



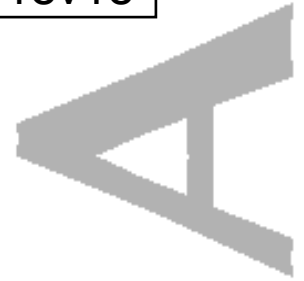
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WLTP-06-06-rev1e

Sailing in WLTP: Manual Transmission (MT) application Clutch & Gear requirements during deceleration

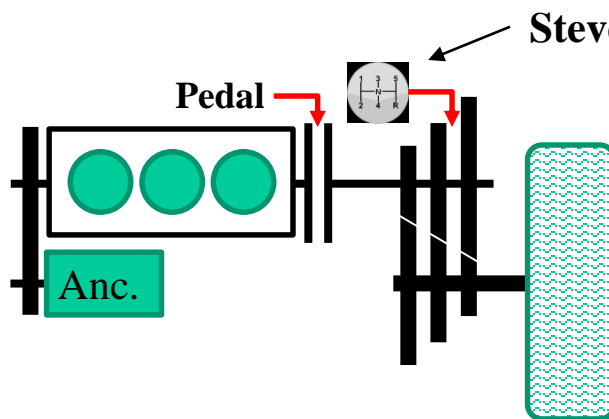
**January 2014
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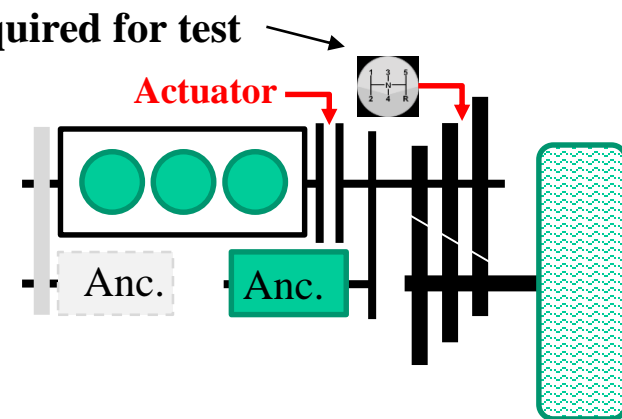


Sailing: Definition and Application

- ***Sailing*** is coasting with driveline decoupled to reduce vehicle braking by engine loss
- **GTR and Steven Tool** should support equal treatment of MT's vs. AT's in terms of sailing
- **Context: Manual Trans & Steven Tool affected**



Standard MT



MT with automated clutch



AT ↔ MT comparison

- **Current GTR makes application of sailing with Automatic Transmissions (AT) possible**
- **Speed profile and tolerance band is accepted to be sufficient for repeatability in AT applications**
- **Sailing with pure Manual Transmission (MT) is widely restricted, due to GTR clutch and shift requirements during deceleration phases**
- **This will disadvantage MT applications with high sales volumes against AT, leads to unequal treatment of technologies and does not encourage OEMs to install this technology for supporting the CAFE targets**



Sailing benefits

- **Sailing is an effective instrument for CO2 reduction in real life, but only partially utilizable in a WLTC due to speed tolerances**
- **Test fleet results show significant CO2 reduction in real life while achieving also higher NVH comfort.**
- **In the WLTC with predefined profile and tolerances the vehicle often can not follow its natural coast. Therefore sailing opportunities shrink relative to real life. The measured CO2 reduction benefit is about half of the real driving reduction.**
- **Sailing is cost efficient, easy to implement measure for CO2 reduction in real life. Should be considered in test cycle as well as in certified CO2 value.**

