

shaping the future of optics



## **Sill Optics S5LPJ0303 + EL-16-40**

**Variable focus for laser processing inline inspection through the galvo scan head and f-theta lens**

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Joerg Wertli, Senior Sales & Marketing Manager

Bernstrasse 388 | CH-8953 Dietikon | Switzerland  
Phone +41 58 856 3040 | [www.optotune.com](http://www.optotune.com) | [info@optotune.com](mailto:info@optotune.com)

# Summary

- Z-range of 26mm achieved with -2 to +3 dpt
  - At nominal WD of 144mm (@0dpt)
  - Optical leverage is  $\sim 5\text{mm}$  per diopter
- No vignetting
- HFOV of 4mm achieved with 2/3" sensor
- Note: f-theta lens is optimized for 1064nm, while this test was done with red light



# Test setup

C-mount camera: UI-3080CP-M  
2464 x 2056 @ 3.45um,

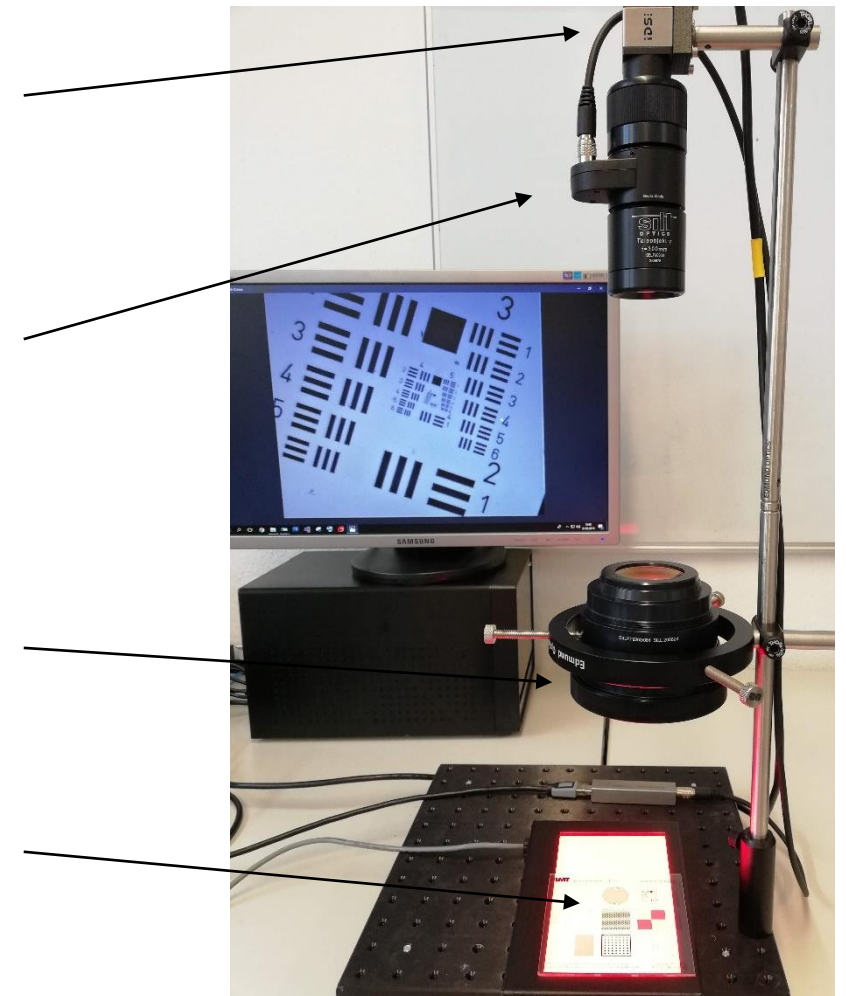
Teletens:

- Sill Optics S5LPJ0303 300mm tele lens
- [Optotune EL-16-40-TC-VIS-5D-M42](#)
- Sill Optics S5LPJ0303 300mm tele lens

