

Has Quality Become a Commodity?

How European companies meet today's strict quality demands on their products and the environment

By Wallie Dayal
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Less than two decades ago, quality was a personal matter. Pundits explained it as a way of life, an essential attitude for business and private life. Today, quality assurance for many springmakers and their suppliers consists of highly sophisticated technology that is used as an essential survival strategy. Fewer employees are working in springmaking, technology reigns, the customer is king. Have people become obsolete, or is this a manifestation of working smarter instead of harder? Please read on for a bird's-eye perspective of springmaking/coating operations in The Netherlands, Spain, Germany, Finland and the UK.

Tom Bakker, CEO

Bakker's Verenindustrie, Groningen, The Netherlands

Since February 2007, the Bakker Group is also represented in China. It has subsidiaries in Belgium, Germany and Romania, and runs fully automated production in the Netherlands. With a total staff of approximately 70 employees, Bakker Group generates \$10 million in sales.

Quality has always been central to production, and Bakker has a keen awareness of the cultural, political and emotional dimensions inherent in quality that go well beyond national standards. This can express itself in a Germanic focus on measurement precision, countered by an equally insistent Franco focus on functionality. "Quality touches feelings that are deeply rooted in culture," says Bakker. "What is good for some is incorrect for others, but it is certain that demands on springmakers will continue to rise, and Germans will aim to be the best, Americans the newest and the Chinese the most affordable."

Sometimes quality is as elusive as the truth. When business is good, customers expect high quality but tend to subordinate quality to other factors, for example, to receiving springs as quickly as possible. Conversely, in lackluster markets, it is not uncommon for a customer to lodge a complaint if his spring delivery arrives one week earlier than expected. If an identical delivery is late by a week, it will generate no complaints. If busi-

ness is bad, payment delay tactics spring into gear. Payment will sometimes be delayed or a credit demanded because a 1,000-count box of springs purportedly contained only 999 or 1,001 springs.

The limited practical experience of customers' spring designers is one of the greatest quality challenges, in Bakker's opinion. Many of these technical experts approach spring design based on the theory they learned in engineering school, but without thorough practical knowledge in application areas of springs. Command of such experience, for example, would tell them if beveling is required or not relevant. If such an extra step is not needed for a particular spring application, but apparently required because of the designer's knowledge gap, the price of these springs increases unnecessarily.

Furthermore, Bakker says it is unfortunate that designers are often unwilling to admit that spring-steel is alive; spring wire wants to spring. Sometimes, designers' expectations are not feasible or too expensive because they are based on CAD tools that tempt designers to build such miniscule tolerances into drawings that quality springs can no longer be produced as drawn. As a result, customers are beginning to develop the habit of requesting springs that differ from the drawing to keep production costs in line, and to prevent having components unfit for their intended purpose that require remakes and delay production.

Ten years ago, designers had much broader knowledge of spring composition and logical, procedural applications of springs. Today, the designer experience gap is further aggravated by the multitude of technical aspects of springs that require a substantial investment of time and money, such as stressing a torsion spring. In this environment, the safety net of control machinery is mandatory; else



defective product would be the rule.

Ten years ago, Bakker Group started to take advantage of statistical process control (SPC) on all spring machines for two reasons: first, it is a tool for controlling precise product measurements to customer specifications; second, the software interfaces with the machine and, if necessary, initiates self-correction of deviating parameters, such as spring diameter and length. In addition, it provides a simple overview of production, enabling a machine to run much longer in fully automated mode. This is a vast improvement over the old process when a machine was stopped and a specialist controlled the precision of measurements every 30 minutes.

Since fully automated machinery requires fewer highly skilled operators, it eliminates the search for those scarce Dutch employees who are willing to do repetitive manual functions. Six years ago, robots started to do mundane tasks. They put springs in boxes or in ovens with unwavering accuracy. At first, this was not universally welcomed; some people feared the change. In hindsight, it was a superb decision. Today, 10-15 machines run approximately 20 out of 24 hours, until the wire runs out.

Laser cameras have kept watch over spring machinery for the last 12 years. Starting two years ago, the machinery located in the Netherlands can also be monitored remotely. This allows personnel to leave work in the evening while the machines continue to run. A few hours later, the person on duty checks a computer display on a home PC. Should a machine have stopped, a film showing the last five minutes of runtime can be played back. The machine adjuster can thus diagnose the problem: Did a tool break? Did the machine run out of wire? Based on his conclusion, he can decide to address the problem immediately or delay repair until the next day.

