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Anderson Manufacturing, Inc.
1743 Anderson Blvd
Hebron, KY 41048

Re: Results of Frictional Testing on RF-85 (RF-85.com) Treated AR-15 weapon.

Anderson Manufacturing requested thermal measurements of AR-15 rifles during firing to compare the effects of their proprietary RF-85 treatment. The goal of the RF-85 treatment is to produce a lubricious surface that allow the elimination of liquid lubricants. Another benefit of this would be to reduce the temperature gained during normal operation of the weapon due to reduced friction in the receiver, barrel, and bolt assembly. This test was to characterize the temperature rise in the receiver between a normally CLP coated weapon and a weapon with no liquid lubrication with only the RF-85 treatment from Anderson MFG.

To test this, two methods of measuring the temperature was used. First, an Infra-red camera was aimed at the receiver to use the infra-red heat emanating from the weapon during firing to measure the temperature. Second, a very fine thermocouple was attached to the weapon at the receiver just in front of the ejection port. This would record the temperature there and this temperature would also be used to calibrate the temperature measured at other locations on the receiver by the IR camera. In addition, a high speed camera was used to film the action of the receiver and the bolt at a frame rate of 1000 frames per second.

First, the weapon coated with CLP was placed in a test fixture and a lanyard was attached to the trigger. The magazine was placed in the weapon and the weapon was fired at an interval of 4 seconds between shots. The magazines were replaced at regular three min intervals and 10 (20 rounds) magazines were put through the weapon. Next, another 9 magazines were put through the weapon at 30 second intervals at a rate of 2 seconds between shots. This was repeated with the weapon treated with the RF-85. Figure 1 shows the temperatures of the receiver and barrels for both weapons. Notice that the weapon treated with RF-85 experienced lower temperatures. This indicates that there was less friction due to the treatment and within the tests completed, the treated RF-85 weapon experienced less frictional heating. However, this thermocouple only measured temperatures at one point, and other points may show a more significant difference in temperatures. However, this indicates that within the tests completed, frictional heating appeared to be less in the weapon treated with RF-85 compared to the normally lubricated weapon.

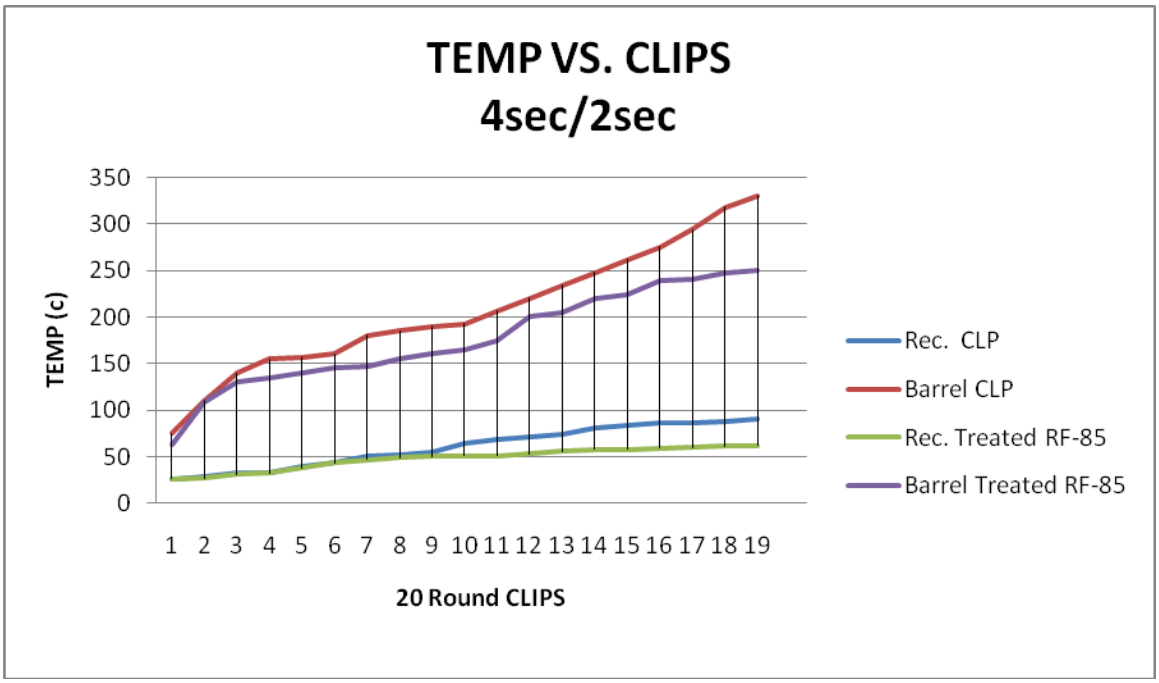

Figure 1. Comparisons of receiver temperatures using thermocouples attached to the receiver just infront of the ejection port.

Figure 2 presents the IR temperatures as witnessed by the IR camera for the first 10 magazines. Notice that the temperatures were not visible for the first couple of magazines in the weapon coated with CLP due to a filter problem. This was replaced and the temperatures were then visible. Notice that the temperature of the receiver in both weapons is nearly identical, indicating that the weapon treated with the RF-85 and no lubrication experienced the same temperatures as the weapon lubricated with CLP. This indicates that at the very least, the treated weapon as tested experienced temperatures in the receiver no different from the standard lubricated weapon.

