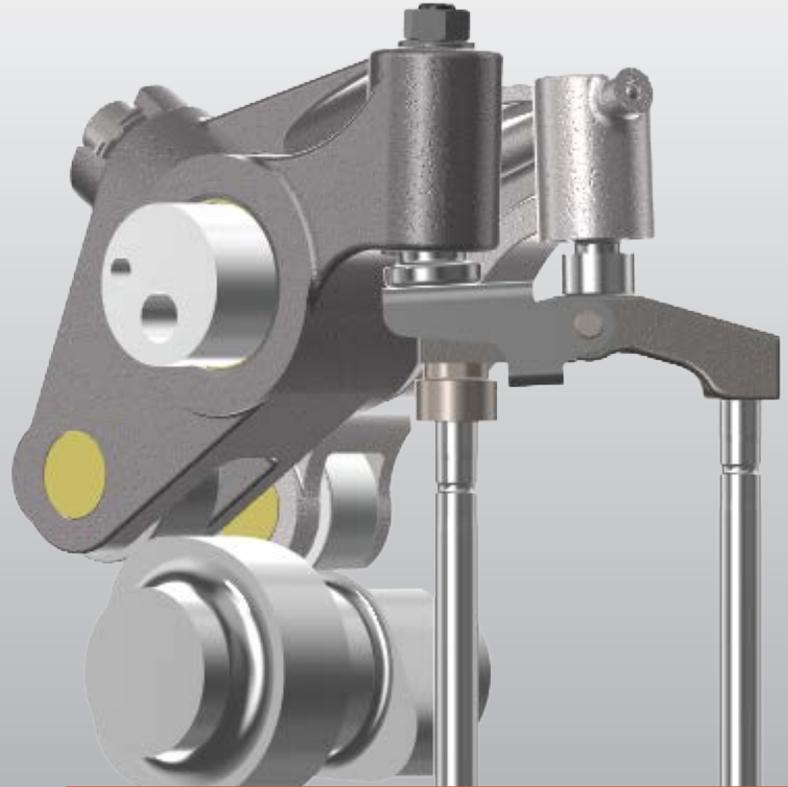




Jacobs Vehicle Systems®

LASHLESS

**Fulcrum Bridge
& Spring Bridge**



BENEFITS

- ▶ Enables the use of Hydraulic Lash Adjusters and a Jake Brake®
- ▶ Eliminates the need to adjust valve lash
- ▶ Increases vehicle uptime with reduced maintenance time and cost for operators
- ▶ Reduces noise, vibration, and harshness (NVH) due to improved valve seating
- ▶ Improves fuel economy and emissions
- ▶ Cam design optimization improves performance and efficiency with optimized seating ramps
- ▶ Suite of solutions available for any valvetrain
- ▶ Cuts production time and cost at the manufacturer's assembly line
- ▶ Simple, cost effective solution without compromise

LASHLESS VALVETRAINS WITH ENGINE BRAKING

Hydraulic Lash Adjusters (HLA) technology has been desired on heavy-duty engines to eliminate the need to set and adjust lash as well as to optimize the cam design to enhance engine performance and efficiency. Conventional engine brakes and HLAs are incompatible because the HLA will over-extend during braking causing possible valve to piston contact. Jacobs lashless technologies apply a reactive load to the HLA during an engine braking event to prevent over extension.

LEARN MORE
**Lashless
Technologies**



BENEFITS

Optimization of hydraulic cam design for improved performance and efficiency

A hydraulic cam design allows for optimization in the seating ramp areas which can lead to improvements in fuel economy and emissions. HLAs with Jacobs lashless technologies also allow for more consistent valve motions throughout all engine operating conditions.

Increases vehicle uptime with reduced maintenance time and cost for operators

Eliminating the need for setting lash in service will improve vehicle uptime for the operator, thereby improving Total Cost of Ownership. This is especially important for applications where valvetrain access is challenging such as off-highway applications in dirty environments.

Cuts production time and cost at the manufacturer's assembly line

Many times, setting lash on the assembly line is the bottleneck for engine production. This process is eliminated with the use of HLAs and Fulcrum or Spring Bridge.

