

The Survey Says...

(Konnie Steele)

Top Three Concerns in Manufacturing

1. Complete Traceability Systems (ISO 9000)
2. Quality Cost Analysis
3. Closed Loop Corrective Action System

From the survey results, we learn that Quality Managers and Engineers today are more concerned about what is going on in their processes than ever before. Accurate, easily accessible, organized data has become crucial to the manufacturing environment and the standards necessary to conform to ISO certification.

As technology and standards advance, manufacturers are striving to satisfy the how, why and how much questions regarding their processes. Complete seamless integration and analysis in the manufacturing environment help to contribute the answers and create diverseness in an enterprise solution.

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You Ask, We Answer

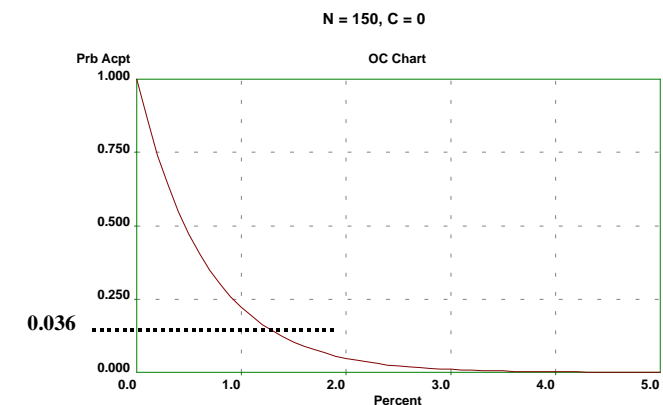
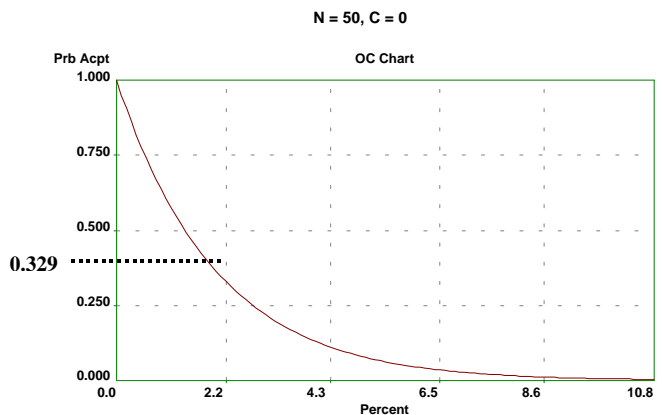
(Don Holmes)

Submitted by Larry W. Blondin, AP/Northern

The Question: Can I please have more information on C = 0 Sampling Plans and their value at receiving inspection and how to develop a closed-loop internal Corrective Action system for internal rejects and rework?

Evaluation of C = 0 Sampling plans:

Like all other sampling plans, evaluation must be made on the basis of the Operating Characteristics (O.C.) curve. The OC curves for several C = 0 plans are shown below.



Don't be misled by the semantics here:

C = 0 plans will accept lots which are more than 0% defective.

Our sample may fail to hit any of the defectives in a lot that is say 2.2% defective. From the $n = 50$, $C = 0$ OC curve we see that there is a 0.329 chance of that happening. Similarly for the $n = 150$, $C = 0$ OC curve we see that there is a 0.036 chance of that happening. The basic question is; does the decrease in risk warrant the increase in the cost of $n = 150$ rather than $n = 50$? It is often argued that $C = 0$ plans have a psychological advantage of "We don't allow any defectives in our plant". I'll leave the

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Stochos Incorporated is pleased to announce a new partnership:

Welcome Pinnacle Group

Pinnacle Group strategically integrates people, systems and information technology to produce profound, sustainable business results. Pinnacle builds capacity within organizations to initiate dramatic improvements in the overall supply chain. The approach is hands-on, dealing with current organizational issues and challenges.

