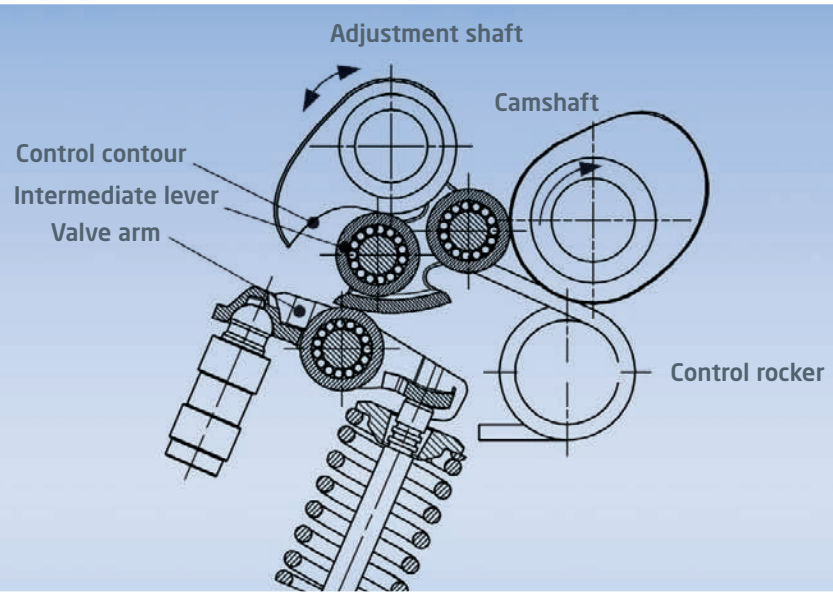
Fully Variable Mechanical Valve Control System

For Continuous Variation of Valve Lift and Duration

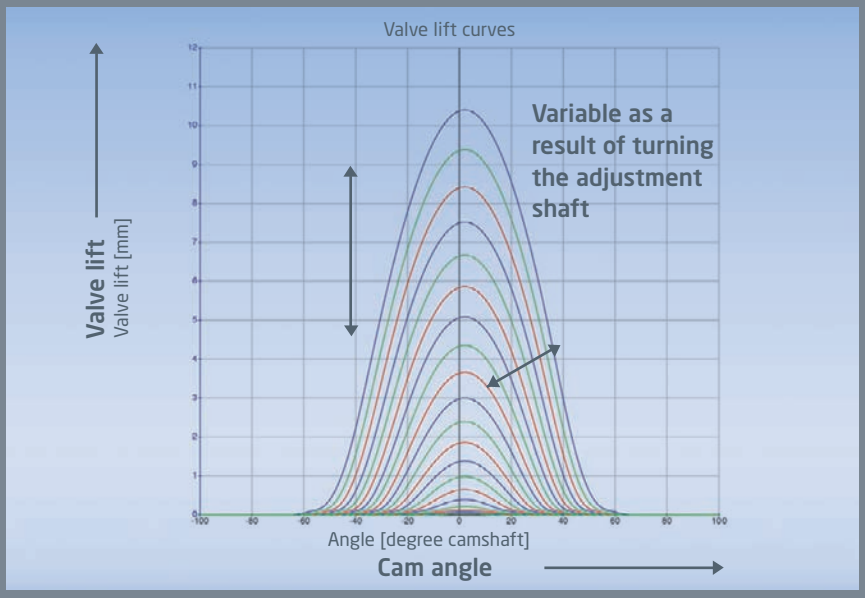


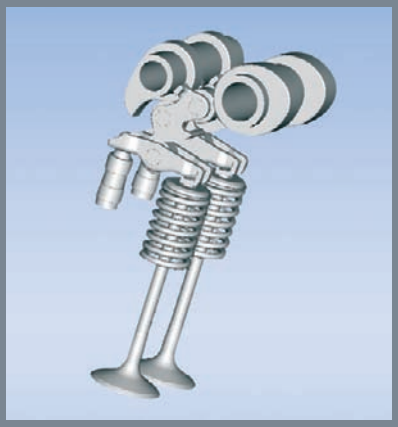
Why Mechanical Fully Variable Valve Control?

