

Focus on Lighting Design

Advanced thermal, flow and structural analysis solutions

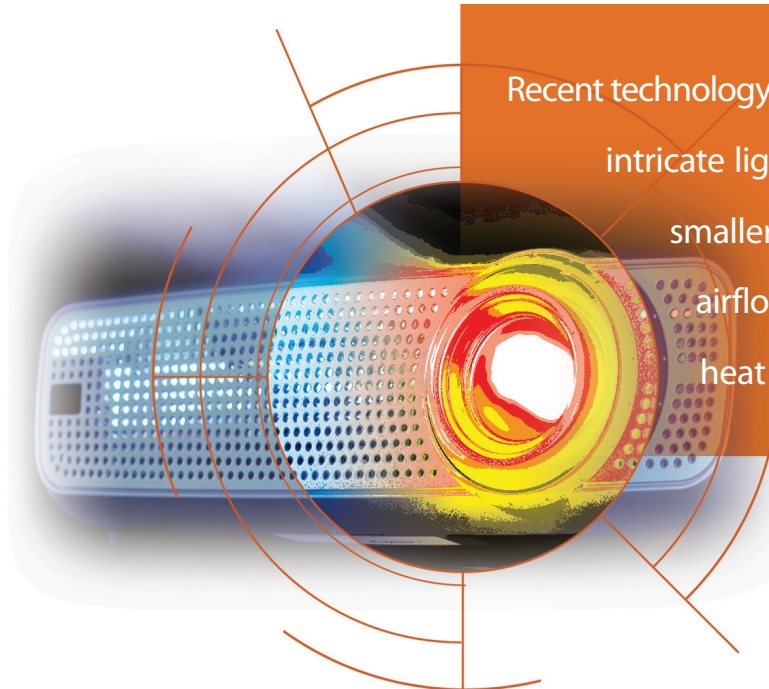
MAYA HTT Ltd is an engineering firm specializing in CAE services and software. With proven experience in thermal, 3D flow and structural analysis, we have developed unique expertise in lighting system design. MAYA's proficiency in this domain has led many international automotive, architectural and theatrical lighting manufacturers to rely on our solutions. We have also performed comprehensive analysis for digital display systems including multimedia projectors, digital cameras and televisions. Years of working with suppliers spanning many industries have given MAYA a solid technical foundation to support the lighting design process.



- ◆ LED lighting systems
- ◆ Automotive lighting systems including headlamps, fog lamps, tail lamps, CHMSL and dashboard displays
- ◆ LCD, DLP and plasma display systems including cameras, monitors, projectors and televisions
- ◆ Architectural and landscape lighting
- ◆ Theatrical lighting
- ◆ Detailed bulb simulation



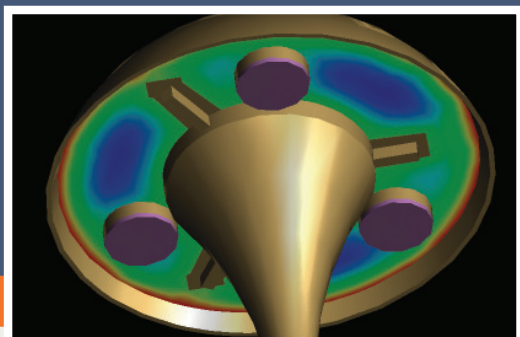
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Recent technology advances have resulted in increasingly intricate lighting systems being built inside ever smaller enclosures. This can lead to reduced airflow. When combined with the excessive heat generated by today's bright light

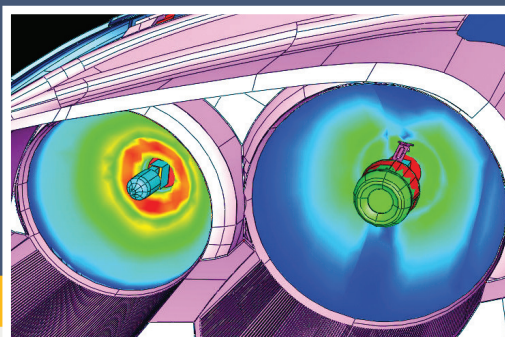
Our engineers have enabled companies like *Automotive Lighting, Decoma, Koito, North American Lighting, Stanley Electric US, Visteon* and others to maintain their market leading presence.

