

HGV Accreditation Scheme - Testing

Gas Vehicle Workshop

16th May 2016

Phil Stones – Chief Engineer - Powertrain



Millbrook History

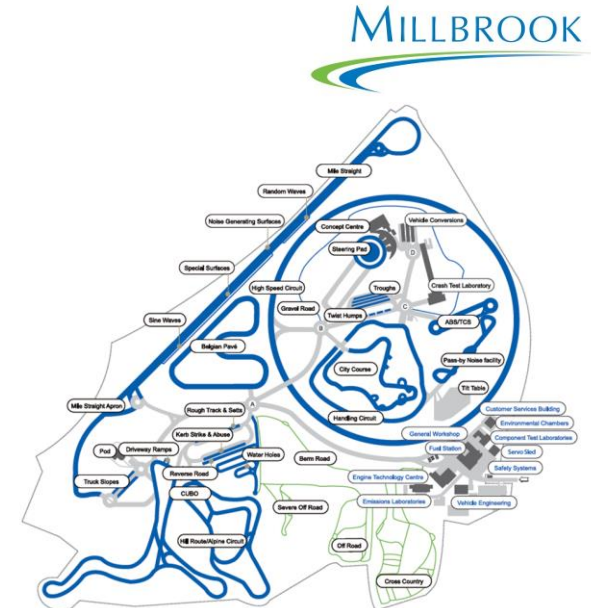
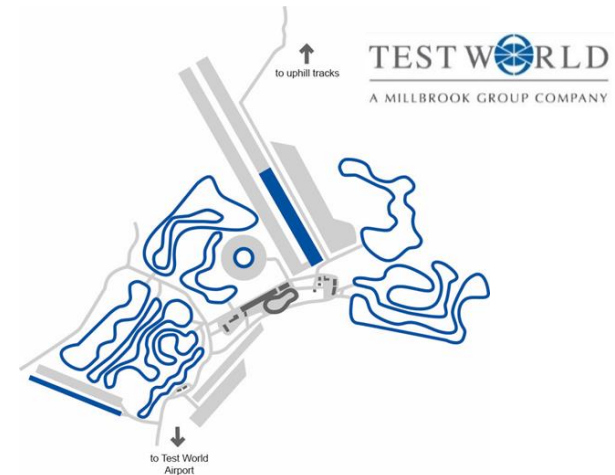


Globally over 480 employees
Revenue > €60m

Executive Overview



- Millbrook Group consists of two unique established proving grounds in Europe, Millbrook in Bedfordshire and Test World in Ivalo Finland.
- Providing both summer and winter testing all year round.
- Primary business activities focus on whole vehicle, powertrain, component and tyre testing.
- Under new independent ownership and making significant investments.
- Helping customers to develop vehicles that are:
 - Less polluting,
 - Safer, more durable,
 - More comfortable, and
 - Compliant with regulations.
- Specialist vehicle conversions business.
- Centre for international events.
- Growing Technology Park
- Independent and impartial in everything we do.



