

# NATIONAL INSTITUTE OF TECHNOLOGY KARNATAKA

SURATHKAL, MANGALORE, 575025



DEPARTMENT OF MECHANICAL ENGINEERING

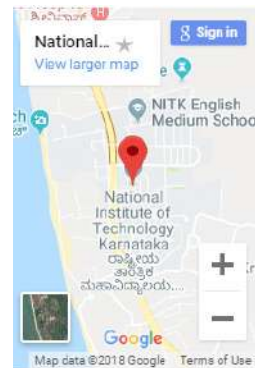
## EQUIPMENT CATALOGUE

2018 - 2019

## About the NITK

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The National Institute of Technology Karnataka (NITK), Surathkal has established itself as one of the top technological institutions in India and richly deserved recognition as an Institute of National Importance under the NIT Act 2007. Accreditation of all our academic programs by NBA, many with highest rating, recognition as a QIP Center, initiation and operationalization of MoUs with several national and international institutions and more competitive student admissions are achievements that bear testimony to our commitment to maintain quality in all processes and systems. NITK is making sustained efforts towards consolidation of the state-of-the-art infrastructural facilities for teaching and research, attracting highly qualified and motivated staff into the existing pool and ensuring availability of all other amenities necessary for imparting globally relevant technological education. A research culture is taking shape in the institute through enhanced R&D activities, creation of centers for interdisciplinary research, establishment of industry-sponsored Charis, stronger interface with industry, alumni and a special focus on new post-graduate and doctoral programs. Team NITK is fully geared to take on the challenges of the 21st century to establish itself as a World-Class Technological Institution.



## About the Department

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Department of Mechanical Engineering established in 1960, is the oldest and largest department of NITK and has earned a good reputation as a centre for academic, research and industrial consulting activities. Academic Programmes leading to B. Tech. Degree in Mechanical Engineering, M. Tech. Degree in Manufacturing Engineering, Mechatronics Engineering,

Thermal Engineering & Design and Precision Engineering, and Ph.D. Degree are currently offered by the department. Laboratories with state of the art equipment, highly qualified faculty and dedicated supporting staff provide an ideal environment for academic and research pursuits.

# Content

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<b>Equipment</b>	<b>Page No.</b>
1) Pin on Disc Tribometer	4
2) Transmission Polariscopes	5
3) Induction Melting Machine with chilling Unit	6
4) Muffle Furnace with Inert atmospheric condition	6
5) Free Vibration Setup	7
6) Forced Vibration Setup	7
7) Sound Pressure Level Measurement Setup	8
8) Quarter Car Test Rig	9
9) Vehicle Vibration Measurement Instrumentation	10
10) Dynamic Testing Machine	11
11) Wire Electrical Discharge Machine	12
12) Vacuum Arc Melting	13
13) Micro-Hardness Tester	13
14) Image Analyzer	14
15) Double Head Rolling Machine	14
16) Universal Testing Machine	15
17) Electrochemical corrosion Analyser	16
18) Single Screw Extruder	17
19) 3D Printer	17
20) Low speed compressor/turbine cascade wind tunnel with water injection facility	18
21) Subsonic Wind Tunnel	19
22) Pool boiling Setup	20
23) High Speed Camera	21
24) FMS Systems	22
25) Pneumatic & Electro Pneumatic Control Module	23
26) Hydraulic & Electro Hydraulic Control Module	23

# Pin on Disc Tribometer



This equipment is used to study the friction and wear characteristics in sliding contacts under dry and heated conditions. The sliding occurs between the stationary pin and a rotating disc (counter face).

## **Specifications**

Max Load:	200 N
Disc Speed:	200 to 2000 rpm
Max. Temperature:	600°C

## **Model**

**TR-20LE-PHM4000C-CHM6000C**

## **Faculty In-charge**

**Dr. Ramesh M R**

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Lab Name : Tribology Laboratory  
Room No. : M321

# Transmission Polariscope



Photoelasticity Applications. Equipped to analyse the stress fields in different models by studying the fringe patterns. Both white light and mono-chromatic light source are used to get coloured and back-white fringe patterns.

