

# 튜브 액압성형 공정에서의 마찰 특성 분석에 대한 실험적 연구

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## Experimental investigation of friction in tube hydroforming

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### Abstract

Hydroforming process has been widely applied to manufacturing parts in various fields, such as automobile, aircraft and aerospace. Hydroforming reduces weight and the number of parts joints. It also increases or improves structural strength and part quality. In hydroforming process, lubricants have a variety of functions. Lubricants play a major role in tubular hydroforming process as they reduce the friction stress at the tool-tube wall interface, thus enhancing product quality and reducing tool wear. With good lubrication, problems associated with wrinkling, buckling, premature failure can be reduced or eliminated. In this study, the coefficient of friction between tube and die at guiding zone was estimated. Friction testing apparatus for tube hydroforming were proposed, which can sustain 1500bar inside the tube. The tube was expanded by an internal pressure against the tool wall. By pushing the tube through the tool, a friction force at the contact surface between the tube and the tool occurs. From the recorded axial feeding forces, the friction coefficients between tube and die at the guiding zone in tubular hydroforming can be estimated. The effects of the various internal pressures, viscosity of lubricants, tube materials, tube size and die coating on the friction forces and friction coefficients are discussed.

**Key Words** : Tube Hydroforming, Internal Pressure, Coefficient of Friction, Lubricant, Axial Force

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