On the occasion, Shri. Aniruddha Kulkarni, Vice President and Head, CV Engineering, Tata Motors Ltd., said, "Tata Motors always pioneers new products through structured approach of technology creation and deployment by leveraging innovation and consistently driving towards energy efficient vehicles to reduce carbon footprint for environment sustainability. Incubation for SHIVAY would catalyse development of future technologies in vehicular level refrigeration system and cold chain transportation, which will be deployed across multiple platforms of Tata Motors commercial vehicle".

LN2 based refrigeration system - SHIVAY-V.

The incubation agreement was signed as per recently formulated policy and guidelines for DAE Incubation Centres. Shri S. V. Nakhe, Director, Laser Group and Materials Science Group, played a pivotal role in signing this agreement. It includes technology transfer of both SHIVAY and SHIVAY-V, and their subsequent development for Tata vehicles in three variants: small commercial vehicle (SCV), intermediate light commercial vehicle (ILCV) and medium and heavy commercial vehicle (MHCV). It may be noted that the lowest temperature for SHIVAY is -20 °C, while it is -70 °C for SHIVAY-V. The technology of SHIVAY and SHIVAY-V is developed by Cryomodule Development & Cryoengineering Application Section of Proton Accelerator Group.

The incubation agreement was signed through virtual meeting by Shri Debashis Das, Director, RRCAT and Shri Aniruddha Kulkarni, Vice President & Head, CV Engineering, Tata Motors Limited. The meeting was also attended by Shri S. V. Nakhe, Director, Laser Group and Materials Science Group, Shri Prashant Khare, Technology Developer and Dr. C. P. Paul, Convener, Incubation Centre RRCAT, while Shri Rajeev Dave, Head, Application Engineering, and other TML delegates attended from TML.

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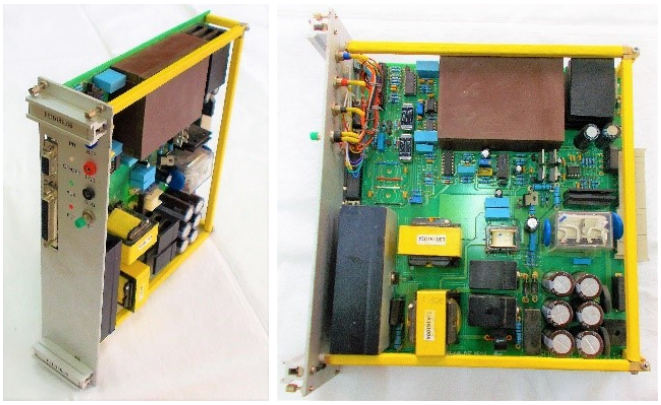
N.5: Technology transfer of high-stability, unipolar and bipolar power converters for electromagnets

Power converters for electromagnets is an important sub-system of particle accelerators. Power converter with very high stability of the output current are deployed in large numbers to energize electromagnets in an accelerator installation. Various types of power converters, namely, the dc or slow-ramped, fast-ramped, pulsed, unipolar, bipolar, etc., are used. Each type of power converter has different sets of specifications and challenges.

Most of the power converters being manufactured in the industry are voltage regulators, being used for common commercial applications. The technological know-how of the output-current-controlled power converters feeding high-stability current to the inductive load such as electromagnets is limited in the Indian industry.

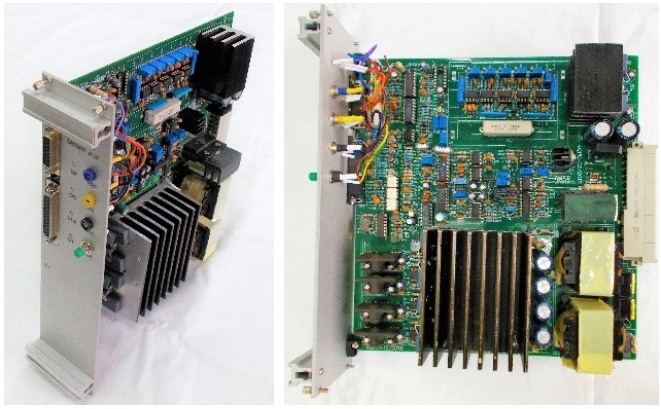
The output power rating of power converters for electromagnets may vary in a wide range from few watts to few 100s of kilowatts and further to megawatts. However, unipolar and bipolar power converters with relatively lower output power (few 100s of watt) are required in large numbers for applications such as corrector magnets as well as for various magnets in beam transport line of low-energy accelerators used for various research, industrial, medical and societal applications. For such applications, the power converters based on single printed circuit board (PCB) and using switch-mode power conversion schemes were developed, tested and deployed for various applications at RRCAT. Subsequently, the technologies of these unipolar and bipolar power converters were made available for transfer to the industry through TT&CD, BARC.



