QUADOA
optical systems

Lens Data

3D CAD Positioning
Real World Elements
Assembly arrangement
Lens Catalog with Filter Function
Lens Wizard
Surface Stack Ability: Freeforms and User Defined Forms by combining Surface Forms
Surface Types: Sphere, Plane, Asphere, Off-Axis, Axicon, Cylinder, Biconic, Cosine, Periodic Rotation, Gauss
Polynomial Form: Zernike, Zernike Fringe, Polynomial
Phases: Grating, Radial, Axial, Zernike, Zernike Fringe, Polynomial
Apertures: Circular, Rectangular, Elliptic, Annular
Obscuration: Circular, Rectangluar, Elliptic
Operators: Form Array, Fresnel, Phase Array
XYZ-Coordinate System / Easy Positioning
Absolute and Relative Coordinates
Drag & Drop of Elements
Easy drop down handling
3D Preview of Lens Design
Glass Catalogs with Filter Function
Coatings (Ideal VR, Ideal Mirror, Beam Splitter, Wavelength Dependant)

Light Sequence

Multi-Sequence Path Definition (unlimited)
User Defined Sequence
Easy Light Path Definition
Unlimited Sequence Fields
Aperture Types (Obj. Space, From Stop, Entrane Pupil, None)
Field Type (Angle, Image Height)
OPD Reference (EP, Absolute over Cam, Absolute over EP)
Source Types (Point Source, Plane Wavefront, Wavefromt from Surface)
Aperture Radius
Source Power Settings
Unlimited Number of Wavelengths
Distribution Types
Tilf of Field
Weight Fields separately
Vignetting of Field

Analysis Plots

Ray Distribution (Spot Diagram, Field vs. Wavelength, Config vs. Field, Footprint Diagram, Ghost Diagram)
Aberrations (OPD Fan Plot, Transverse Ray Function)
Distortion (1D, 2D, Petzval Curvature 1D)
Wavefront (Falsecolor, Fringes, Gradient, Zernike)
Interferogram (Fringes, Unwrapped)
Vignetting over Field
Image Analysis (Incoherent, Coherent, Ghost)
Point Spread Function (FFT PSF, Huygens PSF, Geometrical PSF)
Modulation Transfer Function (FFT MTF, Huygens MTF, Geometrical MTF)
Surface Analysis (Form, Form Gradient, Phase, Phase Gradient)
Plot Settings incl. easy drop down selection

Ghost Analysis Tools

Live Ghost Analysis Tools (Generate Ghosts analysis parallel to design process within seconds)
Analysis of Ghost Impact on Camera
Diffractive Ghosts for Computer Generated Holograms
Total Flux Analysis
Total Illuminance Analysis
Ghosts inside same data structure

Real Time Tools

Live Ghost Analysis: (During the optical design process the ghost wizards implemented in Quadoa® Optical CAD allow the automated generation of ghost sequences for any of the defined sequences in your system within seconds)
Live Tolerancing: (Perform a Tolerance Analysis at any time during design process to avoid the iteration process after the design process)
Live Mechanics Analyzer: Integrated live Mechancis Analyzer to analyze influence of mechanical parts on optical system performance

Optimization

Local Optimization
Extended Optimization
Global Optimization
Material Substitution
Lagrange Multiplier Constraints
Soft Constraints
Merit Function for different sequences (unlimited)
Unlimited Ray Trace Optimizations
Optimization Goals
Aberrations: Spot Radius RMS, Spot Radius PV, Spot Size 1D RMS, Wavefront RMS, Wavefront PV, Lateral Chromatic Aberration, Longitudinal Chromatic Aberration, Field Curvature, Distortion, Zernike, Tilt, Defocus, Astigmatism, Coma, Spherical Aberration
Optical Properties: Image Space NA, Object Space NA, Image Space F#, Object Space F#, Effective Focal Length, Entrance Pupil Position, Entrance Pupil Radius, Exit Pupil Position, Exit Pupil Radius, Maginifation, Angular Magnification, Chief Ray Position, Spot
Ray Properties: Chief Ray Incident Angle, Chief Ray Incident Direction Angle, Chief Ray Exit Angle, Chief Ray Exit Direction Angle, Ray Incident Angle RMS, Ray Incident Angle MAX, Ray Exit Angle RMS, Ray Exit Angle Max, Ray Refraction Angle RMS, Ray Refraction Angle MAX, Absolute OPL
Element Properties: Center Thickness, Edge Thicknes, Center Air Gap, Edge Air Gap, Aperture Radius, Surface Sag, Aspheric Departure, Refractive Index, Abbe Number

Tolerancing

Tolerancing Wizard for Easy Tolerancing
Element Tolerances
Surface Tolerances
Assembly Tolerances
Compensators
Tolerance Simulations (Sensitivity Analysis, Inverse Analysis, Monte-Carlo Simulation)
Tolerance Weights
Specific ID Tolerancing (specify tolerances due to production process or to producer tolerances)
Realistic Tolerancing (Tolerance single elements without affecting each other)
Tolerancing with Multiple Merit Functions

Technical Drawing

Lens Drawing ISO 10110 Export (PDF)

CAD and Mechanics Integration

Import CAD Data (STEP, STL, IGES)
Export CAD Data (STEP, STL, IGES)
CAD Primitivs Creator
Integrated CAD Mechanics Analyzer (Analyze directly inside Quadoa for intersection between Mechanics and Optical Rays)
CAD Handling (XYZ-Coordinate System for Position and Rotation)

System Handling

3D View: (Create multiple 3D System Views to analyse system with different configurations at a time)
3D CAD Coordinate System (Simple system construction with CAD Interface)
Mutli-Configuration (Unlimited number of Multi Configurations incl. Math Expression)
Slider Interface for stepless Parameter Values or Math Expression Input
Drag & Drop of elements
Easy drop down menu handling

Scripting Programming Interfaces

Matlab
Python
C++ SDK

System Parameters

Temperature Influence Calculation
Pressure Influence Calculation

Exchange File Formats and Data

Import External File Formats (*.ZMX)
Import CAD Data (STEP, STL, IGES)
Export CAD DATA (STL)
Export Point Cloud
3D View Image (Export of 3D System as PNG)