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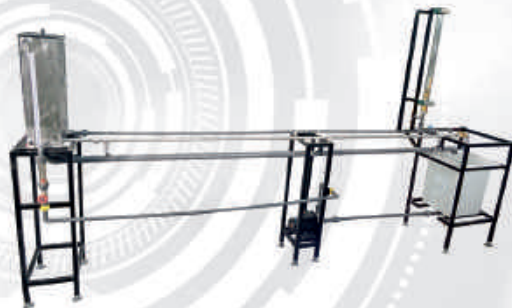
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## Oil & bitumen



## OIL & BITUMEN

Regular asphalt also known as bitumen testing is an important aspect of the asphalt paving industry. PRI's asphalt / bitumen testing allows producers, suppliers, and industry agencies to determine whether asphalt / bitumen products meet their product certification and performance requirements

Asphalt / bitumen testing is not just about meeting regulatory agency requirements; it is also an important factor in new product research and development. New blends, different modifiers and novel manufacturing techniques can be tried in the laboratory before put into large scale production

AO1	Softening Point Apparatus
AO2	Penetration of Bituminous materials
AO3	Cloud Point Apparatus
AO4	closed cup flash point
AO5	Open Cup Flash Point

## FLUID MECHANIC

Fluid mechanics is a branch of physics concerned with the mechanics of fluids (liquids, gases, and plasmas) and the forces on them. Fluid mechanics has a wide range of applications, including mechanical engineering, civil engineering, chemical engineering, geophysics, astrophysics, and biology. Fluid mechanics can be divided into fluid statics, the study of fluids at rest; and fluid dynamics, the study of the effect of forces on fluid motion. It is a branch of continuum mechanics, a subject which models matter without using the information that it is made out of atoms; that is, it models matter from a macroscopic viewpoint rather than from microscopic.

FM 1	Orifice Discharge
FM 2	Cavitations
FM 3	Base Module for Experiments in Fluid
FM 4	Bernoulli's Principle
FM 5	Series and Parallel connected Pump
FM 6	Reynolds and Osborn Experiment
FM 7	Energy Losses in Pipe
FM 8	Falling Sphere Viscosimeter
FM 9	Vortex Formation
FM10	Stability of Floating Bodies
FM11	Friction Losses in pipe System
FM12	Methods of Flow Measurement
FM13	Water Hammer
FM14	Measurement of Jet Forces
FM15	Over Flow
FM16	Open Channel flow

Rock & Fluid Properties



Process Control



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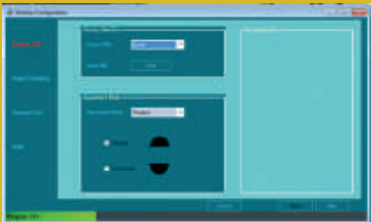
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ROCK & FLUID PROPERTIES

Petroleum Services is the world's largest and most technologically advanced independent provider of reservoir fluid and petro physical services to the oil and gas industry. Petroleum laboratory provides data and services that characterize the porous reservoir rock and all three reservoir fluids - gas, oil and water. Measurements acquired from rock/fluid provide the only direct quantitative measurement of reservoir properties and therefore represents a resource of immense and enduring value. Petroleum laboratories test dead/live oil, petroleum feed-stocks and petroleum refined products.

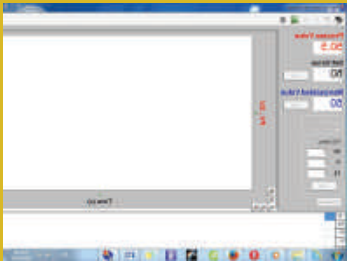
RF1	Helium Porosity Apparatus
RF2	Gas and Liquid Interfaced Tension Apparatus
RF3	Gas and Liquid Permeability Apparatus
RF4	High Temperature & High Pressure Viscometer
RF5	Steady State Water Permeability Apparatus
RF6	Steady State Gas Permeability Apparatus
RF7	Gas-Liquid RelPerm Measurement Apparatus at Reservoir Condition
RF8	Liquid-Liquid RelPerm Measurement Apparatus at Reservoir Condition
RF9	atmospheric pressure wettability
RF10	high pressure wet ability
RF11	Slim Tube
RF12	Core Flooding System
RF13	Gas and Liquid Interfaced Tension Apparatus 10000 psi



