

■ Spring 2012

Automotive

E X C E L L E N C E

Quantum Quality

**Fixing Things and The Discipline
of Language and Thought**

**2012 ASQ Automotive Division
Symposium Summary**

**Synergistic Partners for the
Automobile Industry**

**ASQ Automotive Division -
The Global Voice of Quality**

Official Publication of the ASQ Automotive Division

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ASQ - SPRING 2012

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Upcoming Events

2012 ASQ World Conference - Anaheim, California

- May 20th, 2012, Sun., 3:00 p.m. - 5:00 p.m. - ASQ Auto Business Meeting - Huntington A&B
- May 21st, 2012, Mon., 8:00 p.m. - 10:30 p.m. - ASQ Auto Hospitality Suite
- May 21st, 2012, Mon. - May 22nd, 2012, Tue. - ASQ Auto Booth in Exhibition Hall (GM and Ford Cars on Display)
- May 22nd, 2012, Tue. - Technical Paper - Enterprise Risk Management - Kush Shah and Ha Dao

ASQ Automotive Division Southeast Symposium - Clemson Center for Automotive Research, Greenville, South Carolina

- Sept. 26th, 2012, Wed. evening - "BMW Drive Event" held at the BMW proving grounds
- Sept. 27th, 2012., Thu - Symposium - presentations by leaders and technical sessions
- Sept. 28th, 2012, Fri. morning - tour of the BMW facility

See the ASQ Automotive Division Website for updated information - www.asq-auto.org

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ASQ AUTOMOTIVE DIVISION

VISION: To be the worldwide automotive industry's leader on issues related to quality
MISSION: To facilitate continuous improvement and customer satisfaction by identifying, communicating and promoting • Quality knowledge • Management's leadership role
 • Industry comparison • Professional development • Recognition • Opportunities to network
CUSTOMERS PRIMARY: Automotive division members • Automotive suppliers - all tiers • ASQ sections • Division sustaining members • Potential Automotive Division members
SECONDARY: Automotive original equipment manufacturers (OEMs) • Other ASQ divisions • Strategic alliances - SAE, AIAG, SME, ESD, ASI, organized labor • Community colleges/universities
 • ASQ headquarters/Board of Directors/Technical Council
TERTIARY: Quality award initiatives (federal/state/local) • Standard activities • Automotive dealerships • International global markets • Aftermarkets/service parts • Third party registrars
 • Recruiters / consultants

FROM THE PUBLICATIONS CHAIR

Letter from the Editor

Dear ASQ Automotive Members,

Welcome to another edition of Automotive Excellence. I am once again asking for your continued support in helping us provide a quality publication by sharing your knowledge in the form of an article for our upcoming publications.

I'm sure our membership would also like to hear from the growing number of members outside the United States. If any of you have articles you would like to contribute, please contact me so we can make sure you have the opportunity to share your experiences.

I would like to thank Dana Clark, John Lindland, and John Allen for their contributions to this edition. This edition as well as past publications can also be found on our website at ASQ-auto.org. I look forward to hearing from you.

Ideas, questions or comments can be forwarded to me at ralangdon58@hotmail.com

My best wishes to everyone,



Rob Langdon
ASQ Publications Chair 2010-2011
ralangdon58@hotmail.com



Rob Langdon,
2011-2012 Publications Chair

Our New Website

We have completely revamped and upgraded our new website.

www.asq-auto.org

ASQ Automotive Division: Letter From The Chair



Kush Shah
Automotive Division Chair
asq.automotive@gmail.com

It is my great pleasure to update you on recent ASQ Automotive Division activities and also inform you for exciting activities that are planned. First of all, thanks to all the ASQ Automotive Division members globally for their continued support through their membership. If you are not an ASQ Automotive Division member, I encourage you to be part of this great group of quality professionals in the automotive industry.

Earlier this year, we updated our mission statement to truly reflect the purpose of our organization - "Our mission is to be recognized as the global network of automotive professionals, helping individuals and organizations achieve personal and organizational excellence." We also developed following key objectives:

- Engage Global Automotive OEMs and Suppliers
- Increase Member Value
- Develop and Deliver Core Tools Training
- Collaborate with Universities and Colleges
- Provide Webinars and Symposiums

We have started 2012 with a great momentum. We already have hosted four webinars with global participation in the first three months. We are always looking for dynamic speakers who would like to share their knowledge with other quality professionals. So please contact me if you are interested.

I am also happy to report that ASQ Automotive Division has developed Core Tools training in cooperation with ASQ HQ. ASQ Automotive Division is now ready to conduct on-site training for APQP, FMEA, SPC, MSA and PPAP. Please contact me if your organization is interested in having validated instructors from ASQ Automotive Division provide this high quality training.

