



The Inside Q

- [Certification Test Schedule](#)
- [Recertification Info](#)
- [Career Placement](#)
- [Education Offerings](#)
- [Lending Library](#)
- [ASK MIKE](#)

This newsletter is published each month. The office address is:

ASQ Section 0915
The 2425 Building Suite 402
2425 U.S. Highway 41 North
Evansville, IN 47711

Distribution of this newsletter is sent by email to all members of the local section as listed by the national office.

Newsletter Chair:
Brian Wilson
232 Kerry Lane
Henderson, KY 42420
asq0915newslettereditor@gmail.com

Please contact me with information that you would like to include in the next newsletter.

The local section information is located at:
Evansville/Owensboro
Section 0915 Web Site:
<http://www.psci.net/asq915>

ASQ National Web Site:
<http://www.asq.org>

September Newsletter

Dinner Meeting Agenda



DATE: Tuesday, September 8, 2015

TOPIC: DEK Solder Paste Application DOE to optimize critical inputs

- Pre-dinner clinic on upfront DOE work
- Post dinner DOE run and analysis"

PRESENTER: Tom Watson

LOCATION: Colby's Owensboro, KY (see directions on pg. 2)

TIMES: (Central Daylight Time)
5:00 pm Pre-Dinner Clinic
5:45 pm Register & Network
6:00 pm Dinner
6:45 pm Board Review then Annual Auction

COST: **\$18 per member**

RSVP: Please make reservations **by noon Friday, September 4th** by sending an email to Tom Watson at tom.watson@kimballelectronics.com.

Dinner accommodations cannot be guaranteed for reservations received after the 12-noon deadline date.

Please note: **If you make a reservation and do NOT show up, the section has to pay for your dinner!**

Mission:

Promote Quality and provide value to our membership and local businesses by continual improvement of information and services, meeting content, and training/education.

In The Q- 2015

Website Updates!

Check out our Section 915 website <http://www.psci.net/asq915> for information about our section and upcoming section events, training and more.

We welcome our new members and hope to see you at a dinner meeting soon.

XXXX

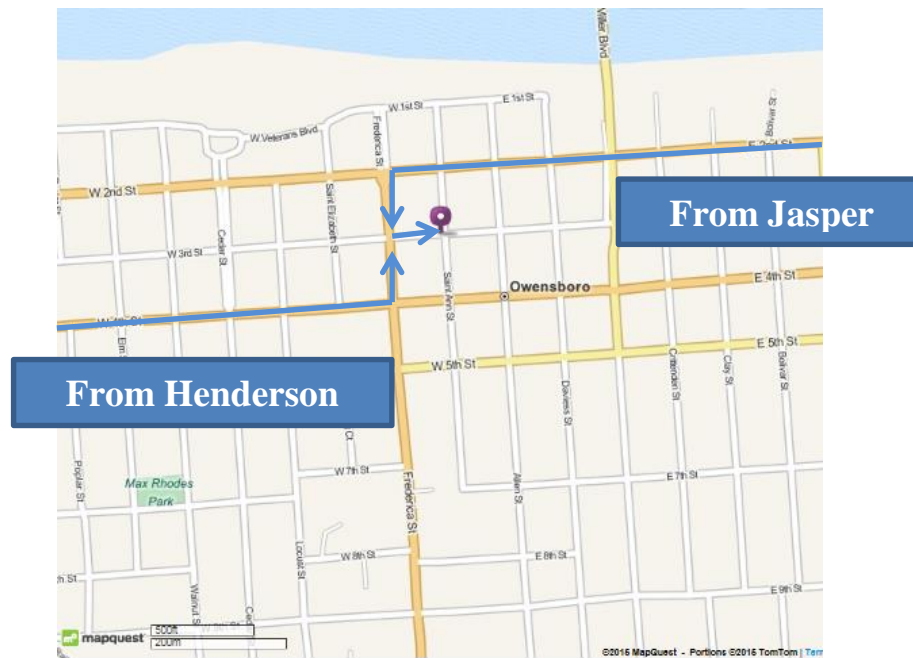
Directions to Colby's Fine Food & Spirits 202 W 3rd St, Owensboro, KY 42303

From I-69 and US 41 (about 40 minutes)

- Take US 41 south transferring to the Pennyryle Parkway for about 10 miles.
- Take exit 77 to Owensboro to US 60 (formerly the US 60 bypass) for about 23 miles.
- Take exit 24B to US 60 North for about 0.2 mile.
- Take a right on to Second Street in about 0.6 mile.
- Second Street splits into one way and becomes Fourth Street, take for about 2 miles.
- Take a left onto Frederica Street,
- Take the first right onto Third Street; 202 is on the right.