## Specification

Size of optical Elements: 300 mm with  $1/2^\circ$  least count of rotation

Universal Load Frame capacity: 300 kg

With oblique incidence attachment

## Faculty In-charge

Prof. S. M. Murigendrappa

Contact : [smmnitk@gmail.com](mailto:smmnitk@gmail.com)

Brand & Model : Contech Microsystems

Lab Name : Stress Analysis Laboratory

Room No. : M409

# Induction Melting Machine with chilling Unit

Melting of metals

## Specification

Metal to melt:	Any metal
Melt quantity:	1 kg
Max. Temperature:	1500°C
Melting Time:	10 min.



# Muffle Furnace with Inert atmospheric condition

For heat treatment of alloys or metals

## Specification

Dimensions:	6" x 6" x 12"
Temperature Range:	400°C to 1100°C



## Faculty In-charge

Prof. S. M. Murigendrappa

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Brand & Model : Shapet Electric Company

Lab Name : Fracture and Fatigue Laboratory

Room No. : M408

## Free Vibration Setup

Used for vibrational measurement (FRF & FFT) in a composite and metal specimen. To get natural frequencies and their mode shape.

### Specification

Impact Hammer:	10 mV/N
Uniaxial accelerometer:	9.81 mV/g
Clamping fixture(Cantilever):	1 m
DAQ integrated with output display of 8-input channels	



## Forced Vibration Setup

Used for vibrational measurement (FRF & FFT) in a composite and metal specimen.

### Specification

Arbitrary Waveform generator:	SMG5220
Micron Power Amplifier:	MPA-0100
Micron ED Shaker:	50N (MEV-0050)
Transducer:	Kistler 50N
Uniaxial accelerometer:	Kistler 9.81mV/g
NI DAQ 9234 with chassis and BNC cable.	



## Faculty In-charge

Dr. Jeyaraj P

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Lab Name : Advance Vibration Laboratory

Room No. : M403



# Sound Pressure Level Measurement Setup



Used for sound pressure level measurement, radiated by the structure under the forced excitation (forced vibration). To study the acoustic characterization.

## Specification

### 1] Forced vibration part

Arbitrary Waveform generator:	SMG5220
Micron Power Amplifier:	MPA-0100
Micron ED Shaker:	50N (MEV-0050)
Forced transducer:	Kistler 50N
Uniaxial accelerometer:	Kistler 9.81mV/g
NI DAQ 9234 with chassis and BNC cable.	

### 2] Sound measurement part

Free-field:	1/2"
Prepolarized condenser microphone:	377B02
NI DAQ 9234 with chassis and LabVIEW software interface.	

## Faculty In-charge

**Dr. Jeyaraj P**

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Lab Name : Advance Vibration Laboratory

Room No. : M403



# Quarter Car Test Rig



To characterize and test automobile suspension. Consists of a damper testing machine and a quarter car test machine, hydraulic power pack and control software.

## Specification

Hydraulic power pack with 60 HP motor	
Maximum stroke:	150mm
Peak velocity:	1.2 m/s
Capacity:	1 ton

## Faculty In-charge

**Dr. Hemantha Kumar**

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Lab Name : Vehicle Dynamics Lab

Room No. : M014

# Vehicle Vibration Measurement Instrumentation



Used to measure vibration levels in a vehicle. Consists of Spider 80x controller and DAQ, tri-axial and uni-axial accelerometers.