We have great activities planned for 2012 WCQI Conference in Anaheim, California. If you are planning to attend this conference, please attend our business meeting on Sunday, May 20th and visit our booth in the exhibition hall

This is the first year we are planning ASQ Automotive Division Southeast Symposium during Sept. 26-28, 2012 at Clemson Center for Automotive Research, Greenville, South Carolina. Objective of this symposium is to get more automotive OEMs and suppliers engaged with ASQ Automotive Division. Going forward, we would like to even explore opportunities to participate in other symposiums / conference globally.

I am also proud that three ASQ Automotive Division members were select to ASQ Fellow status this year - Denise Devos, Kush Shah and Mary Beth Soloy. This is a great accomplishment at personal level and divisional level.

We are always looking for dedicated volunteers globally that can provide leadership and help us in advancing our mission and objectives.

ASQ Automotive Division is very active in social media. Please join us on ASQ Automotive Division Group on LinkedIn. We have presentations from webinars posted on our website www.asq-auto.org.

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Quantum Quality

by John Lindland



John Lindland

Introduction

This is the first of a three part article that will describe the newest and most powerful process improvement method in the world. Power is a measure of the amount of work that can be performed within a given amount of time. Six Sigma projects take six months or more to be completed. Quantum Quality Projects produce better results and are implementing solutions while Six Sigma is still trying to measure the process.

The author began his industrial quality applications in as a young engineer at Ford Motor Company. In 1985 he progressed through 8D problem Solving, Design of Experiments, The Seven Quality Tools, Kaizen, Lean, Failure Mode and Effects Analysis, and all the automotive core tools including the quality systems and quality systems auditing. He noticed that all improvement methods focus on one or more of three topics, wasted time, wasted work, and the causes of problems. He trained design of experiments at the Motorola University in the late 1980s. He has been a practicing Six Sigma Master Black Belt since 1995.

This first part of the article will cover the road that lead to discovering Quantum Quality. Then a short description of each of the four phases of Quantum Quality will be presented. The article will then cover a solid overview of Phase 1 of Quantum Quality, The Macro FMEA. The remaining three phases will be covered in the following two editions of Automotive Excellence.

The discovery of Quantum Quality

The basic framework for Quantum Quality began in 1991 with a training document called process based management. This quickly became error proofing and mistake proofing. By that time, the author had worked with a large number of problems solving teams and setup and analyzed hundreds of designed experiments. He also worked with a large number of teams to perform a large number of Process Failure Mode and Effects Analysis and mistake/error proofing. He found that when root cause analysis was performed at on each operation, the root analysis produced better results. He later started to perform root cause analysis on every action and energy transfer that produced a product or assembly and the analysis became a laser beam. Causes for each action/energy were normally very specific and were normally five or less in number. The causes could be identified very rapidly.

Anyone who has ever been involved in performing PFMEAs has found that the same cause is repeated many times and that the cause normally has the same prevention and occurrence number. They have also found that the same effects are found many times in the analysis and that the effect always has the same severity number. Along with these two phenomena every process has a finite number of in-line gages and inspection and testing strategies. All failure modes in the analysis use this short list of detection and control strategies. In fact, half way through a PFMEA very few new causes and effects are found. It becomes an exercise of cutting and pasting. The end result is that a team might produce a fifty page FMEA that contains two or three pages of unique information.

A new way to analyze PFMEA was created as the author continued to practice error proofing. While working with the United States Army to error proof the design and manufacturing of tank munitions, it was essential to evaluate every action of the process. This was termed to be a micro action analysis and a root cause analysis was performed on each micro action. The laser beam became brighter and more powerful. At that level, the descriptions of errors started to form consistent and repeatable categories. The author found seven errors that describe every way that an individual action could fail.

In the spring of 2000, Automotive Excellence published the first of a three part article on mistake

proofing using these seven errors and examples of solutions for most of the errors. The work that started with the US Army became an entirely new way to perform root cause analysis. During this time frame, the author rewrote a set of training materials on PFMEA and found that the seven errors were also the seven failure modes and a new method for performing PFMEA was created. Each failure mode has a finite number of causes and a finite number of effects. The team never had to argue about what was a failure mode. This made it easy and fast to identify potential causes and potential effects. As soon as all the correct actions and energy transfers were identified all potential failure modes were also known. In less than sixty seconds a team could write down all seven potential failure modes and cross off any that were silly or improbable. This approach was continually improved and eventually produced a book by the author called, "The Seven Failure Modes" which was published in 2008. The first production run of "The Seven Failure Modes" sold out with the exception of copies that were given to the author. The next production run is scheduled for February 2012.

The last chapter of The Seven Failure Modes described an improvement method called Process Based Management. This is the same set of notes that started in 1991. Every year the author would take all his best discoveries and place them in this training manual. In an earlier form of Process Based Management, Ford Cleaveland Casting reduced their expenses by \$110,000,000 over a three year period. The process described in "The Seven Failure Modes" is a four step process. It also described the possibility of have a single page PMFEA that would contain 100% of all FMEA information in a more useful format. After doing some research it was found that there were a large number of improvement methods around the world that were also called Process Based management. Some of them seem to be solid and similar to Six Sigma. The most notable is a method used by Boeing.

