

ASQ's Black Belt Certification —A Personal Experience

*Two members tell why they took the exam
and how they prepared*

by

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SIX SIGMA IS the most talked and written about quality tool of the last five years. And it shows no signs of being what some like to call “the flavor of the month.”

In fact, if annual reports and press releases from businesses, large and small, are any indication, use of Six Sigma is expanding at a rapid pace—most likely because it ties quality to business results.

As a result, many quality professionals are interested in learning Six Sigma techniques to benefit not only their careers, but also their employers' bottom lines.

We are two experienced quality professionals with different levels of experience with formal Six Sigma programs. We believed readers of *Quality Progress* might benefit from learning about our experience. When we asked the editors if we could submit an article, they agreed.

Why get ASQ's certification?

What's the value of the ASQ certified Six Sigma Black Belt (CSSBB) recognition for employers and quality professionals?

As interest in and use of the Six Sigma

approach have grown in recent years, so has the need for some consistent method of assessing the qualifications of those seeking quality leadership roles in organizations.

Many different entities, both corporate and educational, have been offering Black Belt (BB) and Master Black Belt (MBB) designations for those who

(continued on p. 35)



TABLE 1 Comparison of Certifications

Certified Quality Manager	Certified Quality Engineer	Certified Six Sigma Black Belt
Leadership <ul style="list-style-type: none"> Organizational leadership Team processes 	Management and leadership in quality engineering <ul style="list-style-type: none"> Leadership principles and techniques Problem solving and quality improvement <ul style="list-style-type: none"> Barriers to quality improvement 	Enterprise deployment <ul style="list-style-type: none"> Enterprise view Leadership Project management <ul style="list-style-type: none"> Team leadership Team dynamics and performance Change agent
Strategy development and deployment <ul style="list-style-type: none"> Environmental analysis Strategic planning and assessment Deployment 	Planning, controlling and assuring product and process quality <ul style="list-style-type: none"> Processes for planning product and service development 	Enterprise deployment <ul style="list-style-type: none"> Organizational goals and objectives
Quality management tools <ul style="list-style-type: none"> Problem solving tools Process management approaches Measurement: assessment and metrics 	Planning, controlling and assuring product and process quality <ul style="list-style-type: none"> Processes for planning product and service development Measurement systems Problem solving and quality improvement <ul style="list-style-type: none"> Approaches Management and planning tools Quality tools Corrective action Preventive action 	Business process management <ul style="list-style-type: none"> Process vs. functional view Business results Six Sigma improvement methodology and tools (define) <ul style="list-style-type: none"> Project scope Metrics Problem statement Six Sigma improvement methodology and tools (measure) <ul style="list-style-type: none"> Process analysis/documentation Design for Six Sigma <ul style="list-style-type: none"> Quality function deployment
Customer focused organizations <ul style="list-style-type: none"> Customer identification and segmentation Customer relationship management and commitment 	Management and leadership in quality engineering <ul style="list-style-type: none"> Customer relations, needs, expectations and satisfaction 	Business process management <ul style="list-style-type: none"> Voice of the customer
Supplier performance <ul style="list-style-type: none"> Supplier selection Communicating requirements to suppliers Assessment and feedback of supplier performance Supplier improvement strategies Supplier certification programs Partnerships/alliances with suppliers Logistics and supply chain management 	Management and leadership in quality engineering <ul style="list-style-type: none"> Supplier relations and management methodologies 	Not addressed
Management <ul style="list-style-type: none"> Principles of management Communications Projects The quality system Quality models 	Management and leadership in quality engineering <ul style="list-style-type: none"> Management systems for improving quality Facilitation principles/techniques Cost of quality Quality philosophies/approaches Quality systems development, implementation and verification <ul style="list-style-type: none"> Elements of a quality system Documentation system Standards and specifications Quality audits 	Enterprise deployment <ul style="list-style-type: none"> History of organizational improvement/Six Sigma foundations Project management <ul style="list-style-type: none"> Project charter and plan Management and planning tools
Training and development <ul style="list-style-type: none"> Alignment with strategic planning and business needs Training needs analysis Training materials and curriculum development Methods of training delivery Techniques for evaluating training effectiveness 	Management and leadership in quality engineering	Questions specific to the Six Sigma certification (training is a significant part of the Six Sigma initiative).