Lighting Design Simplified



Thermal Analysis

- Accurately model heat generated from high temperature light sources including HID's, LED's and incandescent lamps
- Quickly identify problem areas such as melt spots or burn marks
- Simulate heat dissipation under a wide range of operating conditions
- Incorporate ambient radiation from solar or environmental heat sources
- Simulate multi-layered and orthotropic conduction
- Incorporate variable material properties



Radiation Analysis

- Comprehensive thermo-optical properties specification
- Bi-spectral heat sources including visible and IR spectrum radiation
- Efficient Hemicube method for surface to surface radiation
- Iterative view factor correction eliminates residuals
- Automatic view factor calculations for complex enclosures
- Fast ray tracing for diffuse and specular reflections, transmission, and refraction

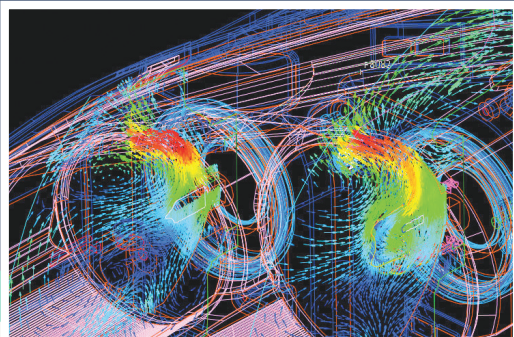
sources, the enclosure can quickly become overheated. The combination of these factors demonstrates the need to consider thermal issues throughout the design process. The ability to accurately model and simulate complex lighting assemblies provides valuable insight about thermal, flow and structural effects within the system and enables engineers to develop effective cooling strategies early in the process.

The MAYA HTT Solution

MAYA leverages powerful, in-house, CAE software to provide expert solutions for lighting companies. MAYA has been called upon to perform services such as:

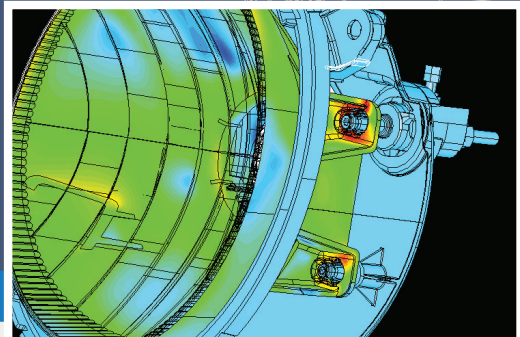
- Detailed 3D model development
- Comprehensive thermal, flow and structural analysis
- Design recommendations
- Material selection based on thermal performance

Analysis results are provided in a comprehensive report that can be used to develop cooling strategies, optimize design concepts, validate physical test data and improve the overall design process.



3D Flow Analysis

- Quickly identify areas with stagnant air flow
- Simulate ice formation and melting
- Predict areas and rate of condensation and evaporation
- 3D flow simulation completely integrated with thermal calculations
- Unstructured flow solver with tetrahedral meshing easily models arbitrary geometries
- Disjoint fluid meshes allows automatic modeling of disconnected enclosures



Structural Analysis

- Accurately calculate mounting point stress concentration and distribution
- Simulate dynamic response of lighting assemblies
- Perform specified test simulation including random vibration, static loading, impact and fatigue analysis

Geometry support

Automatic support for native CAD models from industry standard software including NX, I-deas NX Series, Solid Edge, CATIA, Pro/ENGINEER and SolidWorks, as well as CAD neutral files including IGES, STEP, and Parasolid.

Business Benefits

Accelerate engineering efficiency

Use simulation to gain insight into compact enclosures and quickly formulate effective cooling strategies.