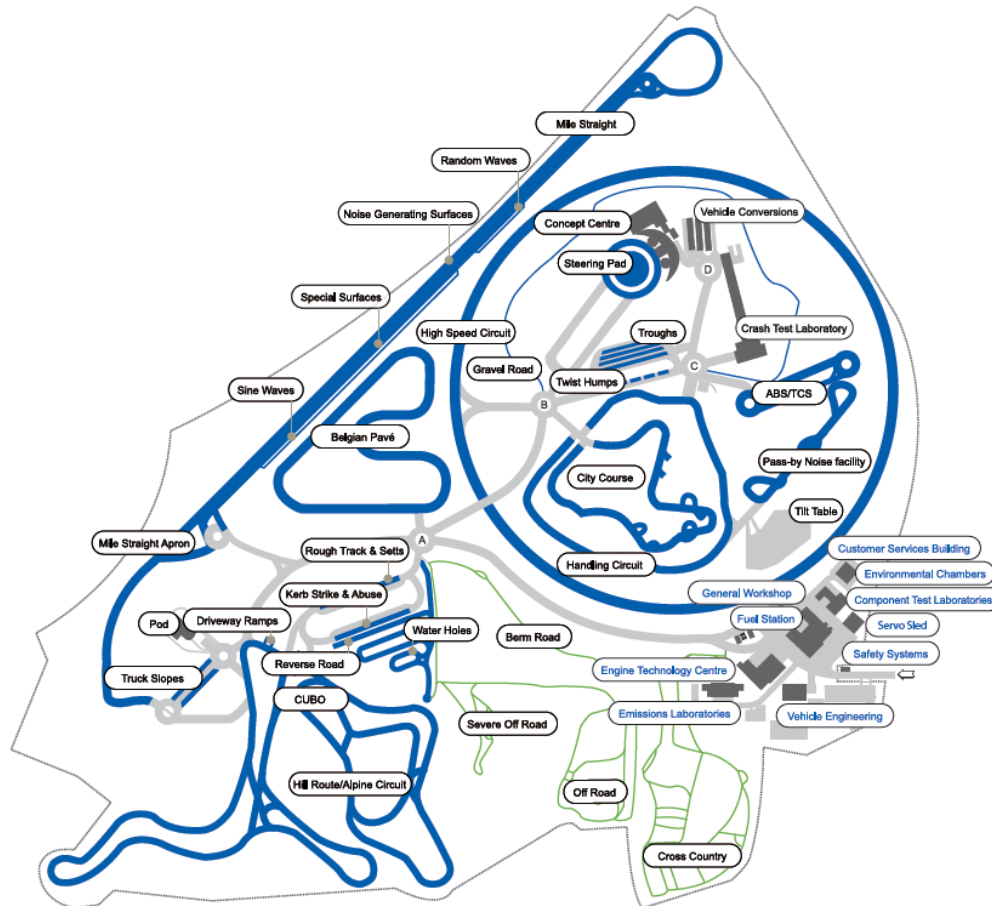
Powertrain Testing Capability

- Sixteen engine test cells
- Light duty chassis dyno for emissions testing
- Heavy duty chassis dyno for emissions testing and climatic
- Three PEMS systems
- Extensive track facilities
- Department of 75 people with extensive experience.



HGV Accreditation Test Process

- Worst casing meeting to understand technology and appropriate approach.
- Testing based on whole vehicle operation on a proving ground.