From I 64 and US 231 exit 57 (about 44 minutes)

- Take US 231 south for about 34 miles
- Stay straight ahead on Fourth Street (US 60 and 231 go left). Fourth splits into one way and becomes Second Street, take for about 1.2 miles.
- Turn left onto Frederica Street.
- Take the first left onto Third Street; 202 is on the right.



September 2015 Speaker Biography

Tom Watson is the Continuous Improvement Manager at Kimball Electronics, Inc. Jasper, Indiana facility. He is responsible for managing the Training Department and Lean Six Sigma Program. He has been with Kimball Electronics since 2010.

Tom will be presenting information on the FDA Operational Qualification he performed on the DEK Solder Paste Printer. The presentation will be in two parts:

Pre-Dinner

Tom will cover the FDA OQ plan, including the Cause and Effect diagram, which was used to identify the variables to be used in the Designed Experiments.

Post-Dinner Presentation

Tom will review the Fractional Factorial, Full Factorial, Response Optimizer Modeling and Confirmation Run that was used to get the ranges of critical input variables to optimize the solder paste volume.

Future Dinner Meetings

Date	Topic	Location	Presenter
10/13/2015	Rolled Throughput Yield in Healthcare Revenue Cycles	Angelos, Evansville, IN,	Barb Cash
11/10/2015	Dana Plant Tour,	Henderson, KY	Mike Young
12/8/2015	Your Problem Statement is the Problem	Riviera Grill, Newburgh, IN	Mike Mazu

Future Board Meetings

Location: The 2425 Building Board Room, 2425 U.S. Highway 41 North, Evansville, IN 47711
6 pm on the following dates: September 3, October 1, November 5, and December 3.

CERTIFICATION TEST SCHEDULE

Test Date: 10/3/2015 Application Date: past
Biomedical Auditor, HACCP Auditor, Manager of Quality, Quality Inspector, Quality Technician, Reliability Engineer, Six Sigma Blackbelt, Six Sigma Yellow Belt
Next Opportunity is 3/5/2016

Test Date: 12/5/2015 Application Date: 10/16/2015
Calibration Technician, Pharmaceutical GMP Professional, Quality Auditor, Quality Engineer, Quality Improvement Associate, Quality Process Analyst, Six Sigma Greenbelt, Software Quality Engineer

The dates above are for the local certification exams. Late applications have an extra \$50.00 charge. Exams are held at Ivy Tech Community College, Evansville, IN Room 259.

If you miss a test due to weather, notify the Examiner or National so that you can reschedule without losing the test fee.

Contact Cleat Smerchek at csmerchek@hansen-motor.com
for more information see <http://www.asq.org/certification/>



- We also now have a “members only” group page on LinkedIn. If you are a member of ASQ, you are eligible to join our group. Search for “ASQ Section 0915” on your LinkedIn page or access our group here.

➤ [ASQ Section 0915](#)

➤ [Now on Facebook](#)



- If you are a Facebook user, please search for “ASQ Section 0915” or go directly to our page by clicking the button above. “Like” our page and you’ll have another way to keep up with everything going on in Section 0915.

RE-CERTIFICATION:

Re-certifications may be sent to:

Michael Gross
2943 Meadowland Dr.,
Owensboro, KY 42303
Smoky1001@yahoo.com
FAX: 270 730 6730

Please submit at least three weeks prior to the recertification/test dates above.

If a recertification application was due on 7/31/2014, there is a six-month grace period. Send the information to Michael Gross **ASAP** in order to retain the certification without re-testing. Please send the information to Michael Gross ASAP to allow him time to review it and send the information to National. Any questions can be directed to the e-mail above.

