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# RESOTECH FATIGUE TESTING MACHINE

*Professional Manufacturer of Test Equipment*

## FEATURES:

**FATIGUE Testing Machines have a wide range of applications and number of materials, metals in different form and shapes can be tested for variety of tests like Tension, Compression, Static ,Transverse, Bend, Dynamic, Shear, Brinell Hardness etc. Special attachments are also available for testing of Flat Belts, Chain Links, and Wire Ropes etc.**

**MAKE-RESOTECH**

**MODEL NO. RESOTECH-FRANK003**

# MANUFACTURERS & SUPPLERS

**SPECIAL PURPOSE MACHINE, MATERIAL TESTING MACHINE, LEAKAGE TESTING MACHINE, PACKIGING TESTING MACHINE, ENVIRONMENTAL TEST CHAMBER, ASSY. LINE EQUIPMENT, SOLUTION FOR ELECTRONIC AUTOMATION AND PRODUCT DEVELOPMENT, COMPUTERIZED CONTROL MACHINE , PLC HMI SCADA VISUAL BASIC SOFTWARE DEVELOPMENT SOLUTION AND OTHER SERVICES.**

**The mechanical properties of materials are determined by performing carefully designed laboratory experiments that replicate as nearly as possible the service conditions. In the real life, there are many factors involved in the nature in which loads are applied on a material. The following are some common examples of how these loads might be applied: UNIVERSAL, compressive and shear, just to name a few. These properties are important in materials selections for mechanical design.**

RESOTECH Series are Universal hydraulic servo-controlled machines from 20kN to 2000kN capacity, computer controlled, to perform static tensile testson metallic materials.

RESOTECH machines basically consist of:

- Strong loading frame with a reading strain gage load cell built intothe piston

- Computer Controlled System SCM3000 and software, for the dataacquisition, control and processing.

- Hydraulic Power Pack: adapted to the users specific needs: range of force, speed, stroke, type of control, etc. The whole is built in a console.

The frame is designed to carry out fatigue tests using the grips placed in the clamping heads. In the upper part, between the head and traverse,

It is possible to carry out flexion, compression, bending, hardness, dishing tests, according to the International Standards by using the suitable (see accessories) devices.

The hydraulic servo-controlled unit regulates the load or the displacementrate by the Computer.

An emergency device stops the machine in any moment as per the International Safety Standards.

A control panel situated on the frame governs the movement of the lower tensile head (typical excursion 0÷300mm with electric end of stroke switches)for an easier positioning of the specimen according to its length.

The machine is supplied complete with loading frame, control system SCM3000 and hydraulic power unit.

The extensometers, the grips and the printer are options and should be ordered separately according to the needs of the user.

# DETAILED SPECIFICATIONS

FTM is electromechanical system with integrated digital closed-loop control, data acquisition
System with measurement of load, crosshead travel and extension (through extensometers). The
Basic system comprises of Electromechanical Load frame, Signal conditioning and Control Unit,
Standard Computer, Software Package, Load Cells, Displacement Transducer and Grips/ Fixtures (As per requirement).

# FTM MACHINE
# MODEL NO.RESOTECH- OMEGA

The RESOTECH testing machines include one or more **force transducers** (load cell) that provide better precision measurement of the applied force than pressure transducers or gages used in traditional hydraulic systems. In this way the force measurement is not affected by oil temperature, local disturbances caused by theoil flow, friction in the load cylinder, etc.

**The test speed and the position can be digitally controlled and measured by means of a linear displacement transducer in the actuatoraxis obtaining a high precision controlled movement.**

RESOTECH MACHINES FLEXIBILITY

**The RESOTECH machines flexibility is further extended by a wide array of accessories instrumentation, grips and fixtures to perform all kind of test with the higher efficiency. These accessories include LVDT extensometers, compress-meters, strain gage extensometers, high temperature extensometers, as well as grips, holders, jigs or platens for holding the test specimens. They can also be delivered with special testing equipment as high temperature furnaces, climatic chambers, etc.**

RESOTECH can provide a great variety of grips and accessories, depending on the material or test.

**Among others:**

- Compression platens.
- Pneumatic, hydraulic or manual grips for tensile tests with different jaws.
- Bend fixtures.
- Other test fixtures (shear, friction, tear, peel, etc)
- Extensometers, furnaces, climatic chambers, etc.

**This flexibility makes RESOTECH machines very suitable in most of the standardized axial tests,where the force to be applied is under the load capacity of the machine, in tensile testor compression tests in the same single test zone.**

Among others, with the suitable fixture, the following tests can be done:

- Tensile tests on metal samples: standard shapes, ribbons, springs, screws,fasteners, washers, wires, cables, elastomeric samples, etc
- Corrosion under tension tests.
- FATIGUE tests on standardized steel samples.
- Tensile, shear or bending tests on aluminum samples or profiles.
- Compression tests on concrete, mortars, ceramics, foams, wood, rocks, etc.
- Friction tests, peel tests, Axial Test, shear, etc.
- Bending tests on metals, mortars, concrete, ceramics, wood, paving tiles, etc.

**Do not hesitate to contact us to consult any need about your tests.**

## LOADING FRAME:

**The base has a hydraulic cylinder at its center and two main screws at both ends. The middle cross head is mounted on screws through main nuts. The middle cross head can be moved up or down through chain transmission and geared motor to adjust the initial tensile/compression clearance. Inside base of machine, hydraulic cylinder is seated in which piston is placed on the piston, rests an assembly of upper, lower cross head and two columns. The individually lapped cylinder piston assembly ensures smooth axial force with minimum friction.**

## CONTROL PANEL

**Hydraulic circuit it consists of hydraulic power pack which has a directly driven radial plunger pump which gives continuous non pulsating flow of oil pressure up to 210bar a pressure compensated needle type flow control valve is obtained with help of valves. Optionally this can be controlled form electronic system.**

## LOADING RATE / STRAINING RATE CONTROL

**This is superfine controlling system which controls loading rate / straining rate as per commands from electronic machine control system. FTM Software can send loading rate / straining rate to electronic system for fully automatic testing.**

## LOAD MEASUREMENT SYSTEM

**The oil pressure in the main cylinder is also transferred to an electronic pressure transducer which gives proportionate signal to electronic unit. Both the motors for hydraulic operation and cross head motion are controlled by buttons on electronic control system and they have interlocked to prevent simultaneous working of motors. The electrical panel is housed in control panel. Displacement measurement is carried out by means of a rack and pinion on rotary encoder. Encoder signal is fed to electronic system to get displacement.**

## RESOTECH / 25 LOADING FRAMES

- RESOTECH /25kN is an axial servo-hydraulic precision aligned two column load frame with hydrauliclifting system for the adjustable upper crosshead and hydraulic-mechanical clamping system to lock it on the chromed guiding columns at the desired height. The lower base plate is fixed.
- Hydraulic lifts and locks for adjusting the crosshead height. The position control of the uppercrosshead is adjustable by means of two built in hydraulic lifts and commanded electrically. The EFH load frame is floor mounted with a fixed lower base plate and can feature the actuator in either the lower table (base mounted) or the upper crosshead. In this proposal the hydraulicactuator is upper crosshead mounted. For the measurement of the force, the load cell is mounted on the upper crosshead.
- Maximum fatigue rated capacity +/-25kN: The frame iscapable of testing in both tensile and compressive modes. The high stiffness, minimum 600kN/mm, of the proposed frame makes it also suitable for higher fatigue forces. In this proposal, the hydraulic fatigue actuator is limited to 25kN forces, but the frame is designed forhigher forces.
- Test that can be carried out: Tensile; Compressive; Shear test; Fatigue test; Flexural test; Fracture test, etc.
- The load is applied by means of an integral axial Servo-hydraulic Dynamic System with a hydraulic actuator mounted in the upper crosshead of the loading frame.
- Calibrated for full range.

Figure shows an RESOTECH frame with climatic chamber

The frame has the typical following **specifications**:

| | |
|---|---|
| • **Dynamic Capacity:** | **±25 kN** |
| • **Typ. Actuator stroke:** | **±40 mm; ±75 mm (other under request)** |
| • **No. of columns:** | **2** |
| • **Frame stiffness:** | **100 kN/mm** |
| • **Maximum vertical test space between crosshead and the base:** | **Adapted to customer specifications From 700 to 2000 mm** |
| • **Minimum space between crosshead and the base:** | **Typically 50 mm** |
| • **Horizontal daylight, width between columns :** | **Adapted to customer specifications From 400 to 800 mm** |
| • **Total crosshead travel** | **Adapted to customer specifications From 700 to 2000 mm** |
| • **Height (variable and according to crosshead travel)** | **2000mm to 3750mm** |
| • **Global frame Width** | **1200mm-1400mm** |
| • **Depth** | **700mm** |

## OPERATION

**Fatigue test is conducted by gripping the test specimen in the upper and middle cross head. Compression, Bending, Transverse, Shear and Hardness tests are conducted between the middle and lower cross head by using appropriate fixtures. The rapid adjustment of middle crosshead facilitates easy fixing of tensile / Compression specimens of different lengths.**

**Hydraulic controls are through hand operated valve, ergonomically placed for ease of control. Optionally valves can be controlled form electronic control system. Adequate safeties for over load and over travel are incorporated and emergency switch is provided.**

## ACCURACY & CALIBRATION

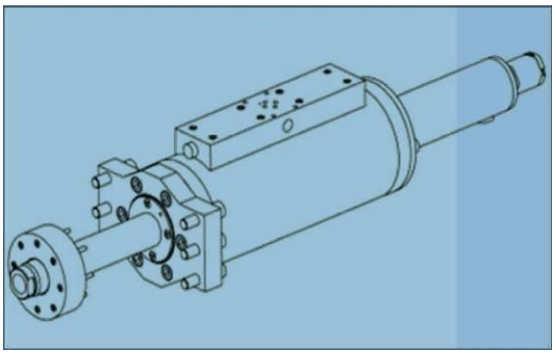
Every machine is calibrated in accordance with procedure laid down in BS-**1610-1964 IS 1828-1991. 'RESOTECH' Computerized Fatigue Testing Machines comply with grade of BS 1610-1964 and Grade 1.0 of IS 1828-1991. An accuracy of ± 0.2% guaranteed from 2% to 100% of capacity of the machine. In the computerized FTM, the computer is an integral part of the entire system and not just on ADD ON feature. This puts a lot of power and versatility into the hands of the operator and makes the system much more self-contained than usual, as it includes many functions usually only available as additional (often expensive) optional features.**

RESOTECH frame series are ideal for a variety of tests like tension compression flex/bend fatigue (low cycle fatigue / high cycle fatigue / fatigue crack propagation, fracture mechanics, damping properties and vibration testing.

