

Medhaavi

AN ISO 9001:2008 CERTIFIED CO.

ADDING
INTELLIGENCE
TO ENGINES

www.medhaavi.com



==== PROMOTING RESEARCH & INNOVATION =====

DRIVABILITY
FUEL EFFICIENT
COMFORT SAFETY

Research & Development
FUEL EFFICIENT
LESS EMISSION
PERFORMANCE

Medhaavi Center for Automotive Research (Regd.)

PROFILE

“Medhaavi” Center for Automotive Research (MCAR) – An ISO 9001:2008 Organization is working in the area of latest automotive technologies. We at Medhaavi, are committed to develop & apply state of the art technologies on to the engines in order to make them comply with stringent emission norms. The organization is very well steered by its Founder, Mr. Yogesh Kalia having more than 11 years of experience in this field. We have world-class set-up necessary for Research & Development complemented by strategic alliances with International companies.

As we witness, the technology is fast changing, our Academic Wing is dedicated towards sharing the knowledge with academic institutes.

SUSTAINABLE MOBILITY



OUR VISION

“Our vision is to bring the modern technology to the Academic Institutes of India who accepts the challenge of fast changing technologies in the field of automotive.”

Research... Need of the day

Stringent emission norms, fuel economy targets coupled with ever increasing expectations from customer on vehicle safety & comfort, have been fast replacing the conventional mechanical systems with latest electronics based technologies in automobile. These technologies are smarter & are able to adapt very quickly to varying conditions, thanks to the use of advanced microcontrollers & sensors.

For example, rotary pump/inline pumps & carburetors have been already replaced by CRDi & MPFi technologies for diesel and petrol engines respectively. Mechanical brake systems are being replaced by advanced ABS technology.

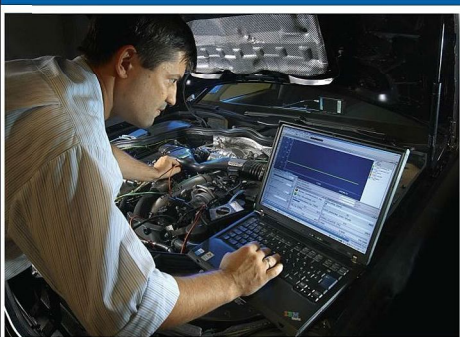
Gone are the days when vehicles used to be solely mechanical machines. The advancement in the field has brought together so many different fields of engineering and coined new fields like Mechatronics.

Motivation

There is a need to expose the students through Research & Innovation towards latest automotive technologies in order to enhance their knowledge & be “Industry Ready”.

Government is encouraging the research by earmarking funds. Research brings glory & adds significantly to the contribution towards improvement of society.

*We promote ‘Research & Innovation’
at academic level and that too
at ‘Affordable Price’.*



SERVICES

- Installation of 'Advanced Automotive Labs' to study latest Technologies.
- Installation of State of the art 'Research Centers' to do advanced research on engines.
- Industry oriented joint 'R&D Projects'.
- Supply of 'Open ECUs' for research in order to enhance the flexibility in ongoing research projects.
- Supply of 'Research Engines'.
- 'Workshops' to expose the students with practical aspects of cutting edge engine technologies.
- Guest Lectures.
- Training Programs.

Why Medhaavi:

- An Experienced Team
- Dedicated Resources
- State of the Art Equipments
- International Collaborations
- Practical Knowledge
- Focused Approach

*Introduction of New Syllabii & study modules in view of latest needs of automotive industry.
Setting-up of Center of Excellence!*



Technologies which can be learnt:-

- EFI
- MPFI
- CRDi
- VGT
- VVT
- VCR
- ABS
- TCS
- ESP
- ACC
- DPF
- SCR
- TPMS
- CVT
- Cruise Control
- Electronic Steering
- Start-Stop
- Predictive Emergency Braking



