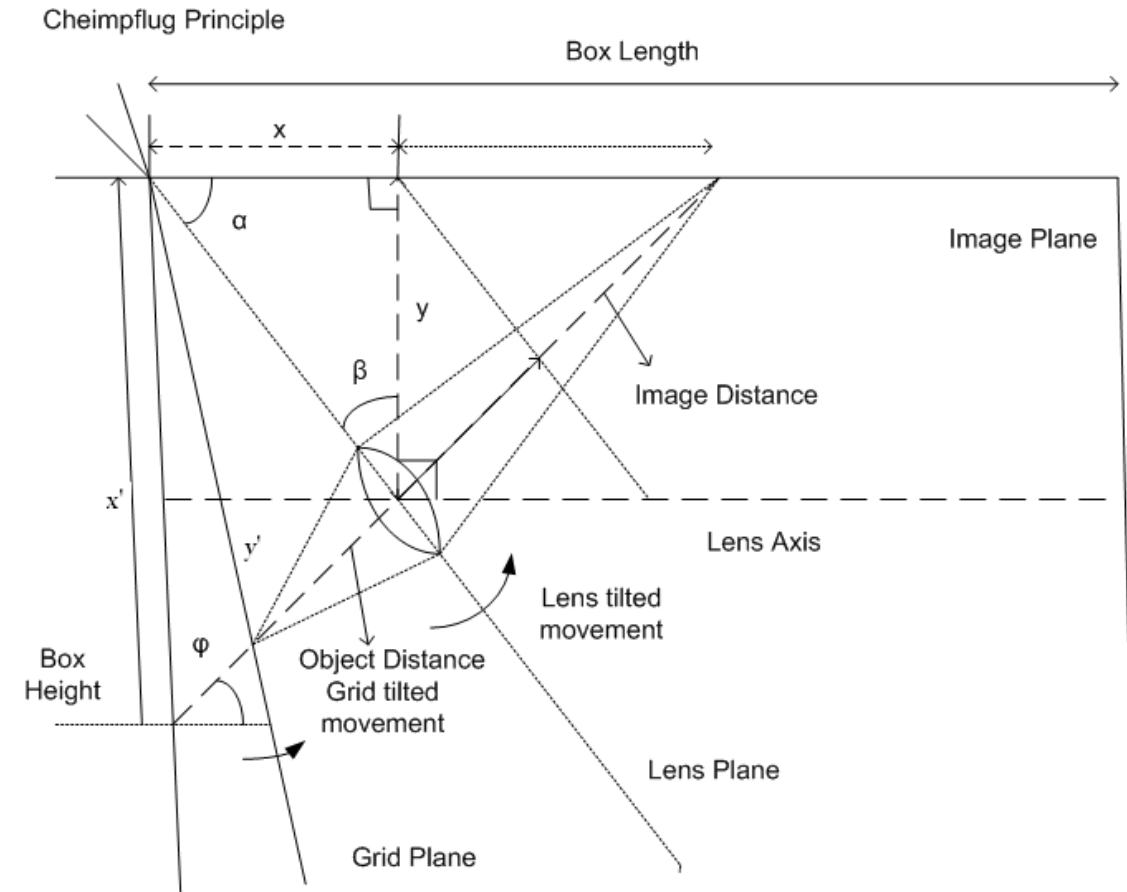


Optical System Review



$$M = \frac{S'}{S} = \frac{h'}{h} \text{ (Magnification)}, f = \left(\frac{1}{S'} + \frac{1}{S} \right)^{-1} \text{ (Focal length)}, \beta = \tan^{-1} \left(\frac{x}{y} \right), \alpha = 90 - \beta$$

