

INDUSTRIAL VISIT REPORT

Schneider Electric Innovation & Technology Labs (I&T Labs) and GIGA Labs

Bearys Global Research Triangle (BGRT), Bengaluru

Hosted by	Schneider Electric India	Date of visit	25 September 2026
Location	Bearys Global Research Triangle (BGRT), Bengaluru	Organised by	Career Development Cell (CDC), Dr. AIT
Department	Electronics and Instrumentation	Participant group	30 students — EEE, ECE and EIE (10 from EIE)
Faculty coordinators	Ms. Mary Cindrella J and department coordinators	Host facility	Schneider Electric I&T Labs & GIGA Labs

Acknowledgement

We thank **Dr. Ambedkar Institute of Technology** and the **Career Development Cell (CDC)** for organising this visit, and **Ms. Mary Cindrella J** and the department faculty coordinators for their guidance throughout. We are also grateful to the engineering teams and host personnel at **Schneider Electric's I&T Labs and GIGA Labs** for the facility access and technical explanations provided during the visit.

1. Executive Summary and Objectives

1.1 Executive Summary

On **25 September 2026**, a delegation of 30 students from the Departments of Electrical and Electronics Engineering (EEE), Electronics and Communication Engineering (ECE) and Electronics and Instrumentation Engineering (EIE)—including 10 representatives from EIE—visited Schneider Electric's Innovation & Technology Labs (I&T Labs) and GIGA Labs, located at the Bearys Global Research Triangle (BGRT) in Bengaluru. The visit provided first-hand exposure to the complete product lifecycle of industrial power distribution hardware, smart switchgear, embedded tripping logic, additive manufacturing and global compliance testing.

1.2 Primary Objectives

- **Bridging theory and practice:** to observe real-world implementations of embedded microprocessors, signal processing and automated control in industrial switchgear.
- **Understanding hardware life cycles:** to analyse how low-voltage protection systems transition from rapid polymer prototyping to rigorous mechanical, electrical and environmental testing.
- **Compliance and standards awareness:** to study international validation protocols (ISO/IEC 17025:2017) and testing accreditations (NABL, ASTA, Intertek, DEKRA, BIS).

2. Industry and Facility Profile

The Innovation & Technology Labs (I&T Labs) and GIGA Labs at the Bearys Global Research Triangle (BGRT), Bengaluru, form Schneider Electric's principal research, development and validation hub for

power distribution equipment, circuit protection devices and smart-grid automation architectures. The facility operates under internationally recognised quality benchmarks and issues accredited certification for hardware deployed globally.

3. Detailed Technical Observations

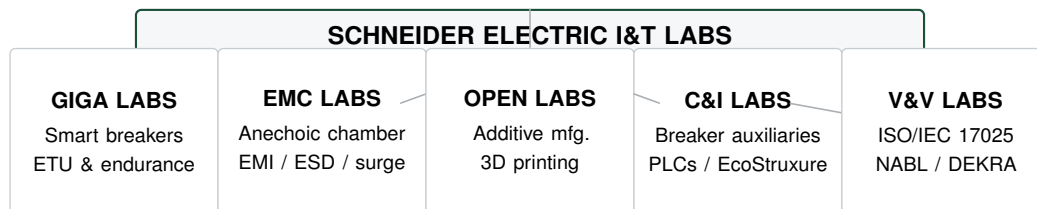


Figure 1: Structural breakdown of the research, development and validation facilities visited.

3.1 Lab 1: Smart Breaker Logic and Endurance Testing (GIGA Labs)

Unlike conventional electromechanical breakers that rely solely on thermal-magnetic expansion strips, modern switchgear utilises **Electronic Trip Units (ETUs)**. These embedded microprocessor systems sample live current waveforms to execute programmable tripping curves.

- **Electrical endurance testing:** Test benches built on National Instruments (NI) platforms run automated cyclic load routines, simulating continuous duty and fault conditions. They deliver test currents up to 630 A and short-circuit interrupt capabilities up to 10 kA.
- **Mechanical endurance and structural testing:** Pneumatic and electric linear/rotary actuators toggle switchgear mechanisms thousands of times to determine the Mean Time Between Failures (MTBF). Universal Testing Machines (UTM) assess structural integrity by mapping real-time torque versus angle and force versus displacement profiles.

3.2 Lab 2: Electromagnetic Compatibility (EMC) and Immunity Chambers

To verify that embedded logic controllers withstand noisy industrial grids, hardware undergoes severe electromagnetic stress testing inside shielded spaces and specialised anechoic chambers.

- **Surge and Electrical Fast Transient (EFT) immunity:** Test equipment injects high-voltage spikes and high-frequency noise into power lines to simulate power disturbances, lightning strikes and sudden inductive motor shutdowns.
- **Electrostatic discharge (ESD):** Direct high-voltage static discharges are applied to exposed chassis surfaces and terminals to ensure internal Printed Circuit Boards (PCBs) resist latch-up or permanent damage during human handling.
- **Radiated and conducted emissions (RE/CE):** Enclosed within RF-absorbing foam in an anechoic chamber, the lab measures radiated emissions (emitted radio noise) and conducted emissions (noise fed back into supply lines) to ensure full compliance with electromagnetic interference limits.

