

White-LED Lightguide scanner

Illumination system utilizing light-guide and white LED for document scanner application

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1 Lab.2

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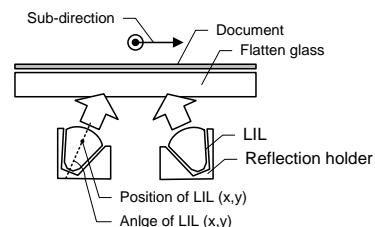
Abstract

A configuration of illumination for high-speed color document scanner has been proposed utilizing white light emitting diode and transparent plastic lightguide. The design of illumination system including lightguide for high optical efficiency and uniform image quality is performed based on a simulation using ray-tracing method. The device characteristics are also experimentally evaluated in terms of illumination distribution against longitudinal and transverse direction on document plane. Uniform illumination distribution about 85% of in longitudinal and transverse direction is realized by control of mechanical dimension and position of lightguide.

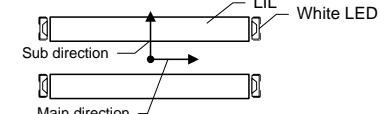
1. INTRODUCTION

array, contact image, micro lens
 focusing field depth
 filed depth
 Fluorescent Lamp, CCFL(Cold Cathode
 , 30 가 warm-up time,
 (Hg)
 CCFL LED(Light emitting diode)

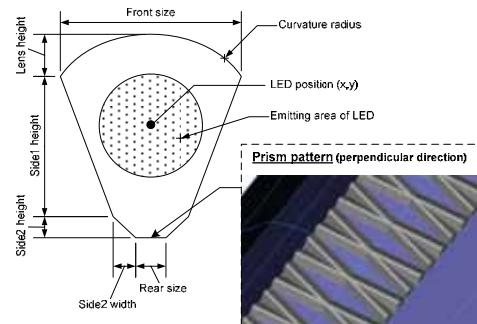
Side view



Top view



(a)



(b)

2. DESIGN AND FABRICATION OF ILLUMINATION SYSTEM

1. (a) Lightguide
 Lightguide

(b)

1. LED lightguide
5400 cell linear CCD sensor 가
lightguide, cell voltage
micro prism, , scan
CCD sensor
CCD sensor

lightguide, 3. 88.7% uniformity 가
, 91% uniformity 가

社 ray-tracing simulation ,

Ray-wizTM 가 , , 12

parameter 가

2. ± 108mm, ± 2.5mm 가
lightguide 4 18 lumen

yellow-phosphor type white LED 가

lightguide PMMA(Polymethyl methacrylate) 가

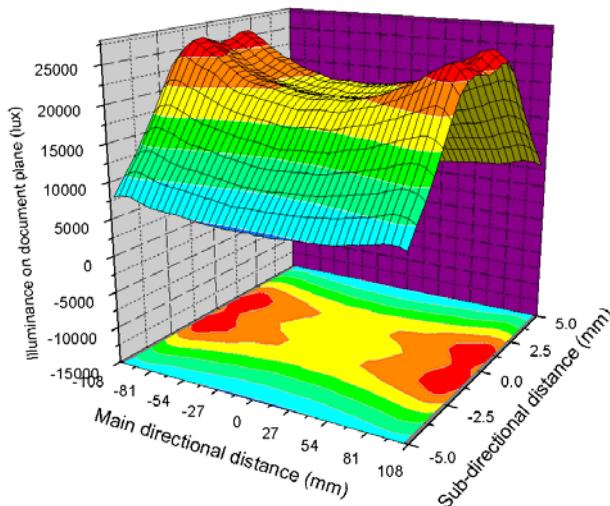
234mm, , 4.4mm

prism

100um

33.5%

85%

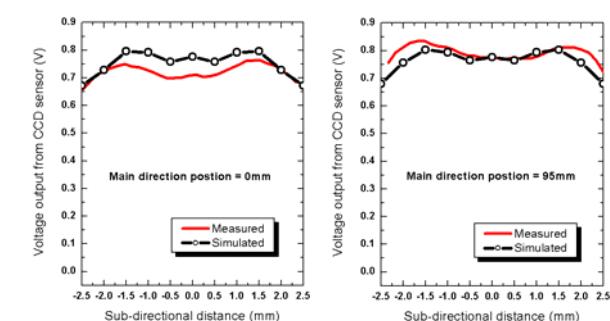
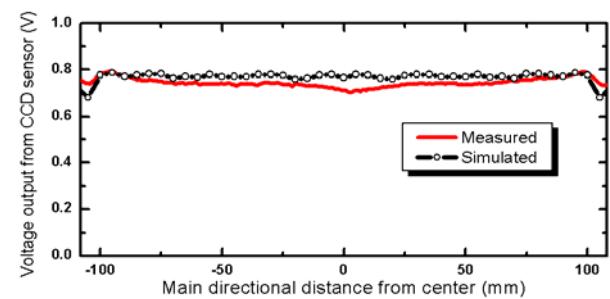


2. 2-D simulation 33.5%
85%

Lightguide 가

Lightguide 3.2 x 2.8mm
top emission white LED
CCD

simulation 96%



3. Linear CCD sensor

3. CONCLUSION

white LED

Lightguide

Lightguide

tolerance

, , 가 85%

96%

4. REFERENCE

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4. W. Folkers *et al.*, *SID symposium digest*, 35, 2004