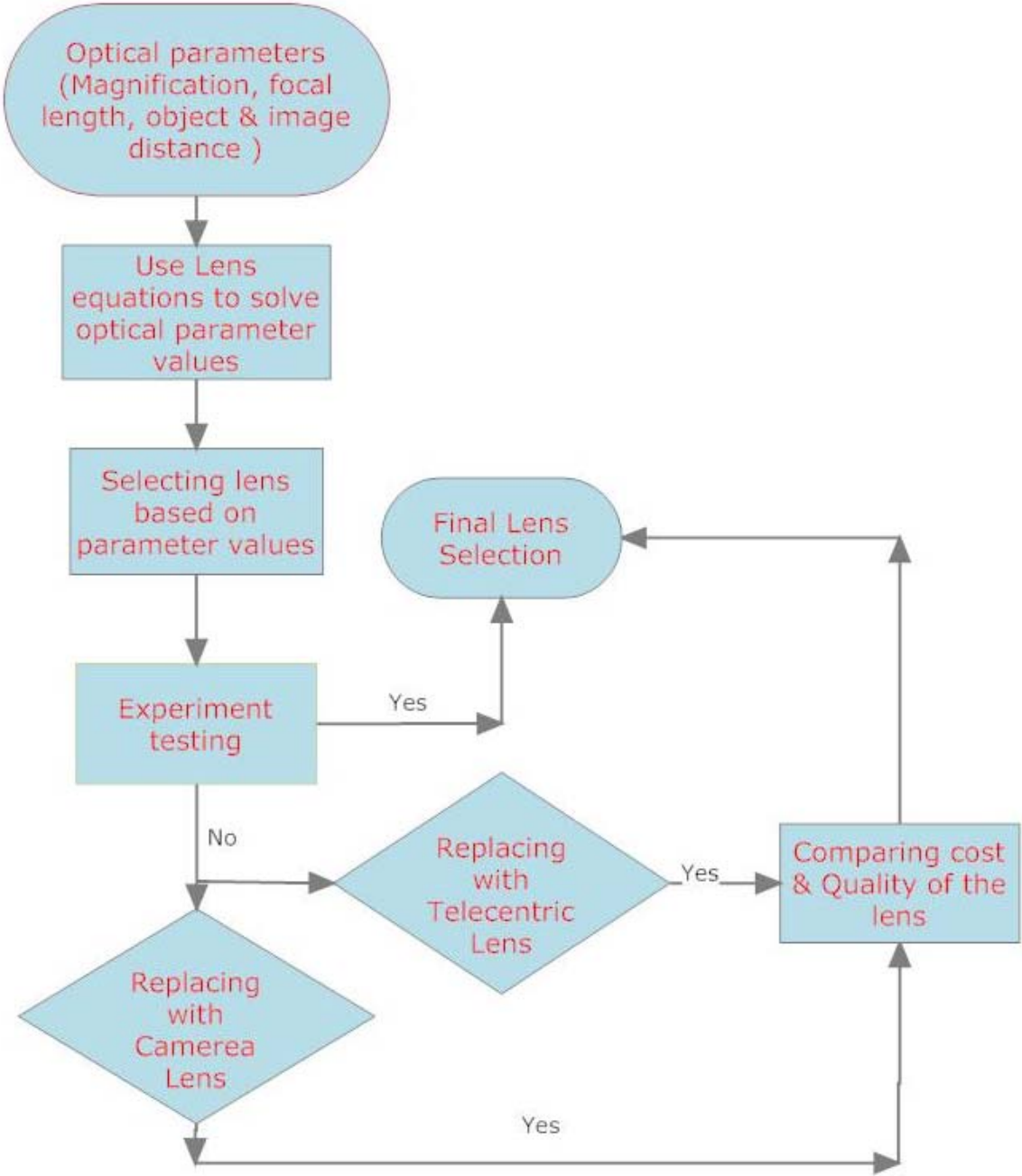
Where, S' is the distance from the lens to image plane

S is the distance from the Grid to the lens

M is the magnification.

Box Length = 250 mm, Box Height = 200 mm.

