FRED® Optimum

Photon ENGINEERING
Illuminating Ideas

Today's challenging optical design problems require advanced tools such as FRED Optimum to assist engineers during all stages of project development.

FRED Optimum is capable of simulating the propagation of light through virtually any opto-mechanical system… and there are no limits! Users can define as many sources, optical components, mechanical structures and rays as are needed to solve your problem. With its **64-bit architecture**, **CPU multi-threading, hybrid-optimization capability**, **parameter pickups**, **configuration management** and **built-in BASIC compiler**, FRED Optimum is guaranteed to be fast, accurate, expandable and cost-effective.

What is FRED Optimum?

FRED Optimum is Photon Engineering's most powerful edition of FRED and includes the following features:

- **64-bit architecture**
- **32 core CPU multi-threading**
- **Hybrid optimization**
- **Parameter Pickups**
- **Configuration Management**

64-bit Architecture

FRED Optimum's 64-bit architecture allows full utilization of the capabilities of modern computer systems. Expanded memory access for FRED Optimum 64 means that your system models can be built larger and raytracing times are significantly decreased. FRED Optimum 64 lets your engineers spend less time on data processing and more time on system design and analysis!

32 Core CPU Multi-threading

The most efficient way to perform raytracing and analyses operations is to distribute the computational workload among many CPU cores. FRED Optimum allows multi-threading up to a maximum of 32 cores and results in a significant savings in raytrace and analysis time.

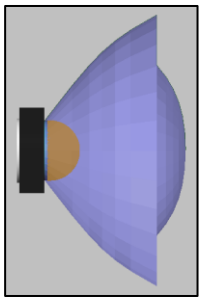
What are pickups and configurations?

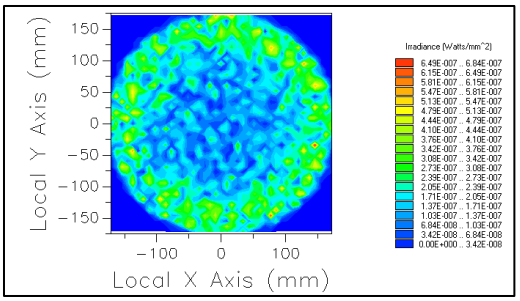
- Parameter pickups allow object specifications to be functionally linked together. Rather than have the user manually change each object to reflect the dependency, FRED handles these updates dynamically.
- Although a given raytrace and analysis is valid for a static state, the system may be designed to operate in a multiplicity of states (think of a zoom lens). FRED's configuration manager allows the user to quickly switch into different states without the need for multiple files.

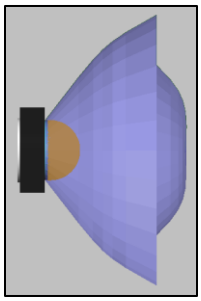
Hybrid Optimization

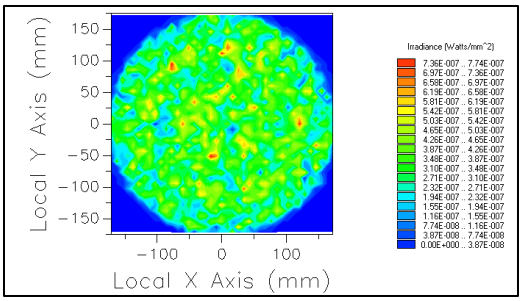
FRED Optimum's general optimization algorithm is non-sequential, allows for multiple targets, has fractional weighting capability for linking variables, and uses several built and user-scriptable merit functions. Simplex, simplex with multiple random restarts and simulated annealing are used to provide both local and global optimization capabilities.

440 South Williams Blvd, #106 – Tucson, AZ 85711 – 1-520-733-9557 – sales@photonengr.com – www.photonengr.com







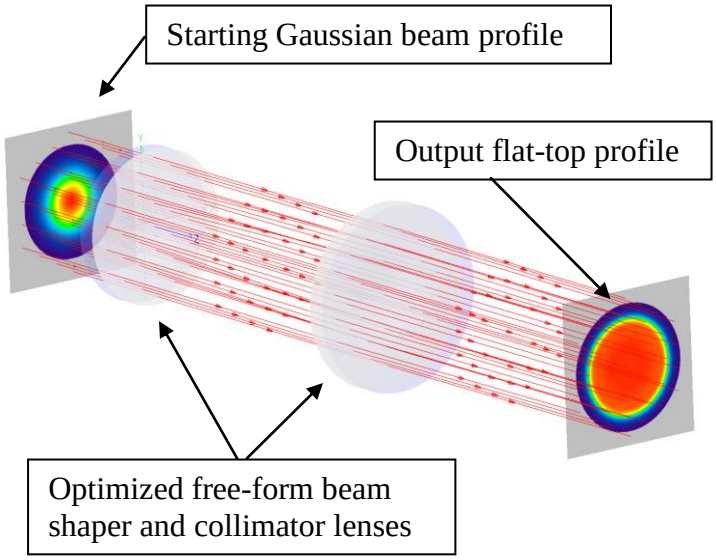


Optimization Example #1

- Goal:
  Optimize an LED hybrid optic for illumination uniformity
- Variables:
  NURB optic control point positions and weight factors
- Merit Function:
  Standard deviation of illumination distribution (uniformity) and detector power (transfer efficiency)
- Method:
  20 iterations using Downhill Simplex

Optimization Example #2

- Goal:
  Re-shape a Gaussian beam into a flat-top beam using free-form surfaces.
- Variables:
  Amplitudes and widths of four super-Gaussian terms on the beam-shaper and collimator lenses.
- Merit Function:
  Power output, irradiance variance and RMS ray direction spread.
- Method:
  50 iterations using Downhill Simplex.



The FRED Optimum Optical Engineering Software from Photon Engineering is the essential tool for opto-mechanical systems design and analysis. For more information regarding FRED Optimum's features and applications, contact us today!

(520) 733 – 9557

sales@photonengr.com

www.photonengr.com

Photon ENGINEERING
Illuminating Ideas