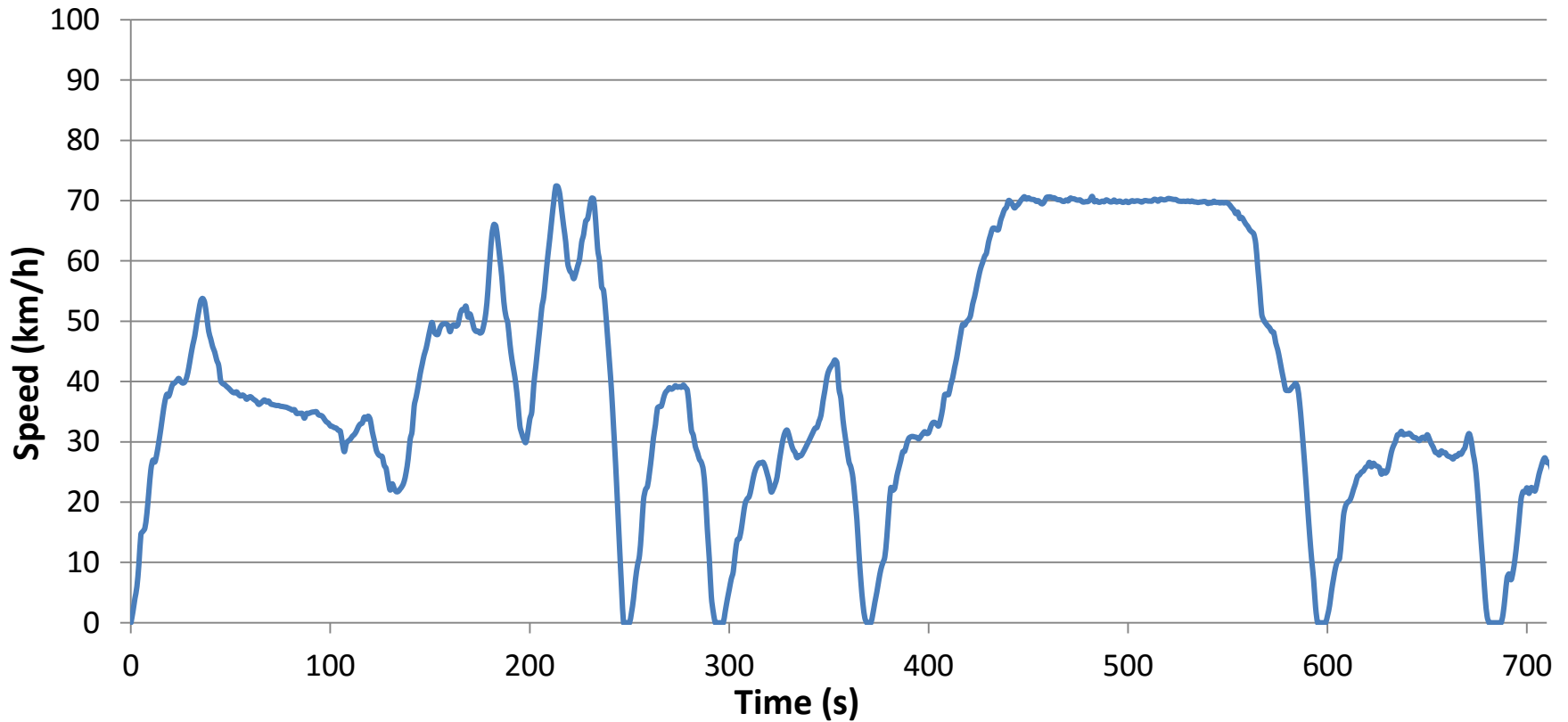
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Vehicle & loading	Long Haul	Regional Delivery	Urban Delivery
12t rigid - unladen	0.15	0.27	0.72
12t rigid - reference load	0.15	0.27	0.71
12t rigid - fully laden	0.15	0.27	0.71
40t artic - unladen	0.15	0.26	0.67
40t artic – reference load	0.15	0.25	0.67
40t artic – fully laden	0.15	0.24	0.67
Overall average KI (per km)	0.15	0.26	0.69
Characteristic Acceleration (CA, ms ⁻²)	0.08	0.11	0.15
Aerodynamic Speed (AS, km/h)	82	75	53

