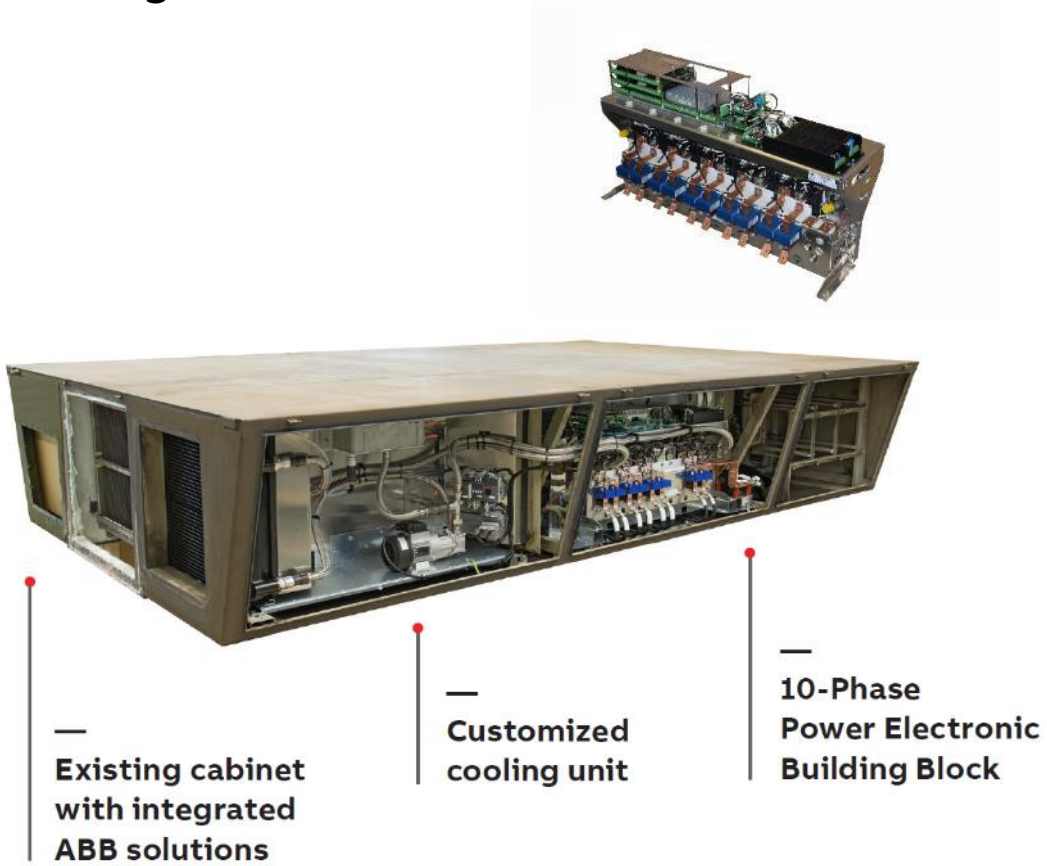
Traction Converter Integrated in Existing Commuter Train Cabinet

Box in the box integration

Keeping vehicles interfaces untouched

Very high level of integration

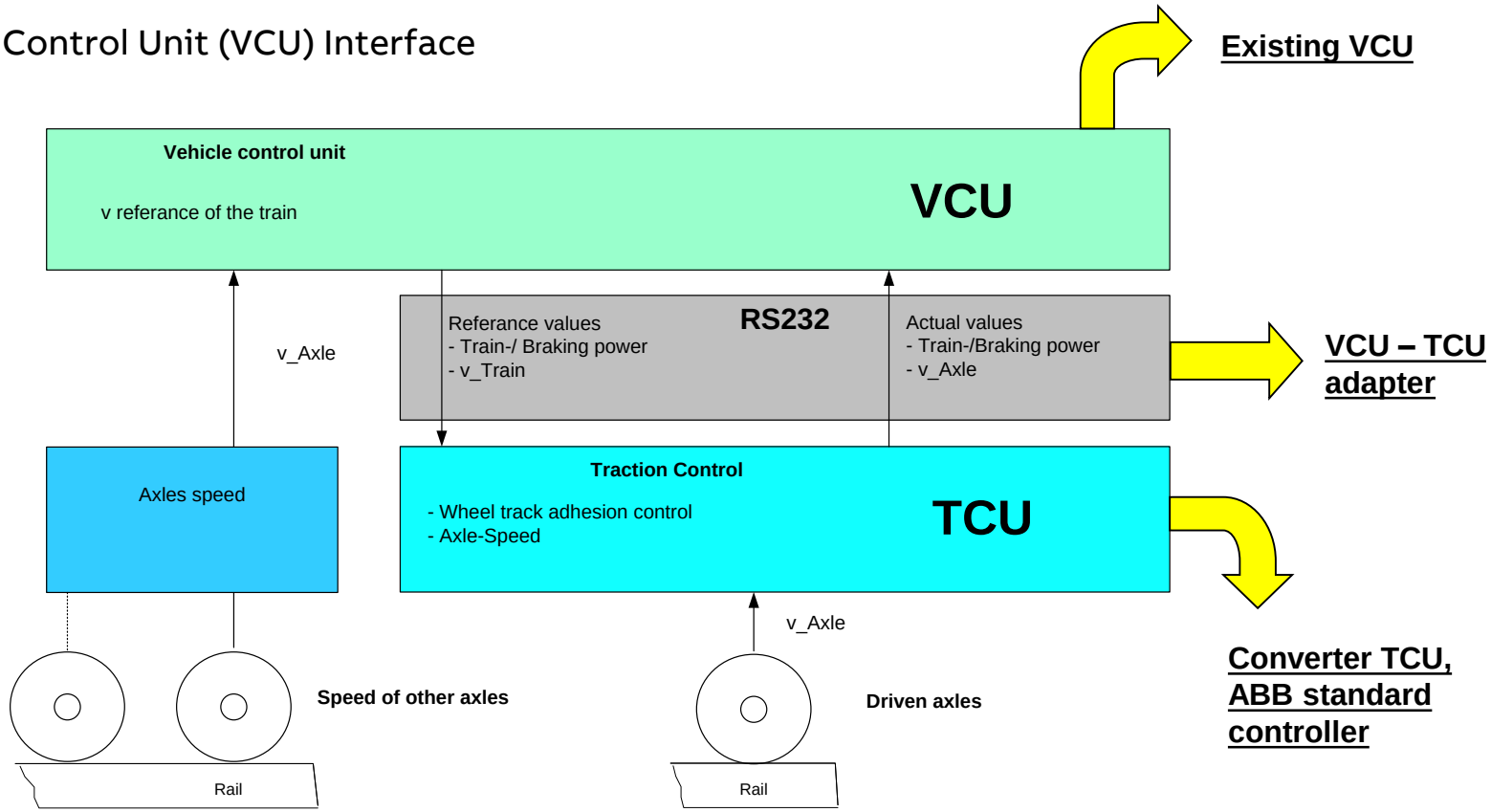
“Plug – Play” Installation, performed directly by the train operator



Refurbishment Solutions

Adaptation to the existing vehicle interfaces

Vehicle Control Unit (VCU) Interface



Refurbishment Solutions

Adaptation to the existing vehicle interfaces

Mechanical Interface

Refurbishment Solutions

Hybridization of a Diesel Train

Recuperation of braking energy

Driving Modes

- Diesel Only
- Diesel + Battery
- Catenary
- Catenary + Battery
- Battery only