ASQ

Spring 2010

Automotive

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Official Publication of the ASQ Automotive Division

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ASQ Automotive Division Webinar Series
Tuesday, April 20, 2010 – 8-9:00 p.m.

2010 ASQ Automotive Division Symposium
Monday, April 26, 2010 – 7:30-5:30 p.m.
Macomb Community College, University Center, Warren, MI

ASQ Automotive Division World Conference Annual Meeting
Sunday, May 23, 2010 – 2-4:00 p.m., St. Louis, MO.

Ford CEO Alan Mulally to speak at 2010 ASQ World Conference on Quality & Improvement, St. Louis, MO
Alan Mulally, president and CEO of Ford Motor Company, will kick off the conference's Opening Session, Monday, May 24 at 8:00 a.m.

2010 ASQ World Conference in Quality Improvement (WCQI)
May 24 - 26, 2010 in St. Louis, MO. We will hold our Annual Meeting and Strategic Planning ar the conference on May 23, 2010 from 2-4:00 p.m.

ASQ Automotive Awards & Recognition Banquet
Tuesday, June 15, 2010
General Motors Heritage Center in Sterling Heights, MI.

See the ASQ Website for Updated Information

Letter from the Editor

Teresa L. Pratt
2008-2010 Publications Chair

Rob Langdon,
2010-2011 Publications Chair

Ha Dao mentioned in his Letter from the Chair, the leadership team has instituted some changes... they're going **GREEN**! This will be the final edition of the ASQ Automotive Excellence magazine. As this chapter in the ASQ Automotive Division's history comes to a close, a new one begins. The new communications strategy will provide articles with greater speed, so keep those articles coming! Watch your e-mails for future announcements.

My two-year assignment has ended. In automotive language, it's time for a process handoff. I have enjoyed publishing interesting articles that have been relevant to the automotive industry. We've been through a lot together, haven't we? I have never doubted the spirit, energy and commitment of the people within the automotive industry! Keep sharing!

Special thanks to the publications committee for their quality work. Our team included Ha Dao, Denis J. DeVos, Jim Odom, James Michael Prusak and Michael A. Shader

Your new Publications Chair, **Robert Langdon**, has been working closely with the last two editions and is ready to take the new electronic Newsletter to a new level of excellence. Please join me in welcoming Rob to his new assignment!

Robert Langdon is a '89 and '94 graduate of GMI Engineering & Management Institute with a BSME and MSE. He spent 10 years working for Delphi with positions in Manufacturing, Product and Quality Engineering. He held the position of Six Sigma Manager for GKN Sintermetals. Working for nine years as a Sr. Consultant for Shainin LLC, he helped clients solve their toughest technical problems and delivered problem solving training around the globe.
Please begin sending articles to Rob at: ralangdon58@hotmail.com.

My best wishes to everyone,

Teresa L. Pratt
ASQ Publications Chair 2008-2010
teresalpratt@aol.com

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http://www.linkedin.com/groups?home=&gid=1383527&trk=anet_ug_hm
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ASQ Automotive Division: Letter From The Chair

Ha Dao, ASQ Automotive Division Chair
hdao@ssaandco.com

With the recent recalls, Quality in the automotive industry is playing a more important role than ever. Building a quality reputation requires painstaking efforts. Maintaining it requires constant care and attention. What happened in recent months shows us the ripple effect that can be caused by a quality problem.

Whether you're new or a seasoned member of the division, there's never been a better time than now to be a part of the organization that's leading the way in quality in the automotive industry. We remain a proactive division in automotive quality leadership because of YOU, our members.

Recognizing that you are a leader in quality, ASQ and the Automotive Division's goal is to meet your specialized needs through specific automotive conferences, publications, and educational programs. Also of great importance is your opportunity to interface and network with other automotive quality leaders. You can do this by coming to our monthly council meetings or online meetings, attending conferences, and other networking activities.

We would like to invite all ASQ Automotive members to participate in the upcoming division programs for the 2009-2010 year. Our leadership team continues to work on our mission "To provide member value by identifying, communicating and promoting quality knowledge, professional development and networking opportunities."

- We look forward to seeing you at our 2010 ASQ Automotive Division Symposium on April 26, 2010. The symposium will be held at Macomb Community College. The symposium team has done an excellent job organizing the event. We are expecting a sold-out symposium!

- We will be exhibiting at the 2010 ASQ World Conference on Quality and Improvement (WCQI) May 24-26, 2010 in St. Louis, MO. We will also hold our Annual Meeting and Strategic Planning Session at the conference on May 23, 2010 from 2-4 pm.

- We will have our annual Awards Banquet to recognize the outstanding accomplishments of our people on June 15, 2010 at the General Motors Heritage Center in Sterling Heights, Michigan. The Awards team has been very busy coordinating the event.

As with the drastic reduction of employment in the Auto industry, our membership numbers have been down approximately 34% in the last two years. Our revenues have been also reduced by the same percentage. The leadership team has to look at ways to serve our members with the reduced budget.

One of the changes is that the division will only have the electronic versions of the magazine going forward. This last printed version will also be distributed only to active members to reduce costs. I want to thank Terri Pratt, our editor, and the entire publication team for a fantastic job they have done for the past two years.

To keep up with division information, be sure to check the **www.asq.org/auto** website frequently to get meeting details, news, training offerings and to register for upcoming events.

