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Experimental comparison of roller die and conventional wire drawing

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Abstract

In this work, the application of roller dies as an alternative to conventional dies in the wire drawing process – claimed in earlier works to offer many advantageous improvements – is evaluated. To this end, experimental procedures using a single stage drawing machine were conducted, drawing low and medium carbon steel wires using both roller dies and conventional dies. The two reduction processes were compared with respect to drawing force and the resulting wire temperature. Also the mechanical properties of the drawn wires were investigated. The obtained results have not shown any large differences between the two processes, and the main improvement using the roller die method was a better wire surface. This advantage was counteracted with downsides including higher wire temperature and lower strain at fracture.

Moreover, a formula to theoretically calculate drawing force for the conventional drawing process was modified and used to calculate drawing force for the two reduction steps in the roller die cassette. The results showed that the proportion of inhomogeneous deformation was much higher in the rolling process as compared to the conventional process.

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