

BENN - THE BETTER SOLUTION





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Introduction

We specialise in the design, development and manufacture of both AC & DC motors, generators, dynamometers, electrical machine trainers & other rotating electrical machines.

We are also engaged in the marketing of controls & accessories for electrical machines like regulated power supplies, transformers, AC-DC starters, R-L-C load banks, data acquisition system, etc. All our designs and developments are completely indigenous.

Our setup facilitates us to custom build products to our client's specifications, leading us to the forefront for import substitute products.

SPECIALISED IN CUSTOM BUILT & IMPORT SUBSITUTE PRODUCTS



Today, with nearly four decades of expertise in the industry, Benn is a well-established, trusted brand due to our quality and technical support. Thousands of Benn products are installed in numerous industries such as:

Manufacturing & Process Industries:

We manufacture standard DC motors for variable speed drives as well as the required control system used in the plastic, paper and textile industries, ferrous/non-ferrous rolling mills, etc. Electric Dynamometers for motor testing, Double Voltage Double Frequency (DVDF) alternators for transformer testing.

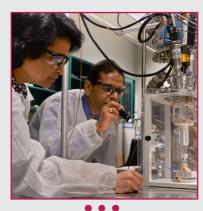
Material Handling Electric Vehicles:

Battery operated AC and DC motors for traction, lifting & steering duty; Installed in conveyors, stackers, pallet trucks, platform trucks, forklifts, mining/tunnel locos, etc.

Educational Institutes:

Electrical machine laboratory equipment for IITs, polytechnics, engineering colleges, ITIs. We have supplied equipment to more than 2000 institutes all over India, and exported 1000s of electrical machine trainer units.









The BENN group of companies is among the leading suppliers of electrical machines and controls for technical laboratories. Starting off with the Karnataka market in 1980's, the group has since spread its reach to states such as Maharashtra, Tamil Nadu, Orissa, Gujarat, Chhattisgarh, Assam, Kerala, Rajasthan, Telangana, Andhra & Madya Pradesh through a well-established dealer network.

Amusement Industry:

AC and DC motors for dashing cars, baby trains, merry go rounds,

Fitness Industry:

DC drive motors for treadmills.

Power Houses:

DC motors installed as stand-by for hydraulic power packs feed water pump motors in power generating stations.

Electric Vehicle Industry:

DC & AC motors for electric vehicles such as golf carts, buggies (all types) and wheelchairs.

Why Benn Machines?

- A trusted brand
- Highly efficient designs with excellent operating characteristics
- Custom built lab equipment capability
- Dynamically balanced machines eliminating the need for rigid foundations
- Low operating sounds
- Insulated terminals for educational products
- Attractive look & simplistic presentation of control panels
- Comprehensive & user friendly product manuals
- Experienced personnel for pre & post-sale technical support
- Conforming to IS, IEC Standards





QUALITY CONTROL

By Professionals **For Professionals**



- > The use of high permeability rolled steel for main frame (yoke) of solid yoke DC machines & high permeability lamination steel for laminated yoke DC
- > Provision of interpoles for DC motors greater than 1 > Provision of terminal plate with colour-coded HP for good commutation.
- > The use of high quality punched laminations for the main and interpoles.
- > Rotors designed using low loss silicon steel laminations.
- > The use of high quality cast iron for the frames of AC machines.
- > Commutators manufactured from hard drawn electrolytic copper segments - insulated with mica between segments, and between segments and earth.
- Moulded sliprings made using bronze rings.
- > The use of enameled copper conductors for all
- Armature, main field and interpole windings are impregnated with high dielectric strength

- thermosetting varnish and are cured to render them immune from moisture, acids, alkalis and oils.
- Additional moisture protection varnish applied.
- All rotors are dynamically balanced.
- terminals & labels (for educational laboratory machines) & terminal boxes (for industrial machines).
- Quality checks at every stage of the manufacturing
- ➤ All machines are tested rigorously before dispatch to monitor their performance in accordance with IS/ IEC standards.

DC MOTORS FOR THE PROCESS INDUSTRY SOLID YOKE DC MOTORS

We manufacture both solid yoke & laminated yoke DC motors having applications in the process industry

SELF FAN COOLED DC MOTORS



Self fan cooled motors have an internal cooling fan affixed on the motor shaft. Considering the speed rotation has a bearing on the effectiveness of the cooling, it is not recommended to run these motors below 80% of their rated speed for extended periods.

