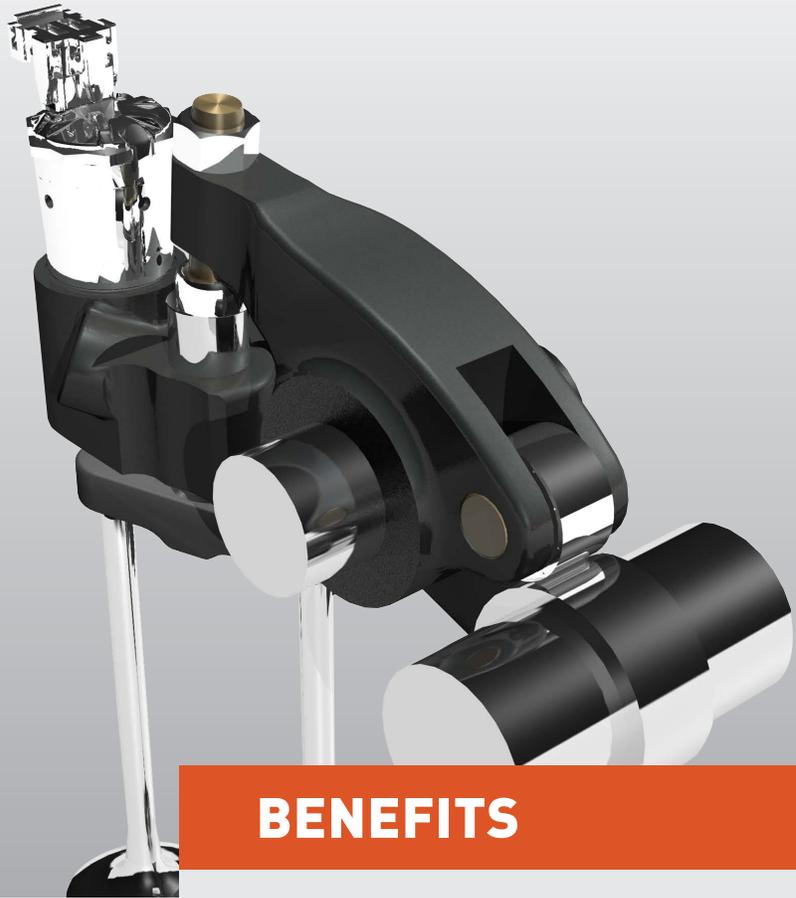




**Jacobs Vehicle Systems<sup>®</sup>**

# VVA

## Variable Valve Actuation



## FOR MEETING FUTURE EMISSIONS & FUEL ECONOMY TARGETS

Jacobs' Variable Valve Actuation and control systems bring you an entire suite of solutions to help achieve performance, fuel economy and emissions targets. This can range from fully-flexible valve trains to very specific, targeted variability.

### BENEFITS

- ▶ Lower emissions
- ▶ Optimized fuel consumption
- ▶ Improved transient response
- ▶ Aftertreatment temperature management
- ▶ Individual cylinder control
- ▶ Ease of integration
- ▶ Cycle-to-cycle response time
- ▶ Variable compression ratio
- ▶ Infinite braking modulation
- ▶ Mechanical valve life with no oil as a configurable option
- ▶ Scalable from automotive, medium and heavy duty diesel or natural gas engines to large diesel or natural gas engines

LEARN MORE  
**Variable Valve Actuation**

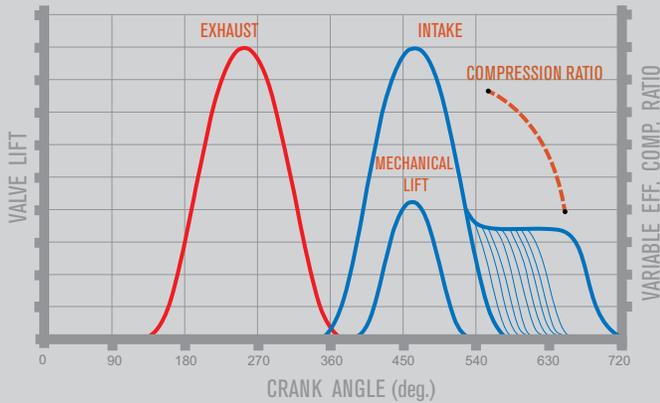


# EVOLVE VVA CAN OPTIMIZE YOUR ENGINE PLATFORM

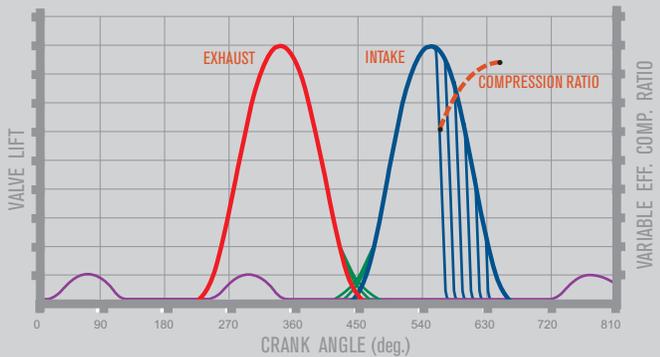
Variable Valve Actuation allows real-time adjustments to valve opening and closing, maintaining accurate control of valve motion. By creating a hydraulic link between the cam and the valve, VVA precisely tunes the engine across its operating range. This allows the engine designer to extract superior performance from the engine.

VVA is one of an engineer's most powerful and cost-effective tools for accomplishing vehicle system performance goals: meeting tightening fuel economy standards while maintaining emissions and lowering overall engine systems costs. Elegant in its simplicity, Jacobs' VVA provides a means to achieve desired valve movement, integrating with minimal impact to engine overhead designs. The accumulator is an oil storage device; a spring-loaded piston enables the VVA system to respond instantly to changes in operating conditions.

## Intake VVA (Late Valve Closing)



## Intake VVA (Early Valve Closing)



## HOW VVA WORKS

### HIGH SPEED SOLENOID VALVE

The High Speed Solenoid Valve has been developed for both high-flow and fast actuation to handle the response needs of today's dynamic engine requirements. Designed for the life of the engine, it is the heart of the system.



### VCU

The Valve Control Unit (VCU) is designed to mount on the engine and respond to the ECM's valve timing commands on a cycle-by-cycle basis by controlling the high speed solenoids. It is the brains of the VVA system.



### SAVC

VVA systems that do not seat valves using cam ramps must use an alternate device. Jacobs' series of SAVCs accomplishes this critical function. These hydraulic valve seating dampers automatically adjust for lash to compensate for assembly tolerances, wear and, thermal growth.



### VARIABLE COLLAPSING ELEMENT

This device provides the hydraulic link between the cam and the valves, allowing control of varying valve elements.



### ROCKER ARM

This modified version of a stock rocker arm includes bias spring assembly - elevated for packaging purposes.



### ACCUMULATOR

The accumulator is an oil storage device; a spring-loaded piston enables the VVA system to respond instantly to changes in operating conditions.



### HPCV

The High Pressure Check Valve allows for added oil supply to the variable collapsing element when required per system dynamics, as well as providing checked high-pressure return flow.