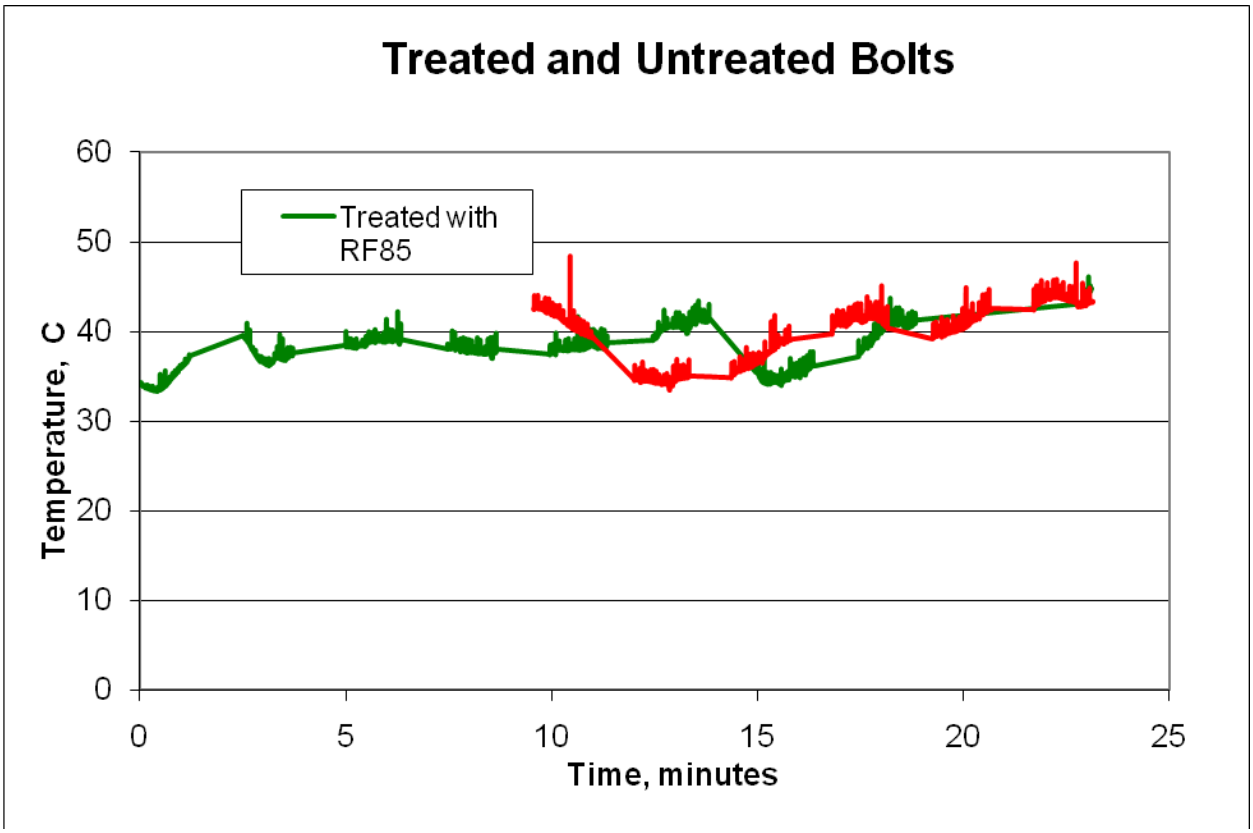

Figure 1. Comparison of temperatures using an Infrared Camera on the receiver of an uncoated AR-15 and an AR-15 treated with RF-85. This is the average temperature of the receiver (not just a single location)

Next, the high speed camera was examined to compare the performance of the bolts. First the action of the bolt with normal lubrication was examined. It was found that with the bolt coated with CLP, 108 Frames ellapsed for the shot, giving a time of 108 milliseconds for the shot to complete (see Figure 3). With the bolt treated with RF-85, the camera showed that 83 frames ellapsed for the shot, for a time of 83 millisecondsfor the shot to complete (see Figure 4). Clearly, the bolt treated with RF-85 was able to cycle nearly 23% faster than the bolt lubricated with the normal method with CLP. Hence, the treatment allows the action of the coated bolt treated with RF-85 to cycle 23% faster. It appears that like other systems treated with RF-85, the treatment of the bolt with RF-85 reduces friction in the bolt assembly during cycling. For further information, please see www.rf85.com.

Figure 3. Movie of the uncoated bolt during the cycling. This action takes 108 frames (108 milliseconds to complete).

Figure 4. Movie of the bolt coated with RF-85 during the cycling. This action takes 83 frames (83 milliseconds to complete).

Last, it was proposed that the RF-85 treatment would also promote the cleaning of the bolt. So, both bolts were returned to the laboratory and disassembled. Each part of the bolt was weighed individually, and the totals were added for a complete weight (313.706g for the RF-85 treated bolt and 313.529g for the CLP coated bolt). Then the normal bolt was soaked in acetone (a solvent that cleanly dissolves the CLP). The RF-85 bolt was soaked in warm soapy water. The liquid from each soaking was then poured over filter paper and the resulting materials from the soaking were weighed. It was found that the material/residue from the bolt coated with normal CLP totaled 40 milligrams while the material/residue from the bolt treated with in RF-85 totaled 51 milligrams.

It was also noticed that a simple green scotch brite cleaning pad could clean the remaining parts of the RF-85 treated bolt with soapy water and no solvents. It also was noticed that the treated coated with CLP required both scotch brite pads and solvents to clean them, as compared to only soapy water and scotch brite for the RF-85 treated bolts.

Sincerely,
James Klett

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