

WORKSHOP C

SESSION ONE

Presentation 4

E-MOBILITY: Recuperation test with function and performance dynamometers

Thomas Schulz

Sales Director Export,
MAHA Maschinenbau Haldenwang GmbH & Co, KG

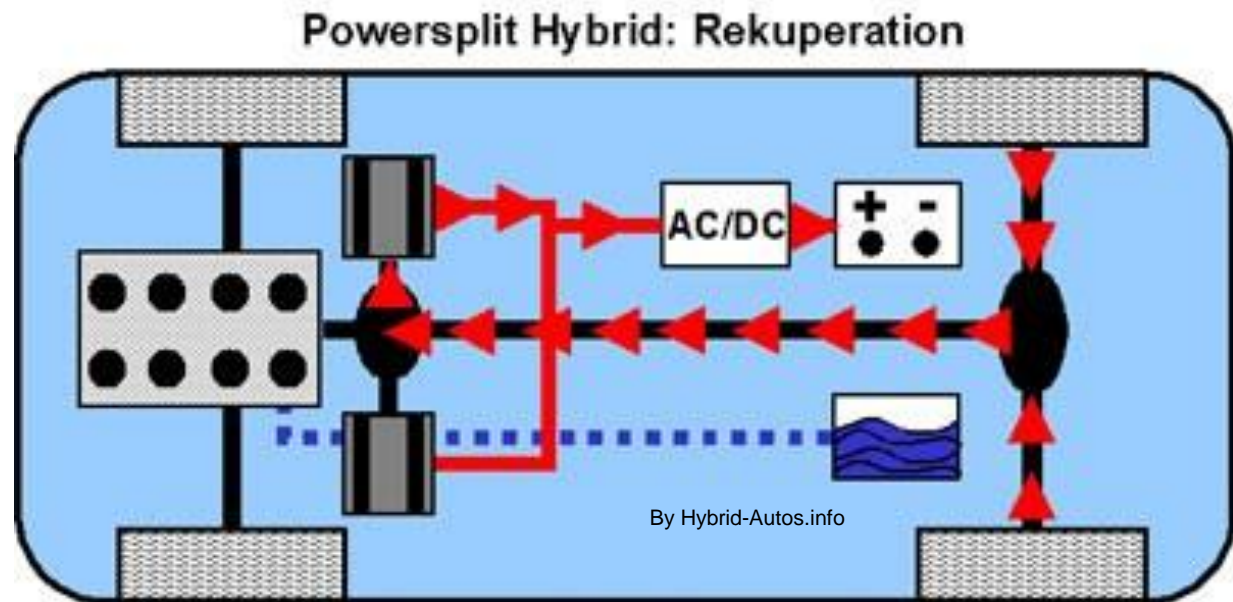
E-Mobility

Recuperation Test with function and performance Dynamometers



Agenda

1. Recuperation what is it ?
2. How to perform recuperation tests ?
3. Which Tests can be performed ?
4. Available Dynamometer Technology.
5. Résumé and considerations



1. Recuperation what is it ?

Recuperation from Latin “recuperare” - Recovery

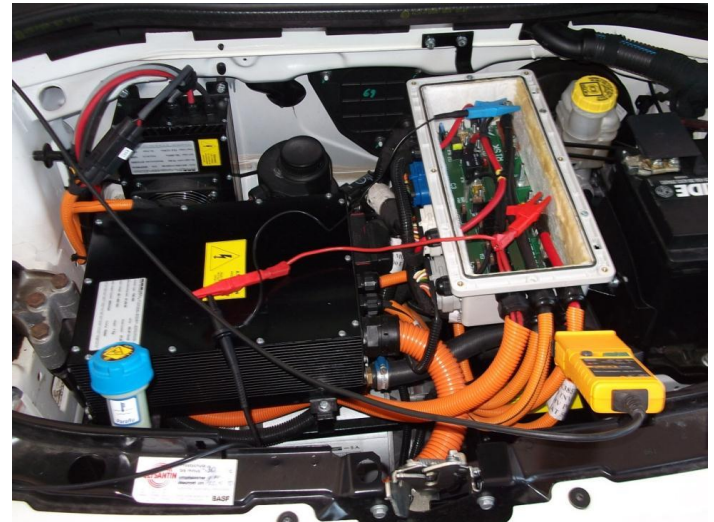
- Exploitation of anyway available kinetic energy to reload the electrical battery of the vehicle.
- Happens automatically during coast down phases while driving.
- Significant fuel reduction and improvement of the CO2 Balance.