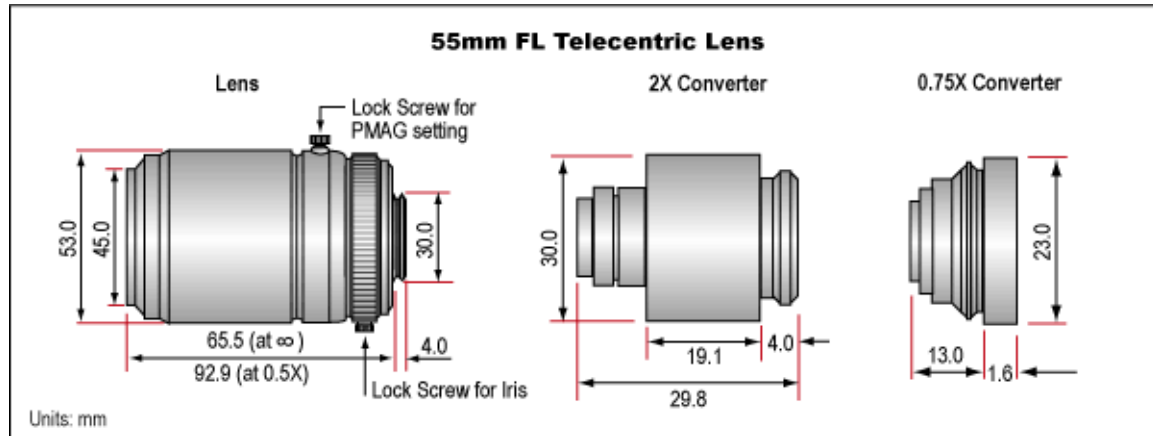
Lens selection concept



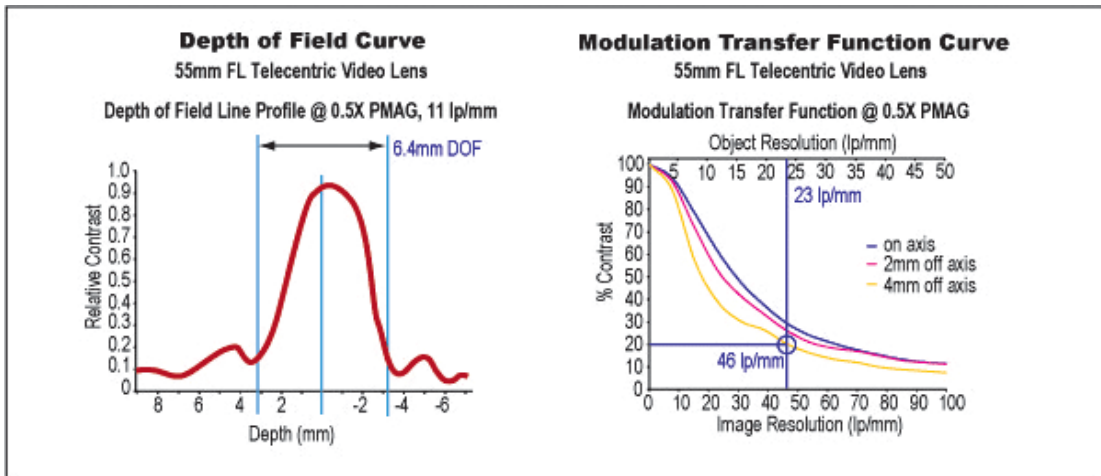
Lens Types and Specifications

(Estimate cost: \$150 - \$400)

From: www.edmundoptics.com

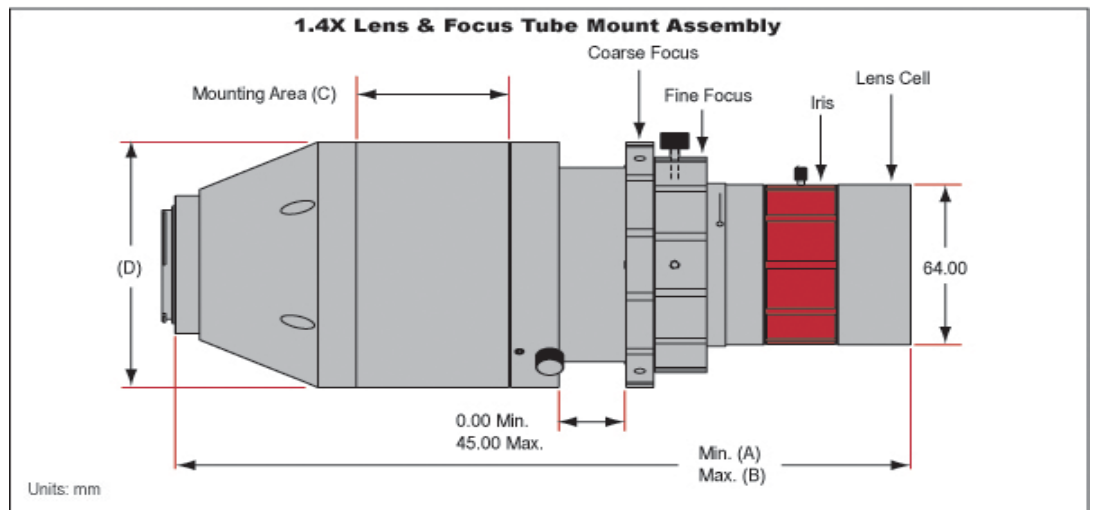
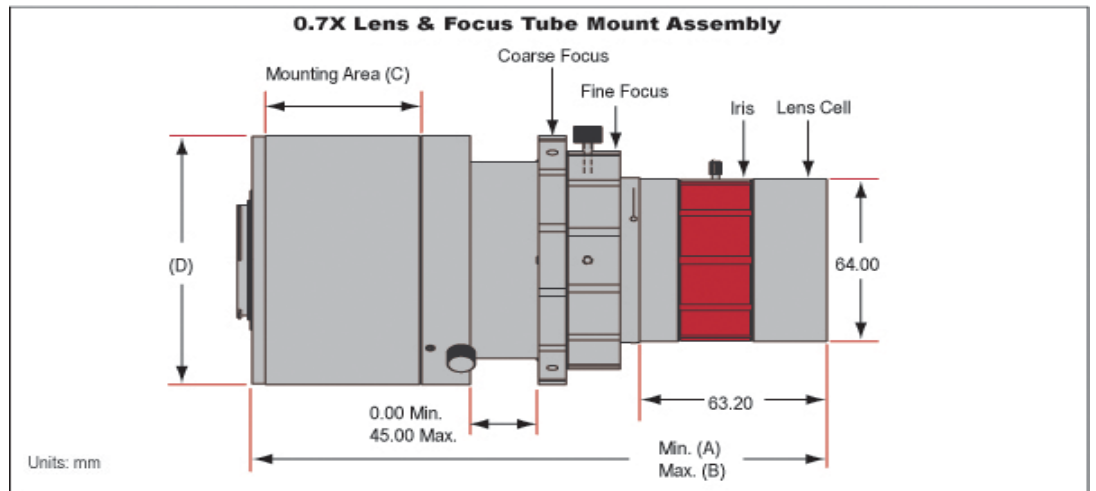
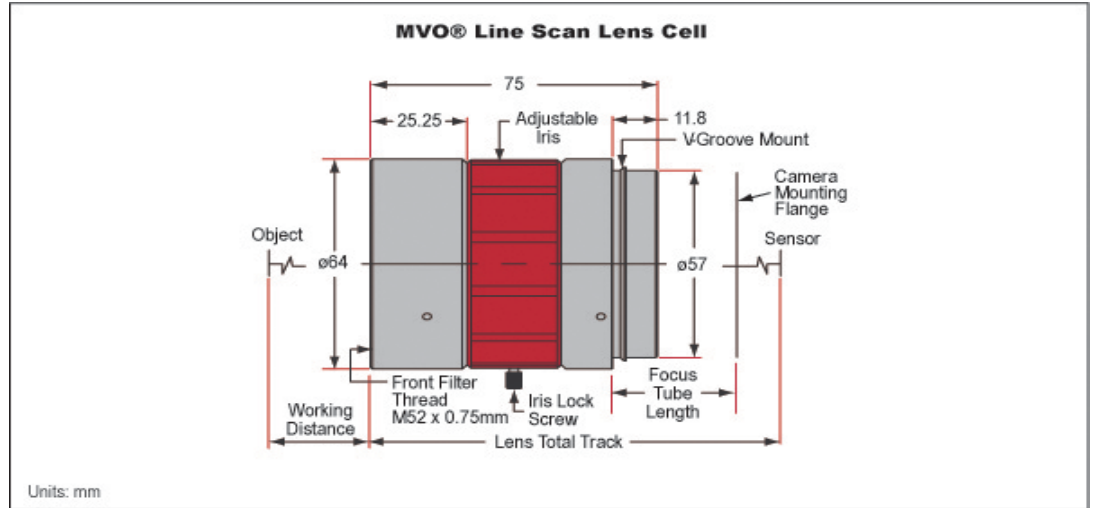