PROCESS CONTROL

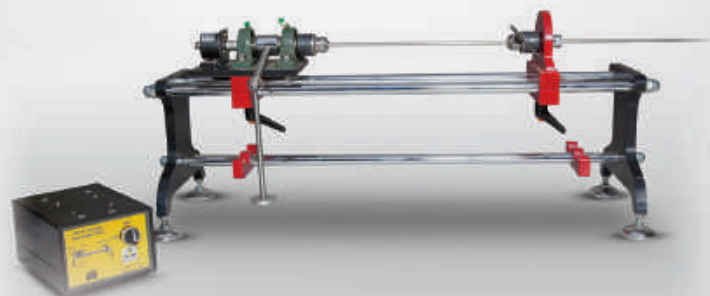
Control process is an essential feature of modern engineering systems. Aircraft, motor vehicles, shipping, production lines, oil refineries, manufacturing and domestic equipment all depend on control systems and sensors. Engineers need an understanding of modern control engineering principles, based on a solid foundation of theoretical and practical training.

PC1	Temperature Control
PC2	Level Control
PC3	Flow Control
PC4	Pressure Control
PC5	PH control
PC6	Flow and Level control





Strength of material



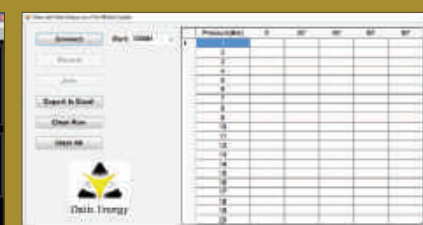
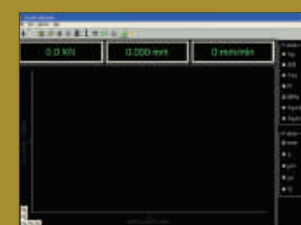
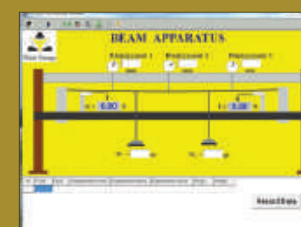
## STRENGTH OF MATERIAL

Strength of material laboratory demonstrates body reaction against various forces. This laboratory has an important role in creating a proper understanding of engineering concepts. Strength of material laboratory Apparatuses has designed flexible to cover wide range of experiments and also tried to use sensors with digitally indicator or software to decrease test errors.

SM1	Universal Material Tester
SM2	Pendulum Impact Tester, 150 J
SM3	Beam Apparatus
SM4	Buckling Apparatus
SM5	Elastic Torsion Apparatus
SM6	Plastic Torsion Apparatus
SM7	Unsymmetrical Cantilever Apparatus
SM8	Thin Cylinder Apparatus
SM9	Bending Device
SM10	Curved Bar Apparatus
SM11	Deformation of Frames
SM12	Fatigue Testing Machine
SM13	Strain Gauge Training System
SM14	Creep Testing Machine
SM15	Deformation of Trusses



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Heat Transfer

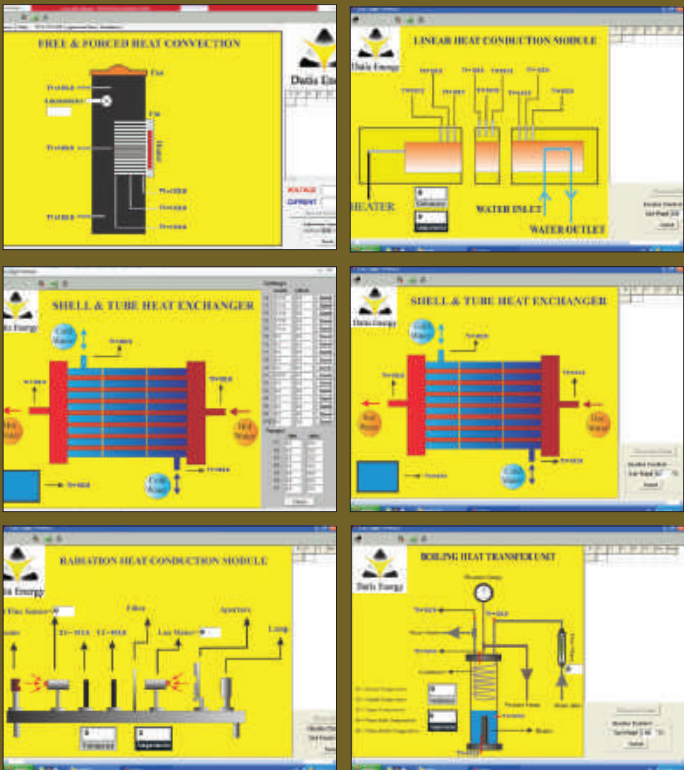


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HEAT TRANSFER

Heat transfer is the movement of thermal energy from one object to another. According to the Second Law of Thermodynamics, heat will always transfer from a hotter object to a cooler one. Once heat has begun to transfer from one object to another, it can never be stopped (only slowed down). Heat transfer can also occur when an object is at a different temperature than its surroundings. In this case, the object will gain or lose energy until it is the same temperature as its surrounding. This is known as thermal equilibrium.

