Line generator linewidth simulation:

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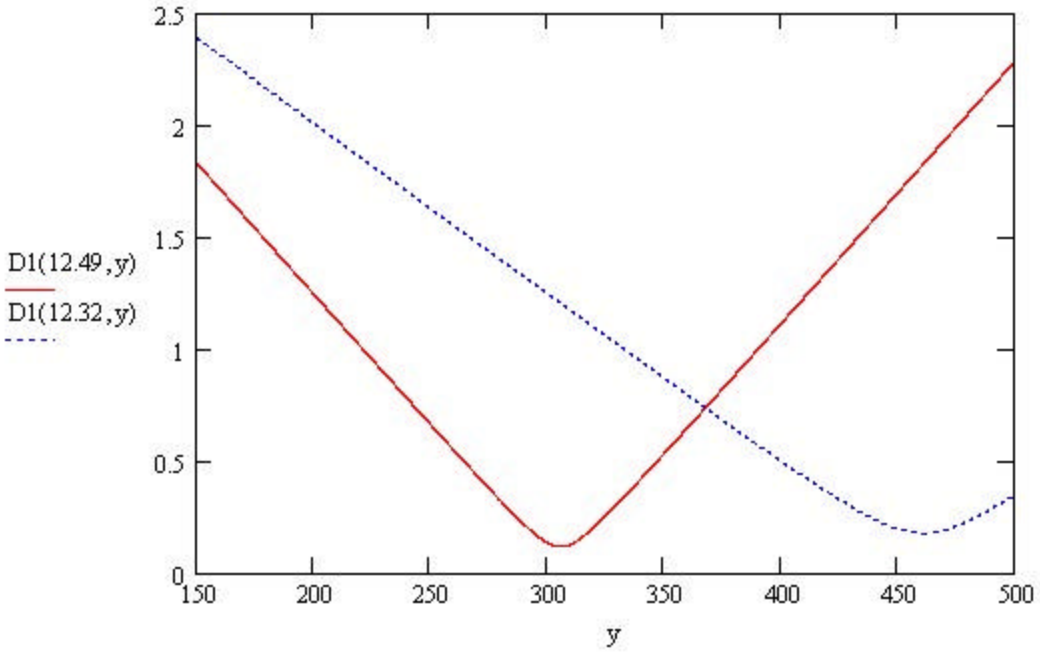
Assumption: 635nm laser from the diode with divergence of 8°×30° (FWHM), the collimating lens has an EFL=12mm. All the calculations are based on Gaussian beam with M^2 =1.3 and all the beam sizes are diameters @ $1/e^2$.



The curves show the beam size varying with y, the distance from the lens exit. D1(12.49,y) (red solid) is the curve when the line is focused to 12” (or 300mm) distance and the D1(12.32,y) (blue dashed) happens when the line is focused to 18” (or 450mm) distance.

According to my simulation:
1. If we focus the line at 300mm (12") distance, the beam size (dia.) will be < 1.0mm (1/e2) in 300mm +/- 75mm. At 18" (450mm) and 6" (150mm), the beam size will both be 1.7mm (1/e2).
2. If we focus the line at 450mm (18") distance, the beam size (dia.) will be < 1.0mm (1/e2) in 450mm +/- 110mm. At 18" (450mm) and 6" (150mm), the beam size will be 0.2mm (1/e2) and 2.3mm separately.

How to choose an appropriate focus distance is really depends on what distance the user want to optimize. For example, if the linewidth at 6” and 18” are equal weight in the evaluation, the line may need to be focused at 12”. If the linewidth at 18” is more important than that of 6”, then the line should be focused at 18” or some distance between 12” and 18”.