

FINE GROUP'S

**FULL PRODUCT RANGE OF
MATERIAL TESTING MACHINES**



Mastering the fine art of testing

Manufacturers of Material Testing Machines

About Us -

- We are the leading manufacturers of Material Testing Machines in INDIA (Located in Miraj, Maharashtra State).
- "FINE GROUP" founded in 1977, Our designs are perfected. Over past 35 years we have supplied more than 35,000 machines all over India & abroad.
- We shall endeavor to achieve and maintain the quality standards and also improve upon embracing latest techniques, technologies and processes.
- Customers satisfaction is the ultimate motto of each member of our Organization. So the desired quality and prompt service shall remain point of one and all.
- Deep inside, we shall remain honest, transparent, welcoming state of art technologies and shall leave no stone unturned for satisfying our customers for a long time to come.
- We are proud to mention here that reputed companies in India and abroad are using our machines.
- We Manufacture special purpose machines to suit specific applications.

Infrastructure -

- Sufficiently large land area as well as factory and office buildings.
- Handling facility upto 10 Tons.
- Machine tools like Centre lathes, Milling Machines, Shaping Machine, Boring Machine, Planning Machine, Surface Grinder, Cylindrical Drilling Machines, Radial drilling machine, etc.
- A number of Jigs, Fixtures, Templates and Test Rings.
- Inspection Equipments like large Surface plates, Vernier Calipers, Micrometers, Precision dial gauges, Height gauges, Cone gauges, Clinometers, Special gauges, etc.
- Proving Rings, Dynamometers and Load cells with NPL traceability for force calibration in various capacities.

Team and the Spirit -

- Highly qualified Engineers, Workers and the staff trained in their respective fields and having long experience.
- Well established, quality and work culture.
- In house product and software development enabling us to provide custom built machines.
- Over a long period of 35 years our designs are perfected and we have technical directors who have experience of 35 to 40 years and also we have well experienced qualified staff in this very field of Testing Machines.

ANALOGUE - UNIVERSAL TESTING MACHINES

(Model : TUN)

- Variety of tests like Tension, Compression, Transverse, etc are conducted.
- Continuous roll autographic "Load Vs Elongation" recorder.
- Suitable for testing a wide range of metallic materials.
- Extra (Optional) Accessories such as - Extensometer, Pace (load) rate control, Load-Stabilizer, Attachment for - Brinell test, Tensile test for shouldered & threaded, Single & Double shear test, Bolts-Nuts & Washer test, Rope test, Flat Belt test, Bend-Rebend test, 180° Bend test, Pull-Out test, Chain testing, etc are available.
- Various Models - Capacities from 100 kN to 2000 kN are available.
- Loading accuracy well within $\pm 1\%$, conform to IS:1828 / BS:1610.



COMPUTERISED - UNIVERSAL TESTING MACHINES

(Model : TUE-C)

- Automatic Data capture, storage & graphic display.
- Recording, storage & retrieval of results & details.
- On line display of load & extension.
- Fully automatic, on screen calculations based on the delivered data.
- Out put to digital printer of test data, test results & graphs.
- Auto detection of over load, over travel & specimen break, on detection of the above conditions, the machine is automatically switched off.
- Load resolution : 0.01% of machine capacity for entire range.
- Accurate and Users friendly software & all other facilities mentioned under Model : TUN.

ANALOGUE CUM COMPUTERISED - UNIVERSAL TESTING MACHINES

(Model : TUE-CN)

- The DC valve is provided which directs oil flow either to analogue or computerized control panel. One can use one system at a time.
- Both Analogue & Computerized control panels are provided.
- Various Models - Capacities from 100kN to 2000kN are available.
- Loading accuracy well within $\pm 1\%$, conform to IS:1828 / BS:1610.



SERVO COMPUTERIZED - UNIVERSAL TESTING MACHINES (with Load & Strain rate controls) (Model : TUE-C-SERVO)

- Electronically controlled sophisticated imported pressure and flow control valves with dedicated controller and are controlled in closed loop with PID looping for getting desired load rate and strain rate.
- Variable load rates and strain rates can be selected through computer.
- DAS Panel is equipped with 32 bit Micro-Controller.
- Various control modes are available.
- DAS Panel can be connected to any new generation PC or Laptop with USB Port.
- Load accuracy as high as $\pm 1\%$ from 2% to 100% of machine capacity.
- Resolution of load upto $\pm 5,00,000$ counts (Optional) can be supplied.
- Accurate and Users friendly software and all other facilities mentioned under Model : TUE-C.
- Various Models - Capacities from 100 kN to 2000 kN are available.
- Machines strictly conform to IS:1828 & BS:1610 standards.



COMPUTERIZED & ANALOGUE VERSIONS, 2000 kN CAPACITY, UNIVERSAL TESTING MACHINES (Models : TUE-C-2000 kN & TUN-2000 kN)

- This is a big size machine i.e. 2000 kN (200 Tons) capacity, with neck breaking height.
- Machine performance is excellent and even bars of size upto dia 50 or 60 mm are comfortably tested without jerks and shakes.
- Middle crosshead speed is 300 mm/min.
- Additional middle crosshead control push buttons on machine columns to facilitate ease of machine operation.
- Increased length and rigidity of jaws and inserts.
- Accuracy and other features as mentioned under Models : TUN & TUE-C.
- Machines strictly conform to IS:1828 & BS:1610 standards.

SERVO COMPUTERIZED - UNIVERSAL TESTING MACHINES (with Load & Strain rate controls, with front open crossheads and hydraulic grips) (Model : TUF-C-SERVO)

- Machine is Servo controlled i.e. with Load rate and Strain rate controls.
- Machine is electronically controlled with sophisticated imported pressure and flow control valves along with their dedicated controller are used and they are controlled in closed loop with PID looping.
- This machine is designed with Front end opening crosshead and hydraulic gripping.
- Accuracy of $\pm 0.5\%$ of indicated load valve is guaranteed from 2% to 100% of machine capacity.
- All other specifications are as mentioned under Model : TUE-C-(SERVO).
- Various Models - Capacities from 400 kN to 2000 kN are available.
- Machines strictly conform to IS:1828 & BS:1610 standards.