MJM Associates
Michael J. Mazu, Principal Consultant

MJM Associates are consultants in process management. Michael J. Mazu has over forty six years experience with two Fortune 100 companies (BF Goodrich and Alcoa) in applying design of experiments, statistical process control, problem solving, six sigma and lean techniques, acceptance sampling concepts, gage and process capability, measurement assurance, process management, total quality management, quality improvement techniques and quality engineering in an industrial environment. His experience has involved over 150 manufacturing plants in the United States, Canada, Mexico, Brazil, Great Britain, France, Germany, Russia, Hungary, Australia and China.

The objectives of MJM Associates are:

- To provide concentrated consulting and training to help organizations manage their processes.
- To understand the needs of the client and custom design a consulting and training program to achieve their needs.

For more information, contact Michael Mazu at:
812-853-9443 (H) or 812-459-9303 (M)
pmazu@roadrunner.com
<http://sites.google.com/site/mjmassociatesinc/home>

SECTION 0915 PLACEMENT SERVICE

Job Seekers - if you would like to be placed on a confidential email distribution list to be notified of job opportunities made known to the ASQ Section 0915 Placement Chair, please contact Placement Chair:

David McGan, McGan Business Solutions,
53 Dorsey St., Corydon, KY 42406
dmcgan@mcgangroup.com
270-823-2831

For national job postings, see:
<http://www.asq.org/career/index.html>

Job Providers - if you have a job opening that you would like distributed to those on the ASQ Section 0915 Placement Distribution list, send a detailed description of the job, including location, and **appropriate contact information**, to:

dmcgan@mcgangroup.com
270-823-2831

Those interested in learning more about your opportunity may then contact you directly.

Advertise in the News On Quality

- ✓ Support Section 0915
- ✓ Reach hundreds of Quality Professionals each month

Size	Approx. Size	Cost per Year	Cost per Issue
Full Page	7.5" x 10"	\$320	\$45
Half Page	7.5" x 5"	\$210	\$35
Quarter Page	3.5" x 5"	\$110	\$25
Eighth Page	3.5" x 2.5"	\$60	\$15

The ad will also appear on Section 0915 web page

NOT GETTING THE EMAIL MEETING NOTICES?

Have you moved, changed jobs, or changed your email address? Help us keep you informed of Section events and information by updating your contact information at www.asq.org. Log in and click on Change Address to update your membership record

TO CHANGE YOUR ASQ EMAIL ADDRESS:

Sign on to <http://www.asq.org>

At the top of the page, click Log-In

Type in your membership number and ID. If you don't have an account setup, fill in your membership number in both the account number and password fields.

Click on My Account and then Email Preferences. Make sure the third line

ASQ Section Communication

has the first radio button lit up. If not, select the first button.



Evansville-Owensboro ASQ Section 915 2015 FALL (Aug.-Dec.) Workshops and Classes



Shown below is the education offerings with a brief description for the Fall 2015 (August-December) session. These details can be viewed at <http://www.psci.net/asq915/education.htm> . Please take the time to review this opportunity and if possible attend one of these training opportunities. Please pass this information onto others in your organization that you think may have an interest in these courses. If you don't see a course or topic that you have an interest in, please contact me and I will see what I can do for you.

Michael J. Mazu, Education Chair at pmazu@roadrunner.com or **812-459-9303**.

