

PRODUCTIVE TECHNOLOGIES PRIVATE LTD has been engaged in the manufacture and marketing of sophisticated engineering testing and measuring equipment since its inception nearly two decades ago. The company has accumulated abundant knowledge and experience in the fields of dynamic balancing, vibration measurement and analysis, in-situ balancing of rotors, sound measurement, spin testing, torque measurement and materials testing. The company has detailed engineering knowledge and experience in these arenas and has striven to nurture and develop the nascent markets for these products and has met with considerable success in these efforts through its vision of innovation and consistent research aimed at customer satisfaction.

The core strengths of the company are focused in the following areas of business.

1. Manufacture of Microprocessor Based Dynamic Balancing Machines and sub-systems serving material handling plants.
2. Marketing of Vibration meters, Vibration Analysers, In-situ Balancers, Sound Level meters etc.
3. Marketing and after sales support of sophisticated internationally renowned Testing systems and In-situ balancing Vibration Measurement & Analysis services.
4. Marketing and servicing of other hi-technology capital equipment of other well renowned foreign companies in India as their representatives.

PROTEQ are the authorized Indian representatives of the following leading foreign companies in India.

1. APPLIED TEST SYSTEM INC. USA creep testing solutions, furnaces and high temp. testing accessories.
2. Torquemeters Limited, UK Torque test rigs
3. Epsilon Technology Inc. USA Extensometers and COD gauges for materials testing
4. Barbour Stockwell Inc. USA Spin test systems
5. LANSMONT CORP. USA Dynamic package compression, shock, impact and vibration test systems, portable journey data loggers

CUSTOMER SUPPORT

PROTEQ fully backs up all delivered systems with its factory trained team of qualified service engineers providing country wide coverage. Support personnel are available to commission all new installations and thereafter ensure that the equipment is maintained in first class condition with planned service visits or post warranty maintenance contracts. The company has a team of engineers who are trained and experienced professionals having extensive experience in the above product lines. The company operates from its head office in Delhi, works in Gurgaon and Bhiwadi. After sales Services are offered from Delhi, Gurgaon, Chennai, Kolkata and Mumbai.

HARD BEARING DYNAMIC BALANCING MACHINES

Vibration free running of all rotating systems and machinery is an increasingly essential requirement of industry. A principle cause of vibrations is rotor unbalance, which is due to uneven mass distribution in the rotor with respect to its geometric axis of rotation. Centrifugal forces produced by unbalance in rotors cause stresses and vibration leading to catastrophic failures.

Dynamic balancing reduces these forces so as to bring them within permissible levels, thereby ensuring smooth running of the rotors. Extremely accurate and reliable Dynamic Balancing Machines are required to perform this operation. PROTEQ lead in design, manufacture and supply of state of art Microprocessor Based Dynamic Balancing Machines. The range includes both vertical and horizontal hard bearing dynamic balancing machines. Single- and two plane machines are available for multifarious rotor balancing from 200 gms to 30,000 kg for a variety of industrial rotating components. The machines find use in various industries- automobiles, air-conditioning, power generation, textiles, railways, aeronautics, chemicals, fertilizers, domestic appliances, and other process plants etc.

PROTEQ Hard Bearing Dynamic Balancing Machines employ robust roller carriages to convey the centrifugal force generated by the unbalanced rotor. This force is resisted by the piezoelectric sensors mounted on the pedestals of the Balancing machine. They produce an electrical charge signal proportional to the centrifugal force. This is further converted in to a voltage signal and conditioned by using electronic circuits for further processing to compute the amount of unbalance directly in grams.

Angle of unbalance is measured by infra red sensors using digital phase relation loop technology. This phase generator produces electrical pulses that provide a feedback of rotor speed and zero degree orientation with digital smoothness after computing its phase difference with the unbalance signal derived from the force measuring electronics to display the angle of unbalance.

The rotor support pedestals of horizontal machines and sensor bridges of vertical machines are robust rugged and incorporate an integrated approach in the design of the force measuring system. This is superior to other designs and provides higher rigidity and accuracy, which are vital for efficient operation. The roller carriages & bridges are designed to accommodate a large variety of rotors with widely varying journal diameters. The entire support system is built to withstand significant overloading and yet retain a high order of achievable accuracy.

End Driven Balancing Machines

These types of machines are ideally suited for large rotors, often with high inertia and where high power is consumed due to air resistance etc. The weight of rotors which can be balanced is limited by acceleration capacity of the drive unit and speeds available on the balancing machine. Drive options include single and multiple speeds through pulley arrangements, gear boxes or AC frequency variable speed drives. Gap bed machines are available for bigger diameter rotors.