Telecentric Specifications	Lens Alone	Lens with 2X Extender	
Primary Magnification	0.5X - 0.4X	1.0X - 0.4X (full range)	
Field of View (Horiz. 1/2" cCD)	12.8mm - 16.0mm	6.4mm - 16.0mm	
Working Distance	5.0" - 6.25"	5.25" - 11.25"	
Focal Length	55mm	110mm	
Aperture (f/#)	F2.8 - 32C	-	
Max CCD Format	2/3"	2/3"	
Distortion	<1.0%	<1.0%	
Lens Mount	C-Mount	C-Mount	
Filter Size	M43 x 0.75mm	M43 x 0.75mm	
Weight	11.1 oz.	11.1 oz.	
Non-Telecentric Specifications	Lens Alone	with 2X Extender	with 0.75X Converter
Primary Magnification	0.5X - 0X	1.0X - 0X	0.375X - 0X
Field of View	12.8mm - 6.7°	6.4mm - 3.3°	17.0mm - 8.9°
Lens Working Distance	5" to Infinity	5.25" to Infinity	5" to Infinity



High Resolution Large Format Lens

(Cost estimate: \$500 - \$1500)



Lens Specifications

Lens Specifications		
Stock No.	#58-481	#58-480
Nominal Magnification	0.7X	1.4X
Aperture (f/#)	F4 - 22	F4 - 22
Magnification Range	0.65 - 0.78X	1.3 - 1.5X
Working Distance @ Nominal Mag	223mm	166mm
Lens Total Track	241mm	298mm
Distortion	0.1% max	0.1% max
Image Space Resolution at		
Max Sensor	62mm	90mm
MTF @ F4	100 lp/mm	75 lp/mm
Notes	<ol style="list-style-type: none"> 1. Focus Tube Mount: includes focusing mechanism and camera mount interface. 2. Nominal Magnification specified at midpoint of focus range, 25mm of travel. 3. Focus Range: 50mm total includes 5mm fine and 45mm coarse. 4. Full Focus Magnification Range (0 - 50mm settings): 0.51 - 0.91X and 1.19 - 1.60X. 	

Design Risk Assessments

