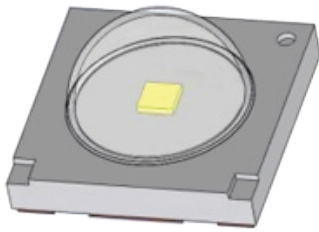
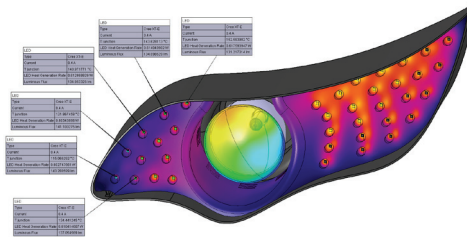


FloEFD LED Module



CAD model of a LED



Automotive headlight model

Mentor Graphics' Mechanical Analysis Division has been a leader in electronics cooling since 1989 and has pioneered thermal characterization and analysis of ICs and LEDs. With FloEFD's concurrent CFD, software that connects directly with your CAD software, users can simulate airflow and heat transfer using 3D CAD models directly, with no need for data translations or copies.

More specifically, the LED Module for FloEFD is an industry first providing a unique set of additional analysis capabilities for lighting engineers and designers. Capabilities added to FloEFD are:

A combined thermal and photometric model for LEDs:

- Import of RC-ladder compact thermal models created by Mentor's Transient Thermal Tester 'T3Ster' (Ref. 1) with optical data from TeraLED (Ref. 2)
- '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 FloEFD's Engineering Database

Correct Power and Temperature Prediction:

- Specify forward current for your LEDs and FloEFD calculates the correct thermal heating power, and hence the correct operating temperature.
- Accurate thermal radiation model that is capable for simulating absorption of radiation in semi-transparent solids such as glass as well as taking into account effects as refraction, specular reflection and wave-length dependency (spectrum properties of the radiation).

Lumen output from your design ('hot lumens'):

- As part of the analysis FloEFD calculates the light from the LEDs in your design so you can see whether these meet your design goals for light output and uniformity.

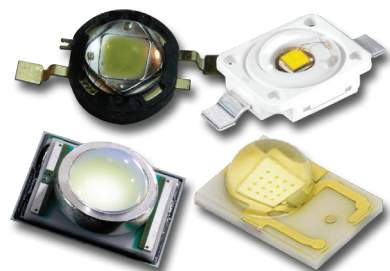
Benefits:

- Predict accurate operational light output (hot lumens) and temperature for your LED in situ.
- Design concurrent SSL workflow embedded within your preferred MCAD system yielding:
 - faster, high-fidelity, right-first-time product designs in the shortest timescale possible,
 - fewer design iterations, reduced development costs and fastest time to market.
- Ensure compliance with LED vendor's specs and avoid reliability issues and warranty recall costs.
- Thermal and photometric models used are fully compliant with relevant CIE and JEDEC standards (Refs 3,4).
- Contact your supplier for photo-thermal models generated by T3Ster TeraLED.

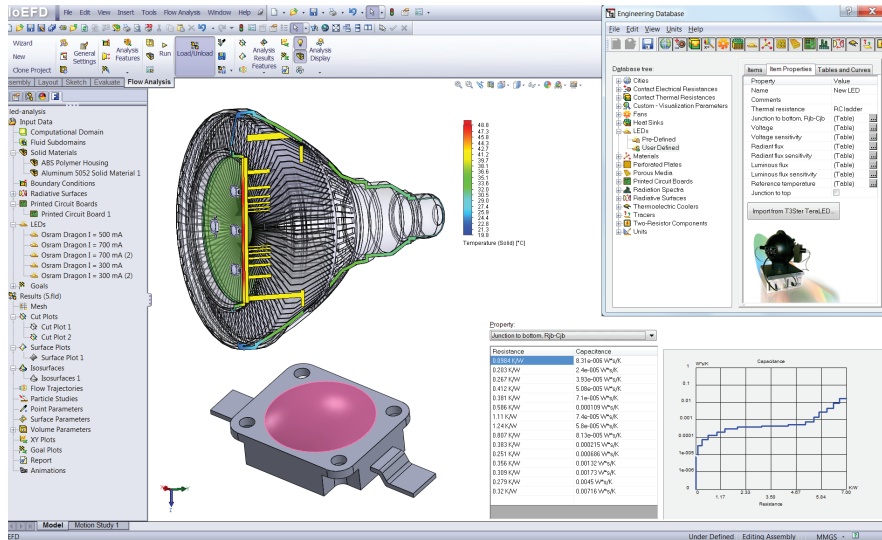
"What-if?" Testing Made Easy

One of the most powerful features of FloEFD is the ease with which you can conduct "what-if?" analyses. FloEFD makes it simple to clone/modify your models and analyze design variations. The process is very simple. Create your base model and analyze it. Then create multiple variations of your design by modifying the solid model without having to reapply boundary conditions, material properties etc. When the analysis is complete, use FloEFD's Compare Results Tool to select the best possible design variant from the options analyzed. When you are satisfied with your design, publish your report at a touch of a button. You can even publish a fully interactive 3D dynamic plot and share it with colleagues or customers.

FloEFD is a general-purpose CFD solution embedded in CATIA V5, PTC Creo and Siemens NX for use by design engineers and analysts concurrently within the design flow. FloEFD's user interface and help is available in Japanese, Chinese, French and German. By providing a deeper understanding of design performance earlier in the product creation process FloEFD reduces risk, design rework and time and ensures a right first time design, speeding up the start of volume manufacture.

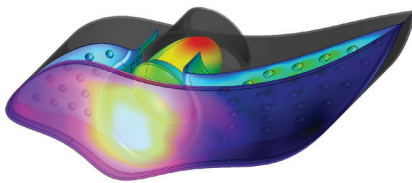


LED Module Interface



Automotive Lighting

Headlights, Tail Lights, DRL...



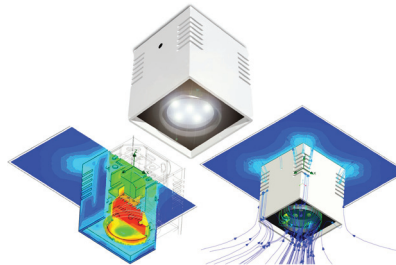
Architectural & Signage

Exterior, stadia, videowalls, advertising...



General Lighting

Indoor residential, office, commercial...



LCD Backlighting

TVs, Tablets, SmartPhones...



Industry News:

"LEDs shipped to use in headlamps are forecast to grow significantly from 10 million units in 2012 to 78 million units in 2018. The quality, lifetime and reliability requirements in the automotive sector are very high, higher than most other LED sectors."

— Jamie Fox, lighting and LEDs research manager for IHS

References

- <http://www.mentor.com/products/mechanical/products/upload/t3ster.pdf>
- <http://www.mentor.com/products/mechanical/products/upload/tered.pdf>
- "Implementation of the Electrical Test Method for the Measurement of Real Thermal Resistance and Impedance of Light-Emitting Diodes with Exposed Cooling" JESD51-51, April 2012
- "Guidelines for Combining CIE 127-2007 Total Flux Measurements with Thermal Measurements of LEDs with Exposed Cooling Surface" JESD51-52, April 2012

For the latest product information, call us or visit: www.mentor.com/mechanical

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