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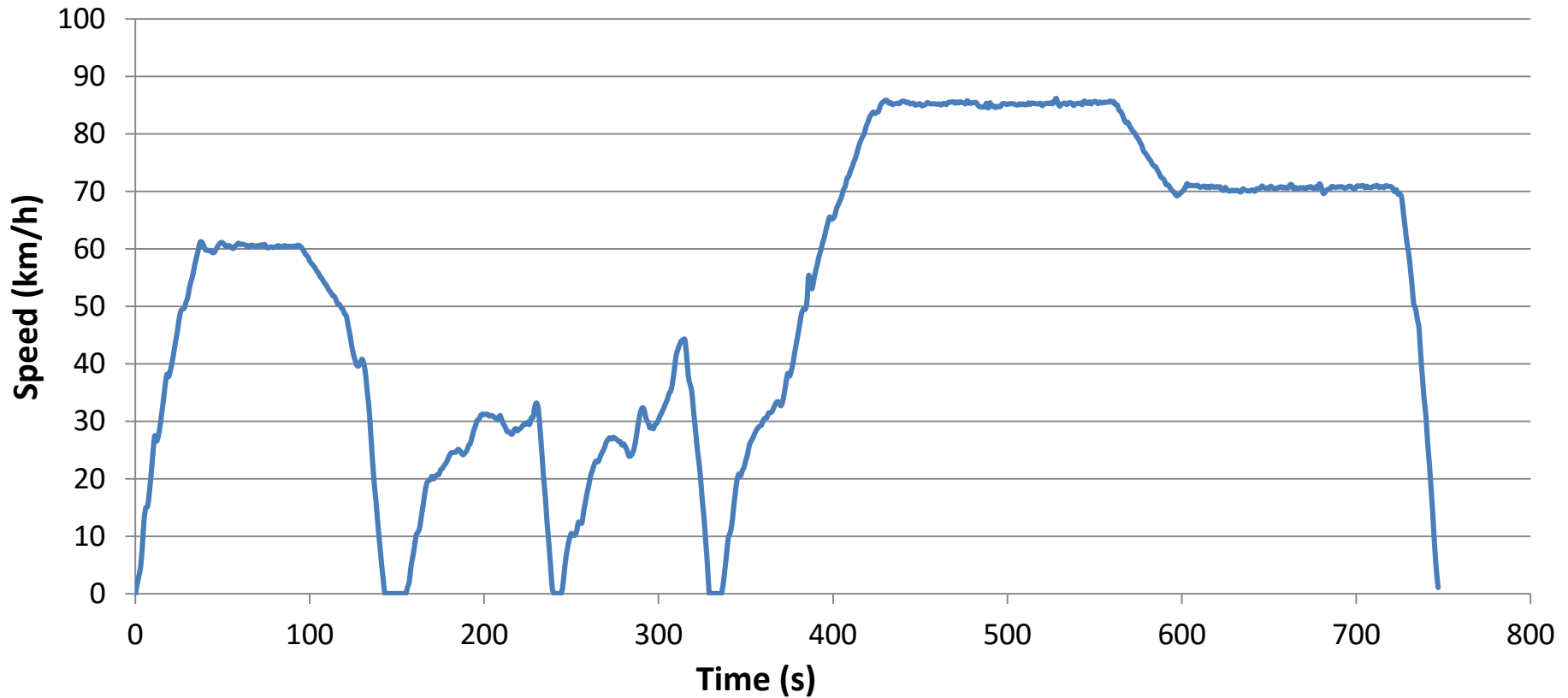
Millbrook Urban Cycle