Pinnacle Group provides education and coaching in skills that allow you to fully exploit your **Stochos** system, including:

- High Performance Leadership
- Productive Work Relationships
- Training in the Utilization of your Stochos Software
- Real-time Use of Statistical Process Control (SPC)
- Off-line Statistical Methods (Experimental Design-DOE)
- Critical Thinking Skills: Root Cause Analysis, Decision Making and Planning
- World Class Manufacturing Methods to include:
 - Single Minute Exchange of Dies (SMED)
 - Quality Function Deployment (QFD)
 - Poke Yoke (Error proofing)
 - Supply Chain Management
 - Process Innovation

Stochos provides the platform for data acquisition and analysis; **Pinnacle** builds the competence needed to leverage this information resource to produce dramatic results.

Pinnacle (423) 671-0611, Email: pinngroup@aol.com

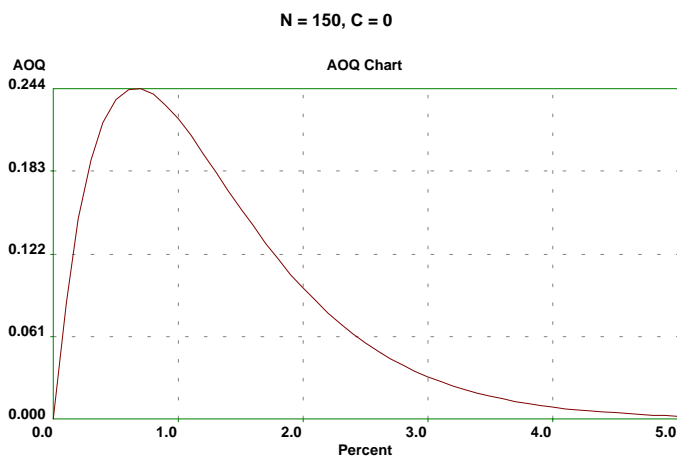
You Ask, We Answer...Readers' Questions

psychological economics to you.
C = 0 Sampling Plans (Cont'd)

Long before there was TQM there were Lot Acceptance Sampling plans such as MilStd.105 (now 105E). These plans are indexed by, for one thing, an idea referred to as the AQL (Acceptable Quality Level). In our example, we compared the performance of two sampling plans $n = 50$, $C = 0$ and $n = 150$, by comparing the probability of acceptance for an AQL of 2.2%.

As a reference value for comparing different sample plans, use the AQL whether or not they are $C = 0$ plans.

From the OC curve, one can also obtain the Average Outgoing Quality (AOQ) curve like the one shown below for the $n = 150$, $C = 0$ plan.



The highest value for the AOQ is called the Average Outgoing Quality Limit (AOQL). The AOQL is the highest percentage defective, on the average, that the customer will receive if you use this sampling plan on lots shipped to them. For this plan, the AOQL is 0.244 % defective. The AOQL calculation is based on the assumption that any rejected lots are 100% inspected and any load items found are replaced with good items.

The addition of information about the frequency distribution of the lot percent defectives generated by your plant takes you into the realm of Discovery Sampling. The effect of this approach is to replace the AOQL (which is the worst case) with the average value of the AOQ (EAOQ) given the lot quality distribution. The AQL, AOQL, AOQ and others (e.g. RQL) are just reference values that allow for comparison of the results of various sampling plans.

Sampling plans do NOT have a noticeable direct effect on the quality level of the individual lots received by the customer. However, sampling plans do put pressure on the supplier to improve his quality level so that the customer does not reject so many lots.

Closed-loop Corrective Action:

In the manufacturing industry, there are a numerous amount of benefits to using a closed-loop corrective action tracking system. Since paperwork can "fall through the cracks", an electronic tracking system is the perfect solution to decrease the possibility of lost and unresolved issues. Tracking issues from the time of occurrence to the time there is

resolution, including the personnel involved, gives way to unlimited means of utilizing pertinent data, both for management and operator needs.

Stochos Quality Action Reporting (QAR) System is an easy-to-use closed-loop Corrective Action Tracking System that has proven to be successful in satisfying ISO 9000 standards such as; Control of Nonconforming Product, Nonconformity Review and Disposition, and Corrective Action.

The QAR incorporates Customer, Incoming Materials, Vendor, Safety, Quality Audit, etc. issues into a closed-loop system that requires action from all appropriate personnel.

