

# HKS

## Design of the HKS System Under Repetitive Load

S. W. Woo<sup>1,\*</sup>, J. K. Lee(jlee@andong.ac.kr)<sup>2</sup>  
 ( ),<sup>2</sup>

Key words : HKS(Hinged Kit System), Reliability, Refrigerator

### 1.

HKS(Hinge kit system)  
 HKS  
 SDE(statistical design experiment)  
 (Taguchi)  
 1-4

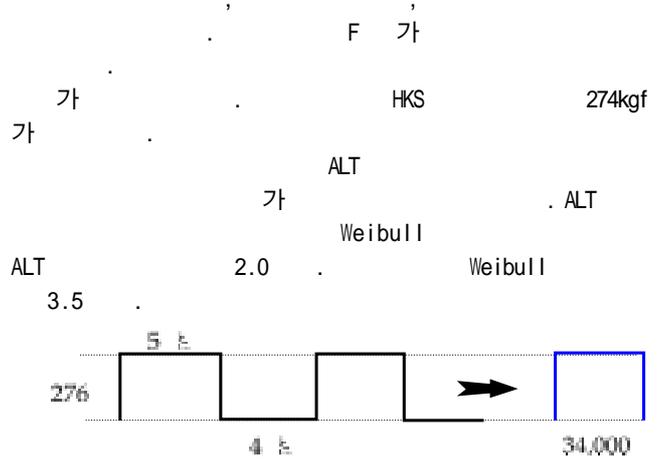


Figure 1. Duty cycles of door closing force F on the hinge kit

### 2. 가

Bx 가  
 (ALT, accelerating life testing)  
 ALT  
 ALT  
 HKS  
 가 ALT  
 Bx

ALT 가 Weibull  
 ALT 가  
 Fig. 2 HKS 가 HKS HKS 가  
 21.2MPa



Figure 2. Result of 1st ALT

### 3.

HKS K 0 43°C  
 가 0.2 0.24G(G:  
 가  
 10,950 36,500  
 110kgf, ALT  
 276kgf 가 6.3 2  
 ALT

Bx 10 B1  

$$B_x \cong \frac{k \cdot AF}{L_B} \cdot \left( \frac{-x \cdot n}{r+1} \right)^{\frac{1}{\beta}} \quad (2)$$
  
 AF 6.3 2.1 (2)  
 41,000 6  
 Bx 1 3 ALT  
 HKS 가 ALT  
 ALT

$$n \cong \frac{1}{x} \cdot (r+1) \cdot \left( \frac{L_B \cdot B_x}{AF \cdot k} \right)^{\beta} \quad (1)$$

x=0.01 AF 가 , LB Bx  
 (1) 6 ALT 60% B1 10 HKS

Fig. 1 F

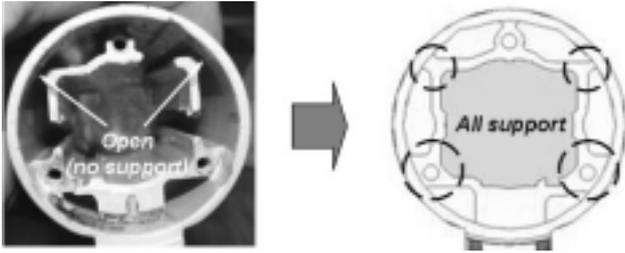
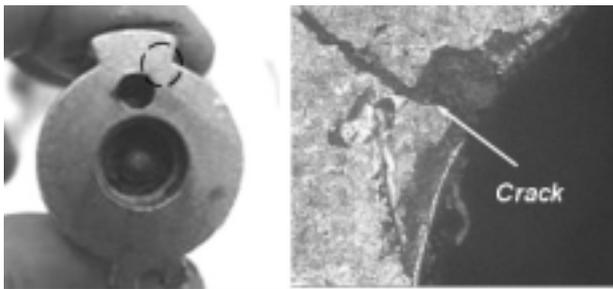
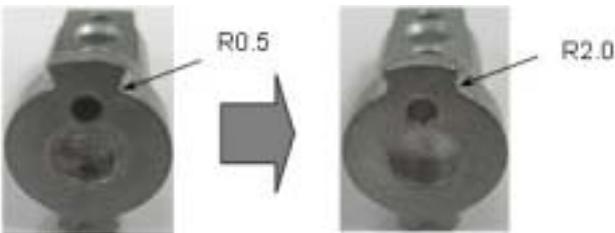


Figure 3. Structure of newly designed hinge kit system



(a) Crack of Torsion Shaft



(b) Redesigned torsion shaft

Figure 4. Redesigned hinge kit system

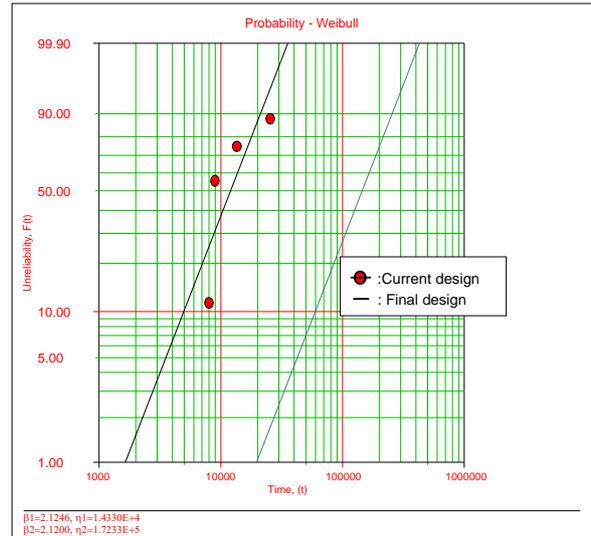


Figure 5. Results of ALT plotted in Weibull chart

. ALT  
 HKS B1 10 0.01%  
 ALT

1. Ashley, S., "Applying Taguchi's Quality Engineering to Technology Development," Mechanical Engineering, 58-60, 1992.
2. Phadke, M. S., Quality Engineering Using Robust Design. Englewood Cliffs, NJ, Prentice Hall, 1989.
3. Wilkins Jr., J.O., "Putting Taguchi Methods to Work to Solve Design Flaws," Quality Progress, 33(5), 55-59, 2000.
4. Byrne, D. M. and Taguchi, S., "The Taguchi Approach to Parameter Design," Quality Progress, 20(12), 19-26, 1987.
5. Box, G. E. P. and Jones, S. P., "Designing Products that are robust to the environment," Total Quality Management, 3, 265-282, 1987.
6. Vining, G. G. and Myers, R. H., "Combining Taguchi and Response Surface Philosophies: A Dual Response Approach," Journal of Quality Technology, 22, 38-45, 1990.
7. McPherson, J. W., "Accelerated Testing, Packaging, Electronic Materials Handbook," ASM International, 1, 887-894, 1987.
8. Ryu, D. S. and Chang, S. W., "Novel Concept for Reliability Technology," Microelectronics Reliability, 611-622, 2005.

Fig. 4  
 HKS  
 Fig. 4 (b)  
 (a) R0.5 R2.0  
 Fig. 5 Weibull ALT  
 B1 Fig. 5 1, 2, 3 ALT 가 4.7  
 10  
 4.  
 (HKS)  
 HKS , ALT  
 HKS ALT  
 HKS HKS  
 가 ALT

. ALT