TABLE 1 Comparison of Certifications (continued)

Certified Quality Manager	Certified Quality Engineer	Certified Six Sigma Black Belt
Not addressed	Planning, controlling and assuring product and process quality <ul style="list-style-type: none"> •Material control •Acceptance sampling 	Not addressed
Not addressed	Reliability and risk management <ul style="list-style-type: none"> •Terms and definitions •Reliability concepts •Design of systems for reliability •Reliability and maintainability •Reliability failure analysis and reporting •Reliability/safety/hazard assessment tools 	Design for Six Sigma <ul style="list-style-type: none"> •Robust design and process •Failure mode and effects analysis
Not addressed	Quantitative methods <ul style="list-style-type: none"> •Concepts of probability and statistics •Collecting and summarizing data •Properties and applications of probability distributions •Statistical decision making •Measuring and modeling relationships between variables •Designing experiments •Statistical process control •Analyzing process capability 	Six Sigma improvement methodology and tools (measure) <ul style="list-style-type: none"> •Probability and statistics •Collecting and summarizing data •Properties and applications of probability distributions •Measurement systems •Analyzing process capability Six Sigma improvement methodology and tools (analyze) <ul style="list-style-type: none"> •Exploratory data analysis •Hypothesis testing Six Sigma improvement methodology and tools (improve) <ul style="list-style-type: none"> •Design of experiments •Response surface methodology •Evolutionary operations Six Sigma improvement methodology and tools (control) <ul style="list-style-type: none"> •Statistical process control •Advanced statistical process control
Not addressed	Not addressed	Six Sigma improvement methodology and tools (control) <ul style="list-style-type: none"> •Lean tools for control •Measurement system reanalysis Lean enterprise <ul style="list-style-type: none"> •Lean concepts •Lean tools •Total productive maintenance
Not addressed	Not addressed	Design for Six Sigma <ul style="list-style-type: none"> •Design for X •Special design tools

complete various training programs.

Programs vary from several days to several weeks, with different criteria for passing. Some cost more than \$20,000.

Companies looking to hire people to lead process improvement efforts are faced with the question, how do we tell the real expertise level of people with various Six Sigma BB credentials?

Quality professionals also want to acquire new skills in the Six Sigma area and be able to offer some

credible evidence of their level of knowledge and skills to prospective employers.

We decided the ASQ CSSBB exam offered a cost effective and practical alternative for the following reasons:

- It is internationally recognized.
- Employers recognize and value an ASQ certification as a respected credential that gives them confidence in the knowledge and skills of those who have the certification.

- Many job postings for senior quality positions now mention the ASQ CSSBB as a required or desired credential.
- The value of an ASQ CSSBB in the job market is high and continuing to grow, as indicated in *Quality Progress'* annual salary survey published in the December 2001 issue.
- The cost was only about \$180 for the exam fee. Don spent an additional \$130 for reference materials.

Comparing bodies of knowledge

The body of knowledge (BOK) for the CSSBB is extensive. Six Sigma is built on many traditional quality approaches and techniques (as covered in the ASQ certified quality engineer [CQE] and certified quality manager BOKs), but it also provides rigorous, data driven strategies for achieving target values and reducing variation.

Given our familiarity with the CQE and certified quality manager BOKs, we were interested in their similarities and differences from the CSSBB BOK. In Table 1 (pp. 34 and 35) we compare the BOK for three ASQ certifications: CSSBB, CQE and certified quality manager. Our perceptions of some of the key differences among the three BOKs are:

Leadership: All three certifications address leadership. However, both the certified quality manager and the CSSBB address leadership at a more strategic, organizational level, while the CQE stays focused on leading process improvement efforts at a tactical level.

Supplier performance: The certified quality manager and CQE address this subject, but surprisingly it is not addressed in the CSSBB. This is a key issue to be managed in Six Sigma and may be an area future versions of the CSSBB BOK should consider.

