

## Dynamometers & Test Benches To test...

### ◆ MOTORS

- \* AC Motors
- \* DC Motors
- \* Pneumatic Motors
- \* Hydraulic Motors
- \* BLDC Motors



### ◆ ENGINES

- \* Petrol Engines
- \* Diesel Engine
- \* Gasoline Engines
- \* Kerosene Engine



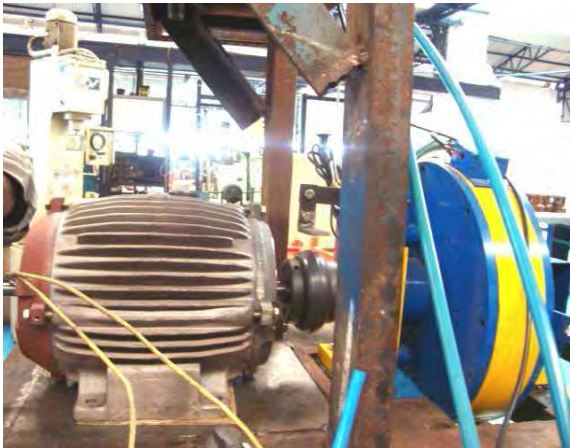
### ◆ GEARBOXES

- \* Automotive Gears & Gear Boxes
- \* Industrial Gears & Gear boxes
- \* Gear Transmissions



### ◆ SHAFT & AXLES





**Dynamometers employed to test Motors are:**

♦ **Eddy Current dynamometers:**

**Water Cooled** - in wide Torque rating range from tiny 1 Nm to massive 5000 Nm. In self cooled & Water/coolant cooled version depends on Power rating. Speeds upto 30000 RPM.

Eddy current dynamometer, A simple dynamic load system for accurate testing of all type of Electric Motors, Air Motors, Hydraulic Motors, Engines and other rotating machinery's. It provides the ideal solution for accurate analysis of Power, Torque, Speed, Fuel and Lubrication consumption and quick pass / fail testing of all type of Electric Motors, Engines, Gears and other Rotating Machineries.



**AC INDUCTION MOTOR TESTING**

Eddy current dynamometer absorbs power & measures Torque and Speed characteristics with a unique braking system, which provides frictionless Torque loading (0% to 100%) constant / variable torque load, independent of shaft speed. Torque is transmitted by a magnetic field without friction or wear. It eliminates mechanical contact and shock loading to the prime mover, providing longer life. In Eddy Current Dynamometers torque increases as the speed increases, reaching peak torque at rated speed. EC dynamometers have low inertia as a result of small rotor diameter and a low residual torque of 1%.



**PNEUMATIC MOTOR TEST**

Cooling is provided by a water circulation system, which passes inside the stator to dissipate heat generated by the braking power. The water cooling in the EC Dynamometer provides high continuous power ratings & has typical accuracy ratings of  $\pm 0.3\%$  to  $\pm 0.5\%$  full scale, depending on size and system configuration and a very long lifetime. Mounting orientation of Eddy Current Dynamometers is in any direction, Horizontal, Vertical or inclined.



**SUBMERSIBLE MOTOR TESTING**

♦ **EDDY CURRENT RETARDER Type DYNAMOMETER** Torque range 5 Nm (0.5 KgM) to 3000 Nm (300) KgM Torque range, in self cooled & fan Cooled version, to avoid Water cooling hassles.

Eddy Current Brake Retarder to apply non friction brake to reduce Speed from full speed to lower speed in controlled fashion.

