Overview

- Engine Brake Description & Use
- Vehicle and Engine Brake Noise
- Focus on Mufflers & Configuration
- What is Jacobs Doing
- Community Concerns & Actions
What is a Jacobs Engine Brake™?

- Supplemental vehicle retarding device
- For diesel-powered vehicles
- Mounted on engine overhead above valves
- Converts a power-producing engine into a power absorbing air compressor by opening exhaust valves at or about compression top-dead-center (TDC).

Jacobs Model 340B for Caterpillar 3406E Engine
Who Uses Engine Brakes

North American Engine Brake Penetration
Class 8 Trucks

Additionally, engine brakes are also used on buses, vocational and off-highway equipment.
Jacobs Product Applications

CATERPILLAR

Cummins

DETROIT DIESEL

DAF

DAEWOO

HINO

MITSUBISHI MOTORS

HYUNDAI

RENAULT
Why Use Engine Brakes?

- Controls vehicle speed with minimal use of wheel brakes on downhill grades, in flatlands and in traffic.
- Minimize speed differential between cars and trucks.
- Reduces wheel brake maintenance frequency and cost and increases tire casing life.
Why Use Engine Brakes? (continued)

- **Total Integration of engine brake into specialized vehicle control systems:**
  - Cruise Control
  - Collision Warning Systems
  - Auto-shift transmissions

- **Engine Brake activation is automatically controlled by these control systems**
  - Driver cannot deactivate
Why Use Engine Brakes? (continued)

- Helps to prevent dangerous brake overheating & fade
Proper Exhaust System Configuration is the Answer
Vehicle Noise Sources

- **Exhaust Noise**
  - Engine Combustion Noise
  - Engine Brake Noise

- **“Rest of Truck” Noise**
  - Tire & Road Noise
  - Intake & Turbo Noise
  - Fan & Mechanical Noise
  - Drive Train Noise
  - Chassis Noise

Engine Brake Noise is a component of exhaust noise and is similarly controlled with a functioning muffler.
Sound Pressure Levels - Human Perception

dB(A) Scale

150
Jet Aircraft @ 50 ft.

110-115
Loud concert for an attendee

96-101
Truck with no muffler @ 50 ft.*

80-83
Truck with OEM Muffler @ 50 ft.*

60-70
Normal Conversation @ 3 ft.

0
Threshold of Hearing

* Range of Truck Noise Level in Full Acceleration and Full Braking
Characteristic Engine Brake Sound

- Created by sudden release of high pressure air into exhaust manifold
- Distinctive and easily recognized.
- Generally described as a staccato sound or “Bark”
- Usually slightly higher noise level in retarding than in acceleration
- Much higher noise level for defective mufflers and no mufflers.

Not a large difference between engine brake and acceleration sound levels, but a very noticeable difference when the engine is properly muffled.
Focus Should Be On Mufflers

• *Install and Maintain Proper Mufflers:*  
  – Controls noise during acceleration as well as braking  
  – Drivers exposed to less on-the-job noise  
  – Local residents exposed to less noise
Controlling Engine Exhaust Noise

• Proper engine exhaust system maintenance is the key to controlling engine brake sound levels
  – Lack of mufflers are the worst offenders by a significant amount
  – Use of proper muffler, outlet pipe and orientation for the vehicle as specified by vehicle builder and federal mandate
  – Higher performance mufflers are available if greater noise suppression is required

• Total vehicle noise is comprised of other factors in addition to engine exhaust noise.
Truck Noise Emission Control Regulations

• *EPA has regulated truck noise since the mid-70’s under 40 CFR Part 205*
  - New trucks are certified under a full throttle drive-by test.
  - Noise control performance of new vehicles must be warranted by the manufacturer to the end purchaser.
  - The manufacturer must communicate to the end user what constitutes “tampering” with the vehicle noise control system.
  - The manufacturer must also provide instructions to the end purchaser for proper maintenance, use and repair of the vehicle noise control system.
  - Tampering by dealers, repair personnel, end purchasers and operators is prohibited.
What has Jacobs been doing...

• Jacobs has been working with states and municipalities that have posted no engine brake signs to assist in implementing reasonable and effective noise control regulations and signs.

• A Truck Maintenance Council Task Force on Engine Brake Noise has been formed. It has developed a recommended practice for muffler noise control rating and marking to facilitate “proper” maintenance. Additionally, Jacobs has developed muffler identification guidelines for vehicle inspections.

• Jacobs is supporting the industry in exhaust noise research. Joint development between Jacobs and muffler manufacturers has resulted in premium, high performance mufflers.
Elimination of “No Engine Brake” signs has benefits

- Truckers will be free to utilize the safety benefits and cost effective engine retarding equipment they have come to depend on.
- Safer vehicles and therefore safer public roadways
- Increased vehicle productivity

- Any signage should address existing or new muffler requirements
Benefits to Community

- *Enforcement of existing muffler requirements or addition of state-specific muffler regulations will reduce noise.*
  - Colorado law HB1144 $500 fine imposed on commercial vehicles that do not have a muffler.
  - Oregon prohibits unmuffled engine brakes from being used, except in emergencies, otherwise fining drivers $500.
  - Maryland inspects vehicles for mufflers and will issue a $50 fine for the first offense (progressively higher thereafter), and requires re-inspection of vehicle for compliance before vehicle is allowed back on the roads.
Conclusion
What Can Be Done?

• Regulate when necessary the causes, not symptoms.
• Support enforcement of existing noise laws.
• Encourage use of proper mufflers and muffler maintenance procedures.
• Muffler identification procedures are available to inspect exhaust systems for proper configuration and condition.
• Implement muffler inspection as part of current roadside commercial inspections.