Automation brings a number of advantages: customers are extremely satisfied because it ensures good and consistent quality; Bakker likes it because it ensures safe operation, permits longer cycles of productivity and brings economic advantages.

Suppliers are electronically monitored by Bakker Group for quality and on-time deliveries.

The Question of Quality

By Michael Parkinson OBE, past president
European Spring Federation

Well-trained people using best practices and the latest technology can certainly produce components to specification. However, experience has shown that such components are often "unfit for purpose."

What causes so much frustration, broken delivery promises and resulting waste of money? In the final analysis, technology is only a partial solution. People, and the relationships between them as coworkers, customers and suppliers, ultimately determine success.

Any fool with money can invest in the right technology, but how such technology is used in support of the mutual objectives of all parties along the supply chain decides the outcome.

Would it not be best if we made genuine attempts to establish honest, trusting relationships between suppliers and customers that cut the nonsense of producing components to specification which are then useless for their intended application? To me, that is the most important question! ❖

Each month, performance reports are generated, and problems are discussed and addressed realistically. This electronic interface has forged strong loyalties and fostered mutual understanding between the company and its suppliers. However, the ranks are not permanently closed; Bakker is prepared to give new suppliers a chance to prove themselves. Case in point: Years ago, all of the company's raw material came from Sweden until a Korean supplier proved the quality of his material to be equal. Now, all of Bakker Group's raw material is sourced in Korea.

Bakker's state-of-the-art operation did not drop from the sky. He took advantage of the booming market between 1998 and 2001 and invested over \$1,000,000 in automation. It was a well-considered approach supported by the research of springmakers in other countries and spring associations. Bakker is a strong proponent of information exchange and company visits among springmakers. By reaching out, springmakers can support one another, keep their knowledge up to date and peg developments in the global marketplace.

While proud of his automated springmaking site in the Netherlands, Bakker is a realist. His German subsidiary works with thicker wire and smaller lots. There, automation is much less, as it would not be economically justified. In Romania, the company takes advantage of lower labor cost to assemble products such as windshield wipers. No spring production takes place there. What Bakker Group will ultimately do in China is still uncertain. The new managing director is a Western-schooled and trained Chinese with keen business acumen. If Bakker's bet is right, this venture will help the Group stay ahead of the curve and take advantage of China's rise in the global economy, which, at some point, may make China not only the price but also the quality leader.

Lluís Callejon i Font, owner
Muelles Crom S.A., Barcelona, Spain

Muelles Crom S.A. is family-owned and was founded in 1953. Today, it employs 45 people who specialize in making springs at two manufacturing centers for technologically advanced products.

It produces a full range of extension and torsion springs for the automobile industry, motorcycles, electric appliances, electronics, armaments, the textile industry and others. Its springs are sold in the European Union; Eastern Europe; the Middle East; North, Central and South America; and North Africa. Sales are approximately USD \$8 million (EUR 6 million).

While quality has always been in vogue, Muelles Crom's focus has changed in recent years from satisfying the quality system and ISO certification demands of customers, to parts per million (PPM) control and monitoring processes with the aid of SPC. This has become an essential component in helping the company achieve its Real PPM objectives, which are set at 500 Real PPM.

At both springmaking sites, spring dimensions are precisely measured in real-time by lasers and cameras. Defective parts are sorted out immediately. Essentially, software controls quality, but Muelles Crom is keenly aware that it must control and monitor the software on which it so heavily relies.

Environmental quality is another concern. Thankfully, Muelles Crom's suppliers of coating treatments have been able to change their processes to meet the increasingly stringent environmental regulations of the European Union.

"Today, the most challenging component of the quality equation is customer design," says Callejon i Font. "Initial customer expectations are not always compatible with the reality of springmaking, nor can a springmaker always rely on full customer support. At the same time, the quality of springs is good enough only if it meets the requirements of the customer."

**Norbert Schmalzhaf, manager of quality assurance
Gerhard Heiche GmbH, Schwaigern, Germany**

Heiche GmbH opened in 1965 in a basement, coating silver jewelry. Today, Heiche coats and conditions aluminum, magnesium, stainless steel and other metal surfaces in Germany and Hungary. Springmakers are among its customers.