Behind the many ASQ activities are many people working quietly behind the scenes – thank you for your support hard work. I would like to thank Frank Bykaylo for his 5-years serving as our Treasurer. Under his leadership, our division has maintained a very strong balance sheet. I also want to thank the entire council for their leadership and dedicated service for the past year.

Thank you for being an Automotive Division member. On behalf of the entire the leadership team, I want to emphasize that we are eager to provide you with the support and services that you want and need. If you have any questions or would like to become more actively involved in the division, please send me an e-mail to *hdao@ssaandco.com*

2009 was a turbulent year, no doubt, but 2010 will see automakers just as busy. This time, however, they will be busy launching new products and competing for customers, not fighting to keep the lights on and the payroll checks from bouncing. And that is something we can all look forward to.

Ha Dao, Chair
ASQ Automotive Division

Risk Analysis - Why Is It Important?
by Dan Brown

Why Risk Matters
In the business world, "risk" is a scary word. There are risks if we move forward, or if we remain still. No matter what industry you are in, you are guaranteed to run into risks. As a business leader, how do you know when to take a risk and when not to take a risk? The answer is pretty straight forward – analyze and then manage your risks. To most people, that can be easier said than done.

Fortunately, there are a multitude of tools to help businesses manage their risks. For some industries, having a formal risk management program is a requirement and the guidelines are dictated. For others, the answer is not as easy and it is up to management to recognize the need for formal risk management tools.

It is important to note that a formal risk management program includes more than conducting a one-time Failure Mode and Effects Analysis (FMEA) that is only pulled out during periodic audits. Although an FMEA is important, it barely meets the requirements of a formal program and it clearly misses the mark on intent. An FMEA only serves to identify risks but does not manage them. It also fails to identify risks beyond the FMEA scope of Design or Processes. Companies must also ensure that the scoring criteria are relevant to their operation and understood by the individuals preparing and using the FMEAs. As a snapshot in time, it may not cover changes that have occurred since it was prepared.

So the important question becomes, "Why is risk analysis important?" The answer can be found in newspaper headlines, stock market reports, consent degrees, attorney fees, class action lawsuits and lost business analyses to name a few. A failure to act on the part of a business becomes mismanagement and leads to a great deal of personal risk beyond the professional and corporate risk. As a result, business leaders are held personally accountable by their companies, stakeholders and the regulators to be effective risk managers.

Requirements for risk management have been well documented in industries such as medical devices, aerospace and automotive, and are

driven through tools such as the International Organization for Standardization (ISO) management systems, which include a component on risk management.

Requirements for risk management are also now starting to arise in the rest of the manufacturing world. This is a positive step for the global economy. To help support this effort, the International Organization for Standardization (ISO) published ISO 31000:2009: "Risk management - Guidelines on principles and implementation of risk management." This document provides general guidelines on risk management that can be used across most industries.

Risk Identification…Getting Started
The first step in building a robust risk management program is to understand if your process(es) for risk identification includes all sources of risk.

Things to consider when identifying risks include:

- Your supply chain

- Your computer and communications systems

- Your employees, equipment and capabilities

- Power outages or facility shut-downs

- Natural disasters, such as earthquakes, fires, floods, tornadoes, hurricanes and blizzards

All of these have different risks that create different problems. Proper risk identification looks at all of the concerns. Are you a component supplier? If so, have your customers properly defined and provided you with all of their requirements? Are you sure about that? Are you the design-owner subcontracting components? If so, can your chosen supplier meet all of the requirements you have specified? Do you understand their processes well enough to know what questions to ask them?

If you have a high level flowchart of your operation, you already have a very useful tool for risk identification. If you do not have one, now is the time to create it! For every box on your

flowchart, ask your team, "What can go wrong here?" "How will we know if it does?" "What do we do if it happens?" Identify the answers to these questions in the right margin of your flowchart and you have a ready-made risk management tool at your disposal. You must review it often to ensure it remains current.

When corrective actions occur, ensure the lessons learned are added to the risk management chart. Remember to add all the improvements you make to the system through risk management to your list of corporate preventive actions. Every action taken to mitigate risk is defined as a "preventive action" in terms of ISO quality management standards.

During an audit, you will need to be able to answer the question, "How do you ensure your system will identify all of the potential sources of risk?" Simply pulling an FMEA out of your files will not be sufficient evidence you have identified all of your sources of risk.

Identifying your risks is the easy part. It is much more difficult to figure out what you are going to do about them, and that is the most important part of a Risk Management program.

Risk Management
Managing risks begins with documenting them, and then continues with carefully considered responses. Look at redundant facilities in different areas of the country, alternate suppliers, validated production processes, mistake proofing (Poke Yoke), inspection and testing, control plans, feasibility studies, design for manufacturability, design for maintainability, design of experiments, statistical process controls, process capability studies, six sigma, lean manufacturing, preventive and predictive maintenance, off-site data storage, paper and electronic documents, security protocols, liability insurance, worker's compensation insurance, fire and flood insurance.

There are plenty of resources who will offer good advice, but no one outside of your organization can really tell you what you must do to manage your risks. Keep in mind that for every risk, there is a means to mitigate it if it is cost effective to do so.