The author changed the method's name to Quantum Quality because it produces a fast and sudden change in quality and uses almost all new methods and tools. One of the definitions of Quantum is discrete quantities of energy with nothing in between. Quantum in the sense of this method is to produce sudden improvements in quality (not continuous). There are three tools in Quantum Quality that are adaptations and improvements from previous tools.

Quantum Quality *continued*

by John Lindland

One of the tools comes from QFD and a book called "Better Designs in Half the Time," by Bob King. Mr. King's book shows how powerful the relational matrix can be in making decisions. The Macro PFMEA and it resembles QFD as far as the 9, 3, 1 scoring of the relational matrix. The left side, roof, right side, and bottom of the analysis are classical PFMEA topics. The second tool that Quantum Quality modified is the Cause and Effect matrix that the author first learned to use in the mid 1980's. Six Sigma also makes great use of this tool. However, the method of determining cause and effect described in the book, "The Seven Failure Modes" provides the most structured, complete, and quickest cause and effect analysis possible. The only causes and effects that this process misses are outside the body of knowledge of the members involved in the analysis. Eighty to ninety-five percent of all causes and effects will be found through this analysis. If the team is experienced, ninety-five percent can be documented and structured. The five percent that will be missed either have not yet happened or have not happened in the collective time the team members have been working. The third tool is the SIPOC flow diagram which is used as the Macro Level Flow Diagram in Phase 1. This tool is modified with specific instructions for identifying inputs as conditions for success and outputs as intended outputs.

The current methods of Quantum Quality were recently applied to the launch of Ford Motor Company's 6R140 automatic transmission. The complete process was analyzed and solutions were applied to the new process before launch. The transmission launched with almost zero warranty and the internal poor quality produced was among the lowest in the plant. Tooling costs were 35% lower than comparable processes. The methods were then applied across the plant on all processes.

The author has been asked why 5S and Lean methods have not been included in Quantum Quality and the answer is simple. They are great tools in their own right. They each have their own objectives, which are honorable and desirable. They each have their own very fast timeline. They should be applied to every process and every operation. For example, lean manufacturing can complete value stream in a few hours. It might take a few days to fill in some of the knowledge gaps. Solutions can be implemented a few days later and control of the solution can be achieved within a few weeks. 5S is

another great process. The first three steps of 5S can be applied in three to six hours. The fourth step can be applied within one day. It can take three to four weeks to gain control of the fourth step. The fourth step deals with leadership and makes sure that everyone knows what to do (Standardize, procedures, train to procedures). The fifth step (Sustain) is a function of discipline and good management. The executive manager of an operation needs to make sure that all his or her direct reports manage all their employees to established processes. This can take months or years to improve.

The four phases of Quantum Quality

There are four phases of Quantum Quality. Phase 1 the Macro PFMEA, Phase 2 Process and Product Metrics, Phase 3 Micro PFMEA, and Phase 4 Solutions. Phase 1 can normally be completed in a single eight to ten hour workshop. Phase 2 and 3 are started at the same time and run parallel with each other. Phase 2 is often completed after solutions have been found and implemented and this is okay. Phase 2 offers many new thoughts on the effective running of a business, quality, and when to use data to confirm cause and effect and when to simply move forward and implement a solution. Phase 2 assignments are normally delegated to employees who are not actively on a Quantum Quality team. This is an assignment that is similar to a PPAP (Production Part Approval Process) submission. Important input/function, noise metrics (the independent variable x in $y=f(x)$) and intended outputs (the dependent y) are measured and the results are given to the team for consideration and evaluation. Gauge capabilities are also confirmed. When problems with out of spec parts or non-capable gages are found, assignments are given to those who have control of the input, function, noise factor, or gage. Objective evidence of improvement is required to close the assignment. Phase 2 can take several weeks to complete and it will contain its own problems found and solutions rendered.

Every operation in a process receives its own Phase 3 and Phase 4 analysis. A rational prioritized plan of attack is identified in Phase 1. Phase 3 can usually be completed in two to six hours. Phase 4 can be completed in two to three hours to define technical solutions and the risk reduction of the solution. However, all solutions are not implemented and those

that are might take a few days to weeks or longer depending on cost and delivery of solution constraints. It is rare that 50% of the solutions are implemented before quality improvement goals are achieved. It is easy to understand that solutions might be found before data exists to confirm cause and effect. Phase 4 offers a simple thought process for when to confirm cause and effect and when it is required. When a suggested solution is solid and inexpensive, confirming root cause might cost more than the solution. For example, adding a position sensor to make sure that a part is correctly in place (cause solution) before a cycle can start. When the solution is expensive, cause and effect really should be confirmed statistically. Also consider how difficult it is to confirm cause and effect for a cause. What if a process only produces 5 ppm defects? It would be statistically impractical to set up a confirmation study. In the case where a company produces a total 50 ppm and they are trying to achieve a goal of 3 ppm total defects, all solutions will be for causes that happen so rarely that confirming them all but impossible, in a practical sense. More simply stated, when the starting quality is fairly good (50-500 ppm), teams will need to implement solutions based on their best judgment because proving cause and effect will cost too much money.

