

Comparative study of conventional and nano-diamond coated wire drawing dies

Tuesday, 25 March 2025 16:10 (20 minutes)

The wire drawing process enhances the material properties and dimensional accuracy of hot-rolled wire by pulling it through dies typically made of cemented tungsten carbide or diamond. Despite ethical and health concerns associated with cobalt, a key component of cemented carbide, it remains the most common choice due to its cost-effectiveness and durability. Recently, Nano Dies with nano-diamond coatings have gained attention, offering claims of lifespans 20 to 100 times longer than conventional dies. These dies have the potential to reduce cobalt dependence and improve the efficiency and sustainability of wire drawing. However, the price of these tools varies significantly, by up to a factor of 20, creating uncertainty about performance differences across price segments. This paper presents an in-depth comparison of a conventional die with two nano-diamond coated tools from different price ranges, focusing on mechanical properties such as hardness, surface roughness, and microstructure. Additionally, laboratory wire drawing experiments were conducted to assess the performance of these new tools compared to conventional dies.

Speaker Country

Sweden

Are you interested in publishing the paper in a Steel Research International special issue?

Yes

Primary authors: LARSSON, Joakim (Örebro University); KARLSSON, Patrik

Presenter: LARSSON, Joakim (Örebro University)

Session Classification: Surface Treatment & Coating

Track Classification: Application: New technologies