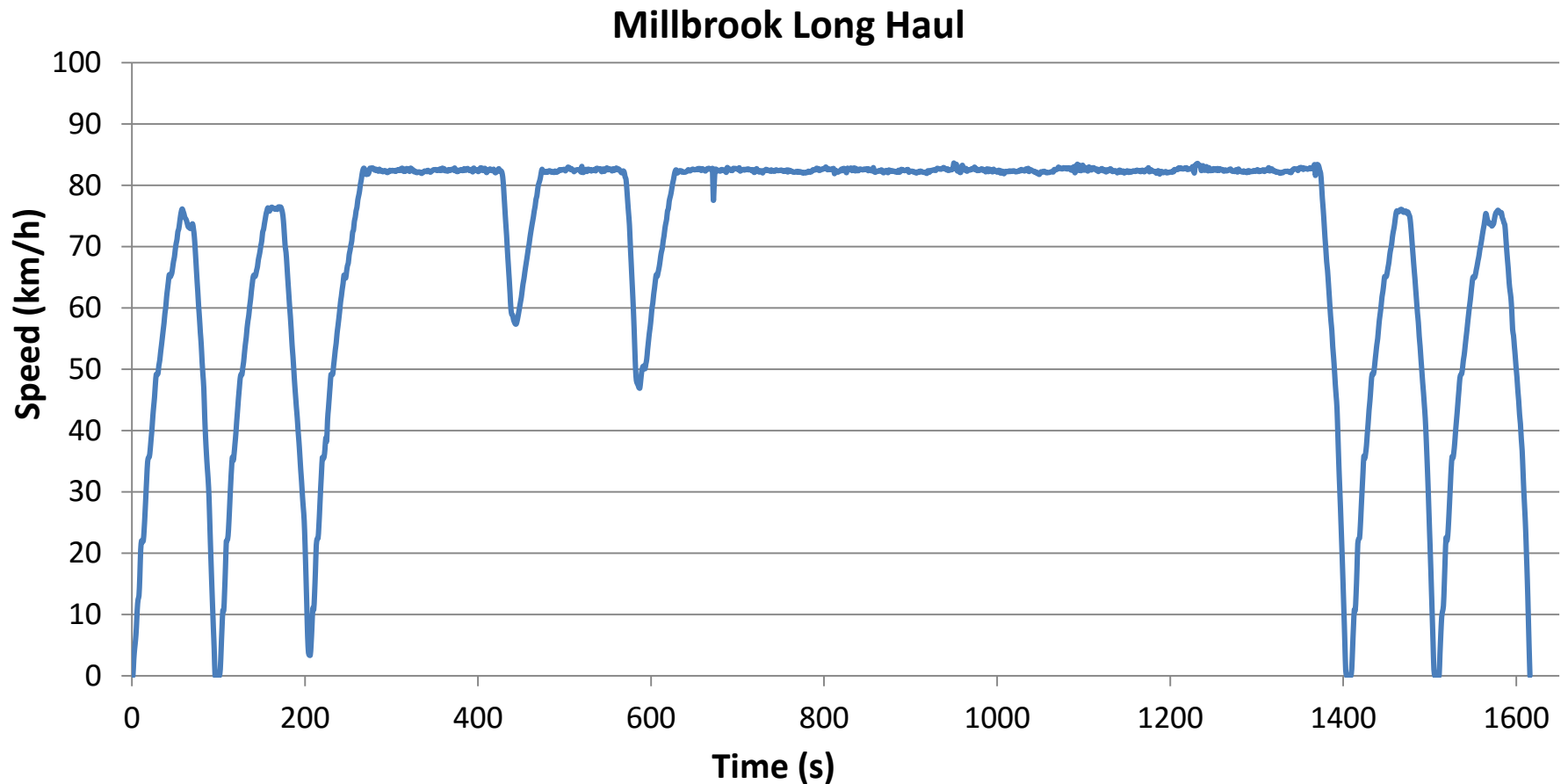
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Millbrook Regional Delivery



HGV Accreditation Test Process



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- Two similar vehicles required with one to act as the trial and the other as a control.

