i-VTEC (intelligent- Variable Valve Timing and Lift Electronic Control)

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3 Issues for the Future Automobile:

- Energy Supply & Demand Sustainability
- Climate Change
- Urban Air Quality
Transportation’s Social Issues

Key Issues

Air Pollution

Climate Change

Energy Sustainability

Social Concerns
FEW ADVANCEMENTS IN AUTOMOBILE ENGINES

• Common Rail Diesel Injection System (CRDI)
• Direct Injection System (DI-System)
• Multi Point Fuel Injection (MPFI)
• Digital Twin Spark Injection (DTS-I)
• Quantum Core Engine
• 16 Valve Engine
• Programmed Electronic Fuel Injection (PGM-FI)
• Six Stroke Engine
INTRODUCTION

- i-VTEC (intelligent-Variable valve Timing and lift Electronic Control)

- The name is derived from ‘intelligent’ combustion control technologies that match

1. Outstanding fuel economy
2. Cleaner emissions and
3. Reduced weight with high output and greatly improved torque characteristics in all speed range.
• At low rpm
  1. the timing of the intake valves is now staggered and
  2. their lift is asymmetric

• At high rpm
  1. VTEC transitions as previously into a high-lift,
  2. long-duration cam profile.
The demanding aspects of fuel economy, ample torque, and clean emissions can all be controlled and provided at a higher level with VTEC (intake valve timing and lift control) and VTC (valve overlap control) combined.

- VTC: valve opening overlap between the intake and exhaust valves to be continuously varied during engine operation.
• BASIC V-TEC MECHANISM

- hydraulically actuated pin links up adjacent rocker arms
- A spring mechanism is used to return the pin back to its original position

- There are two cam/rocker pairs
  1. The one on the left has a "wilder" profile
  2. Later one is mild cam rocker arm
• DIFFERENT VARIANTS OF V-TEC:

1. 2-Stage VTEC
   - What It Does: Intake & Exhaust Valves Change Profile
   - Effect: High Output & High RPM

2. VTEC
   - What It Does: Intake Valves Change Profile
   - Effect: Mild Gains For Practical Uses

3. VTEC-E
   - What It Does: One Intake Valve Closes @ Low RPM
   - Effect: Ultra Low Fuel Consumption

4. 3-Stage VTEC
   - What It Does: High Output & Ultra Low Fuel Consumption
• i-VTEC SYSTEM:

2) Fuel Economy + Power (EGR Effect)
Using the low-speed cam, one intake valve is mostly resting, which results in a strong swirl. With large overlap, clean emissions and improved fuel efficiency can be realized.

3) Optimum Low-End Torque
The intake valve closing timing is controlled to optimize torque.

4) Optimum Mid/High-End Torque
When switched over to the high-rpm cam, both intake valves open, and valve closing angle is optimized for maximum torque.

1) Best Fuel Economy (Idle/Mean-burn range)
Using the low-speed cam, one intake valve is mostly resting, which results in a strong swirl. Overlap is minimal, and exhaust gases are kept separate from intake air for more stable combustion.
ROLE OF ECU:

- The VTC cam sensor is required by the ECU to determine the current timing of the intake camshaft.
The ECU provides two engine configurations

A. The ECU pops out of lean-burn mode, goes back to 14.7 or 12 to 1 air-fuel ratios and brings the intake/exhaust overlap right up to maximum

B. Lean burn mode, the state in which the ECU uses >20:1 air-fuel ratio
APPLICATIONS :-

- HONDA CIVIC (2006)
- HONDA JAZZ (2008)
- HONDA ACCORD (2011)
- HONDA CITY (2012)
Honda Announced Improvements

• 2006 Civic VTEC
  – Delays intake valve closure timing during cruising and other low-load conditions
    • Throttle-by-wire used for larger throttle opening and a major reduction in pumping loss
  – Switches valve timing for excellent acceleration

• Advanced VTEC
  – Continuously variable intake valve timing and lift
  – + 13% efficiency (vs. 2005 i-VTEC engine)
Worldwide Fuel Control

- On a systems basis, good fuel is needed to enable many technologies.

- It is even the best factor to be considered in developing the automobile sectors.

- Growing countries, such as India and China, need to improve fuel quality.
CONCLUSION

• i-VTEC system is more sophisticated than earlier variable-valve-timing systems

• i-VTEC Technology gives us the best in vehicle performance.

• Fuel economy is increased, emissions are reduced, derivability is enhanced and power is improved.