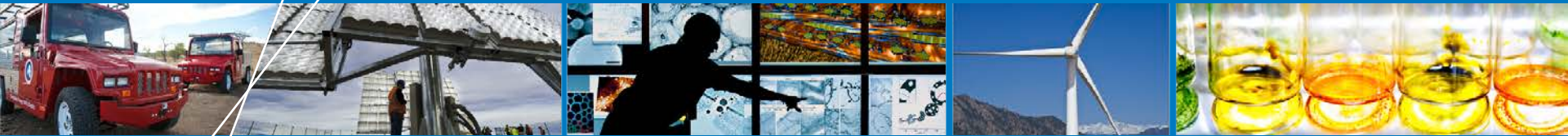


NGV Fuel and Fuel Systems

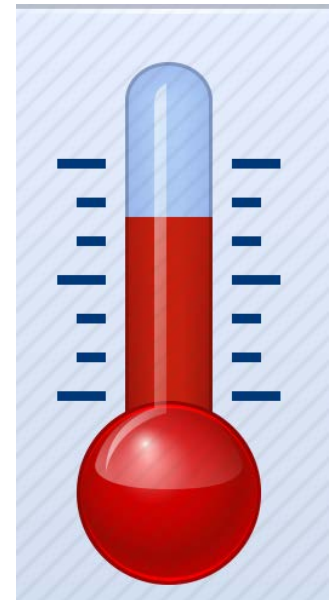


Margo Melendez

7/25/17

Temperature Compensation and Full Fills

- **Defining a full fill with temperature compensation**
- **Greater understanding of heat of compression**
- **Dispenser Controls and safety protocols**
- **Understanding tank types and affects on full fill**
- **Drive perception of full and temperature compensated fuel gauges**
- **Gas composition affects on temperature compensated full fills**



Tank Safety – CNG End of Life Characterization

- Very common to have tanks in service past their manufacturer's defined useful life.
- Tanks are generally designed with a large margin of safety.
- Understand the safety risks of the tanks in service past their useful life (no tank failures recorded to date were due to fatigue of tank).
- Initial testing at Digital Wave Corporation to better understand risks:
 - All transit tanks from LA Metro (non-harsh application)
 - All tanks that were burst tested met the pressure requirement defined for initial manufacture
 - Unable to complete the fatigue cycling tests due to budget
- **Would like to continue testing once able**
 - Tanks at end of life from more severe use
 - Fatigue cycling to better understand risk



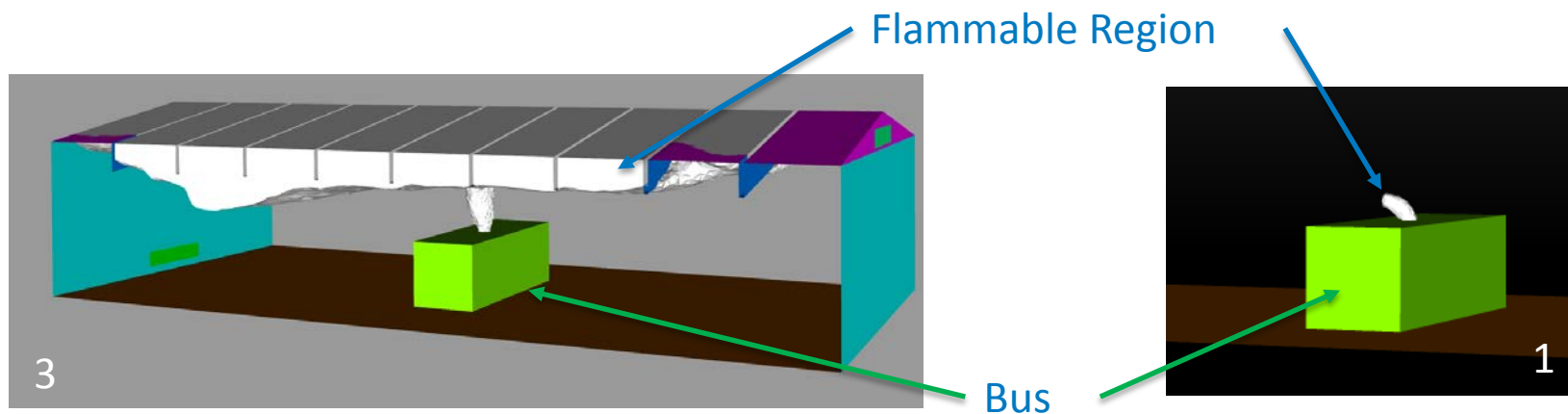
CNG Tank Requalification

- **After better understanding tank integrity at the end of useful life, explore tank requalification for service.**
 - Non destructive testing method to requalify tanks
 - Modal acoustic emission analysis
- **Benefits of tank requalification**
 - Safety
 - Cost reduction to end user/owner
- **Concerns of tank requalification**
 - OEM business
 - CSA voiced concerns



Gas Release Analysis

- Understanding garage safety and other tank leak/venting implications
 - Fuel system line cracking
 - Tank over pressure from external fire
 - PRD fails to open
 - Tank fitting failure



Smart Technology and Tank Monitoring

- **Tank Monitoring**
 - Understanding the life of the tank
 - Alert if a failure is imminent
 - Tank temperature and size
 - Integrated OBD and telematics devices
- **Real-time communication and monitoring**
 - Communication with infrastructure
- **Tank to infrastructure communication**
 - Safety
 - APIs for databases
 - Efficiency improvements

Other topics

- **Lower cost storage is critical**
 - ARPAe adsorbed technology research
 - CEC storage projects for CNG
- **Fuel Quality**
 - Dealing with composition variability
- **RNG**