**Test area guard** to protect the user and an **emergency stop** to shuts off hydraulics are part of thesecurity elements.
The system is free standing for installation on a standard concrete floor without requiring any specialfoundations Isolation mounts are provided for fatigue testing.

## SERVO ACTUATOR

### CH-9 300kN C-150 .-200 Hydrostatic Bearing Actuator



The axial hydrostatic bearing servo-actuator SERVOSIS CH-9 300kN C-150 or C-200 has a Capacity of ±250 kN Force with maximum input supply pressure of 207 bar and a maximum capacity of **±300 KN** with maximum input supply pressure.

Double action, double piston rod. The typical stroke of the actuator is ±40 mm (total 80mm) or ±75mm (total 150mm) or +-100(total200). Other under request. The actuator is a double ended, equal area constructed actuator to generate equal axial force in tension and compression with hydrostatic bearings.

The hydrostatic bearings provide extremely low friction for the most accurate control and longest reliable lifetime at full ratings.

A precision displacement LVDT transducer or a digital position transducer is integrated in the actuator, co-axially mounted. Typically it is a contactless type MTS Tempo Sonics. Resolution: 40bits. Power supply: 24 Vdc.

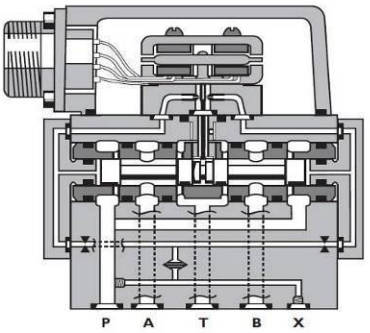
Designed for operation under high dynamic fatigue admitting frequencies up to **100 Hz.**
Cylinder and piston are ceramic coated and high fine polished to reduce friction. HydrodynamicsTechnology (without seals) with continuous oil flow and double drain front and rear bearings, guaranteeing a very low coefficient of friction and long life with very low maintenance.
- Hollow rear rod and weight lightened moving parts to reduce inertia.
- Frontal flange attachment.

P/T accumulators (to avoid or minimized the hydraulic pressure fluctuations attachment, etc).

**Servo Valve**

The system has closed loop servo control. The servo valve has a flow rate depending on the required specifications, adapted to the customer requirements.
Typically RESOTECH/300 uses a MOOG **64 L/min** servo valve with an operating pressure of 207 bar.

The hydraulic servo valve manifold is coupled to the servo-cylinder body and mounts a high response servo valve MOOG series **G761-3005 of 64 l/min** rated flow for high cycle fatigue tests and low-cycle fatigue



tests. Provision is made to manually shut off the servovalve.

Manifold houses all of piping in the actuator, removing the need for most of the exterior piping.

- 2-stage design with nozzle flapper pilot stage and mechanical feedback offers highdynamics, high resolution and low hysteresis. Control signal ±20mA.
- High spool driving forces, rugged design ensures long-life operation
- Compact design allows applications with limited footprint.

## HYDRAULIC POWER UNIT

- The system is provided with suitable hydraulic power supply unit complete with constantpressure control (210 bar) system.
- Typical Flow rating of 67 l/min and operating pressure at 210 bar (3000 psi).
- Output pressure: fully adjustable, user selectable.
- Constant pressure control 210 bar, with pressure gauge.
- A relief valve, factory adjusted, is provided to limit the system pressure.
- Incoming electrical power will be 300 VAC, single phase, 50/60 HZ.
- Remote air-blast cooling unit is available for installation when water cooling is not desirable.The cooling unit is designed for ambient air temperatures of up to +38 ° C.
- Flow rated, 4lpm or higher.
- Interlock circuitry for over tempreture and low flow-fluid level protection.
- Nominal noise rating of 65GB(A) or less measured at 3 feet with the pump[ operating at high pressure and dumping the full flow over the relief valve.

A compatible hydraulic power pack unit CHH/210/67/400, 210 bar (3000psi), 67 l/min provides the pressure and flow rating for the machine. This hydraulic power unit utilizes submerged variable displacement pump unit for maximal electrical efficiency and has protection against different events. Electric motor to efficiency class 1. Star-Delta starting.

The specifications and capacity are determined by the dynamic requirements of the machine: max. speed of the actuator, forces (25kN), etc. The nominal power for the main motor of this unit is approx. 30kW. The hydraulic power unit has also a heat exchanger system to avoid overheating of the oil. The reservoir tank of the unit has a capacity of about 250 l. The required electrical power for the whole unitis about 40kW, 300Vac, single phases, 50/60Hz+ neutral + ground.

With protection devices for oil temperature, oil pressure, oil level, oil filter condition and motor temperature. Off-line cooling and filtration systems.

System management: A PLC power pack control system with digital display is used to control the hydraulic power unit functions, digital display of oil pressure, oil alarm level and oil temperature, other alarms, controls, etc. The information from the hydraulic unit is also displayed and commanded in the main computer.

This PLC allows the choice of local control (at HPU) or remote control from the machine computer. The maximum pressure can be regulated by the user in order to provide a limit for the applied force, when needed, as security element. The unit disposes of electrical system for command and Pump Start, Pump Stop and Emergency Stop buttons. The unit provides input and output information to the control and measurement unit: state of the input/output signal, activation of electro-valves, alarms, etc. The unithas trip circuits to shut the pump down in the event of high oil temperature and low oil level. It disposes of local or remote Start/Stop functionality

Illuminated trips for.

- Filter blocked.
- Low oil level.
- High oil temperature.

This information is also displayed in the PC through the SCM4000 software.

Water cooled heat exchanger is used. The integrated cooling water system and hydraulic accumulator (minimum 1 liter) keep hydraulic fluid temperature and pressure uniform for peak system performance. Interlock circuits turn the unit off if the level gets too low or its temperature too high. Easy- to-read gauges let the user monitor **fluid pressure, level and temperature.**

## FORCE TRANSDUCER: ±500 KN Load Cell

The load cell is completely compatible with the system components and it includes an integral accelerometer for inertialmass effect compensation.

Fatigue rated axial load cell ±500kN capacity with an overload capacity of **500%** of the rated load.

**RESOTECH PB2/500-300** low profile fatigue rated load cell, Tension and compression **±500kN** fatigue capacity (rated load). Overload capacity 500% of the rated load.

- Temperature compensated strain gages with high signal-to-noise ratio.
- Performance to static error band (nonlinearity, hysteresis): < 0.1% F.E.
- Low moment sensitivity.
- Low deflection: higher fatigue life
- 0 .0015%/°C temp. effect on output
- Tension and compression
- Overload capacity: 15% static capacity, 25% dynamic capacity.
- Calibration error : Calibration to class 0.5 down to 1% of full scale

## FATIGUE TESTING MACHINES SERVO-HYDRAULIC RESOTECH SERIES. RESOTECH/25KN

PB2 load cells for dynamic applications include a miniature **accelerometer** installed in the center of the load cell system, in the load axis, to compensate the error due to inertia forces caused by the attached mass. The range of compensation is from 0 to 200Hz, covering the majority of cases in servo-hydraulic testing systems. Amplitude and phase inertial errors can be compensated. A procedure for compensation configuration is included in software SCM4000 when used with MOOG PTC System.

Automatic **transducer recognition** with proposed control system and **SCM4000 software**.

### CONTROL AND DATA ACQUISITION SYSTEM: CONTROL ELECTRONICS

***Digital Controller*** **RESOTECH SCM 4000 –MOOG PTC system** *: control, measurement, acquisition* The Control Unit has a controller and signal conditioning modules for the control of position andload.

#### Digital controller with computer control Features

FTM Machine will perform in load controlled, strain controlled and displacement controlled mode. The system control is from the PC via the built-in computer interface but the controllerdisposes also of a frontal operator panel to provide additional and supplementary manual userinterface to the controller.

Real time control function like loop closure of data acquisition, command signal generation, and signal conditioning.

Emergency stop button, upper lower limit switches included.

Transducer conditioners for stroke control, load control and strain control and be a full rangedesign.

Controller & Interface software have the typical functions associated with setting up limits, sensor selection, valve tuning and set up, error detects, status display and digital displays of sensoroutput.

Safety features with over travel protection.

Function generation of monotonic ramps and cyclic waveforms using sine, square and triangular shapes, etc, Auto-zero, bump-less start, hydraulics on mode switching, ability to save and restorePID tuning settings.

Adaptive control system with adaptive controls compensation: Peak-valley and null placing andoverall accuracy of the test systems better than 1% which is a combination of actuator, controller and servo valve and HPU. The adaptive controller automatically updates the control loop terms to compensate for changes in stiffness during testing. This facility run at 1kHz adaptive control for amplitude and phase. Controller provides adaptive PID gain control, limit and event detectors and system trips. It is possible to generate ramp, triangular, trapezoidal and any other complicated waveforms.

### RESOTECH SCM 4000 System with MOOG PTC and RESOTECH SCM4000/m software

- Fully Digital real time control loop 32 bits with synchronized data acquisition and with function generation to drive the actuator with system update rate of 10kHz.

It includes the necessary transducer conditioning for load (extensometric force transducer), displacement (for LVDT or SSI input), strain channels (extensometric or analog ±10V). 24 bits conditioning units for conducting fatigue tests, in closed loop load and strain control modes with a minimum data acquisition rate of at least 10 kHz.

- Multichannel system: 4 channels x 2 high resolution analog inputs/channel
- PID terms are updated at a rate of at least 1kHz,
- Controller has at least one analogue input for an analogue waveform drive signal and at least six assignable analogue outputs.
- Full reverse-stress dynamic testing capability in tension and compression
- Specimen protection features
- Automatic servo valve null adjustment is provided.
- Servo valve limits are provided with independent settings for low and high pressuremodes.

**The MOOG Portable Test Controller** is a 1-4 channel stand-alone digital servo-controller that has been carefully designed based on input from users to meet the demanding needs of automotive testing. It can be used for manual control, constant amplitude tests and high performance handling of complex testing formulas.

It incorporates a unique force loop technology for force, displacement and Acceleration control to handle general purpose testing with or without a PC. The controller can be operated by PC, hardware panel or both. It is ideal for either replacement or upgrade to digital control, as users can just plug it in and be ready to run without offline external software. PC interface to controller is through Ethernet. Appropriate configuration PC will be supplied. It operates on Windows based OS.

The controller is capable of being operated by a personal computer or hardware panelor both.

The user is able to select a preferred units system, through software; SI, Metric and US Customary are provided. The selection (configuration) will be persistent through power- down.