Academic Clients

- IIT Ropar
- IIT Kanpur
- IIT Madras
- IIT Delhi
- NIT, Hamirpur
- ACET, Amritsar
- CGC, Landran
- University of Petroleum & Energy Studies, Dehradun

LEADERSHIP



YOGESH KALIA
Founder, Director & CTO



RAKESH PATHAK
Vice President



JOHAN GUSTAFSSON
Advisor

STRATEGIC PARTNERS



INDUSTRIAL CLIENTS



Medhaavi

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SINGLE CYLINDER KIRLOSKAR DIESEL RESEARCH ENGINE WITH OPEN ECU

Medhaavi offers Single Cylinder Diesel Research Engine (KOEL-TV1/SV1/AV1) Set-up with Open ECU with advanced research options. It can help you take research to a new level. With the help of Open ECU, all the important engine parameters (Injection Quantity, Injection Timing, Injection Pressure, Multiple Injection, etc) can be varied online from a very simple to use PC based software. All these flexibilities truly make this set-up with **UNLIMITED RESEARCH OPTIONS**. Not only in research the equipment and also be used for regular B.Tech/UG level lab experiments

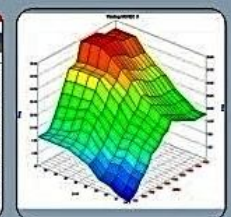


SALIENT FEATURES:

- Single Cylinder Diesel Engine
- Stationary Engine (With Multispeed Option)
- Open ECU for Online Change of fuel parameters
- Injection Timing Variation
- Injection Pressure Variation
- Multiple Injections
- ECU Controlled EGR (Optional)
- PC Based software for online Monitoring of Engine Parameters
- Data logging facility for off-line analysis
- High Speed CAN Bus Communication
- Eddy Current Dyno
- Combustion Analysis

USE CASES:

- Study the effect of various alternate fuels (biodiesel, greendiesel etc.) on engine performance, combustion & emission characteristics.
- Study of Dual Fuel / Bi-fuel Systems on engine performance & emission.
- Study of Advanced Combustion Modes – HCCI & PCCI.
- Study of Methanol, DME, Ethanol.
- Experimentation work for M.Tech/Phd in Thermal, IC Engines, Automobile.
- Lab Experimentation for B.Tech Students.
- Industry oriented training for Engineering Students.



Add-Ons : Engine with Open ECU can be integrated with following add-ons:

- EDDY CURRENT DYNAMOMETER
- COMBUSTION ANALYSIS SYSTEM
- AIR & FUEL MEASUREMENT SYSTEM
- PORT FUEL INJECTION SYSTEM

TECHNICAL DETAILS

ENGINE SPECIFICATIONS:

No. of Cylinders	1
Application	Stationary
Volume	661cc
Bore x Stroke (mm)	87.5 x 100
Compression Ratio	17.5:1
No. of Valves/Cyl	2
No. of Strokes	4
Ignition	CI
Camshaft	Push Rods
Cooling System	Water Cooled
Max. Power	7 bhp@1500 rpm

ECU CONTROLLED PARAMETERS:

Injection Timing	Yes
Injection Quantity	Yes
Multiple Injections	Yes
Rail Pressure	Yes (PID)
Cold Start Assistance	Yes
EGR	Yes (Optional)
Idle Speed	Yes (PID)
Over Speed Protection	Yes
Error Diagnostics	Yes
Torque Control Mode	Yes
Speed Control Mode	Yes

DYNAMOMETER:

Type	Eddy Current
Dyno Controller	Advanced (Optional)

FUEL SYSTEM:

Type	Electronic (CRDi)
Injector	Solenoid, Multihole
Pressure Control	PCV (Mounted on Rail)
ECU	Open (MCS1-i7)
Sensors	Cam Sensor Crank Sensor Rail Pressure Sensor Engine Temperature

PC BASED OPEN ECU CONTROL SOFTWARE:

Measurement of Parameters	Yes
Protocol/Communication	CAN
Change of Parameters Online	Yes
Recording of Parameters	Yes
Offline Analysis	Yes

