

What's New in CODE V 2026

Introduction

The CODE V 2026 release delivers significant enhancements focused on accelerating optical design workflows, improving real-world tolerancing analysis, and strengthening system-level imaging simulation. The new AI Start Expert, accelerated custom tolerancing, expanded macro libraries, and enhanced interoperability with ImSym help optical engineers move more quickly from concept to validated design while maintaining physical accuracy and manufacturability.

Jumpstart Optical Design with AI Start Expert

CODE V 2026 introduces AI Start Expert, a locally executed, generative-AI-powered tool that rapidly generates high-quality starting point lenses from a small set of user-defined specifications. AI Start Expert dramatically reduces time spent on initial design exploration while producing starting points that are immediately suitable for refinement using CODE V's established optimization tools.

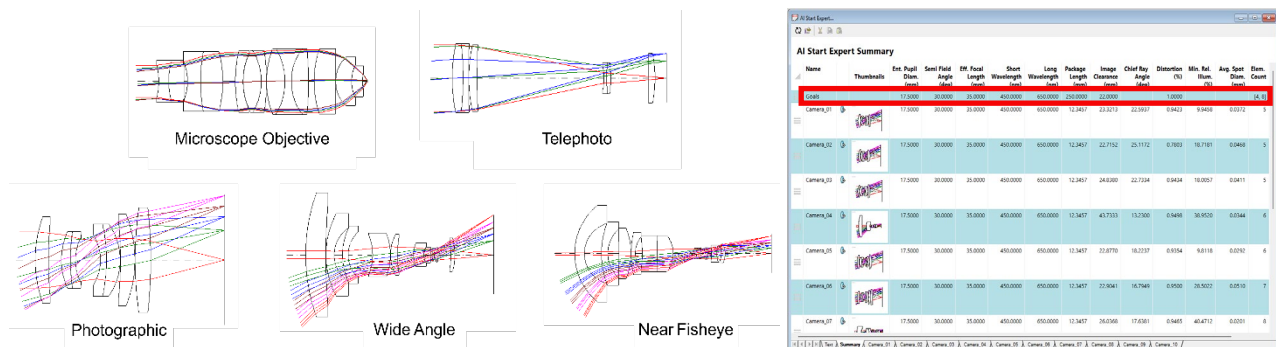


Figure 1. Example starting point designs and AI Start Expert output summary in CODE V 2026

