Feature List - Part 1

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, Paraboloid, Asphere, Axicon, Cylinder, Acylinder, Biconic, Gauss, Cosine, Periodic Rotation, Python
Polynomial Form: Zernike, Zernike Fringe, Polynomial
Phases: Grating, Radial, Axial, Zernike, Zernike Fringe, Polynomia
Apertures: Circular, Rectangular, Elliptic, Hexagonal, Annular, Array
Obscuration: Circular, Rectangluar, Elliptic
Operators: Form Array, Fresnel, Transformation, 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)

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)

Light Sequence

Multi-Sequence Path Definition (unlimited)
User Defined Sequence
Easy Light Path Definition
Unlimited Sequence Fields
Aperture Type: Object Space, Entrane Pupil, From Stop, None
Field Type: Object Height, Angle, Image Height
OPD Reference: EP, Afocal EP, Absolute over Image, Absolute over EP
OPD Chief Reference: Individual, Primary
Image Space: Focal, Afocal
Source Type: Point Source, Plane Wavefront, Wavefromt from Surface, Extended, From Ray File, Gaussian Beam
Apodization Type: Constant, Gauss, Super Gauss, Gauss 2D, Super Gauss 2D
Aperture Radius
Source Power Settings
Unlimited Number of Wavelengths
Distribution Types
Tilt of Field
Weight Fields separately
Vignetting of Field

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 Mechanics Analyzer to analyze influence of mechanical parts on optical system performance

Tolerancing

Tolerancing Wizard for Easy Tolerancing
Specific ID Tolerances: Spefific Element, Specific Surface, Specific Assembly
Element: Position, Angle, Thickness, Index
Surface: Decenter, Tilt, Radius, Zernike, Postion Z, General
Assembly: Position, Angle
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 and assemblies without affecting each other
Tolerancing with Multiple Merit Functions

Polarization Raytracing

Linear Polarization
Circular Polarization
Jones Complex
Jones Phase
Stokes
Random

Fiber Coupling

Fiber Coupling: Multi Mode, Single Mode, Beamlet Propagation
Fiber Coupling Scans: Multi Mode, Single Mode

Beam Propagation

Beamlet Propagation: Point Spread Function, Through Focus
Multi Sequential: Beamlet Propagation Interferogram
Gaussian Beam Report

Optimization

Local Optimization
Extended Optimization
Global Optimization
Optimization Wizard for intuitive Optimization
Material Substitution
Replace Model Material with best fitting Substitute
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, Collimation RMS, Lateral Chromatic Aberration, Longitudinal Chromatic Aberration, Field Curvature, Distortion, Zernike, Tilt, Defocus, Astigmatism, Coma, Spherical Aberration, Strehl Ratio, Seidel Sum, Seidel Surface Contribution, Math Expression, Python, Aberration Constraints Container
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, Math Expression, Python
Ray Properties
Chief Ray Goal: Chief Ray Position, Chief Ray Position Global, Chief Ray Incident Angle, Chief Ray Exit Angle, Chief Ray Refration Angle, Incoming Chief Ray Angle, Outgoing Chief Ray Angle, Incoming Chief Ray Angle Global, Outgoing Chief Ray Angle Global, Chief Polarization Orientation, Chief Polarization Ellipticity
Single Ray Goal: Ray Position, Ray Position Global, Ray Incident Angle, Ray Exit Angle, Ray Refration Angle, Incoming Ray Angle, Outgoing Ray Angle, Incoming Ray Angle Global, Outgoing Ray Angle Global, Ray OPL, Polarization Orientation, Polarization Ellipticity, Ray Energy
Multi Ray Goal: Spot Position, Incident Angle RMX, Incident Angle MAX, Exit Angle MAX, Refraction Angle RMS, Refraction Angle MAX, Footprint Radius RMS, Footprint Radius PV, Mean OPL, Total Energy, Geometric Enclosed Energy, Polarization Ellipticity RMS, Polarization Orientation RMS
Dimensional Properties: Center Thickness, Edge Thicknes, Center Air Gap, Edge Air Gap, General Distance 3D, General Distance 1D, Global Surface Position, Global Surface Orientation, Aperture Radius, Surface Sag, Aspheric Departure, Angle at Edge, Surface Phase Gradient, Refractive Index, Abbe Number, Model Material Offset, Dimensional Property Container

Feature List - Part 2

QUADOA optical systems

Analysis Plots

Ray Distribution: Spot Diagram, Field vs. Wavelength, Config vs. Field, Footprint Diagram, Ghost Diagram, Field Vignetting
Aberrations: OPD Fan Plot, Transverse Ray Function, Seidel Bar Plot, Seidel Report, Longitudinal Chromatic Aberration, Longitudinal Chromatic Aberration over Pupil, Lateral Chromatic Aberration, Distortion, Distortion 2D, Petzval Curvature
Wavefront: Falsecolor, Fringes, Gradient, Zernike
Interferogram: Fringes, Unwrapped
PSF/MTF: FFT PSF, Huygens PSF, Geometric PSF, FFT MTF, Huygens MTF, Geometric MTF, Through Focus FFT MTF, Through Focus Huygens MTF, Through Focus Geometrical MTF, FFT MTF vs. Field, Huygens MTF vs. Field, Geometrical MTF vs. Field
Irradiance: Incoherent Image Analysis, Coherent Image Analysis, Ghost Image Analysis
Image Simulation: Geometric Image Simulation, Huygens Image Simulation
Reports: Single Raytrace, System Report, Dimensions Report, Gaussian Beam Report
Polarization: Polarization Map, Polarization Transmission Fan, Poincaré Sphere
Lens: Form Sag, Form Sag Gradient, Surface Interface Transfer Plot, Surface Phase, Surface Phase GradientGradient)
Plot Settings incl. easy drop down selection

Coating

Coating Wizard
Ideal Coatings: Ideal AR, Ideal Mirror, Beam Splitter
Interpolated Coatings: Wavelenght Dependent, Incident Angle Dependent, Incident Angle/Wavelenght Dep.
Thin Film Coatings: From Catalog, Thin Film, Layer
Spatial Coatings: Position Dependent, Array Coating
Import CSV Data from Measurement

Retarder

General Retarder: General Jones, General Mueller, General Retarder
Ideal Retarder: Linear Retarder, Circular Retarder, Quarter Waveplate, Half Waveplate
Interpolated Retarder: Wavelenght Dependent, Incident Angle Dependent, Incident/Wavelenght Dep., Pupil Dependent, Pupil/Wavelenght Dep
Attenuator: Constant, Gaussian, Periodic
Spatial Coatings: Form Array, Fresnel, Transformation, Phase Array
Import CSV Data from Measurement

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

Scripting Programming Interfaces

MATLAB® interface with intuitive MATLAB® Scripting Wizard
Python interface with intuitive Python Scripting Wizard
C++ SDK
Independent scripting interfaces from GUI through direct interaction with Quadoa core library

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

System Parameters

Temperature Influence Calculation
Pressure Influence Calculation

Exchange File Formats and Data

Import External File Formats (*.ZMX *.SEQ)
Export External File Formats (*.ZMX *.SEQ *.CSV)
Import CAD Data (STEP, IGES, STL)
Export CAD DATA (STEP, IGES, STL)
Export Point Cloud
Import AGF Material Catalog Files
Import DAT Measurement Data
Import CSV Pointcloud Data
Import CSV Grid Data
ISO 10110 Lens Drawing Export
3D View Image (Export of 3D System as PNG)

Technical Drawing

Lens Drawing ISO 10110 Export (PDF)