**SERVO COMPUTERIZED - UNIVERSAL TESTING MACHINES,
1200 kN CAPACITY (with Load & Strain rate controls,
with front open crossheads and hydraulic grips)
(Model : TUF-C-1200 kN-SERVO)**

- Machine is 1200 kN (120 Tons) capacity, Servo controlled i.e. with Load rate and Strain rate controls.
- Machine is electronically controlled with sophisticated imported pressure and flow control valves along with their dedicated controller are used and they are controlled in closed loop with PID looping.
- This machine is designed with Front end opening crosshead and hydraulic gripping.
- The design is more suitable for easy fixing of flat or round samples, testing of round & TMT bars upto dia. 42 mm with less jerks during breaking of samples.
- Accuracy of $\pm 0.5\%$ of indicated load valve is guaranteed from 2% to 100% of machine capacity.
- All other specifications are as mentioned under Model : TUE-C-(SERVO).
- Machines strictly conform to IS:1828 & BS:1610 standards.



**COMPUTERISED & ANALOGUE VERSIONS -
COMPRESSION TESTING MACHINES
(Model : FCT, FCT-E & FCT-EC)**

- Suitable for testing a wide range of materials.
- Wide range of standard & special (Optional) Accessories such as - Load-Stabilizer, Attachments for Brinell test, etc are available.
- Various Models - Capacities from 100 kN to 3000 kN are available.
- Analogue, Digital & Computerized versions are available.
- Loading accuracy well within $\pm 1\%$, conform to IS:1828 / BS:1610.

DIGITAL, HAND OPERATED, COIL SPRING TESTING MACHINES (Model : STM)

- The machine is table mounted, digital & hand operated.
- Load measurement by load cell & displacement by rotary encoder.
- LCD display on DAS panel for Load & Displacement.
- Standard load resolution is with 10,000 counts. Finer resolution (Optional) with 20,000 counts can also be offered at extra cost. Standard displacement resolution is 0.01 mm.
- Vertical day light is 300 mm. • Tension Shackles & Compression plates are provided for Tension & Compression springs. • It is possible to use a number of load cells, say two or three, to cover much wider range of load, to suit the application. Cost of one load cell is included in the price, but additional load cell will be at extra cost. • Various Models - Capacities from 100 N to 2000 N are available. • Loading accuracy well within $\pm 1\%$, conform to IS:1828 / BS:1610.



COMPUTER CONTROLLED, BALL-SCREW DRIVEN UNIVERSAL TESTING MACHINES

(Model : M SERIES)

- Variety of tests like Tension, Compression, Tranverse, Peel off, Bend, Shear, etc are conducted.
- Suitable for testing a wide range of materials like rubber, plastic, ferrous metals, non-ferrous metals, etc of various forms like round, flat, thread, wire, dumb-bell, fabric, belt, strip, rope, etc.
- AC Servo motor for crosshead control with infinitely variable speed drive.
- Computerized crosshead control. • Load measurement by load cell.
- Over Load & Over travel safety.
- Latest Windows based, Users friendly, Accurate, Menu driven software.
- On line display of Load, Elongation & Graph.
- Tare load & reset elongation facilities available.
- Built-in facility for printing of test results and the graph.
- Selectable units like N, kN, kgf, lbf, inch, mm, etc.
- Fully automatic on screen calculations like UTS, YS, Proof stress, etc.
- Large storage space for storing test data of upto 50,000 tests.
- Electronic Extensometer (Optional) is available for proof stress evaluation.
- Standard load resolution is with 20,000 counts. Finer resolution (Optional) with 50,000 to 5,00,000 counts can also be offered at extra cost.
- Wide range of grips & accessories to suit different materials & tests.
- Various Models - Capacities from 1 kN to 100 kN are available.
- Loading accuracy well within $\pm 1\%$, conform to IS:1828 / BS:1610.



LEAF SPRING TESTING MACHINES

(Model : FST, FST-E, FST-EC)



- The machine is used to test wide range of Leaf / Laminated Springs for load rate as per IS:1135-1984.
- Measuring ranges available with auto load selection facility.
- Large size table for wide range of springs with motorized rapid adjustment of test height.
- Standard autographic recorder.
- Over load & Over travel safety provisions.
- Facility of Compression, Shear, Brinell & Bending test with extra accessories.
- Load stabilizer (Optional) is an extra attachment used to maintain a desired load constant at specific deflection enabling measuring it easily & accurately.
- We can also supply machines for Helical compression springs & Disc springs.
- Various Models - Capacities from 100 kN to 500 kN are available
- Analogue, Digital & Computerized versions are available.
- Loading accuracy well within $\pm 1\%$, conform to IS:1828 / BS:1610.

COMPUTERISED & ANALOGUE VERSIONS - HORIZONTAL CHAIN & ROPE TESTING MACHINES (Models : FCR, FCR-E, FCR-EC)

- Machines are designed to test chains, ropes & any long specimens for proof test or destructive tensile test.
- High loading accuracy & infinitely variable straining speeds to suit a wide range of materials.
- Robust loading frame, Simple controls & easy to operate.
- Adequate safety devices for safe operation.
- Analogue models with large dial & load measurement by pendulum dynamometer principle.
- Digital / Computerized models are also available where load Vs elongation is in digital display & printout of results can be taken.
- Both the ends, where the grips & fixtures (Optional) are fixed are of fork & pin type arrangement.
- Special Accessories like - Extra Bed length, Extra Ram stroke, Various special grips / attachments / fixtures as per sizes / shapes of specimens, Load-stabilizer (at extra cost) can be provided to suit special application.
- Various Models - Capacities from 100 kN to 3000 kN are available.
- Loading accuracy well within $\pm 1\%$ from 5% to 100% of machine capacity, conform to IS:1828 / BS:1610.

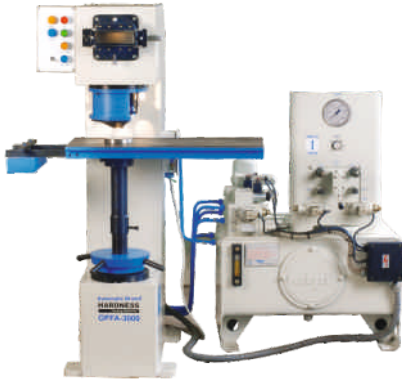


MICRO VICKERS HARDNESS TESTING MACHINES (Model : FMV-1)



- Suitable for finish components like thin sheets, fine wires, etc. Watch parts like springs, pivot bearings, gears, cutting edge of Razor blades, drills, file teeth, etc. Metallic foils, surgical needles, pen points & so on.
- To determine hardness on - surface coatings (like electroplating, etc.), extremely thin case hardened parts, anodized castings of aluminium, shot blasted or rolled faces, etc.
- A range of test loads can be used to suit particular application. Test loads from 10 grams to 1000 grams.
- Magnifications - 125X, 250X & 625X available.
- X-Y stage is provided with least count of 0.01mm, which can move the job as per the requirements.
- A precision Diamond Indentor (136° Pyramid) is used to make sharp indentations on the specimens / samples.
- Maximum Test height x Throat : 115 x 70 mm.
- Load accuracy well within $\pm 1\%$ of nominal load value.
- Machine conform to IS:1754
- Extra (Optional) accessories like - Knoop Indentor, Knoop test block, Precision vice, Thin specimen holding device, V-shape anvil, Vertical & Horizontal fine specimen holding device, Rotary table, etc are available.

