

Problem overview

Studying deformation of a Winchester 700 barrel during firing in order to determine both length change and angular displacement using photogrammetry method. Experimental results are presented in Figure 1 and Figure 2. It is showed that barrel moves (expands and twists) which in turn affects rifle's accuracy.

Test setup

ARAMIS 3D system using a pair high-speed cameras at 10,000 frames per second and high intensity lights are used to capture barrel deformation during the firing experiment. The ARAMIS dot target tracking capability is used to measure barrel's movements.

Notes

The current application showed that optical metrology has advanced capability for evaluating rifle's movement during firing, resulting in barrel's expansion as the bullet passes through the bore. The results, presented in Figure 1, were of high quality and helped quantified the barrel's expansion. The results shown in Figure 2 show for their part some twists due to the torque of the riffling during propellant ignition.

The displacements of a barrel during firing was measured by tracking of target dots placed on a rifle.

Conclusion

Optical metrology solution, such as the ARAMIS photogrammetry technology, was able to accurately measure rifle's barrel deformation during firing. These results can be further use to perform vibration analysis and tune the barrel which would improve it's accuracy.

For more information on this application, please contact Trillion Quality Systems, world leader in custom optical metrology application development.

Keywords: Rifle barrel deformation, Aramis, DIC, vibration analysis, rifle barrel tuner

Figure 1

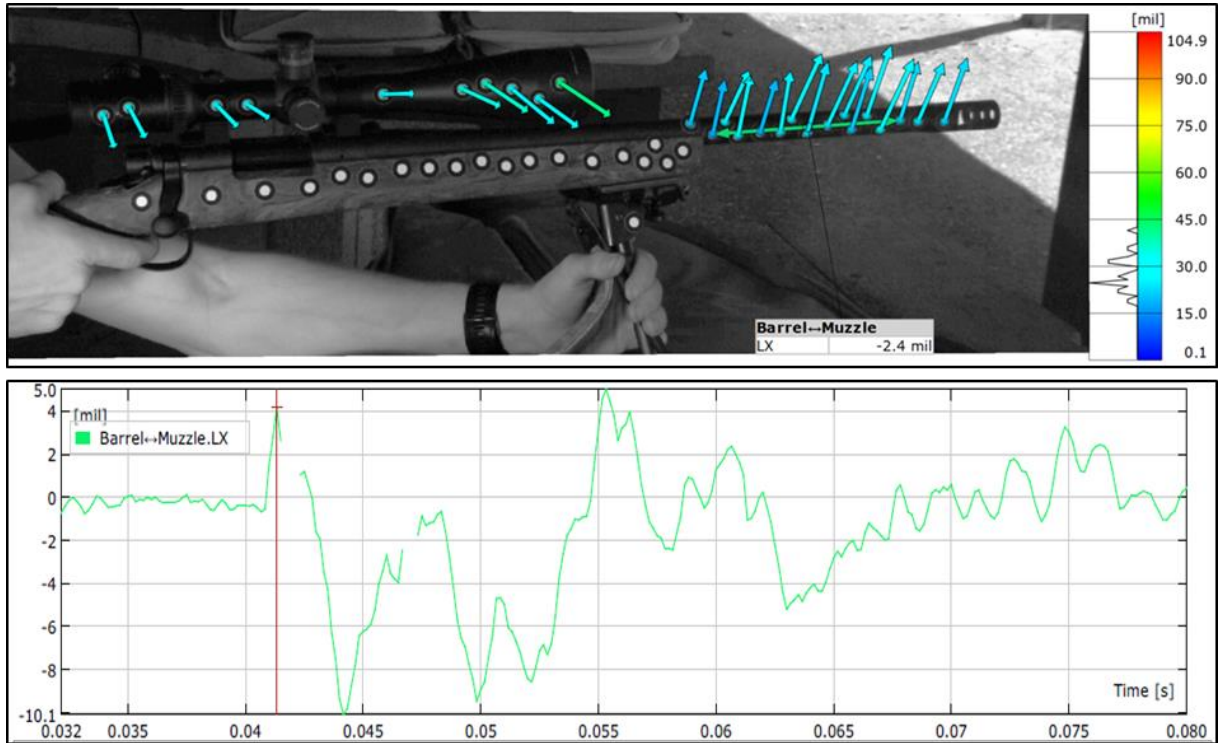


Figure 2

