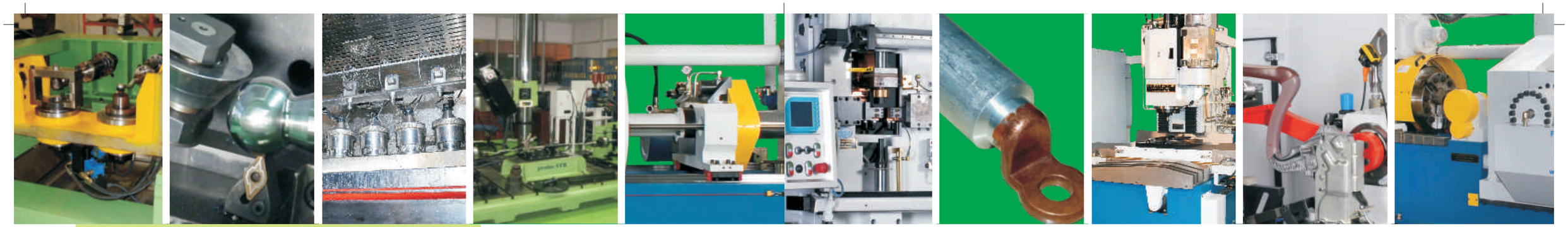

ETA Product Range Includes:

Friction Welding Machines
- Continuous drive Rotary Friction Welding
- Linear Friction Welding
- Friction Stir Welding
- Friction Surfacing

Electrical Upsetting Machines
(Metal Gathering Machines)
- Hydraulic & Electrical Servo Upsetters

Servo Controlled Screw Presses

Machines for making Engine Valves
- Tappet End Grinding
- Valve End Cut off
- Grooving
- Head diameter Turning and Facing
- Profile Turning
- Straightening
- Chemical Etching
- Friction Welding Machine (Pin to Pin and Head to Pin)
- Servo Electric Upsetters

Special Purpose Machines
- Ball Turning and Burnishing
- Commutator Slotting
- Shaft Straightening
- Double Ended CNC Turning
- Duplex Milling for Gear Pump Body
- Bore Grinding - Carbon Bushes

Testing Machines
- OBJ Boot Testing
- Parking Brake Testing
- Fatigue Test Rig for Steering Column
- Axial Elasticity Testing for SBJ, OBJ and IBJ
- Test Rigs for Steering Gears
  - -Rack Push Pull Testing
  - -Endurance Testing
  - -Impact Testing
  - -Torque to Failure Testing
  - -3-Axis Durability Test
  - -Functional Test
  - -Alternated Fatigue Test
- Accelerator Pedal Module Active Endurance Test Rig
- Control Arm and Silent Block Test Facility
- Control Arm Test Facility
- Stewart Platform
- Hub and Knuckle Test Facility
- Rear Beam Test Facility
- Hydraulic Hose Flex - Impulse Testing

Assembly Machines
- Steering Gear
- Forward Carrier (Differential Case)

Packaging Machines
- Tablet Filling
- Bottle Filling and Capping

Global customer base
24 hours on-line service support

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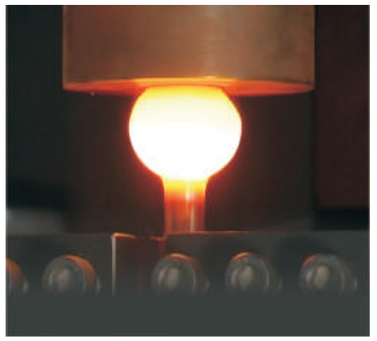
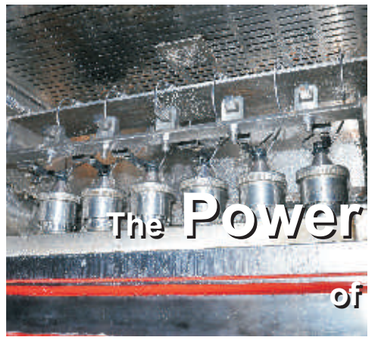
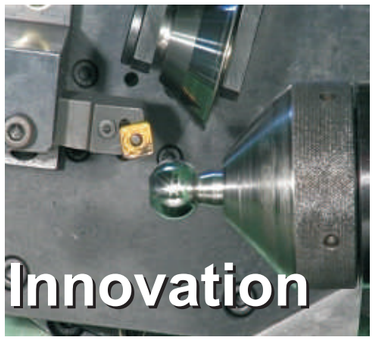
CAT-GEN-E-0114-SWE-1

Innovative Machines
for Productivity, Performance & Profitability







FRICTION WELDING | MACHINES FOR ENGINE VALVES | SPMs | TEST RIGS

ETA TECHNOLOGY

DRIVEN BY INNOVATION

Established in 1991 in Bangalore, hub of the machine tool industry in India, ETA Technology is a leading manufacturer and global supplier of state of the art high-end machines for Friction Welding, Stir Welding, Friction Surfacing and Metal Gathering.

ETA manufactures a wide variety of Test Rigs for testing auto components. ETA also manufactures Special Purpose Machines for a wide range of products.