Risk Analysis - Why Is It Important?
by Dan Brown

What guidelines should you use to determine your risk management strategy? ISO 31000:2009 includes very effective guidance, including making sure the outputs of your risk management system:

a. Create value – Risk management must be a "value adding" not "value reducing" activity.

b. Are an integral part of organizational processes – Not an afterthought, but designed into how the business is conducted.

c. Are part of decision making – You must make decisions based upon facts not assumptions.

d. Explicitly address uncertainty – No risk is understood completely before something happens - state the "knowns" and "unknowns" in your risk analysis.

e. Are systematic and structured – You need a structured approach to ensure it is consistently applied.

f. Base analysis on the best available information – Remember, you must make decisions based upon facts not assumptions.

g. Are tailored – Your risk is unique to your products and your operations. An off the shelf fix will not be effective.

h. Take into account human factors – We are not machines. Human factors can dramatically increase or decrease risk.

i. Are transparent and inclusive – Everyone must understand the risk management process and see how it is applied and utilized. If it is kept in a confidential folder in the CEO's office, it will lose all credibility.

j. Are dynamic, iterative and responsive to change – Risk management is a living process. As our companies, products, and processes change – so do our risks.

k. Are capable of continual improvement and enhancement – Your first pass through the process will not be perfect. You will get better at it the more you do it. Don't wait for perfection to begin the process.

Prioritization of Risk Mitigation
How do you know how much risk management is enough? Knowing begins with understanding that not all risk is created equal. Some risks are acceptable, some risks are not. You must rank and prioritize your risk mitigation activities. Decide for your company how much of an investment you will make in risk management. Too little and you will end up on the wrong side of a product liability lawsuit. Too much and you will go bankrupt and produce nothing. As a business leader, it is your obligation and liability to draw those lines.

The food industry has a highly effective risk management strategy called "HACCP" or "Hazard Analysis and Critical Control Points." The key word here is "critical" control points. Each and every step and each and every part can be controlled, but to do so is so costly in resources and is wholly impractical. Products today are no longer handmade by skilled craftsmen who labor over each step knowing lives are on the line with the results of their work. Instead, they are mass produced by individuals who rarely see the whole picture and understand the complete process. As a result, we need teams of individuals who collectively possess that "big picture" perspective.

Where does this leave you today? You must look at all of the processes and determine the last point at which no further control can impact a feature, attribute or risk potential. That step becomes the "critical control point" and is where you must have a strategy to ensure the potential risk is either eliminated (if possible) or at least mitigated. Even if you are not in the food industry, this concept can (and should) be a key component of your risk management processes.

Another model is the one used by ISO to determine the changes made to the ISO 9001 standard in 2008. This simple matrix compared the beneficial impact of the change to the resources required to implement the change – an Impacts/Benefits Matrix. Horizontally, it determined if the change had a "High," "Medium" or "Low" benefit to the company. Vertically, it determined if the change required a "High," "Medium" or "Low" amount of resources and effort to effectively implement. Where benefit is low and cost is high – do not do it. Where

benefit is high and cost is low – definitely do it. In between is where the harder decisions must be made. This is where having facts and clearly established decision criteria will make your job easier.

Legal & Ethical Considerations
No discussion of risk management is complete without a consideration of legal and ethical concerns. Risk management is your best proactive shield from lawsuits. While events will occur, what you do today before a problem occurs will dramatically influence how you are perceived when the day of a liability trial occurs. If you have been open and honest about trying to identify and control risks whenever encountered, you have a record of "due-diligence." This will greatly reduce any award a lawyer could obtain for their client.

Preventive Action & Risk Analysis
Nearly every company struggles with risk management. Struggling is okay, but ignoring it is not okay. You will only get better the more often you do it. Remember, the goal is to add value, not cost! In the end, effective risk management will save you money. Your corporate liability insurance costs will be reduced, your failure rates will be reduced and your customer satisfaction (and retention) will improve. Remember these are all preventive actions – fixing problems before they arise, which is always cheaper than fixing them after costly mistakes.

Risk analysis may still be a scary word, but when you have the right tools, knowledge and experience, your fears will quickly be replaced with confidence and success.

Contact Information
Dan Brown is the Medical Device Industry Expert for the ASQ and is the ISO 13485 Registration Services Manager for EAGLE Registrations Inc., an accredited third-party certification body that provides value-added third-party certification for international quality, environmental, safety and food standards. For more information, contact Dan at dan.brown@eagleregistrations.com or EAGLE Registrations at 1.800.795.3641 or www.eagleregistrations.com.

Walter P. Chrysler Museum offers something for every Auto Enthusiast

Automotive enthusiasts rejoice! There's a gem of a museum showcasing the history of one of the Detroit Three just waiting for you to explore. The 55,000 square-foot Walter P. Chrysler Museum is located on Chrysler Group LLC's Auburn Hills, MI, complex and celebrates the company's proud heritage with three floors of more than 65 antique, custom and concept vehicles interspersed with interactive displays and historical exhibits. The exhibitions spotlight Chrysler's contributions to automotive design, technology and innovation, as well as the automobile's impact on American culture.

- The first floor traces the industry's first 50 years from Chrysler's perspective - both the man and the company. Rare vehicles date back to the early 1900s and a timeline wall details the key executives and predecessor companies that played a key role in the company's evolution. The vintage collection includes such historic marques as DeSoto, Hudson, Nash, Plymouth, Rambler and Willys-Overland.

- The second floor continues Chrysler's story, beginning with the introduction of the first HEMI® in 1951 and spotlighting the automaker's design, engineering and marketing successes. Exhibitions illustrate decades of vehicle styling brilliance, the electronic age of transistors, Mopar® Muscle, turbine technology, the family transportation revolution and leadership in safety and fuel economy.

