etendue

Generating starting points for a 16 mm machine vision lens with the Seed Generator

A 16 mm f/2.8 lens with a 28° field of view: a manufacturable starting point in a few minutes.

The specification

A machine vision camera needs a compact imaging lens: 16 mm focal length, f/2.8, a 28° full field of view, an object at infinity and visible light (F, d and C lines). The constraints: at most 6 elements, aspheric surfaces allowed, and a total track of no more than 50 mm.

From a description to a form

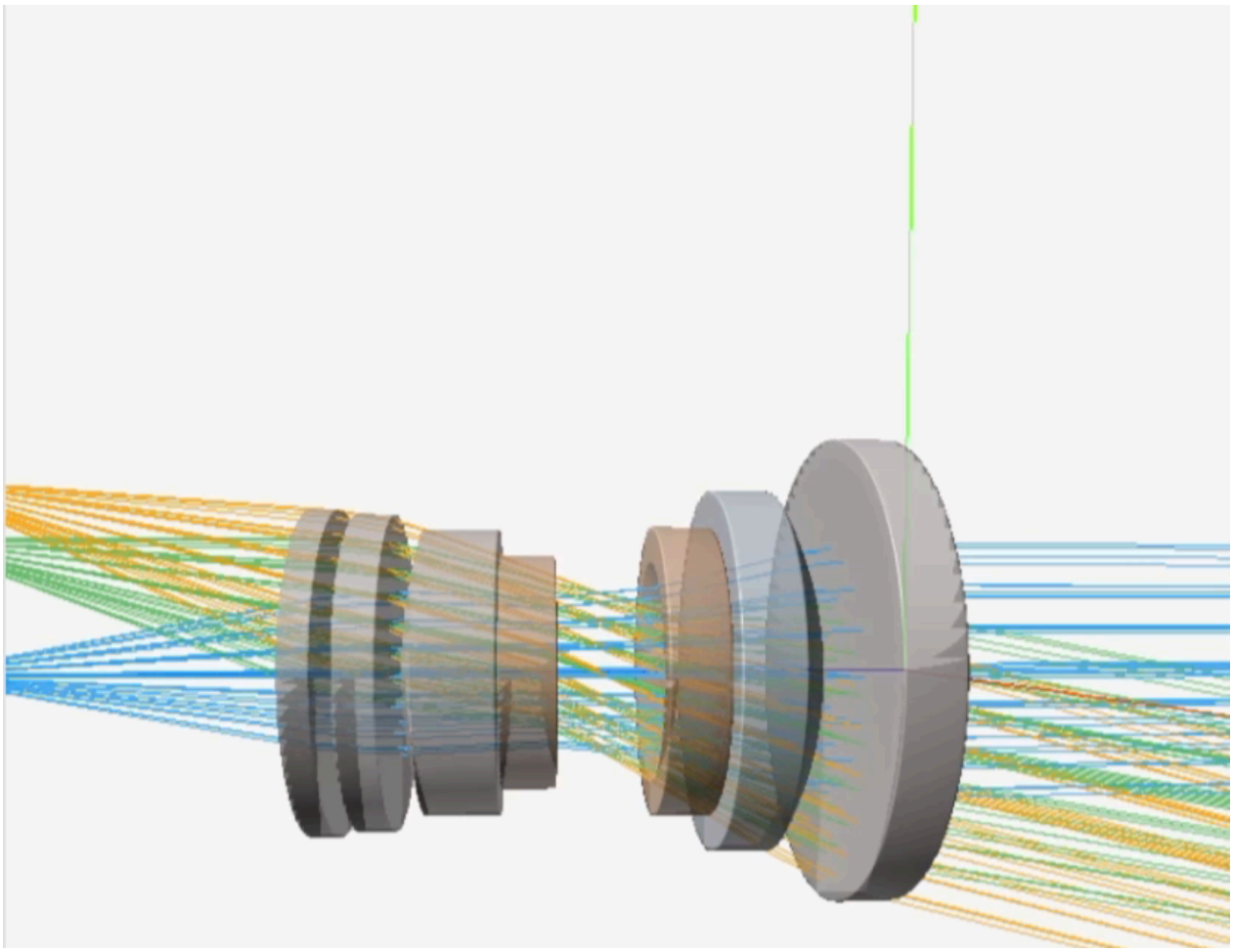
The specification is typed in natural language. etendue's Seed Generator reads it and fills in the full form (focal length, aperture, field, wavelengths, constraints), which the engineer checks and can edit at any time. Before running, the tool proposes the lens architectures most likely to succeed. The engineer can also set mechanical limits, choose the material catalogs or import their own, and choose up to three starting points to compare.

The result

After a few minutes, the starting points are ready and shown side by side, each with its full prescription, its ray trace and its spot size.

Quantity	Specification	Starting point
Focal length	16 mm	16 mm
Aperture	f/2.8	f/2.80
Total track	50 mm at most	22.8 mm
On-axis RMS spot		2.97 μm (1.5 × the Airy radius of 2.0 μm)
Worst-field RMS spot		5.57 μm
Manufacturability		manufacturable

The starting point meets the aperture and the length constraint with a wide margin, and its spot stays within a few microns across the whole field. It opens in etendue in one click, ready to be optimised and toleranced.



The starting point generated for the 16 mm f/2.8 specification, traced in etendue.

Going further

The Seed Generator was tested at scale in our October benchmark, on 1,080 specifications and nearly 16,000 generated starting points. The results are available on our website.