Driven by continuous innovation over the years, ETA has a global customer base for its machines and test rigs. Components produced and tested on ETA machines include engine valves, propeller shafts, axle housings, steering gear, ball joints, piston rods of hydraulic cylinder, cutting tools, bimetallic cable lugs, drill pipes etc.

A well experienced, trained and highly motivated team of Engineers is engaged in creating innovative designs.

24/7 customer support ensures minimum down time.

FRICTION WELDING - A SOLID PHASE WELDING

PROCESS

Friction welding is a solid phase welding process, in which two similar or dissimilar materials are made to rub against each other under axial force to produce sufficient heat at the interface and when the impurities at the interface are removed as flash, stopping the relative motion of jobs and applying a forge welding force to form a strong metallic bond between the materials.

Friction Welding - Advantages

- Short cycle time (a few seconds) and hence ideal for mass production
- Saving costly material if bi-metallic component is used (drills – HSS/ MCS)
- Low energy consumption
- No edge preparation, filler material or shielding gas
- No spatter, fumes or radiation
- Excellent welding; joint as strong as or stronger than parent material
- 100 % in- process quality check
- Material as diverse as Cu to Al, Cu or Al to Steel, Titanium to SS, PVC to Nylon etc. can be welded

Typical Components Welded on ETA Machines


Gear wheel to Cup


Engine Valve


Propeller shaft -Yoke and Spline Shaft to Tube


Cable lugs, Copper to Aluminium


Tripod to Rod


Drill bit


Trailer axle housing


Stub shafts to Tube


Drill Pipe


Drive axle housing


Rod-eye to Rod of hydraulic cylinder

and More.....

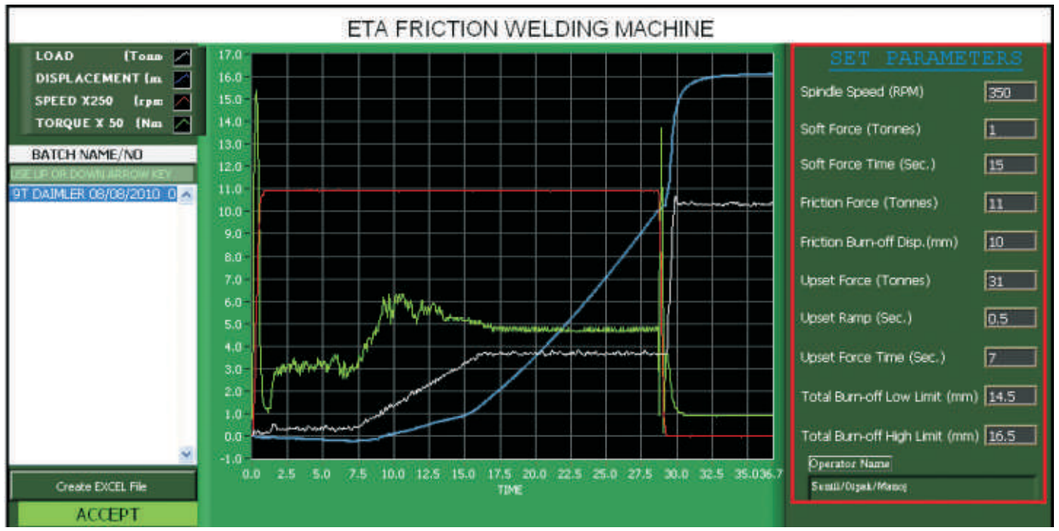
WIDE RANGE OF MACHINES WITH CHOICE OF CONFIGURATIONS AND FEATURES...

ETA designs and supplies machines of capacity ranging from 30kN to 2000kN for varied customized applications. Machines are available in vertical (up to 60kN), horizontal or inclined configurations with or without tie rods. Machines are also offered with twin heads, built-in or standalone deflash units, automatic component loading/ unloading systems, special vices for welding unlimited rod/ pipe length etc.. Advanced features with simplicity in design, make ETA Friction Welding Machines the preferred choice.

Features include

- Spindle driven by AC servo motor
- Rapid stopping of spindle by regenerative braking which saves energy
- Welding force provided by servo hydraulic cylinders in closed loop control system
- Pressure transducer/ load cell and linear scale feedback for load and displacement control
- PLC based control system integrated with Industrial PC and advanced software
- On-line plotting of important parameters like axial thrust, spindle speed, loss of length and spindle torque during weld cycle
- Archiving and retrieval of weld data
- Axial welding forces applied through AC servo motor and ball screws for smaller capacity machines (less than 60kN) as option
- Spindle orientation option for aligned welding
- Remote customer support through internet

