

APA for Heavy Industry

When it comes to heavy industry, Altair HyperWorks and the Altair Partner Alliance (APA) software provide engineers the simulation tools to design large equipment that will operate under extreme loading environments. The APA grants customers access to partner applications using their existing HyperWorks Units with little or no incremental cost, under one simple licensing model.

Learn more about the APA and the products mentioned below at www.altairhyperworks.com/apa.

Noise, Vibration and Harshness (NVH) Simulation

AlphaCell, AVL EXCITE™ Acoustics, Coustyx, EFEA, Insight+, SEAM, VMAP

An important factor in improving heavy equipment quality and perception is guided by how they are designed for NVH.

APA users can simulate noise among all frequencies, accurately perform model correlation, modal analysis, and test vibration on various material models, including heterogeneous, poro-elastic, visco-elastic, screens and fabrics.

Durability, Fatigue & Reliability Analysis

CAEfatigue VIBRATION, FEMFAT, LW Finder, nCode DesignLife, RAMDO, S-Life

Heavy equipment engineering involves designing products to operate in harsh environments under severe conditions. Customers in the heavy industry demand machines, equipment and vehicles with service life measured in decades.

With APA software, simulate vibration fatigue, strength, uncertainty quantification, reliability analysis, reliability based design optimization weld analysis, ect. using actual loading conditions, apply random response options to reduce the need for physical testing and decrease manufacturing costs and identify the ideal strain gauge placement.

Composite Modeling & Analysis

CoDA, CONVERSE, KTex Family, MultiMech

In heavy equipment, machines and vehicles, increasing payload and improving fuel economy while meeting performance and safety requirements is a competitive advantage. Composites are playing an important role in lightweighting and optimization. Composites also offer tailored properties, desirable material properties and flexibility in manufacturing.

In addition to optimizing composite materials, APA software provides micromechanical modeling, structural analysis, detailed failure and stress analysis, crush analysis and fiber orientation of reinforced plastics and mold-filled parts.

Impact Analysis & Ergonomics

Crash Cad Calculate, Cross Section Creator, MADYMO, Santos® Pro

Occupant safety and managing the energy in a crash event are important in protecting operators. By testing the effects of impacts at various velocities, engineers can better anticipate where more work is necessary to achieve ultimate safety in heavy equipment.

APA software can help ensure occupant safety with the ability to analyze virtual dummy models and the effects experienced at impact. APA software can also be used for human-centered design to analyze ergonomics of the equipment and determine whether actions can be performed without strain. Users also possess the ability to optimize and design thin-walled cross sections for beams by swapping out materials and placement and comparing results to find the best combination.

Manufacturing Processes

Additive Works, AFDEX, Design Profit, Materialise 3-matic, NovaFlow&Solid, Virfac®

Manufacturing processes involve high development costs to set up tool and die designs if done only by trial and error — simulation of these processes can identify and rectify manufacturing defects before production to improve part quality. Casting, welding and 3D-printing processes can be simulated by APA products.

Electromagnetic Analysis

Optenni Lab, SENSE

Today's commercial trucks, off highway equipment, and specialty vehicles include advanced electronics including infotainment systems, navigation systems, etc. It is becoming more common for a lot of agricultural machinery to be remote controlled or fully automated. Complementing Altair's electromagnetic simulation tools (FEKO™, WinProp™ and Flux™), APA enabled-customers can use Optenni Lab to quickly and easily design matching circuits for antenna systems and SENSE for touch screen designs.

Systems Simulation

AVL Cruise™ M, CarSim, ChassisSim, CosiMate, DSHplus, Flow Simulator, MapleSim, ModelCenter®, XLDyn

System level modeling tools simplify the heavy equipment analysis process by allowing users to understand overall system behavior in a matter of seconds. Multibody dynamics (MBD), 1D and physical system modeling tools within the APA help users model and analyze systems at different levels of detail that yield best performance.

Computational Fluid Dynamics (CFD) Analysis

AcuNexus, AVL FIRE™ M, FieldView Express, scSTREAM, SC/Tetra, TAItherm

Using Computational Fluid Dynamics (CFD) in the product development process helps heavy industry engineers solve problems involving the flow, heat transfer and stress of fluids. Altair and the APA Partners provide a number of solutions, such as aerodynamics analysis to help reduce any extra friction produced by different aspects of the equipment. Electronics cooling, thermal management, HVAC system and air conditioning system analysis are all also key factors for creating a comfortable and safe vehicle.

Illumination & Optical Design

TracePro

Illumination and optics are a key component of any large equipment vehicle. Making sure operators can see in low light conditions and view interior displays are vital to vehicle safety. Lighting designers can use TracePro for the design and analysis of interior lighting, exterior lighting, instrument panels, and head-up displays.

Material Information

CES Selector, Matereality Workgroup Database Pro, Total Materia

Use APA software to access a comprehensive materials database and quickly pre-screen materials to identify the most promising solution before investing significant time in a design. Making the correct material choice at the start of the process minimizes costs of both materials and development. Build and maintain a fully scalable material database, and empower team members with data ownership while still achieving consolidation. Data is always globally available precisely when you need it.



Altair Engineering, Inc., World Headquarters: 1820 E. Big Beaver Rd., Troy, MI 48083-2031 USA
Phone: +1.248.614.2400 • Fax: +1.248.614.2411 • www.altair.com • info@altair.com

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