

Effect of the Firing Cycle on the Microstructure and Mechanical Properties of High Steel Barrel Fabricated by Forging Process

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Abstract : The choice of gun barrel materials is crucial to ensure the maximum high rate of fire. The high rate of fire causes wear-out damage and shuts off mechanical properties (hardness, strength, wear resistance, etc.) and ballistic properties (bullet speed, dispersion and precision, longevity of barrel, etc). To overcome these kinds of problems, a deep understanding of the effect of the firing cycle on the mechanical and ballistic properties of the barrel is regarded as crucial to improving its characteristics. In the present work, a real experimental test of firing by using a high steel barrel with 7.62x39 ammunition was carried. Microstructural observations by using SEM were investigated. Hardness evolution through the barrel of both barrels labeled as reference barrels and as fired barrels were compared and discussed. Ballistic properties during the firing test, including speed of projectile and precision dispersion, are revealed and discussed as well. The aim of the present communication is about to discuss the relationship between pressure distribution versus mechanical properties through the wall barrel. Ballistic properties, including speed of the projectile, dispersion, and precision results during the shooting process, were investigated. Microstructure observations of the as-rifled barrel in comparison with the as-reference barrel were performed as well.

Keywords : barrel, ballistic, pressure, microstructure evolution, hardness

Conference Title : ICBS 2024 : International Conference on Ballistics Studies

Conference Location : Amsterdam, Netherlands

Conference Dates : December 02-03, 2024