Visit the ASQ
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complete
Quantum
Quality
article by:

John Lindland

www.asq-auto.org

Fixing Things and The Discipline of Language and Thought

by John Allen



John Allen

"There is no difference between these two solenoids," Andreas said.

I thought about letting it go, then changed my mind. Andreas is a fine young engineer with a lot of potential. I like him. He is teachable. Maybe he is just humoring an old man. "It isn't helpful to say, 'there is no difference,' Andreas," I said. "Instead, say, 'I can't see any difference.' It keeps your mind open to differences that might be there, but you can't see them yet."

We had been working on a project in Germany for a couple of weeks, including building the test stand, buying and hooking up the data collection system, and designing the tests. We were close to finishing, and confident we were close to a causal explanation for motor failures. The causal explanation fit four failures that were thought to be separate failure modes but could all be explained by the by one set of physics. That's usually the way it is.

The project was a lot of fun. We had a small shop and all its machines at our disposal. The client sent us the motors, so we could move as quickly as we wanted, and work all day and half the night, wear the same blue jeans day after day, and not even bother to shave. There was a guy in the next shop rebuilding an old Mini Cooper, with a restored 1960 Fiat 500 still in the shop, which showed his rare talent. He was great to talk to. I understood about

half of what he said, but when he spoke, it was with the animated passion of a craftsman. It is contagious.

What Andreas said gave me a chance, a man with far fewer years left in my career than behind, to teach just a small bit of the discipline we have found to be so important to fixing things. We are not fond of the idea of out-of-the-box thinking. We think the best strategy and tactics are nicely constrained by a sound set of principles we teach in our seminars, and demonstrate in our projects.

I told him how your mind can play tricks on you, but there are also things you can do to help yourself with your thinking and logic, to help yourself with sound constraints if based on principle and physical law. We must discipline our thinking to develop good strategy, and make sure tactics are in phase with strategy. If you say, "there is no difference," you won't find it if there is. The conclusion you drew might block you from the truth. And once we are off track, when we are wrong, we tend to believe our own nonsense, and get defensive when it is challenged. That's why we say, "It's OK to be wrong, but you better be wrong fast." The longer you are off track, the harder is it to get back on. That's why we say, "Your job is not to solve the problem, but to learn one thing every day about the physics of function or failed function." If you do, you can't be off track for long, and the answers will come fast.

The tools you have in the shop are important, but the most important part of technical diagnosis is the question you start with to lead to a causal explanation for the behavior the customer finds objectionable. The question IS the strategy, and how you pose it, dictates the tactics. If you are not getting answers fast, then your tactics are poor. Getting the question, tactics, and answers working for you is a powerful constraint. The slower you go, the more likely you are to be off track. Once off track, the longer you are off, the harder to get back on. We know how to stay on track, and practice doing so.

The key to discovering a causal explanation for a failed function is really the starting point, the first question. A professional problem solver must consciously have a model in the forefront of his thought process that drives his thinking and actions, right from the start. Every bit of evidence must be collected and evaluated in terms of that model. The model is not only a guide to gaining insight, but acts

as a constraint, preventing divergence. The model sets the strategy, defining single big question that dictates how resources are allocated. Remember, just collecting data is no strategy at all.

David Hartshorne and I, having worked together professionally solving tough technical problems for over 20 years, know how important it is to avoid the pitfalls of finding a root cause, an answer to the question, "What is wrong?" which tends to diverge. Our first question, "What is happening?" leads to characterization of behavior using the sound constraining principles we teach. The approach we have developed provides us performance insight, and helps us pose narrow and focused serial questions on a convergent search that will always lead to a causal explanation.

Those of you who have worked and followed what I write know that I find it annoying to refer to "resolving issues." It means absolutely nothing. Or, it can mean whatever you want it to mean, also useless, as it is no constraint. The way we speak influences the way we think. I worry about the consequences of the move away from concreteness in technical thought and discussion. Precise work cannot come about from language and thought not precise. "The slovenliness of our language makes it easier for us to have foolish thoughts," George Orwell wrote. He later wrote, "If thought corrupt language, language can also corrupt thought. A bad usage can spread by tradition and imitation, even among people who should and do know better."



Author: John Allen is the Co-Founder of The New Science of Fixing Things, www.tnsft.com. John was previously a Founding Member of Shainin, LLC. He has worked around the world solving technical problems and teaching the unique and powerful method developed in conjunction with Co-Founder David Hartshorne.