## **Specification**

8 Input channels 1 hybrid output with power adaptor and ethernet cable

IEPE Accelerometer

10mV/g with BNC cables(wax mounted)

3mV/deg sensitivity AC single axis gyroscope

DC to DC LVDT 0-200mm range 50mV/mm sensitivity 24V DC

## **Faculty In-charge**

**Dr. Hemantha Kumar**

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Lab Name : Vehicle Dynamics Lab

Room No. : M018

# Dynamic Testing Machine

Servo hydraulic dynamic testing machines and systems with a capacity range of 10 kN to 1000 kN are a unique offering from Blue Star E&E. They work as per dynamic servo test technology and utilise the design methods of unitisation, standardisation and modularisation, which enhance the stability and reliability of the system. These machines are mainly used for dynamic and static mechanical performance tests of materials and parts. When equipped with corresponding accessories, the machines can perform tensile, compression, low cycle and high cycle tests, as well as crack growth tests and tests of other mechanics for various kinds of materials. These are widely used in the fields of aviation, aerospace, and ship-building, and in the military



## Faculty In-charge

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Lab Name : Vehicle Dynamics Lab

Room No. : M018

# Wire Electrical Discharge Machine



Wire-EDM has similar functionality to that of a conventional EDM with an exception that it uses 150-250 $\mu$ m diameter wire to cut intricate profiles with errors ranging only few microns. Where conventional EDM is limited to profiles which are mirror of the tool, Wire-EDM can cut profiles of any shape. All electrically conductive materials can be machined using Wire-EDM.

## Specifications

Pulse on time:	30-130 $\mu$ s
Pulse off time:	1-63 $\mu$ s
Servo voltage:	0-100V
Flushing pressure:	0.5-1.5 kg/cm <sup>2</sup>
Wire feed :	1-15 m/min
Servo feed:	0-2999 $\mu$
Wire Diameter:	0.15, 0.20, 0.25m
Dielectric fluid:	Deionized water.

## Faculty In-charge

**Prof. Narendranath S**

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snnath88@yahoo.co.in

Brand & Model : EcoCut-ELPULS15

Lab Name : Manufacturing Laboratory

Room No. : M005

## Vacuum Arc Melting

In this vacuum arc melting equipment, argon gas is used to generate an inert environment. Melting takes place using arc generated from Tungsten electrode at very high temperature (around 10,000°C). Sensitive alloys (Ti alloys) which demands minimum environmental contamination can be cast into small button, crucibles or as a bar.

### Specification

Electrode :	Tungsten rod
Inert gas :	Argon gas
Operating current :	0-500A
Operating vacuum :	0.00001 mbar



## Micro-Hardness Tester

This microhardness tester is an integrated optical, mechanical and electrical device which uses software (Quantimet) in PC to measure microhardness of small, thin specimen and superficial permeable coating. This can also be used to measure the microhardness of glass, ceramics and other brittle materials.

### Specification

Load :	100g-2kg
Magnification :	100X and 400X
Hardness type :	Vickers and Knoop



## Faculty In-charge

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Lab Name : Manufacturing Laboratory  
Room No. : M005

## Image Analyzer

Integrated with an optical microscope, this Image Analyzer can investigate microstructure of polished surfaces with ease. Inbuilt software (BIOVIS) allows measurements like grain size, porosity, nodularity, object counting, coating analysis, distance between any two points, angle between two edges, area measurement and so forth.



### **Specification**

Available Magnification: 4X,10X,40X,100X

Camera type : CMOS (Moticam)

Camera resolution : 2.0 MP

## Double Head Rolling Machine

This double head rolling machine can produce thin sheets and draw wire as per user's need. It is mainly used for producing hot/cold rolled sheets of copper, Ti-alloys etc.



### **Specification**

Minimum attainable plate thickness : 1 mm

Speed control : Low and High (2 steps)

No. of groove rolls : 23

## Faculty In-charge

**Prof. Narendranath S**

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Brand & Model : Expert Vision Labs Pvt. Ltd.

Lab Name : Manufacturing Laboratory

Room No. : M005

# Universal Testing Machine



This Universal Testing Machine is a bench-top type testing machine which can determine tension, compression shear and flexure properties of material. This unit is ideal for testing composites and polymer. Jog speed can be adjusted as per operator's habituality. Test data fed to PC through inbuilt software (Horizon) can reproduce suitable graphs as per user requirement and can be exported for further investigation.

