SIMULIA

3DEXPERIENCE®

PowerFLOW 6-2019

IMPROVING THE PRODUCT DESIGN & DEVELOPMENT PROCESS THROUGH SIMULATION

Unique, inherently transient Lattice Boltzmann-based physics allows SIMULIA's PowerFLOW® to perform simulations that accurately predict real-world conditions. Using the PowerFLOW suite, engineers evaluate product performance early in the design process prior to any prototype being built—when the impact of change is most significant for design and budgets.

SOLID SOLUTIONS FOR TRANSPORTATION

PowerFLOW accurately simulates fluid flow design problems for numerous transportation industry sectors including: Automotive, Commercial Vehicle, Off-Highway, Train, Motorsport, Motorcycle, Military Vehicle, Bus, Aerospace and others.

SIMULIA offers validated application solutions and best practice methodology for:

AERODYNAMICS: aerodynamic efficiency; vehicle handling; soiling and water management; panel deformation; driving dynamics

AEROACOUSTICS: greenhouse wind noise; underbody wind noise; gap/seal noise; mirror, whistle and tonal noise; sunroof and window buffeting; pass-by/community noise; cooling fan noise

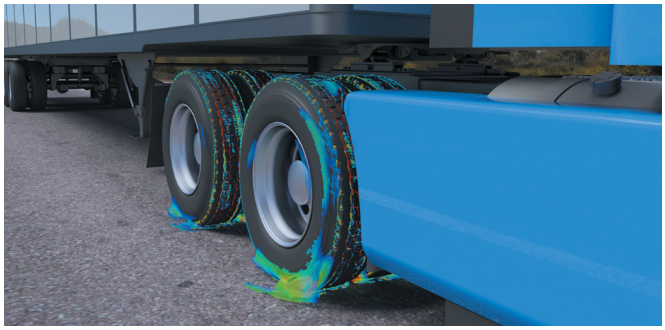
THERMAL MANAGEMENT: cooling airflow; thermal protection; brake cooling; drive cycle simulation; key-off and soak; electronics and battery cooling; RoA/intake ports

CLIMATE CONTROL: cabin comfort; HVAC unit & distribution system performance; HVAC system and fan noise; defrost and demist

POWERTRAIN: drivetrain cooling; exhaust systems; cooling jacket; engine block

SOILING AND WATER MANAGEMENT: A pillar overflow, dirt and dust accumulation, tire spray

DASSAULT SYSTEMES



TRUE ROTATING GEOMETRY

PowerFLOW's ability to simulate true rotating geometry enables practical and accurate prediction of noise and performance of HVAC and cooling fans—simply not possible using standard rotating reference frame models. It also improves accuracy for any application that has rotating components and is transient in nature. Applications include:

- Fan noise and performance:
  - simulations for axial flow fans, centrifugal fans, mixed flow fans and cross flow fans,
  - ability to analyze flow rates, pressure rise
- Brake cooling
- Wheel aerodynamics
- Pumps, blowers, turbines, mixers and more

COUPLED SIMULATIONS

PowerFLOW seamlessly couples with other SIMULIA applications to perform expanded applications:

- **PowerTHERM®**: predicts surface temperatures and heat fluxes generated with fully coupled state-of-the-art radiation and conduction solver.
- **PowerCOOL®**: predicts heat exchanger performance and top tank temperatures with fully coupled cooling system simulation model
- **PowerACOUSTICS®**: predicts and analyzes aeroacoustic noise

DIGITAL WIND TUNNEL™

- For validation with experimental data it's important to simulate the physical wind tunnel setup along with the model.
- For external flow studies, PowerFLOW comes with ready-to-use parametric digital wind tunnel templates for aerodynamic and aeroacoustic simulations
- Standard digital wind tunnel templates may be customized to conform to your wind tunnel
- The Digital Wind Tunnel model includes:
  - Static and moving ground plane modeling to more accurately reflect real world conditions
  - Boundary layer suction point to match experimental wind tunnels
  - Specification of a known experimental boundary layer inlet profile

RAPID SIMULATION TURN-AROUND TIME

- PowerFLOW is architected from the ground up for operation in high performance computing environments in order to achieve the fastest possible simulation times—providing near linear scalability up to hundreds of processor cores
- One model, many simulations: once a surface mesh model is prepared, our best practices detail how the same model may be used to perform additional simulations (such as thermal or aeroacoustic) using SIMULIA's integrated suite of products.

WHAT'S NEW WITH THE 6-2019 RELEASE?

- Improved noise prediction for applications such as greenhouse wind noise,fan, exhaust, and HVAC systems
- Increased accuracy for aeroacoustics noise prediction as well as for general thermodynamics in high subsonic simulations
- Freeze velocity in certain areas of the simulation domain for aerodynamics simulations
- A new hybrid transonic-high subsonic solver for noise prediction in engine-wing-body configurations
- Consistent heat transfer prediction at thermal boundaries for all flow regimes, from low subsonic to transonic
- Improved accuracy for turbomachinery applications, such as aircraft engines
- Run human thermal comfort simulation using distributed and hybrid parallel processing
- The updated Stellar 2019X version improves on the realistic rendering performance of PowerVIZ

DASSAULT SYSTEMES | The **3D**EXPERIENCE® Company

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