

DIGITAL INDUSTRIES SOFTWARE

Simcenter FLOEFD LED module

Accurate thermal and optical simulation for successful luminaire product design

Benefits

- Advanced lighting focused simulation capabilities for designers to analysts
- Predict accurate operational LED light output (hot lumens) and temperature
- Achieve highly accurate radiation simulation using an advanced Monte Carlo radiation model with spectral absorption, reflection, refraction and scattering characteristics
- Enable LEDs to operate within the limits of the vendor's specs and avoid reliability issues and warranty recall costs
- Facilitate transient film condensation/icing simulation

Summary

Simcenter[™] FLOEFD[™] is a fully CAD-embedded computational fluid dynamics (CFD) software for frontloading fluid flow simulation and heat transfer analysis earlier in product development. By allowing lighting engineers and designers to perform simulation earlier, directly in the CAD environment and using native geometry directly, you can elminate tool and data translation delays for a shorter, more efficient analysis workflow. The LED module provides additional lighting focused capabilities for radiation analysis, condensation simulation, and highest fidelity modeling of Light-emitting-diode (LED) thermal and optical performance.



A halogen bulb modeled for automotive headlights.

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Benefits continued

- Enable import of detailed thermal and photometric models from Simcenter Micred T3STER and Simcenter Micred LED Tester
- Specify forward current for LEDs and Simcenter FLOEFD, enabling users to calculate the correct thermal heating power, and, hence, the correct operating temperature



Accurate modeling of radiation and condensation/icing

- Monte Carlo radiation model for simulating absorption and scattering of radiation in semi-transparent solids such as glass as well as considering effects such as refraction, specular reflection and wavelength dependency (spectrum properties of the radiation)
- Discrete Ordinates this radiation model solves the radiative transfer equation for a finite number of discrete solid angles, each associated with a vector direction which allows the solution of radiation in absorptive (semi-transparent) media and to model spectral dependencies
- Condensation model capable of simulating thin film condensation, evaporation and icing/de-icing and a water absorption model that enables solids to absorb humidity and release it again in the right environmental conditions



Evaluate lighting performance with advanced radiation results visualization

- Ray trajectories can be plotted from Monte Carlo radiation studies
- Near Field Illuminance and Far Field luminous intensity (luminous flux per unit solid angle) calculations help engineers analyze the optical performance of a light-emitting system when modeled with Monte Carlo radiation and using spectral characteristics defined.

A combined thermal and photometric model for LEDs

- Import RC-ladder compact thermal models using measurement data from Simcenter[™] Micred[™] T3STER hardware and optical data from Simcenter[™] Micred[™] LED Tester hardware.
- Starter pack of LEDs for popular lighting applications: Cree XT-E, Osram Golden Dragon, Seoul P4 and Philips Luxeon Rebel
- Import your own LED models into an engineering database

Precise LED optical performance prediction at operating junction temperature

- Calculate the light output (lumen) of the LEDs to see if these meet design goals for light output and uniformity
- Pulse-width modulation, to control the brightness of LEDs, can be modeled for thermal-electrical-optical LED models. You can set the duty cycle as a percentage which allows for an easier and more accurate definition of the LED boundary condition.
- Photoluminescence and Mie scattering of phosphor particles can be simulated.
 Temperature dependency of the luminous efficiency is taken into account. You can improve accuracy and detail for LED models as well as LASER lights where originally blue light gets converted to white light.

Advanced lighting thermal and optical simulation directly in your CAD environment

Design reliable, high performance lighting products faster using Simcenter FLOEFD, fully CAD embedded CFD simulation software. The Simcenter FLOEFD LED module advanced capabilities enhance virtual development for traditional lighting, LED and Laser lighting applications in consumer, industrial, to automotive industries and beyond.









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