CASE STUDY #1520 | EMAP

TRIGGER PULL

CHALLENGE

A manufacturer of handguns for the US Military needed to assure reliably consistent operations of the arms they produced. Each and every time any individual weapon was fired, the force required to actuate the trigger needed to be the same, and that force needed to be consistent weapon to weapon. Pulling a small-arms trigger should not take more than a few pounds of force, and accurately measuring & gaging force at such low levels, presented a challenge.

The manufacturer sought to maintain a consistent standard across their handguns of 5.5lbs, +/- 0.5lbs, in order to achieve maximum quality & consistency. The trigger should begin to engage within 0.1" of travel and should take no more than 0.4" of travel before reaching its break. The maximum force required to pull the trigger and fire the handgun should be 5.5lb, +/- 0.5lb. Additionally, the spring-actuated trigger reset should be less forceful while still remaining tactile enough to allow the user to know the trigger has been reset and is ready to fire again.

SOLUTION

Promess' applications engineering team responded to the manufacturer's needs by working closely with them as they designed tooling that worked with Promess' EMAP (Electro-Mechanical Assembly Press), outfitted with a high-precision 10lb external load cell, capable of .5% accuracy, calibrated to precisely 5.5lbs. The press provided the precise linear positional accuracy and force needed, while the external load cell allowed measurements to be taken all the way down into mere ounces. Positional data and force data from the external load cell, both, were monitored by the Promess software, and gaged. Any unit produced that fell outside the spec they had established was quickly and efficiently identified and removed to be reworked before re-testing.

As a result of the manufacturer's use of a Promess EMAP system, they could be certain that every trigger met the spec they had established regarding the amount of force required to actuate it. (See Figures 1 & 2, below) They were able to successfully supply the military, and the same technology that allowed them to meet the rigorous military spec could also be applied to improve the quality of the civilian arms they produced. They had verification data to prove their process and that data was precisely gaged to prove the quality of each unit that had been produced.

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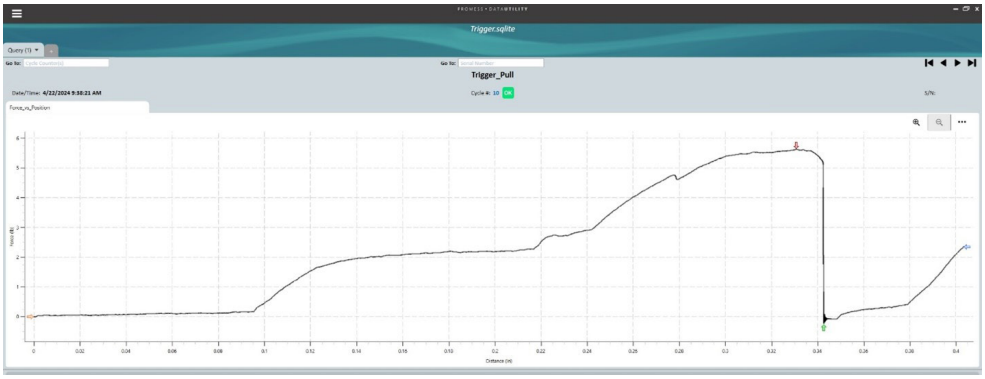
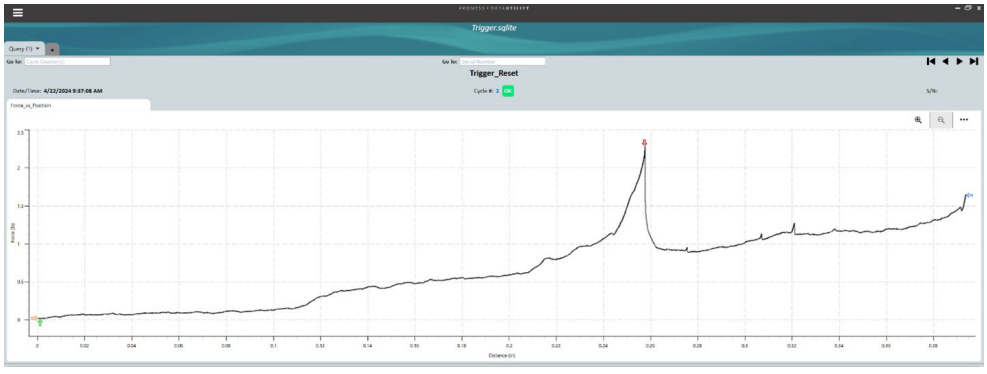
If anything in their process had changed without their knowledge (i.e. incoming quality issues, ambient factors, etc.) they were immediately made aware which allowed them to remedy the problem and minimize variance before any significant volume of units were produced. The in-process gaging gave them the ability to respond to problems before the unit ever even left the station. Additionally, the manufacturer had access to Promess' team of experts 24/7/365.

They were able to produce high-quality arms that worked as they should. They were able to produce them with certainty. And they had the data that both verified their quality and contributed to their efforts of continuous improvement. This resultant data was also gaged in the Promess software and the operator was immediately alerted anytime an out-of-spec trigger was detected. Because of the capability of the software, the engineers who designed their process had full control over the responses to out-of-spec conditions, that were best suited to their needs. (i.e. stop process immediately for intervention, continue process tagging the unit for later rework, divert out-of-spec unit and continue, etc.). In the end, the manufacturer was able to consistently and reliably produce top quality arms.

ACCEPTABLE TIGGER PULL GRAPH



ACCEPTABLE TIGGER PULL RESET GRAPH



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