My Internship at Technology International

During my internship under the R&D Head at **Technology International**, I had the opportunity to dive into the heart of mechanical innovation. Working in a fast-paced environment where ideas were transformed into tangible engineering solutions, I gained first-hand experience in product design, material selection, prototyping, and performance testing.

Being part of the R&D team taught me how creativity and precision coexist in engineering — how even the smallest design adjustment can dramatically affect performance, safety, and manufacturability. Beyond learning advanced mechanical concepts, I understood the importance of interdisciplinary collaboration and market-oriented thinking, ensuring that innovation is both technically sound and commercially viable.

Over the course of my internship, I contributed to the **development of four distinct products**, each addressing a unique gap in the industrial market. These projects challenged me to apply theoretical principles to practical scenarios, from ideation to validation.

Let’s take a look at these four products in detail.

Snap-Fit Standard

The **Snap-Fit Standard** vent is a compact, tool-less pressure equalization solution built for ease of integration. Using a **snap-ring locking system**, it eliminates the need for screws or fasteners, allowing for quick installation in molded or pre-slotted enclosures. Made from **Polyamide 6 (PA6)**, it’s both lightweight and durable, while the **microporous hydrophobic or oleophobic membrane** ensures breathing under normal conditions and degassing during sudden pressure surges. With **IP66, IP67, and 6K9K protection**, it reliably shields sensitive components from dust, water, and contaminants.

During my internship, I worked on refining the **fitment geometry and tolerance margins** to ensure consistent sealing without compromising the ease of assembly. I also assisted in evaluating **membrane porosity and airflow rates**, learning how minute design variations can affect real-world performance. This project gave me my first exposure to balancing mechanical efficiency with manufacturability.

M12 Dual

The **M12 Dual Vent** is a precision-engineered, **screw-in venting solution** designed for environments exposed to vibration, heat, and pressure fluctuations—such as **EV battery packs and industrial control enclosures**. Its **dual venting mechanism** combines a microporous membrane for steady pressure equalization and a **mechanical spring valve** for overpressure degassing, ensuring both gradual and sudden pressure changes are managed safely. Made from **HE30 aluminum**, the vent offers exceptional mechanical strength and corrosion resistance, proven through a **96-hour salt fog test**. Rated at **IP66, IP68, and 6K9K**, it's designed to withstand the harshest operational conditions.

My contribution involved **assisting in the design validation phase**, where I analyzed prototype performance under variable pressure conditions. I also helped compare **alternative spring materials and coating options** to minimize corrosion and friction wear. This hands-on experience helped me understand how design choices directly impact durability and lifecycle safety in real applications.

M20 Dual

The **M20 Dual Vent** extends the same robust dual-venting principle to larger enclosures that require higher airflow capacity. Its **M20 × 1.5 threaded design**, paired with an **HE30 aluminum body**, enables stable mounting and superior structural rigidity. The vent's **hydrophobic membrane** allows it to breathe effectively under normal use while a **spring-based relief valve** activates during overpressure events to prevent system failure. Like the M12, it meets **IP66, IP68, and 6K9K** ingress protection standards and passes the **96-hour salt fog corrosion test**, ensuring long-term reliability in harsh conditions.

I was actively involved in **testing and performance evaluation**, focusing on **flow rate optimization and burst pressure analysis**. Working alongside the R&D Head, I learned how engineering design is not just about building a product but refining it through repeated testing and data-driven decisions. This project helped me appreciate the complexity of scaling designs while maintaining functional precision.

M-14 Screw-in Vent

PorVent's standard M14 screw-in vent is used in EV battery packs to release gas when internal pressure rises. Because many packs now require an early, predictable burst near **450 mbar**, our team adapted the cap so a calibrated burst-pin works with a thin, unbacked sPTFE membrane, allowing the membrane to flex and then rupture cleanly at lower pressures. We first characterised **10** unmodified vents on the SPM rig and observed an average of **1,827.9 mbar** (range **1,450–2,126 mbar**), confirming the need to lower activation. I helped plan and run this baseline and collated the raw measurements for analysis.

Working with tooling and test engineers, we tried multiple pin heights implemented via injection-mould adjustments. I coordinated the batch tests and analysis that pointed to **2.6 mm** as the best balance between early activation and safe handling. To verify repeatability, we validated on **n = 100** parts; I compiled the dataset and plotted the distribution, which centred at **482 mbar** with a **±200 mbar** spread, close to the target window.

Finally, we assessed post-burst performance on the SPM pressure–airflow setup. I configured the check with lab support and confirmed that measured flow met the battery-pack evacuation requirement. The work shows a practical, membrane-only route to early, predictable relief while keeping the design manufacturable, and it clarifies my specific contributions within the team effort.