COMBUSTION ANALYSIS:

Cylinder Pressure Sensor	Kistler or PCB
Encoder	360 ppr (3600 ppr - Optional)
DAC	NI
Combustion Analysis Software	IPIMEP Indications

Data logging ,editing,
printing, and export
P0-PV plots, performance
plots and tabulated results

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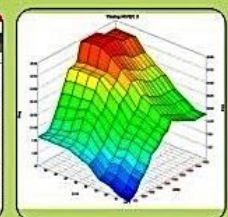
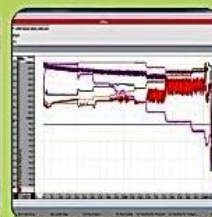


SALIENT FEATURES:

- Single Cylinder Diesel Engine
- Multispeed (Automotive)
- Open ECU for Online Change of fuel parameters
- Injection Timing Variation
- Injection Pressure Variation
- Multiple Injections
- ECU Controlled EGR
- PC Based software for Online Monitoring of Engine Parameters
- Data logging facility for off-line analysis
- High Speed CAN Bus Communication
- Eddy Current Dyno
- Combustion Analysis

USE CASES:

- Study the effect of various alternate fuels (biodiesel, greendiesel etc.) on engine performance, combustion & emission characteristics.
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- Industry oriented training for Engineering Students
- Motor Sport Applications.



Add-Ons : Engine with Open ECU can be integrated with following add-ons :

- EDDY CURRENT DYNAMOMETER
- COMBUSTION ANALYSIS SYSTEM
- AIR & FUEL MEASUREMENT SYSTEM
- PORT FUEL INJECTION SYSTEM

TECHNICAL DETAILS

ENGINE SPECIFICATIONS:

No. of Cylinders	1
Application	Automotive (Multispeed)
Volume	430cc
Bore x Stroke (mm)	86 x 74
Compression Ratio	19.0:1
No. of Valves/Cyl	2
No. of Strokes	4
Ignition	CI
Cooling System	Air Cooled
Max. Torque	21.5 Nm@2200 rpm
Max. Power	8.2 bhp@3500 rpm

ECU CONTROLLED PARAMETERS:

Injection Timing	Yes
Injection Quantity	Yes
Multiple Injection	Yes
Rail Pressure	Yes (PID)
Boost Pressure	NA
Cold Start Assistance	Yes
EGR	Yes
Idle Speed	Yes (PID)
Over Speed Protection	Yes
Error Diagnostics	Yes
Torque Control Mode	Yes
Speed Control Mode	Yes

DYNAMOMETER:

Type	Eddy Current
Dyno Controller	Advanced (Optional)

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FUEL SYSTEM:

Type	Electronic (CRDi)
Injector	Solenoid
Pressure Control	PCV (Mounted on Rail)
ECU	Open (MCS1-i7)
Sensors	Cam Sensor
	Crank Sensor
	Rail Pressure Sensor
	Accelerator Pedal
	Engine Temperature

PC BASED OPEN ECU CONTROL SOFTWARE:

Measurement of Parameter	Yes
Protocol/Communication	CAN
Change of Parameters Online	Yes
Recording of Parameters	Yes
Offline Analysis	Yes

COMBUSTION ANALYSIS:

Cylinder Pressure Sensor	Kistler or PCB
Encoder	360 ppr (3600 ppr - Optional)
DAC	NI