On-line plotting of important parameters



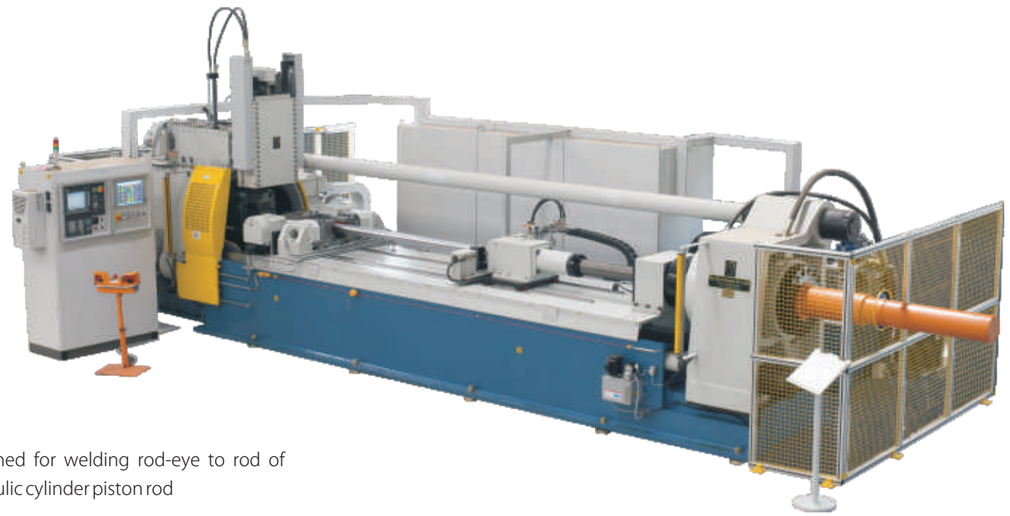
ETA Friction Welding Machines Available in Capacities...

Models	3T	6T	10T	15T	20T	30T	40T	60T	100T	125T	150T	200T
Max. Forge welding force in kN	30	60	100	150	200	300	400	600	1000	1250	1500	2000
* Weld cross sectional area in mm^2	250	500	830	1250	1665	2500	3330	5000	8330	10415	12500	16660

* Only indicative – Assumed Forge pressure = 12kg/ mm^2 - MS Material

FRICTION WELDING MACHINES FOR SPECIFIC APPLICATIONS

200T - Horizontal Machine with built-in CNC Deflash Unit



Designed for welding rod-eye to rod of hydraulic cylinder piston rod

Spindle speed	: 0-450 rpm- Infinitely variable
Spindle motor	: 250kW, 800 rpm, 2986 Nm
Chuck	: Custom 2 jaw chuck- dia. 600mm -hydraulically operated

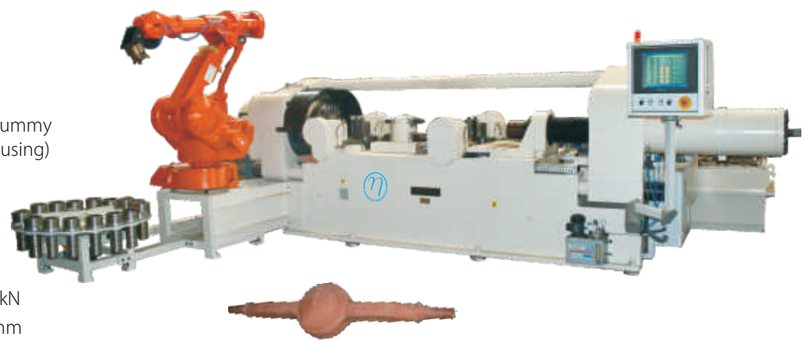
Rod -eye

Max. height of Rod-eye	: 280mm
Bore dia.	: 140mm
Max. dia. of Rod-eye	: 280mm

Rod

Rod dia.	: Min. 50mm / Max.130mm at weld
Rod length	: 750mm to 3500mm

100T - Horizontal Machine integrated with Robot for component loading/ unloading



Designed for welding live and dummy Axle housings (Spindle to Axle Housing)

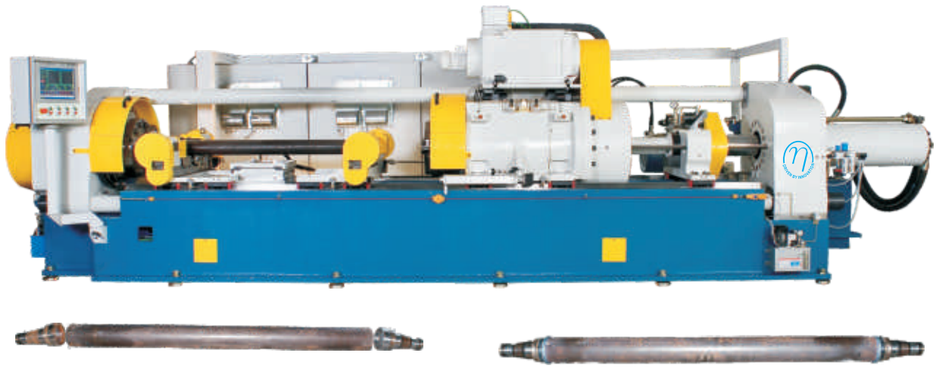
Max. forge force	: 1000kN
Max. OD of spindle	: 150mm
Max. length of spindle	: 380mm
Max. length of axle	: 2300mm

150T - Horizontal Machine without back stop

Designed for welding unlimited length of Pipe / Rod with heavy duty hydraulic clamping system