HE01	Extended Surface Heat Transfer
HE02	Tubular Heat Exchanger
HE03	Shell and Tube Heat Exchanger
HE04	Plate Heat Exchanger
HE05	Free and Force Heat Transfer by Convection
HE06	Thermal Radiation Unit
HE07	Boiling Process
HE08	Linear Heat Transfer by Conduction in Solid
HE09	Radial Heat Transfer by Conduction in Solid
HE10	Heat Conduction in Gases and Liquids
HE11	modul of Heat Exchangeres



Mechanical  
Vibration



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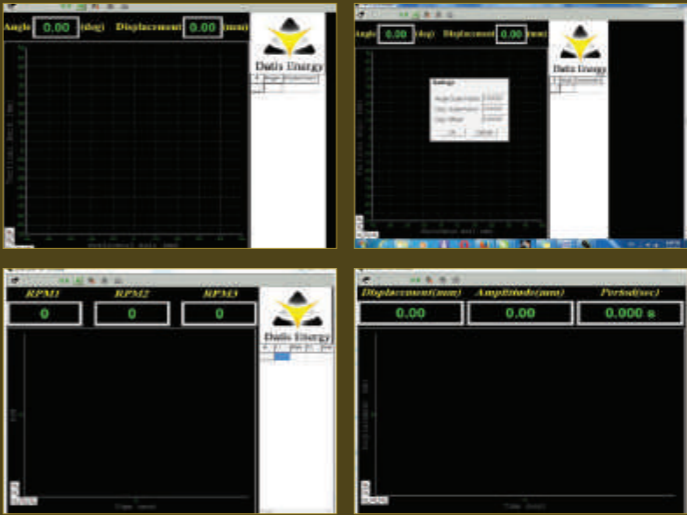


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MECHANICAL  
VIBRATION

Vibration is the process occurring when a physical quantity periodically changes depending on time. This is associated with a conversion of energy from one to another. In the case of mechanical vibrations, periodic potential energy is converted into kinetic energy and the reverse.

DV 1	Journal Bearing
DV 2	Whirling Shaft
DV 3	Gyroscope
DV 4	Governor Apparatus
DV 5	Free and Damped Torsional Vibration
DV 6	Gear Apparatus
DV 7	Epicyclic Gear
DV 8	Static and Dynamic Balancing
DV 9	Centrifugal Force
DV 10	Cam and Follower
DV 11	Coriolis Force Demonstration
DV 12	Free and Force Vibration
DV 13	Four Bar Mechanism
DV 14	Geneva Mechanism
DV 15	Hook coupling Apparatus
DV 16	Oldham Coupling Mechanism
DV 17	Whitworth Mechanism



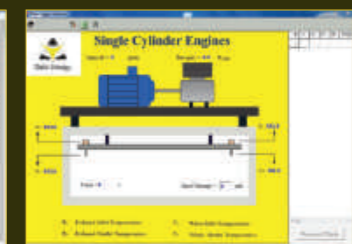
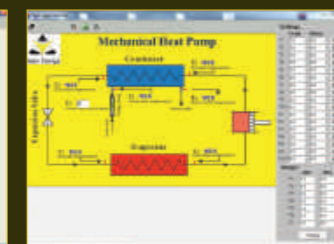
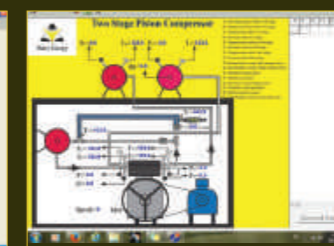
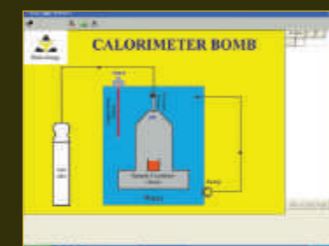
## Thermodynamics

# THERMODYNAMICS

The Thermodynamics range is extremely broad, covering topics such as properties of fluids, heat and work transfer.