The QAR tracks steps from initiation to solution. The general flow of the closed-loop corrective action scheme used in the *Stochos* QAR package is shown below.

1. QAR Initiation
2. QAR Accepted/Rejected by QM
3. Notification to responsible party
4. Disposition of Materials
5. Disposition Sign-off
6. Root Cause Analysis
7. Corrective Action Sign-off
8. Verification of Corrective Action Effectiveness
9. Closure of QAR

The system includes Reporting and Pareto Analysis of QAR Types, Nonconformances, Immediate Actions, Apparent Causes and more.

The QAR saves time and money by eliminating the paper trail burden for document flow and reporting procedures.

Submitted by Pauline Pariseault, EFD, Inc.

Question: When performing a sampling of a lot containing multiple cavities, how can I be sure the sample size is adequate without having to sample each cavity? Or will a desired AQL cover that concern?

Your question about a sampling lot indicates that you are using the sample to make a decision as to whether or not to ship a lot to a customer.

If the outputs from the various cavities are randomly mixed, in the lots, then an AQL (milStd 105E) type plan should perform satisfactorily for you.

If, however, your lots are not the result of random mixing, then you may have to segregate the output of the various cavities before performing the evaluation. This is true because there are, as you know, some differences from cavity to cavity.

My sampling question #3 addresses the question of what sample size is required to insure (at a certain level of confidence) that each cavity is represented in the sample. Also, see our previous newsletter Vol. 7, No.1.

Question: Control Charts for short runs – Attribute Data; What is your opinion on the best statistical method and package available?

The best answer for short run control charts is to standardize your data and plot the results of many short runs on the same chart.

The usual standard is:

$$Z = \frac{x(\text{or } \bar{x}) - \text{Target}}{\text{StdDev } x(\text{or } \bar{x})}$$

Once the standardization is performed, you may use the control chart of your choice. (I prefer an EWMA on the values of Z for most applications.)

Z values for attribute data is still:

$$Z_v = \frac{V - \text{Target}V}{\text{Std Dev}V}$$

Where V is the attribute statistic that is calculated for each sample.

I guess the question here is do you want to allow varying values of, say, the number of defects that occur from one run to the next.

If you do, then for the defects example:

$$Z_c = \frac{P - \text{Target}(c)}{\sqrt{\text{Target}(c)}}$$

Where c is the number of defects observed in a short run.

For fraction defective (p), the form is:

$$Z_p = \frac{p - \text{Target}(p)}{\sqrt{\frac{\text{Target}(p) * (1 - \text{Target}(p))}{n}}}$$

Where p is the fraction defective observed in a short run of n products.

Again, use the chart of your choice on the Z values.

Best Statistical Package:

That is a tough one to ask the supplier of statistical packages! Our Custom/QC package is excellent and will handle short runs, varying sample sizes and many other techniques. Our support is hard to beat.

Stochos Annual Summer Sale

SPC Direct and Custom/QC Software
(Upgrades included)

Call Stochos for details (800) 426-4014

**25-35%
Discount**

(Offer ends 8/31/98)

Question: Are you going to continue supporting UNIX/JAVA/Web reporting, or are you going to a Microsoft platform?

Our SPC analysis packages (CQC and SPC Direct) are now available in DOS, UNIX, and WindowsNT™. We will continue to support them on these platforms.

Our Quality Management Database Systems are also available on those platforms.

We are considering building JAVA versions of our materials.

If you would like to be placed on our QC Report mailing list or if you want to submit questions to be answered in future QC Reports:

Please contact: **Konnie Steele**

Phone: **(518) 372-5426** Fax: **(518) 372-4789**

Email: Kesteele@Stochos.com

ISO Made Easy.

Stochos Incorporated...The Quality Solution Experts

Designing, implementing and consulting quality system solutions for over 30-years, *Stochos Incorporated* has perfected a **Shop Floor Data Collection and Quality Management Database System** like no one else in the world.

Efforts necessary to conform to ISO are made easy with the *Stochos* system. **Time** and **money** will be saved in all aspects of certification.

