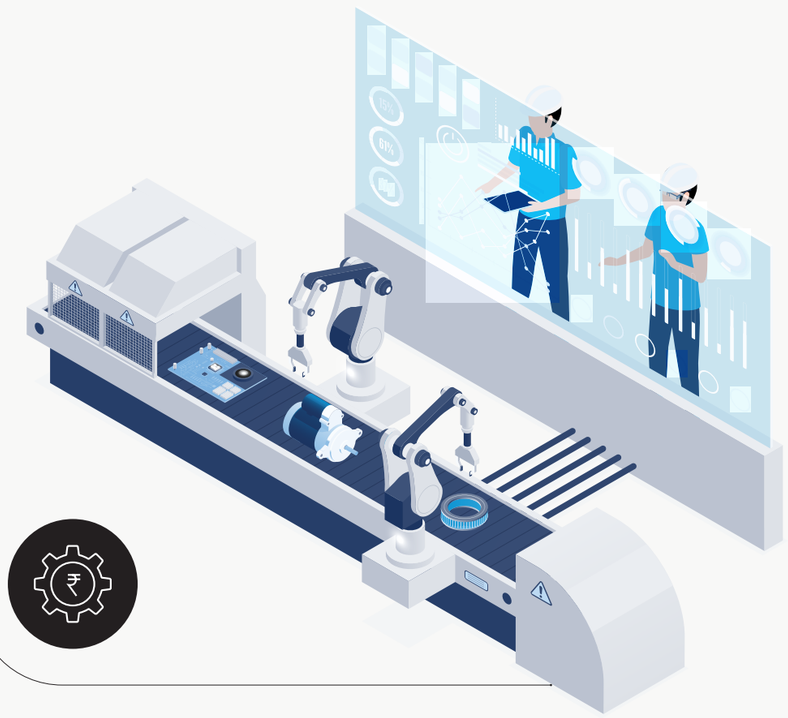
Technology and innovation

One of the key success factors for Sona Comstar's unparalleled growth is our focus on technology and innovation. Today, we have the ability to design and manufacture high-power-density EV systems handling high torque requirements with a lightweight design. This ability has enabled our customers to enhance their electric vehicles' range, acceleration and overall efficiency.



Process-Driven Innovation

We have a robust innovation framework to adapt to evolving technology and market demands. Innovation is a well-defined process that consists of scanning the environment, selecting the appropriate response to the changes in the marketplace, and turning the ideas into products that address those changing needs.

01

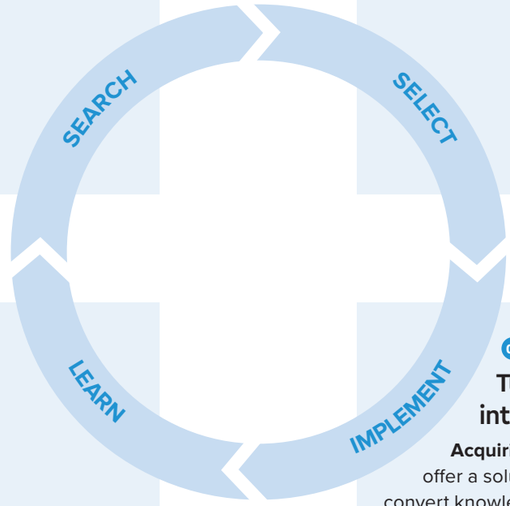
Scanning the environment

Constantly looking for threats and opportunities within and outside the organisation to know about T**echnology evolution** and **Changing requirements of the market**

02

Deciding our response

Strategically respond to the threats and opportunities considering - **Fit with our strategy roadmap**, and **Our technological competence**



04

Learn throughout the process to innovate better in the future

Constantly build the knowledge base by improved learning from each of the above three steps about **new technologies** and **organisation's needs,** Understand the **causes of failures**, Improve the ways in which the process is managed, **Restart next cycle of innovation** with refined and improved understanding.

03

Turning ideas into products

Acquiring the knowledge to offer a solution, **Executing** to convert knowledge into an innovation, **Launching** the innovation, **and Sustaining** its adoption for the long-term.

Strategic priorities – Technology and Innovation

New Launches

This year, we launched three new product lines: electronically locking differential assembly or EDL for the high-end electric SUV for the North American market, precision-formed input shaft and intermediate gears, and net-shaped spiral bevel gears. Each of these is groundbreaking and brings a unique value to our customers.

