



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**, and **built-in BASIC compiler**, **FRED** Optimum is guaranteed to be fast, accurate, expandable and cost-effective.

#### 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!

#### 16 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 16 cores and results in a significant savings in raytrace and analysis time.

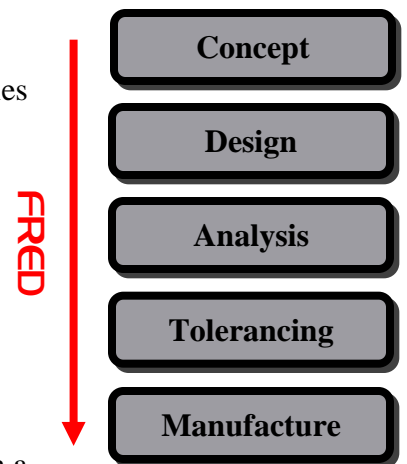
#### **Who should use **FRED** Optimum?**

- Anyone who needs an advanced virtual prototyping tool to assist in design and analysis of optical systems
- Anyone who demands speed and efficiency in their software simulations
- Anyone who requires the power and flexibility of optimization capability to maximize their system performance

#### What is **FRED** Optimum?

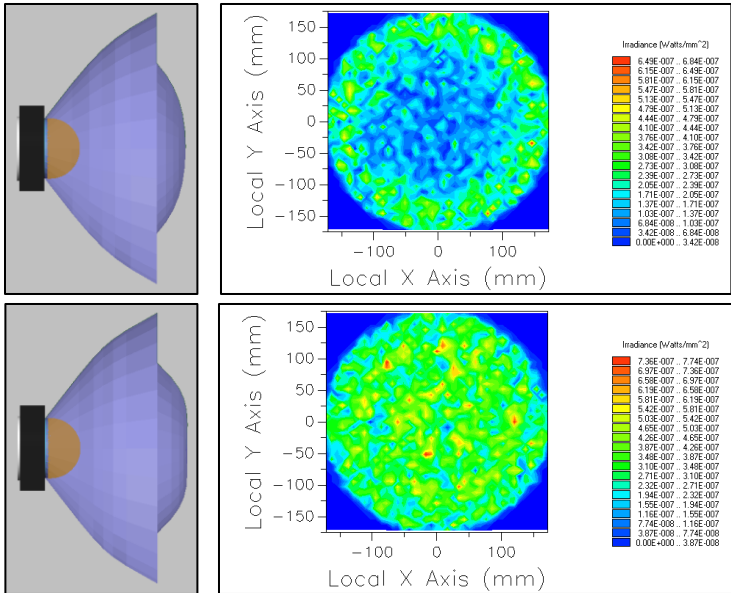
**FRED** Optimum is Photon Engineering's most powerful edition of FRED and includes the following features:

- **64-bit architecture**
- **16 core CPU multi-threading**
- **Hybrid optimization**



#### 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. This optimization scheme gives the user the complete control over variables, merit functions and algorithm (1D or Downhill Simplex) required for solving the toughest design problems.

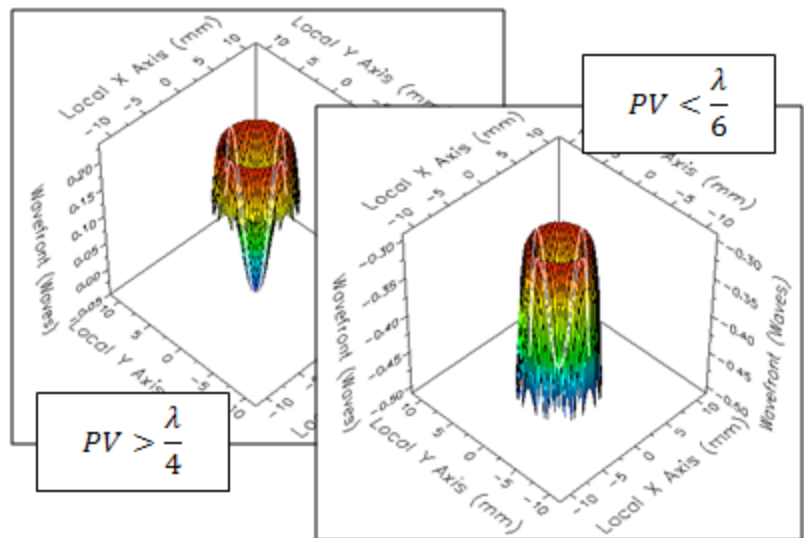


## Optimization Example #1

- 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:  
Optimize system configuration for a laser beam expander
- Variables:  
Relative axial positioning of optical elements
- Merit Function:  
P-V wavefront variation in the scalar field of the exit beam
- Method:  
17 iterations using 1-D Minimization



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!



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