Management of quality: Another interesting difference is both the certified quality manager and CQE focus on the quality system, but this does not appear to be a major focus in the CSSBB.

This difference may be due to Six Sigma's focus on executing individual improvements rather than maintaining a quality system, but also we sense it is part of the strong business results focus in the Six Sigma culture. Maintaining a quality system is not the accomplishment—making measurable improvements is.

This connection of Six Sigma to the near term bottom line appeals to many business leaders today and is viewed as more direct than some of the approaches of traditional quality programs (ISO 9001 compliance, for example).

These traditional methods are perceived by some as building infrastructure that may also yield valuable returns, but in a less direct way and over a longer time.

Inspections: The CQE puts a fairly heavy emphasis on inspections, where the certified quality manager and CSSBB have very little on that subject beyond philosophical issues.

Quantitative and statistical methods: There is very little coverage of these in the certified quality manager BOK, but fairly heavy coverage in the CQE. The CSSBB has an even heavier emphasis on statistical concepts than the CQE, going into much more depth on topics such as design of experiments (DOE) and advanced techniques for statistical process control (SPC).

Lean manufacturing and design for Six Sigma (DFSS): Both areas are unique to the CSSBB BOK.

How we prepared for the test

To qualify for the exam, you must provide documentation of your experience with Six Sigma projects or significant process improvement. Because the terminology often varies across companies, the projects need not be labeled "Six Sigma."

There is also no single detailed set of steps required for a project to constitute a Six Sigma project. Both of us were able to provide affidavits signed by the project Champions describing major

improvement efforts that leveraged many Six Sigma techniques.

To prepare for the exam, we performed an informal gap analysis between the level of understanding required for each item in the BOK and our own familiarity with the material.

Praveen concluded his 15-plus years of experience applying many of the Six Sigma practices (he was among the early practitioners of these techniques at Motorola back in 1987 and trained others) meant there were relatively few areas he needed to study. He focused on studying those few techniques.

Don, on the other hand, with an R&D background and earlier CQE and certified quality manager certifications, had less experience with the applied statistical techniques and very little experience with manufacturing quality. He concluded he would have to focus heavily on statistics application (SPC and DOE), lean manufacturing and DFSS.

Rather than take a formal Six Sigma training course, Don opted for self-study. He identified several general texts on Six Sigma from the ASQ references and train-

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ing material that focused heavily on the statistical applications in Six Sigma.

Don spent about two months preparing for the test. Just reading through the material (about 1,200 pages in total) took 150 to 200 hours. (He admits some of the heavier statistical material induced occasional napping, but that time is excluded from the total.)

Several areas in the BOK, addressing newer or less mainstream subjects, were not covered in any of the textbooks used. Don was able to do Web searches and locate material that provided good overviews for some of the material covered at a high level, such as TRIZ (a Russian acronym for a method of solving design and production problems) and axiomatic design.

Don's general strategy for preparation was to get to a high comfort level with the material the BOK indicated would be covered in depth, bring a set of reference material that covers the entire BOK and have a good index into the material—particularly for areas in which he had a lower comfort level. A simple preparation process is illustrated in Figure 1.

Taking the exam

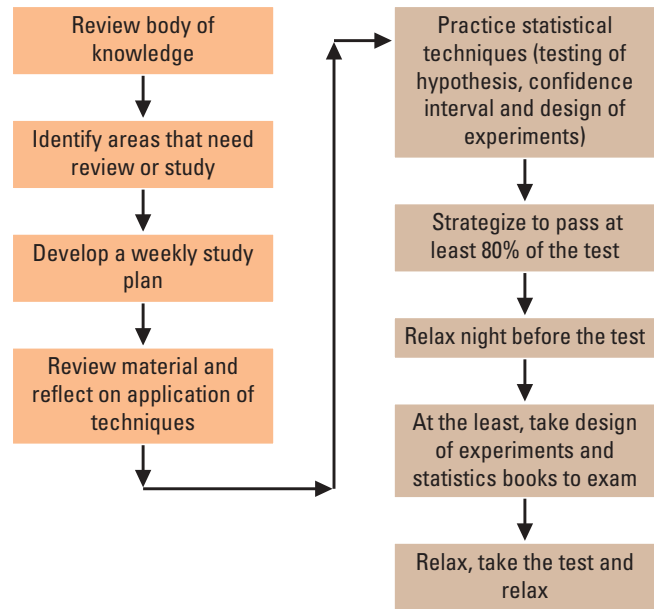
The exam consists of 150 multiple-choice questions to be answered within four hours. You need to spend an average of less than two minutes on each question. More computationally intensive ones may take much longer, although many of those calculations are straightforward if you understand the concepts well. We both thought the test involved fewer statistical calculations than the CQE test had.