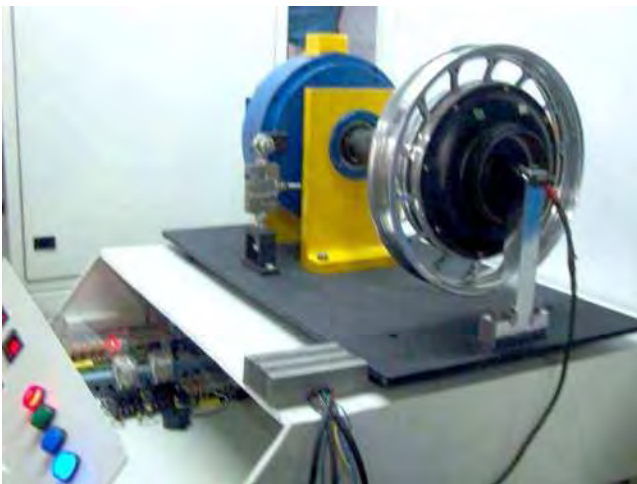
**25 watts PMDC Motor Testing**



Eddy Current Retarder Brakes are designed to apply non contact friction less braking, for re-tarding Vehicle, machine speed from full speeds (upto 30000 RPM) to minimum speed of 300 RPM in sudden or decelerated manner.

◆ **Powder Dynamometers:**

as their name suggests, contain magnetic powder in Dynamometer. The electrical current passing through the coil generates a magnetic field, which changes the property of the powder from free flowing condition at no excitation, to solid rock condition at full excitation. Thus producing a smooth braking torque through friction between rotor and stator – proportional to excitation.



**BLDC Hub Motor Testing**

The Powder Dynamometers produces their rated torque at *zero speed*. Unit under test can be loaded at standstill to determine the starting torque. Powder Dynamometer achieves at low control power, a high torque being independent from the slip speed.

Powder Dynamometers are ideal for applications operating in the low to mid speed range and mid to high torque range up to 200 KgM, 1965 Nm of torque.

For higher heat dissipation Powder dynamometers are provided with water circulation system for cooling, which passes inside the stator to dissipate heat generated by the braking power with power ratings up to 60 kW. They have system accuracy ratings of typically  $\pm 0.5\%$  full scale, depending on Dynamometer size and system configuration

By changing the exciting power force, the torque to be transmitted can be adjusted infinitely variable in the range 1:50. Powder dynamometers are typically limited to lower RPM due to heat dissipation issues.



**AC Induction Motor testing Dynamometer**



◆ **Tandem Dynamometers**, also called as Hybrid Dynamometer, is combination of Powder Dynamometer & Eddy Current Dynamometer

Tandem Dynamometers are used for testing prime mover right from **Zero RPM** to extended speed range.

In Eddy Current Dynamometers rated torque is developed at approximately 15% to 25% of maximum speed capability depending on models.

Advantage of Powder Dynamometer is that it controls Torque right from Zero RPM but has poor heat dissipation capacity (due to higher speed), whereas Eddy Current Dynamometer operating range is 300 RPM onwards to 18000 /30000RPM, but below 300 RPM it doesn't produce rated braking torque.

Hence, to apply Torque loading from Zero RPM to full speed - Tandem Dynamometer – at lower speed Powder Dynamometer is in operation, whereas at higher speeds Eddy Current Dynamometer are in use. Powder Dynamometer & Eddy Current Dynamometer are constructed in line, has one output shaft, to be coupled to unit under test. Electronic dual channel Controller switches Excitation Voltage from Powder Dynamometer to EC Dynamometer & vice a versa at preset transfer speed, for bump less, jerk free Torque loading

The unique features of each type of dynamometer are utilized allowing for broad torque and speed range capabilities. A judicious selection and sizing of units provide a combination with extended speed and power ranges as needed for load testing of hydraulic motors, servo motors, AC & DC motors, AC & DC Electronic Drives and so on.

Tandem Dynamometers are offered with basic controls of Torque & Speed by Manual Controller as well with PC based, computerized controls for data acquisition & post test analysis in graphical & tabled reports, useful for monitoring Performance & Endurance data of Tests performed, in R&D, Engineering & Production departments.





Our Proprietary APPSYS MOTOR TEST software developed for motor test to monitor & display Motor Input Power, Output Power, Efficiency, Input Voltage, Motor No Load Current, Full Load Current, No Load & Full Load Speed, No Load & Full Load Torque, Power factor, Motor temperature, bearing temperature, winding temperature.