## Faculty In-charge

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snnath88@yahoo.co.in

## Specification

Load cell capacity :	50 kN
Strain rate :	0.001-500 mm/min
Test area :	Vertical (1100 mm) Horizontal (405 mm) Depth (Unlimited)
Fixtures available :	Tensile, Compressive and Flexural
Accessories :	Extensometer
Testing standards :	Generic inbuilt ASTM standards are available

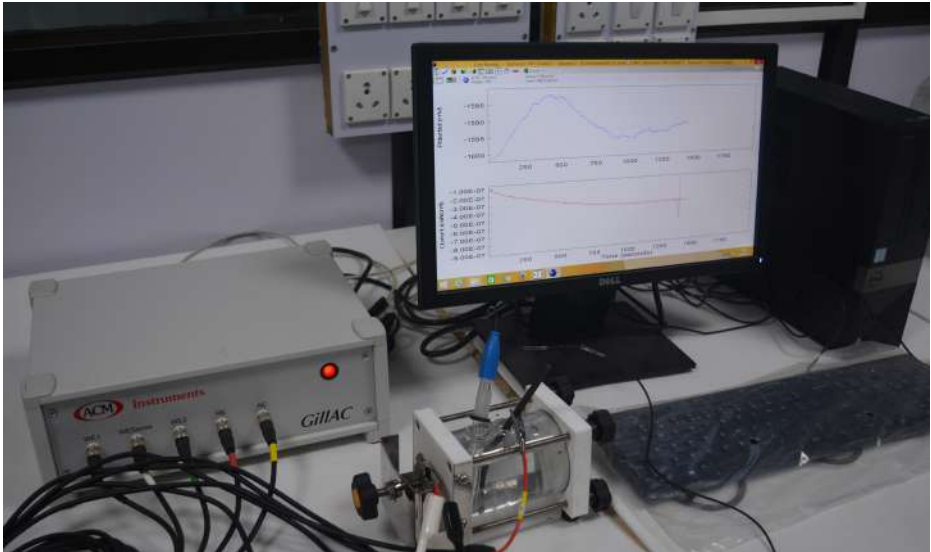
Brand & Model : Tinius Olsen-H75KS

Lab Name : Manufacturing Laboratory

Room No. : M005



# Electrochemical corrosion Analyser



Electrochemical corrosion Analyser-supplied by Techscience Services Pvt.Ltd. Equipped with graphite (auxiliary electrode) and Saturated Calomel Electrode (Reference electrode) to measure corrosion resistance for materials like Al, Mg, steel etc.

## Faculty In-charge

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## Specifications

Compliance Voltage:	± 15Volts
Sweep voltage range:	± 3 Volt
Sweep Resolution:	25 $\mu$ volt
Input Impedance:	>1T Ohms
Potential Measurement:	21 Bit A/D
Maximum Potential Resolution:	1 $\mu$ V
Current Range:	10pA to 550mA
Galvanostat Current Output:	± 10pA to 550mA
Frequency Range:	10 $\mu$ Hz to 100 KHz
Amplitude:	1 to 200mV
Sample speed:	1 MHz

Brand & Model : ACM Gill AC-1684

Lab Name : Manufacturing Laboratory

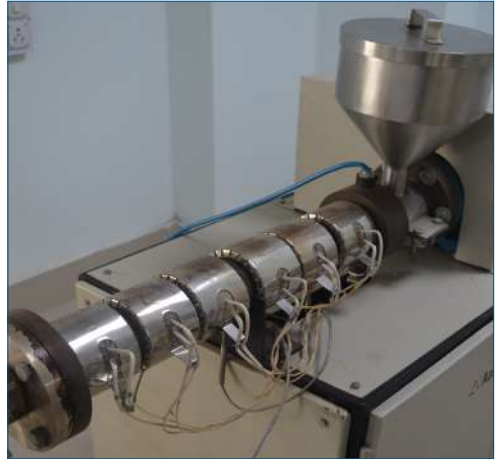
Room No. : M410

## Single Screw Extruder

Used for single filament extrusion. 25 mm Mini Extrusion Equipment for LD/LLD.