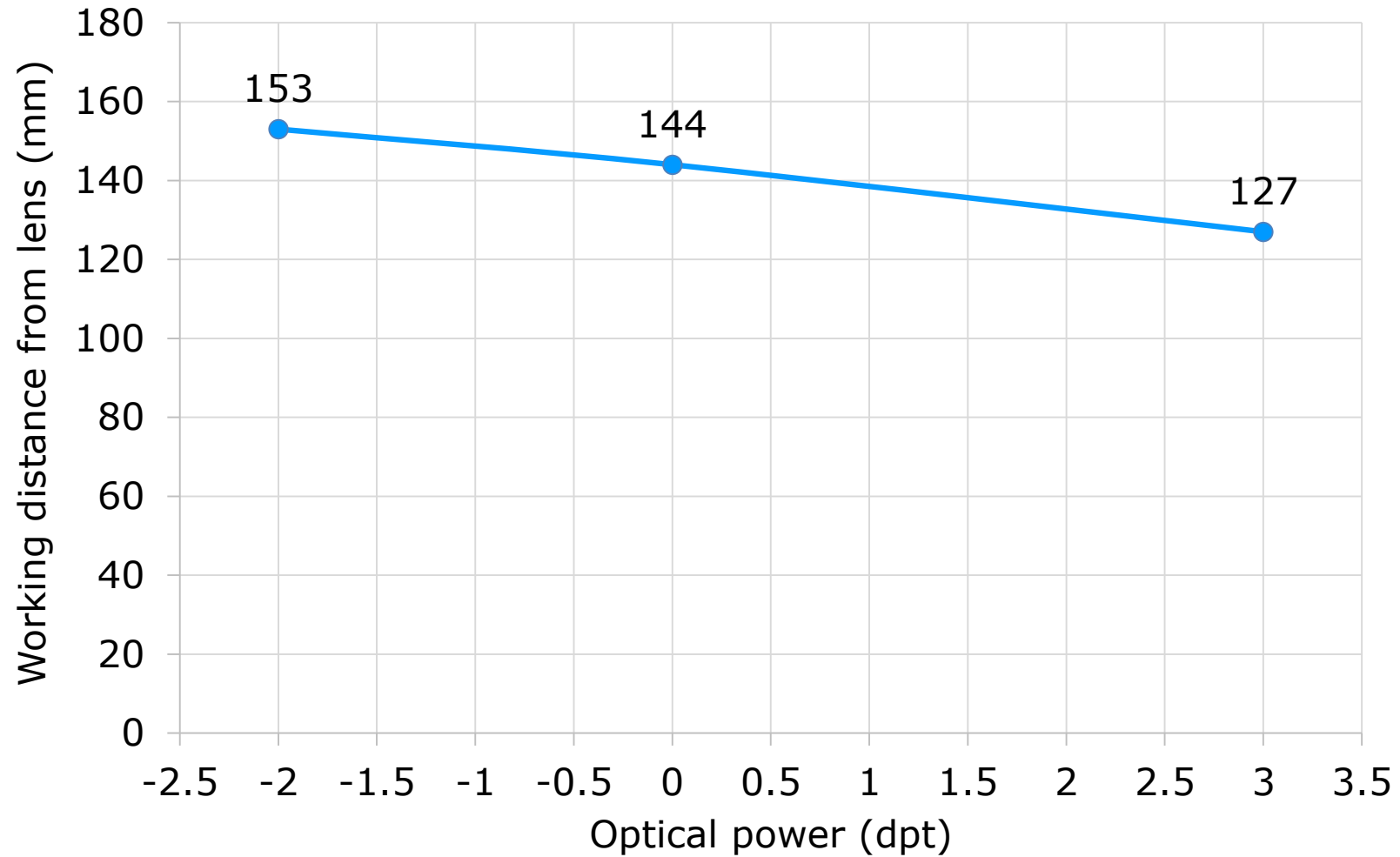
F-theta lens:

Sill Optics S4LFT9263/081 160mm f-theta lens

Test targets with red LED back light

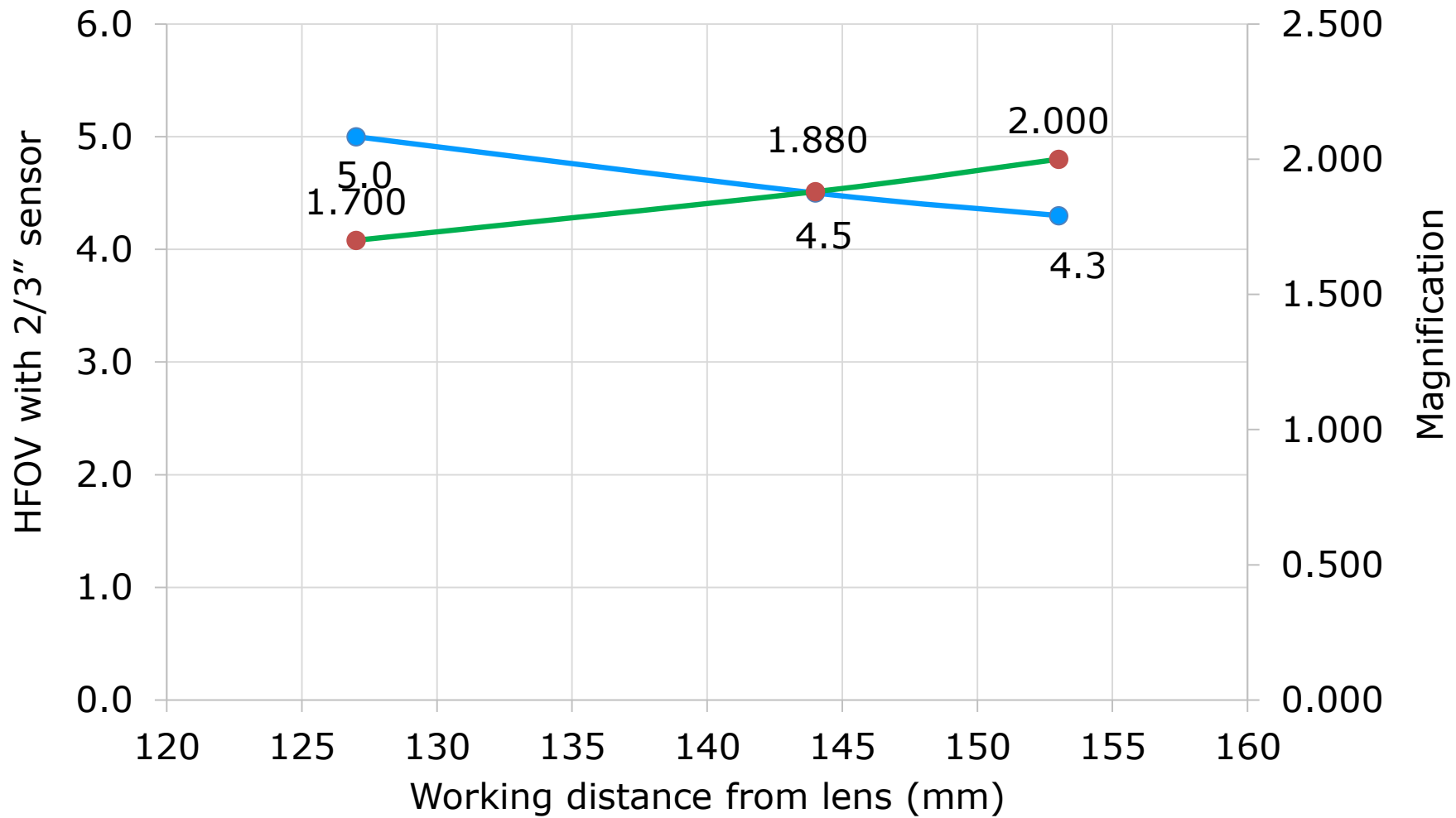