AUTOMATIC OPTICAL BRINELL HARDNESS TESTING MACHINES (Model : OPFA-3000)



- The machine has a robust, C-type load frame, designed for production testing of cast or forged components like leaf springs, cam shafts, etc. for Brinell Hardness value. This machine is suitable for foundries, engineering industry on production line.
- Since most of the operations are fast and automatic, the test speed is high with less operator fatigue.
- The cycle time (except job loading / unloading) is about 12 seconds per test.
- Load stages-750kgf & 3000kgf (Optional loads-500kgf & / or 1000kgf).
- Optical measuring equipment with 14 X magnification.
- Machine Test height x Throat is 365 x 200mm.
- Size of supporting table with fixing slots – 260 x 400mm.
- Load capacity of table (which can withstand) – 200kg.
- Job loading / unloading, on/off the machine table, pushing cycle start & de-clamp buttons, impression measurement are the only manual operations & rest all are automatic. • A push button is pressed for

cycle start & hydraulic operations. After cycle time, impression is visible on screen, which (Diameter) is to be measured with the help of microscope of least count of 0.01mm • Heavy duty Model : OPFA-3000 (SPL) with height x throat of 650 x 350mm, heavy supporting table of size 600 x 600mm with loading capacity of 500kg can also be offered. • The machine accuracies conform to IS:2281-2005 & BS:240.

COMPUTERISED - AUTOMATIC OPTICAL BRINELL HARDNESS TESTING MACHINES (Model : OPFA-3000-PC)

- The machine has a robust, C-type load frame, designed for production testing of cast or forged components. This machine is suitable for foundries, engineering industries on production line.
- Since most of the operations are fast & automatic, the test speed is high with less operator fatigue. • The cycle time (except job loading / unloading) is about 12 seconds per test. • Machine Test height x Throat is 365 x 200mm. • Size of support table with fixing slots – 260 x 400mm. • Load capacity of table – 200kg • Job loading / unloading, on / off the machine table, pushing cycle start & de-clamp buttons, impression measurement are the only manual operations & rest all are automatic. • Fully computerized system for indentation measurement & display. • Window based software system. • Accurate measurement of Brinell hardness through matched Optics, CCD camera, Hardware & Software using advanced image processing technology. • A push button is pressed for cycle start & hydraulic operations. After cycle time & on removal of load the optics will transfer the image of indentation to CCD. The image is further digitalized and processed by PC for measurement. The diameter of the image can be measured automatically / manually to give Brinell hardness value. Results printout can be taken. • The optical device magnification is 16 X & least count of measurement is 0.01mm. • Two modes of measurement – Manual & Auto. • In Auto mode, the image is scanned for measurement & hardness is displayed automatically.
- Verification facility is provided for clear indication of measured impression by encircling the same. • Windowing facility is provided which encircles the blurry images for better accuracies. • Macro & Micro adjustment facilities are provided in manual mode for fast & accurate encircling of the image to be measured. • Batch testing facility is provided. • Statistical Analysis report can be generated. • Calibration mode is provided with password protection. • Heavy duty Model : OPFA-3000-PC (SPL) with height x throat of 650 x 350mm, heavy supporting table of size 600 x 600mm with loading capacity of 500kg can also be offered.
- The machine accuracies conform to IS:2281-2005 & BS:240.



DEEP THROAT BRINELL HARDNESS TESTING MACHINES WITH FIXED TABLE (Model : WOM TYPE)



- The Semi Automatic Brinell Hardness Tester is an inline Production machine highly suitable for batch testing of heavy jobs.
- The machine has a C-Type heavy & big loading frame with a deep throat of 400mm & Test height of 900mm or 600mm.
- This machine is more suitable for testing hardness of heavy jobs.
- Load stage of 750kgf & 3000kgf (Optional loads of 500kgf & / or 1000kgf).
- The indentation measurement is with Brinell microscope of 25X magnification & least count of assuring device 0.01mm
- The machine is provided with a large & fixed table size : 1200mm wide x 600mm depth. Load capacity of table is from 1200kg to 1500kg.
- Ram stroke of 300mm with upward speed of 930mm/min. & downward (loading) speed of 440mm/min.
- Test block of desired hardness range are available (Optional).
- Special test fixtures for odd jobs/ production testing (Optional).
- Computerised Brinell Impression measurement system (BIMS system) (Optional).
- Accuracy conform to IS:2281-2005 & BS:240.

DEEP THROAT BRINELL HARDNESS TESTING MACHINES WITH MOVABLE TABLE (Model : TEXMACO TYPE)

- The semi automatic Brinell hardness tester is an inline production machine highly suitable for batch testing of heavy jobs.
- The machine has a C-Type load frame with a deep throat of 400 mm & vertical clearance of 600 mm.
- This machine is more suitable for testing hardness of heavy jobs in the form of wheels, discs, plates, cylinder blocks, etc.
- Load stages of 750 kgf & 3000kgf (Optional loads of 500kgf & / or 1000 kgf).
- The indentation measurement is with Brinell microscope of 25X magnification & Least count of asuring device 0.01 mm.
- The machine is provided with a movable table size : 1100 x 600 mm with rollers for moving the job in both XX (1000 mm) & YY (200 mm) directions. Load capacity of table is 700 kg.
- Ram stroke of 300 mm with upward speed of 1200 mm/min & downward (loading) speed of 600 mm/min.
- Test blocks of desired hardness range are available (Optional).
- Special test fixtures for odd jobs / production testing (Optional).
- Computerised Brinell Impression measurement system (BIMS System) (Optional).
- Accuracy conform to IS:2281-2005 & BS:240.