Fall, 2015 – Instructor Led Courses

Course	Total # Hours	Cost	Description
Certified Quality Technician (CQT) Re-view All Modules Starts Sept 5, 2015	16	\$200	This course is designed as a refresher course to help prepare individuals for ASQ's Certified Quality Technician (CQT) certification examination. This course will cover the CQT body of knowledge (BOK), the basis for the exam. The topics include: basic quality management concepts, basic statistics, statistical inference, control charts, sampling concepts, sampling plans, quality costs, quality auditing, geometric dimensioning and metrology and inspection techniques. The course is divided into eight modules. The text is a 230+ page manual developed by the instructor.
CQT Review Module 1 - Quality Management and Tools	4	\$50	Topics covered will include: quality principles, TQM, ISO 9000, Malcolm Baldrige award, continuous improvement, customers and suppliers, continuous improvement, 6 sigma, lean manufacturing, quality tools (problem solving and basic 7 tools), team building concepts, and basic statistics (location, variation and shape). Published questions taken from old exams will be reviewed and the correct answers will be provided.
CQT Review Module 2 - Statistical Tools	4	\$50	Topics covered will include: normal distribution, types of data, point estimates, confidence intervals, basic probability, hypothesis testing, types of hypothesis testing, risks of wrong decisions, central limit theorem, basic design of experiments and ANOVA. Published questions taken from old exams will be reviewed and the correct answers will be provided.
CQT Review Module 3 - Control Charts and Acceptance Sampling	4	\$50	Topics covered will include: concepts of control charts, control chart rules, types of control charts, interpreting control charts, rational subgroup sample size, different process conditions, process capability studies, process capability indices, sampling concepts, sampling plans, MIL-STD-105 sampling plans, MIL-STD-414 sampling plans and Dodge-Romig sampling plans. Published questions taken from old exams will be reviewed and the correct answers will be provided.
CQT Review Module 4 - Auditing, Inspection, Testing and Metrology	4	\$50	Topics covered will include: quality costs concepts, concepts of auditing, types of audits, conducting an audit, basic metrology, measurement systems, precision vs accuracy, measurement assurance, calibration systems, types of gages, gage capability studies, methods of analyzing gage capability studies, geometric dimensioning, blueprints, inspection and testing methods, inspector errors, and preventative and corrective action. Published questions taken from old exams will be reviewed and the correct answers will be provided.

Certified Quality Engineer (CQE) Review All Modules Starts Oct 10, 2015	32	\$400	This course is designed as a refresher course to help prepare the experienced quality engineer for ASQ's Certified Quality Engineer (CQE) certification examination. This course will review the CQE body of knowledge (BOK), the basis for the exam. Topics covered will include: basic probability, basic statistics, simple hypothesis testing, design of experiments and analysis of variance, regression analysis, control charts, process capability, acceptance sampling, basic reliability, quality auditing, quality costs, inspection and testing, metrology, and total quality management. After each major topic, published examination questions will be reviewed and explained. The course is divided into eight modules. The text is a 360+ page manual developed by the instructor.
CQE Review Module 1 - Basic Statistics	4	\$50	Topics covered will include: definition of probability, laws of probability, mutually exclusive events, independent events, conditional probability, permutations, combinations, probabilities for repeated trials, frequency distributions, measures of central tendency, measures of variability, measures of shape, types of data, coding data, normal distribution, binomial distribution and Poisson distribution. Published questions taken from old exams will be reviewed and the correct answers will be provided.
CQE Review Module 2 - Hypothesis Testing	4	\$50	Topics covered will include: point estimates, confidence intervals, statistical hypothesis, alpha and beta risks, tests for equality of variances, tests for equality of means, tests for dependent means, tests for proportions, contingency tables, central limit theorem, analysis of variance, types of designed experiments, completely randomized designs, randomized block designs, Latin square designs, factorial designs, fractional factorial designs, confounding, and fixed and random effects. Published questions taken from old exams will be reviewed and the correct answers will be provided.
CQE Review Module 3 - Advanced Statistics	4	\$50	Topics covered will include: simple linear regression, method of least squares, correlation coefficient, reliability concepts, measures of reliability, nature of failures, reliability failure functions, reliability models, reliability engineering techniques, hazard functions, maintainability, failure mode and effect analysis and basic time series. Published questions will be reviewed and the correct answers will be provided. Published questions taken from old exams will be reviewed and the correct answers will be provided.
CQE Review Module 4 - SPC	4	\$50	Topics covered will include: concepts of control charts, control chart out of control rules, types of control charts, rational subgroup sample size, process capability, capability indices (C_p , C_{pk} , P_p , P_{pk} , P_{pm}), pre control charts, short run SPC, estimating inherent variability and evaluating for capability. Published questions taken from old exams will be reviewed and the correct answers will be provided.
CQE Review Module 5 - Acceptance Sampling	4	\$50	Topics covered will include: sampling inspection, basic definitions associated with sampling, criteria for evaluating sampling plans, calculating probability of acceptance, classification of defects, effects of sample size and acceptance number, types of sampling plans, MIL-STD-105 sampling plans, MIL-STD-414 sampling plans, and Dodge-Romig sampling plans. Published questions taken from old exams will be reviewed and the correct answers will be provided.
CQE Review Module 6 - Total Quality Management	4	\$50	Topics covered will include: ANSI/ASQ Standard A3, TQM Department of Defense, Deming, Juran, Feigenbaum, Crosby, Ishikawa, Taguchi, ISO-9000, ISO-9001, MBNA Award, six sigma, DMAIC, defects per million opportunities, lean manufacturing, customers and suppliers, continuous improvement, team building concepts, training activities, design control, basic quality tools. Published questions taken from old exams will be reviewed and the correct answers will be provided.