# Working distance range of 26mm achieved with -2 to +3 diopters

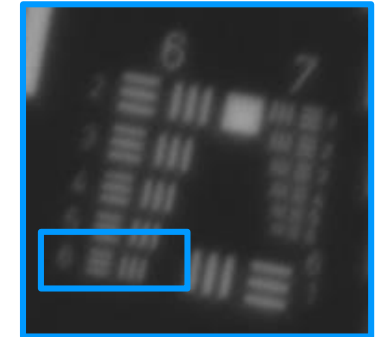
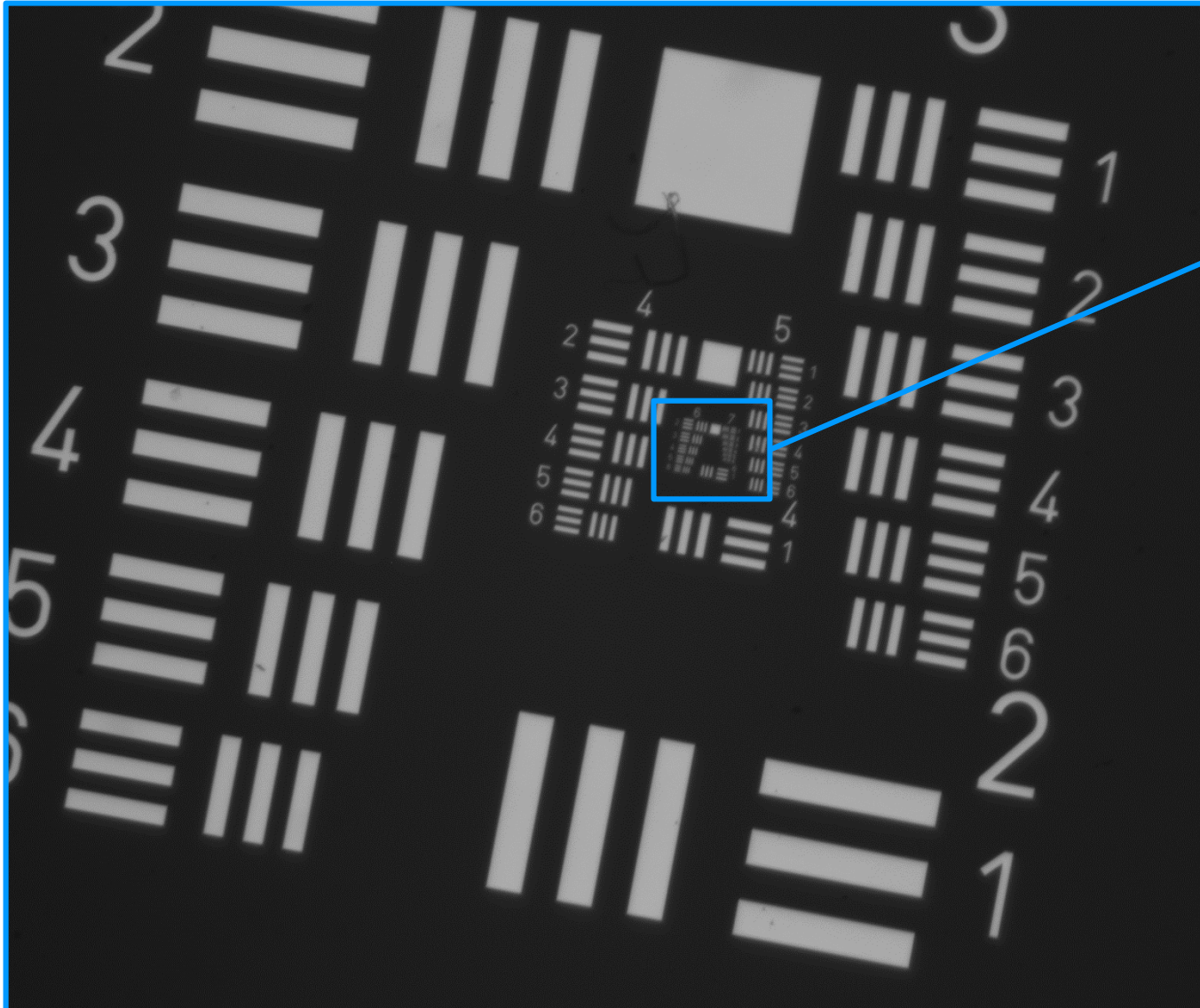


