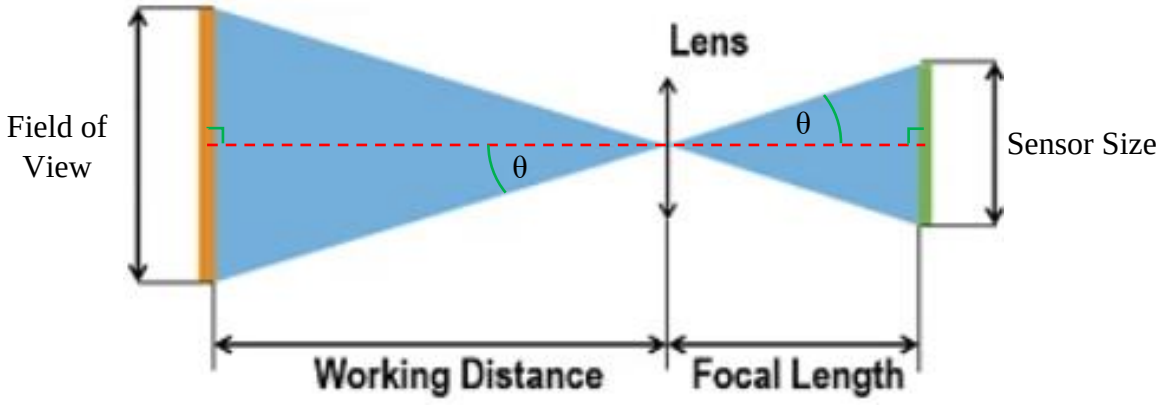
Camera's Parameters Calculation

According to the lens manual:

Focal Length	51.38 mm
Sensor size	3.5 x 10^{-3} mm
Working Distance at 0.2 Optical Mag.	261.9 mm

Thus, the field of view is:



$$\tan\theta = \frac{0.5 * FOV}{WD} = \frac{0.5 * SS}{FL}$$

$$\frac{WD}{FL} = \frac{FOV}{SS}$$

$$\frac{261.9mm}{51.38mm} = \frac{FOV}{3.5 * 10^{-3}mm}$$

$$FOV = \frac{3.5 * 10^{-3} * 261.9}{51.38} = 17.84 * 10^{-3}mm$$

But FOV will change according to the optical mag. Thus, it's better to calculate the corresponding angle:

$$\tan\theta = \frac{0.5 * SS}{FL} = \frac{0.5 * 3.5 * 10^{-3}}{51.38} = 34.06 * 10^{-6}$$

$$\theta = 0.002°$$

Required conveyor speed V_c (with the working distance = object surface distance):

We know that:

$$\tan\theta = \frac{0.5 * FOV}{WD} \rightarrow FOV = 2 * WD * \tan\theta$$

$V_c = \frac{FOV}{ET}$ (NOTE: ET is Exposure Time)

Thus, the required conveyor velocity is:

$$V_c = \frac{2 * WD * \tan\theta}{ET}$$

With the given setting, the required conveyor velocity is:

$$V_c = \frac{2 * 261.9 * 34.06 * 10^{-6}}{700 * 10^{-6}} = 25.49 \frac{mm}{s}$$