CQE Review Module 7 - Quality Sys- tems	4	\$50	Topics covered will include: concepts of quality auditing, types of quality audits, general audit features, concepts of quality costs, quality cost categories, implementing a quality cost program, classical optimum cost model, Taguchi's optimum cost model and Taguchi's loss function. Published questions taken from old exams will be reviewed and the correct answers will be provided.
CQE Review Module 8 - Metrology and Inspec- tion	4	\$50	Topics covered will include: basic metrology concepts, measurement standards, error of measurement, measurement assurance, calibration systems, types of gages, gage capability, gage linearity, gage capability studies, inspection and test methods, quality characteristics, corrective action program and geometric dimensioning and tolerancing. Published questions taken from old exams will be reviewed and the correct answers will be provided.
Evaluating and Inter- preting Pro- cess Capa- bility Starts Dec 12, 2015	4	\$50	The objective of this interactive workshop is to provide the individual with a working knowledge of how to evaluate a process for capability and to determine the next steps for process improvement. Topics covered will include: steps in determining process capability, performing a potential study analysis, performing a short term study analysis, performing a long term study analysis, and interpreting the results of a capability study in order to improve the performance of the process. Individuals will also be shown how to use Minitab to calculate the capability of a process and the various capability indices.
Certified Quality Audi- tor (CQA) Review Starts Oct 12, 2015	21	\$250	The objective of this course is to help experienced auditors become better prepared for the ASQ Certified Quality Auditor (CQA) certification examination. Class discussion will include an overview of the exam process and a thorough review of the complete CQA body of knowledge (BOK), the basis for the exam. This will offer all participants a better understanding of the basic principles and applications that will appear on the examination.
Evaluating and Gage Process Ca- pability Starts Dec 5, 2015	4	\$50	The objective of this interactive workshop is to provide the individual with a working knowledge of how to evaluate the capability of a gage or measuring system. Topics covered will include: methods for analyzing gage capability studies, estimating accuracy, estimating repeatability and reproducibility, AIAG method, analyzing a potential study, analyzing a short term study, analyzing a long term study, and interpreting the results. Examples will be used throughout the session so that individuals can interactively participate in interpreting the results. The course will stress how to interpret the results in order to improve the measuring system. Individuals will also be shown how to use Minitab to calculate the capability of a gage and the various capability indices.

<p>Statistical Process Control (SPC)</p> <p>Starts Aug 8, 2015</p>	16	\$200	<p>The course will begin by discussing process control, the tools of statistical process control, the concepts of process variation and three common probability distributions (the normal, binomial and Poisson distributions).</p> <p>Next the course will discuss the concepts of control charts. Topics will include the basic concepts of control charts, types of control charts, planning for control charts, constructing specific types of control charts and interpreting out of control conditions. The out of control discussion will address the concept of non random patterns within the control limits and the Western Electric out of control rules.</p> <p>The course will also discuss the general concepts of capability studies, planning capability studies, methods for analyzing the results of capability studies and how to interpret and use the results of a capability study. Topics will include: Gage capability studies, process capability studies and using and interpreting capability indices (i.e., Cp, Cpk, Pp and Ppk).</p> <p>The course will concentrate on using and interpreting the various tools rather than learning and memorizing formulas. It is suggested that each individual have a basic understanding of basic statistics (i.e., averages, ranges, standard deviations, histograms, etc.) and know how to use a calculator or an electronic spreadsheet (i.e., EXCEL).</p> <p>The text is a 330+ page manual developed by the instructor and has over 100 problems.</p>
<p>Introduction To Process Management</p> <p>Starts TBA</p>	16	\$200	<p>The course will begin by discussing the concepts of process management, responsibilities of management, and a general deployment model. The course will concentrate on the significant phases of deployment. The first phase is to identify the customer and business requirements, the key performance indicators, the goals and objectives of the organization and the key processes.</p> <p>The second phase we measure the current performance of the process. In the third phase we analyze the current performance of the process to determine current control and capability of the process. In the fourth phase we develop and deploy process control in order to manage the process on an on-going basis.</p> <p>In the fifth phase we focus on improving the performance of the process. In the sixth phase is where the organization institutionalizes the process control activities to sustain the process in control and capable.</p> <p>A case study will be presented throughout the course to illustrate the various concepts and activities of process management. This course should be considered basic to immediate. A training manual with over 170 pages is included.</p>

