FloEFD – Frontloading CFD for Automotive Lighting & ADAS

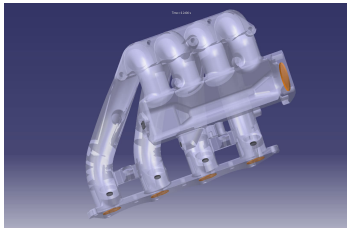
Alexey Kharitonovich

what is FloEFD?

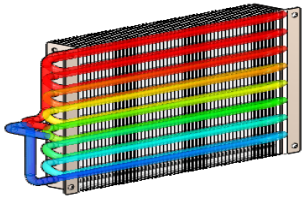
FloEFD – General Purpose CFD Simulation Software

CAD embedded CFD for Thermal-Radiation-Fogging-Flow management

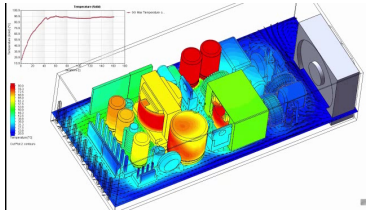
SIEMENS
Ingenuity for life



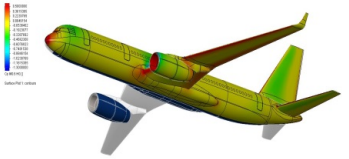
MIXING FLUIDS



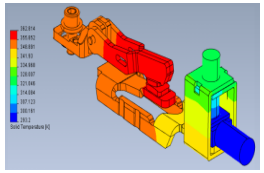
REFRIGIRANTS (Real Gas)