3.3 Lab 3: Additive Manufacturing and Rapid Prototyping (Open Labs)

The Open Labs unit shortens R&D cycles by deploying four distinct polymer 3D printing technologies to fabricate enclosures, arc chutes and internal linkages prior to steel mould production:

- **Fused Deposition Modelling (FDM):** extrudes thermoplastic filaments for general form and mechanical fit evaluations.
- **Stereolithography (SLA) and Digital Light Processing (DLP):** employ UV lasers and light engines to cure liquid resins, producing smooth, high-precision electronic housings and sub-assemblies.
- **Selective Laser Sintering (SLS):** uses thermal lasers to fuse nylon powder into durable structural prototypes capable of withstanding functional stress tests.

3.4 Lab 4: Low Voltage (LV) Systems and Breaker Auxiliaries (C&I Labs)

The Custom & System Testing Zone focuses on integration between switchgear and plant automation networks. Key sub-components evaluated include:

- **Auxiliary contacts:** microswitches that track the mechanical position of the breaker mechanism, transmitting binary status signals to PLCs or the Schneider EcoStruxure platform.
- **Shunt trips and Undervoltage Releases (UVR):** electromagnetic coils integrated directly into the breaker tripping bar. Upon receiving external emergency signals (for example, thermal overrun, fire alert or remote fault trip), the shunt coil energises to instantly decouple the grid.

3.5 Lab 5: Verification, Validation (V&V) and Environmental Compliance

The V&V facility integrates data across mechanical, electrical and environmental stress runs to certify hardware safety and operational endurance.

- **Environmental infrastructure:** includes salt spray corrosion chambers, heating chambers and high-range climatic chambers operating from -70°C to $+180^{\circ}\text{C}$.
- **Ingress Protection (IP) test rigs:** ingress protection chambers evaluate seal integrity against dust ingress (IP5X/IP6X) and pressurised water exposure (IPX4/IPX5/IPX6).
- **Accreditations:** the facility operates in compliance with ISO/IEC 17025:2017 and holds accreditations from international bodies including NABL, ASTA RTL, Intertek, DEKRA and the Bureau of Indian Standards (BIS).

4. Group Photographs and NDA Compliance



Figure 2: Full delegation of 30 students (EEE, ECE and EIE) at the BGRT campus entrance.



Figure 3: EIE department group (10 students) at the BGRT campus entrance.

Non-Disclosure Agreement (NDA) compliance note. In compliance with Schneider Electric facility security guidelines and Non-Disclosure Agreement restrictions, photography inside active testing chambers, proprietary R&D rigs and internal laboratory spaces was strictly prohibited. Only the two group photographs above, taken at the facility entrance and reception area, are included in this report.

5. Consolidated Testing Infrastructure Matrix

Table 1: Testing infrastructure, equipment and parameter limits observed during the visit.

Testing domain	Observed equipment and infrastructure	Parameter limits / standards
Electrical	NI-based automated benches; residual current test benches	Up to 630 A load; 10 kA short circuit; temperature rise
Mechanical	Pneumatic actuators; UTMs; impact test rigs	Torque–angle mapping; MTBF verification; terminal reliability
Environmental	Climatic chambers; salt spray; IP dust and water chambers	–70 °C to +180 °C; IP ingress; corrosion rating
EMI / EMC	Anechoic RF chamber; ESD generators; EFT and surge benches	Radiated and conducted emissions; magnetic field immunity
Prototyping	FDM, SLA, DLP and SLS 3D printing technologies	Structural nylon; resin housings; thermoplastic fits

6. Engineering Insights

- 1. Protection logic has moved from mechanical to computational.** The ETU architecture in GIGA Labs makes the point directly: a tripping decision that used to be a thermal-magnetic strip's physical response is now a sampled waveform and a programmable curve running on an embedded processor. The design problem shifts from material science to firmware correctness and timing under fault conditions.
- 2. A single design margin is validated from multiple, independent directions.** The same breaker assembly is pushed through electrical endurance (630 A load, 10 kA interrupt), mechanical cycling to MTBF, and environmental extremes (–70 °C to +180 °C, salt spray, IP ingress) as separate test regimes. No single test qualifies the hardware; certification is the intersection of all of them.

3. **EMC compliance is a systems concern, not an afterthought.** ESD, EFT/surge and radiated/conducted emissions testing exists because embedded controllers sit on noisy industrial supplies; a circuit that is functionally correct on a bench can still fail in the field without this layer of validation.
4. **Additive manufacturing compresses the design-test-iterate loop.** Running FDM, SLA/DLP and SLS in parallel lets the same enclosure or arc chute be evaluated for form, precision and structural load before committing to a steel mould, cutting the cost of an iteration late in the design cycle.
5. **Accreditation (ISO/IEC 17025:2017, NABL, ASTA, Intertek, DEKRA, BIS) is what converts an internal test result into a globally accepted one.** It is the traceability and repeatability of the test process, not just the pass/fail outcome, that these accreditations certify.

7. Conclusion

This visit connected classroom coursework to industrial practice by showing how embedded control, automated test infrastructure and formal compliance standards jointly determine whether a piece of power-distribution hardware is fit for deployment. The exposure to GIGA Labs, EMC, additive manufacturing, LV integration and V&V facilities gives a working reference point for the reliability and certification expectations placed on embedded and electronic systems in industry.