

## Optimization of Process Parameters for Three-roll Skew Rolling Based on Design of Experiment(DOE)

**Baoshou Sun<sup>1</sup>, Guangxing Huang<sup>2</sup>, Wenfei Peng, Xuedao Shu, Lu Wang**

<sup>1</sup> College of Mechanical Engineering and Mechanics, Ningbo University, China, 315211

<sup>2</sup> Zhejiang Provincial Key Laboratory of Part Rolling Technology, Ningbo,  
315211, aemail:695842684@qq.com

### Abstract

Titanium alloy with high strength, corrosion resistance, heat resistance and many other advantages, has widely applications in aviation industry and the military-industrial complex[1-2]. Three-roll rolling is one of mature methods in current production of titanium alloy bars. In this paper, we take the titanium alloy bars TC4 as the model and adapt DEFORM-3D finite element software to simulate the three-roll skew rolling process. By this means the feasibility of titanium alloy bar used in three-roll skew rolling and the deformation mechanisms are analyzed. Additionally, experiment design method is applied to determine the critical process parameters impacting the forming quality of three-roll skew rolling. Range analysis and variance analysis methods show that the influencing parameters of average distance of swirl marks in decreasing sequence are as follows: deflection angle, initial temperature of rolled piece, angular velocity of rolled piece, and the optimal parameter combination are as follows: deflection angle = 8, initial temperature = 900°C, angular velocity = 10rad/s.

### References

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