

**MECHANISM AND METHODS FOR CONTROLLING LIFT AND TIMING OF ENGINE VALVES USING AN INCLINED PROFILE ON THE ROCKER ARM**

**IITM Technology Available for Licensing**

**Problem Statement**

- Valves in internal combustion (IC) engines currently operate with fixed timing, lift, and duration during the combustion cycle.
- Altering valve timing and lift at different engine speeds can improve fuel efficiency and reduce emissions.
- However, the use of these in IC engines is currently very limited due to difficulties in manufacturing, assembly, size constraints and cost.
- Hence there is a need of an improved mechanism for enhancing fuel efficiency and reduce emission in valves.

**Intellectual Property**

- IITM IDF Ref. 1186
- IN 368037 - Patent Granted

**Technology Category/ Market**

**Category - Variable Valve Timing (VVT) and Valve Lift (VVL)**

**Applications -** Internal Combustion Engines, Vehicle Design & Development.

**Industry -** Automotives, Vehicle Manufacturing

**Market-** From 2023 to 2030, the worldwide Variable Valve Timing (VVT) market is anticipated to expand at a **CAGR of 4.8%**, reaching a value of USD 48.82 billion.

**TRL (Technology Readiness Level)**

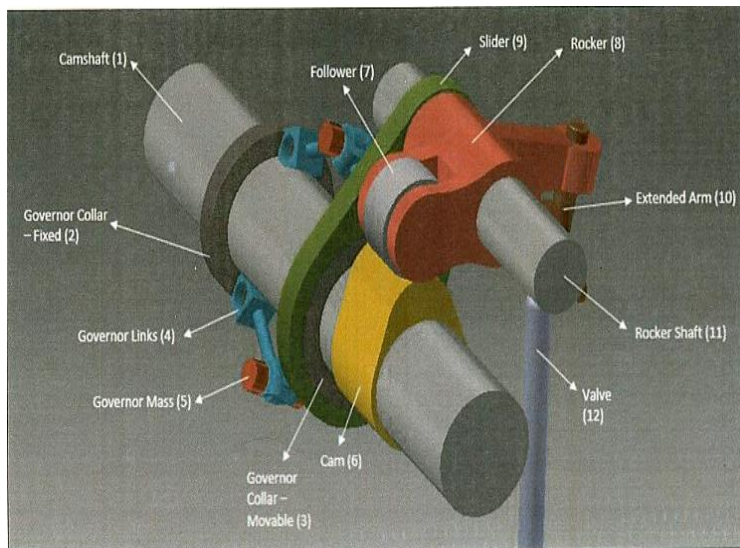
**TRL - 4: Technology validated in lab scale.**

**Research Lab**

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**FIG.1. A 3 dimensional layout of the proposed mechanism indicating the respective positions of the governor, slider and the sliding rocker.**

**Technology**

- The invention is based on developing and prototyping a mechanism to achieve variable valve lift and timing in IC engines. (Fig. 1&2)

- The technology pertains to a method and mechanism for controlling engine valves, specifically varying valve timing and lift based on engine speed.
- It utilizes a conventional rocker shaft setup, including a cam shaft and rocker shaft.
- A unique component in this mechanism is a rocker with an extended arm featuring an inclinable surface.
- The cam shaft's angular velocity triggers an actuation mechanism that either moves the rocker axially on the rocker shaft or adjusts the inclinable surface of the extended arm.
- This arrangement of the rocker and extended arm enables dynamic control of valve timing and lift in response to changes in engine speed.

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### Key Features / Value Proposition

#### 1. Variable Valve Timing and Lift (VVT&L) Integration:

The primary innovation lies in the ability to achieve variable valve timing and lift within a conventional rocker shaft system based on the engine's speed.

#### 2. Flexibility in Valve Control:

The technology allows for either the sliding motion of the rocker or the inclinable surface of the extended arm to be adjusted, providing flexibility in valve control.

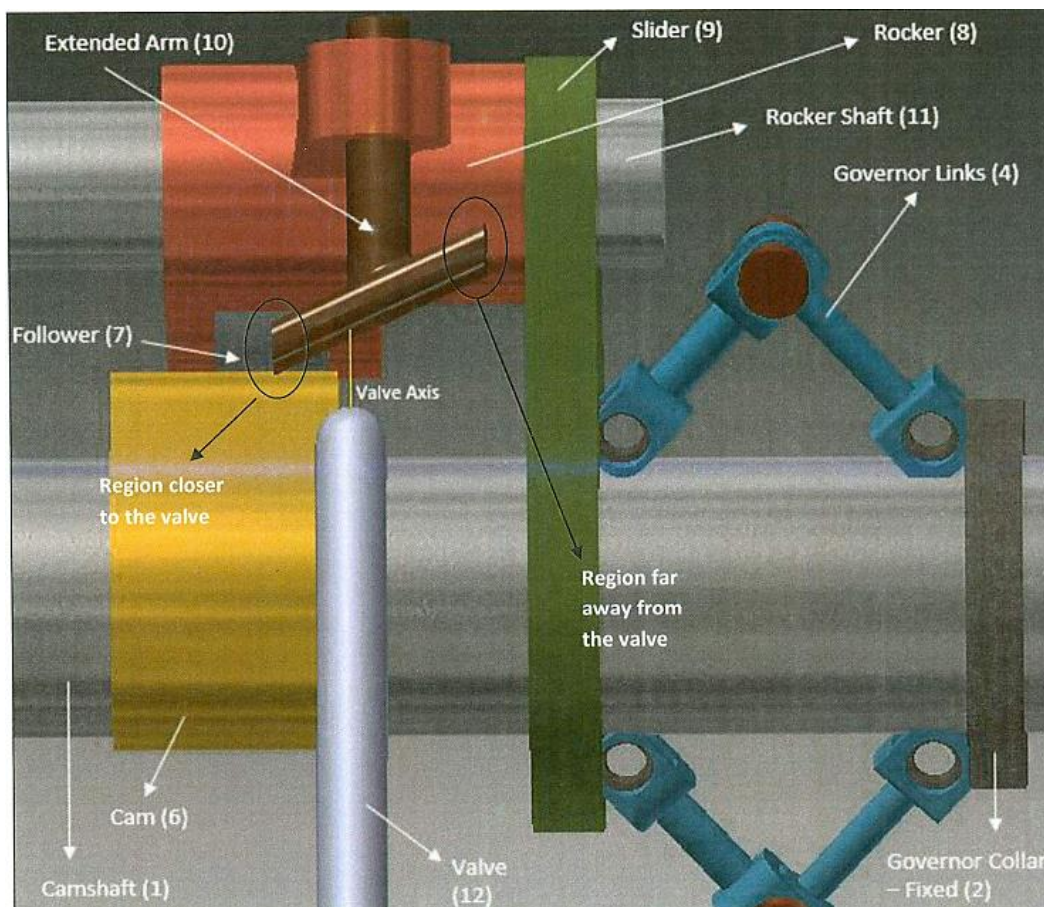
#### 3. Enhanced Fuel Efficiency:

The invention optimizes valve timing and lift based on engine speed variations, leading to improved fuel efficiency and reduce emissions.

**4. Cost-Effective Retrofitting:** Unlike many existing solutions, this invention can be integrated into conventional rocker shaft setups, making it cost-effective to retrofit older engines and potentially extending their lifespan.

#### 5. Minimal Component Replacement:

The technology minimizes the need for extensive component replacement within the engine, reducing maintenance costs and downtime.



**FIG. 2. A side view of the assembly. The image shows the angled and the parallel sections of the extended arm. The angled section has one edge closer to the valve than the other.**

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