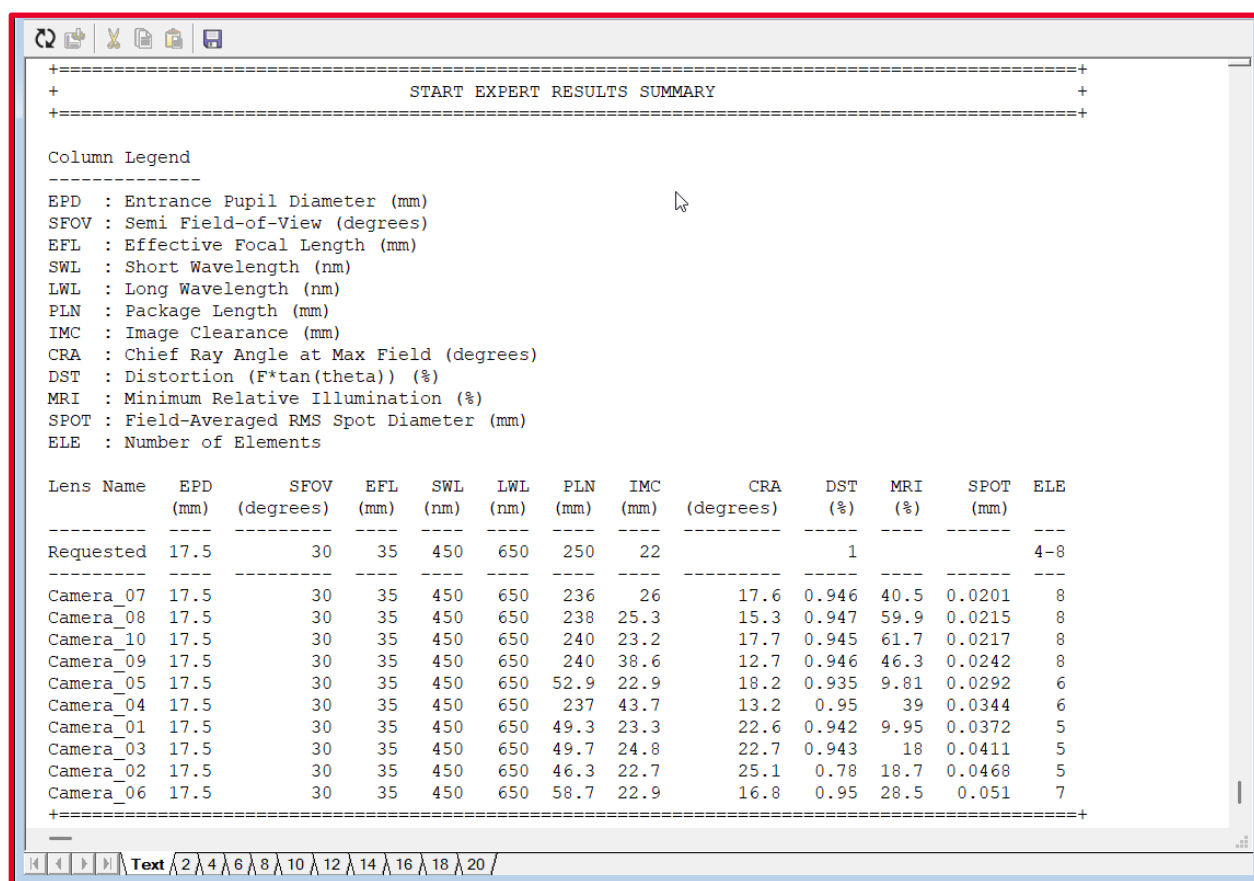
CODE V 2026 expands tolerancing analysis with Accelerated Custom Tolerancing, implemented through the UserTol macro. This capability is designed to model realistic fabrication and alignment processes that occur in production, including complex, step-based alignment strategies.

Key capabilities include:

- Generation of starting point designs for:
 - Camera and photographic lenses
 - Telephoto and retrofocus lenses
 - Microscope objectives
 - Collimators and projectors
- User inputs include field of view, focal length, and aperture (EPD, NA, or F/#), with optional constraints such as distortion and image clearance
- Built-in intelligence for lens shape and sensitivity
- Operates entirely on-premise with no internet access required

AI Start Expert enables engineers to focus on performance trade-offs and optimization strategies sooner, rather than spending time constructing initial lens forms.

Support Real-World Engineering with Accelerated Custom Tolerancing



The screenshot shows a software window titled "START EXPERT RESULTS SUMMARY". It contains a "Column Legend" and a table of lens performance metrics. The table lists various lenses (Camera_01 to Camera_10) and their performance parameters compared to a "Requested" design.

Column Legend

- EPD : Entrance Pupil Diameter (mm)
- SFOV : Semi Field-of-View (degrees)
- EFL : Effective Focal Length (mm)
- SWL : Short Wavelength (nm)
- LWL : Long Wavelength (nm)
- PLN : Package Length (mm)
- IMC : Image Clearance (mm)
- CRA : Chief Ray Angle at Max Field (degrees)
- DST : Distortion ($F \cdot \tan(\theta)$) (%)
- MRI : Minimum Relative Illumination (%)
- SPOT : Field-Averaged RMS Spot Diameter (mm)
- ELE : Number of Elements

