CASE STUDY

Transforming Connected Vehicle Data into Actionable Engineering Insights

Our customer, a leading automotive manufacturer, collects large volumes of Controller Area Network (CAN) data to understand how its vehicles are used in real-world conditions. This data is captured in MDF4 files, each containing thousands of measurement channels and ranging from 10 to 40 GB in size. Analysing these datasets provides valuable insights into customer usage patterns, including vehicle speed distribution, road types and emergency braking events. However, processing and interpreting such large volumes of data was time-consuming, making it difficult to fully utilise the information collected.

Challenge

Processing large volumes of CAN data was time-consuming, while a lack of calculated metrics made it difficult to analyse vehicle usage and categorise different driving conditions.

Solution

Advantage Insights by nCode enabled rapid CAN data decoding, engineering analysis and KPI extraction, with augmented data indexed in Aqira for searching, comparing and analysing vehicle usage information.

Result

Engineers could extract and visualise over 2,000 channels in three seconds, create analyses 10 times faster and analyse five times more vehicle data per day.

Unlocking Insights from High-Volume Vehicle Data

The manufacturer collected vast amounts of vehicle data, but processing and analysing it efficiently presented a significant challenge.

Each MDF4 file contained thousands of measurement channels, with file sizes ranging from 10 to 40 GB. The high volume of data made it difficult for engineers to quickly decode, visualise and analyse the information needed to understand customer vehicle usage.

The lack of calculated metrics also made it challenging to perform global analyses and categorise data according to different driving conditions.

The manufacturer needed a more efficient way to extract insights from this information, particularly to understand:

- **Vehicle speed distribution:** How vehicle speeds varied during real-world use.
- **Road types:** Vehicle usage across city, motorway and off-road conditions.
- **Emergency braking events:** The number of emergency braking occurrences.

Improving the speed and efficiency of data processing would enable engineers to make better use of the information already being collected.

Accelerating Data Processing and Analysis with Advantage Insights

To address these challenges, the manufacturer used Advantage Insights to rapidly decode CAN data and perform engineering analyses on large MDF4 datasets.

Advantage Insights enabled engineers to select relevant measurement channels, extract key performance indicators (KPIs) and generate histograms and other graphical visualisations in a matter of seconds.

The augmented data was then indexed in Aqira, allowing engineers to search for information based on specific engineering conditions.

This approach enabled engineers to:

- Rapidly decode CAN data from large MDF4 files.
- Select and visualise relevant measurement channels.
- Extract KPIs and generate engineering analyses.
- Search for data based on engineering conditions.
- Compare, trend and extrapolate results to better understand customer vehicle usage.

Together, Advantage Insights and Aqira provided a more efficient way to process, analyse and explore large volumes of vehicle data.

Faster Analysis and Greater Data Utilisation

The solution delivered significant improvements in data processing speed and engineering analysis efficiency, enabling the manufacturer to make greater use of its vehicle data. Key results include:

- **3 seconds - Rapid data extraction and visualisation:** A few channels could be extracted and visualised from a 10 GB file containing more than 2,000 measurement channels in just three seconds.
- **10× faster - Engineering analysis creation:** Engineering analyses could be created 10 times faster compared with the manufacturer's previous internal tool.
- **5× more - Vehicle data analysed per day:** Through parallel processing, the manufacturer could analyse five times more vehicle data each day.

Making Vehicle Data More Accessible

Beyond these improvements, the solution enabled engineers to exploit previously underutilised vehicle data more effectively.

By making it easier to process, search, compare and analyse large datasets, engineers could better understand customer usage patterns and make more data-centric, physics-informed decisions.

> We collect tons of data but we are not really using it for engineering purposes. Being finally able to process all this data was equivalent to exploiting a gold mine.

Engineer, Customer usage at a sports car manufacturer

Making Better Use of Connected Vehicle Data

By using Advantage Insights and Aqira software by nCode, the automotive manufacturer significantly improved its ability to process and analyse large volumes of CAN data.

With analysis creation 10 times faster, more than 2,000 channels visualised in just three seconds and five times more vehicle data analysed each day, engineers could extract meaningful insights more efficiently.

The use case demonstrates how faster data processing and more accessible engineering analysis can help automotive manufacturers better understand real-world vehicle usage and support data-driven engineering decisions.