NCCRD EQUIPMENT LIST

**Optical automobile engine.**

Description - Optical engine spray studies using alternative fuel such as bio diesel & emulsion

![Ducom cylinder optical engine](image)

Hand operated overhead travelling Crane  
AVL transient fuel measurement system

GDI Engine  
AVL Transient fuel measurement system
Optical gas turbine engine

Description- Study spray at high pressure up to 10 bar.

Tec-Sol Spray rig 3A

High pressure spray testing rig

Description- Spray nozzle study at 10 Bar
**Supersonic combustor set up**

**Description** - Study physics of supersonic combustion at Mach 2.5.

**Drop tower for micro gravity**

**Description** - Conduct experiments for short duration in microgravity.
**Phase Doppler particle analyser (pdpa)**

**Description** - To measure the particle size and three direction component velocity.

**Spray/particle analyser based on Mie scattering**

**Description** - Measure spray patterns of industrial spray nozzles (atomiser), droplet distribution & uniformity.
Time resolved planer laser

Description- For CH, OH, NO and similar radical based PLIF experiments for low speed (up to 10 Hz) imaging application.

Two colour plif thermometry

Description- For CH, OH, NO and similar radical based PLIF experiments for low speed (up to 10 Hz) imaging application.
**Laser induced incandescence (LII) set-up**

**Description**- Pulsed Nd:YAG laser with separate detachable units for providing second, third, and fourth harmonic and a repetition rate of 10 Hz.

**TDLAS set up induced laser**

**Description**- Solid state Nd:YAG dual cavity pulsed laser having a maximum repetition rate of 15Hz with a output wavelength of 532nm and maximum energy of 145mj per pulse. Main applications of this laser includes low speed PIV and low speed imaging. Internal and external triggering / synchronization feature is available.
Spectrometer and accessories-2no.

Description- Wave meter is used for precise wave length measurement on laser beam, optical wave length of optical devices. They can be operated with very low light intensity coupled through an easy-to-use optical multi-mode fibre.

Online chromatography set up

Description- Identify the organic constituents in liquid samples/fuels, and quantify them
Thermocouples/thermal anemometer and accessories.

**Description** - Measure gas temperature

Measure gas flow

**High speed stereo particle image velocimetry (piv system)**

**Description** - Measure time resolved three component velocity field in a volume

High Speed Tomographic PIV 4 Camera
**Component laser Doppler velocimetry LDV system**

**Description:** Measure the velocity of particle in the flow

3D Miniature Laser Doppler Velocimetry 30KVA UPS -1NO& 10KVA UPS

**Channel hot wire anemometer (HWA) system**

**Description:** Measure gas velocity
Optical accessories (optical table, x profiles, 3 axis traverses, lens, mounts, filters, UV/IR grade lenses and mirrors, camera, c mount, lenses, adapters, etc.

Description- Accessories needed for laser diagnoses.

Optical table with noiseless compressor

Pressure transducers (strain gauge, differential, piezo-electric, piezo resistive, condenser type microphone)

Description- Measure static and dynamic pressure
Micro manometers, scanivalve, flow meters, anemometers, etc.

**Description** - Measure static instant time

Alicat Mass flow controller

**Thermal analysers (TGA, DTA, DSC, TMA)**

**Description** - Measure exhaust gas composition.

Indus fuel gas analyser 3m sa-2000 dual Gas detector
GAS Detector for Hydrogen gas

High pressure thermogravimetric analyser

**Emission analysers (8 species)-3no**

**Description**-Study performance and exhaust of IC engines.
**FTIR Spectroscopy capable of taking solid, liquid, and gaseous samples** (for aerosol analysis)

**Description** - Determine the organic functional groups in solid and liquid samples

![FTIR Spectroscopy](image1)

**Calorimeter for fire safety characterisation**

**Description** - Test for heat and visible smoke release rates for materials up to a size of 100mm X 100mm with a peak heat release rate of 0.15 kW

![Calorimeter](image2)

Cone calorimeter  Open calorimeter
Fuel characterisation equipment (calorimeter, viscometer, thermal conductivity measurement, apparatus, densitometer, goniometer, temperature, baths)

Description- To measure surface tension and interfacial surface tension of liquid fuels, molecular weight distribution of polymer, for digestion of liquid samples and also conduct microwave assisted solvolysis and catalytic reactions.
**Proximate ultimate and sulphur analyser for coal (and other solid fuels)**

**Description** - Perform proximate analysis of solid samples as per ASTM standard procedure.
**Data acquisition/image processing systems**

**Description** - Acquire and process the data from the experiments.

Dell 3020 Led computer

Kyocera- Plain paper copier

UPS system with power-10kva

30 kva ups

Dell Vostro computer 360 AIO

Dell computer 3040 Model
Frequency analyser, wave form generators, signal conditioners, oscilloscopes.

**Description** - Measure frequency to create wave (sine, pulse)

![Wave form generator](image1.png)

Vitiated hot air supply (50,000 litres at 15 bar and 1000 deg.c)

**Description** - Supply continuous compressed air for experiment

![Compressor](image2.png)

Compressor – Ingersoll rand model 2475

Compressed air pipe lines
Reciprocating compressor- 2stage 120hp
Supply of air at 40 bar

Ingersoll rand screw Air compressor-3no to supply at 10 bar

**Air conditioning, ducting and other site preparations**

**Description**-Machines used to assist the projects.

Esteam Brand Workshop lathe

Akash Brand Bench grinder

EIFCO Hydraulic drilling Machine

And motor

Hydraulic hand pallet and stacker-1set
Diesel forklift

Gemini AC water chiller unit

Epson projector

Polycom sound station

**High performance computing cluster**

*Description*: High performance computers for post processing and data storage.

UPS system with dc power pack 10kva

Dell workstation-T5600
Fulitsu Celsius R920-Work station

Boston Data Server