

# CASE HISTORY 18

## Surveillance Lens

### Market

Various industrial applications

### Client Type

Large OEM (Kodak Imaging Group, government end-client)

### Unmet Need

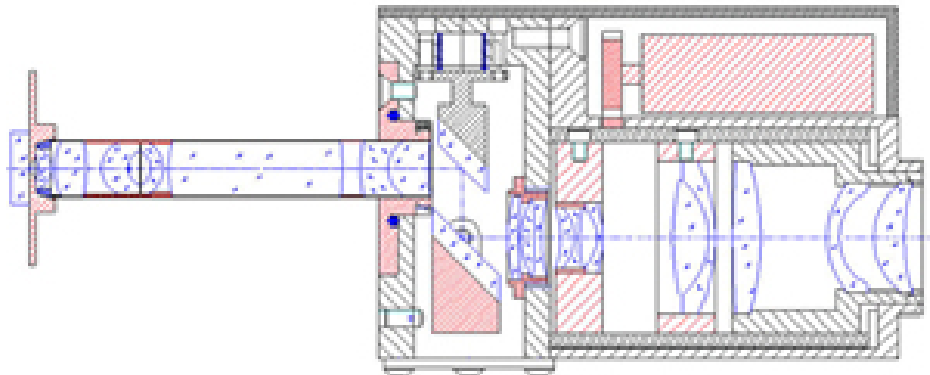
A surveillance lens that could look through a tiny external aperture and achieve an extremely challenging performance specification.

### Approach

The client was doing work for a government agency – the kind that doesn't have business cards. The client's own world-class optical engineering group had given up on solving the optical design challenges. The program manager was referred to us by another client. We assessed the requirements and determined that we could leverage our expertise in endoscope design to meet device requirements.

### Product Features

The device specification called for a 50° field of view. It needed a 70° pan capability for a 120° swept field, and then zoom in on an area of interest 2:1 – with no external moving parts. The optical zoom had to be parfocal (not go out of focus during zooming). An f# of  $\leq 5.6$  was required, and a very high Nyquist frequency for high resolution imaging. The "shaft" part of the optics had to be at least 100mm long, be no more than 10mm in diameter, and had to look through an external aperture of 1mm diameter. We solved the optical challenges by designing an ultra-wide field objective, an endoscope-type relay system, a rotating mirror to scan through the field, a staring telescope section, a cam-driven parfocal zoom section, and a C-mount for the camera. A cross section of the resulting design is shown above. It has 17 optical elements, one motor for zoom, one motor for scan, and over 100 parts altogether. We met all of the specifications with the first prototypes.



### Services Provided by OTI

- Optical design, engineering, and sourcing
- Mechanical engineering, including part design & vendor sourcing
- Development of assembly and test methods and fixtures
- Prototyping
- Verification testing

### Client Comment

*"My own engineers were stumped. Optimum came in, studied the problem, said they could do it, and did it. Fast. My team and our end client were all very impressed."*

- Joe Zigadlo, Program Manager

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