

## **Tata Motors/ Indica 475 IDI**

The Tata Indica is a supermini car launched by the Indian manufacturer Tata Motors in 1998. It was the first passenger car from Tata Motors and it is also considered to have been India's first indigenously developed passenger car. As of August 2008, more than 910,000 units had been produced and the platform had spawned close to 1.2 million vehicles.

### **Engine Experimental Setup**

A four-cylinder CI indirect injection diesel engine (Tata Motors, Indica 475 IDI BS II) was used for experimental. Engine was equipped with a rotary type fuel injection pump having electric stop solenoid which facilitates fuel injection in the pre-chamber. Engine was provided with an EGR system which optimized the emission characteristics of the engine by reducing NO<sub>x</sub> emission. For the cooling of engine, a water supply line was connected which maintain supply at constant flow rate of 480 LPM and water temperature was maintained at approximately 25°C for all operating conditions.



**Engine Experimental Setup**

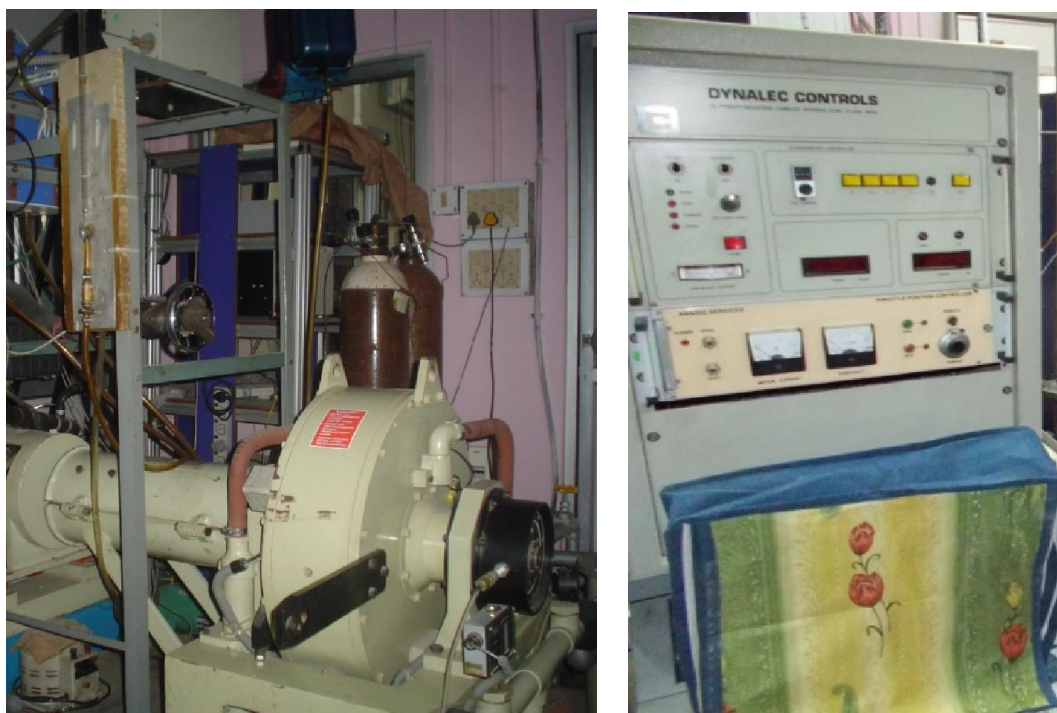
<b>Make/ Model</b>	Tata Motors/ Indica 475 IDI
<b>Engine type</b>	Water cooled indirect injection diesel Engine
<b>No. of cylinder</b>	4 cylinders with inline arrangement
<b>Bore/Stroke</b>	75 mm × 79.5 mm
<b>Cubic capacity</b>	1405 cc
<b>Maximum engine output</b>	39 kW at 5000 rpm
<b>Maximum Torque</b>	85 Nm at 2500 rpm
<b>Compression ratio</b>	22:1
<b>Fuel Injection System</b>	Rotary type with electric stop solenoid

#### Tata Indica 476 IDI engine specifications

The Tata Indica 476 IDI engine was coupled with an eddy current dynamometer which was used for loading and unloading the engine. Dynamometer was controlled by a dynamometer controller. Eddy current dynamometers are electromagnetic load devices. The engine being tested spins a disk in the dynamometer. Electrical current passes through coils surrounding the disk, and induce a magnetic resistance to the motion of the disk. Varying the current varies the load on the engine.

<b>Make/ Model</b>	Dynalec Controls, ECB-200
<b>Max. torque</b>	420 Nm at 1500-3500 rpm
<b>Max. power</b>	200 HP at 3500-8000 rpm
<b>Cooling</b>	Water cooled
<b>Max excitation current</b>	6 Amp D.C.

#### Specifications of the eddy current dynamometer



**Eddy current dynamometer and controller**

### **Research Done on Indica set up**

The inexpensive non-noble metal based mixed oxide catalysts have been developed and used for DOC coating. Four non-noble metal-based DOCs (named as DOC2, DOC3, DOC4 and DOC5) were prepared for evaluating their emission reduction performance. The prepared DOCs were tested for emission reduction with mineral diesel and 20% (v/v) Karanja biodiesel blended with mineral diesel (B20). An extensive experimental study was performed in a medium duty transportation diesel engine (1.4 L, four-cylinder engine) for observing the effect of prepared DOCs on various emission parameters. Emission involved an extensive experimental study was performed in a medium duty transportation diesel engine (1.4 L, four-cylinder engine) for observing the effect of prepared DOCs on various emission parameters.

Screening of DOCs was performed in order to find DOCs with satisfactory performance in the first instance. It was observed that DOC2 (three-layer coated DOC based on Cobalt-Cerium mixed oxide catalyst) and DOC3 (three-layer coated DOC based on lanthanum-based perovskite catalyst) performed satisfactorily in emission reduction and were comparable to commercial DOC (DOC1). Performance of DOC2 was good in particle number and particle mass reduction compared to DOC3. While On the other hand, performance of DOC3 was good

in regulated gaseous emission reduction compared to DOC2. DOC2 and DOC3 showed significant reduction in organic carbon (OC) content of particulates at 50% and higher engine loads. DOC2 was found to be superior in reduction of particle number emissions for tested engine speeds and loads for both diesel and B20.



**Commercial DOC inside a canister**

This research shows some important aspects for possible use of some of the prepared DOCs in effectively reducing overall particulate and gaseous emissions from commercial diesel engines as well as with use of Karanja biodiesel blended with mineral diesel (B20).