End driven machines also lend themselves to high speed balancing applications in conjunction with safety enclosures. Furthermore the positive drive arrangement through Universal coupling assures the rotor does not lift off the pedestals during running due to high centrifugal forces.

With our experience spanning nearly two decades, our most commonly served applications for end driven machines include but are not limited to: Blowers, Impellers, Motor rotors, Paper machine rolls, Centrifuges, Crushers, Turbine rotors, Pulleys, Hubs, Crankshafts, Drive Shafts, Propeller Shafts, Armatures, Fans, Compressors, Etc.



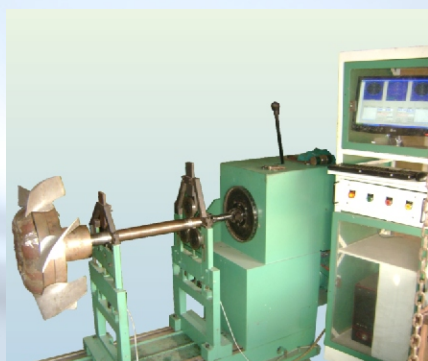
5000 Kg Machine for Motor Rotors



3000 Kg Machine



10000 Kg Machine for Paper Rolls



300 Kg Machine for Overhang fans



1000 Kg Gap Bed Machine



3000 Kg Machine for Blowers

T e c h n i c a l D a t a

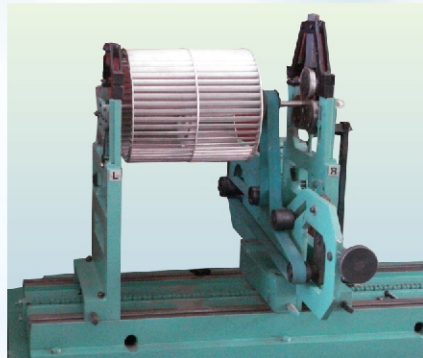
Machine Model	H 50	H 100	H 300	H 650	H 1K	H 3K	H 5K	H 10K	H 16K	H 30K
Weight Capacity KG	50	100	300	650	1000	3000	5000	10000	16000	30000
Max Dia of Rotor	500	1000	1150	1350	1600	2100	2500	3000	3500	4000
Std. Bed Length - S	800	1200	1500	1500	1500	2000	2500	3000	4500	4500
Std. Bed Length - M	1200	1500	2000	2000	2000	2500	3000	4500	6000	6000
Std. Bed Length - L	2000	2000	2500	2500	2500	3500	4500	6000	7500	7500
Journal dia Range (mm)	8~50	10~80	12~100	15~120	15~120	25~180	25~250	40~250	70~350	70~350

Belt Driven Balancing Machines

Belt driven machines are used for balancing of rotors where high accuracy is desired and parasitic errors and influences due to the drive cannot be tolerated. The need for making adaptors is also eliminated. Belt driven machines are mostly applied for Printing rolls, Cylindrical rotors, Armatures, Motor rotors, Blowers, etc. Such machines also reduce loading and unloading time as the rotors do not have to be coupled with the universal shaft. The balancing speed achieved is a function of the ratio between the rotor diameter under the belt and the driving pulley diameter in this friction based transmission .



50 Kg Machine for Submersible Pump rotors



100 Kg Machine for Blowers



5 Kg Machine for Armature



100 Kg Machine for Fans



Belt Drive Arrangement



20 Kg Machine for AC Split Blowers

Technical Data on Belt Drive Machines										
Machine Model	HB 5	HB 10	HB 20	HB 50	HB 100	HB 300	HB 650	HB 1K	HB 3K	HB 5K
Weight Capacity KG	5	10	20	50	100	300	650	1000	3000	5000
Max Dia of Rotor	180	250	500	700	900	1150	1350	1500	2100	2500
Std. Bed Length - S	300	500	500	800	1100	1500	1500	1500	2000	2500
Std. Bed Length - M	500	1000	800	1000	1200	1500	2000	2000	2500	3000
Std. Bed Length - L		1500	1500	2000	2000	2500	2500	2500	3500	4500
Journal dia Range (mm)	3~20	5~25	8~50	10~80	12~80	15~120	15~120	15~120	25~180	25~180

Vertical Balancing Machines

These type of machines are ideally suited for mass production of disc shaped rotors like Fan blades, Impellers, Blowers, Pulleys, Flywheels, Clutch assemblies etc . Correction units like drilling/milling unit can be mounted on the machine for on machine removal of unbalanced masses . The clamping is easy, efficient and fast to assist high throughput. This is further assisted by dynamic braking control options to save further time. Great attention is paid to operator safety parameters and options like safety shields and interlocks. The angular disc provided on the machine spindle helps the operator to easily locate the unbalance angle, Electronic Remounting control is a standard feature of our software to minimize the remounting errors.



