

The Thermal Stress Analysis of Brake Disc with The Change of Shape

*D. Y. Kim¹, K. H. Kim², M. J. Choi³

¹ Dept. of Mech. Eng., Kyung Hee Univ., ² Dept. of Mech. Eng., Kyung Hee Univ., ³ Dept. of Mech. Eng., Kyung Hee Univ.

Key words : Disc brake, FEM, Thermal stress, Temperature distribution

1.

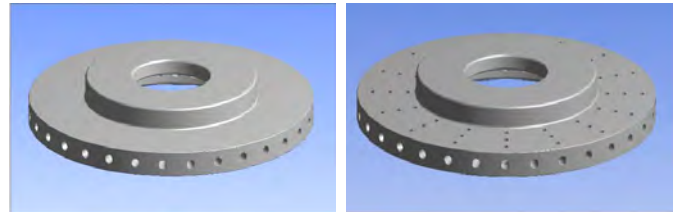


Fig. 1 Disk Brake Model

40W/m²K, 20 ° C
Moon, Gortyshov

2

(Thermoelastic instability)
(hot spot)

3.

3.1

node element 29994,17460
66409,40140 von Mises

CATIA

Ansys

Fig.2

184.2MPa

192.8 MPa

2.

2.1

3.2

22.5 ° 3 5mm 48

500 ° C

Fig.3

475 ° C

Fig. 1

2.2

15kN

500 ° C

Table. 1 Material properties

Material Properties	Disk (Cast Iron)
Young's Modulus (GPa)	115
Poisson Ratio	0.28
Density (kg/m ³)	7100
Conductivity (W/m · K)	54
Specific Heat (J/kg · K)	586
Thermal Expansion Coefficient(1/ ° C)	12 × 10 ⁻⁶

Table.1

281

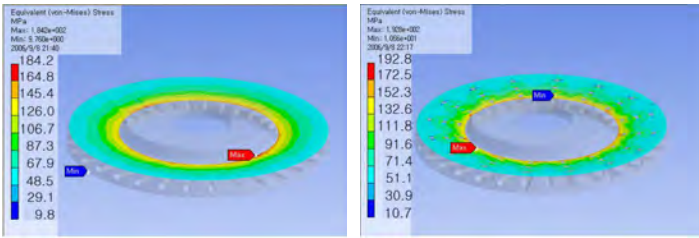


Fig. 2 Comparison of Thermal Stress

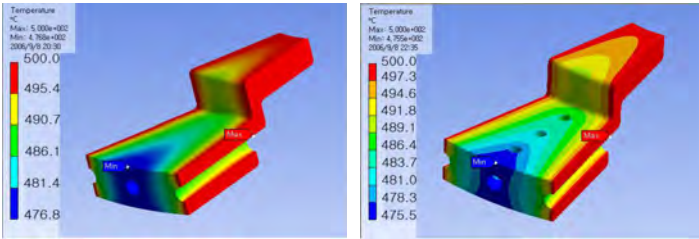


Fig. 3 Comparison of Temperature Distribution

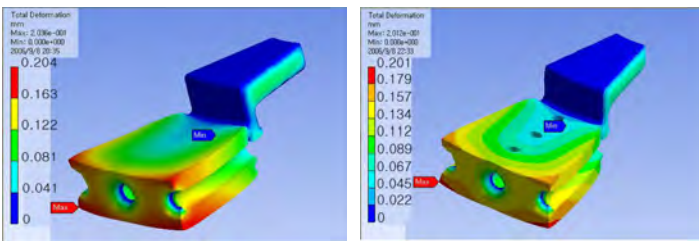


Fig. 4 Comparison of Deformation

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3.3

Fig.4

5mm 3
0.201mm
0.204mm

4.

Ansys

1)

2)

3)