2012 ASQ Automotive Division Symposium Summary

by Kush Shah

We conducted our 10th Annual ASQ Automotive Division Symposium on Monday, April 16th, 2012 in the Metro Detroit area. The theme of the symposium was 'The Future of Quality' appropriately as ASQ Automotive Division is focused on looking forward and providing insight from leaders and quality professionals on the future trends in automotive quality.

I am happy to report that this symposium was a great success at several levels - this event was a sold-out event with over 160 attendees, high quality of speakers and very positive feedback from attendees. Dennis Drabik was the Chair of this symposium. I want to thank him and the symposium planning committee for making this event a great success. I am sharing highlights and key points from the symposium with all our members.

A New Definition of Quality - Keynote Address Terry Woychowski, Vice President Global Quality and Vehicle Launches, General Motors
Not long ago, quality was defined as an adherence to

standards. Today, quality is a far reaching concept that deals with not only practical matters such as reliability and durability, but also with more abstract concepts such as customer satisfaction and the purchase experience. Terry Woychowski emphasized that General Motors team has embraced these new concepts, adopting a philosophy that says: "We don't win until our customers tell us we win." GM is taking an enterprise-wide approach to quality improvement and incorporating the voice of customer at every step of the way. He provided insights on some innovative approaches being used to improve the customer experience - everything from learning a few lessons from Mickey Mouse to cracking the youth market with the help of MTV.

How Can Lean Six Sigma Improve the Top and Bottom Line

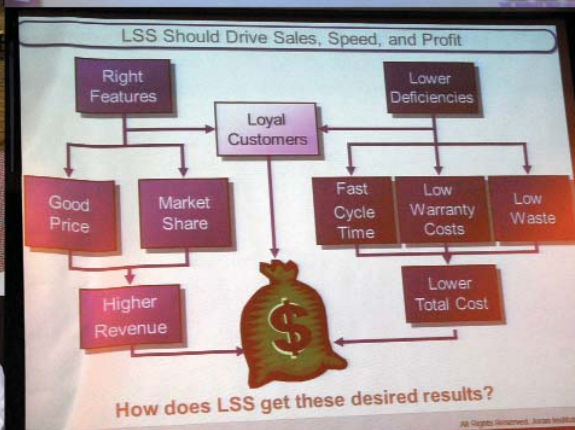
Joe DeFeo, President and CEO, Juran Institute, Inc.
Mr. DeFeo shared his most recent research and experiences in helping global service organizations achieve transformational change using both Lean and

Six Sigma as an integrated methodology. He shared a set of techniques that were successfully used to improve quality, reduce waste and cycle time; minimize the time for designing, producing, marketing, and delivering a product or service to customers; and eliminating elements that inflate costs, lead times, and inventory. But most of all delivering top line and bottom line results.

The Changing Automotive Customer Demands of Quality

John McElroy, Host "Autoline"

While traditional quality efforts focused on durability, reliability and manufacturing precision, those are not enough to satisfy today's demanding car buying customers. They are far more discerning than in the past, so automakers must learn how to enhance the perceived quality of their cars with innovative uses of materials and technology.



ASQ Symposium *continued*

by Kush Shah

These can be subtle nuances that are not immediately obvious to automakers, since in many cases the customers themselves don't know them. This speech covered a number of the current examples that are in the market right now.

Automotive Core Tools Fundamentals **Ken Coll, Quality Manager, Continental Automotive**

The six Automotive Core Tools (APQP, FMEA, Control Plan, PPAP, SPC, and MSA) are core requirements for any supplier in the automotive industry. Proper use and application of the tools is essential to an

effective quality system and satisfied customers. Ken Coll provided an overview of the Core Tools, reviewed the basic requirements and purposes of each, and discussed barriers to effectiveness of these tools.

Core Quality Tools Overview and Failure Mode and Effects Analysis **Mark Morris, President, M and M Consulting, LLC.**

ASQ Headquarters approached the Automotive Division as the subject matter experts to develop training materials covering the five automotive core

tools: APQP, FMEA, PPAP, MSA, and SPC. This presentation began with a status update on the progress of these efforts. Then it shifted focus specifically toward FMEA, a proven quality tool used to identify and take action on high risk potential failure sequences. Mr. Morris's focus was on how we all can make better use of FMEA in our company. A Rational Structure for Quality Planning differentiates the scope and motivation of the common types of FMEA: Design, Process, Machinery, etc. An FMEA worksheet approach and a three meeting strategy was presented that could help make our FMEAs more efficient and effective.