The system has necessary safety features & interlocks (see later). The control electronicsis able of performing diagnostic tests during power up and report and define any faults found. The controller has a communications watchdog to detect loss of communication with the personal computer and operator panel. In the event of communications loss,the controller reverts to a safe state.

### Advantages

- High performance operation due to Moog unique force loop technology for faster and more efficient testing and reduced set-up times
- Dual mode, bump less switching allows test labs to take advantage of the full range of the Application . Bump less transfer from one control mode to another is possible. Test interruption facilities are included, allowing the tests to be intermittently stopped and re-started. This facilityallows the test to be paused on completion of the current cycle, the specimen ramped to zeroload and the temperature reduced to ambient, while maintaining zero load.
- Matrix Control provides measurement and control flexibility for more efficient testing.
- Flexible features such as ability to run with or without a PC offer user-friendly operation in a rangeof testing applications

- Proven controller reliability with more than 5,000 control channels installed (MOOG) and used Daily in test labs around the world.

- Advanced control that is expandable up to four channels
- A portable and standalone test controller
- Unique control loops (e.g. force, displacement and acceleration) for faster and more efficient testing and reduced set-up time
- Simple operation that allows you to add just the functionality you need for cost-effectiveintegration
- Built-in data-acquisition, integrated oscilloscope display and data storage capability on a localhard-disk, make testing easier and save both lab space and running costs
- Flexibility with any hydraulic, electric or pneumatic actuators
- Plug and play with all connectors for cost-effective, immediate integration.
- Pseudo channels capability allowing the user to create online calculated channels using formulas and other inputs, offering greater flexibility and cost savings for the lab. The controller is able to control any close loop from any concerned, calibrated available transducer. i.e. position, load or strain control, as well as derivatives of these such as

- Stress intensity and plastic strain.
- Matrix control provides measurement and control flexibility for more efficient testing
- Bump less switching (e.g. Force, Position) to take advantage of the full range of application
- Scripting for digital and analog I/O as well as limits and peak detectors makes set up and running of tests easier
- Online adaptive controls for amplitude and phase saves set-up time

- Calibration and tuning wizard to facilitate and accelerate setup.
- Expandable to 32 channels test controller version, using multiple units.

## Housing

- Expandable: it can contain up to 4 channels (for 4 axis) in the same housing.
- Desktop or 19" rack mountable 450 x 177 x 280 mm (17.7 x 6.9 x 11.0 in)
- Weight 9.2 kg (20.3 lb)
- Integrated 640 x 480 full VGA color display
- Input voltage: 90-132/180-264 VAC; 47-63 Hz; 10A@115V, 5 A@230V,400VA
- 2 x 2 A @24 V Low/High Solenoid output

## Servo controller

- Up to 6kHz multi-channel or up to 10 kHz 40 bit digital single channel control loop (software selectable)
- Moog unique control loop
- Three feedback control possibilities (Force, Position (and strain), Acceleration)
- Bump less instant mode switching between force (or strain) and position mode.

## Function generation

- Frequency range (wave form): 0.01 to 500 Hz (1kHz with external input generator) accuracy ≤0.01%
- 32 bit Internal Multi-channel function generation with user defined "mixer" functions (e.g. mix a low frequency offset with a higher frequency load)
- Waveforms: sine saw tooth or triangle, block/square, ramp, rounded ramp. Exponential, $\text{sen}^2$ (Θ/2). Etc .
- These waveforms are available too on the control panel in absence of a computer
- Analog input can be used as command
- Complex simulation spectrum support including spectral density (psd frequency definition)
- Constant amplitude and phase matching
- A cycle counter is available and able to display elapsed and total cycles.

### Standard Inputs (per channel)

- 2x high resolution (0.03 %) with selectable gain and bridge excitation.
- Pot meter input (0.03 %) (± V 5 mA) or LVDT input (0.03 %) with LVDT excitation

### Standard Outputs (per channel)

- 16 bits ± 100 mA valve driver output, with a limit in software from O to 100 % or (hardware selectable) ± 10 V output
- 2x 16 bit D/ A converters. ± 10 V
- Manifold Control Unit with 4 On/Off Low/High pressure valves (24 VDC/2 A each)
- Digital I/O board containing 8 inputs and 8 outputs
- Add on board for 3-stage servo valve
- A servo valve dither facility is provided with a variable frequency and amplitude up to 10% of full scale drive signal. Servo valve automatically adjusted

## HARDWARE OPERATOR PANEL

- Via computer touch screen and Handset fully compatible with console software.
- The console provides manual control and system status for at least one axis of control running tests in position, load or strain control without a computer; with setting of limits , setting of test waveforms and data displays
- This touch screen console is provided to adjust actuators, start/stop test, and turn hydraulics on/off, etc. at the load frame. This remote hand control unit provides manual control of crosshead positioning including a digital display of static and dynamic load as well as the static and dynamic stroke shall beprovided. The operator panel provides system status information when using computer control
- A cable connected **handset** can be provided with push buttons for easy actuator positioning. The hand set includes up/down movements and emergency button. This element is user enable from the console and remains in a non active state when test is running.
- The controller has the capability of **sample data** playback via computer interface with a rate of at least 10 kHz. Standard digital filters are available for sampled data playback adjustable by the user.
- All the necessary cables for connecting the machine, controller,
- Load frame, PC, transducers etc. with one another are included in the supply.

## SIGNAL CONDITIONING NI COMPACTDAQ PLATFORM

- The system is typically equipped with low noise, low drift, high accuracy signal conditioning. Separate tapping points are provided for acquiring signals such as load, strain and stroke.
- Each strain channel will provide for closed-loop control and data acquisition for one transducer, along with enabling transducer excitation. Transducer means or refers to strain Gage Bridge, LVDT or ± 10VBNC input.
- The system supports at least 2 main digital conditioning units: for voltage/current signals (up to 4channels 24 bits) and four strain gage transducers (4 channels 24 bits).

# TECHNICAL SPECIFICATION

- Two high stiffness column designs with 75 mm or above solid column for axial and torsion testing.
- Nominal dynamic load rating: +25 kN, fatigue rated.
- . Vertical test space: Height 700 mm or above.
- Servo Hydraulic actuator must be mounted in the top crosshead of the load frame.
- Total actuator stroke must be 40 mm or more.
- Coaxially mounted encoder with at least 0.2-micron resolution for displacement measurement.
- Internal threads in the piston rod for mounting a grip or a load cell.
- +-25 KN axial with 100 Nm torque fatigue rated load cell.
- +-500N axial with 2 Nm Torque fatigue rated load cell.
- Compression Gripper, Three-Point gripper, Mechanical Tensile Grip.
- Dynamic force capacity: 125 KN axial.
- Operation from 100-260 V 50/60 Hz Single-phase AC Supply.
- 40-bit digital servo loop update at 6 kHz or better.
- 210 bar operating pressure.
- Oil to water heat exchanger to dissipate all heat generated by the power unit
- LPM: 4-12
- WAVE OF LOADING: SINE
- DISPLAY:DISPLAY OF ALL TEST PARAMETERS ON COMPUTER SCREEN i.e., AXIAL FORCE,RADIAL FORCE TORSIONAL FORCE OR STROKE, CYCLES , PRE LOAD VALUES,CPM,PART NO. ,PART NAME, DATE,FORCE VS CYVLE GRAPH, DATATRANSFER TO XLS FORMAT .
- COMPUTER : Dell Laptop computer running Windows 10 or later with MS Office Professional installed, i7 or i9 processor having 16 GB RAM.
-

Emergency Stop

- **Type of Testing**

1. Tensile Test
2. Elongation Test
3. Strain Test
4. Stress Test
5. Bending

- **Graphical Representation**

1. Load V/S Displacement
2. Stress V/S Strain
3. Load V/S Time
4. Displacement V/S Time

- **Report Format**

Excel
Pdf
word

## SERVO CONTROL PANEL:

A.C. servomotor drives the gear box, rotates and gear box output shaft drives a belt which in turn lead screws. The gearbox & motor is mounted on a plate, which in turn is fixed to the bottom plate being a variable speed motor the middle cross head can be moved up and down at the required speed.

A rotary encoder is in-built in the servomotor to measure the middle cross head movement and in turn the elongation, displacement in the specimen

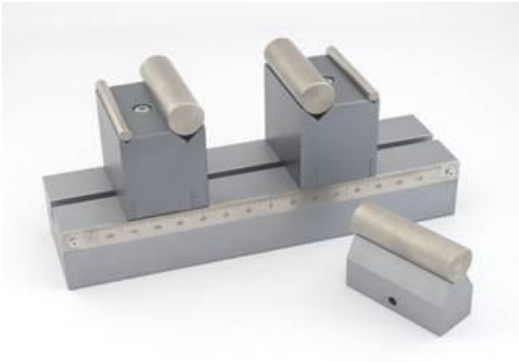
## METHOD OF TESTING:

InitialAdjustment:-

Select suitable grips for the specimen to be tested various types of grips can be supplied to the customer depending on the requirement. the grips are designed in Such way that they can be mounted easily on the machine by inserting a pin or by tightening the threads in the joints. Adjust the cross head as per the specimen length and grips.

If load v/s Displacement, curve is to be recorded. Connect the printer to the interface circuit socket

# ACCESSORIES








The RESOTECH series machines flexibility is further extended by a wide array of accessories instrumentation, grips and fixtures to perform all kind of test with the higher efficiency. These accessories include variousfatigue rated sensors, load cells, strain gage extensometers, LVDT extensometers, compress meters, high temperature extensometers, as well as grips, holders, jigs or platens for holding the test specimens They can also be delivered with special testing equipment as high temperature furnaces, climatic chambers, etc.

MICROTEST can provide a great variety of grips and accessories, depending on the material or test: mechanical, pneumatic or hydraulic tensile grips, compression platens and anvils, bending fixtures, shear fixtures or specific grips or accessories for any type of test or material.