Output Range	0.18 kW to 75 kW	
Frame Size	80 to 280	
Voltage	12 to 500 V (dependent on client's requirements)	
Protection	IP 21 / IP 22	
Mounting	B3 / B5 / B14 / B35 / B34 / V1	
Cooling	IC 01	
Excitation	Shunt / Series / Compound	





FORCE COOLED DC MOTORS



Motors used for variable speed drives normally run in the speed range of 1:20 (by armature control) & are therefore cooled by a separate unit mounted on the motor. Typically, this unit consists of fan (blower), driven by a single or three phase AC motor which runs at a constant speed thus delivering a constant rate of cooling irrespective of the speed of the main DC motor.

Output Range	0.18 kW to 110 kW		
Cooling	IC 06		

TOTALLY ENCLOSED DC MOTORS



Totally enclosed motors are recommended for installation in dusty and highly humid environments. These enclosures eliminate direct contact between the internal air (within the motor) and the external atmosphere, thus providing protection. Totally enclosed motors with several cooling arrangements are manufactured by us.

Output Range	0.2 to 55 kW	
Enclosure	IP 54	
Cooling	Totally Enclosed Natural Cooled (TENC) - IC 410	
	Totally Enclosed Fan Cooled (TEFC) – IC 411	
	Totally Enclosed Force Surface Cooled - IC 416	

Benn Electricals

SOLID YOKE DC MOTORS

GEARED DC MOTORS



DC motors with worm reduction or inline helical gear boxes directly mounted on the motor flange.

Output Range	0.2 to 75 kW
Cooling	IC 06

BRAKE MOTORS



DC motors with an electromagnetic fail safe brake mounted on motor shaft at the non-drive end to instantaneously stop the motor when the supply is cut off.

Output Range	0.2 to 75 kW	
Brake Supply Voltage (DC)	24 to 190 V	
Cooling	IC 06	

LAMINATED YOKE DC MOTORS

As the name suggests, the entire body (yoke) of the motor is constructed using sheets of laminations interlocked together. These motors are compact in design, with a high power to weight ratio. They commutate well under high ripple armature currents from thyristor drives while possessing a good dynamic response.





Output Range	3.7 to 55 kW		
Frame Size	112 / 132 / 160		
Voltage	180 to 500 V (dependent on the power rating)		
Protection	IP 21 / IP 22 / IP 44 / IP 54		
Mounting	B3 / B14 / B34 / V1		
Cooling	IC 06 / IC 0041		

DC MOTORS FOR ELECTRIC VEHICLES

For several decades Benn has been one of the leading suppliers for motors used in material handling equipment. With applications in forklifts, stackers, platform trucks, tunnel & mining locos, a wide collection of low voltage motors have been designed & engineered to user specifications.

Output Range	0.18 to 55 kW		
Protection	IP 21 / IP 22 / IP 44 / IP 54 / IP 55		
Cooling	IC 01 / IC 02		
Excitation	Series / Compound		
Voltage	12 to 220 V (depending on customer specs)		
Mounting	B3 / B5 / B14 / B34 / B35 / V1		
Duty	S1 / S2 / S3 / S8		
Excitation (for traction motors)	Series / Sepex.		

MATERIAL HANDLING





















AMUSEMENT









AC MOTORS FOR ELECTRIC VEHICLES

The battery powered electric vehicle industry has seen a huge shift from DC to AC. AC motors offer an economical solution without tradeoffs in performance. With the advancement in power electronics technology, state of the art controllers have been developed to extract the most out of AC motors. With lower initial costs & fewer maintenance hassles, AC motors offer an economical advantage in addition to the performance.

With our expertise in the field of DC motors for electric vehicles & investment into R&D of AC motors, we have developed a range of AC motors to substitute DC motors in existing battery powered electric vehicles. Our technical know-how in this field has set us up perfectly to cater to OEMs. With an enthusiastic team that relishes problem solving, we are well-equipped & ever keen to take on new projects.