BEND & RE-BEND TESTING MACHINES

(Models : FBR-100 kN & FBR-150 kN)

- To conduct testing of carbon steel bars upto 42 mm diameter for reinforcement of concrete.
- C- frame design & hydraulically operated.
- Maximum load capacities available are 100 kN & 150 kN.
- Dia. of support rollers is 100mm & distance between support rollers is 400mm.
- A common attachment for testing bend re-bend & 180° is supplied with the machine.
- Different sizes of formers (tools) are available from diameter 6 to 400mm.
- Suitable re-bending tools supplied which will be incorporated in the machine.
- Hinged grilled safety doors at front is provided for safety.
- Accuracy conforming to BS:4449, IS:1786 & ASTM:A 615.



DROP WEIGHT IMPACT TESTING MACHINES

(Model : FDW-1650 J)

- To conduct fracture toughness test as per ASTM-E-208.
- Energies are 350, 400, 450, 550, 800, 1100, 1350, 1650 J.
- Drop weight is 136 kg & height of fall is 1237mm (max.) adjustable to get the desired energies. Striker tip radius is 25.4mm and hardness is 50 HRC (min.).
- Striker lifting arrangement is motorised driven by electrical motor & speed of lifting is 0.9 mtr/min. (appx.).

MECHANICAL EXTENSOMETER

(Model : FXT - 3)

- It is an attachment to Universal Testing Machine and Tensile Testing Machines, used to find out the proof stress at the required % elongation.
- It measures the elongation of a test piece on load for the set gauge length.
- Least count of measurement 0.01 mm and maximum elongation measured upto 3 mm.
- Adjustable gauge length from 30 mm to 120 mm.
- Round specimen from 1 mm to 20 mm dia. & flat specimen from 1mm to 20 mm thickness can be accommodated.



ANALOGUE - TENSILE TESTING MACHINES (Model : TKG)



- Variety of tests like Tension, Compression, Cross breaking / Bending, Shear, Linear Bonding / Gripping / Peeling strength of adhesives & tapes, etc are conducted.
- Suitable for testing a wide range of materials like rubber, wood, plywood, plastic, rexins, ceramics, teflon, cardboard, latex, composites, ferrous metals, non-ferrous metals, etc of various forms like round, flat, thread, wires, dumbbells, fabric, belts, strips, ropes, etc.
- Wide range of Grips, Attachments & Special fixtures are available to suit variety of material and shapes.
- Continuous roll autographic "Load Vs Elongation" recorder.
- Elongation scale with least count 1 mm.
- Three measuring ranges for accurate testing.
- A number of straining speeds are available for proper selection.
- Machine with AC or DC drive motor is available.
- Various Models - Capacities from 200 N to 50 kN are available.
- Loading accuracy well within $\pm 1\%$, conform to IS:1828 / BS:1610.
- Hand operated cutting press with different sizes dies are available for cutting dumbbell shape specimens of rubber, leather, etc.

COMPUTERIZED - TENSILE TESTING MACHINES (Model : TKG-EC)

- Latest Windows based, Users friendly, Accurate, Menu driven software.
- Fully automatic, on screen calculations based on the delivered data.
- Automatic Data capture, storage & graphic display.
- Recording, storage & retrieval of results & details.
- Build in facility for printing of test results and the graph.
- Load measurement by load cell.
- Over Load & Over travel safety.
- On line display of Load, Elongation & Graph.
- Tare load & reset elongation facilities available.
- Selectable units like N, kN, kgf, lbf, inch, mm, etc.
- Fully automatic on screen calculations like UTS, YS, Proof stress, etc.
- Electronic Extensometer (Optional) is available for proof stress evaluation.
- It is possible to use a number of load cells, say two or three, to cover much wider range of load, to suit the application. Cost of one load cell is included in the price, but additional load cell will be at extra cost.
- Standard load resolution is with 10,000 counts. Finer resolution (Optional) with 20,000 counts can also be offered at extra cost.
- Standard displacement resolution is 0.1 mm.
- Types of tests, testing materials, grips, attachments, fixtures, straining speed as like Analogue version, Model : TKG.
- Various Models- Capacities from 200 N to 50 kN are available
- Loading accuracy well within $\pm 1\%$, conform to IS:1828 / BS:1610.



DYNAMIC BALANCING MACHINES - HORIZONTAL TYPE

(Model : FBM - M)

- Hard bearing type horizontal end driven two plane machines with microprocessor based or DSP based measuring panel.
- Suitable for balancing of different types of rotors like rotor of electrical machines, fly wheels, crankshafts, submersible pump rotors, etc.
- Measures & stores the unbalance in gms along with the angle for two selected correction planes on digital display.
- Additional bed length with or without gap bed arrangement can be provided at extra cost for extra long rotors.
- Additional center height arrangement is also possible to accommodate bigger diameter rotors. • Minimum achievable unbalance upto 0.5 micron shift in c.g. • Various Models Suitable for rotors from 0.5 kg to 10,000 kg. • Horizontal belt driven hard bearing two plane machines are also supplied for rotors weighing from 0.1 kg upto 3000 kg. • Unbalance indication either by stroboscopic method or photo scanning method sensitivity upto 0.5 micron. • Computerized / Electronic versions with printer facility & special machines to suit customers requirements can also be supplied. • Machines conform to IS:13277-1992.



DYNAMIC BALANCING MACHINES - VERTICAL TYPE

(Model : FVBM - M)

- Vertical type hard bearing machines for single plane balancing of rotors like clutch plates, fan blades, fly wheels, magnetos, grinding wheels, impellers, pulleys, etc.
- Microprocessor based or DSP based measuring panel with auto compensation facility.
- Minimum achievable unbalance upto 0.5 micron shift in c.g.
- Various Models Suitable for rotors from 0.3 kg to 300 kg.
- Computerized / Electronic versions with printer facility & as per customers requirements can also be supplied.
- Machines conform to IS:13277-1992.



DSP BASED DYNAMIC BALANCING MACHINES

(Models : FBM - D & FVBM - D)

- All specifications mentioned under Models : FBM-M & FVBM-M. • 32 bit DSP based all digital hardware in compact foot print. • Enhanced accuracy & repeatability with fast response. • Auto calibration.
- RS 232 / USB interface, thermal printer interface (Optional). • Rotor programing up to 100 Nos. • Negligible power consumption.