Optical leverage:  $\sim 5$  mm per diopter

# Magnification changes with 1% per mm from 1.7x to 2.0x over the 26mm z-range

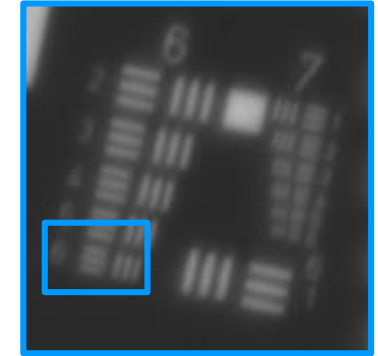
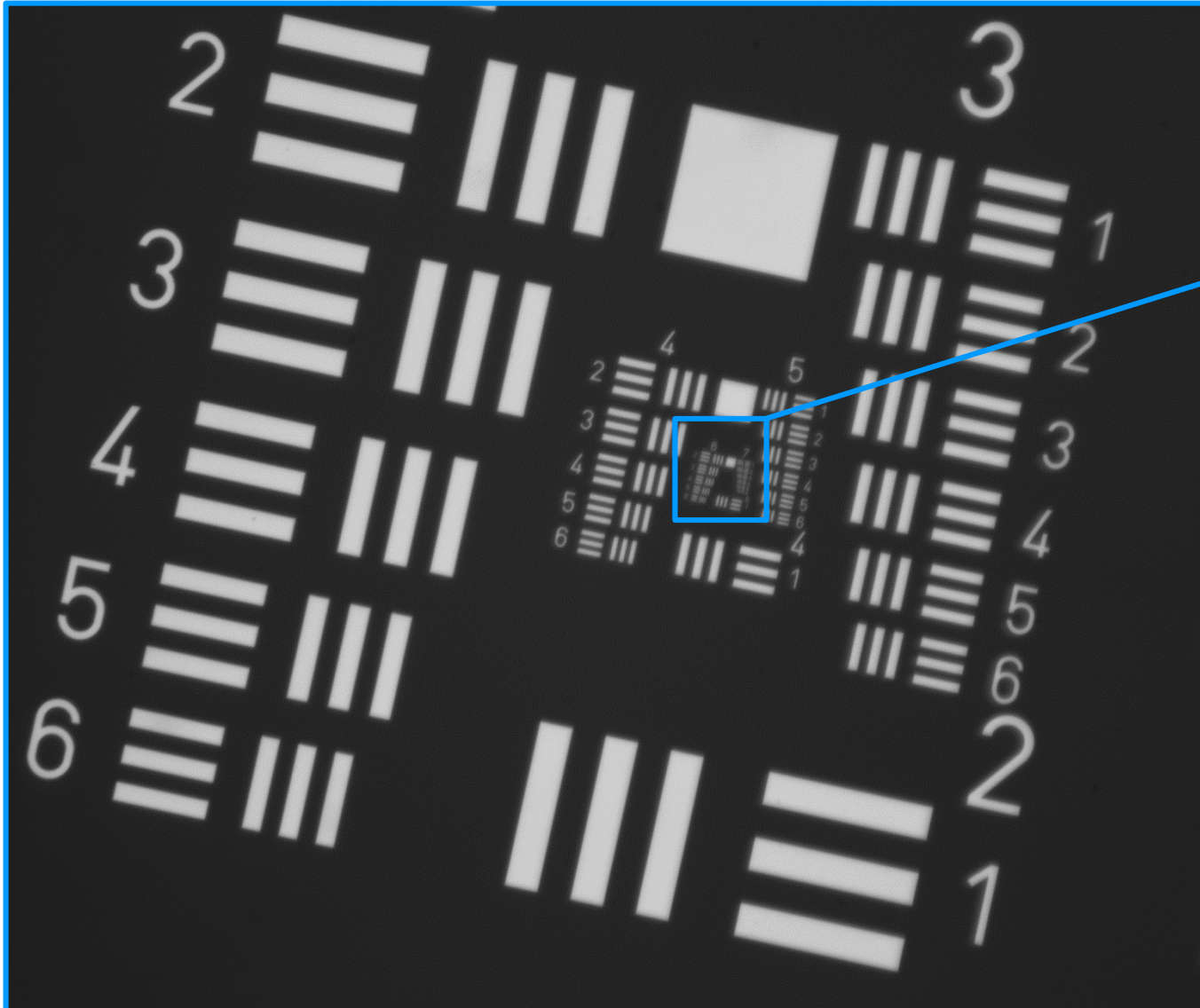


