

# Prediction of Fatigue Life in Cold Forging Punch Design for Fastener by Using Integrated FEA and Stress Life Approach

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## **Abstract**

This research was conducted to analyze the potential fatigue area in term of stress distribution, punch elastic deformation and forging load and the number of life cycles of the punch were calculated by using the integrated system combined a finite element analysis (DEFORMTM F3 version 6.0) and stress-life approach are presented. The fatigue life analysis was utilized by taking into account the modification factors and to improve punch performance where case studies are performed with the modification in corner radius of punch design. There are four punches with different corner of radius sizes were modeled; sharp edge, 1.0 mm, 2.0 mm and 3.0 mm. The number of life cycles of the punch has be successfully predicted and improved, as discussed in the result discussion of the cold forging of a fastener, through changes in punch design (corner radius). The sizes of corner radius of punch were optimized to obtain the maximum number of fatigue life. Corner radius 3.0 mm was found to be the optimum punch to obtain maximum number of fatigue life with minimum stress concentration while enhancing punch performance.

**Keywords:** Fatigue analysis; Cold forging; Punch design; FE analysis; Stress life approach;