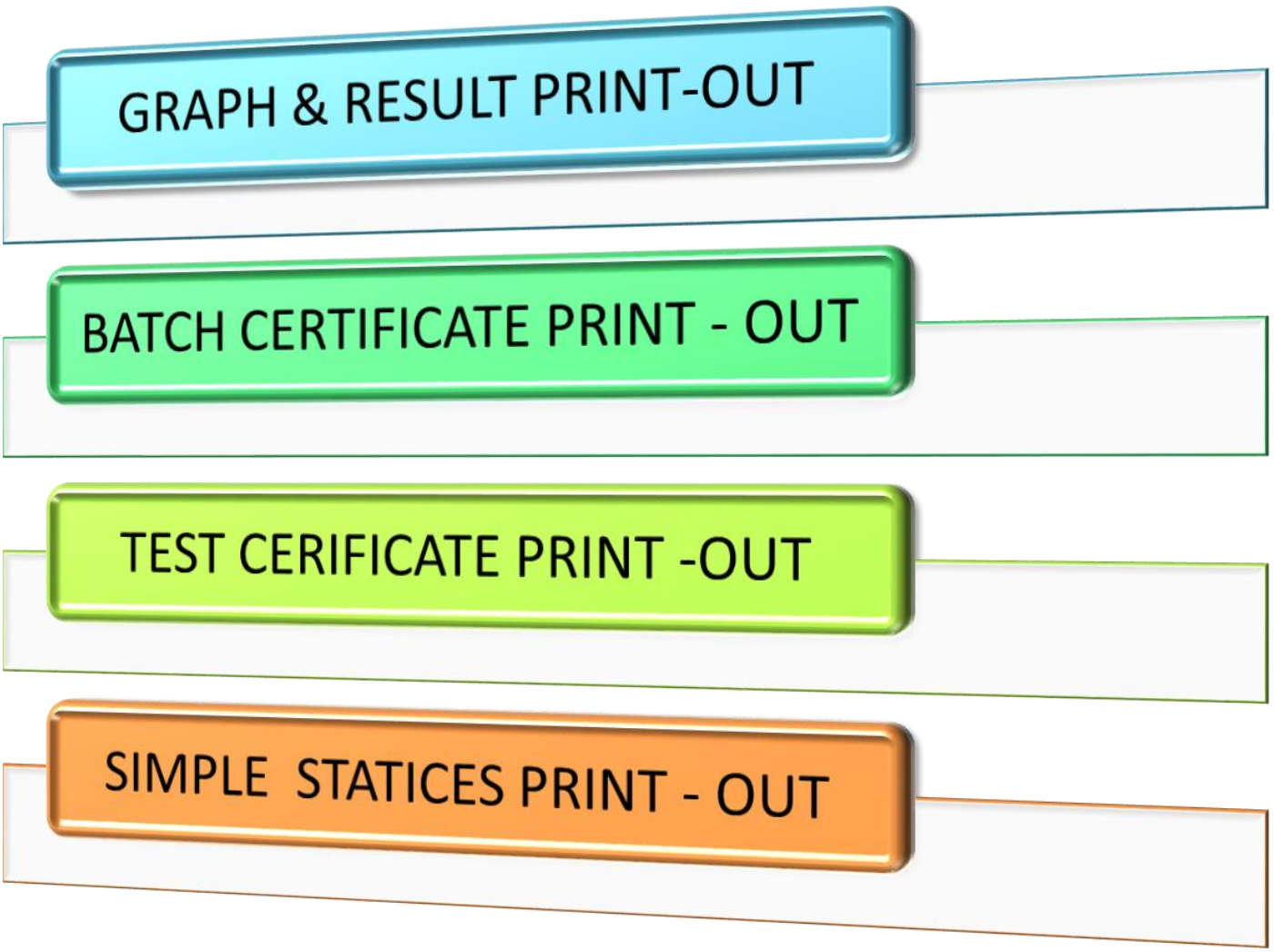
## FEATURES OF RESOTECH FTM SOFTWARE:

- Menu driven form system with color graphs to compare sample test results
- Test details and reports are stored in database
- User programmable master test templates
- User can select test from master test Templates and can start similar test
- Load and Elongation is continuously displayed on screen
- Overload protection for machine by electronic control
- Tare Load and Reset Elongation facility available
- User selectable sample break detect condition
- Load rate and strain rate are also displayed while testing
- Unlimited Load rate and strain rate control steps
- With Load rate controller, user can hold the load on specimen for unlimited time
- With Load rate control, user can specify positive or negative Rate of Loading
- User selectable units for load and displacement (kg, KN, N, Ibf, mm, cm, inch etc.) Results and graphs are automatically displayed accordingly
- On line display of Load and Displacement (Stress, Extension, Strain) etc. while test is conducted
- Provision of auto zeroing of Elongation at preload set by user
- User Programmable Reports. User can select Header, Footer, Specimen information, Dimensions, Test information, Test results, Statically analysis as per his need
- Generated reports can be exported to PDF file and can be e-mailed
- If electronic extensometer is used then proof stress values from 0.1% to1%can be determined
- Software will give alert to user to remove extensometer when load crosses .2% of Gauge length selected then proof load value is calculated. (With extensometer)
- Separate graph of extensometer and encoder is displayed
- Provision of calculation of Load and Elongation at yield, Peak load and Load at break, Yield stress, Ultimate stress etc.
- Special software for tensile, compression, bend, TOR steel and other test software as per customer requirement

## TECHNICAL SPECIFICATION:

| Specifications | Models | | | | | |
|---|---|---|---|---|---|---|
| | **OMEGA-100** | **OMEGA-200** | **OMEGA-400** | **OMEGA-600** | **OMEGA-1000** | **OMEGA-2000** |
| Measuring Cap. (KN) | 100 | 200 | 400 | 600 | 1000 | 2000 |
| Measuring Range. (KN) | 0-100 | 0-200 | 0-400 | 0-600 | 0-1000 | 0-2000 |
| Least Count (KN) | 0.005 | 0.01 | 0.016 | 0.024 | 0.04 | 0.08 |
| Load Range in KN with accuracy of Measurement ± 1% | 2 to 100 | 4 to 200 | 8 to 400 | 12 to 600 | 20 to 1000 | 40 to 2000 |
| Resolution of Piston movement (mm) | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.01 |
| Max. tensile clearance at fully descended piston position | 50 to 700 | 50 to 700 | 50 to 700 | 50 to 800 | 50 to 850 | 50 to 900 |
| Maximum clearance for Compression test (mm) | 0 - 700 | 0-700 | 0-700 | 0-800 | 0-850 | 0-900 |
| Distance between columns (mm) | 450 | 500 | 500 | 600 | 750 | 850 |
| Piston Stroke (mm) | 150 | 200 | 200 | 250 | 250 | 300 |
| Maximum straining speed at no load (mm/min) | 300 | 150 | 150 | 100 | 80 | 45 |
| Power Supply | 3 phase 415V 50 / 60 Hz AC. | | | | | |
| H. P. (Total) | 1.5 | 1.5 | 2.5 | 2.5 | 4.0 | 6.5 |
| Overall dimensions (Approx.) (mm L x W x H) | 1950 * 800 * 1850 | 2000 * 800 * 1900 | 2100 * 800 * 2060 | 2200 * 800 * 2400 | 2350 * 800 * 2700 | 3000 * 800 * 3600 |
| Weight (Approx. in kg) | 1300 | 1400 | 2000 | 3000 | 4200 | 10000 |