- The lower level, called "Boss Chrysler's Garage," houses dream machines from the '60s – '70s, including classic and muscle cars from the heyday of cruising to one of a kind record setting race vehicles. The Garage also features a series of Jeep® vehicles and trucks as well as an eclectic sampling of vehicles from the Chrysler collection.
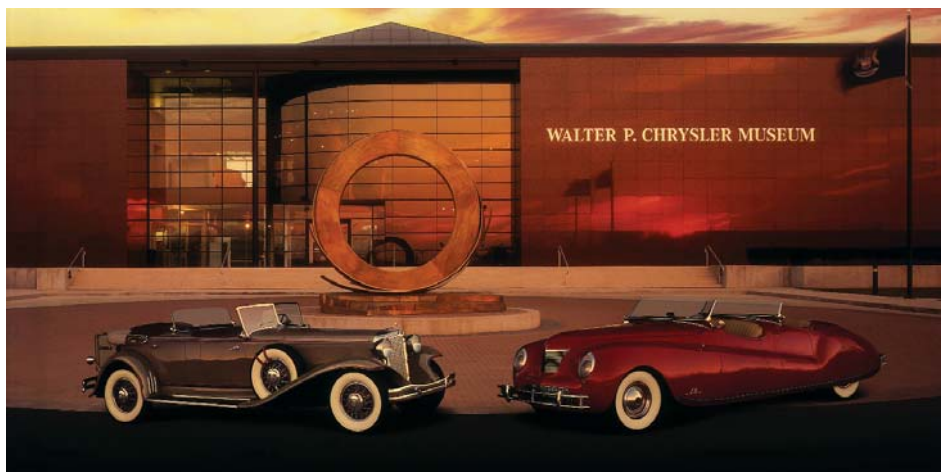
A complete overview of Museum offerings is available at www.wpchryslermuseum.org, including highlights of the Museum's membership program; Adopt a Vehicle and Brick Legacy programs; a comprehensive listing of enthusiast clubs and extensive historical content about Chrysler Corporation, as well as key executives and products.

The site is continually updated with news of special events, including:

- **An Illustrated History of Specialty Vehicles**
  by Author Walt McCall 9:30 a.m. – noon Saturday, April 17, 2010
- **What Can You HEMI®?**
  A special exhibition of distinct inventions built for power, through May 2
- **Luxury Hybrids**
  Featuring 1999 Chrysler Citadel and 2000 Dodge ESX3 concepts, through May 17

- **Dodge Viper Racing Exhibition**
  A special exhibition spotlighting five racing and pace Vipers, May 4 – Aug. 30
- **Futuristic HEMIs**
  Featuring 2001 Dodge HEMI® Super 8 and 2005 Chrysler Firepower concepts, May 18 – Aug. 2
- **Roots of The LH Revolution**
  Featuring 1989 Dodge Intrepid and 1995 Chrysler LHX concepts, Aug. 3 – Sept. 27
- **Under The Hood Exhibition**
  Hoods will be raised on many of the Museum's 65+ vehicles for an inside peak, Sept. 18 – Oct. 31
- **Eco Muscle**
  Featuring 2000 Dodge Maxx Cab and 2001 Dodge Power Box concepts, Sept. 28 – Nov. 22
- **Cars, Trees & Traditions**
  Dozens of trees decked for the holidays are paired with vehicles in the Museum's collection, Nov. 20 – Dec. 30

The Walter P. Chrysler Museum is open for self guided tours 10 a.m. – 5 p.m. Tuesday – Saturday and noon – 5 p.m. Sunday. Regular admission is $8 for adults, $7 for seniors and $4 for children ages 6 – 12. Children five and under are admitted free. Two-for-one discount admission coupons are available at www.wpchryslermuseum.org.

The Museum is located on Chrysler Group LLC's headquarters complex in Auburn Hills, Mich., accessible from I-75 at exit 78 (Chrysler Dr.). The Walter P. Chrysler Museum is a non profit 501(c)(3) public charity and donations are tax deductible.

Financial Crisis Continues to Negatively Impact the Supply Chain

by Lestie Carey

The financial crisis is rippling through the supply chain and negatively impacting suppliers linked to the chain. We are regularly seeing Original Equipment Manufacturers (OEM's) sending their assembly activities off-shore, sometimes leaving suppliers with unused capacity as they are only required to supply tooling or tooling repair parts. Consequently, suppliers are left to struggle with cash flow and limited access to credit. Between insufficient cash flow, diminishing quality and headcount reductions, the supply chain may no longer be prepared for when production does increase.

Clearly, the situation has not improved and in some sectors it has even worsened. Unfortunately, we lack a recipe for financial and performance assessment of the supply chain. However, that does not mean that you must invest large sums of money for consultants to conduct an assessment of your supply chain.

Plan and Model Your Successful Supplier Stability and Assessment on the Success of Others

The skills, tools, and information needed for assessment of supplier viability and performance are out there and often within your own organization. Some OEM's and financial institutions successfully engage in this type of analysis but the services can be expensive. You can capture what they do and learn to apply it to your situation. Rely on your own information from cross functional groups and set up a methodology for sharing information and making decisions.

Below are three steps to get you started.