Combustion Analysis

IP,IMEP Indications
Data logging ,editing,
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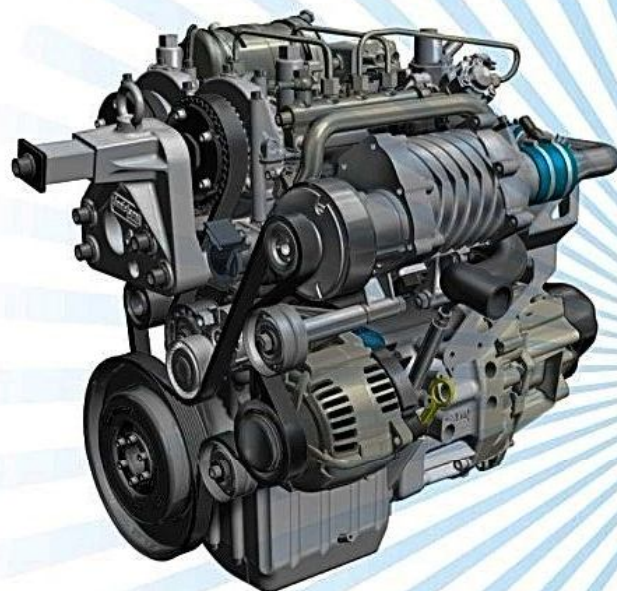
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TWIN CYLINDER DIESEL RESEARCH ENGINE WITH OPEN ECU

Medhaavi offers Twin Cylinder Diesel Research Engine Set-up with Open ECU with advanced research options. It can help you take research to a new level. With the help of Open ECU, all the important engine parameters (Injection Quantity, Injection Timing, Injection Pressure, Multiple Injection, EGR etc) can be varied online from a very simple to use PC based software . All these flexibilities truly makes this set-up with UNLIMITED RESEARCH OPTIONS. Not only in research, the equipment can also be used for regular B.Tech/UG Level lab experiment

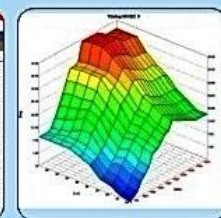
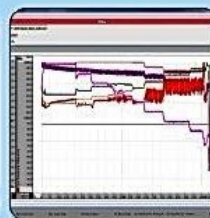


SALIENT FEATURES:

- Twin Cylinder Diesel Engine
- Multispeed (Automotive)
- Open ECU for Online Change of fuel parameters
- Injection Timing Variation
- Injection Pressure Variation
- Multiple Injections
- EGR Controlled EGR
- PC Based software for Online Monitoring of Engine Parameters
- Data logging facility for off-line analysis
- High Speed CAN Bus Communication
- Eddy Current Dyno
- Combustion Analysis

USE CASES:

- Study the effect of various alternate fuels (biodiesel, greendiesel etc.) on engine performance, combustion & emission characteristics.
- Study of Dual Fuel / Bi-fuel Systems on engine performance & emission.
- Study of Advanced Combustion Modes – HCCI & PCCI
- Study of Methanol, DME, Ethanol.
- Experimentation work for for M.Tech/Phd. in Thermal, IC Engines, Automobile.
- Lab Experimentation for B.Tech/B.E./UG Students
- Industry oriented training for Engineering Students
- Motor Sport Applications.



Add-Ons : The Engine with Open ECU can be Integrated with following add-ons :

- EDDY CURRENT DYNAMOMETER
- COMBUSTION ANALYSIS SYSTEM
- AIR & FUEL MEASUREMENT SYSTEM
- PORT FUEL INJECTION SYSTEM

TECHNICAL DETAILS

ENGINE SPECIFICATIONS:

No. of Cylinders	2
Application	Automotive (Multispeed)
Volume	909cc
Bore x Stroke (mm)	83 x 84
Compression Ratio	18.5:1
No. of Valves/Cyl	2
No. of Strokes	4
Ignition	CI
Camshaft	SOHC
Cooling System	Water Cooled
Max. Torque	55 Nm@1800-2200 rpm
Max. Power	25 bhp@3600 rpm

ECU CONTROLLED PARAMETERS:

Injection Timing	Yes
Injection Quantity	Yes
Multiple Injection	Yes
Rail Pressure	Yes (PID)
Boost Pressure	NA
Cold Start Assistance	Yes
EGR	Yes
Idle Speed	Yes (PID)
Over Speed Protection	Yes
Error Diagnostics	Yes
Torque Control Mode	Yes
Speed Control Mode	Yes

DYNAMOMETER:

