

CASE STUDY

Accelerating E-Bike Battery Sizing Through Real-World Usage Analytics

A sporting goods manufacturer developing e-bikes needed to understand how battery performance varied across different riders, road conditions and usage scenarios. To support battery sizing decisions, the manufacturer collected real-world usage data from e-bike riders using data loggers connected to the battery systems. By analysing factors such as torque demand, battery state of charge and riding conditions, engineers could better understand battery requirements across different e-bike models.



Challenge

Analysing e-bike test data consistently was difficult due to the variety of tools, scripts and software versions used to process measurements from different riders and road conditions.

Solution

Advantage Insights by nCode provided a single environment to decode, visualise and analyse data directly from e-bike battery system loggers, replacing a workflow involving three separate software tools.

Result

Raw data could be decoded into interpretable engineering signals in under one second, enabling faster, more consistent analysis and easier collaboration to support e-bike battery sizing decisions.

Simplifying Complex E-Bike Battery Analysis

Determining the appropriate battery size for different e-bike models requires an understanding of how bikes are used in real-world conditions. The manufacturer collected test data from different riders across a variety of situations, road types and environments. This information was needed to evaluate torque demand, battery state of charge and other usage parameters that influence battery sizing. However, analysing this data consistently was challenging.

Data scientists used a variety of scripts, tools and software versions, making it difficult to process and compare measurements in a consistent way. The existing workflow relied on three separate software tools to decode, visualise and analyse the collected data. This created complexity in the analysis process and made it harder for engineers to collaborate and obtain reliable insights quickly.

The manufacturer needed a simpler, more efficient approach that would allow engineers to analyse real-world usage data consistently and support battery sizing decisions across its e-bike models.

Bringing Data Decoding, Visualisation and Analysis into One Environment

To address these challenges, the manufacturer used Advantage Insights by nCode to consolidate its data processing and analysis workflow into a single engineering environment.

Advantage Insights could natively read measurement data from loggers connected to the e-bike battery systems, allowing engineers to work directly with collected test data.

The software enabled engineers to:

- **Decode raw measurement data:** Convert logger data into interpretable signals with engineering units.
- **Visualise battery performance:** Explore measurements such as battery state of charge and other recorded operating parameters.
- **Analyse real-world usage:** Evaluate torque demand, battery performance and riding conditions across different users and scenarios.
- **Investigate relationships:** Perform analyses, including correlations between e-bike range and usage parameters.

- **Work within one environment:** Replace a workflow involving three separate software tools with a single platform for decoding, visualisation and analysis.

By bringing these capabilities together, Advantage Insights simplified the process of analysing e-bike measurement data and made engineering information easier to access and interpret.

Faster Data Processing and More Consistent Engineering Insights

Using Advantage Insights, the manufacturer streamlined its workflow for processing and analysing e-bike test data. Key results include:

- **Less than 1 second - Rapid data decoding:**
Raw logger data could be decoded into interpretable signals with engineering units in under one second.
- **3 -> 1 - Consolidated analysis workflow:**
A workflow previously requiring three different software tools was consolidated into Advantage Insights for data decoding, visualisation and analysis.
- **Faster insights - Improved engineering efficiency:**
Engineers could extract, visualise and analyse e-bike data within a single, high-performance environment, enabling quicker access to reliable engineering insights.

Supporting More Effective Battery Sizing Decisions

With data decoding, visualisation and analysis available in one environment, engineers could more efficiently evaluate how battery performance related to real-world usage.

Analysing torque demand, battery state of charge and correlations between range and usage parameters helped inform battery sizing requirements for different e-bike models.

The simplified workflow also made it easier for engineers to collaborate and consistently interpret data collected across different riders, road types and operating conditions.



Advantage Insights is really made for the engineer. It is simple to use, has lots of features and various visualisations to help the engineer interpret the data. Its adoption was really quick!

Engineer, E-Bike Testing and Design Department

Enabling More Efficient E-Bike Battery Development

By using Advantage Insights by nCode, the sporting goods manufacturer simplified how its engineers processed and analysed real-world e-bike usage data.

Replacing a workflow involving three separate software tools with one integrated environment, the manufacturer could decode raw measurement data in under one second and analyse battery performance and usage parameters more efficiently.

The solution enabled faster access to reliable engineering insights, easier collaboration and more consistent analysis to support battery sizing decisions across different e-bike models.