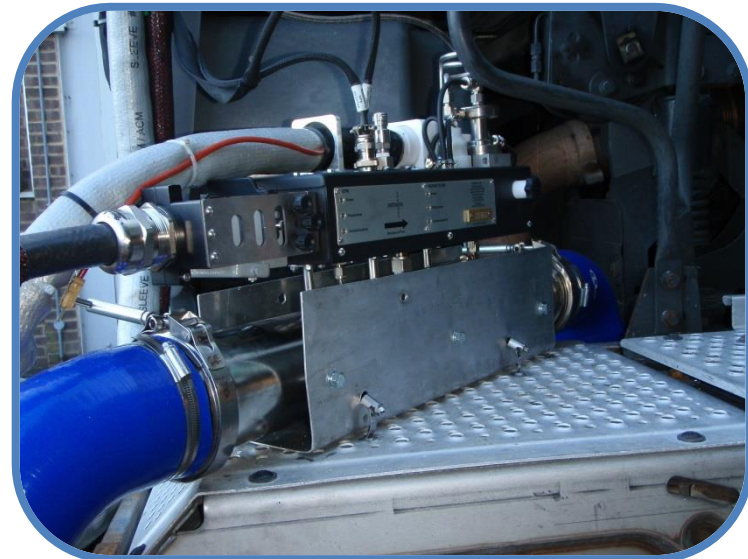
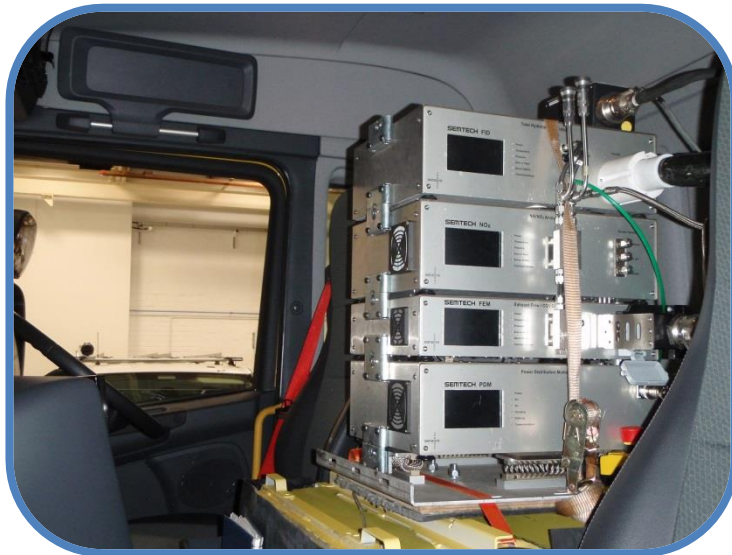