Type	Eddy Current
Dyno Controller	Advanced (Optional)

FUEL SYSTEM:

Type	Electronic CRDi
Injector	Solenoid
Pressure Control	PCV (Mounted on Rail)
ECU	Open (MCS2-i7)
Sensors	Cam Sensor Crank Sensor Rail Pressure Sensor Accelerator Pedal Engine Temperature

PC BASED OPEN ECU CONTROL SOFTWARE:

Measurement of Parameter	Yes
Protocol/Communication	CAN
Change of Parameters Online	Yes
Recording of Parameters	Yes
Offline Analysis	Yes

COMBUSTION ANALYSIS:

Cylinder Pressure Sensor	Kistler or PCB
Encoder	360 ppr (3600 ppr - Optional)
DAC	NI

Combustion Analysis

IP/IMEP Indications
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FOUR CYLINDER DIESEL RESEARCH ENGINE WITH OPEN ECU



Medhaavi offers 4 Cylinder Diesel Research Engine Set-up with Open ECU with advanced research options. It can help you take research to a new level. With the help of Open ECU, all the important engine parameters (Injection Quantity, Injection Timing, Injection Pressure, Multiple Injection, EGR etc) can be varied online from a very simple to use PC based software . All these flexibilities truly makes this set-up with UNLIMITED RESEARCH OPTIONS. Not only in research, the equipment can also be used for regular B.Tech/UG Level lab experiment

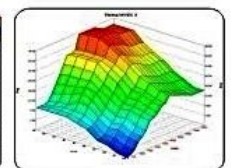


SALIENT FEATURES:

- Four Cylinder Diesel Engine
- Multispeed (Automotive)
- Open ECU for Online Change of fuel parameters
- ★ Piezo Injector for faster response
- Injection Timing Variation
- Injection Pressure Variation
- Multiple Injections
- ECU Controlled EGR
- Cooled EGR
- ★ Turbocharger - Variable Geometry Turbine (VGT)
- PC Based software for Online Monitoring of Engine Parameters
- Data logging facility for off-line analysis
- High Speed CAN Bus Communication
- Eddy Current Dyno

USE CASES:

- Study the effect of various alternate fuels (biodiesel, greendiesel etc.) on engine performance, combustion & emission characteristics.
- Study the effect of Variable Geometry Turbo (VGT) on engine performance.
- Study of Dual Fuel / Bi-fuel Systems on engine performance & emission.
- Study of Advanced Combustion Modes – HCCI & PCCI
- Study of Variable Geometry Turbine (VGT)
- Study of Methanol, DME, Ethanol.
- Experimentation work for for M.Tech/Phd. in Thermal, IC Engines, Automobile.
- Lab Experimentation for B.Tech/B.E./UG Students
- Industry oriented training for Engineering Students
- Motor Sport Applications.



Add-Ons : The Engine with Open ECU can be integrated with following add-ons :

- EDDY CURRENT DYNAMOMETER
- COMBUSTION ANALYSIS SYSTEM
- AIR & FUEL MEASUREMENT SYSTEM
- PORT FUEL INJECTION SYSTEM

TECHNICAL DETAILS

ENGINE SPECIFICATIONS:

No. of Cylinders	4
Application	Automotive (Multispeed)
Volume	1994cc
Bore x Stroke (mm)	84.45 x 88.95
Compression Ratio	17.5:1
No. of Valves/Cyl	2
No. of Strokes	4
Ignition	CI
Camshaft	SOHC
Cooling System	Water Cooled
Max. Torque	260 Nm@1750-2500 rpm
Max. Power	100 bhp@4000 rpm

ECU CONTROLLED PARAMETERS:

Injection Timing	Yes
Injection Quantity	Yes
Multiple Injection	Yes
Rail Pressure	Yes (PID)
Boost Pressure	Yes (PID)
Cold Start Assistance	Yes
EGR	Yes
Idle Speed	Yes (PID)
Over Speed Protection	Yes
Error Diagnostics	Yes
Torque Control Mode	Yes
Speed Control Mode	Yes

