Single Sampling Plan for Attributes

Introduction:

Acceptance sampling is a large part of quality control and is used when the cost of testing a product is high compared to the cost of passing a nonconforming item. Acceptance sampling can be done on attributes or measurements of the product. The purpose of an acceptance sampling plan is to determine if a specific lot of incoming product is worth buying. This plan is developed by first determining a few variables:

- The lot size that is being bought (N)
- The sample of (n) units selected at random from the lot of (N) units,
- If there are (c) or fewer defectives, accept the lot. If there are more than (c) defectives, reject the lot.

The three charts created include an operating characteristic curve, average outgoing quality curve, and an average total inspection curve. Each of these graphs portray a different aspect of the acceptance sampling plan.

The Operating characteristic curve plots the probabilities of accepting a lot versus the percent of the lot that is nonconforming. Acceptable quality level is the poorest level of quality from a supplier's process that would be considered acceptable as a process average. When the producers risk $\alpha$ is set to 0.5%, $100 - 100(\alpha) = 99.5\%$ the corresponding acceptable quality level (AQL) is 0.4%. Rejectable quality
level is the poorest level of quality that the consumer is willing to tolerate in an independent lot. With a rejectable quality level (RQL) set at 4% the resulting consumers risk $\beta$ is 2.9%.

The average outgoing quality (AOQ) plot depicts the relationship between the quality of the incoming material and the quality of the outgoing material, we assume that rejected lots will be 100% inspected and that a screen and scrap will be performed to remove those parts in which are nonconforming. If the incoming quality is good then outgoing quality is good, but if incoming quality is poor then those parts want to be caught in order to keep the outgoing quality good.
The average total inspection (ATI) plot depicts the relationship between the quality of the incoming material and the number of items that need to be inspected. This goes in pair with the AOQ curve to determine the number of parts that need to be inspected for an average outgoing quality value.

In the case of a screen and scrap the max average outgoing quality level and the corresponding average total inspection at that AOQL need to be determined to create an effective sampling plan. When the percent nonconforming of the incoming lot is 1.7% the maximum average outgoing quality is 0.9%. The average number of parts that need to be inspected is about 400,000. The distribution used to determine these values was the Poisson distribution.