PC based Motor test set up, Window XP /Win7 operating systems, PC hardware, Core 2 Duo PC with built in RAM & PCI Card with necessary Digital & Analogue inputs & outputs, Power analyzer,

Input Power (*Motor Power Sensor to sense Motor Power -To monitor Motor electrical Input Power & for Calculation of efficiency*) & Output Power, Speed, Torque, Efficiency are displayed on Monitor & stored in table & graphs in MS Excel format.

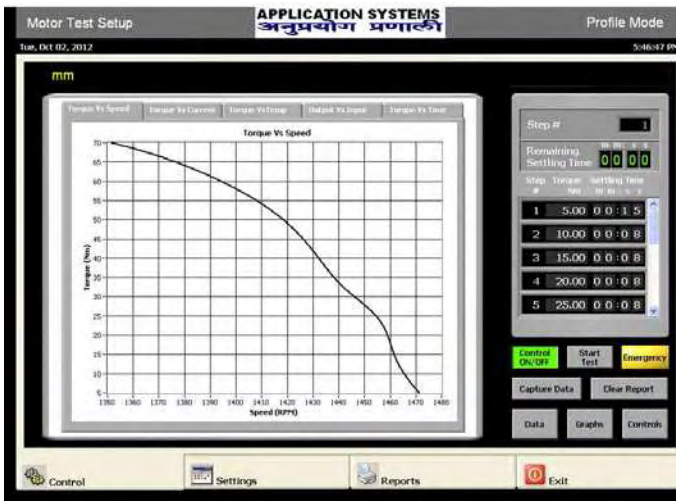
PC Auto & PC Manual mode selector Soft push button switch on Monitor screen. In PC Auto mode, Data is captured on predetermined (Site settable) time & Torque Loading in 100 steps (independently settable), whereas in PC Manual mode – Data is captured manually by pressing data capture soft button on screen. Captured data is exported to MS Excel in Table forms & in Graphs form to show Torque-Speed characteristics, Torque-Current and Speed-Current, Efficiency characteristics, Torque-Speed Oscillations at steady state Torque at different temperatures, Temp measurements etc. & custom characteristics required by clients.

The whole motor testing system consists of electrical and mechanical major sections. The electrical equipment includes different types of electric transducers, Torque Indicator, Speed Indicator, PC Hardware, Monitor, Data interface cards, switches, buttons, indication lights, Temperature Indicators, relays and a cabinet. Mechanical section includes the Test Bed / Bench fabricated out of Aluminum section / MC Channels, support plate, coupling / Cardan shaft, torque transducer, gearbox, clamping device and Dynamometer