# Sample image at 153mm working distance



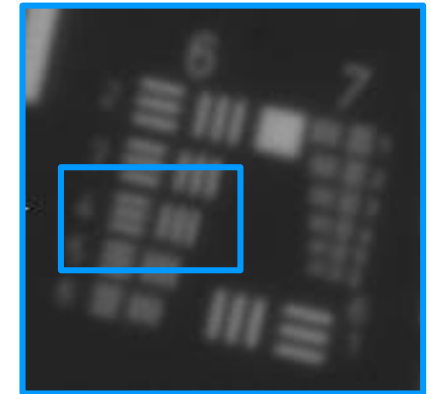
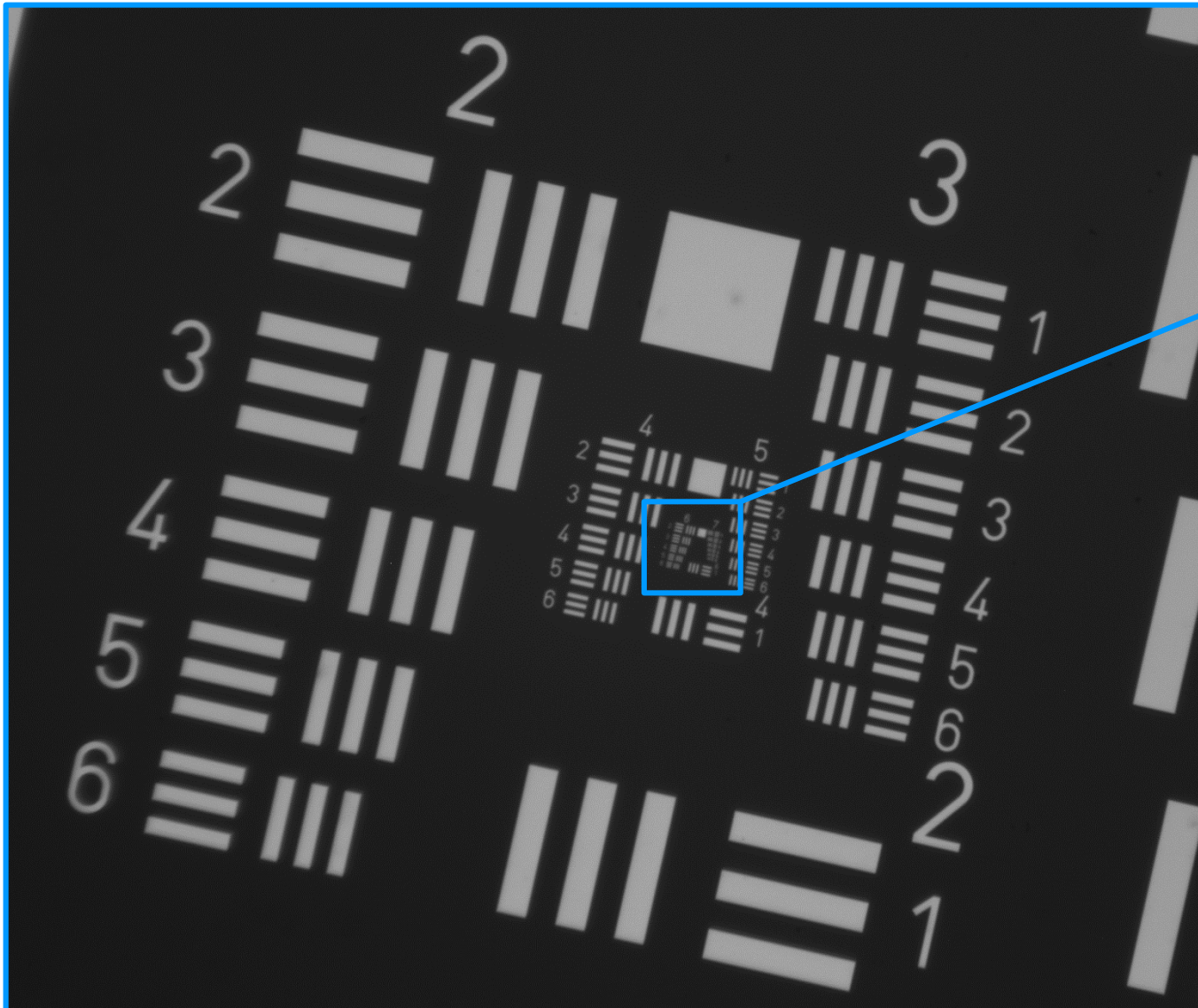
USAF element:	6/6
Line width (um):	4.38
Lp/mm (object):	114
Magnification:	2.024
<b>Lp/mm (image):</b>	<b>56</b>
Nyquist limit:	145
Pixel size (um):	3.45

# Sample image at 144mm working distance



USAF element:	6/6
Line width (um):	4.38
Lp/mm (object):	114
Magnification:	1.889
<b>Lp/mm (image):</b>	<b>60</b>
Nyquist limit:	145
Pixel size (um):	3.45

# Sample image at 127mm working distance



USAF element:	6/3
Line width (um):	6.2
Lp/mm (object):	81
Magnification:	1.700
<b>Lp/mm (image):</b>	<b>47</b>
Nyquist limit:	145
Pixel size (um):	3.45