

POWER ELECTRONICS PROJECTS

© ECIL pioneering technologies

- **ECIL established a world class Power electronics Lab**

Open to the service of all DAE sectors & others

- **Electro Magnetic Forming Machines (EMM)**

Electromagnetic Forming (EMF) & Electromagnetic Welding (EMW)

- 20 KV, 500 Amps **pulsed power supplies** for BARC
- 110 KVA **Variable frequency Drives** for BARC
- 4MW **Pump Drives** for Fast Breeder Reactors

POWER ELECTRONICS LAB

Objectives:

To design, develop and manufacture special power electronics equipment required for Power sectors, DAE, DST and other government organizations and extending other services

Infrastructure :

- ✓ Design and Simulation Software for Electronics, Electrostatics, Fluid dynamics & reliability analysis
- ✓ Drafting and Documentation s/w
- ✓ Project management s/w
- ✓ Test & Measuring Instruments
- ✓ Power sources
- ✓ Dissipative and non dissipative loads

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Available Services & Facilities

- ❖ Design
- ❖ Development
- ❖ Manufacturing
- ❖ Simulation services for
 - Electronics , Electrostatics , Electrical circuits
 - Fluid dynamics & Heat sink designs
 - Reliability analysis

Facilities as service

- Drafting and Documentation s/w
- Project management s/w
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INVERTERS FOR INDUCTION HEATING

Application

Multi zone induction furnaces for vitrification of radioactive waste

Salient features

Output power:	Adjustable up to 50kW
Output voltage:	Adjustable up to 480V, single phase
Output frequency:	2-3kHz
Input:	3ph,415V,50Hz
Technology:	Half bridge series resonant converter with SCRs

Pulsed Power Supply for 9 KHz CVL



Specifications:

INPUT DC SUPPLY VOLTAGE	300 to 400VDC
SOURCE CURRENT	20A
OUTPUT VOLTAGE	-ve polarity pulsed output for gas discharge load
VOLTAGE MAGNITUDE	21KV nominal (it may vary from 15KV to 25KV based on conditions of discharge tube)
OUTPUT PEAK CURRENT	600A (500A at 16KV)
PULSE RISE TIME	80ns
PULSE WIDTH	200ns-300ns load dependent
PULSE REPETITION RATE	9KHz
Max. AVERAGE POWER TO LOAD	5.6KW
JITTER	± 20 ns
CIRCUIT TOPOLOGY	Capacitor discharge circuit followed by three stage magnetic pulse compression
TECHNOLOGY	IGBT based
COOLANT	Oil

Variable Frequency Drives to BARC, RMP, Mysore

ECIL supplied 110 KVA, DSP controlled VFDs to BARC, RMP, Mysore

110 kVA DSP Controlled PWM VFD



Specifications:

INPUT SUPPLY VOLTAGE	450V to 600V DC (550 V DC Nominal)
OUTPUT VOLTAGE	310V, 3 Phase AC at 1000 Hz
OUTPUT FREQUENCY	250 Hz to 1000 Hz (variable)
FREQUENCY STABILITY	0.01% of set value
OUTPUT RATING	110 kVA at 1000 Hz, 310 V
OUTPUT FILTER	Capacitors in delta configuration at the output secondary
PI CONTROLLER	DSP based controller with two loop cascaded control (voltage in outer loop and current in inner loop)
CONTROLLER STABILITY	1% of set voltage in voltage loop and 1% of current in current loop
VOLTAGE WAVEFORM	PWM pulses of 550V peak nominal and 600V peak Max. Fundamental frequency: 250 Hz to 1000 Hz Carrier Frequency: 3.75 kHz to 15 kHz
OUTPUT TRANSFORMER	Primary: 300 V Nominal, 212 A at 1000 Hz in DELTA configuration. Secondary: 300 V Nominal, 205 A at 1000 Hz in DELTA configuration.

Magnet Power supplies to RRCAT

Specifications:

- 300 Watts DC output
- Input: 230 V +/- 10%, 50 Hz, 1phase, Three wire (Line, Neural & Earth)
- Output Current stability: Better than +/- 100 ppm
- Cooling: Forced Air
- Output Current: 13 Amps
- Output Voltage:

Voltage (V)	Qty (Nos)
3	43
5	8
10	3
15	6
Total	60

Development of Variable Speed Drives under XII FYP

Brief Specifications:

INPUT

Power	3 Phase, 3 wire, 6.6 KV +10%, -15%, 30% transient dip for 0.5 sec, Voltage spikes of 3 pu (per unit) for 2 msec.
Frequency	50 Hz +3% -5%
Minimum allowable power factor	0.85
Maximum allowable inrush current	200% of rated current
Maximum allowable harmonics in input current	Individual 3%, THD 5%

OUTPUT

Power	4.0 MW
Voltage	0 to 3.15 KV L-L
Frequency	0 to 50 Hz
Connected Load	Squirrel cage Induction Motor (with Integral fly wheel)
Motor speed range	90 to 590 RPM
Allowable speed variation	± 1 rpm
Acceleration of Motor	0 to 15% of rated speed within 10 sec.

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