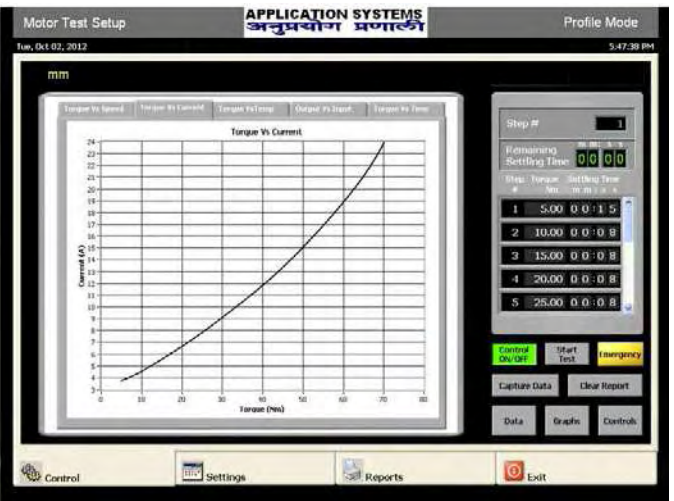




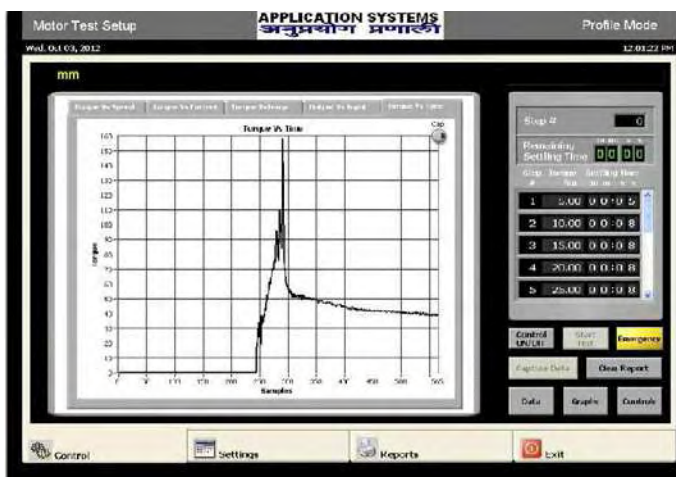
Screen Shots- Motor Test with Computerized Control panel.