1. Get your procurement, production, quality, lean, and finance people to gather their information on your suppliers. The information should include quantitative, system based and (just as importantly) "soft" signs. The criteria for evaluation include the supplier's:
- Leadership and management structure
- Marketing and selling plans
- Performance
- Operations
- Financial and non-financial information to include, structure and amount of debt, cash flow, secured and unsecured creditors, segmentation of both product and customer base, and your position with the supplier.

2. Analyze the cross-functional information quickly by use of a Strengths, Weaknesses, Opportunity and Threats (SWOT) analysis. A SWOT is a great quality tool to focus diversity of information and perspectives on the same goal.

3. Gain answers and decisions (best guesses) to these questions:
- Which of my suppliers are at risk?
- How vulnerable/weak are they?
- What are the possible benefits for our customers?
- What are my contractual options?
- What are my exposures?
- What actions can we take to mitigate the risk?
- What steps can we take to support a distressed supplier?
- When is it time to seek alternative sourcing?

Is There Any Good News?

A few pieces of good news do exist. Supply chain information management and use of analytical tools have improved. In addition, more information is available through third-party sources. The combination of these two factors permits you to struggle well with the multiple forms of supplier risk present today. You can use the gossip chain (sometimes a great piece of information is hidden in the gossip noise). "Well, I heard that supplier XXX is….," with greater assurance because you can verify hearsay with other sources. All this shared information can reduce your own fire fighting response and the number of rude surprises you get from the supply chain. You can be more proactive and make informed and balanced "guesses" aligned with the related risks. In other words, you can have a big picture assessment of your supply chain and setup a powerful decision making methodology. This methodology can be made a part of the practice and culture of your organization. When decisions are made, effective communication with internal and external stakeholders supports keeping everyone on the same track and can give customers increased confidence in your ability to meet their expectations.

No recipe exists for supply chain risk management; however, the use of good tools, methodology, and teaming will lead to great decisions and improved results. But there are great recipes for Chocolate Chip Cookies!

Acknowledgment:
This article was developed through conversations with John F. Carey, experienced banker and procurement specialist

About the author:
Lestie Carey has assisted an OEM to design and implement an early warning system for supplier viability analysis. She has over fifteen years of experience working with the supply base of multiple industries to improve quality and effectiveness. She is an ISO/TS 16949 auditor. To contact Lestie email her at: Lestie@monkeymundos.com.

A Book Review Of Human Error Prevention
authored by B W (Ben) Marguglio, Reviewed by Teresa L. Pratt, CQA, CQM/OE

Can we understand human nature well enough to prevent human error? We can define it, measure it, analyze it and improve it. We cannot control it. Ben Marguglio puts human error prevention tools to effective use and provides the detail necessary to implement them. He also presents case studies from industry and government to support his methodology. What better way to support continual improvement efforts in your own work, than to have supporting evidence that it will work?
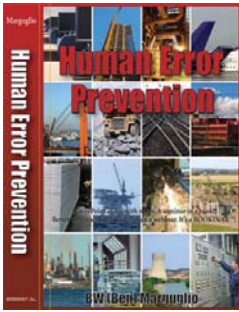
When Ben Marguglio offered to provide a free book in return for a book report, I was eager to accept. After all, I love a bargain! The book is 393 pages long, and packed with information. As I was reading the book, I thought, "WOW, it contains absolutely EVERYTHING that pertains to me in my business life!" Every quality professional would find relevant information for their continual improvement efforts. For example, the information could be approached and implemented for auditing, document design and control, design control and manufacturing processes along with commensurate analytics.

The book begins with operational definitions necessary to understand the valuable messages contained within it. For example, Marguglio defines "barrier" as an action to prevent error, detect an error or the hazard activated by the error, or to mitigate / ameliorate the undesired effect of an error or hazard. To me, a "gate" is how I refer to this same concept, so I began to substitute "barrier" with "gate" in order to understand his message. After all, a "gate" keeps the good things in and the bad things out, right? After we were on the same baseline, it was a thrill to read examples and practical applications. Facts abound! This book would be a great addition to your library – but I doubt it would ever collect dust!

Here are some excerpts:
The Organization's Culture is Learned Over Time
Marguglio explains, "The organization's culture is learned over time. One's beliefs lead to one's values; which lead to one's attitude, which contribute significantly to one's behavior. Behavior patterns define the culture of the enterprise, for better or worse." He points out that beliefs, values and attitudes cannot be observed, but behavior can be observed.

Beliefs ⟹ **Values** ⟹ **Attitudes** ⟹ **Behavior**

Cannot be Observed   **Can be Observed**
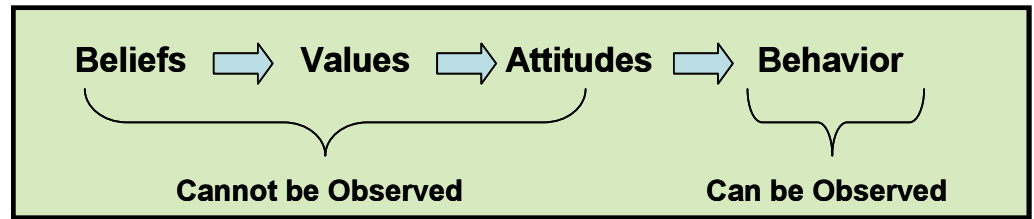
An organization must maintain a questioning attitude coupled with politeness and respect. Culture cannot be mandated. Requiring employees to report problems, issues or concerns will not optimize improvement. Encouraging them to report is what really delivers successful outcomes. Some organizations reinforce their behavior by celebrating "good catches."