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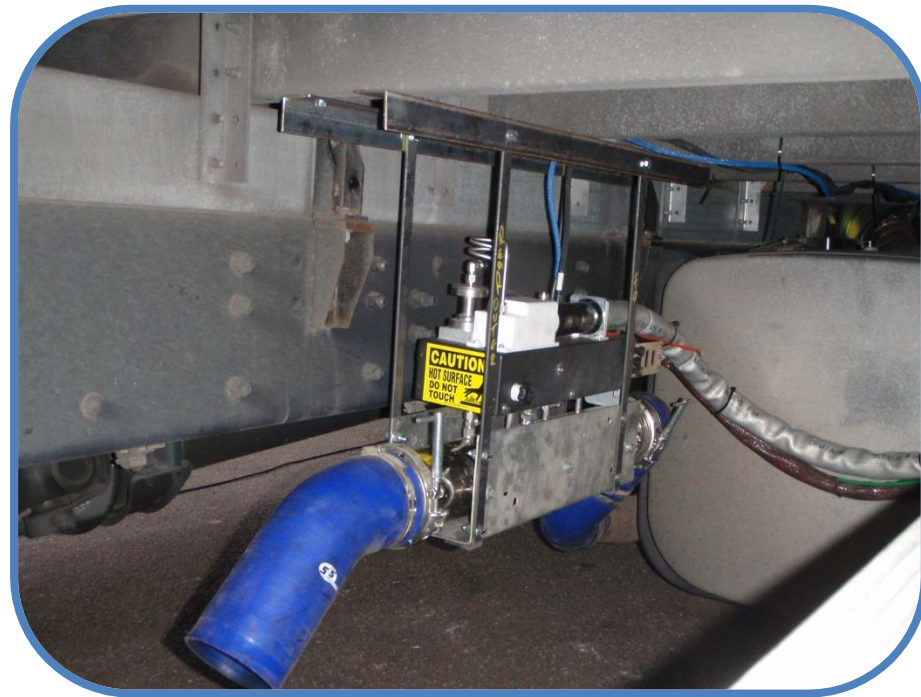
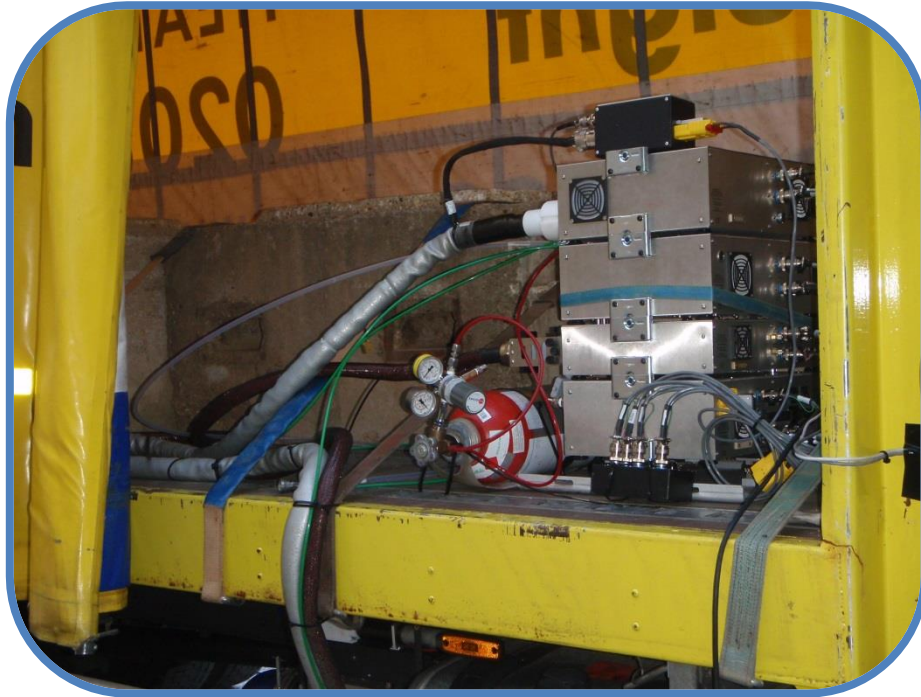