BELT DRIVEN DYNAMIC BALANCING MACHINES - HORIZONTAL TYPE (Model : FSBM - M)



- Horizontal, hard bearing type two plane dynamic balancing machine, with overslung type belt drive arrangement.
- Most suitable for the rotors, where end drive cannot be used or where variety of rotors is more and number of adapters required are more for end drive machine.
- Typical application are balancing of bomb shells for ordnance factories, pipes, printing machine rolls, etc.
- Machine are available from 10 kg. to 3000 kg. capacity in various models.
- Measuring Control panel is microprocessor based or DSP based, indicating amount of unbalance in gms. along with degree, by using photo scanning arrangement for generating reference signal.
- Speed range is from 300 rpm to 3000 rpm.
- Balancing accuracies achievable up to 0.5 microns for maximum rotor weight
- Machines are more suitable for repair workshops, where variety of rotors to be balanced is more.
- Machines conform to IS:13277-1992.

STROBO-DYNAMIC BALANCING MACHINES (Model : SSBM - 3)

- Small & compact machine with high accuracy for balancing of small rotors like textile spindles, electric power tool armature, etc.
- Special electrodynamic pickups are used for sensing minute vibration due to imbalance in the rotor.
- Machine is provided with electronic measuring control panel with digital panel meter for amount indication & xenon flash tube with brilliant white light for locating position of unbalance.
- Machine is very sensitive & accuracies of the order of 0.2 micron.
- Suitable for rotors from 0.1 kg to 3 kg.
- Balancing speed range is 800 to 3000 rpm.



VICKERS CUM BRINELL HARDNESS TESTING MACHINES (Model : BV)



- Suitable for finding out Vickers / Brinell hardness of metals from soft to very hard.
- Push button control for load selection.
- A range of test loads for Vickers / Brinell - from 1 kg to 250 kg.
- Optical Magnifications - 35X, 70X & 140X available.
- A precision Diamond Indenter (136° Pyramid) is used to make sharp indentations on the specimens / samples.
- Maximum Test height x Throat : 250 x 150 mm.
- Load accuracy well within $\pm 1\%$ of nominal load value. Machine conform to IS :1754.
- Computerized model is available .Computerized model has built in CCD and suitable advanced software. Hardness will be displayed on computer monitor automatically. Results printout can be taken.

DIGITAL ROCKWELL / ROCKWELL CUM BRINELL HARDNESS TESTING MACHINES

(Models : TRS-DN, TRB-DN, TRB-250-DN & TRS-DN-P)

- These machines are designed for measuring hardness of metals and alloys of all kinds, hard or soft, whether round, flat or irregular in shapes.
- Semi - Automatic, motorized, digital, microprocessor based panel. We can get hardness value in digital version. • Easy to read, large size LCD display.
- Three modes of operation viz. Motorized automatic mode, Semi automatic mode & Manual mode. • Automatic weight selection by thumb wheel.
- Indenter is guided in linear bearings facilitates to test small diameter jobs.
- Test height x Throat is 290 x 133 mm.
- Centronics parallel port for connecting dot matrix printer.
- Serial Interface (RS-232 Port) is provided for connecting it to Computer.
- Standard Software CD is provided which consists of Serial Number, Hardness values & Limits. • Least count for Rockwell scale is 0.1 HR.
- For Rockwell cum Brinell Hardness Testing Machine, additional Brinell loads in addition to Rockwell loads & Brinell Microscope of 25X magnification are provided.
- Machines strictly conform to IS:1586-2000, BSEN-ISO-6508-2, ASTM-E-18 for Rockwell tests and IS:2281-2005, BS -240, ASTM-E-10 for Brinell tests.



DIGITAL ROCKWELL CUM ROCKWELL SUPERFICIAL HARDNESS TESTING MACHINES

(Model : TSM-DM)

- This machine is designed for measuring hardness of metals and alloys of all kinds, hard or soft, whether round, flat or irregular in shapes.
- Semi - Automatic, motorized, digital, microprocessor based panel. We can get hardness value in digital version.
- Easy to read, large size LCD display.
- Three modes of operation viz. Motorized automatic mode, Semi automatic mode & Manual mode.
- Automatic weight selection by thumb wheel.
- Indenter is guided in linear bearings facilitates to test small diameter jobs.
- Test height x Throat is 290 x 148 mm.
- Centronics parallel port for connecting dot matrix printer.
- Serial Interface (RS-232 Port) is provided for connecting it to Computer.
- Standard Software CD is provided which consists of Serial Number, Hardness values & Limits.
- Least count for Rockwell scale is 0.1 HR & Rockwell Superficial scale is 0.2 HR.
- Machines strictly conform to IS:1586-2000, BSEN-ISO-6508-2, ASTM-E-18 for Rockwell tests and 1586-2000 & ASTM-E-18 for Rockwell superficial tests.



STANDARD - ROCKWELL HARDNESS TESTING MACHINES

(Model : MRS)

- This machine is designed for measuring hardness of metals & alloys of all kinds, hard or soft, whether round, flat or irregular in shapes.
- This machine is ideally suitable for laboratories, tool rooms, Heat treatment shops, R&D departments, inspection departments, foundries & educational institutions.
- Automatic weight selection with automatic zero setting dial gauge.
- Rockwell test minor load is 10 kgf & major loads are 60,100,150 kgf.
- Rockwell hardness scales such as HRA, HRB, HRC, etc is obtained by using different types of indentors (Diamond / Ball).
- Test height x Throat is 215 x 132 mm. • Extra test height & throat of 295 x 148 mm, Model : MRS-150 is also available. • Motorized versions are also available. • Machines strictly conform to IS:1586- 2000.



ROCKWELL CUM ROCKWELL SUPERFICIAL HARDNESS TESTING MACHINES (Model : MSM)

- This is a combined hardness testing machine used to measure hardness of metals & alloys of all kinds, hard or soft, whether round, flat or irregular in shapes.
- This machine is ideally suitable for laboratories, tool rooms, Heat treatment shops, R&D departments, inspection departments, foundries & educational institutions.
- Rockwell superficial method is used for checking hardness of very thin sheets. Surface hardness can also be easily checked.
- Automatic weight selection with automatic zero setting dial gauge.
- Superficial test minor load is 3 kgf & major loads are 15, 30, 45 kgf. Rockwell test minor load is 10 kgf & major loads are 60,100,150 kgf.
- Superficial hardness scales such as HRN, HRT, etc. Rockwell hardness scales such as HRA, HRB, HRC, etc is obtained by using different types of indentors (Diamond / Ball).

- Test height x Throat is 295 x 148 mm • Motorized versions are also available • Machines strictly conform to IS:1586- 2000.