2. How to perform recuperation tests

a) Test-drive on the road

- Difficult to receive repeatable results due to different ambient conditions.
- Additional staff requirement (at least 2 person are needed)
- No accessibility to the Motor from outside during the test so that everything has to be fitted “perfectly” before the test drive.



2. How to perform recuperation tests

b) Test-drive on a Dynamometer

- Laboratory conditions grant great repeatability.
- One man operation.
- All measurements can be done easily from inside and outside the vehicle.



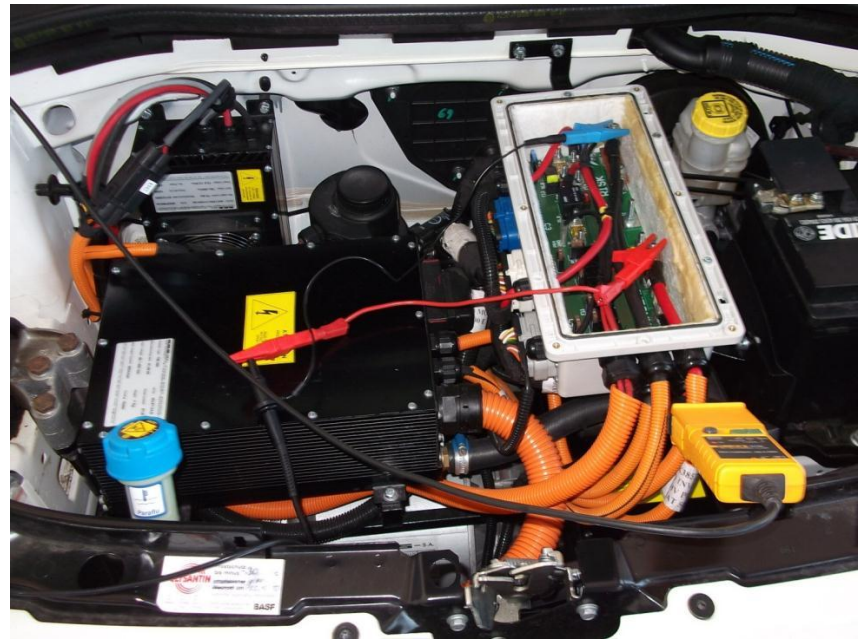
3. Which tests can be performed ?

a) Energy Conversion Efficiency

Test-drive over a defined load and simultaneous measurement of Battery voltage and loading conditions.

b) Function Test and Recuperation

Reloading of the battery; Generator operation in conjunction with an Electric motor.



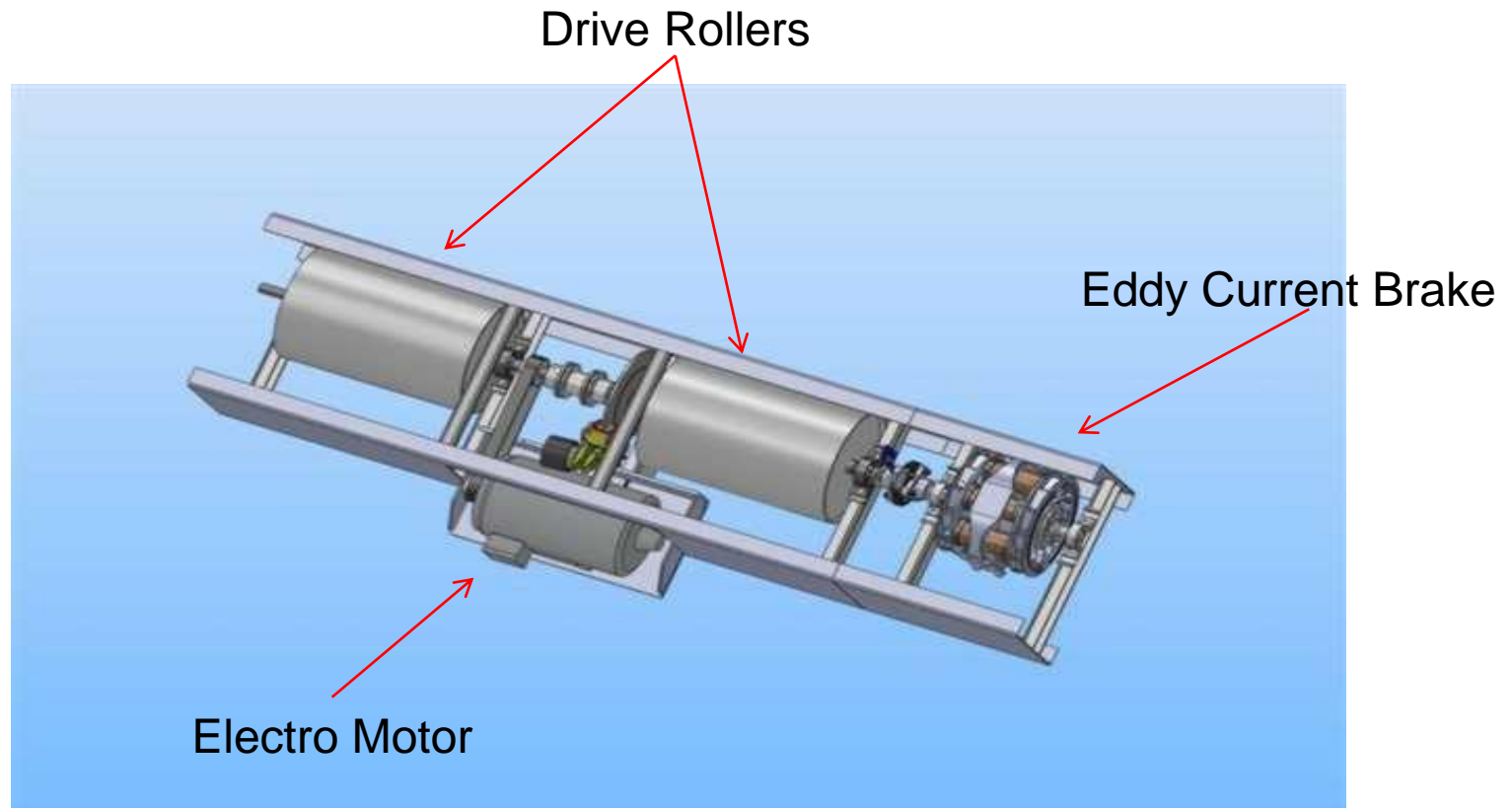
4. Available Dynamometer Technology - General Challenges