Leaders must maintain a relationship to support Environmental responsibility, Health, Safety & Quality by empowering employees, sharing information with employees, and feeding back the results of actions taken to respond to reported problems. Employees must have on-going evidence that the problems they report are acted upon in order to sustain the desired culture.

Understand that the desired behavior is not only that occurring at the point at which the process is last touched but equally, if not more importantly, is that occurring upstream at the point at which the process is designed. Human performance, therefore, is the combination of behavior and its result, as depicted in Marguglio's Model of Human Performance.

What types of things can have an error or problem?
Marguglio states there are only three types of things in which the problem can exist: 1) a hardware item; 2) a document; or 3) a process implementation that is not in accordance with its design document, written procedure or management expectation.

The Seven Causal Factors of Human Error
Errors are caused by the seven causal factors given in Marguglio's Taxonomy of Human Error (see page 8).

Causal Factors are shown in the column to the left. Information regarding when these factors occur are described to the right.

Material is presented in a logical sequence and in manageable steps. He describes four levels of human error, three classifications of human error,

three categories to describe problem causes, common errors in formal root cause analysis, four types of corrective action that must be considered for each undesired occurrence, and four fields of focus. A variety of tools are described and may be applied to human error prevention such as effective root cause analysis, investigation techniques, change analysis, failure mode and effects analysis, hazard-barrier-effects analysis, fishbone diagrams, event and fault trees, administrative process flow diagrams, value stream maps, spaghetti diagrams and performance indicators.

Marguglio challenges his readers, "The best way of reducing the frequency of events is by identifying and eliminating the causes of human error in the management domain – particularly with regard to quality of the design of the administrative and technical processes, and quality of the communication of the design in the written procedures." He adds, "It seems that equipments are designed with far more knowledge and cognition regarding the types of attributes needed to meet EHS&Q criteria than the processes. It seems that some processes are designed with little or no design discipline or are not designed at all, but merely allowed to morph into whatever they will be."

He believes it is imperative that supervisors provide appropriate information in the appropriate way. Information that is inappropriately withheld or that is provided in an inappropriate way can adversely impact one's beliefs and, ultimately, their behavior and results – performance. Behavior that is desired occurs more consistently when it is encouraged and reinforced by organizational leaders, peers and subordinates.

A Book Review Of Human Error Prevention
authored by B W (Ben) Marguglio, Reviewed by Teresa L. Pratt, CQA, CQM/OE

Marguglio's Taxonomy of Human Error Causal Factors

Knowledge based – Error based on behavior	Occurs when one has not received the knowledge or information, expectation or need, either because it wasn't transmitted or got lost or garbled in the transmission or in its receipt. The person engaged in creating a characteristic of a process or hardware item may not be accountable for his or her knowledge based or cognition based error.
Cognition based – Error based on behavior	Occurs when one does not properly process or lacks the ability to process the knowledge or information received – does not properly memorize it, understand it, apply it, or in jobs requiring higher cognitive abilities, does not properly analyze it, synthesize (put it all together), or evaluate it. Higher levels of cognition are needed to prevent problems. Higher levels of cognition are also needed to identify the existence and nature of problems. The person engaged in creating a characteristic of a process or hardware item may not be accountable for his or her knowledge based or cognition based error.
Value based or Belief based – Error based on behavior	Occurs when one does not respect or lacks acceptance of a known requirement, expectation or need, thinking it to be wrong or unnecessary in a given situation. In large part, procedure non compliance fits here. Sometimes the procedure is, in fact, wrong. Sometimes there should be an alternative option for a given situation. However, one would make an additional reflexive based error by acting in non compliance with the procedure, rather than stopping to get the procedure changed.
Error inducing Condition / **Error Likely Situation based** – Error based on behavior	Occurs when the error-inducing or error-likely condition (risk) has not been or cannot be eliminated and when one has not used the appropriate behaviors or lacks recognition of the condition to counteract it. Sometimes prevention cannot be accomplished or cannot be accomplished economically. Sometimes, a reduction in the probability of recurrence of the error or a reduction in the significance of its undesired effect is the best that can be done.
Reflective based / Reactive based – Error based on behavior	Occurs when one is presented with a condition or situation to which an immediate response or reaction is required and lacks conservative judgment in reacting to it. Sometimes, in addition to the immediacy of the required response, the newness or infrequency of the condition may contribute to the error. The lesser the specificity of the procedure governing a process, the greater the potential for reflexive-based error.
Skill based – Error based on behavior	Occurs when one lacks manual dexterity or consistent capability. No matter how practiced, skill-based errors also will exist and cannot be avoided without automation.
Lapse based – Error based on behavior	Occurs when one lacks attention. Humans are fallible. Therefore, lapse-based errors will exist until they are avoided by automation. The lower the level in an enterprise at which a function is being performed, the higher the frequency of repetitive tasks. The higher the frequency of repetitive tasks, the greater the potential for lapse-based error.

Not only equipment should be designed to be compatible with the needs, abilities and limitations of people. Tools such as Spaghetti Diagrams or Value Stream Maps are useful tools to design jobs or tasks (processes) to be compatible with human beings.

