

TFT-LCD

(), (), ()

Optimization to Minimize Deflection of a Large LCD Glass Plate with Multi-Simply Supports

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ABSTRACT

A LCD glass plate is supported by multi-pin and golf-tee type support. In the FEM analysis, the support condition is treated as simply supported boundary condition. In this study, the optimization on the location of multi-simply support is conducted. The size optimization method of ANSYS 8.0 is used as the optimization tool to search for the optimal support location of LCD glass plate. In the manufacturing process, the support condition is a fatal factor of quality control of LCD production. From the results of optimization, deflection decreases 51% compared with the original model

Key Words :TFT-LCD(), Glass Plate(), Deflection(), Optimization(), Multi-Support Point (),

1.

2.

TFT-LCD

가

2.1

TV

Glass

1850 x1500 x0.7mm

, 가 , 가 가

1 . Glass
69.2 GPa , 2730kg/m³

. 가

0.23

. Glass

가

2

LCD

. LCD 가

LCD

LCD

가

TFT-LCD

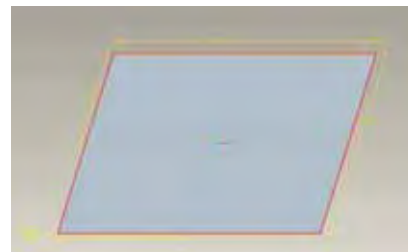


Fig.1 Shape of LCD Glass Plate(unit mm)



