Application of a Driving Simulator to Optimise Vehicle Dynamics Performance

Case study overview

CATL was to launch a bespoke EV platform - CIIC (Integrated Intelligent Chassis) - and HORIBA MIRA's role was the attribute lead for ride, handling and steering. The platform was a skateboard design that can be supplied to a range of different vehicle manufacturers and is able to achieve their corresponding chassis performance 'DNA', including a high-end premium brand option.

The compact timing and broad set of requirements meant that the use of driver in the loop simulators was the ideal solution.

Engineering team deployed: Five key personnel (principal engineer, vehicle dynamics chief engineer, vehicle dynamics consultant, head of strategic sales and customer group programme manager). All based at HORIBA MIRA's UK facility in Nuneaton.

Attributes and performance

Light duty passenger vehicle

China

"The dynamic performance of EV has its unique characteristics, driven by both physics and feature. In the era of EV, it is essential to take a deep dive into the fundamentals during chassis architecture design. Thanks to MIRA's driving simulator technology, which bridges the gap between subjective feelings and objective data, the advanced development of CIIC dynamic attribute was greatly promoted with high-level confidence."

Xuexin WANG, Senior Manager Vehicle Dynamics, CATL

CATL 时代智能

Flexhub 飞极

www.flexhub-ciic.com

Approach

HORIBA MIRA applied its novel process to build a digital twin of the reference vehicle. This was populated using measured K&C and full vehicle objective data and provided a reference model within the simulator environment for comparison.

MBS models of CATL's platform were developed offline, converted to low degree of freedom models and then subjectively developed using static and motion simulators.

Throughout the programme simulator sessions were used for setting the programme targets, determining suspension hardpoints and component characteristics plus providing key design specifications.

During the prototype phase the simulator continued to be utilised to guide the subjective tuning decisions, thereby improving efficiency.

Successes and benefits

The successful application of the driving simulator allowed the platform design to be subjectively assessed early in the design process and created the following benefits:

- **High level of confidence** in the proposed targets
- Chassis design able to be assessed on **range of platform** variants and masses
- **Design configured** to enable it to achieve the DNA of multiple brands
- **Digital twin** of the competitor vehicle available for direct comparison
- **Reduced physical prototype development** time due to optimised targets

Deliverables

- Digital Twin created for programme benchmarks, suitable for use in driving simulators
- Vehicle Dynamics attribute leadership for CATL platform, including local tuning loop in China
- Vehicle Dynamics theoretical modules created for CATL's use

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