Here's some advice:

- If you spend more than four minutes on a question, make your best guess (you can usually eliminate one or maybe two obviously wrong answers), circle it and go on. If you have time left at the end of the exam, go back and rework those you circled. Praveen finished in plenty of time, while Don had only about 15 minutes at the end to go back and work about 10 problems that gave him difficulty.
- Frequent leafing through reference material is a recipe for disaster, which is why good judgment on where to spend your time and a good index are both critical.
- While the exact percentage of correct answers needed to pass is a closely guarded secret (and, indeed, it is adjusted and based on overall student performance on the exam), perfection is not required. So don't get frustrated and stuck on a few tough questions.

We both found the questions to be fairly reasonable compared to our expectations from studying the BOK. Although we took the test at the first nonpilot exam in

FIGURE 1 Simple Preparation Process



October 2001, the quality of the questions was good. We believe the exam fairly assessed our level of understanding of the BOK.

We didn't encounter what we view as trick questions (perhaps we just fell for the tricks without knowing it). In past exams, we had both seen questions that offered two seemingly correct choices with minor differences. These questions can consume a lot of time in indecision and can result in choosing via a coin toss and getting answers wrong, even though you understand the core subject matter very well.

Of course, as you may find on any exam such as the CSSBB, there were a few questions worded in such a way that the real intent of the question (and sometimes the answer) was unclear.

The CSSBB brochure has some excellent guidance on test preparation and test taking ("Myths of Certification" and "Test Taking Tips"), which the authors highly recommend for prospective exam takers.

The results

We both believed we had done reasonably well on the exam. About five weeks later we learned, in fact, we both had passed. We thought perhaps we had overstudied some areas and understudied others. In any case, our preparation for the exam covered useful material that will certainly help us be more effective Black Belts.

The CSSBB exam consists of an extensive BOK but

does build on much of the material in the CQE and certified quality manager BOKs. We believe the following two points to be good indicators of the test's relevance:

- It is possible for a quality professional experienced in traditional quality techniques to acquire the additional Six Sigma knowledge and pass the CSSBB with some significant studying.
- It is also possible for an experienced Six Sigma practitioner to gain the CSSBB recognition with limited study.


We recommend even professionals who have been certified by other entities through training and projects take the ASQ CSSBB to have their Six Sigma BB experience recognized and certified by an independent body using a standard, objective yardstick.

The ASQ CSSBB is like a diploma that provides global acceptance for knowledge and experience.

DON COCHRANE, who recently joined *Stratos Lightwave Inc.*, Chicago, has 25 years of professional experience with Bell Laboratories as part of AT&T and Lucent Technologies. His experi-

ence includes quality, testing, development and reliability. He is a member of ASQ and holds current ASQ certifications for quality manager, software quality engineer and Six Sigma Black Belt.

PRAVEEN GUPTA, partner at *Quality Technology Co.*, Schaumburg, IL, has worked or consulted with more than 100 organizations worldwide including Motorola, AT&T Bell Laboratories, Sloan Valves and Abbott Laboratories. He conducted Six Sigma seminars for Motorola University worldwide for more than 10 years.

Gupta publishes a monthly column, "Mastering Six Sigma," for *www.circuitsassembly.com* and is the co-author of the upcoming book *Six Sigma Deployment*. He is an ASQ Fellow and holds ASQ certifications for quality engineer, software quality engineer and Six Sigma Black Belt. 

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