One of the most popular applications of thermodynamic principles is found in internal combustion engines and gas turbines. Until "green" technologies are sufficiently developed these machines will continue to dominate the way we produce power and travel. A key goal to moving forward is to improve their performance and efficiency – making the most of our limited resources – so future engineers need to have a sound, basic understanding of the thermodynamic principles of these machines and how they work in reality.

TD1	Stirling Cycle
TD2	Petrol Engine Test Stand
TD3	Two Stage Compressor
TD4	Colorimeter Bomb
TD5	Diesel Engine Test Stand
TD6	Marset Boiler
TD7	Air Conditioning
TD8	Heat Pump
TD9	Nozzle Pressure Distribution
TD10	Single Stage Compressor
TD11	Absorption Refrigeration System
TD12	Mechanical Equivalent of Heat Apparatus



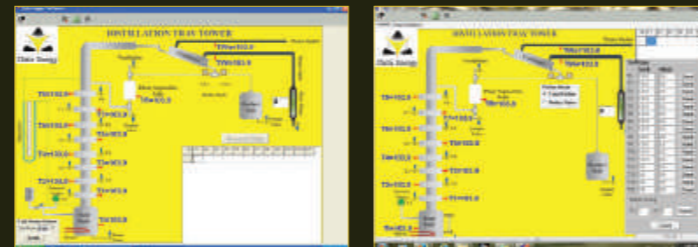
## Unit operation



## UNIT OPERATION

In chemical engineering and related fields, a unit operation is a basic step in a process. Unit operations involve a physical change or chemical transformation such as separation, crystallization, evaporation, filtration, polymerization, isomerization, and other reactions. For example, in milk processing, homogenization, pasteurization, chilling, and packaging are each unit operations which are connected to create the overall process. A process may require many unit operations to obtain the desired product from the starting materials, or feedstock.

U01	Batch Distillation Unit
U02	Absorption column
U03	Liquid-Liquid Extraction
U04	Solid-Liquid Extraction
U05	Convection Drying
U06	Cooling Tower
U07	Spray Dryer
U08	One Stage Evaporation
U09	Rotary Dryer
U010	Fluidized Bed Dryer
U011	Freeze Dryer



UNIT OPERATION

## Supercritical Fluid CO2 Extraction

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## SUPERCritical FLUID CO2 EXTRACTION

The device suitable for high pressure and temperature of the extraction material (solid or liquid) to change the conditions in the separator resolve the dissolved substances to achieve separation. The device consists of: extraction kettle, separation kettle, CO2 high pressure pump, take pump, cooling system, CO2 storage tank, heat transfer systems, display of flow, temperature control system and Safety protection devices, etc.

Affiliated equipment and systems can meet the primary supercritical extraction system requirements and flow requirements.

### Supercritical fluid extraction has the following characteristics:

- The extraction temperature is low, the product will not be decomposed.
- The precise control of temperature and pressure, a selective extraction can be achieved.
- The product is no solvent residue.
- The solvent can be recycled.
- No environmental pollution.

### Advantages of extraction with Supercritical CO2:

- CO2 supercritical state easily obtained.
- Non-toxic contamination of food and medicine.
- Preventing bacterial activity.
- Nonflammable, good chemical stability.

### Technical Data

- production volume: 2 lit, 3 lit, 5 lit, 20 lit and ...
- CO2 high pressure pump: 500 bar 50
- solvent high pressure pump: 500 bar 0.25-4
- pipes and elements in stainless steel S316 with 6000 psi working pressure
- tanks in stainless steel S316 with 6000 psi working pressure
- stainless steel centrifugal pump for hot water circulating 0.37kW
- pressure sensor: 500 bar
- pt100 sensor thermometer
- digital mode; digital indicators
- software mode:
  - particular software to display and save measured amount and export data to EXCEL
  - sensor calibration by Software
  - connect to a PC via USB port
- Rigid structure

### Dimension and Weight

- Super Critical Extraction
  - L×W×H: 220×120×195 cm
  - Weight: 600 kg
- Refrigeration System
  - L×W×H: 100×100×120 cm
  - Weight: 250 kg

### Connection

- 230V , 50/60 Hz , 1 phase or 3 phase
- Cooling water
- Personal computer

SUPERCritical FLUID CO2 EXTRACTION