Strength Analysis and Design Optimization of Press Machinery

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ABSTRACT

The domestic machinery industry plays an important role in global machinery industry. It provides products of good quality in inexpensive prices to the metal-forming industry of the world. In particular, domestically the stamping and forging press machinery occupies about 20 % of all in terms of the total annual value of output. Nowadays, the prices of various raw materials are continuously rising. Besides, intensive competitions among machinery manufacturers are becoming ever intensive. So, every possible way is required to make one more competitive. Among these, the design optimizations of the various machinery structures should be highly emphasized and actually performed. In the design of various types of machineries, conventional design process normally can not provide accurate evaluation of the structural behavior and usually has problems of over design. To overcome such deficiencies, a computer-aided design and optimization analysis process by commercial software should then be employed not only to assure the quality of design but also to pursue a minimization of weight for reduction of material cost. In this study, a press frame is modeled in COSMOSWORKS. Particular dimensions in such a model are set as the design variables. Taking the total weight of the model as the objective function, this parametric model is subjected to design optimization from which the final optimal dimensions are then obtained. Based on the final model, the static stress distribution can be fully realized when it is loaded by the rated magnitude of force.

Keywords : Press machinery ; Finite element anaiysis ; Optimization

Table of Contents

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