DYNAMOMETER:

Type	Eddy Current
Dyno Controller	Advanced (Optional)

FUEL SYSTEM:

Type	Electronic (CRDi)
Injectors	Piezo
Pressure Control	PCV & VCV (Mounted on Pump)
ECU	Open(MCP4-i7)
Sensors	Cam Sensor Crank Sensor Rail Pressure Sensor Accelerator Pedal Coolant Temperature Fuel Temperature Inlet Air Temperature Air Mass Sensor MAP Sensor Boost Air Temperature

PC BASED OPEN ECU CONTROL SOFTWARE:

Measurement of Parameter	Yes
Protocol/Communication	CAN
Change of Parameters Online	Yes
Recording of Parameters	Yes
Offline Analysis	Yes

COMBUSTION ANALYSIS:

Cylinder Pressure Sensor	Kistler or PCB
Encoder	360 ppr (3600 ppr - Optional)
DAC	NI

Combustion Analysis

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SINGLE CYLINDER PETROL RESEARCH ENGINE WITH OPEN ECU

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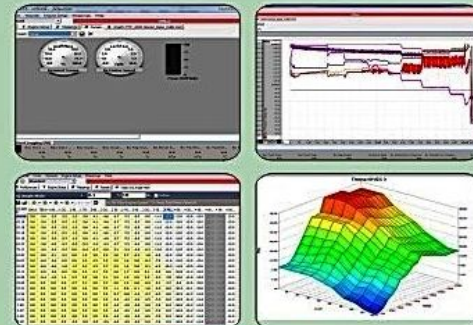


SALIENT FEATURES:

- Open ECU
- Multispeed Petrol Engine
- Ignition Timing Control
- Dwell Time Control
- Closed Loop control for Idle Speed (PID)
- Lambda Control – Open Loop
- Injection Timing Variation
- Cold Start Fuel Enrichment
- Specially Designed Throttle Body with TP & Electronic Injector
- Inline Pump with Pressure Regulator
- PC based Calibration Software for online monitoring of Engine Parameters
- Data logging facility for off-line analysis
- High Speed CAN Bus Communication
- Eddy Current Dynamometer
- Combustion Analysis

USE CASES:

- Study of Alternate Fuel /Gaseous Fuel (H₂, CNG & LPG etc).
- Study of Dual Fuel / Bi-fuel Systems.
- Study of Methanol, DME, Ethanol.
- Experimentation for M.Tech/Phd.
- Lab Experimentation for B.Tech Students
- Industry oriented training for Students
- Motor Sport Applications



Add-Ons : The Engine with Open ECU can be integrated with following add-ons :-

- EDDY CURRENT DYNAMOMETER
- COMBUSTION ANALYSIS SYSTEM
- AIR & FUEL MEASUREMENT SYSTEM
- ADDITIONAL FUEL INJECTION IN PORT

TECHNICAL DETAILS

ENGINE SPECIFICATIONS:

Model	Honda GX200
Volume	196cc
Bore x Stroke (mm)	68 X 54
No. of Cylinders	01
No. of Strokes	04
Cooling System	Air Cooled
Compression Ratio	8.5:1
Power	5.5 HP (4.1 kW) @ 3,600 rpm
Torque	9.1 lb-ft (12.4 Nm) @ 2,500 rpm
Ignition	Digital (ECU Controlled)

ECU CONTROLLED PARAMETERS:

Ignition Timing	Yes
Dwell Time	Yes
Injection Timing Control	Yes
Lambda Control (Fuel Qty.)	Yes
Cold Start Fuel Enrichment	Yes
Idle Speed	Yes (PID)
Over Speed Protection	Yes
Error Diagnostics	Yes

DYNAMOMETER:

Type	Eddy Current
Dyno Controller	Advanced (Optional)

FUEL SYSTEM:

Injector	Saturated, Electronic Injector, Multihole
ECU	Open (MX1-i7)
Sensors	CAM Sensor, Crank Sensor, Air Temperature, Engine Temperature, Throttle Position Sensor, MAP Sensor