The Big "Q" vs. the Small "q" and its Impact on ISO 9001:2008 and ISO/TS 16949:2009 **Chad Kymal, Chief Technical Officer, Omnex Engineering & Management, Inc.**

One of the most significant changes was the movement from a Product Standard to a Business Standard or as we say from the small "q" to the Big "Q". The Big "Q" or the BMS focus of ISO 9001 ushered in the Process Focus and the Customer Focus of the current revision (ISO 9001:2008). The

Process Focus discussed for ISO 9001 as it applies to a single site (i.e., Site Focus) now changes to a discussion of an Enterprise focus using ISO/TS 16949 parlance, the linkages between the site and the remote location. This Process Focus also has an impact on the documentation of the BMS and leads to the standardization of processes throughout the enterprise. This discussion not only included Standardization, but also integration (e.g., integrating ISO/TS 16949 and ISO 14001) and its impact on the

processes and documentation of the organization.

Networking Activity - Quality Bingo

One of the key objectives of the symposium was to make new contacts and establish professional relationships. Mary Beth Soloy created quality bingo that many of the attendees participated and received prizes for their participation.

ASQ Symposium *continued*

by Kush Shah



Sponsors

Organization sponsorship is essential part of the symposium as this allows ASQ Automotive Division to keep costs very reasonable for attendees. Many of the sponsors have been supporting us through their sponsorship year after year. I will like to encourage others to sponsor the 2013 event and take advantage of the unique opportunity to present your products / services to quality professional within automotive industry.

Sponsors for this symposium were BSI, Continental, ASQ Greater Detroit Section, Goal / QPC, M and M Consulting, Minitab, Omnex, QI Macros, Shainin LLC, Sologic and TI Automotive. Special thanks to Tom Gorman, who coordinated all the communications with the sponsors.

Lastly but most importantly, I want to thank attendees of the symposium for taking time out of their busy schedule to attend this symposium and making it a great success.



Please visit www.asq-auto.org for copies of presentations that were released by some of the speakers.

Synergistic Partners for the Automobile Industry

by Dana W. Clarke, Sr.



Dana W. Clarke, Sr.

"Executives say innovation is very important, but their companies' approach to it is often informal, and leaders lack confidence in their innovation decisions. Top managers and other professionals agree that the biggest challenge is talent, but disagree on why."

How companies approach innovation A McKinsey Global Survey

There is little doubt that a similar quote was made about quality only a few decades ago.

Learning how to be an individual innovator or an innovative organization is no different than learning how to be a quality professional or manage quality across an enterprise. With quality, structured methods, tools and techniques were the key. These practices gave practitioners the ability to communicate and work together to improve quality, first in manufacturing then in virtually any other part of an organization. Over the last 20 years, US organizations have been learning that innovation is no different.

As with any other part of business, leaders are driven to seek out and implement manageable structures. Without structure, innovation was left to the whims of talented individuals; no different than quality 60 or 70 years ago. But all of that has changed; a comprehensive collection of structured approaches, such as those found in TRIZ and Structured Innovation, allow for innovation to be executed and managed on-demand in any area of business from top-to-bottom. All of which drives the need for the development of internal professional innovators; again, no different than what many companies have done with quality.

What has been learned through the successful implementation of quality can be leveraged to implement structured approaches to innovation. But to achieve this, it is critical that there is an understanding of the differences between quality and innovation.

So what is innovation... innovation is about discovering something new, creating something new or solving problems that have no known or acceptable solution. It is about creating or evolving business models (the way we interact with customers and suppliers), business processes (the way we function internally), and the technologies that allow us to deliver products and services.

Defining innovation

One of the most common definitions of innovation is "the creation of something new" but this is not insufficient with respect to most businesses' needs. An improved meaning is "the creation of something new that delivers value to the organization and to its customers". However, these traditional definitions only tell us "what innovation is" but don't tell us how to innovate.

New terminology, "structured innovation", characterizes the "how behind the what". Structured innovation is defined as "the abstraction of knowledge from the human experience and the structuring of that knowledge for efficient and effect use". This defines "how" we innovate. It articulates a process that occurs when humans are faced with challenges. In the first part of the definition, "the abstraction of knowledge from the human experience" we have to search for information. Whether this is a process performed by an individual or by a team, this is inclusive of thinking, drawing analogies, research, datamining or collaboration. In the second part of the equation, "... the structuring of that knowledge..." there is the organization, analysis and synthesis of the knowledge that has been acquired. And lastly, "... for efficient and effective use" we find using the knowledge to deliver value. This definition defines "how" innovation occurs and is inclusive of different innovation processes that support discovery, the creation of something new and problem solving.