Max. forge force	: 1500kN
Max. OD of rotating piece	: 150mm
Max. length of rotating piece	: 450mm

125T - Twin Head Machine One head fixed and the other moving for simultaneous welding at both ends



Designed for welding live and dummy Axles (Spindle to Axle Housing)

Max. forge force	: 1250kN
Max. OD of spindle	: 160mm
Max. length of spindle	: 380mm
Max. length of axle	: 2500mm

FRICTION WELDING MACHINES FOR SPECIFIC APPLICATIONS

15T - Twin Sliding Head Machine with automatic loading (non-rotating part) and unloading the welded job

Enables welding at both ends of propeller shafts simultaneously, to join end pieces to tube with precise orientation

Max. forge force : 150 kN

Rotating parts	**Non - rotating part**	
- Midship shaft	Max. dia. of tube	: 102mm
- Tube yoke	Max. wall thickness	: 3mm
- Tube sleeve	Max. length of tube	: 1500mm
- Tube flange		

20T - Dual Sliding Head Machine with Built-in CNC Deflash Unit

Designed for welding Stub Shaft / Tripod to Tubular Shaft

Max. forge force	: 200 kN
Spindle speed	: 0-1500 rpm-Infinitely variable
Spindle torque	: 210 Nm
Tubular shaft (non-rotating part)	
Dia. at weld - OD	: 60mm max.
Wall thickness	: 5mm max.
Length	: 450mm max.

Stub Shaft (rotating part)	
Dia. at weld	: 60mm max.
Max. Wall thickness	: 5mm
Max. Length	: 250mm
Tripod	
Dia. at weld	: 50mm max.

3T - Machine With built-in deflash, deflect and auto loading/ unloading

Designed for welding Engine Valves - Pin to Pin

Max. forge force	: 30kN
Max. dia. at weld	: 10mm
Max. stem pin length	: 150mm
Max. length of head pin	: 220mm

6T - Vertical Machine for smaller foot print

Designed for welding Engine Valves Forged Head to Pin

Max. forge force	: 60kN
Max. dia. at weld	: 14mm
Max. length of rod held in spindle	: 150mm

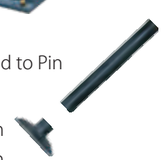
6T - Slant Bed Machine

Designed for welding Engine Valves

Max. forge force	: 60kN
Max. dia. at weld	: 14mm
Max. length of rod held in spindle	: 150mm
Max. length of rod clamped in vice	: 200mm

6T - Machine With built-in deflash, deflect and auto loading/ unloading

Designed for welding Engine Valves - Head to Pin



Max. forge force	: 60kN
Max. dia. at weld	: 14mm
Max. head dia.	: 50mm

FRICTION WELDING MACHINES FOR SPECIFIC APPLICATIONS

30T - Machine

Max. forge force	: 300kN
Max. dia. at weld	: 42mm for SS
	: 28mm for Stellite
Max. dia. held	: 125mm
Max. length of rotating part (for holding dia. 95mm - 125mm)	: 120mm
Max. length of rotating part (for holding dia. <95mm)	: 300mm
Max. length of non-rotating part	: 700mm

20T - Machine with buil-in pre-machining (milling) unit

Designed for welding Bimetallic Cable lug (Copper to Aluminium)

Max. forge force	: 200kN
Max. dia. at weld	: 40mm

Linear Friction Welding Machine

Linear friction welding works on the basic principle of rubbing two pieces of material together by linear oscillation of one of the parts, till the surfaces get hot enough to become plastic and join together under the application of forge force.

Max. forge force	: 100kN
Max. linear rubbing frequency	: 50Hz
Linear motion to slide	: Through crank, driven by AC spindle motor
Amplitude	: 3mm
Load control	: By Servo hydraulics

FRICTION STIR WELDING AND FRICTION SURFACING MACHINES

Friction Stir Welding

Friction stir welding is an Eco-friendly process to weld and produce near nano grain sized materials. It is a relatively new solid-state joining process. It is useful for joining high strength aerospace aluminum alloys and other metallic alloys that are hard to weld using conventional fusion welding. This environment friendly technology is considered to be the most significant development in the metal joining process.

This three-axis vertically configured Friction Stir Welding machine accommodates a maximum plate size of 1000mm x 400mm and has a maximum thrust of 100 kN on Z- axis.

Features :

- The machine can be built to cater to various axial loads and job sizes
- Machine can be supplied in single or double column configuration
- To maintain tool angle in linear welding the head can be tilted manually
- For contour welding the tool can be tilted automatically to follow the required path
- Machine is available for both longitudinal and circumferential seam welding
- The machine is controlled through a Siemens 840D CNC System

Friction Surfacing

Friction surfacing is a process derived from friction welding, whereby a cladding material, in rod form is rotated under pressure, generating a plasticised layer in the rod at the interface with the substrate. By moving a substrate across the face of the rotating rod a plasticised layer between 0.2-2.5mm thick is deposited.