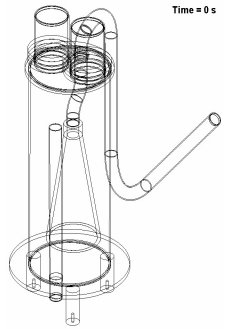
ELECTRONICS COOLING



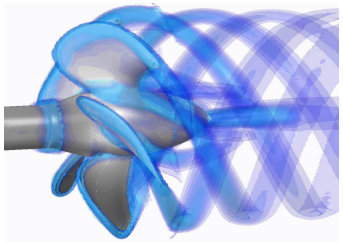
AERODYNAMICS



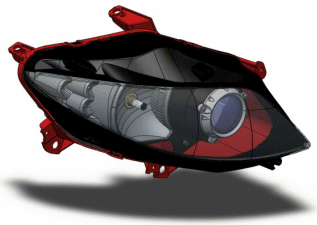
JOULE HEATING



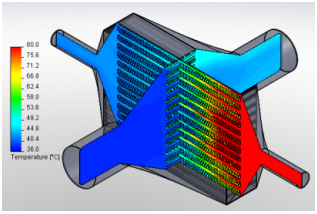
FREE SURFACE



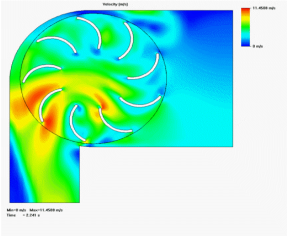
CAVITATION



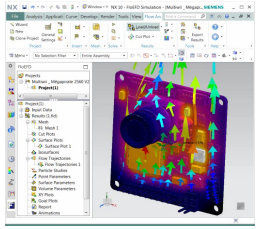
CONDENSATION



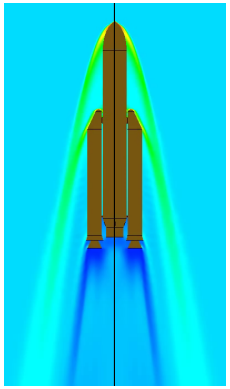
HEAT EXCHANGER



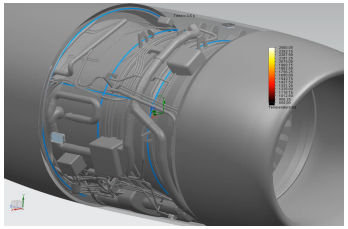
ROTATING EQUIPMENT



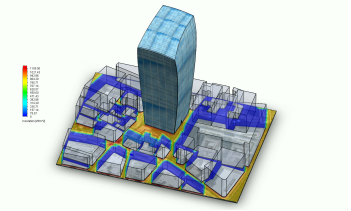
PCB MODELING



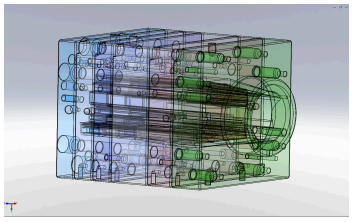
SYPERSONIC



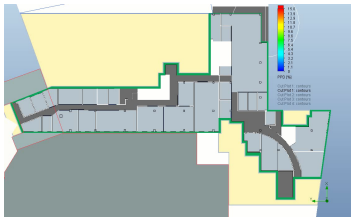
COMBUSTION



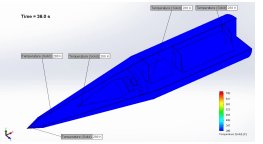
RADIATION



NON-NEWTONIAN



VENTILATION



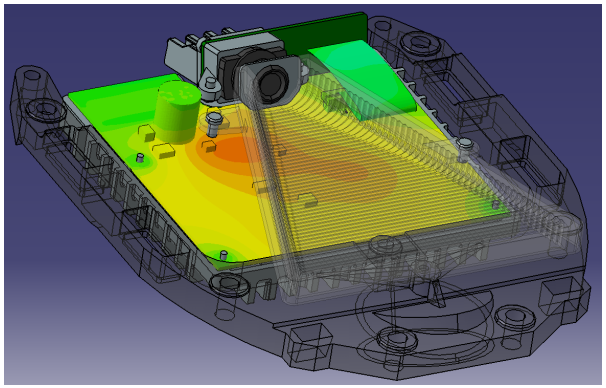
AEROHEATING

why FloEFD?