# PRINTER PORT FOR PRINTER INTERFACE

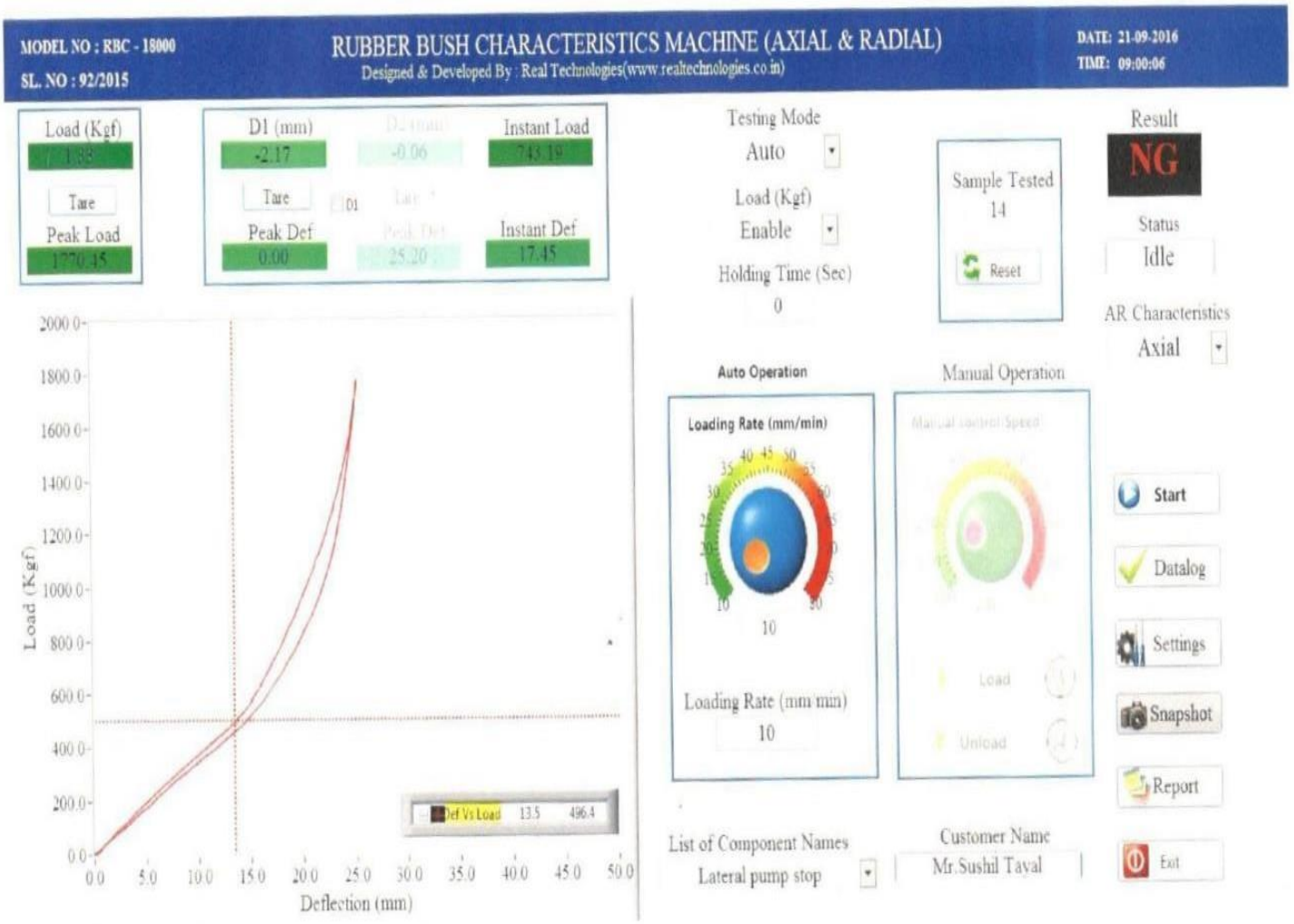


# User Friendly software

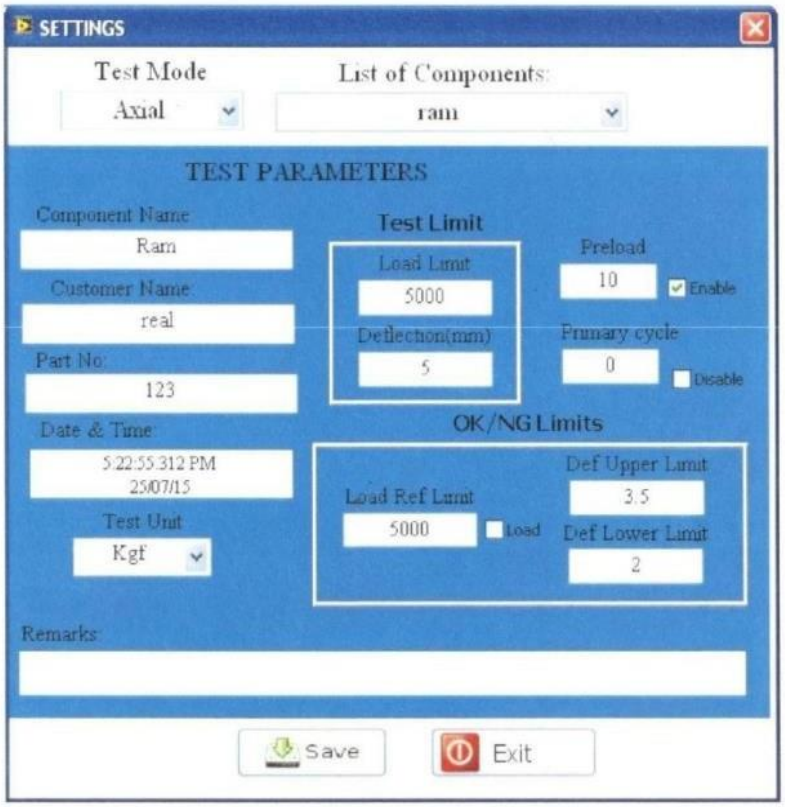
**NI-Labview is used in RBE-2000 which is Europe's #1 software for testing machines. All the LHB test parameters are pre-loaded by default . Just scroll and select , So easy to use !**


LOADING RATE CONTROL FROM SOFTWARE. BOTH MANUAL TESTING AS WELL AS AUTOMATIC TESTING.

# AXIAL LOAD TEST OUTPUT



Test Parameters setting from software. Just enter force or deflection limit once and save the recipe. Next time select part no and machine will automatically load the parameters and test the parts. Provision to make up to 100000 recipes



## ADD EDIT SPECIMEN

Here the administrator can add new specimens like(Rubber, TMT Bar, Iron Rod, Door Hinge, Brake Hose etc) And assign test type(Tensile, Compression, Flexural, Elongation Test etc) also can select test results required For specified specimen.

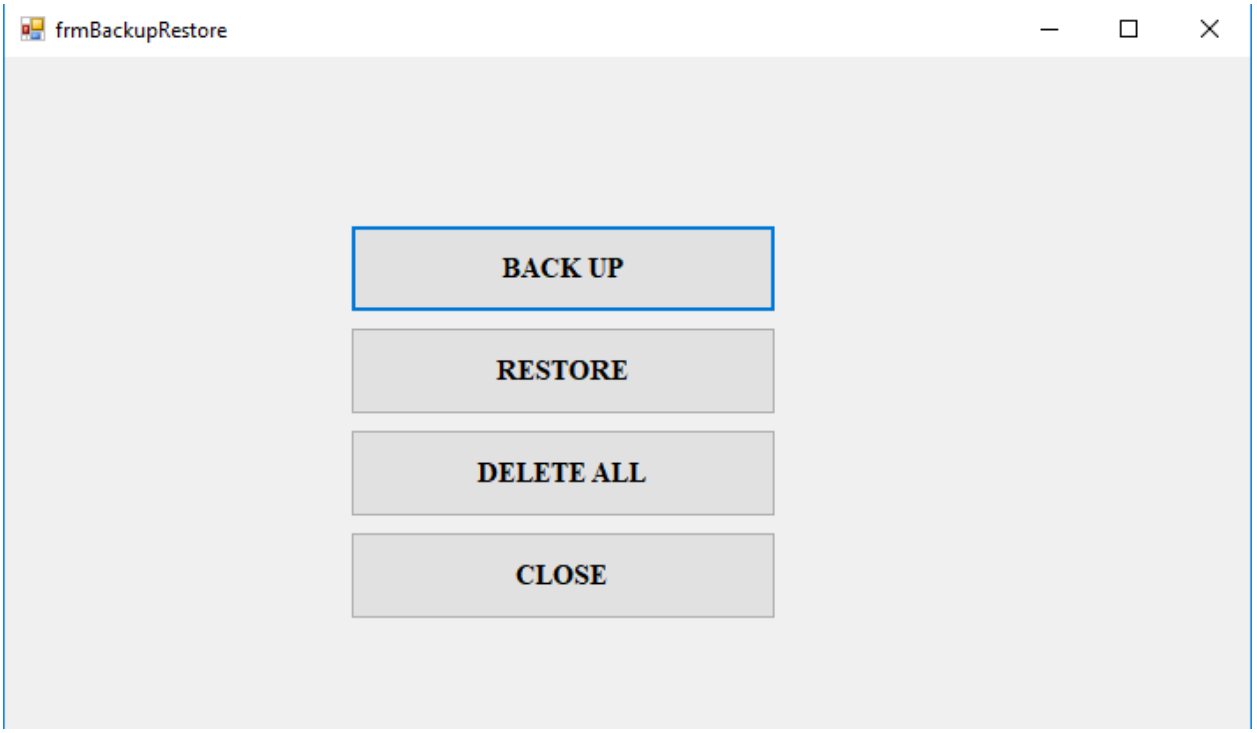
## BACKUP & RESTORE

Backup

Administrator can take backup of all test and settings here. It is advised to take back in regular intervals.

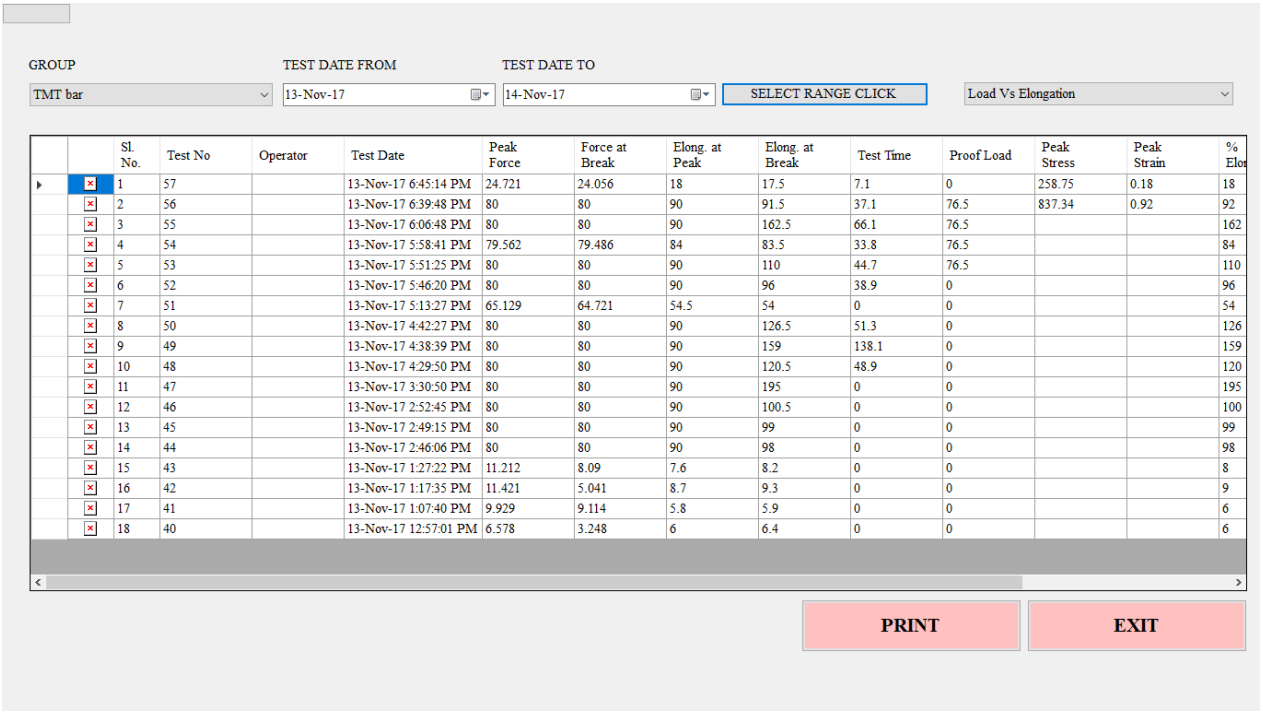
Restore

Any time if your software get corrupted or loss of data, administrator can restore back data back to system using this option. Care should be taken while restoring the data, by clicking delete all data administrator has to clear all current then use restore.( Note : only the data till backup date will be restored).



## HISTORY

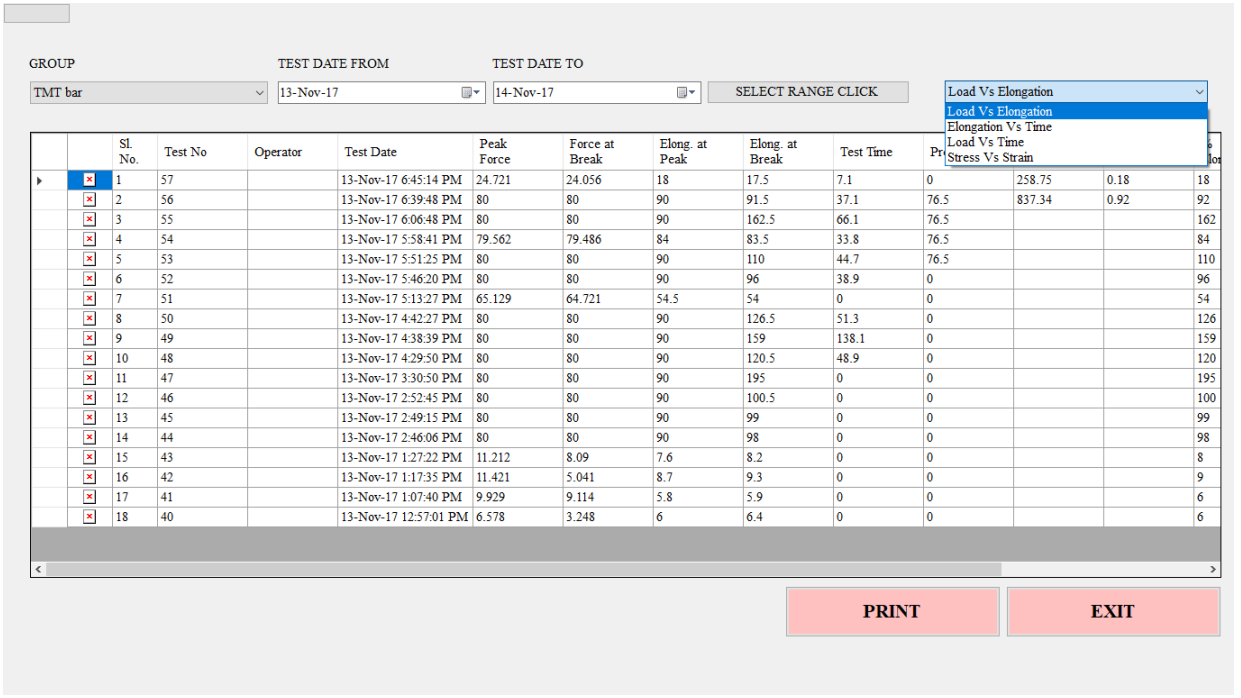
Here user can see all previous test and take print out from here.



