



GOOD Vibrations

Ingrained quality practices mirror
Deming's 14 points

by Luke T. Foo

In 50 Words Or Less

- The Santa Cruz Guitar Co. practiced quality management and Deming's 14 points—before they were aware of the principles.
- The individual craftsmen are empowered to make their own quality decisions.
- Timely responses to questions lead to customer satisfaction.
- Workers are actively encouraged to enhance their skills.

MODERN QUALITY management principles define quality as customer satisfaction with product and service. Quality also depends on the people, processes and environment that create the product and service.¹

It seems that the Santa Cruz Guitar Co. (SCGC) has hit its mark by instilling practices that address all these elements. With musical instruments, sound is the primary measure of quality. Another measure is the degree of customer satisfaction with the product and service provided by the manufacturer. In the world of acoustic guitars, many well-known brands stand for quality.



BENDING THE SIDES: Gradual hand pressure is applied to wet wood on a hot bending template to shape the sides of guitars.

As both a quality professional for a biopharmaceutical company and a lover of acoustic guitars, I wanted to write an article that would combine my work and hobby—my two life passions. This article explores how modern day quality principles were being applied to a centuries old craft at one northern California company known for quality.²

When I first approached Richard Hoover, the founder and proprietor of the SCGC, about writing an article for *Quality Progress*, my first question was, “Do you have a quality department that monitors production quality?” His reply was no.

I then asked, “You must be following the principles of total quality management (TQM), correct?” Hoover replied, “What is TQM?” He did not know what it was and had no formal training on the subject.

As we talked further and I learned of his management style, I informed him he was, in fact, intuitively putting into practice TQM and many of W. Edwards

DEMING’S LEGACY

For more articles about W. Edwards Deming and his quality management principles, go to www.qualityprogress.com.

Deming’s 14 points of management³ (see the sidebar “Deming’s 14 Points,” p. 29) without even being aware of the principles.

Hoover granted me access to his shop, offering me a glimpse into the world of making guitars by hand.

Employee empowerment

SCGC is considered a small-scale manufacturing operation, producing fewer than 800 instruments a year. Although modern computer

numerical controlled (CNC) equipment is used to manufacture minor parts of the guitar, the secret of SCGC’s success lies in the small staff of 14 craftsmen, known as luthiers, who apply care and attention to detail while hand-crafting the major components of each instrument.

DEMING POINTS 8, 11 AND 12

The shop floor is divided into six workstations at which the guitars are progressively assembled as they move from station to station. Experienced luthiers, who are empowered to make their own quality decisions, staff each station. The guitar does not move to the next station until the luthier and another more senior luthier are satisfied with the quality of the work.

DEMING POINT 3

This is equivalent to the relationship between production line workers and supervisors at progressive manufacturing companies, where everyone is involved in ensuring product quality. The manufacturing department inspects what it produces.

DEMING POINT 9

“The most important part of our philosophy is building every instrument as a team,” Hoover says. The company recruits only those who desire to work in a team environment

and have a passion for guitar making.

DEMING POINTS
7 AND 8

Dan Roberts runs the production, repair and service departments. Roberts is a master luthier and is intimately involved in all phases of the operation. He is the equivalent of the modern day plant manager. During my shop tour with Roberts, workers were constantly coming to him for advice and mentoring. Watching him in action, I could see that he understood modern leadership principles as they apply to guitar making.



SHAVING THE BRACES: The thickness of the guitar's top and braces influence a guitar's sound, so the luthier listens to the tone that develops after a series of ribbons of wood are shaved off the braces.

Making a guitar

There are seven major steps in the process of making a guitar:

1. Selecting and drying the wood: The guitar making process starts with the selection of the highest grades of tonewoods.

DEMING POINT
4

Each wood type is obtained from a few trusted suppliers. The choice woods for guitar tops are mainly spruce (Adirondack, Engelmann or German) due to their high stiffness-to-weight ratio.

For guitar backs and sides, rosewood (from India or Brazil), mahogany, koa, maple and cocobolo are common choices. The neck of the guitar is usually sourced from mahogany due to its strength.

The wood is treated in an evaporative dehumidifying kiln that slowly and carefully removes bound cellular moisture from the wood. The target moisture level is 3%, but when exposed to the temperature/humidity conditions of the shop floor, the moisture content stabilizes at 6%. The shop floor is kept at a constant 47% humidity, which is optimum for maintaining the equilibrium of moisture conditions.

2. Rough cutting the wood: Once dried, the wood

is worked down to rough usable forms using traditional woodworking tools. However, SCGC uses a CNC machine for creating the necks.

DEMING POINT
12

The company thought this capital investment was worthwhile because it relieves the craftsmen from performing repetitive tasks. This allows them to concentrate on more delicate processes best suited for human hands and keeps them highly motivated. It also helps to reduce repetitive stress injuries.

3. Bending the sides: To create the desired shapes, the guitar sides are first dipped into water for 10 minutes to condition the wood and then placed under gradual hand pressure on a hot bending template.

