

A

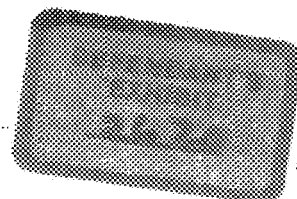
Ilion, New York  
April 2, 1968R. A. WILLIAMSON  
WORKS MANAGERILION QUALITY AUDITS

(Letter P. H. Burdett to E. Sparre, 3-29-68)

Approximately 1% of the firearms produced at the Ilion plant are subjected to a finished gun audit which includes visual inspections, extensive firing and testing for adherence to specifications and Remington quality standards. This sample size gives us 95% assurance that even though a quality problem may evade detection during the various phases of production, gallery testing and final inspection, if the problem affects as few as 1% of any particular model or common sub-assembly, it will be detected by finished gun audit.

Additional auditing or enlarged sample sizes become disproportionately expensive when compared to the expected improvement in the probability of identifying defects.

With the current introduction of new linear measuring machines and data handling systems at the Ilion plant, it is likely that revisions to our quality control system to expand the use of these tools will provide more accurate and extensive quality information. I have asked Lee Pressnell to visit the Ilion plant and revise our quality program.

L. Fox, Supt.  
P E & C SectionLP:1  
Attach.

AL 0021809

1012

## MEASURING GUN QUALITY

In a typical gun produced at Ilion, there are approximately 3000 measurable characteristics. For each of these characteristics, a statistical sampling procedure has been established to assure that components are being manufactured to model drawing tolerances. Approximately 10% of our wage roll labor is expended in measuring these characteristics.

In addition to controlling the characteristics of individual components, sub-assemblies and assemblies are visually inspected and gaged to measure compatibility of components, controllability of assemblies and effectiveness and controllability of the output function of sub-assemblies.

Because of the inter-relationships of components and the large number of characteristics, it is possible for a characteristic to shift from the mean position, still be within gage limits, and cause quality problems. These problems are usually detected at final assembly, during gallery testing or at final inspection. When detected, Production, P E & C and R & D analyze the problem and institute the necessary design or process revisions. This type of action takes place several times each year and keeps most quality deficiencies from the consumer. This action always includes corrections to work in-process and warehouse product.

As a final guard against shifts in physical characteristics which affect product quality but escape detection at the various check points in the production process, P E & C maintains a finished gun quality audit. This finished gun audit provides a random sample of approximately 1% of the finished product.

With the finished gun audit, we have approximately 95% assurance that any previously undetected quality problem which affects as few as 1% of the gun model will be detected and corrected. We have 95% assurance that a gun defect affecting 1% of a particular model will be detected.

To improve the probability from 95% to 97% of detecting a 1% defect rate would require doubling our sample size and increasing finished gun audit cost from approximately \$29,000 per year to approximately \$58,000 per year. Improving the probability to 99% of detecting a 1% defect rate would require quadrupling the sample size and would increase costs to approximately \$116,000 per year.

LF:1

AL 0022810