Like quality, structured approaches to innovation are also inclusive of methods, tools and techniques but

the approaches are different in that they leverage subject matter expertise to envision and drive toward an ideal future state more effectively than optimization or improving the present state conditions. This differentiation becomes obvious when looking at definitions of quality, such as the following examples:

Lean and Six Sigma methodologies tend to emphasize efficiency-saving money through the elimination of wasted material, effort, motion, rework, scrap, etc. (Dettmer)

Lean and Six Sigma are concerned primarily with improving the process and output of system components; (Dettmer)

If one envisions a whole system as a chain made up of interdependent links, Lean and Six Sigma focus on strengthening the links; (Dettmer)

Hidden within the definitions of innovation, structured innovation and quality we find the potential for tremendous synergistic results. By leveraging the best of structured innovation and quality we find processes that can be refined and leveraged in different ways -- quality improves but is often limited by the process it is improving; innovation delivers something new but is typically not focused on controlling and improving the required processes for delivering the new thing of value.

What a powerful team... quality methods, tools and techniques allow us to monitor processes that have been defined and are in existence. Innovation creates "new" things that don't exist. Think about it this way... they are both essential and work hand-in-hand but at the same time have different functionality. Both have the potential to touch every area of business; furthermore, to maximize the value of each they need each other. Quality is the foundation that allows us to perform consistently and innovation allows us to create something new. Both allow us to solve problems... albeit different kinds of problems.

Innovation is the new kid on the block... Seriously, did I just say that? Innovation has been around since the beginning of mankind's existence and will be here until mankind's end. So what did I mean when I stated, "... the new kid on the block..." Well the reality is that with respect to structured approaches to innovation, it is new. Throughout history, innovation has been an individual skill. Some people or organizations have it and some don't. That has all changed.

Synergistic Partners for the Automobile Industry *continued*

by Dana W. Clarke, Sr.

What is the Difference between Innovation as an Art or a Science?

Getting down to business. W. Edwards Deming told us, "If you can't describe what you are doing as a process, you don't know what you're doing."

Traditionally many have seen innovation as a natural ability, an art where a handful of select, gifted people excel. Even today, many worry about the ill-effects structure could have on a culture of innovation. Their concern, what if you create an environment so structured that you kill innovation and the underlying spirit of being innovative? All the while shareholders and executives are crying for more innovation; driven by the need to create bigger, more diverse markets with greater profitability. The key to which, in any other part of your business is structure, discipline and the measurement of results.

But who taught you to be innovative? What books did you read? What courses did you take? What structures do you have behind your efforts to identify opportunities and achieve the desired results? Are you and your peers more comfortable in a world of innovation-as-art? Even if you are a natural innovator and problem solver, what about the people around you? Do they have your unique talent? Are they all naturally innovative? What about communications, do you have the ability to clearly, quickly articulate your innovation and the "how" behind your problem solving efforts to one another? Can your business survive with a critical function, such as, innovation being an art?

.... Or should it be structured, disciplined, managed and measurable, akin to other mature functions within your business? The answer should be obvious... innovation should be treated like any other business function.

Innovation as an Art

Historically, innovation was controlled by a select few naturally innovative individuals. These individuals appeared to have a talent that no one else could or ever would possess. Their individual contributions were key to the success of their companies and this was good enough. But global pressures and competition have changed.

Believe it or not, there was a time when quality had much less structure than today; marketing, sales, management and even finance were the same if you go back far enough. Businesses have always strived

to bring structure to the functions they perform; so why would you treat innovation any differently? Should your innovation be an art or a science? As competition increases and markets become more and more dynamic, the latter is most likely the direction that most companies will pursue.

Innovation as a Science

What is a science?

Merriam-Webster's - Science:

the state of knowing : knowledge as distinguished from ignorance or misunderstanding **2 a**: a department of systematized knowledge as an object of study < **the science of theology** > **b**: something (as a sport or technique) that may be studied or learned like systematized knowledge < **have it down to a science** > **3 a**: knowledge or a system of knowledge covering general truths or the operation of general laws especially as obtained and tested through *scientific* method

Is innovation a science in your organization? Why would you treat it any differently? Shouldn't it be like any other business function?

How, would something as critical as, solving the most complex problems your industry is faced with change? Would having a skill set for innovation make you a better employee? Would it make you and your department more effective? How would it change your company?

Infusing Structure within Innovation

Innovation isn't the only function that has transitioned from being controlled by a select few talented individuals to something that can be done by the masses. One such example is long division in the days of the Romans and their use of Roman numerals. At that point in history, division was seen as genius ability, but with the advent of the Arabic numbering system (specifically the concept of zero) long division became a skill that could be taught to everyone, even young children.

Does that mean that all children had become genius... what do you think? Or was it merely a transition from art to science. More recently (a few decades), you've seen Quality go from "sorting parts and engineering judgment" to learned processes such as Six Sigma, Lean Six Sigma and Design for Six Sigma; collections of science-based methods, tools and

techniques that can be easily taught, learned and applied. Isn't it a basic fact that, in business, repeatable and reliable structured processes are being added to how you perform tasks on a daily basis? Why would innovation be any different?

Innovation Is Becoming a Science

"Learning and innovation go hand in hand. The arrogance of success is to think what you did yesterday will be sufficient for tomorrow."