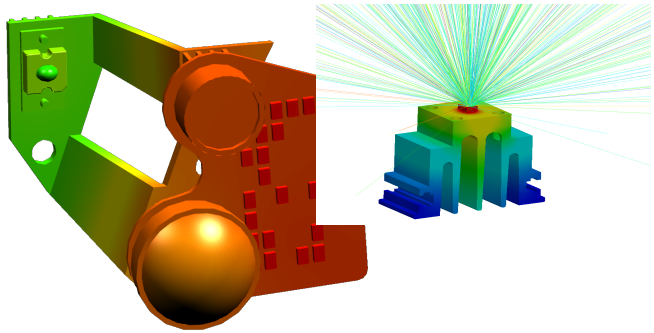
FloEFD – CFD adjusted for AL and ADAS

Developed together with Automotive Lighting and ADAS Engineers

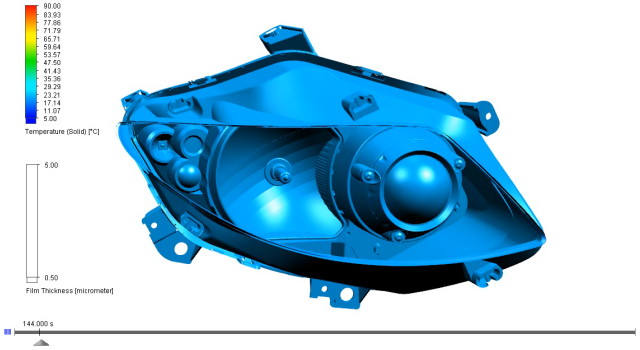
SIEMENS
Ingenuity for life



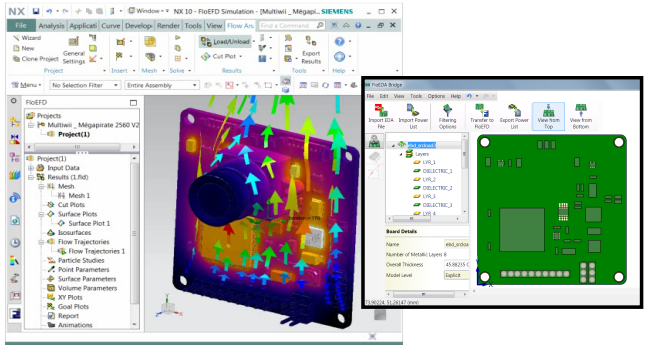
Thermal Management in CATIA V5



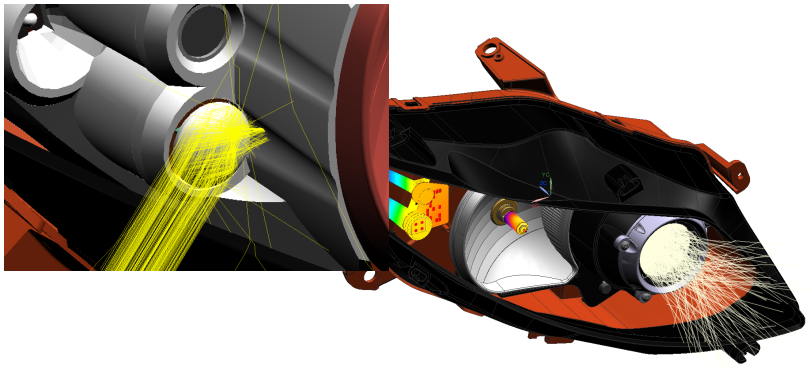
Thermal-Optical-Electrical LED model



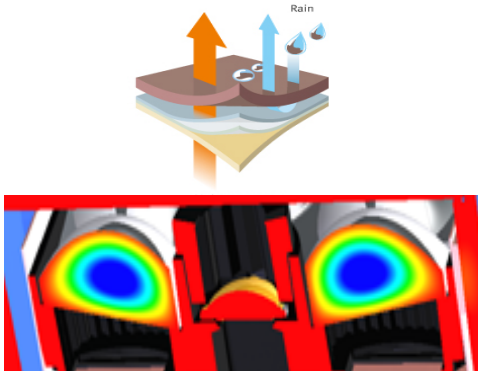
Fogging and Defogging



EDA Import and Joule Heating



Thermal and Solar Radiation and Ray Tracking



Water Sorption and Membrane

FloEFD – CFD powered by Hardware Measurement

LED Thermo-Optical-Electrical Compact Model Generated by Measurement

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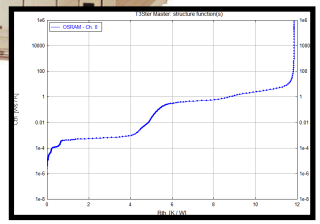
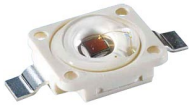
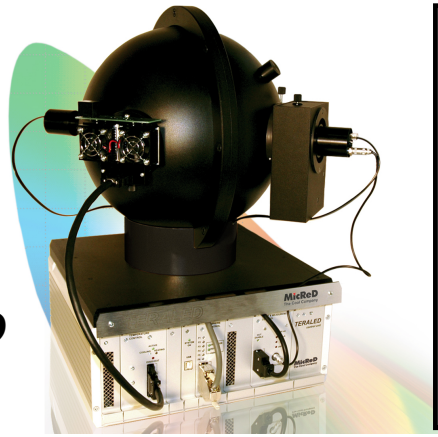
T3Ster

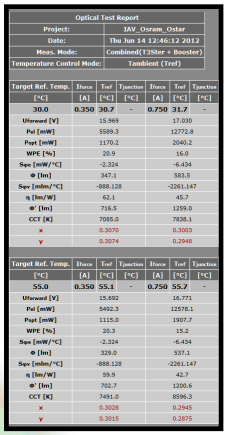
Thermal
Characteristics
(Structure Function)





TeraLED



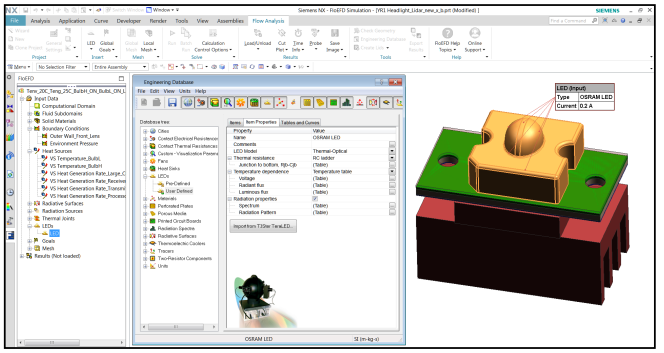


Optical and **Electrical**
Characteristics
(Diode characteristics,
Radiant, Luminous Flux)

Thermo-Optical-Electrical
Characteristics (.xCTM)

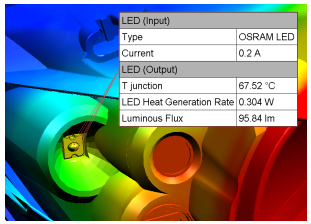
LED Thermo-Optical-Electrical Compact model

User Input: Forward Current (Ampere)