Fig.2 Support position (left) and shape(right) of Support pin

2.2 FEM

ANSYS 8.0
 가 ANSYS
 Shell 63 Shell 63 4
 thin shell

2.3 FEM

“Corning Eagle
 2000” 1100*1250*0.63 mm

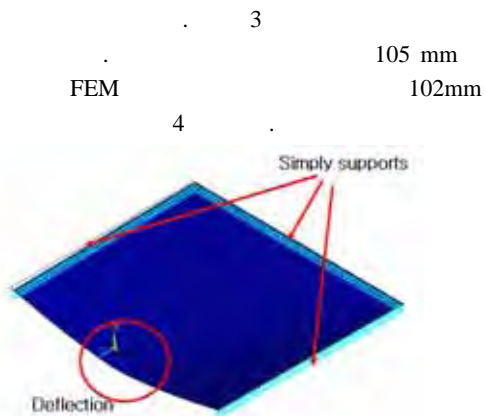


Fig.3 Boundary condition of the LCD glass plate

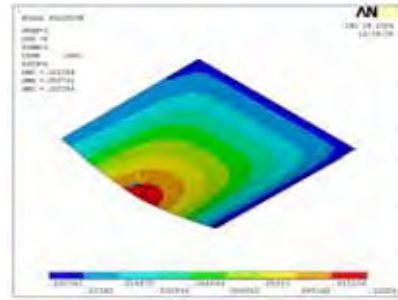


Fig.4 Analytical deflection contour of the LCD glass plate

2.4

5
 6 ANSYS 8.0

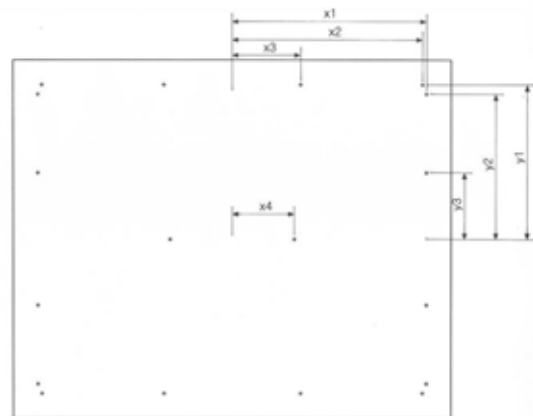


Fig. 5 Design variable X, Y

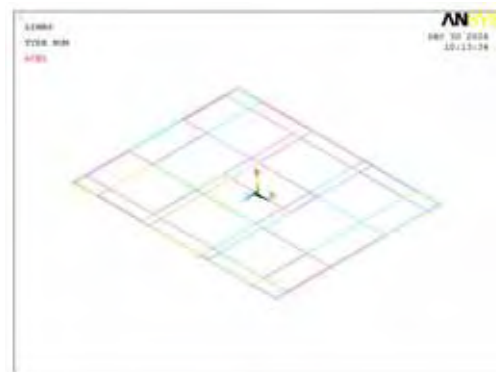


Fig. 6 Finite element model for design optimizations

TFT-LCD

. Glass

Glass edge
10 cm

8.42mm 10 , 20.5 MPa

4.12 mm 20.7 MPa . 11

0mm<X4<750mm

Problem method ANSYS code Sub -
Size Optimize Analysis

4.3 mm

51% . 4.3 mm

7, 8 가 X1 Y1
X1 Y1

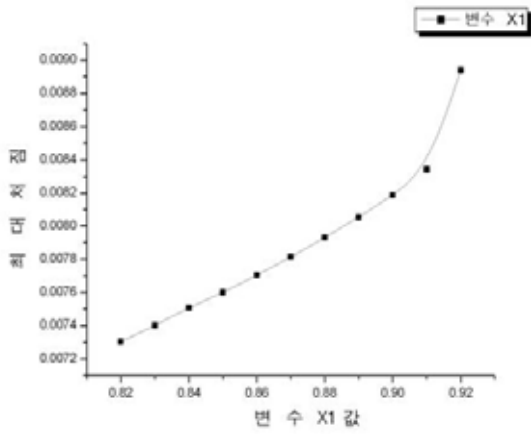


Fig.7 Sensitivity of variable X1 for deflection

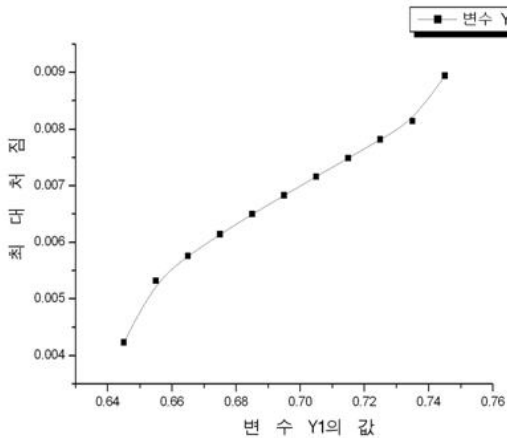


Fig.8 Sensitivity of variable Y1 for deflection

2.5

Glass
9 Glass

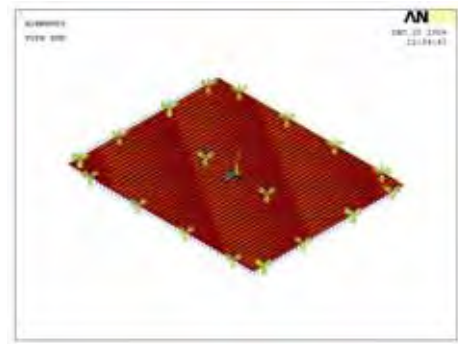


Fig.9 Shape that apply contact condition with glass and support pin

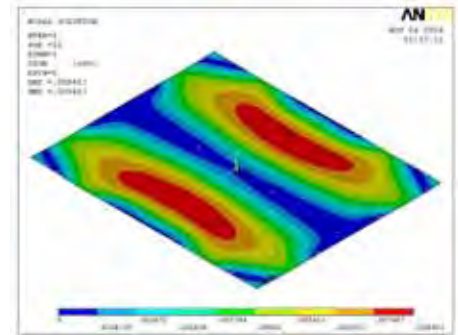


Fig. 10 Contour plot about contact analysis of original model (deflection, unit : m)

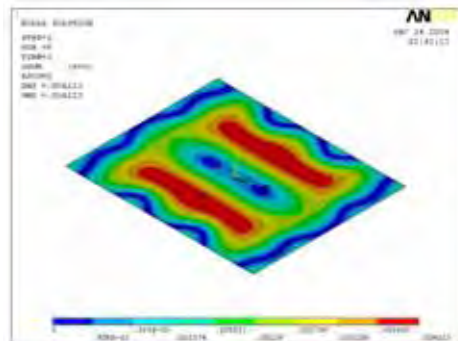


Fig. 11 Deformation of the LCD with optimized support position (deflection, unit : m)

2.6

3.

0.3m/s , 0.5sec
 12 2
 50MPa 47MPa
 13

TFT-LCD
 ANSYS code
 Size Optimize Analysis

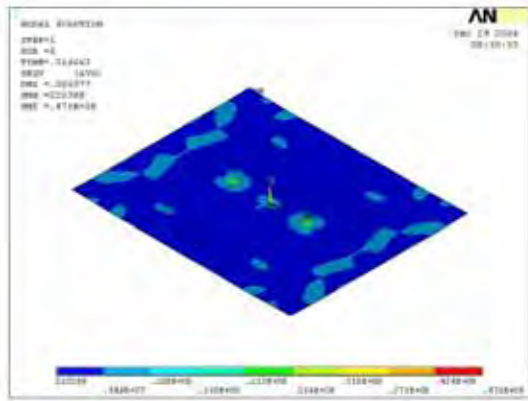


Fig. 12 Contour plot about impact analysis of original model (stress, unit : Pa)

- 1) 4.3 mm
- 2) 53% Y1
- 3) X1 가 가
- 4) 0.3m/s

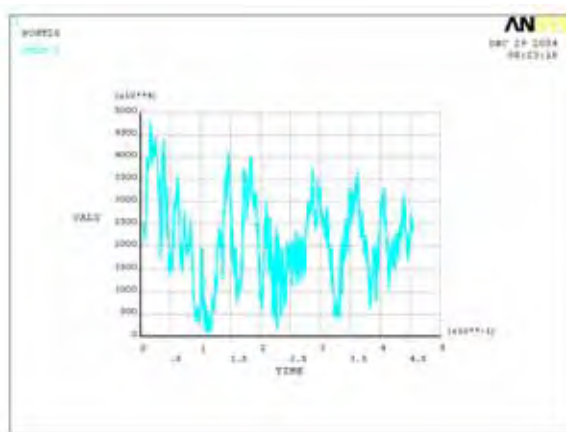


Fig. 13 Time history of stress

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