GROUP: TMT bar | TEST DATE FROM: 13-Nov-17 | TEST DATE TO: 14-Nov-17 | SELECT RANGE CLICK | Load Vs Elongation

| Sl. No. | Test No | Operator | Test Date | Peak Force | Force at Break | Elong. at Peak | Elong. at Break | Test Time | Proof Load | Peak Stress | Peak Strain | % Elo |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 57 | | 13-Nov-17 6:45:14 PM | 24.721 | 24.056 | 18 | 17.5 | 7.1 | 0 | 258.75 | 0.18 | 18 |
| 2 | 56 | | 13-Nov-17 6:39:48 PM | 80 | 80 | 90 | 91.5 | 37.1 | 76.5 | 837.34 | 0.92 | 92 |
| 3 | 55 | | 13-Nov-17 6:06:48 PM | 80 | 80 | 90 | 162.5 | 66.1 | 76.5 | | | 162 |
| 4 | 54 | | 13-Nov-17 5:58:41 PM | 79.562 | 79.486 | 84 | 83.5 | 33.8 | 76.5 | | | 84 |
| 5 | 53 | | 13-Nov-17 5:51:25 PM | 80 | 80 | 90 | 110 | 44.7 | 76.5 | | | 110 |
| 6 | 52 | | 13-Nov-17 5:46:20 PM | 80 | 80 | 90 | 96 | 38.9 | 0 | | | 96 |
| 7 | 51 | | 13-Nov-17 5:13:27 PM | 65.129 | 64.721 | 54.5 | 54 | 0 | 0 | | | 54 |
| 8 | 50 | | 13-Nov-17 4:42:27 PM | 80 | 80 | 90 | 126.5 | 51.3 | 0 | | | 126 |
| 9 | 49 | | 13-Nov-17 4:38:39 PM | 80 | 80 | 90 | 159 | 138.1 | 0 | | | 159 |
| 10 | 48 | | 13-Nov-17 4:29:50 PM | 80 | 80 | 90 | 120.5 | 48.9 | 0 | | | 120 |
| 11 | 47 | | 13-Nov-17 3:30:50 PM | 80 | 80 | 90 | 195 | 0 | 0 | | | 195 |
| 12 | 46 | | 13-Nov-17 2:52:45 PM | 80 | 80 | 90 | 100.5 | 0 | 0 | | | 100 |
| 13 | 45 | | 13-Nov-17 2:49:15 PM | 80 | 80 | 90 | 99 | 0 | 0 | | | 99 |
| 14 | 44 | | 13-Nov-17 2:46:06 PM | 80 | 80 | 90 | 98 | 0 | 0 | | | 98 |
| 15 | 43 | | 13-Nov-17 1:27:22 PM | 11.212 | 8.09 | 7.6 | 8.2 | 0 | 0 | | | 8 |
| 16 | 42 | | 13-Nov-17 1:17:35 PM | 11.421 | 5.041 | 8.7 | 9.3 | 0 | 0 | | | 9 |
| 17 | 41 | | 13-Nov-17 1:07:40 PM | 9.929 | 9.114 | 5.8 | 5.9 | 0 | 0 | | | 6 |
| 18 | 40 | | 13-Nov-17 12:57:01 PM | 6.578 | 3.248 | 6 | 6.4 | 0 | 0 | | | 6 |

PRINT | EXIT



GROUP: TMT bar | TEST DATE FROM: 13-Nov-17 | TEST DATE TO: 14-Nov-17 | SELECT RANGE CLICK | Load Vs Elongation

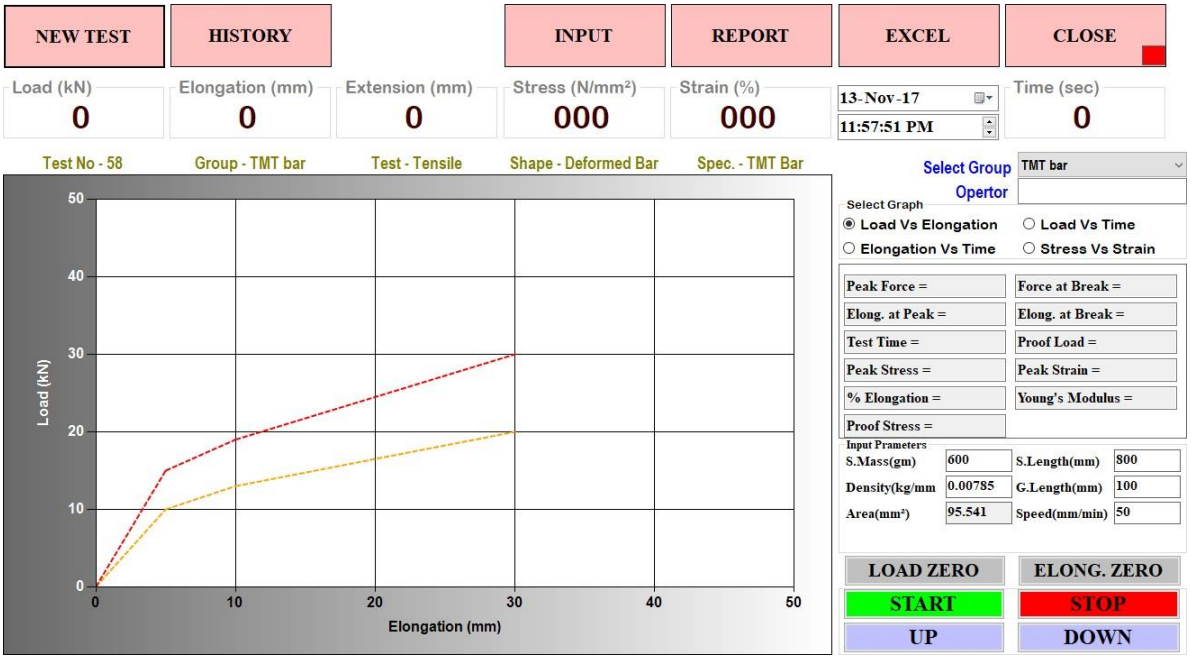
Load Vs Elongation
Elongation Vs Time
Load Vs Time
Stress Vs Strain

| Sl. No. | Test No | Operator | Test Date | Peak Force | Force at Break | Elong. at Peak | Elong. at Break | Test Time | Pr | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 57 | | 13-Nov-17 6:45:14 PM | 24.721 | 24.056 | 18 | 17.5 | 7.1 | 0 | 258.75 | 0.18 | 18 |
| 2 | 56 | | 13-Nov-17 6:39:48 PM | 80 | 80 | 90 | 91.5 | 37.1 | 76.5 | 837.34 | 0.92 | 92 |
| 3 | 55 | | 13-Nov-17 6:06:48 PM | 80 | 80 | 90 | 162.5 | 66.1 | 76.5 | | | 162 |
| 4 | 54 | | 13-Nov-17 5:58:41 PM | 79.562 | 79.486 | 84 | 83.5 | 33.8 | 76.5 | | | 84 |
| 5 | 53 | | 13-Nov-17 5:51:25 PM | 80 | 80 | 90 | 110 | 44.7 | 76.5 | | | 110 |
| 6 | 52 | | 13-Nov-17 5:46:20 PM | 80 | 80 | 90 | 96 | 38.9 | 0 | | | 96 |
| 7 | 51 | | 13-Nov-17 5:13:27 PM | 65.129 | 64.721 | 54.5 | 54 | 0 | 0 | | | 54 |
| 8 | 50 | | 13-Nov-17 4:42:27 PM | 80 | 80 | 90 | 126.5 | 51.3 | 0 | | | 126 |
| 9 | 49 | | 13-Nov-17 4:38:39 PM | 80 | 80 | 90 | 159 | 138.1 | 0 | | | 159 |
| 10 | 48 | | 13-Nov-17 4:29:50 PM | 80 | 80 | 90 | 120.5 | 48.9 | 0 | | | 120 |
| 11 | 47 | | 13-Nov-17 3:30:50 PM | 80 | 80 | 90 | 195 | 0 | 0 | | | 195 |
| 12 | 46 | | 13-Nov-17 2:52:45 PM | 80 | 80 | 90 | 100.5 | 0 | 0 | | | 100 |
| 13 | 45 | | 13-Nov-17 2:49:15 PM | 80 | 80 | 90 | 99 | 0 | 0 | | | 99 |
| 14 | 44 | | 13-Nov-17 2:46:06 PM | 80 | 80 | 90 | 98 | 0 | 0 | | | 98 |
| 15 | 43 | | 13-Nov-17 1:27:22 PM | 11.212 | 8.09 | 7.6 | 8.2 | 0 | 0 | | | 8 |
| 16 | 42 | | 13-Nov-17 1:17:35 PM | 11.421 | 5.041 | 8.7 | 9.3 | 0 | 0 | | | 9 |
| 17 | 41 | | 13-Nov-17 1:07:40 PM | 9.929 | 9.114 | 5.8 | 5.9 | 0 | 0 | | | 6 |
| 18 | 40 | | 13-Nov-17 12:57:01 PM | 6.578 | 3.248 | 6 | 6.4 | 0 | 0 | | | 6 |