The following data is acquired and recorded

- X-axis Load/ Displacement
- Y-axis Load/ Displacement
- Z-axis Load/ Displacement
- Spindle speed / Spindle torque

ELECTRICAL UPSETTING MACHINES

In this machine, a high density electric current at very low voltage is made to pass through a portion of bar stock, which is held against an anvil and clamped between two jaws to generate sufficient heat to make the portion red hot and plastic. An upsetting force is applied axially on the rod against the anvil, making the portion which is in plastic stage, to deform into a bulb shape and to gather the required volume.

Machines are available in 12, 20, 30, 37, 50, 75 and 125 kVA ratings.

20kVA Twin Head Upsetter with Auto Loading / Un-loding and Anvil Indexing

In Upsetters with more than 50 kVA capacity three phase power supply is rectified to DC and inverted to single phase AC. A single phase transformer can thus be used with three phase balanced power input.

50kVA/ 400V Single Head Upsetting Machine

Supplied with various versions & features

- Horizontal and Vertical
- Single head or double head
- Auto loading & Unloading option
- Servo controlled Upsetting and Anvil cylinders
- Bulb temperature control through Optical pyrometer
- Anvil Auto Indexing
- Upsetting force and anvil movement controlled by servomotors through ball screws
- Upsetting force measured by load cell and controlled in closed loop

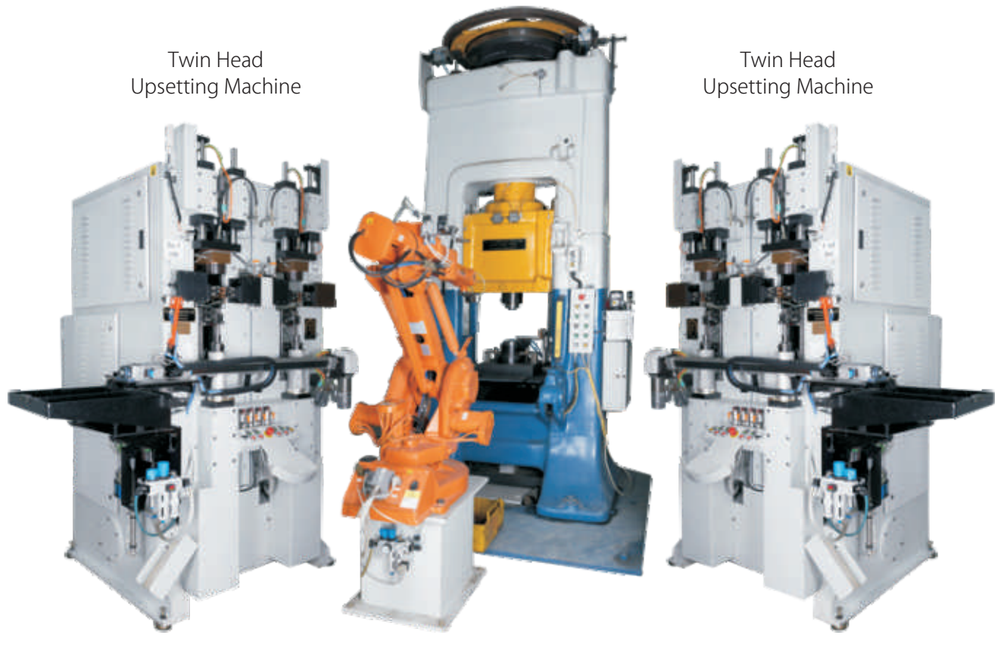
SERVO CONTROLLED POSITIVE-DRIVE SCREW PRESS

In a conventional Friction Screw Press, energy is transmitted from the transmission wheels to the flywheel by friction through a leather band. On the return stroke, energy stored in the moving parts is dissipated as heat by applying brake.

In an innovation by ETA, the two transmission wheels on the conventional Friction Screw Press are dispensed with. The flywheel is driven by an AC servo/ spindle motor through a timer belt/ gear. The motor can be made to run the flywheel at a preset speed very precisely till the dies come very close. The motor is now disabled and the entire energy in the moving masses gets transferred to the job. When the moving die comes to rest, the motor is reversed and the ram returns to its home position very precisely. Since there is no mechanical braking, no energy is wasted during return stroke. The motor brakes on line - regeneration principle where the kinetic energy in the moving mass is converted to electrical energy and sent back to the mains. Since the drive motor does not run when the ram is stationary no energy is consumed during idling of press.

High Speed Production Cell for Making Engine Valve Forgings

ETA offers high speed production cell with auto loading of Upsetters - unloading - transfer to Press and unloading from Press.



MACHINE FOR ENGINE VALVES

Tappet End Grinding Machines

This is a pendulum type machine wherein the valve moves over a grinding wheel capable of stock removal of up to 2mm in one stroke. It is fully automatic with chute loading and input length checking. Floor to floor time - 5 seconds

At pre-set frequency the ground job is measured for its length. To compensate for the wheel wear the spindle head is moved automatically by means of an AC servo motor.

Similar machine is available for finish grinding of tappet end of the valve. In this machine the pendulum is moved by a crank, driven by a servo motor.