- Enhanced efficiency as a result of improved control of gas exchange at part and full load
- Robust and easy to control
- Good system energy balance with reduced operating energy input owing to valve lift control in part load range
- Use of conventional technologies for material treatment, assembly, maintenance, development and testing
- Relatively minor alterations to engine set-up and vehicle (e.g. 14V on-board electrical system retained)
- Proven suitability of fully variable mechanical valve trains for mass production

Variable Mechanical Valve Control increases the efficiency of internal combustion engines:

- *Reduced gas exchange losses*
- *Reduced mechanical operating energy input at part load*
- *Increased charging efficiency*





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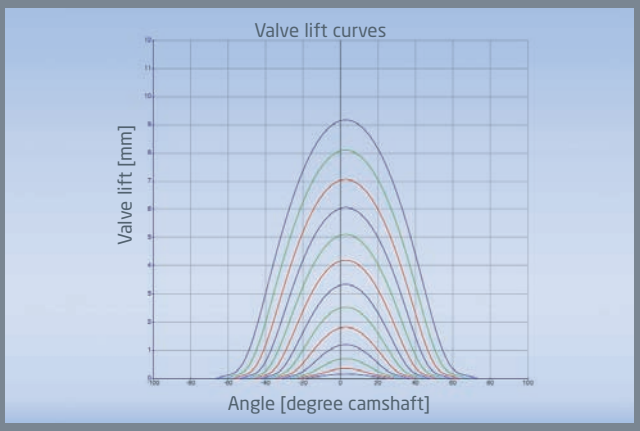
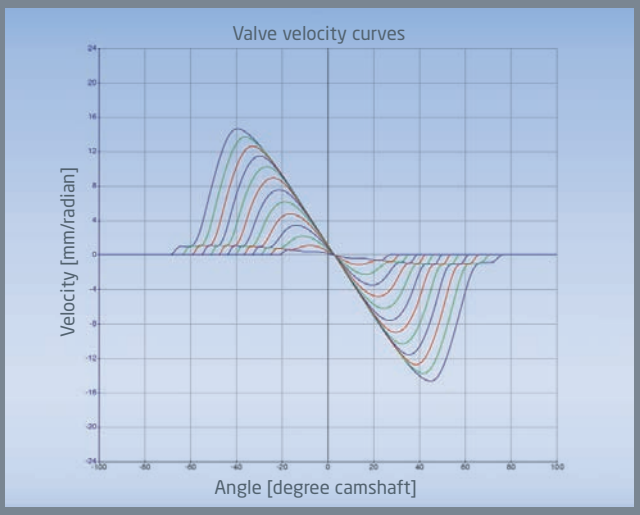
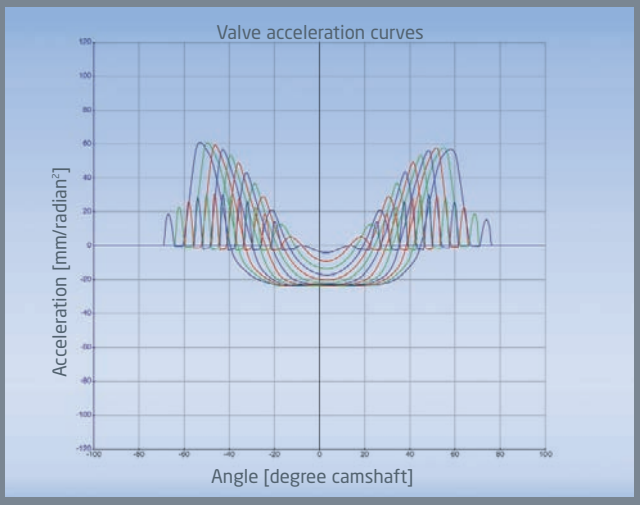


Valve lift



Valve velocity



Valve acceleration

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The Operating Principle

- Valve lift and valve duration changed by turning the control contour
- Zero lift at maximum angle of adjustment

Valve Lift in Relation to Position of Adjustment Shaft

As a result of the cam-related deflection of the control rocker, the intermediate lever moves along the base circle of the control contour until contact is made. Once in line with the control contour configuration, the intermediate lever is moved in the direction of the valve lever, at which point valve lift begins. The lifting movement continues as a result of the combined effects of the cam contour and the control contour until maximum lift is achieved at the cam. By turning the control shaft, it is possible to alter the duration, lift of the valve and lifting dynamics.

Zero Lift Movement

If the system is set for zero valve lift, the intermediate lever moves along the base circle of the control contour. Drive is determined by the cam moving the control rocker. Provided that the intermediate lever is not brought into contact with the control contour, there is no deflection in the direction of the valve lever. A return spring is necessary to keep the cam follower continuously in contact with the cam; the ideal position of the return spring is on the control rocker. Depending on the package available, the position can be chosen to suit design-specific requirements.

Valve Control – IAV Scope of Services

- Design and layout
- Calculation of complex valve kinematics
- Dynamic analysis
- Prediction of thermodynamic potential
- Prototype construction
- Mechanical development
- Function development
- Engine calibration

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