

### MIXTURE PREPARATION UNIT FOR PORT FUEL INJECTED ENGINES

#### IITM Technology Available for Licensing

#### Problem Statement

- Conventional fuel injection systems in gasoline engines struggle with incomplete fuel atomization and evaporation, particularly under cold start conditions.
- This results in poor fuel economy, increased emissions, and reduced transient response due to inadequate fuel vaporization.
- The proposed solution integrates an ultrasonic atomizer with port fuel injectors** to improve fuel atomization and evaporation, addressing the shortcomings of existing systems.

#### Intellectual Property

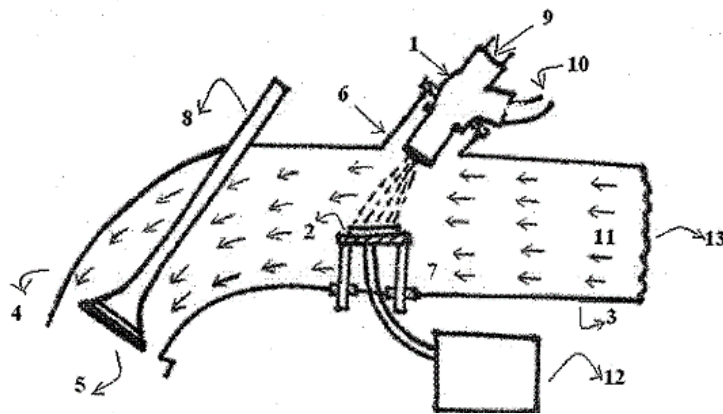
- IITM IDF Ref. **1256**
- IN 357291- Patent Granted**

#### Technology

The proposed technology integrates an ultrasonic atomizer with conventional low-pressure port fuel injectors to enhance fuel atomization and evaporation, addressing issues like incomplete combustion and poor fuel economy, especially during cold starts.

By mounting the ultrasonic atomizer in the intake manifold and adjusting its position dynamically, the system optimizes fuel vaporization and charge cooling, resulting in improved volumetric efficiency and lower emissions.

Experimental testing demonstrates the system's effectiveness in atomizing fuel efficiently, with most fuel droplets atomized within 15 milliseconds, offering better transient response and mixing compared to traditional port fuel injection systems.



PART NUMBER	PART NAME
1.	LOW PRESSURE PORT FUEL INJECTOR
2.	ULTRASONIC PLATE TYPE ATOMIZER
3.	INTAKE MANIFOLD
4.	INTAKE PORT
5.	TO ENGINE COMBUSTION CHAMBER
6.	CONNECTING PASSAGE
7.	ADJUSTABLE MACHANISM
8.	INTAKE VALVE
9.	FUEL
10.	POWER SUPPLY
11.	AIR
12.	CIRCUIT BOARD
13.	TO AIR FILTER

**FIG. 1.** illustrates schematic diagram indicating main components of the proposed fuel injection system.

#### Research Lab

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## Industrial Consultancy & Sponsored Research (IC&SR)

### Technology Category/ Market

**Category - Fuel Injection Systems, Automobile & Transportation**

**Applications-** Passenger Vehicles, Commercial Vehicles, Marine Engines.

**Industry-** Automotive, Engine Component

**Market** - Automotive Fuel Injector Market is expected to reach an estimated \$15.4 billion by 2030 with a **CAGR of 5.8%** from 2024 to 2030.

### TRL (Technology Readiness Level)

**TRL - 5: Technology validated in relevant environment.**

### Key Features / Value Proposition

#### 1. Enhanced Fuel Atomization:

- Integrates ultrasonic atomizer with port fuel injectors for superior fuel atomization, optimizing combustion efficiency.

#### 2. Improved Cold Start Performance:

- Mitigates cold start issues by ensuring rapid evaporation of fuel droplets, enhancing engine responsiveness in low-temperature conditions.

#### 3. Optimal Fuel Distribution:

- Dynamically adjustable atomizer position in the intake manifold ensures uniform fuel distribution, maximizing engine performance across operating conditions.

#### 4. Cost-Effective Solution:

- Utilizes existing port fuel injection infrastructure, offering a cost-effective upgrade path for enhancing engine efficiency and reducing emissions.

#### 5. Reduced Emissions:

- Enables more precise control of air-fuel mixture, resulting in lower emissions and compliance with stringent environmental regulations.

#### 6. Seamless Integration:

- Compatible with various engine configurations, providing an easy-to-implement solution for automotive manufacturers seeking to enhance fuel economy and performance.

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