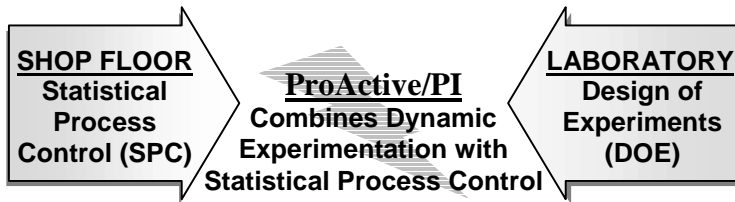
- **Production (Traceability, Process Control)**
- **Documentation**
- **Nonconformance**
- **Corrective and Preventive Action**
- **Training**
- **Statistical Techniques**
- **Reporting**
- **Calibration**
- **Storage/Warehousing**



The *Stochos* system is a complete factory floor solution, designed to be simple and easy to use. It can be interfaced with any front-end business system for fast uploading and retrieval of pertinent shared information.

For more information and details about how our system can help with your certification, contact Stochos Inc.

The Next Step in Process Improvement



Stochos has integrated these tools into a new tool for the plant floor. Imagine on-line process improvement operating in conjunction with on-line SPC.

The beginning of the SMART MANUFACTURING Evolution:

Be the first to learn about intelligent computerized theory application. It is those who learn and utilize this new way of monitoring processes that will be set above the rest and gain a leading edge in the manufacturing industry.

Proven Success:

In one plant that is using this new tool, the *savings* in operating costs alone have amounted to more than **\$250,000** annually. The new tool (**ProActive/Process Improvement**) has demonstrated that these savings can be effected while increasing plant yield. The delay of investment in plant expansion also results in the reduction of the cost of plant operation.

How can you save?

Attend our two-day seminar and learn how you too might achieve such savings.

Topics include: Multivariate SPC methods
Critical Control Variable Identification
Evolutionary Operation

Who should attend: Dynamic Quality Engineers
Inquisitive Process Engineers
Progressive Managers interested in real Process Improvement

Prerequisites: Basic knowledge of SPC and DOE

Price: \$325 for ASQ members, \$400 for non-ASQ members
(This seminar is not sponsored by ASQ, but we do try to help.)

Seminar Leader: Donald S. Holmes, President of *Stochos* Inc.

Experience: Over 40 years in the practice, development and training in the field of SPC and Quality Systems. Experience in industry, academia and government. Don is both an ASQ Fellow and an ASQ Certified Quality Engineer. He has published many papers in professional journals. Don also is currently on the faculty of the Center for Professional Development teaching courses both in the U.S. and in The Netherlands.

Coming soon...

*We will be offering this seminar during the months of September and October 1998. Please call Konnie Steele or Tina George at *Stochos* for dates and locations.*

The Survey Says ...

(cont'd)

Whether you are implementing a complete solution, a Corrective Action System, Analyzing Quality Costs or working on ISO certification, good tools and knowledge are of utmost importance.

With so many choices in today's market, choosing the right tools can become a stressful task. Companies can spend an unlimited number of resources researching and implementing individual solutions to try to satisfy their needs and goals.

In addition, with technology rapidly advancing, integrating systems (tools) in many cases requires additional equipment and/or customized programming. Personnel need to be trained and may be forced to "fight fires" due to integration problems. This is not only frustrating but causes downtime and effects quality costs.

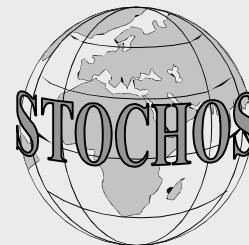
Stochos has designed a complete solution, the Quality Management Database System, which electronically tracks and stores all pertinent production information. With results easily and instantly produced via the keyboard, certification, analysis and quality control tasks are made easier for both management and operators.

As we discussed in answer to Larry's question #1 in this QC Report, a Closed-Loop Corrective Action System gives a facility complete tracking of issues from occurrence to resolution. Here not only do we improve our internal and external issues, but collect pertinent historical data for evaluation and analysis (cost and otherwise).

Good resource utilization achieves satisfactory quality and results in lower costs and successful production

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