Net-Shaped Spiral Bevel Gears

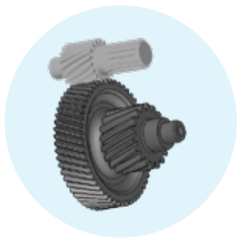
Perhaps for the first time in the world, spiral bevel gears made by forming rather than cutting the gear teeth have been commercialised by us. This development is big because it is poised to do to the automotive spiral and hypoid gears what this technology did to the straight bevel gears several decades ago. They offer an unmatched price-performance ratio because net-formed gears are made with lesser steel and have a more favourable grain structure than their machined counterparts. With decades of expertise in designing and making net-formed straight bevel gears, we can now provide the same benefits for spiral bevel gears, and our customers can get superior quality gears at a competitive cost.

EDL

The EDL is an advanced differential used in high-performance and off-road vehicles to enhance stability, traction and safety. It uses electronic actuators to lock the wheels on a vehicle's left and right sides together. This allows the wheels to rotate at the same speed, providing maximum traction and stability. The differential is controlled by a computer that receives input from various sensors, such as the vehicle's speed, steering angle, and yaw rate.

The computer then uses this information to determine when the differential should be locked or unlocked based on the driving conditions and the driver's inputs. The technology enables better performance in off-road and inclement weather conditions.

The EDL system is a critical component of the car and must integrate seamlessly with the rest of the vehicle's systems. This development required significant engineering and testing to ensure that the EDL performs effectively while minimising the impact on the vehicle's energy efficiency and meeting regulatory requirements. Thanks to our engineers' abilities to work collaboratively in quickly developing a highly engineered product and the customer's trust in their capabilities, we could match the customer's aggressive development timeline.

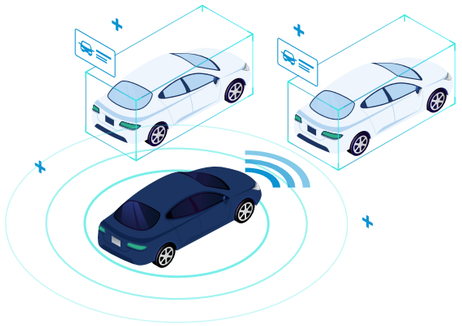


Input Shaft and Intermediate Gears

Other two products – the input shaft and intermediate gears – introduced this year enhance our precision forming and machining capabilities and bring us one step closer to developing a comprehensive EV gearbox.

Introducing these groundbreaking products is a significant milestone in our pursuit of environmentally friendly and safety-enhancing solutions, affirming our commitment to pioneering advancements in the EV sector. We intend to leverage these technological advancements to strengthen our overall capabilities in the EV sector, positioning ourselves at the forefront of precision engineering in our industry.

New Horizons



This year's significant step in expanding our horizons is entering the ADAS sensor market through the proposed acquisition of NOVELIC, an expert in Radar Technology.

Radars will play a significant role in the burgeoning ADAS world. Radars can detect the distance and speed of other vehicles on the road, obstacles in the car's path, the car's position relative to the road, and other vehicles in the car's blind spots. Many ADAS functionalities, such as adaptive cruise control, automatic emergency braking, lane-keeping assistance, and autonomous driving, cannot be performed cost-effectively without Radars.

Another critical application of Radar technology is in-cabin sensing.

Children and pets left behind in locked cars have resulted in thousands of deaths worldwide due to heatstroke. Government regulations and car safety assessment guidelines in new car models mandate child presence detection or CPD. Euro NCAP 2023 requires CPD for a 5-star rating. Major OEMs have joined hands and have announced that they will provide CPD in their cars by 2025.

NOVELIC's Radar Technology detects life presence, child presence and seat occupancy through vital signs such as heart rate and respiration sensing. The technology works under any lighting conditions, including behind the car seats and even in the seat well. Moreover, the sensing happens anonymously, so there can be no privacy concerns like those in sensing by cameras.

The in-car sensing that NOVELIC's technology makes possible can also be used for other applications such as the optimised deployment of airbags and other safety systems, driver monitoring through the signs of drowsy or distracted driving, and gesture-controlled infotainment and human-machine interface.

NOVELIC will add the capabilities of semi-conductor chip design, radar sensors design, signal processing, perception and sensor fusion software and artificial intelligence and machine learning tools to Sona Comstar. These capabilities augment our efforts in addressing the megatrends of increasing automotive autonomy and automation.

Kiran Manohar Deshmukh
Group CTO