PRINT | EXIT

## TESTING

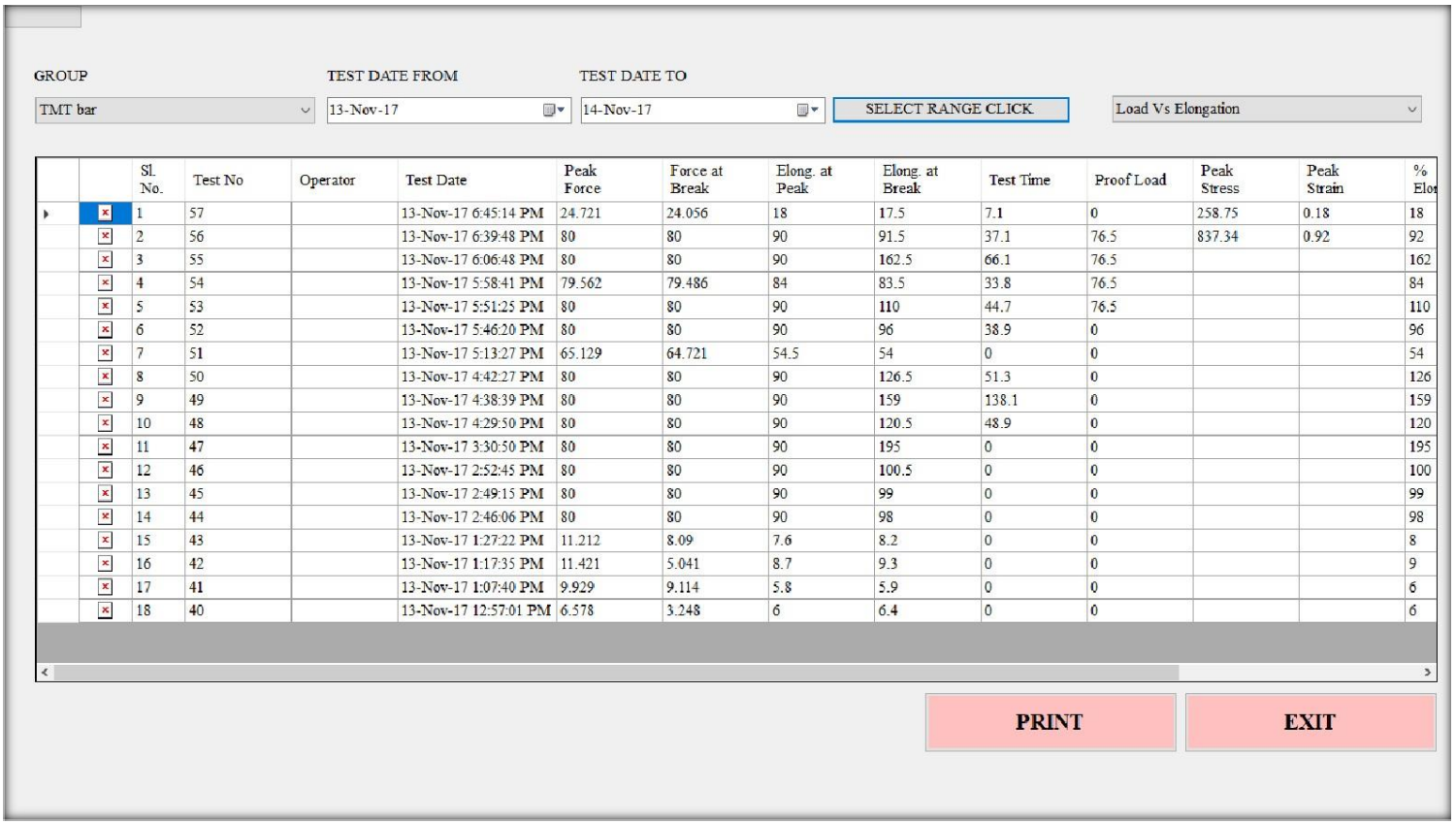
New Test – Old Test data and graph get cleared and ready for new test.
User has to select the group in which he want to do testing. When user select a group all settings get loaded.
Click Start to start test. Input details given below.



# HISTORY

## HISTORY

**Here user can see all previous test and take print out from here.**

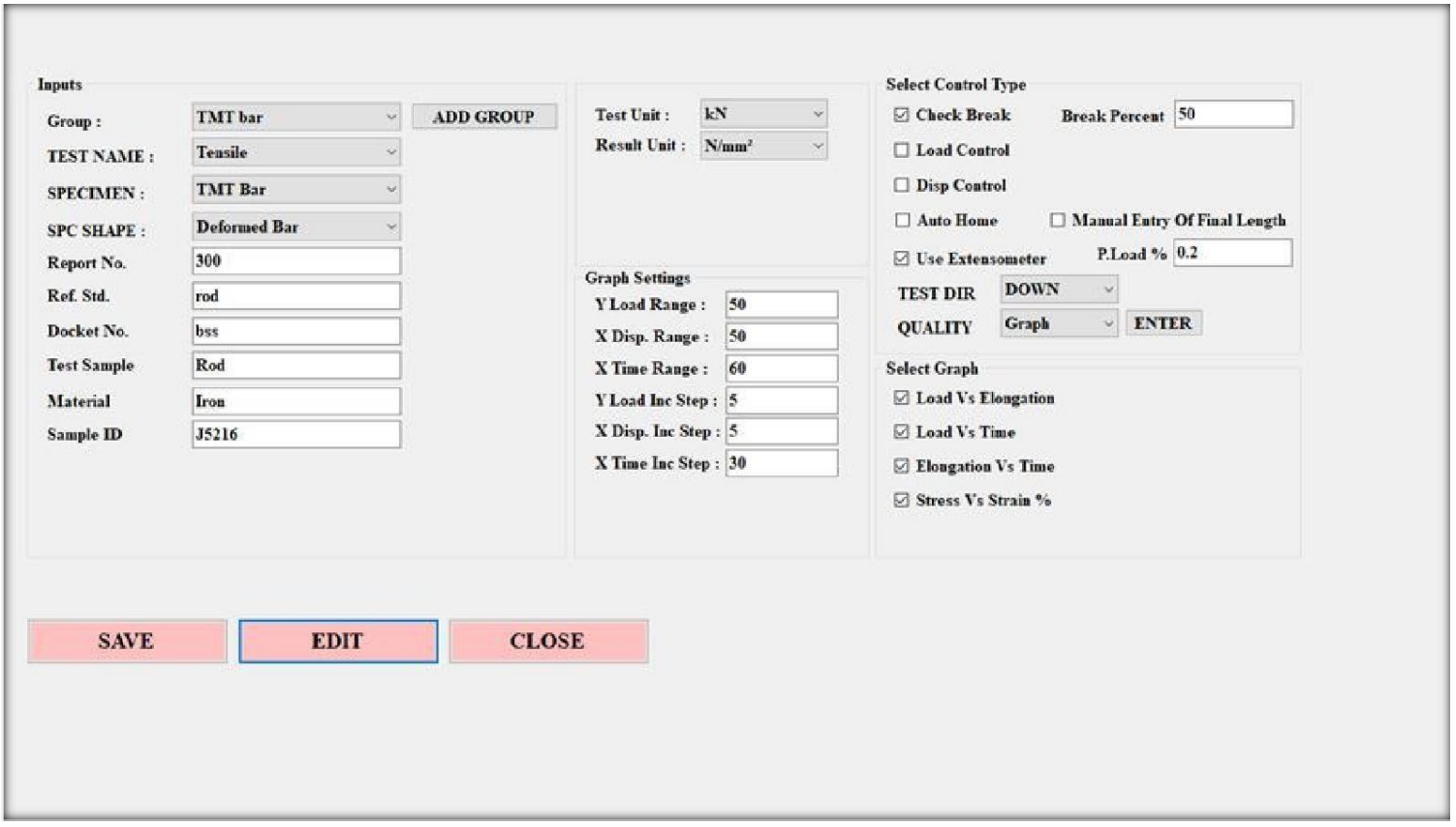



| Sl. No. | Test No | Operator | Test Date | Peak Force | Force at Break | Elong. at Peak | Elong. at Break | Test Time | Proof Load | Peak Stress | Peak Strain | % Elo |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 57 | | 13-Nov-17 6:45:14 PM | 24.721 | 24.056 | 18 | 17.5 | 7.1 | 0 | 258.75 | 0.18 | 18 |
| 2 | 56 | | 13-Nov-17 6:39:48 PM | 80 | 80 | 90 | 91.5 | 37.1 | 76.5 | 837.34 | 0.92 | 92 |
| 3 | 55 | | 13-Nov-17 6:06:48 PM | 80 | 80 | 90 | 162.5 | 66.1 | 76.5 | | | 162 |
| 4 | 54 | | 13-Nov-17 5:58:41 PM | 79.562 | 79.486 | 84 | 83.5 | 33.8 | 76.5 | | | 84 |
| 5 | 53 | | 13-Nov-17 5:51:25 PM | 80 | 80 | 90 | 110 | 44.7 | 76.5 | | | 110 |
| 6 | 52 | | 13-Nov-17 5:46:20 PM | 80 | 80 | 90 | 96 | 38.9 | 0 | | | 96 |
| 7 | 51 | | 13-Nov-17 5:13:27 PM | 65.129 | 64.721 | 54.5 | 54 | 0 | 0 | | | 54 |
| 8 | 50 | | 13-Nov-17 4:42:27 PM | 80 | 80 | 90 | 126.5 | 51.3 | 0 | | | 126 |
| 9 | 49 | | 13-Nov-17 4:38:39 PM | 80 | 80 | 90 | 159 | 138.1 | 0 | | | 159 |
| 10 | 48 | | 13-Nov-17 4:29:50 PM | 80 | 80 | 90 | 120.5 | 48.9 | 0 | | | 120 |
| 11 | 47 | | 13-Nov-17 3:30:50 PM | 80 | 80 | 90 | 195 | 0 | 0 | | | 195 |
| 12 | 46 | | 13-Nov-17 2:52:45 PM | 80 | 80 | 90 | 100.5 | 0 | 0 | | | 100 |
| 13 | 45 | | 13-Nov-17 2:49:15 PM | 80 | 80 | 90 | 99 | 0 | 0 | | | 99 |
| 14 | 44 | | 13-Nov-17 2:46:06 PM | 80 | 80 | 90 | 98 | 0 | 0 | | | 98 |
| 15 | 43 | | 13-Nov-17 1:27:22 PM | 11.212 | 8.09 | 7.6 | 8.2 | 0 | 0 | | | 8 |
| 16 | 42 | | 13-Nov-17 1:17:35 PM | 11.421 | 5.041 | 8.7 | 9.3 | 0 | 0 | | | 9 |
| 17 | 41 | | 13-Nov-17 1:07:40 PM | 9.929 | 9.114 | 5.8 | 5.9 | 0 | 0 | | | 6 |
| 18 | 40 | | 13-Nov-17 12:57:01 PM | 6.578 | 3.248 | 6 | 6.4 | 0 | 0 | | | 6 |