Grooving, Chamfering and Tappet End Facing Machine

The valve is held on the stem by a collet in a special spindle and two tools on a two-axis CNC slide form or generate the groove and chamfer. Tappet face is also machined in the same setting. The jobs are automatically loaded and unloaded. Cycle time achieved is less than 10 seconds.

Valve End Cut Off Machine

ETA also supplies machines for valve end cut-off operation with automatic chute loading facility. Valve is made to fall from the chute into a clamping fixture mounted on an oscillating beam. The beam oscillation is achieved through an AC servo motor, which enables precise control of cutting feed and rapid approach. The job is fed against a cut-off diamond grinding wheel mounted on the machine spindle.

Head Dia. Turning, Facing and Profile Turning

Attaining a face run out of under 50 micron on the face of Engine valve is a difficult proposition because, the reference for facing is the seat or top of radius. Since the valve is not a rigid component, while clamping it against the seat, the valve bends to the extent of seat runout and after facing, when it is removed from the collet, the head will spring back and will show the same runout as the seat had.

This problem is overcome by providing a nose-stopper for the valve, which is hemispherical. This provides a rocking action for the stopper and thus avoids bending of valve head.

Cycle time <12 sec for a 40mm dia. Valve
Run out on face <0.05mm
Run out on head <0.08mm

Valve Straightening Machines

Valves after forging and heat treating normally would be bent both on stem and head. These are straightened on this automatic machine at a very fast rate, Cycle time is as low as 5 seconds. The stem is straightened to 0.05 mm and the head within 0.08 mm.

Auto loading and unloading provision is an optional feature.

Valves with hardness over 40HRC are liable to break during straightening and to overcome this problem, valves are heated in-situ to make them ductile and then straightened.

Heating system is optional.

Machine with heating system for straightening Titanium Valves or Valves having hardness more than 40HRC are also offered.

Model		VS70	VS100	VS130	VS170
Stem dia.	mm	4 to 6.5	6 to 8	7 to 13	12 to 22
Head dia.	mm	15 to 27	20 to 40	35 to 60	55 to 90
Length	mm	55 to 120	85 to 150	100 to 200	190 to 350

Etching Machine

Electro chemical etching machines are offered for marking monogram/ part number on the valves. Two types of machines are available- Static and Moving Head. In the latter the job rolls under the etching head and the characters get etched on the job. Etching on complete periphery of the job is possible. But here etching on chrome plated surface will not be effective. In Static Head Machine this problem is overcome, but etching is possible only on an arc of 120 degrees on the periphery of the job.

SPECIAL PURPOSE MACHINES

Ball Turning And Burnishing Machine

Ball diameter Turned / Burnished	: 15mm – 40mm
X-Axis Stroke (Spindle head slide)	: 160mm
C-Axis rotation (Rotary Head)	: -5 º to 150º clockwise
W-Axis (Turning tool slide) adjustment	: 12mm max.
Max. Thrust of burnishing tool	: 2500N (spring loaded)
- Surface finish attained	: 0.1µm Ra
- Sphericity achieved	: 4 µm
- Depth of cut	: upto 2mm

Can be tooled up for machining ball valves also

CNC Profile Turning and Burnishing Machine with integral spindle

Any job where the hardness is less than 40HRC and which needs grinding after turning can be economically manufactured by turning–cum–burnishing method. In this machine there is provision for three axis (Z, X & A) interpolation of tool to machine and burnish any profile.

Spindle torque	: 48Nm
Spindle speed	: 0 - 4000rpm
X-axis stroke	: 150mm
Z-Axis stroke	: 150mm
A-Axis rotation (tool)	: 360º
Max. thrust of burnishing tool	: 1000N (spring loaded)
Control system	: Siemens CNC

Shaft Straightening Machine

This is an intelligent machine that automatically calculates the extent and location of bends on a shaft, and then straightens it using a built-in hydraulic press. The machine consists of a servomotor-driven slide on which a set of V-blocks supports the job. A stepper / servo motor rotates the job through one revolution and three linear scales measure the 'runouts' at three points on the job. A computer determines at what point and to what extent the straightening load is to be applied.

Machines are available for straightening jobs of various diameters and lengths.

Commutator Slotting Machine

Slotting machine is used for slot cutting of commutator risers. The job is rotated by one turn and the angular position of every copper segment is recorded by means of a laser sensor. Now the job is precisely positioned such that the slotting cutter can cut the first slot in the middle of the segment. After every slot the job is indexed by precise angular displacement and all slots are cut. Jobs are loaded and unloaded automatically. Average cycle time (floor to floor) for a 23 segment commutator is 16 seconds.

Twin head machines are available where six slots can be cut in a second.

TEST RIGS

Steering Gears - Rack Push-pull Testing

The rack is pushed and pulled at a uniform speed and a graph is plotted with axial load v/s displacement. In case of power steering, ATF at the desired temperature is circulated at preset flow rate. The auto-cycle includes filling, testing and purging.

6 Stations Boot Testing Machine

'End of the Line' Tester for Parking Brake

This machine is designed for End-of-line testing of Parking brake assembly of automobile.

