Motive Lab
All Weather Climatic Chamber and Chassis Dynamometer Test Facility

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Kevin Dickson, P. Eng.
Vehicle Technology Research Professional
Project Charter
MotiveLab™

• MotiveLab is a 7000 sq. ft. Climatic and Integrated Dynamometer testing facility located at Red River College’s Notre Dame Campus, co-located in the Vehicle Technology Research Centre.

• Capable of accommodating large vehicles, E.g. on-highway coach. Overall Chamber room size: 61’ Deep, 21’ Wide, 17’ high. Main Door Size: 13’ Wide 14’ 7” high

• Two main modes of operation – Closed loop and Open loop
MotiveLab™ - Thermal

• MotiveLab has thermal capability of producing a chamber temperature range of -40°C to 50°C ( +/- 1°C) year round.

• In a Static operation (i.e. no additional heat being generated) the temperature can be maintained indefinitely.

• In a Dynamic operation the Chamber can maintain -40°C for up to 15 minutes under a 650 hp load (1.63 M BTU’s).
Outside Winnipeg Temperature June 20th - 28°C
Thermal Equipment Facts

• Low Temperature Chiller:
  • Operating Weight – 34,000 lbs.
  • Size – 247 Tons (Average Home A/C – 2.0 Tons)
  • Refrigerant – RG - 507 ( 4800 lbs.)

• Brine Tanks:
  • Full Weight – 135,000 lbs. (each)
  • Capacity – 33,000 Liters (each) - Dynalene HC-50
  • Height – 30’

• Main Chamber Fan:
  • Rating - 125 HP
  • Weight – 10,300 lbs.
  • “Wind Effect” – creates 50km/h at full speed within the Chamber

• Main Brine Pumps:
  • Flow Rate – Max 95l/s
  • 100 HP

• Vehicle Exhaust Fan
  • 100 HP
  • Flow Rate – 23731 CFM
Main Chamber Fan

One of 2 Brine Storage Tanks
Make-Up Air Unit

Chamber PLC Control Rack
MotiveLab™ - Chassis Dynamometer

• Integral 3 Axle Chassis Dynamometer, 2 Stationary Axles (Tandem Axle Configuration), one adjustable.

• Capable of 650 HP continuous (to the Rollers) with up to 1800 HP for short durations (E.g. To produce a Torque Curve).

• Regenerative AC motors, resulting in fast response times and ground topology simulation.
Dynamometer Equipment Facts

• **Dynamometer Weight Capacity:**
  • Maximum Axle Weight: 30,000 lbs./Axle

• **Axle Spacing:**
  • Width: 95” Outside dimension – all three Roller sets
  • Tandem Axles (Center to Center Roller Spacing): 62”
  • Adjustable Axle (Center to Inner Tandem Rollers): 102” to 133”

• **AC Regeneration:**
  • Dynamometer has the capacity to Regenerate enough Power to run the Dynamometer and Cooling system with minimum Utility Power Draw.

• **Resistor Load Bank:**
  • Continuous 1.25M BTU’s load dissipation capacity
Dynamometer Roller Configuration (Fully Retracted)
Dynamometer Roller Configuration – Extended
Sample Screenshot for Dynamometer Control
Terrain Profile Example
Resistive Load Bank

Dynamometer and Chamber
Power Control Racks
Additional Opportunities

• Given the large capacity of the Chamber there have been several other opportunities outside of Heavy Vehicle testing. Some examples include:

  • Validation of Large Stationary Equipment that is required to operate over a wide temperature range.

  • Personal Mobility testing and Equipment functionality – E.g. First responders with all the gear they need to carry in all temperatures.

  • Film Industry – when requiring consistent and secure sets.
Typical Tests

With the ability to reproduce temperature and terrain profiles, iterative design changes can be validated.

Some Typical testing scenarios could include:

• HVAC Verification on Transit and On-Highway Coaches (Drawn Down/Up Testing)
• Emissions Testing.
• Range Tests (Diesel and Electric)