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- Vehicles or trailers ballasted to 50-60% of payload.
- Trial vehicle fitted with PEMS installation and Control vehicle fitted with a fuel flow meter.

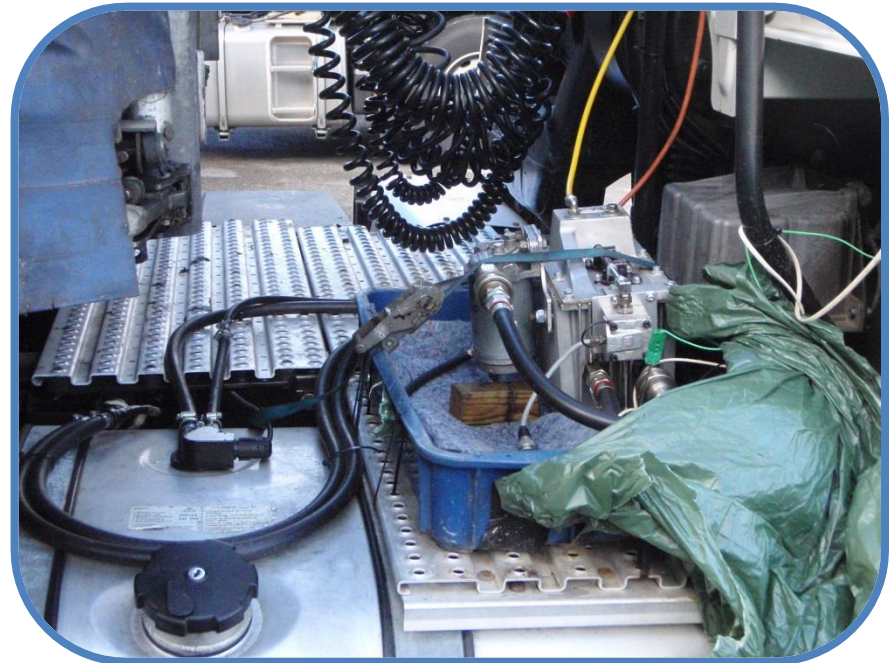
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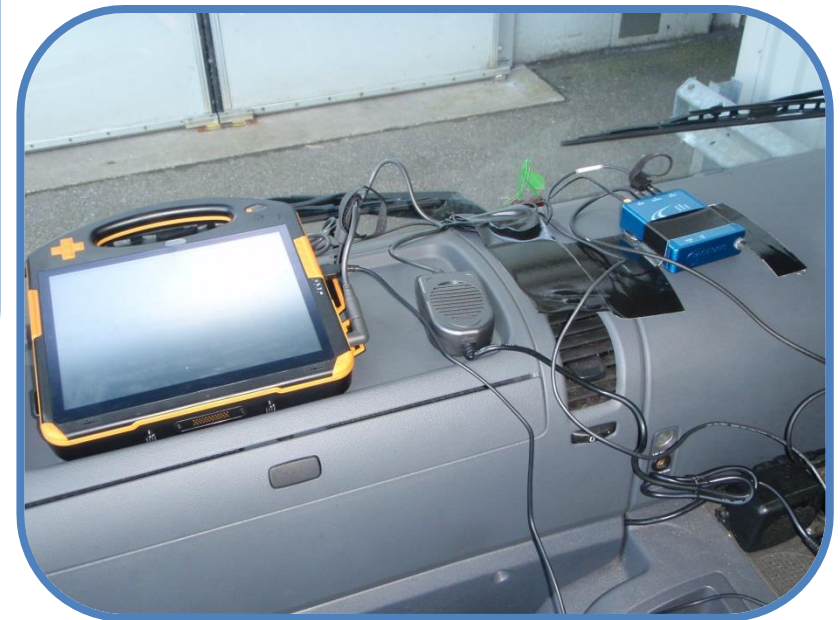
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- Two similar vehicles required with one to act as the trial and the other as a control.
- Vehicles or trailers ballasted to 50-60% of payload.
- Trial vehicle fitted with PEMS installation and Control vehicle fitted with a fuel flow meter.
- Control truck used to correct for any atmospheric affects with any statistical difference used to correct the trial trucks fuel consumption.
- PEMS on trial vehicle measures HC (ideally CH₄ as well), CO, NO_x, NO, NO₂, CO₂, Fuel Consumption.

HGV Accreditation Testing



- Testing weather dependent for consistency.
- Trained drivers used and same one used throughout on each vehicle.
- Tyre pressures and fuel load corrected before each run.
- Equipment calibrated (verified against our approved chassis dynamometer test cells).
- Testing conducted on a consistent fuel.
- Testing conducted from a hot start.
- Repeat test runs conducted to allow statistical outliers to be omitted and then the remainder to be statistically analysed.

- Trial truck results corrected if statistical changes seen in the control trucks fuel consumption.
- Results reported in g/km or l/100km (approx mpg = $282/[l/100km]$)
- CO₂ is corrected for methane emissions. CO₂ equivalence of 25 times (1g of methane = 25g of CO₂).
- Results given for HC, CH₄, CO, NO, NO₂, NO_x CO₂, Fuel Consumption
- Using T-Table statistics the baseline and Trial condition results are statistically analysed to 95% confidence intervals to identify if change is significant or not.
- Results published in a comprehensive test summary.

Things to note

- The testing is weather dependent which can cause delays.
- The testing will typically take one week.
- The vehicles need to be suitably run in and in a sound operating condition.
- The approach taken will depend on the vehicle type and product that is being tested.
- Design of exhaust may impact instrumentation time.
- Curtain sider or flatbed trailers easier to load.
- Millbrook can source trucks and trailers if required.
- CNG refuelling needs to be considered.

Thank you for your attention



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