# INPUT

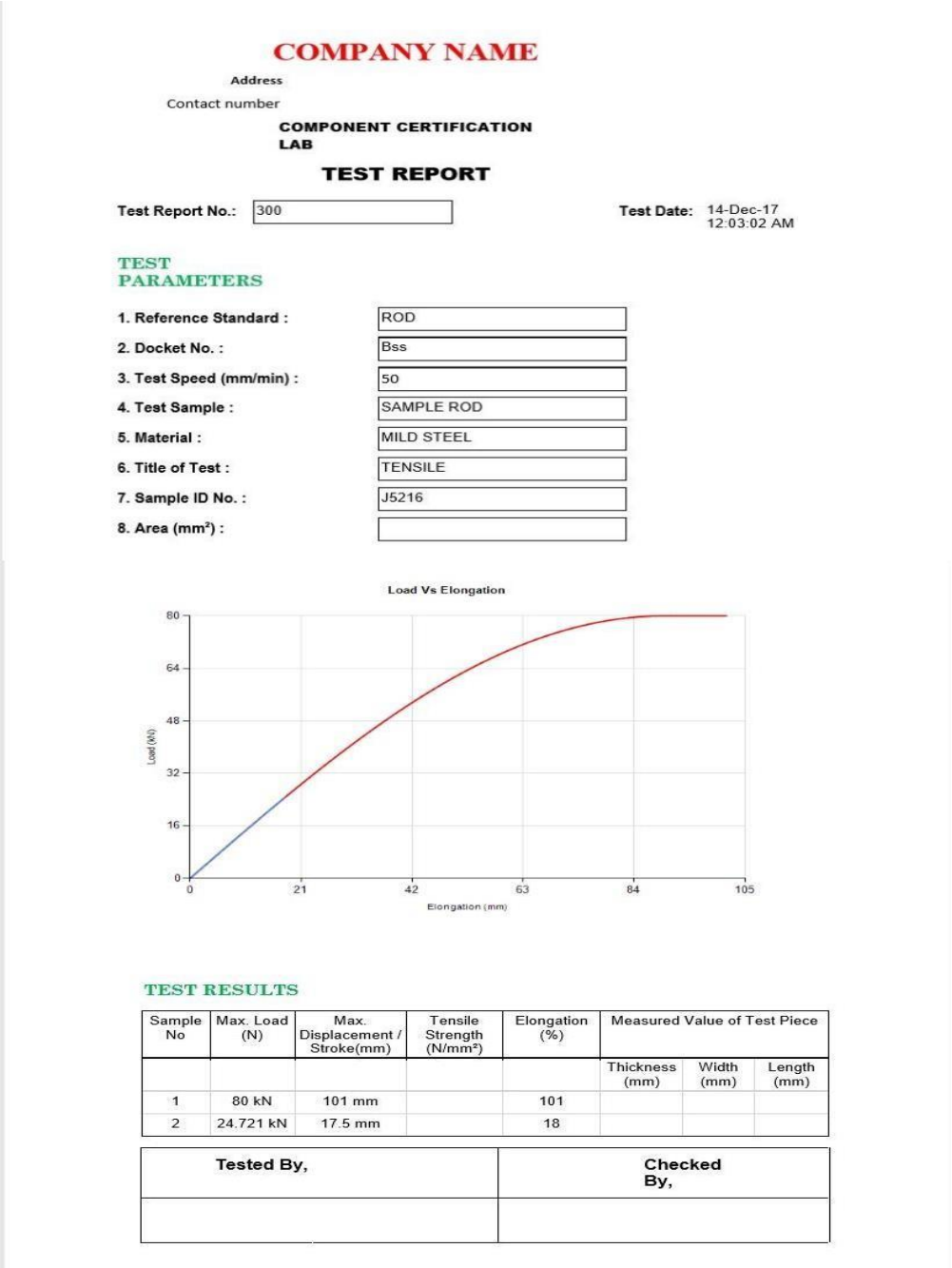
## INPUT

**All input settings are set here. Test Unit, Result Unit, Break Checking, Set Load, and Set Disp., whether to use extensometer or not, if proof load required set percentage for proof load, Test Direction and all other input parameters like test type, specimen, shape etc. Graph**



# REPORT

**After each testing the report will be auto generated and saved into specified folder. User can generate a report directly from testing window and from history. range settings also here.**



COMPANY NAME

Address

Contact number

COMPONENT CERTIFICATION LAB

TEST REPORT

Test Report No.: 300

Test Date: 14-Dec-17 12:03:02 AM

TEST PARAMETERS

| | |
|---|---|
| 1. Reference Standard : | ROD |
| 2. Docket No. : | Bss |
| 3. Test Speed (mm/min) : | 50 |
| 4. Test Sample : | SAMPLE ROD |
| 5. Material : | MILD STEEL |
| 6. Title of Test : | TENSILE |
| 7. Sample ID No. : | J5216 |
| 8. Area (mm²) : | |



TEST RESULTS

| Sample No | Max. Load (N) | Max. Displacement / Stroke(mm) | Tensile Strength (N/mm²) | Elongation (%) | Measured Value of Test Piece | | |
|---|---|---|---|---|---|---|---|
| | | | | | Thickness (mm) | Width (mm) | Length (mm) |
| 1 | 80 kN | 101 mm | | 101 | | | |
| 2 | 24.721 kN | 17.5 mm | | 18 | | | |

| Tested By, | Checked By, |
|---|---|
| | |

# FORMATE

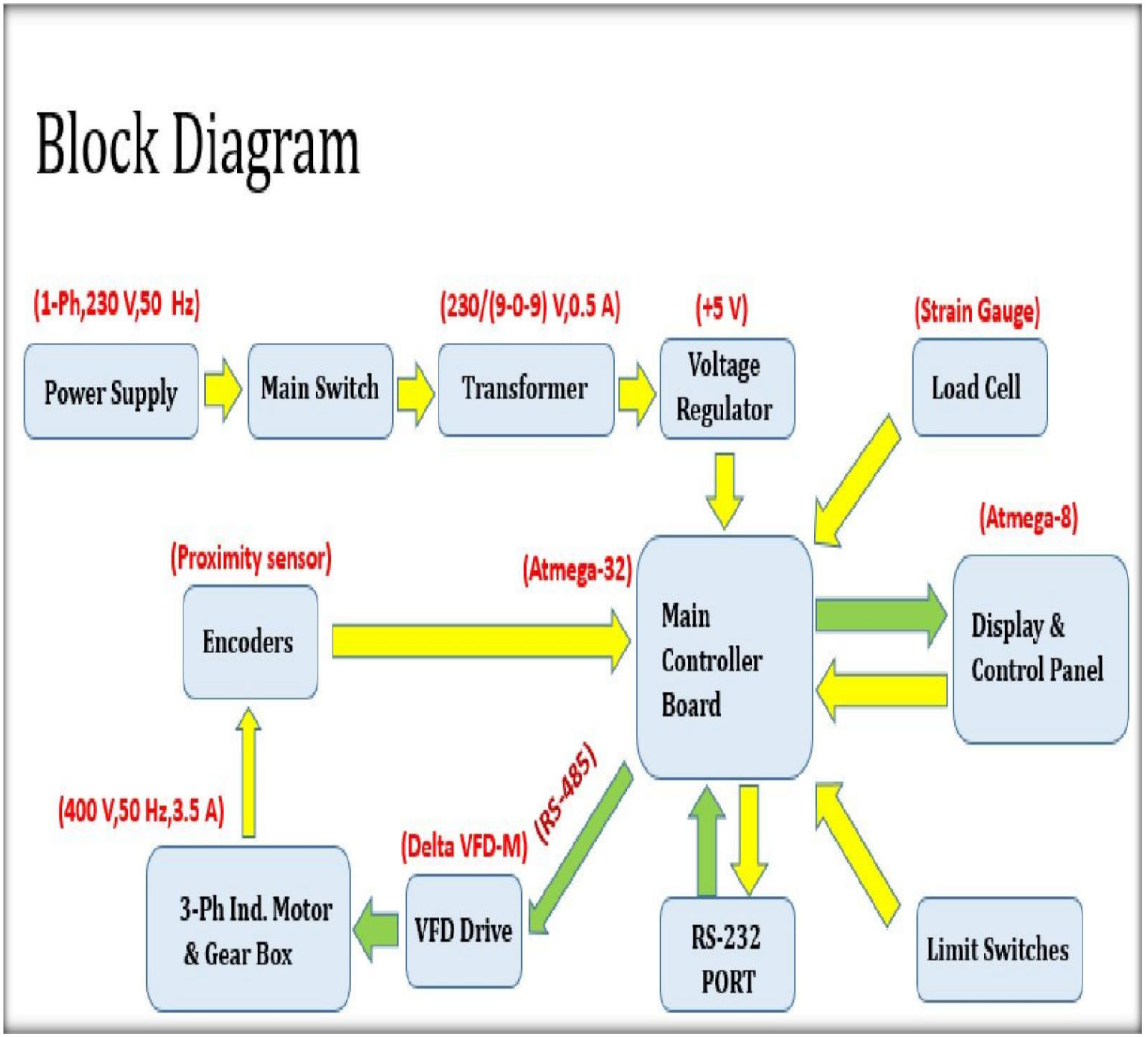
**EXCEL**

**User save raw test data into excel file using this option. TEST**

**REPORT FORMAT**

**EXCEL ,PDF, WORD.**


# CONTROL PANEL



Resonance Automation and machines Universal testing machine is closely controlled for sensitivity, accuracy and calibration during every stage of manufacture. Machine is calibrated over each of its measuring range in accordance with the procedure laid down in as per tender specifications.

# RESONANCE AUTOMATION AND MACHINES


**PLOT NO. 1131 HARI ENCLAVE KIRARI SLEMAN NAGAR NEW DELHI-110086**

**PLANT 2ND H-936 RIICO CHOPANKI INDATRIAL AREA ALWAR RAJASTHAN-301707**

**Web: - www.spmindia.in**
**Director: - Umardin Saifi**
**Mob: - +91-9990770129, 8860268660**
**Email: - info@resotechmachines.com**
**umardin.ramachines@gmail.com**


RESOTECH®

# RESONANCE AUTOMATION AND MACHINES


**PLOT NO. 1131 HARI ENCLAVE KIRARI SLEMAN NAGAR NEW DELHI-110086**

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**umardin.ramachines@gmail.com**


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