

# Online Interactive Quality Procedures

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**Abstract** — Corporations often seek to centralize quality control standards and records over several locations. This paper describes an interactive web site for acceptance sampling, a common quality procedure.

**Index Terms** — Quality assurance, sampling methods, internet.

## I. INTRODUCTION

For reasons of standardization, efficient manufacturing, documentation, and contract fulfillment, organizations often evaluate quality assurance software. There are a variety of approaches available. These include purchasing commercial software packages residing on workstations (often along with the requisite hardware and training), such as SPSS[1] or JMP[2]. Another approach is the use of online tools.

Online tools can be further broken into two groupings. One is any number of the freely available web sites such as those at the University of Baltimore [3] or St. John's University [4]. While many of these sites are very useful, their continued availability is often dependent of a single person and not assured. Some sites also make use of controversial statistical methods.

Custom online tools offer many potential advantages, including: the ability to embed organization-wide standards such as levels of statistical significance; constraining sampling plan variety and use, and; interface consistency, which can reduce data entry error and training requirements

## II. AN EXAMPLE OF INTERFACE DESIGN

There are numerous components to consider in the design of an online interface, but the most important is the objective – that which is to be accomplished. Other important criteria include appropriateness (has the user selected the proper page), error protection, transparency of use, concise instruction, and speed [5]. Many of these points may be illustrated through an example.

Consider the plight of a custom metal tubing fabricator. Components orders are generally small and must meet challenging specifications. Testing is destructive and so must be minimized while still offering assurance the parts will meet specifications. Traditionally, the fabricator has resorted to testing a single component and then shipping the lot to the customer. Returns usually resulted in the attempted implementation of a sampling plan which quickly fell into disuse due to the expense of testing. Worse, the sampling plan was often misapplied as it proved difficult to understand.

After consultation with both labor and management, an online tool was designed to meet everyone's criteria. A mockup is shown in Fig. 1. A rationale for, and analysis of this prototype follow.

A. Select the type of test & enter specification(s).

all parts must be greater than

all parts must be less than

all parts must fall between  &

B. Enter at least 2 test results. All values must be positive and at least 1 must be unique (if the first 2 values are identical, enter them & test at least one more).

1.

2.

3.

4.

5.

C. Click the button to estimate the percentage of the lot that will fall outside specifications (non-conforming).

%

D. To have 95% confidence that the above value is within  $\pm 2$  percentage points of the actual value, the sample size should be:

Figure 1. Prototype inspection form.

## III. ANALYSIS

By keeping the interface as simple as possible, the chance it will intimidate the user is reduced. Statistical jargon is nonexistent. All inspection tests (2 one-sided and 1 two-sided) employed by the fabricator are included – the correct test is given on the specification sheet that accompanies the component throughout production [6]. The radio buttons allow for only one test type to be selected, and the gray specification value entry fields are checked for reasonableness (such as the upper specification being greater than the lower specification). Eventually, this page is to be linked into the inventory tracking system so that the proper test and specification values will be chosen automatically.

Test result inputs are verified by quantity (at least 2, for proper statistical analysis) and uniqueness. Note that all objects requiring interaction by the user are shown in gray throughout the form. Further, gentle popup messages ask the user about missing or suspicious values.

Once the user clicks the button (which becomes active only after preceding data entry is complete), an estimate of the percentage of non-conforming parts is produced. The user can then compare this the minimally acceptable value given on the production specification sheet and with general company standards. At the same time, another estimate is displayed. This second estimate is the number of

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samples that would have to be extracted to give reasonable confidence in the process. If large, this value often seems to be interpreted as an indication of inadequate process quality. The online form will eventually enter results into the company database in addition to simple screen display.

Preliminary results indicate the form is being used both often and successfully.

### REFERENCES

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