Output Range	0.8 to 55 kW			
Protection	IP 21 / IP 22 / IP 44 / IP 54 / IP 55			
Cooling	IC 01 / IC 02 / IC 410 / IC 411			
Battery Voltage (DC)	24 to 80 V			
Motor Supply Voltage (3-phase AC)	16 to 54 V			
Mounting	B3 / B5 / B14 / B34 / B35 / V1			
Duty	S1 / S2 / S3			
Thermistor	✓			
Hall Sensor	✓			
Electromagnetic Brake	✓			



AC/DC MACHINES FOR TECHNICAL INSTITUTES

The BENN group of companies is among the leading suppliers of electrical machines and controls for technical laboratories. Starting off with the Karnataka market in 1980's, the group has since spread its reach to states such as Maharashtra, Tamil Nadu, Orissa, Gujarat, Chhattisgarh, Assam, Kerala, Rajasthan, Telangana, Andhra & Madya Pradesh through a well-established dealer network.

We supply laboratory machines within certain power ranges which were identified after closely analyzing the market requirements.

Ratings -

Motors: 0.5 HP to 7.5 HP Generators: 300 W to 5.0 kW Alternators: 300 VA to 7.5 kVA

AC/ DC MOTORS & GENERATORS









MOTORS

DC motors (shunt/series/compound) 3-phase AC slipring induction motors (wound rotor)

3-phase AC squirrel cage induction motors (with pole changing capability i.e. dual speed)

Single-phase AC squirrel cage induction motors (CSCR/CSIR/split-phase/CR)

3-phase AC synchronous motors (self-starting) Universal motor/AC series motors (up to 1.0 HP) Repulsion motors (up to 1.0 HP)

Switched reluctance motors (up to 1.0 HP)

GENERATORS

DC generators (shunt/series/compound) 3-phase synchronous salient-pole alternators A) Rotor wound / stator excited - 0.5 to 7.5 kVA B) Stator wound / rotor excited- 10.0 to 25.0 kVA 3-phase synchronous cylindrical-rotor alternators -Stator wound / rotor excited - 0.5 To 5 kVA Single-phase cylindrical/salient-pole alternators-

Rotor wound / stator excited - 0.5 to 3 kVA



AC/DC MACHINES FOR TECHNICAL INSTITUTES

AC/DC MOTORS WITH LOADING ARRANGEMENT

Any of the individual motors can be provided with a mechanical loading arrangement. The arrangement comprises an aluminum drum mounted on the motor shaft, friction belt, torque measuring scales and the necessary frame work required for torque measurement.

Type of scales provided for torque measurement:

- Linear- for motors rated up to 1 HP
- 6" round dials scales- for motors rated beyond 1 HP

DC Motors can also be provided with a flywheel for MI test. Benn also provides an option for elevated mounting bases with anti-vibration pads, thus eliminating the need for rigid foundations.







CUT SECTION MOTORS

Benn manufactures both working or non-working cut sections of any of the above motors (up to 1 HP), enabling a study of the internal structure of the machine. We also provide working cut-section models of motors with break loading arrangement up to 3 HP.







AC/DC MACHINES FOR TECHNICAL INSTITUTES

MOTOR-GENERATOR SETS

Any of the motors can be used as prime movers coupled with a swinging field type electrical dynamometer. The arrangement includes a torque measuring dial scale or sensor to compute the instantaneous power. Alternatively, any of the motors can be provided with a double side shaft extension to be used as prime mover; coupled at one end with a generator & mechanical loading arrangement at the other or, any of the AC or DC motors can be used as prime movers coupled to any of the AC or DC generators. Typical arrangements include -

- Identical DC shunt/compound machine set for Hopkinson's test
- Identical DC series machine set for Field's test
- DC-AC motor set to run the AC motor as an induction generator
- Complete machine set for Ward Leonard DC motor speed control.
- 4-pole slip ring induction motor coupled with 2-pole squirrel cage induction motor for cascaded control









Note: Load cell(s) can be provided with a dynamometer arrangement to aid extraction of operating characteristics.



CONTROLS FOR EDUCATIONAL INSTITUTES

At Benn, we are committed to providing complete hassle free solutions from an electrical standpoint for the setup of electrical labs. Laboratory wiring excluded, we provide every single component right from the power supply to meters and rheostats required for performing all electrical experiments as per the educations curriculums.

DC POWER SUPPLY UNIT & DISTRIBUTION PANEL





We offer the two most essential electrical installations required for the setup of an electrical lab i.e. DC power supplies & distribution panels. The power supplies are available either with or without an isolation transformer. The AC/DC distribution panel is provided with multistep MCB control to distribute AC & DC power to individual points or specific panels in the laboratory. An option of either AC or DC feeders instead of both is available with the distribution box.

