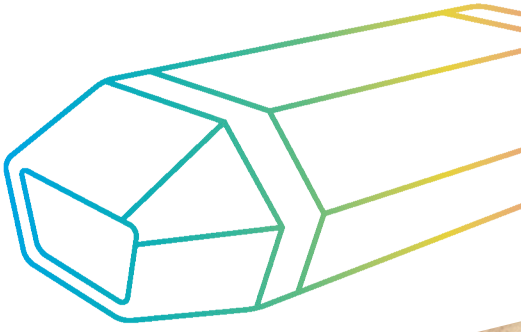
AVILOO
BATTERY DIAGNOSTICS

AVILOO
CASE STUDY

4x4 ELECTRIC STYLE

A Pure Electric Adventure from the Netherlands to South Africa



PROJECT DESCRIPTION:

On 5 November 2022, the remarkable adventure of Renske Cox and Maarten van Pel, an inspiring Dutch couple from Brabant, began.

Their aim was to complete a 38,000 km journey from the Netherlands to South Africa and back in a fully electric Skoda Enyaq, powered exclusively by solar energy. This expedition, organized by the NGO '4x4ELECTRIC', was launched to demonstrate the potential of driving an electric car over long distances, even in regions with limited electrical infrastructure.

Illustration 1

PARTNERSHIP WITH AVILOO:

AVILOO, specializing in battery testing and monitoring for electric cars, played a crucial role as ground control for the Skoda Enyaq's high-voltage battery. Data was monitored around the clock down to the cell level to identify and solve potential problems during the expedition.

VEHICLE EQUIPMENT:

The Skoda Enyaq, built in 2021, was specially equipped for this expedition.

Illustration 2

It featured a 50-liter water tank, an induction system, an integrated tent on the roof, and an impressive 60 solar cells, each with 180 watts of power. These solar cells were innovatively converted directly into direct current, resulting in a reduction in energy losses of up to 20% (source: https://4x4electric.com/).

Illustration 3

CHALLENGES AND SOLUTIONS:

The expedition presented several challenges, including power loss during the solar charging cycle, data and roaming difficulties, and GPS issues.

AVILOO assisted by providing 3 AVILOO boxes and OBD cables to overcome hardware issues. Thanks to a special roaming package from Magenta, connectivity was maintained in almost all African countries.

The AVILOO team discovered interesting insights into the charging cycle created by solar charging. As shown in Illustration 4, the curvature of the power during solar charging corresponded to the position of the sun.

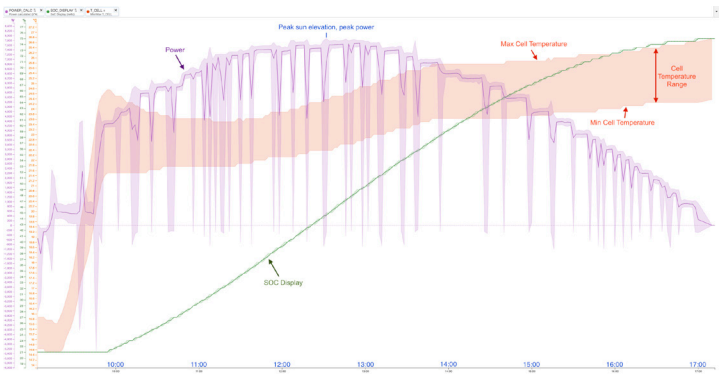


Illustration 4

BATTERY TESTS BY AVILOO:

Two AVILOO PREMIUM tests were carried out at the beginning and midpoint of the expedition. The battery of the Skoda Enyaq had an SOH value of 98% after 25,452 km, which dropped to 96% on arrival in South Africa.

ANALYSIS OF THE SOLAR CHARGING CYCLES:

The precise analysis of battery-related data provided deep insights.

When analyzing solar charging cycles, it became clear that energy and power were lost during the battery warm-up phase before charging. The energy lost ranged from 1 to 2 kWh. Examples from the expedition include:

- Heating the cell temperature from approximately 18°C to 20°C before charging required 0.87 kWh.
- Heating the cell temperature from approximately 15°C to 20°C before charging required 1.5 kWh.

The battery also cooled down several times during the solar charging cycle, especially at high outdoor temperatures, as shown in Illustration 5. In one instance, we observed that the battery cooled down four times during a single solar charging period.

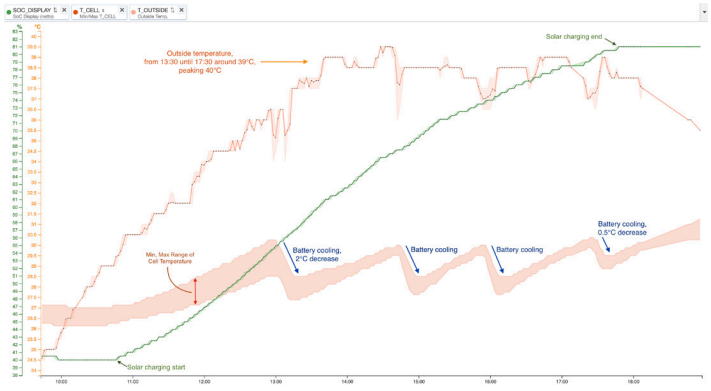


Illustration 5

Although the direct conversion of solar power to direct current should reduce energy losses by 20% (source: https://4x4electric.com/), the 5% loss described above must be taken into account.

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The #magentabusiness team provided us with a SIM card with connectivity for this challenging project.
Many thanks to Magenta for their support!

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