Reduces NVH with improved valve seating

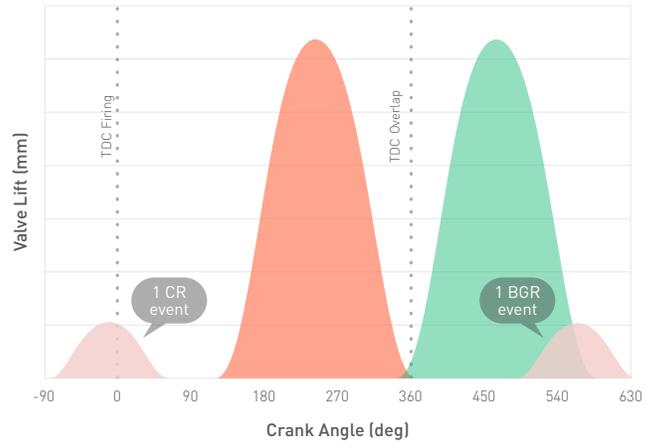
HLAs allow for better control of the valve seating event, thereby reducing the NVH associated with the valvetrain.

Offers a simple, cost-effective solutions without compromise

Jacobs lashless technologies such as Fulcrum Bridge or Spring Bridge are designed to work with conventional HLAs and various engine brake types.

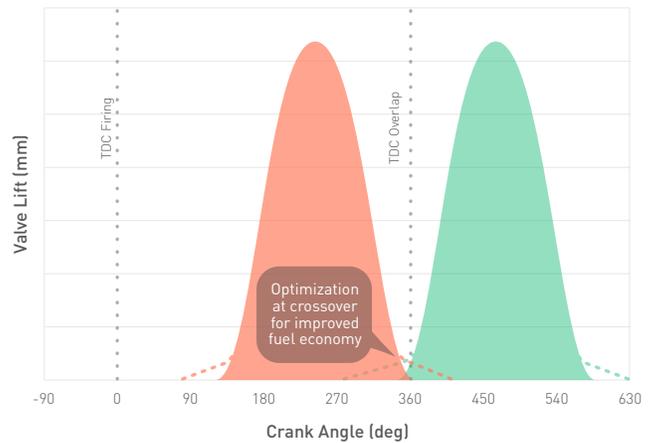
HOW IT WORKS

COMPRESSION RELEASE BRAKE VALVE MOTIONS



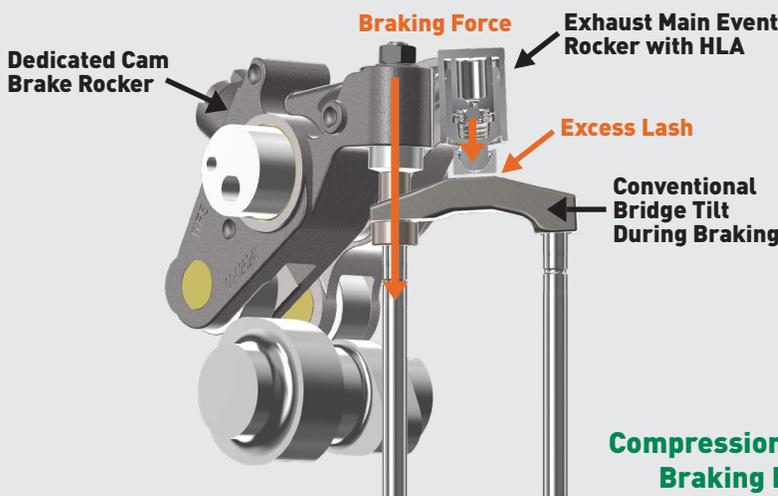
- █ Brake Exhaust Valve Lift
- █ Main Event Exhaust Lift
- █ Main Event Intake Lift

VALVE LIFTS WITH/WITHOUT HLA



- █ Main Event Exhaust Lift w/ HLA
- █ Main Event Intake Lift w/ HLA
- - - Exhaust Lash Ramp w/o HLA
- - - Exhaust Lash Ramp w/o HLA

Conventional Braking with HLA



Braking with Fulcrum Bridge & HLA