Individual Self Paced Courses:

Course	Cost	Date and Time
Certified Quality Technician Review (all Modules)	\$75	At your convenience and all materials will be provided after paying the course fee.
Course Description	See the course description for the instructor led CQT course. Self paced courses provide the same materials but have no specific start and end dates – you do the work at a time convenient to you.	

Course	Cost	Date and Time
Certified Quality Engineer Review (all Modules)	\$150	At your convenience and all materials will be provided after paying the course fee.
Course Description	See the course description for the instructor led CQE course. Self paced courses provide the same materials but have no specific start and end dates – you do the work at a time convenient to you.	

Course	Cost	Date and Time
Statistics Review For ASQ Certification Exams	\$100	At your convenience and all materials will be provided after paying the course fee.
Course Description	See the course description for the instructor led Statistics Review For ASQ Certification Exams course. Self paced courses provide the same materials but have no specific start and end dates – you do the work at a time convenient to you.	

Course	Cost	Date and Time
Practical Problem Solving	\$50	At your convenience and all materials will be provided after paying the course fee.
Course Description	See the course description for the instructor led Practical problem Solving course. Self paced courses provide the same materials but have no specific start and end dates – you do the work at a time convenient to you.	

Course	Cost	Date and Time
Statistical Process Control	\$75	At your convenience and all materials will be provided after paying the course fee.
Course Description	See the course description for the instructor led SPC course. Self-paced courses provide the same materials but have no specific start and end dates – you do the work at a time convenient to you.	

Course	Cost	Date and Time
Introduction To Process Management NEW	\$75	At your convenience and all materials will be provided after paying the course fee.
Course Description	See the course description for the instructor led Introduction To Process Management course. Self-paced courses provide the same materials but have no specific start and end dates – you do the work at a time convenient to you.	

Note:

- (1) These courses are also available for on-site training (days or evenings). Our instructors will come to your company to train a group of 5 or more. We will customize the course to meet your needs and it will save you travel time. The courses will be provided at the above costs plus travel expenses for the instructor. Please contact M. J. Mazu for more details.
- (2) **The minimum number of individuals per Instructor Led course is 5.**
- (3) For the courses that have modules, you may sign up for all modules or you may sign up for 1 or more modules.

Questions about the upcoming courses or on-site training, please contact M. J. Mazu at pmazu@roadrunner.com or 812-459-9303.

Registration

Please check the course(s) for which you are registering (Course descriptions can be viewed at <http://www.psci.net/asq915/education.htm>).

For the courses that have modules, you may sign up for **all modules** or you may sign up for **1 or more modules**.

Please check the Instructor Led course(s) for which you are registering.