Realize significant cost savings

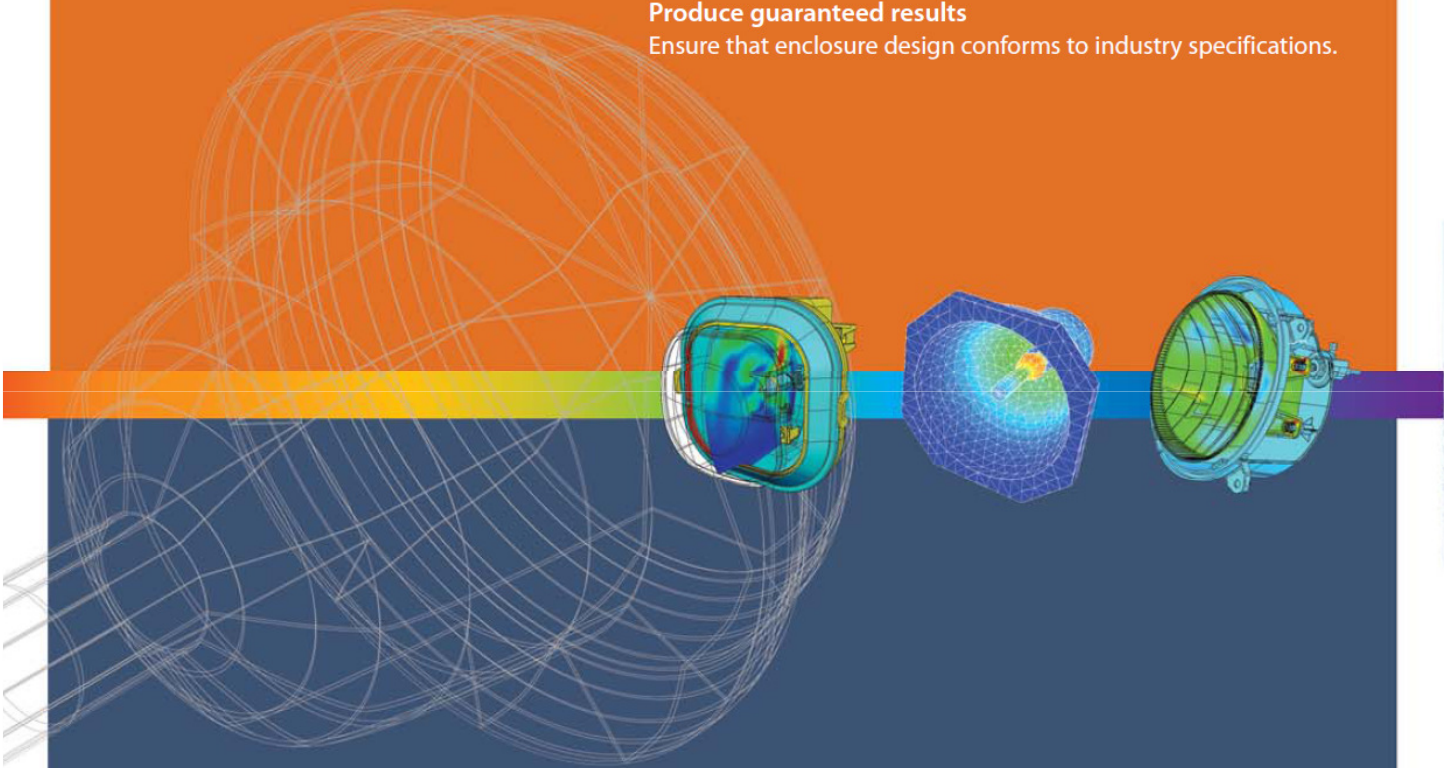
Reduce the need for multiple prototypes and product testing by optimizing the design through simulation.

Build design confidence

Analyze the impact of modifications and make guided decisions including enclosure size and design, vent locations and materials selection.

Produce guaranteed results

Ensure that enclosure design conforms to industry specifications.



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