

Daihatsu

Daihatsu chooses Romax software for new efficient transmission development



“Daihatsu has been working on shortening their product development cycle. In Drivetrain Development Div, using Romax products the speed from design to evaluation is so fast that experimental results can be obtained to validate numerical analysis results, and as a result there is almost no need for additional CAE.”

Mr. Yuuichi Sasaki,
Drivetrain Development Div
Daihatsu

The head office of Daihatsu Motor Company Ltd is in Ikeda city, Osaka with over 10,000 employees. Daihatsu, born out of Faculty of Engineering in Osaka University, develops and manufactures the body, engine and transmission of cars. Since its establishment in March 1907, Daihatsu has devoted its efforts to the mission of creating small cars that are loved by people the world over. Daihatsu aims to provide products and services tailored to each customer. Romax has worked with Daihatsu for the last two years and this relationship has been important in their goal of achieving a quality transmission that is durable but cost effective. Romax Software has played an important role in achieving an optimum drive system.

Mr. Yuuichi Sasaki, (Drivetrain Development Division), said “Our company is a car maker that mainly manufactures compact cars. We have been working on product development that focuses on mass and cost to provide customers with low fuel consumption and low-priced cars.”

Client

One of the oldest car makers in Japan, established in 1907, with R&D and manufacturing bases in Osaka, Shiga, Kyoto, Fukuoka, Oita, and Indonesia and Malaysia.

Challenge

With a background in the development and manufacture of good quality inexpensive cars that deliver for consumers, The Drivetrain Department wanted to develop small, lightweight, and highly efficient transmission and driveline components without compromising on performance.

Solution

Daihatsu used Romax Spectrum (part of the Romax simulation platform) to create and analyse a full transmission model and calculate bearing vibration due to gear meshing of various transmission designs.

Benefits

Romax products contributed to the development of a low cost and low fuel consumption car by allowing the transmission designers to create a high-quality transmission design more quickly and therefore with reduced costs.



2019 Daihatsu Tanto



2019 Daihatsu Tanto Custom

The Daihatsu New Global Architecture (DNGA) development indicates the direction of “manufacturing” with “Light you up” as its slogan and has a strict target level that is challenging to achieve through conventional design methods.

We feel that it is necessary for transmission design to focus on “return to the origin” and “meshing the gears”. Romax Spectrum can easily calculate meshing when considering the gear support system and distortion due to the load case and therefore it is extremely useful for stabilizing the deflection of the gear under various conditions. With Romax Spectrum, we can quickly and easily predict distortion of each component caused by gear meshing and identify reinforcement points that minimize mass gain. In addition, since the NVH phenomenon due to the excitation force generated by the gear can be analysed for the full model, it is possible to simultaneously reduce the number of evaluations during test and improve accuracy. Romax Spectrum is an essential software for NVH analysis using a full transmission model.”

Why Daihatsu chose Romax

Mr. Sasaki (continued) “Daihatsu has been working on shortening their product development cycle. In Drivetrain Development Div, using Romax products the speed from design to evaluation is so fast that experimental results can be obtained to validate numerical analysis results, and as a result there is almost no need for additional CAE.”

Romax’s role at product development

Mr. Sasaki (continues), “The functionality and interface of Romax Spectrum plays an important role in developing better and low-cost transmissions in a limited time. For example, Romax Spectrum provides a clear and easy way to set the coupling conditions of bearings that are difficult to set in other CAE software. And the bearings themselves can be selected from catalogues provided by bearing manufacturers, meaning that more accurate calculation results are obtained. Further analysis of calculation results such as shaft and tooth stresses, and ODS of transmission cases, are sometimes beneficial, and by feeding Romax Spectrum bearing load or NVH analysis results into other

analysis software tools as boundary conditions, Romax Spectrum can act as a highly valuable front-end software tool for the analysis of many more phenomena.

“When we first started to use Romax Spectrum, it was to supplement experimental results. This was because we wanted to carefully validate the simulation results by comparing the software predictions with experimental data. At first, our confidence in CAE tools was low, and our designs were developed based on experimental results as usual. But while validating the simulation results, we recognized that the analysis results of Romax Spectrum had efficient reliability.

“It should be remembered that experimental results from prototypes are only accurate for the dimensions manufactured, which will vary within the tolerance of the drawing. Meanwhile, the analysis model used by CAE will reproduce the performance in the centre of tolerance.

“Mass-produced transmissions do not have a median of all dimensions, therefore, performance predicted with ideal drawing dimensions is only an indication. In NVH evaluation, we aim to predict performance variability by simulation of Romax Spectrum instead of testing products.”

Mr. Sasaki continued, “Two years have passed with Daihatsu using DNGA as an indicator for car making. We will continue to make good quality inexpensive cars. Romax Spectrum is our entrance to CAE simulation in transmission development, and it is indispensable in our process. We will continue to use Romax Spectrum to reduce the number of prototypes, the number of evaluation steps, and improve the evaluation accuracy.

“We use Romax Spectrum to make an analysis model of a transmission simply and quickly and combine its simulation results with those from other connected CAE software tools. By expanding the scope of Romax usage, we develop more efficient products. “

“ Modelling the internal behaviour of a gear train is complicated due to the number of interactions and many operating conditions, so developing a design that satisfies performance requirements can take significant evaluation time. Daihatsu chose Romax Spectrum because of its ability to create an analysis model with quicker calculation times, allowing the study of more conditions resulting in better designs more quickly. With Romax Spectrum, we can efficiently use CAE at each development stage because it can flexibly cope with both Timoshenko beam models which can contribute to low CPU cost and quick calculation and finite element models which can perform more accurate analysis”

Mr. Yuuichi Sasaki,
Drivetrain Development Div
Daihatsu



Hexagon is a global leader in sensor, software and autonomous solutions. We are putting data to work to boost efficiency, productivity, and quality across industrial, manufacturing, infrastructure, safety, and mobility applications.

Our technologies are shaping urban and production ecosystems to become increasingly connected and autonomous – ensuring a scalable, sustainable future.

Romax, part of Hexagon's Manufacturing Intelligence division, provides world-leading solutions for the design, analysis, testing and manufacture of gearboxes, drivetrains and bearings. Learn more at romaxtech.com. Hexagon's Manufacturing Intelligence division provides solutions that utilise data from design and engineering, production and metrology to make manufacturing smarter.

Learn more about Hexagon (Nasdaq Stockholm: HEXA B) at hexagon.com and follow us [@HexagonAB](https://twitter.com/HexagonAB).