William Pollard

Today, there are methods, tools and techniques that can be applied to facilitate the successful solving of almost any complex business, engineering or scientific problem by using structured approaches to innovation, such as, TRIZ and Structured Innovation. The result of extensive research over the last 65 years, innovation has evolved considerably. As a result, innovation is becoming more manageable and the results more measurable both of which are good for your business. While many people have been exposed, only a relative few have truly refined their understanding of the "how" behind the structure of innovation.

Integrating Quality and Innovation

Beyond bringing structure to innovation, there is the integration of structured approaches to innovation within quality practices. Small tools that greatly improve the performance level of other methods, tools and technique. For example, in design of experiment, functional analysis can be used to define factors (an alternative to brainstorming), interactions can be looked at as though they are contradictions and solved using the Separation Principles of TRIZ or the same can be applied when faced with the optimization of two or more quality characteristics with factors and levels that are in contradiction with each other. Examples of integration exist with most quality tools... FMEA, QFD, Failure Analysis techniques, Pugh Concept Selection, Robust Design, and more.

THE QUALITY AND INNOVATION TEAM:

Synergistic Partners for the Automobile Industry *continued*

by Dana W. Clarke, Sr.

Summing things up...

"Innovation distinguishes between a leader and a follower."

Steve Jobs

Innovation and quality go hand-in-hand. They are different and the same; they are synergistic and individually powerful. The creation of something new (innovation) must be held to a standard as measured against other things of a similar kind; the degree of excellence of something (quality). The concepts of continuous improvement and optimization associated with quality can only take an organization so far before a new way of delivering the required functionality to the customer is created through innovation. Quality and innovation are, without question, a necessary team within any business.

There are two structured approaches to innovation; TRIZ and Structured Innovation. TRIZ, The Theory of Inventive Problem Solving, brought us ways to structure our thinking with respect to science and engineering problems and Structured Innovation has been the Westernization of TRIZ. This Westernization has resulted in the integration of TRIZ through the inclusion of competitive intelligence, strategic

planning, value chain, decision making, strategy & strategic planning, markets & market dynamics and business process innovation. This Westernization has allowed structured approaches to innovation to go beyond engineering and science to touching the creation of new business models, processes and technologies based on evolving organizational needs and market demands.

So what does this mean... whether you personally buy into these structured approaches to innovation or not, your competitors "can and will" because they exist. Sixty-Five years of evolution between TRIZ and Structured Innovation is a strong run with key elements and practices being recognized by companies such as Samsung, Intel, Boeing and many more.

Innovation is the life-blood of any organization's ability to manage growth and profitability by delivering something new to the marketplace; something that excites and delights. Without innovation there is stagnation or death of the business. Innovation occurs throughout all parts of an organization and at all levels. Innovation has historically been driven by a lack of structure and remains unmanaged or poorly managed in many

organizations. With today's global competitive pressures innovation must be elevated to the level of a managed business practice that is disciplined, managed and measured. Today, all of the methods, tools and techniques exist to take control of how innovative solutions and business opportunities are delivered. Waiting for innovation to occur is no longer an option.

Author: *Dana W. Clarke, Sr. has been a practitioner, trainer, facilitator and consultant involved in the development of professional innovators and the creation of structured approaches to innovation since the early 90's. He was the first American to become trained and internationally recognized as an expert in TRIZ and has been instrumental in its integration with Western business and engineering practices. His work with Structured Innovation has resulted in uses as diverse as strategy development, creating paradigm shifts and integration of innovation practices.*

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Automotive Division The Global Voice of Quality™

American Society for Quality (ASQ) is the world's leading authority on quality. This professional association advances learning, quality improvement, and knowledge exchange to improve business results, and to create better workplaces and communities worldwide.

ASQ Automotive Division Mission:

To be the recognized global network of automotive quality professionals helping individuals and organizations achieve personal and organizational excellence

Key Objectives of ASQ Automotive Division:

- **Increase Member Value** – Webinars, symposium and Automotive Excellence magazine
- **Develop Core Tools Competency** – On-site training; PPAP, APQP, FMEA, SPC and MSA
- **Global Outreach** – Participate in conferences and deliver training globally
- **U.S. Outreach** - Engage all automotive OEMs and Tier 1 & 2 suppliers
- **Student Outreach** – Collaborate with universities
- **Collaborate with Other Professional Societies** – Engage with other societies and professional organizations

Core Quality Tools On-Site Training Courses Offered by ASQ Automotive:

- Advanced Product Quality Planning (APQP) – 1 day training
- Production Part Approval Process (PPAP) – 1 day training
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- Statistical Process Control (SPC) – 2 day training
- Measurement Systems Analysis (MSA) – 1 day training

Fees: \$100 / student / day for minimum of 10 students for on-site training + travel expenses for instructor. Discounts offered for 5 consecutive days of on-site training.

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