Marguglio's explanation regarding specificity within procedures is a "must read" for those struggling with developing or refining their documented process. His section titled, "Self-Assessment Defense – The Six Levels of Opportunity," will certainly guide his readers to successful outcomes.

Here's more information about the book author:

Ben Marguglio is the president of Bookinars™, Inc. (www.Bookinars.biz). He's also a consultant and seminar presenter (www.HighTechnologySeminars.com).

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Applying Poka Yoke Principles through FMEA and 8-D Processes

by John M. Morris

With the drive for reduction in manufacturing costs due to production inconsistencies it has become critical that organizations evaluate how they apply their problem solving techniques.

Many problem solving tools are available throughout the industry, but little has been defined on how to effectively integrate them into a consistent problem solving process.

This article is an attempt to demonstrate how to integrate the Poka Yoke concept with two of the most common problem solving and risk assessment tools currently in use, FMEA and 8-D.

Definition of Error Proofing: Technique for eliminating errors such that it is impossible to make mistakes.

Error-Proofing Strategies: Eliminate the chance of making the mistake and to make it possible to reverse actions to "undo" them or to make it harder to do what cannot be reversed.

Poka Yoke
Poka Yoke, has been a cornerstone of the ZDQ (Zero Defect Quality) movement for some time. Its purpose is to define issues that could impact the customer (internal or external) negatively. These outcomes result in causing tangible issues such as significant costs due to production delays and intangibles such as damage to the brand.

- Poka Yoke is a key success factor required to achieve 6 sigma and Kaizen improvements, which will eliminate wastes and variation associated with processes.
- Eliminating process wastes, such as defects, through implementation of Poka Yoke efforts, will result in more repeatable and reproducible processes.

Poka Yoking/Mistake Proofing is the result of using wisdom and ingenuity to create methods or devices that prevent errors. The objective is to focus on the error/problem and identify steps / actions / tools to minimize the probability of an error occurring again.

There are 3 levels of **Poka Yoking/ Mistake Proofing:**
- Level 1: **Prevent** an error from occurring at the source (e.g. one-way assemblies, automatic calculations)
- Level 2: **Detect** the error as it is being made (e.g. alarms sound)
- Level 3: **Stop** the defect from reaching the next operation providing the mistake proof solution is used (e.g. checklist)

Poka Yoke/Mistake Proofing is not only for the manufacturing sector. It can be applied to any industry. We encounter mistake proofing in our everyday lives. Examples are irons with automatic shut off, automatic headlight shut off, safety handle for lawn mowers requiring 2 hand operations. In a business environment, examples include the use of checklists, fillable forms with automatic calculators, and motion sensing lights with auto shut off.

To see the significance of these one only has to apply the 1-10-100 Rule of Thumb, which states that as a product or service moves through the production system, the cost of correcting an error multiplies by a factor of 10.

An organization who wants to avoid this impact needs to define a process for integrating their existing problem solving techniques (FMEA or 8-D) with the Poka Yoke Tool. Before this can be done the following must be understood and embraced:

- Work is a series of interrelated processes.
- All processes have variation associated with them.
- Variation results in defects.
- Defects in one process can lead to defects in another process.
- When defects escalate costs escalate.

By incorporating these concepts into their problem solving techniques the organization can provide a solid link between the defect/variation and the tool of Mistake Proofing/**Poka Poke**. A **Poka Yoke** can be applied in two formats: Proactive and Reactive.

Poka Yoke as a Proactive System requires implementation at or prior to the inspection points during the manufacturing process. The goal is to catch the defect/variation prior to its occurrence 100% of the time.

When used as a reactive system, **Poka Yoke** is applied immediately after the process and can be an operator check at the process or a successive process. It is usually most effective in preventing a defect from being passed onto the next process.

Mistake Proofing/Poka Yoke are often seen as an independent issue when in reality they are or should be an integrative part of the organizations Risk Assessment (FMEA) and Problem Solving Processes (8-D).

The key to this is where and how they are linked. The process should be implemented as a part of the Problem Solving/Risk Assessment process, not as an afterthought. The organization needs to define a Mistake Proofing/**Poka Yoke** Process Map. This map should include where the activities should begin, what should be considered and how to implement them as a part of the continual improvement process.

Poka Yoke is a step by step process in applying risk assessment and the development of controls or containment devices. Typically the process is followed using the six steps listed below:

1. Identify the operation or process based on a Pareto.

2. Analyze the 5 whys and understand the ways a process can fail.

3. Decide the right Poka Yoke approach, such as using a shut out type (preventing an error being made), or an attention type (highlighting that an error has been made). Poka Yokes take a more comprehensive approach. Instead of merely thinking of Poka Yokes as limit switches, or automatic shutoffs a Poka Yoke can be electrical, mechanical, procedural, visual, human or any other form that prevents incorrect execution of a process step.

4. Determine whether a contact - use of shape, size or other physical attributes for detection, constant number - error triggered if a certain number of actions are not made or sequence method - use of a checklist to ensure completing all process steps is appropriate.

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5. Trial the method and see if it works.

6. Train the operator, review performance and measure success.

Poka Yoke and FMEA: (Proactive)
The FMEA Process is to define the overall risk of either a design or manufacturing process to its customer. In order to establish this, the organization defines the potential problems (failure modes) to meeting the defined acceptance criteria. This is where the Mistake Proofing/Poka Yoking process should begin. At this stage the risks need to be flagged based on their critical impact and relevant data should be gathered to define the specifics of the problem. From this data the development/design of the Poka Yoke should begin. With this design the organization should establish a means to validate the Poka Yoke (turning it on and off) for its effectiveness. Using the 6 step process for developing the Poka-Yoke, one can immediately identify how it can be effectively integrated with the FMEA Process.