Function: All Parking brakes after assembly, have to be tested for the following parameters:

- Proper functioning of Release button including measurement of load required
- Proper functioning of the brake lamp switch
- Mechanical efficiency of the Brake assembly
- If all the above parameters are acceptable, print label 'ACCEPT' with part number and serial number. If rejected, print 'REJECTED' label

The entire records are archived in the industrial PC and can be retrieved at any time.

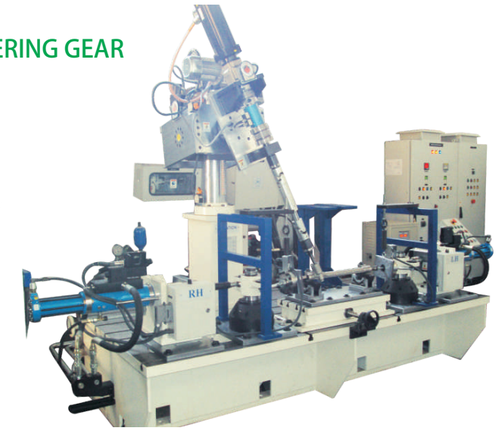
Flex-impulse Test Rig for Hydraulic Hoses

This test-rig simulates rigorous field test conditions. The test complies with SAE standard. For static impulse test, upto 6 hoses are held on two manifolds (90 degree and 180 degree) and for flex impulse test, upto four hoses can be tested.

AC spindle motor and drive for articulation and rotation

Number of ball joints	: 6
Articulation angle	: ± 30° with frequency variable from 0.1Hz to 3Hz
Rotation angle	: ± 70° variable from 0.12Hz to 3Hz
Operation temperature	: -40° C to +140° C
Humidity range	: +15% to 90 % RH

3 AXIS DURABILITY TEST RIG FOR STEERING GEAR



This facilitates easy configuration of test set ups to conduct the following tests on Steering Gear of Passenger Cars and Utility Vehicles.

- Durability tests
- Alternated fatigue test
- Reverse durability test
- Wear tests
- Wear test without power assistance
- Parking test
- Load cycle test
- Rotation and reverse rotation endurance test
- Mounting foot fatigue test
- Input torque test
- Rack pull test
- Valve curve & leakage tests
- Endurance test
- Impact wear test
- Efficiency test
- Noise test (NVH)

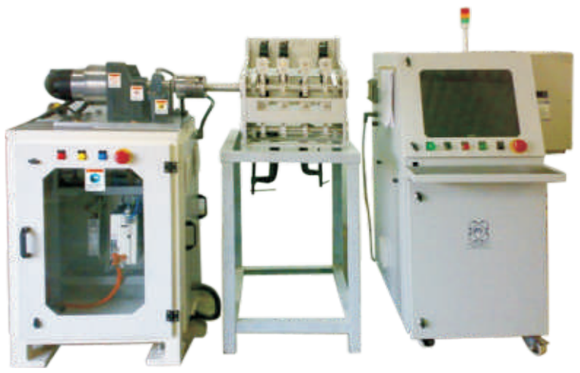
Hydraulic linear actuators will simulate the stub axle condition.

Vertical pinion drive actuator will simulate the steering wheel condition.

Features

- NI real time (FPGA) hardware
- Lab-View software
- Fatigue rated dynamically calibrated load cells
- In-built LVDT sensors for actuator displacement
- In-built encoder for measuring speed/ angle
- AC servo motor for rotary actuator
- Programmable test parameters
- FFT, power spectrum, efficiency & analysis on NI Diadem
- Low inertia torque motor for pinion torqueing

ACCELERATOR PEDAL MODULE ACTIVE ENDURANCE TEST RIG



This test rig facilitates endurance test requirements on all accelerator pedal modules.

APM pedals can be tested for voltage output or contact resistance measurements.

Facility to set the 0% pedal position (LI) & 100% pedal position (MS) is available.

A geared servo motor generates the required torque needed to press 8 pedals simultaneously.

An absolute encoder (16 bit) provides absolute (referenced) position for controlling the pedal position.

Online / offline analysis and reports available.

Features

- Synchronisity test, stability test, contact resistance test, SRC test, kick down error test & snap tests are conducted
- Upto 8 Pedals can be tested simultaneously

CONTROL ARM & SILENT BLOCK TEST FACILITY

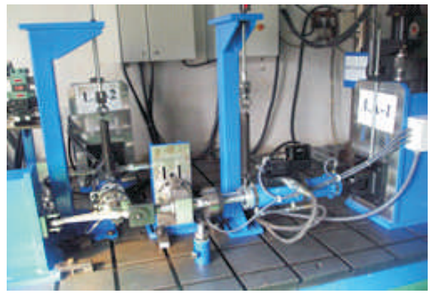
This Test Rig facilitates the following

To conduct performance test (Static Strength Test, Fatigue Strength Test, Torsional Stiffness Test) on Control Arm.

To configure the Test facility with Re-Configurable Tests (T-Slot Bed, Linear Actuators on brackets and Torsional Actuator).

To meet the Low force high frequency and High force low frequency requirements.

To establish state of art controls (Block Programmable), with National Instruments make Real Time Hardware and Software.