Lens Name	EPD (mm)	SFOV (degrees)	EFL (mm)	SWL (nm)	LWL (nm)	PLN (mm)	IMC (mm)	CRA (degrees)	DST (%)	MRI (%)	SPOT (mm)	ELE
Requested	17.5	30	35	450	650	250	22		1			4-8
Camera_07	17.5	30	35	450	650	236	26	17.6	0.946	40.5	0.0201	8
Camera_08	17.5	30	35	450	650	238	25.3	15.3	0.947	59.9	0.0215	8
Camera_10	17.5	30	35	450	650	240	23.2	17.7	0.945	61.7	0.0217	8
Camera_09	17.5	30	35	450	650	240	38.6	12.7	0.946	46.3	0.0242	8
Camera_05	17.5	30	35	450	650	52.9	22.9	18.2	0.935	9.81	0.0292	6
Camera_04	17.5	30	35	450	650	237	43.7	13.2	0.95	39	0.0344	6
Camera_01	17.5	30	35	450	650	49.3	23.3	22.6	0.942	9.95	0.0372	5
Camera_03	17.5	30	35	450	650	49.7	24.8	22.7	0.943	18	0.0411	5
Camera_02	17.5	30	35	450	650	46.3	22.7	25.1	0.78	18.7	0.0468	5
Camera_06	17.5	30	35	450	650	58.7	22.9	16.8	0.95	28.5	0.051	7

Figure 2. Pass/fail statistics output report from the UserTol macro

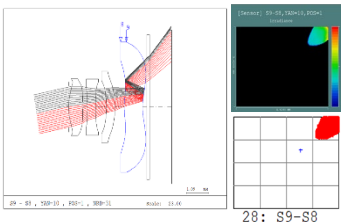
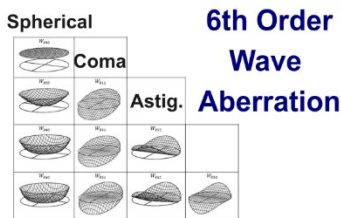
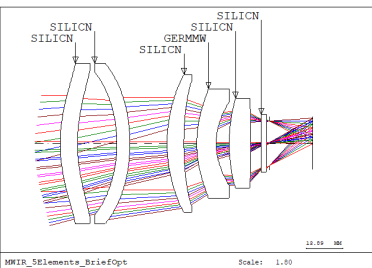
Key enhancements include:

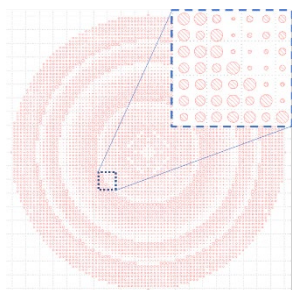
- Monte Carlo tolerancing and sensitivity analysis executed in parallel
- Support for multi-step alignment workflows, including compensation cycles
- Arbitrary user-defined performance metrics
- Advanced statistical outputs, including:
 - Yield estimates with uncertainty
 - Pass/fail assessment across multiple performance metrics
- Cumulative probability plots after each compensation step

These tools allow engineers to evaluate not only final performance, but also the stability and effectiveness of alignment strategies — providing greater confidence in manufacturability and yield.

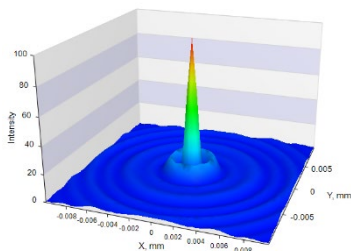
Expand Analysis Capabilities with New Macros

CODE V 2026 adds a robust set of new macros that automate common workflows and improve diagnostic insight.

Macro	Description
	Ghost analysis macros for rapid ghost path visualization and ghost footprint plots
	Wave aberration macros for computing and visualizing 4th- and 6th-order wave aberration coefficients
	VIE labeling macros for clear identification of glass materials and surface numbers in lens drawings



Metalens layout export enhancements, including support for the OASIS file format



CALC_TGR macro for automatic determination of transform grid size in PSF-based analyses

These macros enable faster iteration while providing deeper insight into aberrations, stray light behavior, and manufacturability considerations.