PC BASED OPEN ECU CONTROL SOFTWARE:

Measurement of Parameter	Yes
Protocol/Communication	CAN
Change of Parameters Online	Yes
Recording of Parameters	Yes
Offline Analysis	Yes

COMBUSTION ANALYSIS:

Cylinder Pressure Sensor	Kistler or PCB
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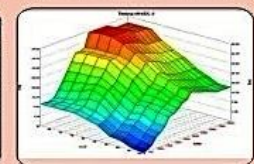
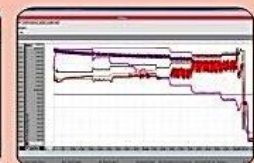


SALIENT FEATURES:

- Open ECU
- Multispeed MPFI Petrol Engine
- Ignition Timing Control
- Dwell Time Control
- Closed Loop control for Idle Speed (PID)
- Lambda Control – Open Loop
- Injection Timing Variation
- Cold Start Fuel Enrichment
- Advanced Electronic Throttle Module (Drive by wire)
- Inline Pump with Pressure Regulator
- PC based Calibration Software for online monitoring of Engine Parameters
- Data logging facility for off-line analysis
- High Speed CAN Bus Communication
- Eddy Current Dynamometer
- Combustion Analysis

USE CASES:

- Study of Alternate Fuel /Gaseous Fuel (H₂, CNG & LPG etc).
- Study of Dual Fuel / Bi-fuel Systems.
- Study of Methanol, DME, Ethanol.
- Experimentation for M.Tech/Phd.
- Lab Experimentation for B.Tech Students
- Industry oriented training for Students
- Motor Sport Applications



Add-Ons : The Engine with Open ECU can be Integrated with following add-ons :

- EDDY CURRENT DYNAMOMETER
- COMBUSTION ANALYSIS SYSTEM
- AIR & FUEL MEASUREMENT SYSTEM
- ADDITIONAL FUEL INJECTION IN PORT

FOUR CYLINDER PETROL ENGINE : TECHNICAL DETAILS

ENGINE SPECIFICATIONS:

Model	Suzuki K12
Volume	1197cc
Bore x Stroke (mm)	73 X 71.5
No. of Cylinders	04
Compression Ratio	11.0:1
Power	87PS@6000 rpm
Torque	114Nm@4000 rpm
Camshaft	Overhead (VVT ready)
No. of Valves	16
Ignition	Smart Inductive Coil (ECU Controlled)
Throttle Module	Electronic

ECU CONTROLLED PARAMETERS:

Ignition Timing	Yes
Dwell Time	Yes
Injection Timing Control	Yes
Throttle Position	Yes
Lambda Control (Fuel Qty.)	Yes
Cold Start Fuel Enrichment	Yes
Idle Speed	Yes (PID)
Over Speed Protection	Yes
Error Diagnostics	Yes

DYNAMOMETER:

Type	Eddy Current
Dyno Controller	Advanced (Optional)

FUEL SYSTEM:

Type	MPFI
Injectors	Electronic Injector, Multihole
ECU	Open (MX4-i7)
Sensors	CAM Sensor, Crank Sensor, Air Temperature, Engine Coolant Temperature, Throttle Position Sensor, Accelerator Pedal Module, MAP Sensor

PC BASED OPEN ECU CONTROL SOFTWARE:

Measurement of Parameter	Yes
Protocol/Communication	CAN
Change of Parameters Online	Yes
Recording of Parameters	Yes
Offline Analysis	Yes

COMBUSTION ANALYSIS:

Cylinder Pressure Sensor	Kistler or PCB
Encoder	360 ppr (3600 ppr - Optional)
DAC	NI

Combustion Analysis

IP,IMEP Indications
Data logging ,editing,
printing, and export
PØ-PV plots, performance
plots and tabulated results

In Technical Association With  NIRA Control Ab, Sweden.

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