- Extreme Tyre tumbling in conventional double roller Dynamometers
- RPM control on both axles (driven and non driven axle)
- Connection between front and rear axle is needed to make sure that same speed appears on both axles.
- Fixing of the different vehicles.

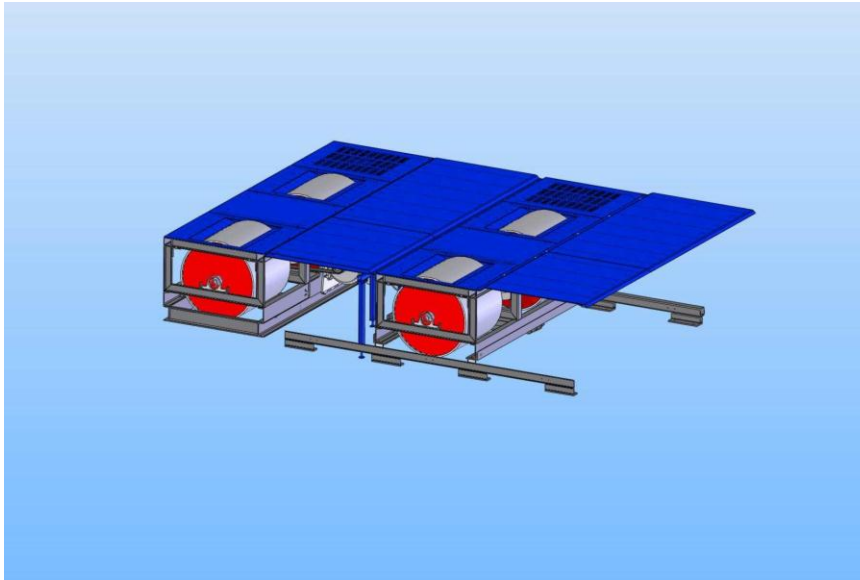


4. Available Dynamometer Technology - Nowadays Solution

- Single rollers with large roller Diameter.
- Reasonable inertia, closer to the actual vehicle weight.
- Electro Motor, do drive the non driven axle or simulate recuperation !