Seamless System-Level Imaging with Lens Performance Data Export

CODE V 2026 introduces **Lens Performance Data (LPD) export**, enabling direct integration with **ImSym Imaging System Simulator** and other external tools.

LPD files contain essential lens performance information — such as point spread functions and distortion data — without exposing lens construction details. This allows image simulation that includes:

- Geometric, aberration, and diffraction effects
- Scene stray light and additive stray light sources
- Sensor physics and noise modeling
- Image signal processing algorithms

The result is a more complete system-level understanding of image quality, supporting tasks such as use-case analysis, performance validation, and AI training data generation.

New Example Models and Enhanced Learning Resources

To support rapid adoption of new features, the CODE V Example Model Library has been expanded with **13 new and updated models**, including:

- AI Start Expert workflows
- Accelerated custom tolerancing examples
- Wave aberration analysis
- Application-based examples such as automotive head-up displays (HUDs)

These models provide practical, working examples that help users quickly apply new capabilities to real design problems. They also serve as effective reference sources.

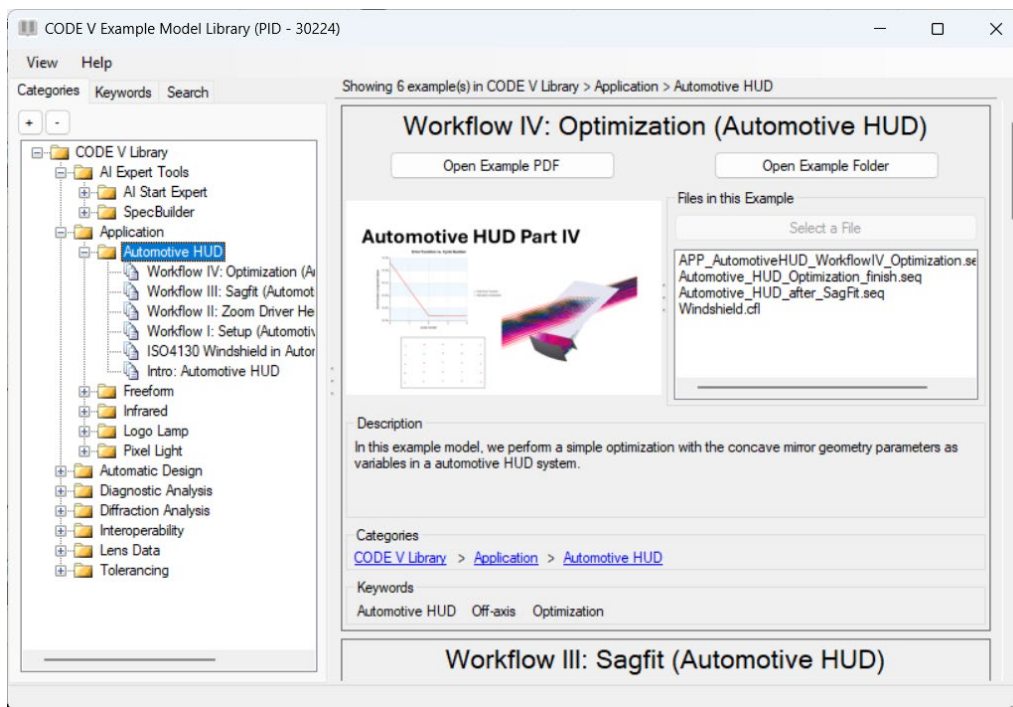


Figure 3. Automotive HUD application-based example model

Conclusion

CODE V Version 2026 continues to advance optical design by combining modern automation tools with the physical rigor and flexibility required for real-world engineering. With AI Start Expert, accelerated tolerancing workflows, expanded macros, and deeper system-level integration, CODE V 2026 enables optical engineers to design, analyze, and validate imaging systems more efficiently and with greater confidence.

Contact Us

- Technical support: [Keysight Support Portal](#)
- Questions: codev_support@keysight.com
- Evaluations and trials: optics@keysight.com



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