Photographs showing unipolar power converter on 6U printed circuit board.

The unipolar power converter is capable of delivering up to 50 V DC output voltage, 15 A DC output current, and 300 W output power ratings with minimum alterations. It operates using 230 V, 50 Hz AC mains.

The power converter is developed on a single 6U double-sided PCB, complete with power circuit, control electronics and interface electronics for its remote operation. Further, a controlled electro-mechanical switch is provided at the output that facilitates the output polarity reversal.



Photographs showing bipolar power converter on 6U printed circuit board. The on-board constant-temperature bath is removed to reveal the electronic circuit.

The bipolar power converter is capable of delivering up to ±50 V DC output voltage, ±15 A DC output current, and 600 W output power ratings with minimum alterations. It operates with 60 V max DC input source. The power converter is also developed on a single 6U four-layer PCB, complete with power circuit, control electronics and interface electronics for its remote operation. It is capable of being operated in both the polarities of output voltage and current, with smooth zero cross-over.

Both the converters are equipped with precision current sensor, electronics and on-board constant-temperature bath that provides output current stability within ±100 ppm of the full-scale current (for 8 hours after 1 hour of warm-up). Important signals are available on the front panel, facilitating in-situ diagnosis/monitoring of the operational status.

Since both types of power converters are based on single-board design, the manufacturing process is industry-friendly. Special manufacturing infrastructure / environment / processes are not required. Standard PCB production, assembly, coil winding and testing techniques are applicable. All components are normal through-hole component, and are readily available in Indian market.

The technology of unipolar power converter is transferred to M/s Electronics Corporation of India Limited, Hyderabad. Similarly, the technology of bipolar power converter is transferred to M/s Electronics Corporation of India Limited, Hyderabad and M/s Scientific Mes-Technik Private Limited, Indore.

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N.6: 29th DAE-BRNS National Laser Symposium (NLS-29)

The DAE-BRNS National Laser Symposium is held every year under the aegis of Board of Research in Nuclear Sciences (BRNS), Department of Atomic Energy (DAE). The symposium covers research and technological advances in areas of physics and technology of lasers; lasers in nuclear science and technology; laser materials, devices and components; nonlinear, quantum and atom optics; ultrafast lasers and applications; lasers in materials science; laser plasma interaction; lasers in industry and defense; laser spectroscopy and applications; lasers in chemistry, biology and medicine; laser and fiber based instrumentation; and electronics and instrumentation for lasers. The symposium is held every year at different locations in India so that the researchers and young students of different areas are exposed to modern and technological developments in lasers and related areas.

Photograph of inaugural ceremony of NLS-29 on February 12, 2021 at SVVV, Indore. From left to right: Shri Praveen Agrawal, Secretary, NLS-29, Prof. Uttam Shrama, Co-convener, NLS-29, Prof. U. Dhar, VC, SVVV, Indore, Shri S. V. Nakhe, Chairman, NLS-29, and President, ILA, Dr. S. R. Mishra, Convener, NLS-29, and Dr Nitu Kataria, Co-secretary, NLS-29.

The 29th DAE-BRNS National Laser Symposium (NLS-29) was conducted in online mode during February 12 to 15, 2021 due to prevailing pandemic COVID-19 situation world-wide. The NLS-29 was organized in online mode by Raja Ramanna Centre for Advanced Technology (RRCAT), Indore and Shri Vaishnav Vidyapeeth Vishwavidyalaya (SVVV), Indore (for details please check *www.ila.org/NLS-29*).The speakers and participants joined NLS-29 by online mode from their respective work/native place via internet facility, without any physical gathering of people at any place. The scientific program of NLS-29 consisted of 36 invited talks by leading experts, 15 theses presentations by Ph. D. scholars and 146 contributory research papers. Among invited speakers, 17 were from foreign and 19 were from India. The keynote address on "Photonics Gone Rogue" was delivered by Prof. Raman Kashyap, Canada Research Chair on Future Photonics Systems, Ecole Polytechnique de Montreal, Montreal, Canada during the Inaguration Function on 12th Feb. 2021.