<input type="checkbox"/>	Statistical Process Control (SPC), \$200 , starts Saturday, August 8, 2015, 8am-12pm, finishes Saturday, August 29, 2015, 8am-12pm (4 Saturdays). The course text is instructor developed manual and handouts.
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<input type="checkbox"/>	Certified Quality Technician Review (all Modules), \$200 , starts Saturday, September 5, 2015, 8am-12 pm (4 Saturdays). The course text is instructor developed manual and handouts. (Note: CQT Exam is on Saturday, October 3, 2015).
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<input type="checkbox"/>	Certified Quality Technician Review Module 1 , \$50 , starts Saturday, September 5, 2015, 8am-12 pm (1 Saturday).
<input type="checkbox"/>	Certified Quality Technician Review Module 2 , \$50 , starts Saturday, September 12, 2015, 8am-12 pm (1 Saturday).
<input type="checkbox"/>	Certified Quality Technician Review Module 3 , \$50 , starts Saturday, September 19, 2015, 8am-12 pm (1 Saturday).
<input type="checkbox"/>	Certified Quality Technician Review Module 4 , \$50 , starts Saturday, September 26, 2015, 8am-12 pm (1 Saturday).

<input type="checkbox"/>	Certified Quality Engineer Review (all Modules), \$400 , starts Saturday, October 10, 2015, 8am-12 pm (8 Saturdays). The course text is instructor developed manual and handouts. (Note: CQE Exam is on Saturday, June 5, 2015).
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<input type="checkbox"/>	Certified Quality Engineer Review Module 1 , \$50 , starts Saturday, October 10, 2015, 8am-12 pm (1 Saturday).
<input type="checkbox"/>	Certified Quality Engineer Review Module 2 , \$50 , starts Saturday, October 17, 2015, 8am-12 pm (1 Saturday).
<input type="checkbox"/>	Certified Quality Engineer Review Module 3 , \$50 , starts Saturday, October 24, 2015, 8am-12 pm (1 Saturday).
<input type="checkbox"/>	Certified Quality Engineer Review Module 4 , \$50 , starts Saturday, October 31, 2015, 8am-12 pm (1 Saturday).
<input type="checkbox"/>	Certified Quality Engineer Review Module 5 , \$50 , starts Saturday, November 7, 2015, 8am-12 pm (1 Saturday).
<input type="checkbox"/>	Certified Quality Engineer Review Module 6 , \$50 , starts Saturday, November 14, 2015, 8am-12 pm (1 Saturday).
<input type="checkbox"/>	Certified Quality Engineer Review Module 7 , \$50 , starts Saturday, November 21, 2015, 8am-12 pm (1 Saturday).
<input type="checkbox"/>	Certified Quality Engineer Review Module 8 , \$50 , starts Saturday, November 28, 2015, 8am-12 pm (1 Saturday).

<input type="checkbox"/>	Certified Quality Auditor Review, \$250 , starts Monday, October 12, 2015, 6pm-9pm, (7 Mondays). The course text is the CQA Primer from Quality Council of Indiana (www.qualitycouncil.com). Each participant is responsible for purchasing their own primer. (Note: CQA Exam is on Saturday, June 5, 2015).
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<input type="checkbox"/>	Evaluating and Interpreting Gage Capability, \$50 , starts Saturday, December 5, 2015, 8am-12pm, finishes the same day. The course text is instructor developed manual and handouts.
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<input type="checkbox"/>	Evaluating and Interpreting Process Capability, \$50 , starts Saturday, December 12, 2015, 8am-12pm, finishes the same day. The course text is instructor developed manual and handouts.
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Please check the Individual Self Paced course(s) for which you are registering.

<input type="checkbox"/>	Certified Quality Technician (CQT) Review (all Modules), \$75 (with all materials)
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<input type="checkbox"/>	Certified Quality Engineer Review (CQE) (all Modules), \$150 (with all materials)
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<input type="checkbox"/>	Statistics Review For ASQ Certification Exams Review (all Modules), \$100 (with all materials)
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<input type="checkbox"/>	Practical Problem Solving (all Modules), \$50 (with all materials)
<input type="checkbox"/>	Statistical Process Control (SPC), \$75 (with all materials)
<input type="checkbox"/>	Introduction To Process Management, \$75 (with all materials)

Name: _____ ASQ Member # (if a member): _____
 Company: _____ Home Phone: _____
 Mailing Address: _____ Business Phone: _____
 City/State/Zip: _____ Email: _____
 Do you have any special requirements of which we should be aware? _____

Make Checks Payable to Evansville-Owensboro ASQ Section 915
 Send the completed registration form and payment to M. J. Mazu, 5311 Woodridge Dr, Newburgh, IN 47630

- Course Cancellation Policy:
1. Substitutions can be made at any time.
 2. Cancellations can be made up to the published registration deadline with no penalty. Registrants who fail to attend will be liable for the entire course fee.
 3. The Evansville-Owensboro section reserves the right to cancel any course prior to the start of the course for any reason with full refund.
 4. The minimum number is five (5) registrants for an advertised course. **The cutoff date for registration is one (1) week prior to the course start date.** Registrants will be notified prior to the first class if the minimum attendee requirement has not been reached.