At that point, the tension in the wood has been relaxed, and the wood eventually takes the shape of the template. This process is best performed by human hands because sides that are shaped by machines have a tendency to spring back when they are being forced into molds.

4. Cutting the top and back: The top and back of the guitars then are cut to shape, and braces are applied to each surface. The thicknesses of the top and



SET TO STRUM: A finished, assembled, set-up and strung guitar is shown by luthier Brent Cooper.

Senior management's **open and timely communication** with customers **translates to repeat business.**

braces have the most influence on the final sound of the guitar.

As the luthier shaves off ribbons of wood from the top and braces, he will tap the top to hear the tone that results from each series of shavings until the tone is perfect. This is known as "voicing the top." It is an art no machine can reproduce.

Since the true sound of the instruments will not be fully realized until they are assembled, the luthiers write down what they did while building the top. After final assembly, if a guitar produces a sound so special it knocks the player's socks off, the luthier who built the top will immediately be notified and asked to check his notes to see how this was accomplished so the sound can be duplicated in the future.

**DEMING
POINTS
12 AND 14**

Hoover said this form of communication among his workers is one of SCGC's primary tools of quality. Being a natural product, wood will vary in tone quality, not only be-

tween species but within a species, so inconsistency in top and brace thicknesses is a desirable attribute.

This, Hoover explained, is one of the major differences between guitars built by small craft based shops, such as SCGC, and those made by big manufacturers that don't take the time to voice the tops.

5. Cutting the neck: About 60% of the SCGC guitar necks are cut on the CNC machine. It is the only major part that is not hand-made. It is critical that the dimensions of the neck be consistent, and the CNC machine does that better than human hands. The 40% of necks that are hand-made are done that way because of a customer's specifications.

Ebony fret boards, which are inlaid with mother-of-pearl, are then glued to the necks.

6. Applying the finish: The guitar body is finished with 12 protective layers of a specially formulated lacquer composed primarily of nitrocellulose and plasticizers to preserve the wood surfaces. But the lacquer is

DEMING'S 14 POINTS

1. Create constancy of purpose toward improvement of product and service.
2. Adopt the new philosophy for economic stability.
3. Cease dependence on inspection to achieve quality.
4. End the practice of awarding business on price tag alone.
5. Improve constantly and forever the system of production and service.
6. Institute training on the job.
7. Institute leadership. The aim of supervision should be to help people and machines do a better job.
8. Drive out fear.
9. Break down barriers between departments and individuals.
10. Eliminate numerical goals, posters and slogans, asking for new levels of productivity without providing methods.
11. Eliminate work standards that prescribe numerical quotas.
12. Remove barriers that rob hourly workers of pride of workmanship.
13. Institute a vigorous program of education and self-improvement.
14. Put everybody, including top management, in the company to work to accomplish the transformation.

Craftsmen are empowered to make quality decisions.

thin enough that the sound is not dampened. Nitrocellulose has been shown to possess superior tonal characteristics on musical instruments.

7. Completing final assembly and setup: The neck is fitted to the body using a dovetail joint and glued in place. Then the bridge is glued to the body. In the next step, called the setup, the saddle and nut, which suspend the strings over the instrument and are made from bovine bones, are installed. Finally, the strings are placed on the guitar, and it is played for the first time.

A technician then adjusts the neck or string height to optimize the feel and playability of the instrument.

Customer satisfaction

SCGC has a web page where guitar owners can have questions about their guitars answered by Hoover or Roberts.⁴ Hoover says the customers are delighted when the person who responds turns out to be part of the company's senior management.

DEMING POINT 1

The company seems to have an innate understanding that superior customer service means really listening to and totally committing to customers.

DEMING POINT 2

Contrast this style of open communication with the traditional customer service website of a car or appliance manufacturer where customers provide feedback on products. It might take days or weeks to get a response. Or, perhaps a response never comes, leaving the customer unfulfilled.

Open and timely communication with customers by senior management translates into repeat customers.

Work environment

At SCGC, workers are encouraged to further enhance their skills either by taking external courses or by a

practice that allows them to build two instruments a year for personal use. These opportunities allow the craftsmen to explore new techniques in guitar building and become familiar with the entire guitar building process.

DEMING POINTS 5-8 AND 13

SCGC workers are even encouraged to go out on their own to open a luthierie business someday. This, along with promoting pride in workmanship, open communication with supervision and employee empowerment, makes it no wonder SCGC has a productive and inspired workforce.

This atmosphere reminded me of my experience working for a large pharmaceutical research organization as an R&D scientist. Creativity and innovation were fostered without scientists having to worry about the bottom line. Those who worked there got to enhance their careers by exploring new areas of research. At the same time, the company benefited greatly from the new inventions developed by the scientists.

With employee empowerment accompanying good price and superior quality and service, the Santa Cruz Guitar Co. is intuitively practicing Deming's 14 points.

REFERENCES

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