CONTROL ARM TEST FACILITY

This Test rig facilitates the following

Conducts performance test (Static Strength Test, Fatigue Strength Test, Torsional Stiffness Test) on Control Arms of automobile steering system.

Configures the Test facility with Re-Configurable Tests (T-Slot Bed, Linear Actuators on brackets and Torsional Actuator).

The Low force high frequency and High force low frequency requirements.

Establishes state of art controls (Block Programmable), with National Instruments make Real Time Hardware and Software.

GLOBAL FUNCTIONAL TEST RIG

The Global functional test stand is designed for performance evaluation of different types of steering systems for the passenger car segment. It is mainly intended for product development quality assurance. Different types of Steering Systems tested are the following.

- Mechanical steering gear
- Hydraulic steering gear
- Electro-hydraulic steering gear
- Electronically powered steering gear
  - belt driven or column driven

Vertical rotary actuator simulates the steering wheel condition

Linear actuators simulate the stub axial condition

CAN communication enables read and write parameters and characteristics to and from the ECU

Features

- End of line testing
- Performance evaluation test
- NVH test

- CAN Commutation test
- All types of passenger cars steering gear
- NI + Labview RT hardware and software
- Yoke lift measurements
- FFT, Power spectrum, Efficiency, Analysis on NI Diadem
- Low inertia torque motor for pinion torqueing

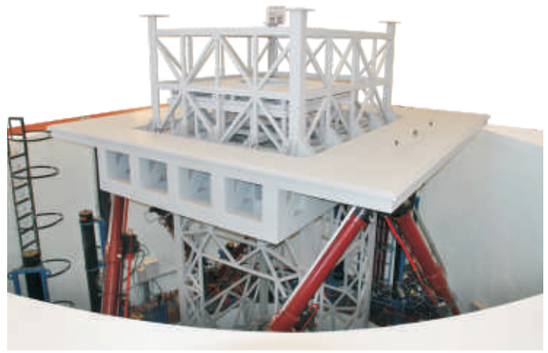
STEWART PLATFORM

This huge platform creates a usable and safe motion base environment for simulation of air, sea or any other arbitrary motion within its specified limits. Safety is the most important factor of the system. Real-time control of the motion base will guarantee a satisfactory level of safety.

Mathematical modeling transfer functions, dynamics and prediction of proposed trajectories can be run on the platform.

Simulation of the overall system model shall yield allowable gains of operation, frequency response, resonance frequency, required filtration etc. leading to a stable operation of the platform by the system design.

The simulation also calculates and predicts the accelerations, forces and the velocities for time wise trajectory.



Features

- Total moving mass - 30 tonne
- Payloads - max. 25 tonne
- Sea state 2 simulation capability
- 50,000 Kgs Payload capacity
- Upto 1.5 G capability
- Upto 1.5 Mtrs/Sec velocity
- Surge, sway & Heave - Linear
- Pitch, Roll & Yaw - Rotary
- Programmable combinational motions possible

Hub Rotation Durability Test Rig

This is a computerized standalone system to perform hub rotational durability test operations with block programming and controlled parameters.

All controls hardware and software are based on National Instruments products.

Online plots and displays with results offer flexibility in data analysis.

Features

- Programmable speeds and forces
- Temperature monitoring

Steering Gear Yoke Setting Rig

This is a computerized standalone system, designed to perform Yoke Setting Operations with programmable controlled parameters. Automatic tightening of Yoke cover to achieve required input pinion torque and yoke lift within set tolerance range is achieved by this machine.

All controls are driven by a standalone dedicated real time hardware (cRIO / PXI) and HMI is on MS OS based PC.

Features

- Auto yoke cover torqueing
- Auto yoke lift measurement
- Auto input torque test
- Lift >5 µm and <80 µm
- Real time controls with MS OS based host for HMI

Online / Offline plots and displays with reports & results offer flexibility in data analysis.

This endurance and wear test bench serves to simulate the wear on ball joints as per the loads experienced in a vehicle. Required Tilt & Rotation axes are driven by Rotary Actuators.

High frequency, high amplitude loading system is established by linear loading of stem using linear servo cylinder.

Online calibration, user friendly test software, standalone operation with independent power-pack etc. make this test rig easy to operate.

Axial loading and longitudinal radial loading can be offered as 4th and 5th axes.

Environment chamber to generate humidity and temperature are optional.

Features

- Environment simulation of temperature and humidity
- Saline water and mud water spraying with Heive can also be offered

Ball Joint Endurance Test Rig

- Elasticity measurement on the test rig is possible without disengaging the ball joint

All test rigs required to test ball joints namely - Endurance test rig (ETR), Elastisitry test rig (ELTR) & Torque test rig (TTR) can be offered

Web Vehicle Sensing Test Rig

This test rig facilitates web and vehicle sensing lock test on a 100% check basis in the production line for partial fulfillment of ECE / JSS etc. specifications.

Features

- Upto 3 G capability
- Less than 45 secs cycle time and easy front loading scheme
- Accurate control of G-level with plots, reports etc.
- User friendly tester with indigenous design and components