1 Kg Machine for Fans



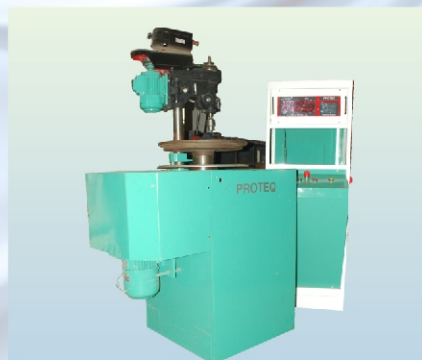
50 Kg Machine for Clutch Cover Assys.



10 Kg Machine with Drill Unit



100 Kg Machine for Brake Drums



70 Kg Machine with Drill Unit



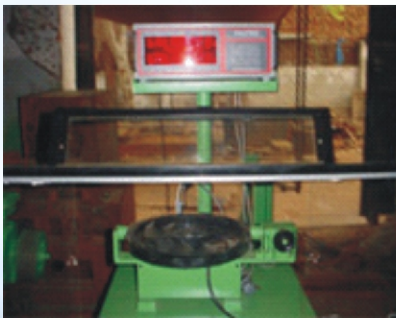
3 Kg Machine for Fans

Technical Data on Vertical Machines

	V1	V3	V10	V30	V50	V100	V300
Single Plane Machines	V1	V3	V10	V30	V50	V100	V300
Two Plane Machines	VT 1	VT 3	VT 10	VT 30	VT 50	VT 100	VT 300
Weight Capacity	1	3	10	30	50	100	300
Table Size - S	350	350	350	450	450	450	450
Table Size - M	400	400	400	500	500	500	500
Table Size - L	500	500	500	600	600	600	600

Special Purpose Balancing Machines

Self Drives: This type of drive is used for balancing of rotors with their own drive i.e. in assembled condition e.g. motor fan assembly, radiator fan assembly etc. The resultant benefit emerging from this arrangement is that the component is balanced at its operating speed and in actual operating conditions, thus achieving better balancing accuracy.



**Radiator Fan Assembly
Balancing Machine**



**Blower Assembly
Balancing Machine**



**Table Top Cooling Fan
Balancing Machine**

High Speed Balancing Machines: PROTEQ supply special purpose Balancing Machines for various applications which include high speed balancing applications including over speed testing of flexible rotors like Propeller Shafts, Drive Shafts etc. The rotor is first balanced at slow speed and then balanced at the operating speed and subsequently at higher speeds above the critical frequency of the rotor



**High Speed Balancing Machine
for Universal Shafts**



**High Speed Balancing Machine for
Propeller Shafts**



**High Speed Balancing Machine for
Drive Shafts**

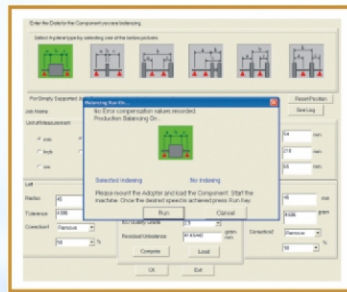
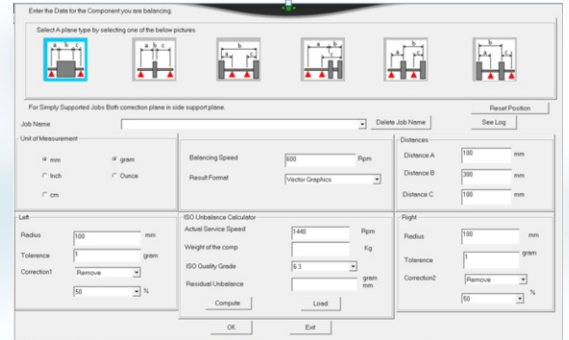
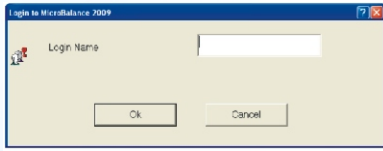
Balancing Instrumentation

The heart of all Proteq Dynamic Balancing Machines is the Microprocessor Based Electronic Measurement system.