ROCKWELL CUM BRINELL HARDNESS TESTING MACHINES

(Models : MRB, MRB-250)

- This is a combined hardness testing machine used to measure hardness of metals & alloys of all kinds, hard or soft, whether round, flat or Irregular in shapes. • This machine is ideally suitable for laboratories, tool rooms, Heat treatment shops, R&D departments, inspection departments, casting & forging industries, educational institutions.
- Rockwell & Brinell method is used for checking hardness on metals & alloys of all kinds. • Brinell hardness is also checked on non-ferrous materials like Cast iron, Aluminium, etc. • Automatic weight selection with automatic zero setting dial gauge. • Rockwell test minor load is 10 kgf & major loads are 60,100,150 kgf. Brinell test for Model : MRB major load is 187.5 kgf. and for Model : MRB-250 are 187.5, 250 kgf.
- Rockwell hardness scales such as HRA, HRB, HRC, etc.
- Brinell hardness scale such as HB is obtained by using different types of indentors (Diamond/ Ball). • For Model : MRB, Test height x Throat is 215 x 132 mm. For Model : MRB-250, Test height x Throat is 295 x 148 mm. • Motorized versions are also available.
- Machines strictly conform to IS:1586- 2000 for Rockwell test, IS:2281, BS:240 & ASTM-E-10 for Brinell test.



LATEST STANDARD - ROCKWELL HARDNESS TESTING MACHINES

(Model : MRS-N)

- It has many unique features over the standard hardness tester (Model: MRS).
- Powder coated, Rigid steel fabricated body with better aesthetic looks.
- The indenter is guided in liner motion bearing which reduces the frictional losses and enables checking of hardness of very small diameter pins also.
- The main screw is toughened for wear resistance and is protected by a bellow against dirt & dust.
- The entire loading system design is with a single reference with no scope for any manual adjustment which results in high accuracies and reliability.
- The dial indicator is of large size and is located at the front end of machine which results in better readability with higher resolution and accuracy.
- Very easy for repair and maintenance if required.
- Test height x Throat is 220 x 133 mm. • Colour is Siemens Gray powder coated.
- Motorized versions are also available. • Machines strictly conform to IS:1586-2000.



DIGITAL TORSION TESTING MACHINES (Model : MTT-E)

- Suitable for Torsion and Twist tests on various metal rods & flats.
- Torque measurement by Torque cell & Angle of twist measurement by Rotary encoder.
- Geared motor is to apply the torque to specimen through gear box.
- Display of Torque & Angle of twist on LCD display provided on Data Acquisition System.
- Torque resolution - 0.01% of machine capacity for entire range.
- Angle of twist resolution is 0.1 Degree.
- Accuracy of Torque measurement $\pm 1\%$ in the range from 4% to 100% of machine capacity.
- Torque speed & direction - 1.5 rpm Reverse.
- Provision to conduct test slowly by a handle which facilitates finding Modulus of rigidity "G".
- Facility for connecting the DAS Panel to Computer. • Optional - Special comprehensive software for torsion test to give Torque Vs Angle of Twist graph & also calculate various parameters like Torsional shear strength, Modulus of Rigidity, etc.
- Various Models - Maximum Torque Capacity from 100 Nm to 3000 Nm are available.

DIGITAL FATIGUE TESTING MACHINES (Model : MFT-8-D)

- This machine is light, compact & simple in design used to test the fatigue strength of materials & to draw S-N diagram, used for research institutes, laboratories, material manufacturers & various industries.
- Machine is table model, no need of civil foundation.
- Rotating beam type machine in which load is applied in reversed bending fashion. • Standard 8 mm diameter specimen is held in special holders at its ends & loaded such that it experiences a uniform bending moment. The specimen is rotated at 4200 rpm by a motor. A complete cycle of reversed stresses in all fibres of the specimen is produced during each revolution. • The bending moment is applied with a lever system and can be easily changed by moving a weight over the lever. • Maximum bending moment of 200 kgcm is applied & adjustable from 25 to 200 kgcm. • Total number of revolutions at which the specimen fails is recorded by a digital counter. • The total number of digits of digital counter is eight. • An interlocking system puts off the motor immediately after specimen fails. • Accuracy of applied bending moment $\pm 1\%$. • Optional - Machine with maximum bending moment upto 400 kgcm can also be offered. • Machine meets requirements of IS: 5075-1969.



ASTM & ISO PENDULUM IMPACT TESTING MACHINES (Models : AIT-300-ASTM & AIT-300-ISO)



- ASTM Pendulum Impact Testing Machine strictly conform to ASTM-E-23-2007 specifications.
- ISO Pendulum Impact Testing Machine strictly conform to BSEN-ISO : 148-2-2008 specifications.
- These machines are suitable for Charpy test only on various materials.
- Basically the design of both the machines are same except the striker radius. We can also supply combined model i.e. ASTM & ISO with an extra striker (Optional).
- Single stand design for easy & quick testing.
- Rigid design of machine frame and other parts assure minimum energy absorption during fracture which results in improved test accuracies.
- The high stressed and wearing parts like support blocks and strikers are of special alloy steels duly heat treated.
 - Safety guard for the operator is provided.
 - Pendulum drop angle is 140°.
 - Unique spring loaded braking system for smooth and jerk free braking.
 - Initial potential energy for Charpy is 300 Joules with a least count of 2 Joules for analogue model

and 0.5 Joule for digital model. • Digital versions are also available. Special software for digital version can be given (Optional).

- NIST & ISO Standard sample sets, Gauges, Tongs, Sub-zero bath, Templates, V notch milling cutters are available (Optional).

PORTABLE ROCKWELL HARDNESS TESTERS

(Model : MRP-1)

- This hardness tester is very light in weight, able to test parts where bench type hardness tester model is not useful.
- Hardness tester is quite handy for product testing of crank shafts, cylinder blocks, liner & assemblies.
- Can also be used for testing the hardness of both inside & outside of surface testing of pipes, bushings, ball bearing rings or other complicated parts.
- The model can be used in any direction without affecting the accuracy.
- Maximum Test height x Throat is 110 x 55 mm.
- Rockwell hardness scales such as HRA, HRB, HRC, etc is obtained by using different types of indentors (Diamond / Ball).
- Machines strictly conform to IS:1586- 2000 for Rockwell test.