"We strive for zero defects; anything less is not good enough," says Schmalzhaf. "Five years ago, demands were not quite as differentiated as they are today, but nowadays, new possibilities and processes help us detect any deviations almost immediately with the help of statistical process control."

Heiche uses cameras to monitor the completeness of multiple coatings and is testing the use of cameras to identify scratches. Heiche's ISO 14001 certification ensures environmental compliance, and its TS 16949 automobile standard certification is a combination of QS-9000 and the German VDA.6 standard. While some coatings for springs continue

to use traditional procedures, new regulations obsolete others and introduce new challenges.

As of July 1, Europe's End of Life Vehicle Directive (ELVD) restricts the use of hazardous substances. It states that for corrosion-preventive coatings, a maximum concentration value up to 0.1% by weight and per homogenous material for hexavalent chromium shall be tolerated, provided that it is not "intentionally introduced," which is defined as "deliberately utilized in the formulation of a material or component."

This requires a change in the corrosion-protective coating for springs, as no substance containing chrome-6 (hexavalent chromium) may be used, explains Schmalzhaf. In the absence of an effective alternative for chrome-6, additional lacquering may be applied. An alternative to a zinc coating followed by a chromium coating is a zinc-nickel coating, but this makes the spring more expensive.

Oddly, it is not clear if the additional expense will ultimately benefit the environment. To unravel the unknowns, chemical manufacturers and research institutions are conducting numerous research projects and are developing a range of alternative coating processes. As a result, nearly every customer requests a different coating process.

Schmalzhaf sees safeguarding the coating process as the greatest challenge in the quality equation of the future, but that's not all: "We must ensure that our employees will be able to meet the demands of our workplace at all times. Each is required to attend a separate training program for metal treatment and learn, for example, that any hydrogen, which embeds in the material during the pickling process, will make springs brittle and must therefore be removed by subsequent treatments, such as tempering."

**Ralf Sohlström, managing director
Meconet Oy, Vantaa, Finland**

Meconet is a family-owned company that was founded in 1941. This year, the company expects to generate sales of USD \$40 million (EUR 30 million) with approximately 220 employees. It has three business areas: springs, punched products and deep drawn products, which are produced in three Finnish factories. Each factory is a dedicated competence center, and Finnish production capacity is supplemented by cost-effective assembly and handcraft work in an Estonian factory. Meconet supplies the electrical, building, electronics, automotive, health care and telecommunications industries.

Because automatic assembly allows only small tolerances and new products are often assembled automatically, their design is essentially "tolerance-free." Consequently, tolerance requirements have become increasingly stringent in recent years, making SPC absolutely essential for monitoring

the manufacturing process and attending to the necessary improvements. Real-time laser camera measurements help ensure that only products within tolerance are cost-effectively produced for the customer. Reliance on software ensures such quality control and has the additional benefit of being more reliable than manual control.

In preparation for the European Restriction of Hazardous Substances (RoHS) directive that came into force in July 2006, Meconet reviewed its entire manufacturing process and demanded the same of its material suppliers. As a result, the company can guarantee that its products do not contain any hazardous substances.

"It is fortunate that we have good customers with constructive attitudes who work with us as partners," says Sohlström. "In any real partnership, both parties try to help each other. That way, they ultimately help themselves."

"A product is only good enough when the customer is satisfied," he continues. "For some applications, meeting tolerances is enough. Other times, the assembled product must also work perfectly. Our responsibility does not stop at ensuring the quality of our product; a customer has to be satisfied with the overall quality of our service. That includes delivery performance, flexibility in production, customer service and total cost."

Sohlström believes that as new products proliferate and customers increasingly take advantage of

automating their production, demands on quality will become even more exacting. Moreover, the finely honed quality and process refinements that originated in the automobile industry will take hold in other industries and elevate quality requirements overall.

"The most important quality dimensions of the future will be people and process," he emphasizes. "Process can not exist without people. But people change or forget or make mistakes. Therefore, documenting the process, continual training of personnel and meticulous attention to all process requirements are absolutely essential."

Unquestionably, quality is neither a luxury nor an option. It must be a function of production that ensures an exquisite balance between process, people and technology. Sooner or later, each springmaker will meet his leading challenge: people, process, technology or their interaction.

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