Integrated Analysis of Energy and Thermal Management in the Vehicle

TESIS DYNAware and MAGNA Powertrain Engineering Center Steyr, have signed a cooperation agreement for the integration of their software. The coupling of the DYNA4 virtual complete vehicle with the KULI® thermal management simulation software will enable an integrated analysis of the energy and thermal management in the vehicle to be performed. In hybrid and electric vehicles in particular, there are many interdependencies between the energy and heat flows that need to be considered when designing an efficient operating strategy and the cooling circuits. The DYNA4-KULI® combination will produce an integrated development environment for this purpose. In particular, it enables the function development and evaluation of the hybrid control unit (HCU) to be carried out with regard to thermal operating safety and warm-up of the internal combustion engine. For tests in an electrified complete vehicle, the DYNA4 simulation framework offers mechanical and electrical model components and a driver model for virtual test drives. KULI® provides the thermal components for the analysis of heating, cooling, and interior air conditioning systems.

"KULI® is an optimum expansion for the DYNA4 simulation framework and provides our customers with a detailed view of the energy dynamics in the vehicle," said Christian Zahn, Chief Executive Director of TESIS DYNAware, describing the benefits of the cooperation. On behalf of Magna...
Powertrain Franz Dorfer, General Manager of the Engineering Center Steyr, also sees a wide range of advantages for KULI® users: “To gain a comprehensive view of the energy management system, it is often necessary today not to restrict oneself merely to the cooling and air conditioning system. For that reason, the DYNA4 modular simulation framework in combination with KULI® offers an excellent platform for integrated analysis.”

The DYNA4 simulation framework offers the possibility to easily simulate all types of hybrid vehicles in a modular way, from mild hybrids through to full hybrids. These can be individually adapted and simply expanded by the addition of the user’s own models, such as specific battery models, thus making different hybrid vehicle versions available for operating strategy design at the click of a mouse. DYNA4 enables virtual test drives to be carried out on standard test cycles such as NEDC, FTP and 15 Mode, and also includes a flexible traffic environment with links to navigation data. This means that individual test cycles can also be set up to examine predictive energy management functions. Integration with the KULI® thermal management simulation tool now also allows a detailed analysis of temperature influences to be performed, including weather-related environment factors, the cooling of vehicle components, and interior air conditioning. All cooling-relevant components are therefore also represented in the KULI® models. In hybrid and electric vehicles, such an analysis is vitally important for the vehicle’s driving range, its realistic overall energy consumption, and its thermal operating safety. Factors relevant to energy consumption, such as the cooling of batteries, power electronics, or electric motors, can be analyzed. A further typical analysis scenario is the evaluation of concepts for heating or cooling the occupant cell and their effects on the vehicle’s electric driving range. On the basis of the DYNA4 and KULI® modular platforms, this combination provides the ideal development environment for the integrated analysis of energy and thermal management in the vehicle.

The integrated DYNA4-KULI® software solution will be presented for the first time at the KULI® users’ meeting on June 29, 2011, in Steyr, Austria.

Munich, 2011-06-01

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About TESIS DYNAware

TESIS DYNAware is your key to cutting-edge technology solutions for vehicle simulation. For more than 19 years, the automotive industry has been benefiting from the efficiency-enhancing simulation solutions of TESIS DYNAware in the development of electronic control units and components.

The products and services of TESIS DYNAware are focused on sustainably supporting our customers’ innovation and development processes, as is well-documented in numerous customer references. In accordance with this objective, TESIS DYNAware integrates the simulation models and work processes of our customers and its own model components and process tools into an overall solution that supports the development process. This experience in model integration and our process expertise have been combined to form the DYNA4 simulation framework. At the same time, the extensive range of applications for DYNA4 reflects the core competencies of TESIS DYNAware: simulation solutions for new engine and powertrain concepts, driving dynamics control systems, driver assistance systems, for energy management and the complete vehicle.

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About MAGNA Powertrain, Engineering Center Steyr

The Engineering CENTER STEYR (ECS) is the ‘center of excellence’ for world class automotive engineering services within Magna Powertrain, group of Magna International, the most diversified automotive supplier around the world.

ECS, located in St. Valentin / Austria, provides a high range of services for manufacturer of passenger cars and commercial vehicles in Europe, Asia and America.

- Commercial Vehicle Engineering
- Powertrain Systems
- Software & Simulation
- Electronics & Electric
- Testing Services
- Production.

ECS is a world leader in the automotive industry. Program development time scales are greatly reduced by incorporating Lean Engineering. ECS has a global engineering network, providing worldwide support for our customers to ensure a successful transition from concept through to production.

Software products, developed by ECS, like FEMFAT (fatigue life prediction) and KULI (complete vehicle energy & thermal management), have been used by all major OEM’s for many years. The appropriate handling of these programs turns concepts like “lightweight” and “CO2 reduction” into reality.

A 40-hectare on-site proving ground for function and endurance testing, 16 fully automated engine test benches, 3 drive train test benches, a fatigue laboratory, and finally a state-of-the-art 4WD chassis dynamometer for functional, NVH and emissions optimization for complete vehicles up to 4.5t axle load make the ECS to a real full-service supplier.

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