In the **Poka Yoke** process, the first step is to identify the operation or process through the use of the Pareto. An example of how this can be linked to the FMEA Process is using the Pareto as a means to identify Customer Feedback issues. These issues can then be applied to the FMEA process in the identification of Potential Failure Modes and ultimately the Causes and Effects. Steps 2-4 can be linked to the development of Detection Tools that can be applied to the process and illustrated within the FMEA and the operations tool, the Control Plan. Steps 5-6 can be linked to the FMEA process in the development of work instructions, performance requirements as identified by an SPC and MSA Plan.

By linking the Poka Yoke/Mistake Proofing Process (Prevention: Design Process error-proofing) with the FMEA/Control Plan Process (Prediction: Design Process) the organization provides a seamless tool that immediately incorporates performance expectations with defined tools for defining ongoing customer satisfaction.

Poka Yoke and the 8-D Process
The 8D Process was primarily developed by Ford to provide a standardized problem solving methodology to its suppliers. The input to the process is a customer complaint, hence, it lacks the Define phase and many of the data gathering, prioritization and standardization tools of the DMAIC process. For the record, the 8 D's or Disciplines are:

1) Select the Team
2) Define the Problem
3) Contain the Problem
4) Determine the Root Cause
5) Determine the Corrective Action
6) Implement the Corrective Action
7) Apply Preventive Action
8) Congratulate the Team

The general objective of the 8-D Process is to provide for a systematic approach for identifying potential issues in a design or manufacturing process that can cause potential performance issues. The overall function of 8-D during the Product Design Process is to evaluate error and error management tools in the design process, analyze common error modes, develop design strategies and tools to predict potential errors and problems in tasks during the design phase of a project, determine error prevention strategies and methods for the design phase and suggest changes to the process to incorporate them. During the Manufacturing Design Process the 8-D process is keyed to identify inaccurate treatments to the process, consistency of the operating environment, and to determine the completeness of defined observations (SPC) and appropriate documentation (i.e., work instructions, check-sheets, etc.).

An organization can use the 8-D process and Poka Yoke/Mistake Proofing as an integrative process, not dependent on a customer complaint. The process can be applied in order to be predictive, by gathering data on typical error states and determining if they are applicable to the process under study. Some of the typical error states are: Incomplete: tasks specified but not performed, Inadequate: task not specified effectively, Misperformed tasks, Omission: tasks not performed and, Incorrect: task as specified as a result of errors. Taking these as a foundation the organization can apply steps 2-3 as a starting point. Steps 4-7 can be used as the identification of Poka Yoke/Mistake Proofing both from a predictive standpoint. These steps will allow for the establishment of error-proofing for the

development of specific Poka Yoke examples as well as additional techniques to prevent design or manufacturing errors. This can then be incorporated in the organizations Corrective and Preventive Action Process.

As stated, the purpose/goal of this article is to provide a general guideline on how to integrate common risk assessment and problem solving tools to provide an organization with a comprehensive method for eliminating or controlling risk to the customer and increasing the overall effectiveness of their processes.

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All classes are held on Saturdays at Macomb Community College, South Campus, Building "T" (located between 12 Mile Road & Martin Road, west of Hayes Road). Refresher course starting dates are subject to change, student should verify.

Certification	Refresher Course #	Refresher Course Start Date	Examination Application (Last) Date	Examination Date	Fee
Certified Quality Engineer (CQE) 12 Sessions	CQE 0210 CQE 0810	08-07-2010 02-05-2011	10-01-2010 04-05-2011	12-04-2010 06-04-2011	$450
Certified Quality Auditor (CQA) 6 Sessions	CQA 0410	04-10-2010	04-02-2010	06-05-2010	$350
Certified Quality Technician (CQT) 10 Sessions	CQT 0710 CQT 1110	07-17-2010 11-06-2010	08-14-2010 01-07-2011	10-16-2010 03-05-2011	$250
Certified Quality Inspector (CMI) 10 Sessions	CQI 0710 CQI 1110	07-17-2010 11-06-2010	08-14-2010 01-07-2011	10-16-2010 03-05-2011	$250
Certified Six Sigma Black Belt (CSSBB) 10 Sessions	CSSBB0710 CSSBB1110	06-26-2010 11-06-2010	08-14-2010 01-07-2011	10-16-2010 03-05-2011	$1000
Certified Manager of Quality/ Organizational Excellence	CMQ/OE 0710	07-17-2010	08-14-2010	10-16-2010	$400
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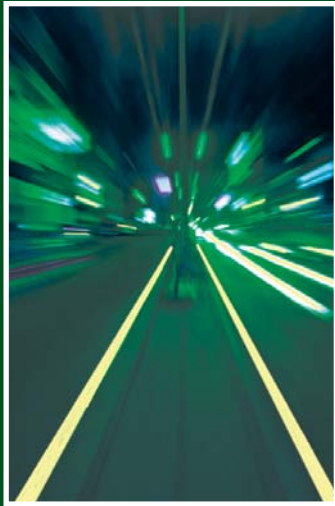27350 Southfield Rd., Suite 102
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