BASE (BALANCING ASSIST SOFTWARE FOR ENGINEERS)

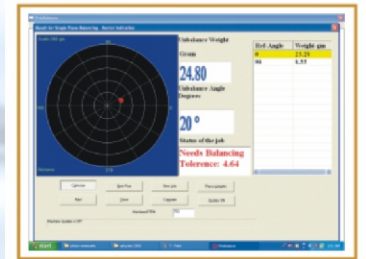
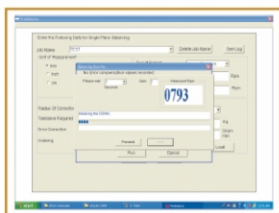
BASE is a windows based software and hardware package representing the state of the art in PC based dynamic balancing instrumentation technology. It runs on any standard PC or laptop without requiring any special configuration. The software is menu driven with simple data

entry. The operator simply needs to click OK with the mouse to start the measurement cycle automatically. It has a built in Calculator to set balancing tolerances in compliance with ISO 1940, thus



the operator need not manually calculate the residual unbalance tolerance required. The display of unbalance amount and location for each plane is available in Polar, Vector or Cartesian formats on the PC screen. Rotor data and test results are automatically saved and stored on the hard disc of the PC, the operator simply recalls the rotor data from the memory at the time of balancing. Log data can be

exported to Excel or Word format for further analysis. It is possible to select any geometrical configuration, feed data through keyboard, set tolerance levels, save and upload rotor history with data storage of more than 10000 rotors. The results are displayed in large and easy to read formats simultaneously in vector and polar modes. Printout facility for each balancing run is available on demand.



MABI (MICROPROCESSOR ASSISTED BALANCING INSTRUMENTATION)

MABI is a fully digital microprocessor based system with the facility of direct data input from the front panels and direct display of the status and balancing results on its high illumination, high readability 7 segment digital LED displays. Using a true digital system developed by the company, the entire signal processing is done digitally using high speed ADCs and latest VLSI technology. The Microprocessor Assisted Balancing Instrumentation MABI electronics is designed to ensure a high degree of reliability coupled with the use of switched capacitance filters for precision. The entire system has no moving parts which could cause a fatigue failure, thus enhancing hardware reliability. A versatile system software makes balancing extremely simple for the operator. The printer can also be interfaced with Electronic Unit to get Hard copy print outs of balancing results.

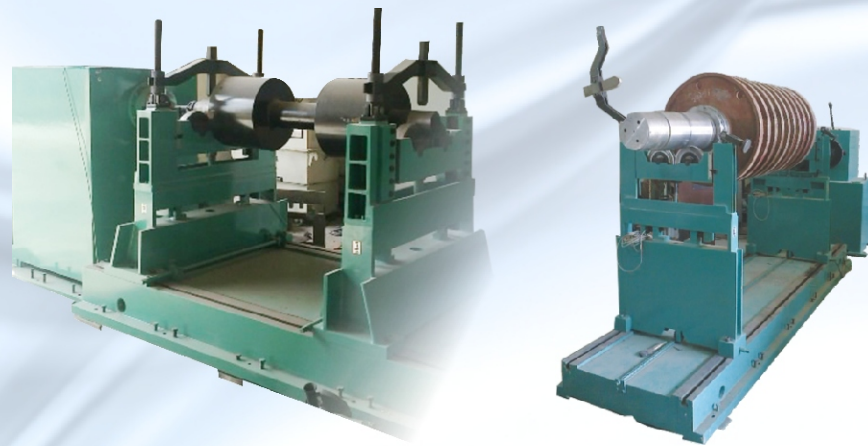
Efficient fault diagnostics are available to provide instantaneous display of errors for prompt rectification. Some special facilities such as display of rotor RPM prior to display of unbalance values and no suppression of unbalance or zero error problems allow even untrained and unskilled operators to use the machine with minimal exposure. If a rotor is balanced within user-specified tolerance levels the machine displays "BALANCED" to indicate to the operator that no further correction is required. Special software routines for automatic compensation of adapter eccentricity and remount errors come as standard facility.





PROTEQ

Microprocessor Based Dynamic
Balancing Machines



Manufactured by Productive Technologies Pvt Ltd.

Head Office :

C - 56 , Jhandewalan Flatted Factories Complex,
New Delhi - 110055

Tel No : 011 - 23636708 / Fax no: 011 - 23636824

Works : Unit - II , Plot No 742 D ,

Pace City - II, Sector - 37 ,

Gurgaon - 122001 Haryana

Tel No : 0124 - 4705400 - 06 / Fax No : 0124 - 4705401

E-mail : info@productivetechnologies.co.in

Website : www.productivetechnologies.co.in

Also at
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Effective solution for all your balancing problems