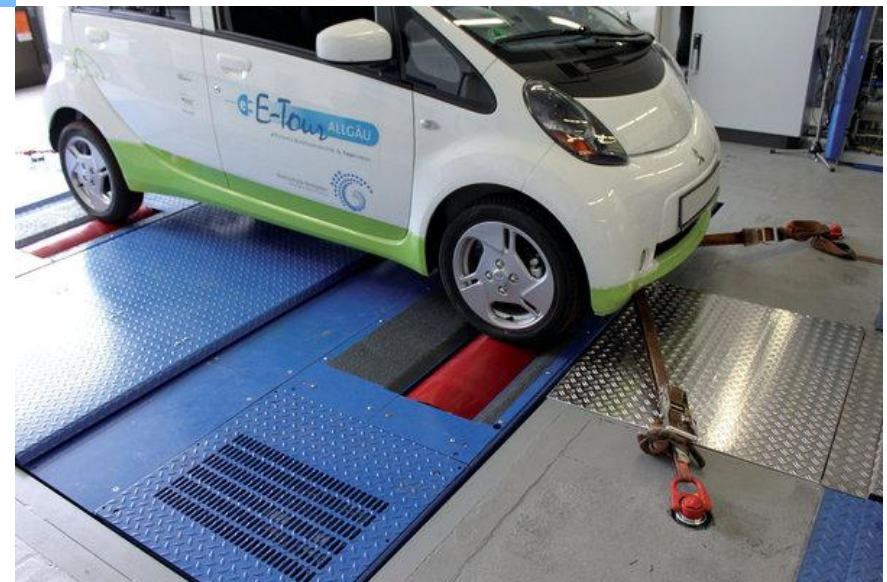


4. Available Dynamometer Technology - Nowadays Solution



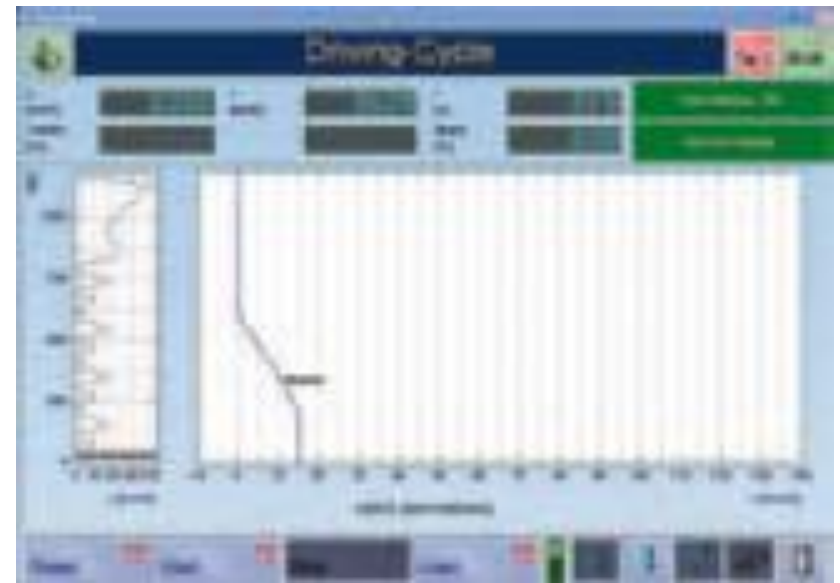
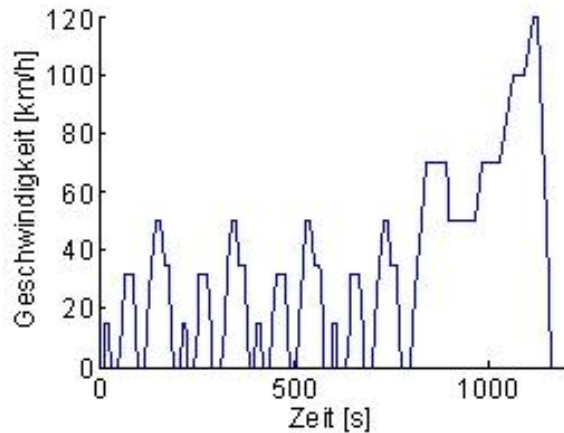
- Standard configuration with movable roller set to adjust to certain axle separations.
- Front and rear axle can be connected electronically or mechanically.

- Contact area between tyre and roller quite similar to real street conditions.
- Due to increased roller diameter is the Rotating mass already close the vehicle mass.



4. Available Dynamometer Technology - Nowadays Solution

- Preprogrammed driving cycle (e.g. NEDC)
- Analogue interfaces for own measurement devices.



5. Résumé and considerations

- Technology for repeatable measurements are available.
- Proofed Dynamometer Technology, so far no standardized procedures for measurement of recuperation available.
- Most nowadays vehicles need both axles running on same speed
→ regulated 4WD configuration.
- Thermal problem while battery loading → ensure a good ventilation.
- All High Voltage Cables / Harnesses are easy to identify in orange colour, Keep your fingers away from the ORANGE cables !
- Before touching the high voltage system disconnect the service plug



Thank you for your attention !



Your success is our motivation !