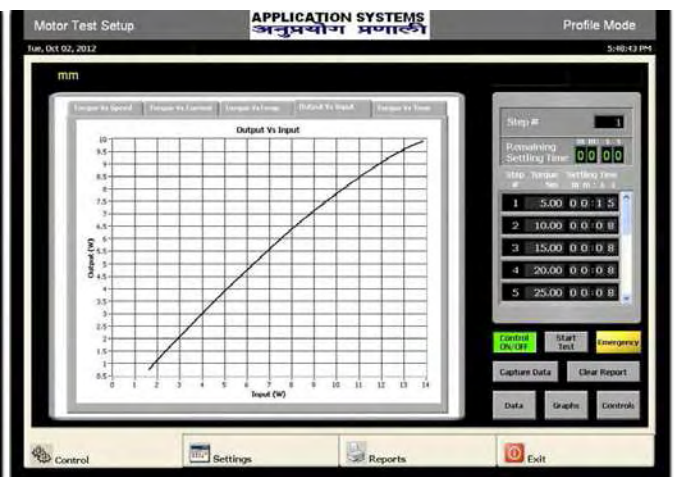
Motor Torque – Speed Curve



Motor Torque – Current Curve

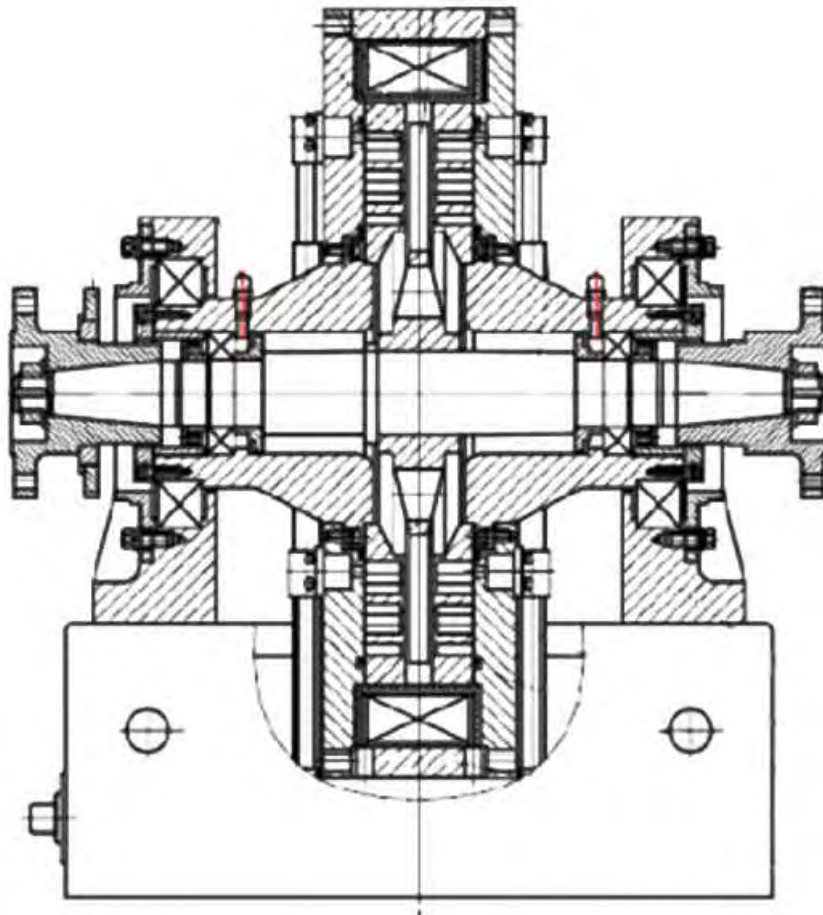


Motor Torque V/s Time Curve



Efficiency – Input V/s Output Curve

Model	Max Absorbed Power		Max Braking Torque	Constant Torque Nm - rpm Range	Constant Power KW - rpm Range	Moment of Inertia	Water Flow
	KW	HP	Nm	RPM	RPM	KgM <sup>2</sup>	Ltr/Hr
WED-0055S	0.64	0.85	1	1500 -6100	14000	0.0001	25
WED-03S	3	4	5	1500-5730	14000	0.0004	110
WED-05S	5.5	7.5	10	1500-5252	14000	0.0006	200
WED-11S	11	15	21	1500-5000	13000	0.0028	400
WED-15S	15	20	40	1500-4665	12000	0.0055	600
WED-22S	22	30	50	1400-4201	12000	0.0055	800
WED-38S	38	50	90	1400-4031	11000	0.018	1400
WED-55S	55	75	125	1250-4201	11000	0.036	2000
WED-75S	75	100	175	1200-4092	10000	0.044	3000
WED-150S	150	200	425	1160-3370	9000	0.16	5000
WED-188S	187	250	590	1150 -3026	8000	0.41	6500
WED-220S	220	300	750	900- 2801	8000	0.54	7200
WED-300S	300	400	1200	875 -2387	6000	0.63	10000
WED-373S	375	500	1780	810 - 2000	6000	0.95	12500
WED-450S	450	600	2820	740 -1562	5500	3.28	15000
WED-670S	650	900	4000	650-1590	4200	9.90	21000
WED-750S	750	1000	5000	620-1432	4000	15.86	24000



## APPLICATION SYSTEMS

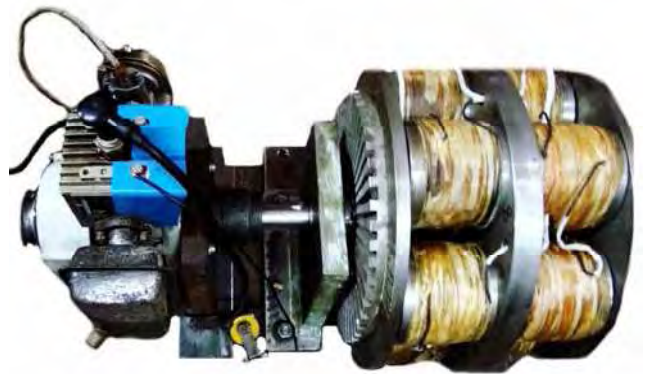


Engine Dynamometers for Performance & Endurance tests on Petrol Engines, Diesel Engines, Gasoline Engines, Kerosene Engines. Eddy Current Dynamometers to test Engines are manufactured up to 900 KW, up to 4500 Nm Torque capacity & 20000 RPM.

The PC-based control system with our proprietary Engine Testing software, facilitates Engine testing under various conditions of loads to evaluate their performance. The instantaneous values of all performance-related parameters such as speed, torque, engine power, Temperature & pressure values are displayed on the PC, and the test results are presented in tabular and graphical forms



Engine Dynamometer for Performance & Endurance tests on small portable Engines & Agricultural Diesel & Kerosene Engine.



Dynamometers for Industrial & Automotive Gear boxes & Transmissions Testing. Torque sensors are applied on transmission test system for measuring input and output torque and speed in order to translate the above factors as the mechanical efficiency. Power, Torque, Speed, Oil temperature, pressure and noise can displayed and save through computerised test procedure. Spread sheets and curves can be plotted through the test date.



All the Transmission Testing / Gearbox Testing Systems are structural flexible and well design. It can be easily upgraded. Through the basic settings, the real time and fully functional measurement system can be built.

- Gearbox no-loading test, ■ Gearbox loading test
- Gearbox efficiency test, ■ Gearbox noise test
- Gearbox over-loading test, etc

## APPLICATION SYSTEMS

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