POWER SUPPLIES		
Isolation Transformer	✓	0
Thyristor Controlled	✓	✓
Voltage Feedback	✓	✓
Voltage Regulation	> 2%	> 2.5%
Input	3 phase / 415 V / 50 Hz / 3 wire AC	3 phase / 415 V / 50 Hz / 3 wire AC
Output Capacity	30 to 200 A at 220 V	15 & 20 A at 220 V
Application	Common power supply for entire lab	Individual power supply for machine set

EXPERIMENT CONTROL PANELS & ACCESSORIES

Through our years of experience in the electrical engineering field, Benn has developed a massive range of panels that cover every experiment found in any electrical engineering syllabus. We are always open to designing panels that do not fall under the regular syllabi, with the design knowhow and enthusiasm possessed by us, you can be sure that you will be able to perform any experiment you please.







The panels are constructed with sheet metal, possessing a polycarbonate facia front. All meters pertaining to the experiment are mounted on the panel or can provided as external meters.

We provide all accessories required to perform the experiments -



DC Starter

• DC Starters: 2, 3 & 4 point.



Resistive Load

- Resistive & capacitive load banks: Single or 3 phase / 5 A to 25 A (controlled in multi-steps).
- Lamp load banks: Single or 3 phase / up to 20 A (controlled in multi-steps).
- Continuous variable inductive load: Single or 3 phase / up to 20 A.





EXPERIMENT CONTROL PANELS & ACCESSORIES

• Transformers: Single or 3 phase, untapped/tapped, provided in a sheet metal enclosure with educational type terminals for easy connection.



Transformer

Autotransformers (Variacs): Single or Three Phase in a sheet metal enclosure.



Autotransformer

• Excitation units: Static or separate excitation units for alternators & DC generators.

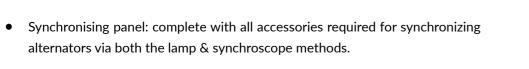


Excitation Unit

• Starter cum excitation unit for synchronous motors.

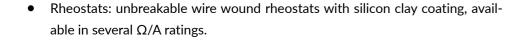


Motor Starter





Synchronising





Rotor Resistance

Starter

• AC motor starters: Direct-on-line (DOL), star-delta starters.



- Auto transformer starters for AC Motors.
- RPM & Torque Sensors: with digital indicator.
- Tachometers: digital/analog, contact/non-contact type.
- Digital stroboscope.
- C.T.s, P.T.s, fixed inductors (chokes).



The '3-phase AC-DC Power Analyzer' is a stand-alone digital electronic device specifically designed to acquire data while performing experiments in a laboratory environment. With its multi-functionality, it is the ideal device for motor testing, research labs & engineering college laboratories .

It has been designed with 3 channels each for AC & DC voltages & currents, a channel for torque measurement & one for RPM measurement using relative sensing elements such as proximity sensors & a load cell. The design parameters enable the measurement of -

AC	DC	Other
Voltages (3)	Voltages (3)	Torque
Currents (3)	Currents (3)	RPM
Active Power	Power	Percentage Slip
Apparent Power		Motor's Output power
Reactive Power		Efficiency (motor)
Power Factor		Efficiency (generator/alternator)
Frequency		Efficiency (motor-generator set)



TECHNICAL SPECIFICATIONS

Modes of operation -

- DC-DC 1.
- 2. DC-AC
- 3. AC-DC

Parameter	Range	Accuracy on FSD
AC Voltage	600V	± 0.2%
AC Current	25Amp	± 0.2%
Frequency	45Hz - 65Hz	± 0.1%
DC Voltage	600V	± 0.5%
DC Current	25Amp	± 0.5%

KEY FEATURES

- USB and RS-232 serial interface
- 20*4 jumbo LCD with blue-white alpha numeric display
- Specific software, offering
 - Real time data monitoring
 - b. Data export to excel for report compilation & graph plotting
- Tamper-proof calibration
- Double fuse protection
- Option for 2-in-1 rack mount or table top model
- 200 MB internal storage capacity
- Rust free aluminum enclosure
- Indigenous product (Made in India)



MACHINE & TRANSFORMER TESTING

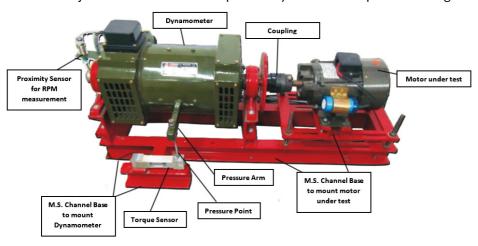
We provide electrical machine and transformer manufacturers with some vital equipment required for testing as per the industrial standards.