Output:

- **Junction T**
- **Dissipated Power**
- **Luminous Flux**



FloEFD – CAD embedded CFD (CATIA, NX, Creo, SE, SW)

Easy to use at early design stages by design engineers

SIEMENS
Ingenuity for life

Mentor Graphics & NX CAD

Circuit Board Development, Solid Model, Thermal Analysis

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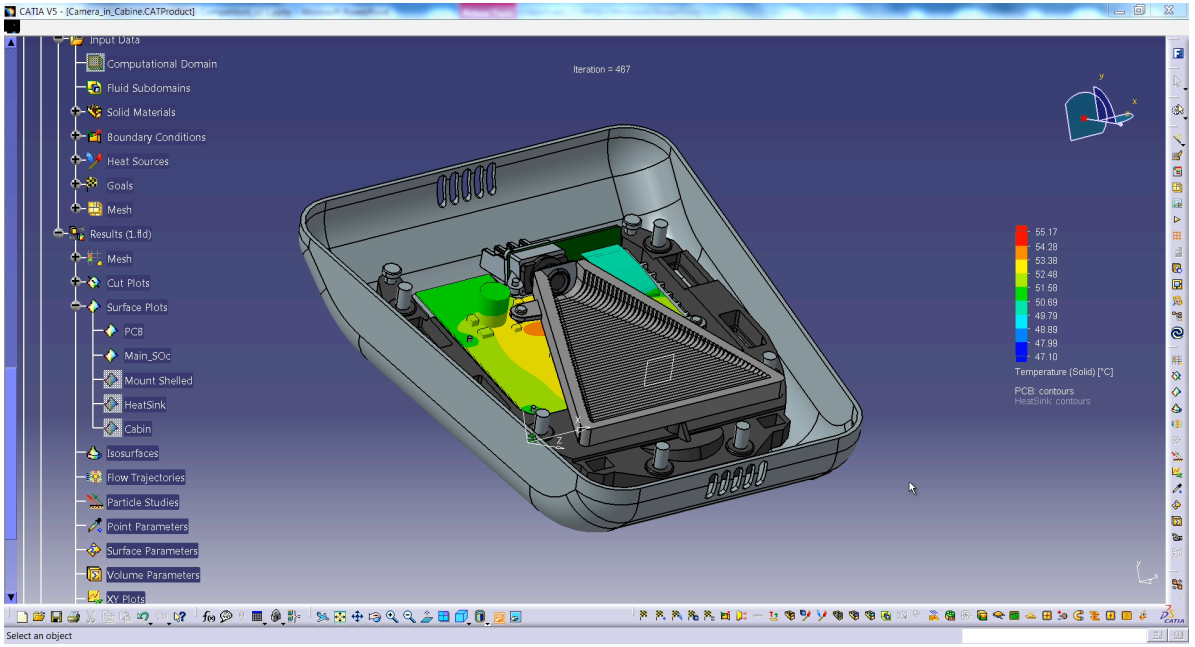
- PCB can be imported with different level of details, including explicit resolution of copper tracers and vias meaning that EDA data is imported into NX as solid geometry.



FloEFD – Unique SmartCell™ Technology

Traditional CFD solver is powered by analytical and empirical models for high productivity without sacrificing the accuracy

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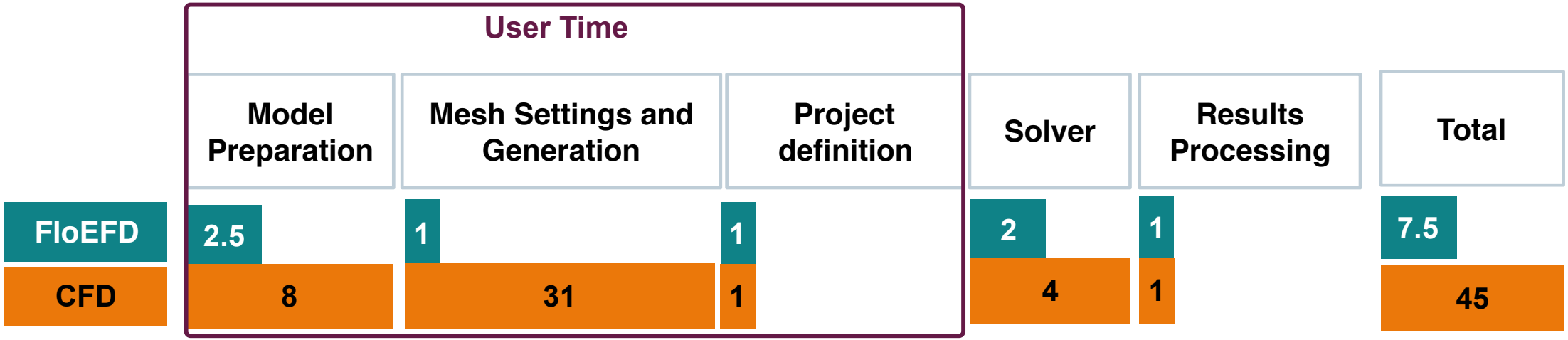