All courses will meet at (unless noted differently): 2425 Building (Room 500 Conference Room) Corner of Hwy 41N and Diamond Ave Evansville, IN	All Courses available to ASQ members and non-members Questions about the courses please contact M. J. Mazu at pmazu@roadrunner.com or 812-459-9303
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ASK MIKE

The purpose of this column is to help local ASQ members better understand the Society, the local section, the philosophy of total quality management and the tools of quality by allowing section members to send or give questions to Mike. You can contact Mike by calling (812)-459-9303 or writing to 5311 Woodridge Dr., Newburgh, IN 47630 or Email to pmazu@roadrunner.com.

Q. I have been taking an on-line statistics course and I am confused between the standard deviation and the standard error of the mean. What is the difference if there is a difference?

It is easy to be confused about the difference between the standard deviation (SD) and the standard error of the mean (SEM). The standard deviation (SD) provides an indication of how far the individual responses deviate from the mean. SD tells you how spread out the responses are -- are they concentrated around the mean, or scattered far and wide? SD generally does not indicate "right or wrong" or "better or worse" -- a lower SD is not necessarily more desirable. It is used purely as a descriptive statistic. It describes the distribution in relation to the mean. SD gives one a sense of how much variability there is in the individual values that make up one single sample.

The standard error of the mean (SEM) gives one a sense of how much variability there is in the means of small samples of size n of the larger population. SEM is the standard deviation of the sampling distribution of the mean.

The standard error of the mean refers to the standard deviation of the sampling distribution of the sample mean. This distribution represents all possible sample means that could be computed from samples selected according to a specified sample size and sampling design. The standard error of the mean quantifies how much variation is

expected to be present in the sample means that would be computed from each and every possible sample, of a given size, taken from the population.

The formula for the standard error of the mean is:

$$\sigma_{SEM} = \frac{\sigma}{\sqrt{n}}$$

where σ is the standard deviation of the original distribution and n is the sample size (the number of observations each mean is based upon).

As an example, assume that you measured the height of a population of 1000 people. The SD is 3.0 cm. This tells you how much individual variability there is among individuals. Now, imagine you measured the average height of ten random people. Then, imagine you measured the height of another ten random people. These mean heights would be different. How different they were would be a function of both the SD (i.e. how much individual variability there is), *and* the sample size - as you choose larger and larger groups of people, the means will deviate less. For this example, the SEM is 0.95 cm ($3.0/\sqrt{10}$). This represents how much variability there is among the 100 means.

Here are the key differences:

- The SD quantifies scatter in the data - how much the individual values vary from one another.
- The SEM quantifies how precisely you know the true mean of the population. It takes into account both the value of the SD and the sample size.
- Both SD and SEM are in the same units -- the units of the data.
- The SEM, by definition, is always smaller than the SD.
- The SEM gets smaller as your samples get larger. This makes sense, because the mean of a large sample is likely to be closer to the true population mean than is the mean of a small sample. With a huge sample, you'll know the value of the mean with a lot of precision even if the data are very scattered.
- The SD does not change predictably as you acquire more data. The SD you compute from a sample is the best possible estimate of the SD of the overall population. As you collect more data, you'll assess the SD of the population with more precision. But you can't predict whether the SD from a larger sample will be bigger or smaller than the SD from a small sample. (This is not strictly true. It is the variance -- the SD squared -- that doesn't change predictably, but the change in SD is trivial and much smaller than the change in the SEM.)

The standard deviation (SD) represents variation in the values of a variable, whereas the standard error of the mean (SEM) represents the spread that the mean of a sample of the values would have if you kept taking samples. So the SEM gives you an idea of the accuracy of the mean, and the SD gives you an idea of the variability of single observations.



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