DC & AC MACHINE TESTING

We manufacture both DC & AC Dynamometers for the testing of electric machines. Our DC Dynamometers can be operated in both motoring and generating modes.

A typical arrangement comprises of our dynamometer mounted on a base plate using trunnion bearing pedestals. Two pressures arms, one on either side of the dynamometer, are used to measure the torque with the aid of analog measuring scales or load cell(s) for digital indication.

The Dynamometer in conjunction with the data acquisition system enables precise testing and recording of data.



Output Range

0.18 to 100 kW (at a base speed of 1500 RPM)

Note: The above image is purely for representational purposes. Supply of the dynamometer will be as per what has been quoted for only (A typical quote generally does not include additional risers for mounting motors of various standard frames, unless specifically mentioned in the same).

DOUBLE VOLTAGE DOUBLE FREQUENCY (DVDF) ALTERNATOR

We manufacture DVDF Alternators which are vital for testing a transformer's capability to withstand high-voltage surges that may be experienced during lightening surges and faults.

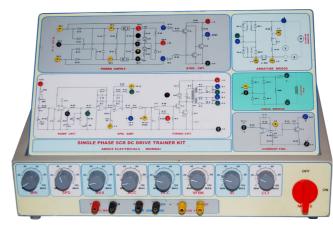


Output Range	5 to 75 kVA
Protection	IP 22 / IP 23
Cooling	IC 01
Input	3 phase / 415 V / 50 Hz
Output	3 phase / 1000 V / 100 Hz
Duty	S2 / 30 - 60 min. / 50% C.D.F.

SPECIAL CONTROL PANELS AND MACHINES

EDUCATION & RESEARCH

At Benn, we continually think outside the box to provide students with additional knowledge related to their curriculum. In view of the same, we have developed some special machines and panels.







Basic Electrical Theorems & SCR Control Trainer.

Winding study for single & three phase AC motors.

INDUSTRY

We thrive on developing motors with unique specifications, this had led us to the development of several non-standard machines.



Motor for Interdrill





Negative Centre Mounting Motor



Monoblock MG Set (DC motor on either side of an AC motor)



ELECTRICAL MACHINE TRAINERS

Benn has developed a variety of machine trainers aimed at covering a massive range of experiments with relatively few machines.

DRONACHARYA SPLIT



The Dronacharya Split is provided with specially designed machines of nominal ratings (300 - 350 Watt) and a control panel containing power supplies, drives, loading arrangements, electronic and digital instruments.

Unit 1

Comprising a DC integrated machine coupled with a three-phase synchronous motor (capable of running as an alternator or auto-synchronous motor).

Unit 2

Comprising a three-phase slipring induction motor complete with a mechanical loading arrangement.

Unit 3

Comprising a three-phase, two speed squirrel cage induction motor complete with a mechanical loading arrangement.

Comprising a single-phase squirrel cage induction motor complete with a mechanical loading arrangement. This motor can operate in Capacitor Start Capacitor Run (CSCR), Capacitive Start Induction Run (CSIR) and Split-Phase modes.

Comprising a universal motor complete with a mechanical loading arrangement.

Comprising a repulsion motor complete with a mechanical loading arrangement.

ELECTRICAL MACHINE TRAINERS

Control Panel

The control panel is constructed using sturdy stainless steel sheets with a polycarbonate facia front displaying diagrams. It consists of the following -



Digital DC Voltmeters - 3 nos. Digital AC Voltmeter

Three-phase / 1E AC Combimeter

Digital DC Ammeters - 3 nos.

Digital RPM indicator with sensor

Single-phase DC thyristor power supply - 3 nos. Single-phase resistive load bank

Three-phase resistive load bank

DOL cum Star-Delta Starter

DC Starter

Field Regulator

Fixed resistance for field diversion

Requisite indicators, switches, terminals, etc.