ERICHSEN CUPPING TESTING MACHINES

(Model : MET-20)

- This machine is designed to reveal the cupping qualities of metal sheets & strips and also to test the adhesion, elasticity & porosity of coats of paints or varnish by way of comparison.
- Testing sample length and width required for this machine will be 70 x 90 mm.
- This machine is used to test maximum thickness of sample upto 2 mm.
- This machine conform to IS : 10175-1982.

END QUENCH TEST APPARATUS

(Model : MEQ-25)



- This apparatus is useful for determining the harden ability of steels by end quench test.
- The test consists of heating a standard size specimen to a given temperature for a specific period of time, followed by a water quenching of one end under specified conditions and measuring the hardness at various points from quenched end along the length of test piece.
- After heating, the test specimen is kept on the specimen support, where it is automatically centered with respect to water jet. The quick action valve starts impinging the water jet on the specimen end instantly. The elaborate arrangement of pump, tank, pipe etc, enables to obtain desired correct water head for the nozzle.
- The electrical controls and safety devices for pump and motor are provided and the entire apparatus is totally enclosed.
- Test piece - Total length is 100 ± 0.5 mm & diameter is $25 (+0.5 ; -0.0)$ mm.
- Inside diameter of vertical water supply pipe 12.5 ± 0.5 mm.
- Height of the free water jet (without test piece in position) 65 ± 10 mm.
- Distance from Tip of nozzle to the bottom of test piece 12.5 ± 0.5 mm.
- This apparatus conform to IS:3848-1981 & ASTM : A 255.

JOMINY TEST FIXTURES

(Model : MJOM-25)

- The most commonly used method for determining harden ability is the end quench test developed by Jominy & Boegehold.
- In this test a normalized 25 mm diameter & 100 mm length test sample of steel to be evaluated is heated uniformly to its austenitizing temperature. The specimen is then removed from the furnace & placed in the end quench test apparatus & immediately end quenched by a jet of room temperature water.
- After end quenching, longitudinal flat surfaces are ground on opposite sides of the test piece as per dimensions. This grinding is very important for correct positioning of the sample in the fixture and also for accurate repeatable and reliable test results.
- Jominy Test Fixture is to be positioned on the main screw of the hardness tester for checking hardness of the test sample. Hardness at equal intervals (1 mm or 1/16") to be checked and noted. Plot the resulting data on graph paper with hardness value as ordinate (Y axis) and distance from the quenched end as abscissa (X axis). By comparing the curves resulting from end quench tests of different grades of steels, their relative harden ability can be established. Thus the flatter the curve, the greater the harden ability.
- The details of the test are covered in IS : 3848-1981 & ASTM : A 255.



PORTABLE DYNAMIC HARDNESS TESTING MACHINES

(Model : DHT-6)

- Sleek & handy design, comes in a slim briefcase, for carrying the machine.
- Mainly used to check hardness in confined spaces, on large & heavy components, permanently installed parts with low test expenditure.
- The machine has built in conversion facility for given material to convert 'D' value to Vickers (HV), Rockwell (HRB,HRC), Brinell (HB), UTS scales which can be selected by pressing arrow keys
- The model operates on two numbers of pencil cells.
- 30 hardness scales for different probes selectable by feather touch keys.
- Alpha numeric display - 16 characters x 2 lines LCD with improved electronics, micro controller circuitry & user friendly software. Display indicates selected material & scale combination & hardness value.
- Five numbers of probes D, G, SH, EX & C can be given in different combinations.
- Facility to connect dot matrix printer through centronics parallel port.
- Upto 999 readings can be stored in memory of the machine for printing purpose.
- Serial interface is possible with RS 232 port at an additional cost.
- Automatic calibration facility of probe is available through keyboard.
- Extra (Optional) Accessories such as Standard test blocks, support rings, printer, serial interface, different types of probes are available.



ELECTRONIC EXTENSOMETERS

(Model : FEE-5)



- This instrument is to be used on Tensile or Universal testing machines to find out Proof stress & Young's modulus values.
- In case of many brittle materials such as high carbon steels, alloy steels, light aluminium & magnesium alloys, it is difficult to get yield values. For such materials stress corresponding to a certain allowable amount of plastic deformation is termed as proof stress say 0.1% or 0.2% proof stress.
- The measuring range is upto 5mm & resolution is 0.001mm.
- Standard two fixed gauge lengths of 25 & 50 mm is provided. Different sizes gauge lengths can also be given at an additional cost.
- If this extensometer is ordered with a computerized UTM, then a special menu driven application software is provided, which accepts load & extension values & evaluates proof stress values.
- The measurement accuracy satisfies all requirements of Class-1 as per IS:12872-1990.

BRINELL HARDNESS TESTING MACHINES

(Model : AKB-3000)

- This machine is designed for Brinell hardness measurement on steel & other ferrous materials & also on non-ferrous materials like Brass, Bronze, Aluminium, etc. The material can be cast, forged or rolled & the shape can be flat, round or irregular.
- This machine is specially used in production testing. Its stability & unique design of a floating fulcrum lever system ensures high accuracy & dependability.
- The load application system is of dead weight type combined with mechanical lever system. The supporting hydraulic system is for initial lifting of load before each test & damping the load application system for smooth application of load.
- Test loads from 500 to 3000 kgf in steps of 250 kgf.
- Test height x Throat is 380 x 200 mm.
- Indentation measurement by Brinell Microscope of 25X Magnification.
- Special Test fixtures for odd jobs / production testing can be supplied (Optional).
- Computerized Brinell impression measurement system is available (Optional).
- Manual / Optical / Computerised type Brinell Hardness testing machines are also available.
- Accuracy conform to IS:2281-2005 & BS:240.



OPTICAL BRINELL HARDNESS TESTING MACHINES

(Model : OPAB-3000)

- This machine is designed for Brinell hardness measurement on steel & other ferrous material & also on non-ferrous material like Brass, Bronze, Aluminum etc. The material can be cast, forged or rolled & the shape can be flat, round or irregular.
- This machine is a modified version of AKB-3000 which is provided with an inbuilt optical system of 14X magnification.
- An Automatic indenter index system is provided which tilts the indenter after the impression and the magnified image is visible on the screen for measurement with a 0.01 mm least count (Direct indentation measurement system).
- Thus this machine gives fast and accurate results with less operator fatigue.
- This model is mainly useful for production testing in Auto Shops, Foundries, Forge shops and Heat treatment units, etc. Its stability and unique design of a floating fulcrum lever system ensure high accuracy & dependability.
- The load application system is of dead weight type combined with mechanical lever system. The supporting hydraulic system is for initial lifting of load before each test and damping the load application system for smooth application of load.

