# 중형엔진용 일체형 피스톤의 구조강도 평가

유재형† · 손정호*(현대중공업)

# Structural Strength Assessment of Monoblock-type Piston for Medium Speed Diesel Engine

Jae-hyeong Yoo and Jeong-ho Son

**Key Words:** Monoblock-type Piston(일체형 피스톤), Diesel Engine(디젤엔진), Fatigue Strength(피로강도), Deformation(변형)

**Abstract :** A piston in a medium speed diesel engine is a key component and is subject to the mechanical load over 200 bar and the high thermal load. Then, the high structural reliability is required to the piston in the marine diesel engine. 2-parts piston which is assembled with a forged-steel crown and a cast iron skirt is widespread. In this paper, the availability of the monoblock-type piston which was made of the nodular cast iron was investigated. In order to confirm it, FE analyses and strength evaluation were performed. In FE analyses, the mechanical contact between neighboring components such as piston pin and connecting rod was taken into account. Additionally, the effect of the inertia force and the side force on structural behavior and strength was confirmed. The characteristics of deformation under each loading were studied.



# 고압포미장치의 피로수명평가

고승기†(군산대) · 이정준*(군산대 원)

# Fatigue Lifetime Estimation of a High Pressure Breech System

Koh, S.K. and Lee, J.J.

**Key Words:** Fatigue Lifetime(피로수명), Breech Ring(포미환), Breech Block(폐쇄기) Low Cycle Fatigue(저사이클 피로), Local Strain Approach(국부변형률법)

**Abstract :** Fatigue lifetime of a breech system was estimated in order to ensure the structural integrity of the breech system used for a thick-walled tube subjected to pulsating high internal pressure. A stress analysis of the breech was performed to locate the critical region vulnerable to crack initiation. Low-cycle fatigue behavior of the breech material was investigated to obtain the fatigue crack initiation properties. Elastic-plastic finite element stress analysis resulted in a stress concentration at the breech ring groove root. Local strains at the groove root was experimentally measured using strain gages and resulted in similar values compared to the calculated strains. Local strain approach was employed to estimate the fatigue life of the breech system, resulting in 9,124 cycle for crack initiation at the groove root of the breech ring. Fatigue test using simulation specimens was performed and an average fatigue life of 10,497 cycle was obtained, which was fairly close to the calculated fatigue life.