### **Specification**

4" Pelletizer with cooling tank  
25 mm Mini Extrusion Equipment for LD/LLD



## 3D Printer

Polymer based. Used for fused Filament Fabrication, Printing.

### **Specification**

Max. Temperature: 500°C  
Filament diameter: 3 mm  
Build volume: 600 × 600 × 500 mm<sup>3</sup>



## Faculty In-charge

**Dr. Mrityunjay Doddamani**

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Lab Name: Advanced Manufacturing Laboratory  
Room No. : M322

# Low speed compressor/turbine cascade wind tunnel with water injection facility



Tunnel is fitted with water injection system. Endwall cooling analysis is provided on turbine blade passage. Flow visualization studies for compressor and turbine blade flow along with Jet impingement studies are conducted. Purge flow studies in turbine blade passage along with transient analysis are conducted.

## Specification

Number of blades:	5 to 7
Test section size: 1	50mm x 450 mm
Maximum speed:	30 m/s
Droplet size:	upto 30 microns
The test section can be rotated for various angle of incidence.	
Secondary air bleeding facility is available	

## Faculty In-charge

Dr. Anish S

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Lab Name : Turbomachinery Laboratory  
Near Workshop (Old Building)

# Subsonic Wind Tunnel



*Type of Tunnel:* Subsonic, Open circuit, Suction type

To measure the lift, drag and pitching moment using three component force balance at different Reynolds number for airfoils.

## **Specification**

Test Section:	1000mm x 1000mm x 2000mm
Air Speed (Velocity):	30 meters/ sec
Contraction Ratio:	9:1
Contraction length:	2.25m
Drive:	Axial Flow Fan driven by AC Motor with AC drive speed controller
Overall Size :	4 meter x 4 meter x 13.5 meter (Approx.)
Power Requirement:	A.C 15 HP (11 kW), 440 volts
Electrical Supply with Neutral & Earth Connections.	

## **Faculty In-charge**

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Lab Name : Turbomachinery Laboratory  
Near Workshop (Old Building)

## Pool boiling Setup



The setup consists of 200×200 mm square boiling chamber made up of SS 316 fitted with SS 316 flanges at the top and at the bottom. The top flange has provisions for liquid charging, condenser cooling water inlet and outlet, pressure transducer. Bottom flange has provisions for test section and drain. The vessel is fitted with four sight glasses to observe the boiling phenomena. The copper condenser coil is connected to cooling water tank through a motor and a PID. An auxiliary heater of 500W capacity provided through the side wall. Pool boiling heat transfer coefficient of pure liquids, mixtures at steady and transient condition can be determined using this setup.

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Lab Name : Heat Transfer Laboratory  
Room No. : M310

# High Speed Camera



A gigabyte Ethernet cable which acts as data logger connects the camera with PC for data transfer. Nikon lens 50mm FL, f1.4D is used. Promon studio viewer software interfaces camera with PC. This user interface software is used to control triggering and recording the cine sequence, it is also used to set the shutter speed, pixel size, and frame rate of the cine sequences to be captured. The camera can record live cine sequence of boiling phenomenon on the test surface at a frame rate of 1000 fps (frame per second) with resolution of 320\*240 pixel.

## Faculty In-charge

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Lab Name : Heat Transfer Laboratory  
Room No. : M310



# FMS Systems



**XL MILL with Transfer Conveyor and automatic loading**



**XL TURN with Transfer Conveyor and automatic loading**



**Automatic Storage and Retrieval System with AGV**

## Faculty In-charge

**Prof. Vijay H Desai & Dr. Navin Karanth P**

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Lab Name : Automation Laboratory 1  
Room No. : M017



## Pneumatic & Electro Pneumatic Control Module



## Hydraulic & Electro Hydraulic Control Module



### Faculty In-charge

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: [navin@nitk.ac.in](mailto:navin@nitk.ac.in)

Lab Name : Automation Laboratory 2  
Room No. : M219



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