

**NTN-SNR bearings and transmission seals are fitted to the Eolab prototype from Renault**

## **NTN-SNR Innovations for optimum Eolab performance**

At the request of Renault, NTN-SNR developed bearings and transmission seal assemblies to be fitted to the Eolab prototype hybrid presented in October 2014 by the company with the diamond logo. This project, a truly ground-breaking innovation, has enabled NTN-SNR to implement solutions which extend far beyond the planned objectives and account for a significant contribution to Eolab's performance. The innovations focus on reducing component weight, reducing wheel bearing drag torque and also on new developments to proven technologies, especially for the drive line. The results achieved reveal a weight saving of more than 25% for all components and improvements of 30 to 40% in rotation torque. This has reduced CO<sub>2</sub> emissions by more than 1%. The gearbox fitted to the vehicle is also equipped with NTN-SNR bearings. These innovations developed by NTN-SNR will mostly be adopted for standard production vehicles in four years' time. Participation in the Renault Eolab project, following the Peugeot 208 HYbrid FE project and developments in electric wheel-motors for a production vehicle, have firmly established NTN-SNR as a major player in innovation for the vehicles of tomorrow.

### **A convergence of innovations boosted by the Eolab project**

#### **25% weight reduction**

Together with NTN Transmission Europe (a subsidiary of the NTN group specialising in drivshafts), NTN-SNR has recaptured and adapted the Japanese technology called "PCS Hub Joint" to design the splined link between the driveshaftCV joint and the hub bearing fitted to the prototype. It is an interference-fit using precisely adjusted splines, which eliminates any free play in movement and reduces noise. This technology offers the required level of torque (technology which is adaptable from 2500 Nm to over 7500 Nm) with a much smaller diameter, thereby contributing to a reduction in the weight of the transmission.

NTN-SNR has also reduced the weight of the wheel bearings by means of compact wheel technology with an aluminium centring pivot, connected to which is the bolt support function for tightening the transmission seal. This development comes straight from the NTN-SNR research plan and was fast-tracked as part of the project. Lighter ceramic balls were also used to produce the bearings for this prototype.

Weight reduction creates a virtuous circle: each weight saving generates less stress on the parts which can then be of a much smaller dimension or produced using lighter materials. The total weight saving for the entire transmission system and bearings achieved by NTN-SNR is more than 25%, or 6 kg, which is a significant contribution to the total vehicle weight reduction.

### **Torque improved by 30 to 40%**

The other area of performance on which NTN-SNR has worked is a reduction in friction torque, where considerable gains have been made. The result is a reduction in energy consumption and CO<sub>2</sub> emissions in the order of 1%. This performance was achieved using adapted dimensions, specific surface treatments and above all, the latest bearing seal technology fine-tuned by NTN-SNR and its suppliers. In fact, the seals represent almost 50% of the torque force. The new seals have helped reduce friction on the front drive axles by 30% and up to 40% on the rear drive axles. These improvements could be detected by the Renault technicians while turning the wheels by hand when the vehicle was lifted during the design development phases.

### **A successful joint venture with Renault for future applications**

Beyond the technological showcase that Eolab represents, this partnership with Renault is a tremendous innovation booster. Renault's very advanced technical-economical analysis has assisted with work on reliable solutions intended for development on an industrial scale in the short to medium term. The seals used herald the new products from NTN-SNR to be produced in the next two years based on this design. Similarly, the adapted PCS Hub Joint

technology and development of the aluminium centring pivot will be used in production within four years.

Lastly, the considerable leeway given to NTN-SNR in its approach and the dialogue established with Renault regarding the design of the chassis itself has led to progress towards more innovating solutions. NTN-SNR has proposed designs to assist with adapting the rear brake system and even improving the attachment of bearings to obtain significant weight gains.

### **Innovation, a pillar of NTN-SNR's development strategy**

#### **One of many for the car of tomorrow**

The main purpose of Research & Development, at the forefront of NTN-SNR's competitiveness, is to reduce CO<sub>2</sub> emissions for the car market. NTN-SNR's contribution to the Eolab prototype is similar to the work carried out for the Peugeot 208 HYbrid FE prototype, but with different constraints required by the customers. As a result of its bearing and transmission developments, NTN-SNR has helped to reduce the weight of this vehicle by 6.6 kg. With exceptional levels of performance, this prototype made headline news at the Frankfurt Motor Show in September last year. NTN-SNR is also at the cutting-edge when it comes to electric wheel-motors. In September, following on from a small city vehicle designed and developed with the manufacturer Lazareth in Haute-Savoie, NTN-SNR presented a modified standard production Honda Civic. This vehicle, fitted with two 30 kW wheel-motors at the rear developing a torque of 490 N.m, and a battery located at the front, can be driven at speeds up to 150 km/h with excellent handling capability. In addition, to help manufacturers comply with the new Euro emission control standards, NTN-SNR has developed Dylco2, a software package capable of producing an extremely reliable calculation of the variations in a vehicle's CO<sub>2</sub> emission levels based on the type of bearing fitted to it. Lastly, NTN-SNR has put in place specific internal expertise to develop new solutions for the design of internal combustion engines.

#### **Anney Research and Development Centre**

NTN-SNR has a European R&D Centre based in Anney (Haute-Savoie, France) equipped with significant human resources and advanced equipment: 400 people are preparing tomorrow's bearings, based on various laboratories (metrology, analysis of organic materials, analysis of metals), including simulation tools described as "best in class" and a test centre with over 200 test benches. This centre works in permanent co-operation with the NTN R&D Centre located in Kuwana, Japan, providing continuous communication and sharing knowledge and particularly productive technical expertise.

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***NTN-SNR ROULEMENTS** is part of the NTN Corporation, the 3<sup>d</sup> largest global manufacturer of bearings in the world, and manages and develops all NTN activities in Europe, South America, Africa and the Middle East. A key player in its capacity as designer, developer and manufacturer of automotive, industrial and aviation bearings, NTN-SNR ROULEMENTS also develops maintenance services and solutions in its Experts & Tools department and thus offers a comprehensive range of products and services. NTN-SNR ROULEMENTS employs 4113 people and has 9 production sites in Europe and Brazil and 23 sales offices worldwide.*

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