- Test loads from 500 to 3000 kgf in steps of 250kgf.
- Machine Test height x Throat is 380 x 200 mm.
- Special test fixtures for odd jobs / production testing can be supplied (Optional).
- Computerized Brinell Impression measurement system is available (Optional).
- Manual / Computerized type Brinell hardness testing machines are also available.
- Accuracy conform to IS:2281-2005 & BS:240.



COMPUTERISED OPTICAL BRINELL HARDNESS TESTING MACHINES

(Model : OPAB-3000-PC)

- This machine is designed for Brinell hardness measurement on steel & other ferrous materials & also on non-ferrous materials.
- This machine is a modified version of AKB-3000 & OPAB-3000, which is provided with an inbuilt optical system (CCD) of 16X.
- An Automatic indenter index system is provided which tilts the indenter after the impression and on removal of load. The optics will transfer the image of indentation to CCD. The image is further digitalized & processed by PC for measurement. The diameter of the image can be measured automatically / manually to give Brinell hardness value. • Thus this machine gives fast and accurate results with less operator fatigue. • This model is mainly useful for production testing in Auto Shops, Foundries, Forge shops and Heat treatment units, etc. Its stability and unique design of a floating fulcrum lever system ensure high accuracy & dependability. • Test loads from 500 to 3000 kgf in steps of 250kgf. • Machine Test height x Throat is 380 x 200 mm. • Fully computerized system for indentation measurement and display. • Windows based software system. • Accurate measurement of Brinell hardness through matched Optics, CCD Camera, Hardware & Software using advanced image processing technology. • Two modes of measurement - Manual & Auto. • In Auto mode the image is scanned for measurement & hardness is displayed automatically.
- Verification facility is provided for clear indication of measured impression by encircling the same. • Windowing facility is provided which encircles the blurt images for better accuracies. • Macro & Micro adjustment facilities are provided in manual mode for fast & accurate encircling of the image to be measured. • Batch testing facility is provided. • Statistical Analysis report can be generated. • Calibration mode is provided with password protection. • Special test fixtures for odd jobs / production testing can be supplied (Optional). • Accuracy conform to IS:2281-2005 & BS:240.



COMPUTERIZED BRINELL HARDNESS TESTING MACHINES (with inbuilt Industrial PC & Touch Screen facility) (Model : OPAB-3000-IPC)



- This Model is mainly useful for production testing in Auto shops, Foundries, Forging Shops and Heat treatment units, etc.
 - Load application system is of dead weight type.
 - Test Loads from 500 to 3000 kgf in steps of 250 kgf.
 - Machine Test height x Throat is 380 x 200 mm.
 - A separate hydraulic power pack, positioned in the bottom part of the machine adds to the machine stability.
 - Our unique design of a floating fulcrum lever system ensures high accuracy and repeatability.
 - This machine saves a lot of cycle time, improved accuracy of measurement and gives fast and accurate results with less operator fatigue.
 - An Automatic index system is provided which lifts the indenter after the impression and the magnified 16X image is visible on the inbuilt industrial touch screen PC with direct BHN values.
 - Some features like : Batch testing facility, Statistical analysis, Test report, Certificate printing facilities are available.
- We can also supply optional loads from 187.5, 250, 500 to 3000 kgf in steps of 250 kgf. In this case our Machine Model will be OPAB-3000-IPC (SPL). • Special test fixtures for odd jobs / big flat table for heavy & big jobs for production testing can be supplied (Optional). • Machine strictly conform to IS: 2281-2005 & BS: 240.

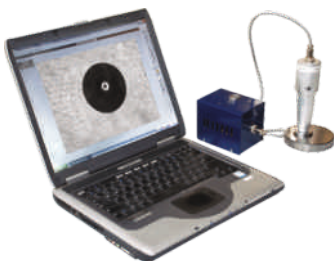
PENDULUM IMPACT TESTING MACHINES (Models : AIT-300-N, AIT-300-EN & AIT-300-D)



- Suitable for Charpy & Izod Impact Tests on various materials. Works on Pendulum principle.
- Rigid designs of machine frame & other parts assure minimum energy absorption during fracture which results in improved test accuracies.
- The highly stressed & wearing parts like support blocks & strikers are of special alloy steels duly heat treated.
- Direct indication of Impact energy absorbed by specimen on large dial for Models : AIT-300-N, AIT-300-EN & on digital panel display for Model : AIT-300-D.
- Safety guard for the operator is provided.
- Initial potential energy for Charpy is 300 Joules & for Izod is 170 Joules with a L.C. of 2 Joules (for Analogue models) & resolution of 0.5 Joules (for Digital model).
- Pendulum drop angle for Charpy is 140° & for Izod is 90° .
- Gauges, Tongs, Sub-zero bath, Templates, U & V notch milling cutters are available (Optional).
- Accuracy conform to IS:3766-2003, IS:1598-1977, IS:1757-1999, IS:1499-2003, BS:131-Part- I, II, III, IV & BSEN-10045-1993 (for Charpy).

MANUAL & MOTORISED - CHARPY & IZOD NOTCH BROACHING MACHINES (Models : BMF & BMF-M)

- Robustly constructed machine cuts the notches (V or U) very accurately by means of specially designed multi-toothed broach, which is drawn across the specimen by self-push of rotating hand wheel.
- This machine is a really cost effective solution for cutting Impact notches. Accurately cuts the desired notches as per respective standard in just a single pass within few seconds.
- A simple hand-vice for holding the specimen.
- The tooling includes the adjusters and end stops necessary to ensure notch-depth and position are correctly set.
- Motorized Notch Broaching Machines are also available.



DIGITAL BRINELL MICROSCOPES (Model : BIMS)

- This is an accessory of Brinell hardness tester.
- It can be connected to computer to get display of impression on computer.
- The special software is provided with it can calculate the Brinell hardness value automatically.
- Accuracy strictly conform to IS:2281.

We can also supply -

- Heavy duty conveyor type Brinell Hardness Tester.
- Pull off load tester.
- Custom built machines to suit specific applications.
- Conversion kit for converting Analogue Machines to Computerised & Servo Computerised.
- Full range of spares & accessories of Hardness Testers.
- Testing Fixtures for specific applications.
- Transverse testing machines for rails upto 200 tons.
- Bridge type Brinell Hardness Tester for very heavy jobs (Supplied to Bharat Forge, Pune).

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