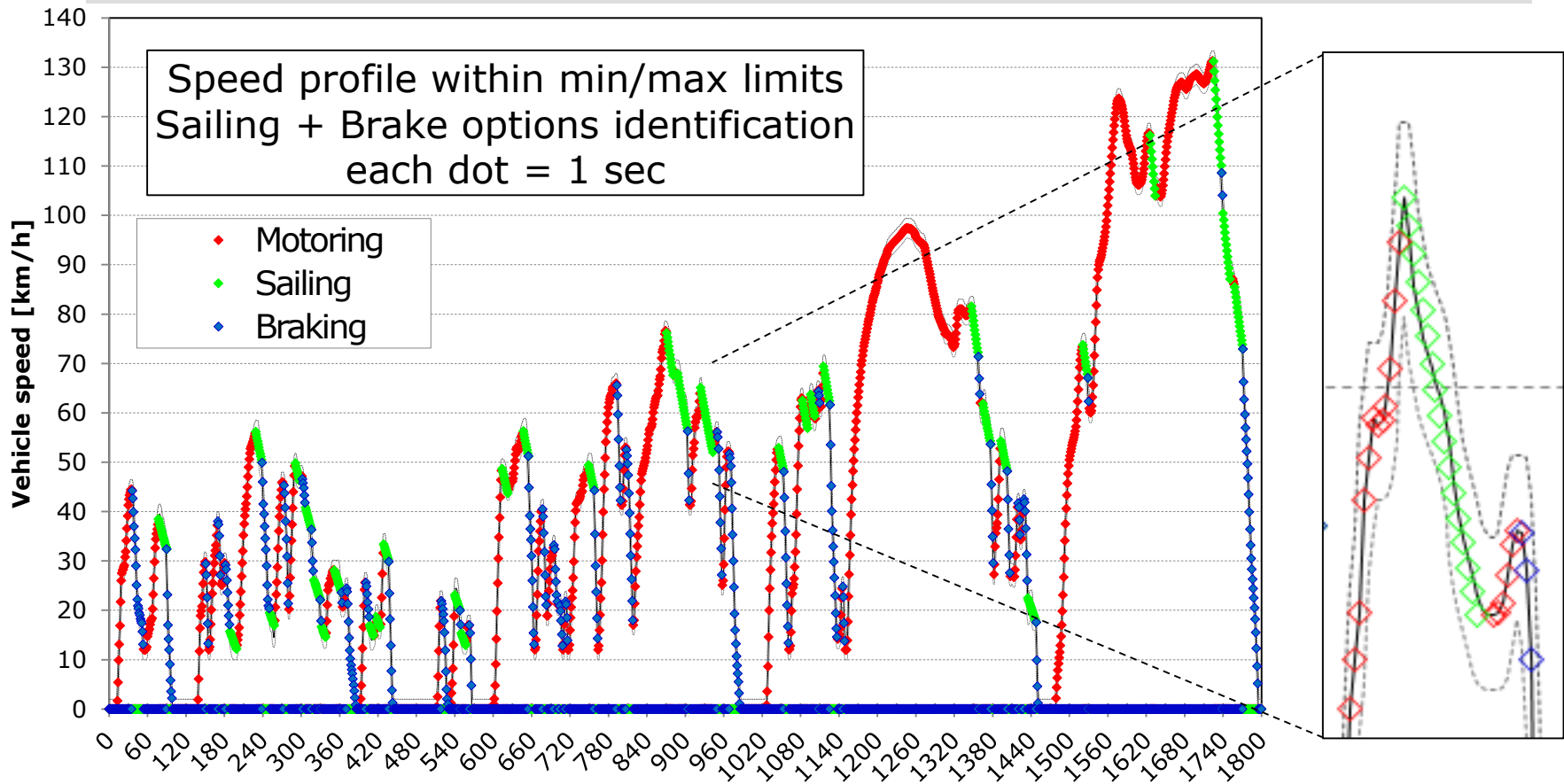


Consideration in WLTP

- **The current GTR gear shift prescription does not foresee sailing. It assumes a “traditional” shift down behavior while decelerating**
- **For encouraging drivers to use the sailing feature, an additional driver indication by an instrument is recommended for MT’s.**
- **Consideration in WLTP would require such an indication.**
- **The combination of an adequate gear shift prescription and driver indication defines the test accurately and allows test repeatability.**



Example: Sailing Simulation in WLTP



sec Stop duration	sec Sail duration	sec Brake duration	sec Motoring duration
234	334	288	944

- **Start of coast is defined at nominal speed**
- **Stop of coast is within tolerance limits**
- **Positive & negative speed trace deviations compensate each other roughly while sailing**
- **334 sec of natural coasting in 32 events**



Thank you!



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