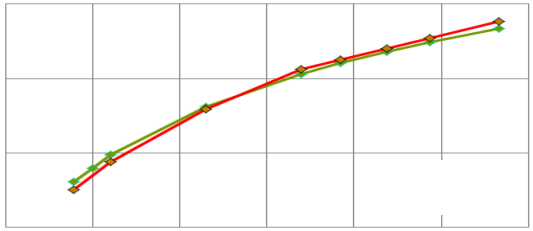

CFD vs FloEFD <1%

FloEFD – Frontloading CFD

Enables simulation at earlier design stages by various user persona

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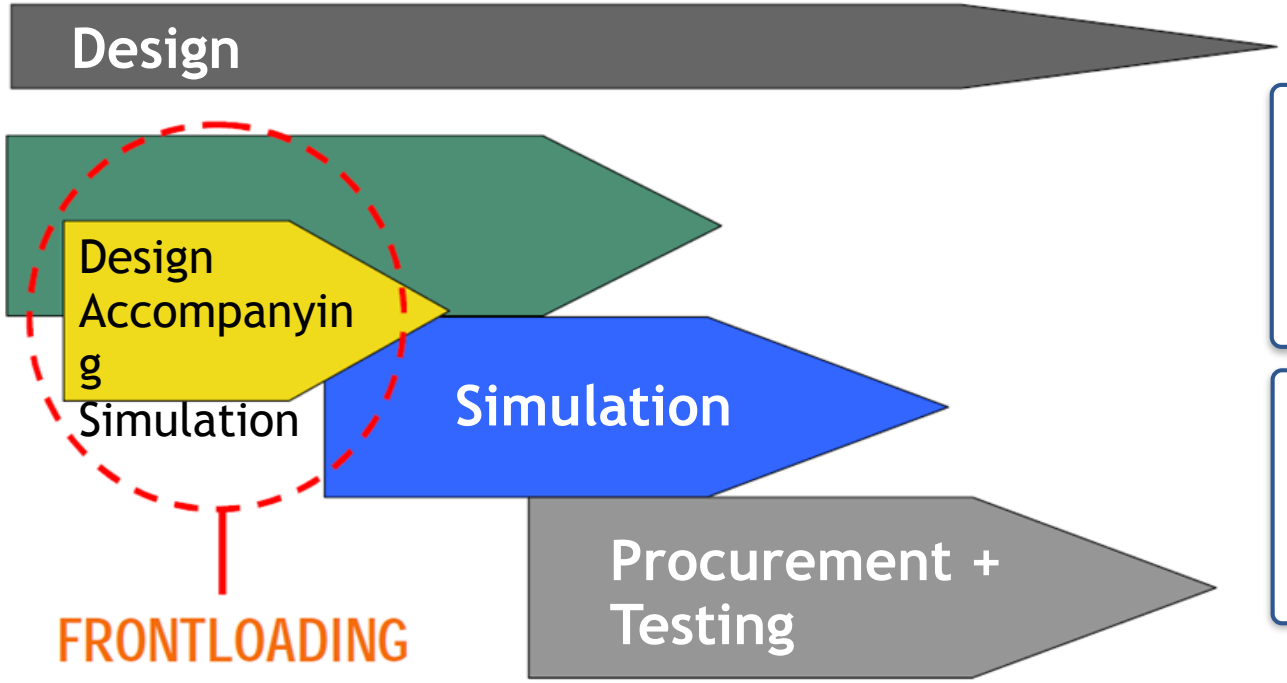

Recognizing tendencies, evaluating comparison concepts and first concept designs early

>> increase of design quality

In the following process, hardware and variant **iterations can be reduced**

>> decrease development time and cost