A three-phase autotransformer (variac) is supplied detached from the panel.

Salient Features

- Good aesthetics due to the polycarbonate facia with mimic diagrams.
- Easy & safe wiring through colour-coded, electrically insulated terminals.
- Dynamically balanced rotors with low vibrational levels.
- Acrylic viewing windows aiding the study of the internal structure of the machines.
- Capability to perform more than 45 experiments.
- Electrically well designed with adequate safety features.
- Performance conforming to IS/IEC standards.
- Comprehensive, user-friendly manual.

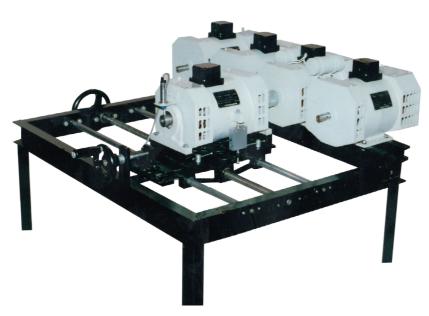
Note:

Individual control panels for each machine set can be provided to facilitate simultaneous performance of several experiments.

ELECTRICAL MACHINE TRAINERS

DRONACHARYA

Benn's Dronacharya is a unique trainer unit with several machines mounted on a single test bench. With a sound mechanical setup, coupling & decoupling machines is effortless. Choice of machines is purely down to customer requirements. A common arrangement would involve the following.



DC Integrated Motor	
3 Phase SLIM	
Single Phase SQIM	
Universal Motor	
Repulsion Motor	
Control panel with requisite accessories	



ELECTRICAL MACHINE TRAINERS

SEMI-DISSECTIBLE FLECTRICAL MACHINE (SDEM) TRAINER

The Semi-Dissectible Electrical Machine (SDEM) Trainer offers a comprehensive but economical solution to technical institutes. The kit comprises of integrated parts of various machines which are used to assemble, test & subsequently study several different machines. A control panel with the requisite measuring instruments is provided to aid performance of experiments.

This kit provides students with a first-hand experience in machine construction & design. It helps students familiarise themselves to essential components of a machine such as - commutator, brush-holder, carbonbrush, centrifugal switch, capacitor, stator, rotor, etc. The assembly & disassembly of motors coupled with their operation provides a holistic insight into these machines.



Salient Features

- Well labelled parts for simplicity
- Options for choice of parts to construct desired machines
- Practical experience with the assembly & disassembly of machines, offering a unique industrial feel.
- Aids in learning the importance of various parts of the machine.
- Straightforward direct loading facility for motors to achieve speed torque characteristics.
- Easy & safe wiring through colour-coded, electrically insulated terminals.
- Dynamically balanced rotors with low vibrational levels
- Performance conforming to IS/IEC standards.
- Comprehensive, user-friendly manual.
- Detailed videos on the testing procedures.



Companies and Institutes we have supplied to

EDUCATION

Benn Electricals

























INDUSTRY











































Benn Electricals is a company professionally managed by experienced technocrats. Since its inception in 1977, we have achieved a steady & substantial growth.

We are thankfull to Benn
Electricals for showcasing their
valuable guidance & providing
demonstration conducting
majority of experiments in
electrical machines lab

ARMIET, HOD Electrical Dept.

Professionalism & Overall Good experience. We are very much thankful to your team who had given us excellent technical support while our Engineers are at customers site and at our factory. Thank you very much.

Jagannath Gaikwad, ANSHUMAN Tech Pvt. Ltd

We appreciate your organization for supplying quality equipments to us & providing good techincal support

Mr. Thanga Raj, IIT Roorkee

We are proud to be associated with your esteem organization as "Benn Electricals" is truly a great name in the field of electrical machines, transformers, and motors.

Your quality products, professional and practical approach towards the business, helps us to satisfy our customers to get good business as it is backed up by your readiness for technical support always.

Mala Patel, Royal Electronics Sales & Services

Good product quality & exceptional technical support

Nandeesha Shetty, HYDAC India Pvt. Ltd.

We found product quality, professionalism and technical support satisfactory and we are happy with the products

Ventra Locomotives



THE BENN GROUP



BENN-THE BETTER SOLUTION

Benn Group of Companies

Benn Electricals Pvt. Ltd.

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