



## WELCOME

The ASQ Reliability Division is the largest group in the world promoting reliability training and education. This newsletter covers professional development opportunities, plus division activities, information and news.

## Chair's Note

## In this edition



### Trevor Craney

Chair, Reliability Division of ASQ  
[chair@asqrd.org](mailto:chair@asqrd.org)

As we come to the end of 2014, my first statement is Happy Holidays to all my fellow ASQ Reliability division members. I am very happy at all the division has accomplished this year. We participated as sponsors of two conferences: RAMS and ASTR. We held three training courses this year. Our webinar program

continued to flourish, having completed more than one per month again this year. For RD members, you now can also earn RU certificates at [www.ASQRD.org](http://www.ASQRD.org) for viewing archived webinars, and the website will track and maintain your webinar training history for you, too. Our budget is as close to on par as we can make it, and looking in very good shape.

Our regional councilors program continues to become more active. We now have numerous engagements planned on the calendars of ASQ sections' programs for the fall of 2014 and spring of 2015. We are getting the word out to ASQ members about the reliability profession and how the ASQ Reliability Division is working to deliver the needs of its members. If you are also involved in your local ASQ section, and would like more information, please contact either me ([chair@asqrd.org](mailto:chair@asqrd.org)) or Dan Burrows ([dcb@panduit.com](mailto:dcb@panduit.com)).

We have a lot of activities planned for you in 2015. We will still sponsor RAMS and ASTR, and we will also be technical sponsors for ARS (in each of Amsterdam and Tucson) and FTC. We are offering numerous training activities, including a week of reliability training in Orlando over the summer (for which details will be available at RAMS in January). Our regional councilors continue to get the word out about reliability and the division, and our leadership team is continuing to innovate to try to bring you value for your membership. I am very proud of all of our sponsors for the volunteer hours they give and I will be recognizing them on LinkedIn.

The RD is engaged in a lot of activities. Get involved. It's a great way to help out the reliability community, network with other R&M professionals, and progress into opportunities for leadership positions of an organization of over 2500 individuals. We have numerous activities and we can add more as ideas are identified and volunteers step forward. If you have an idea or would like to discuss opportunities in the division, please send an email to: [chair@asqrd.org](mailto:chair@asqrd.org) and we can start the conversation. There is always an opportunity to present a webinar or become a host for webinars or help out with website updates or other learning opportunities. I am enjoying this opportunity to serve as your Chair of the ASQ Reliability Division and I'm looking forward to an exciting and active 2015!

This is all in line with ASQ's goal of Creating Member Value (see page 6).

Trevor Craney

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## Division Budget Update

### ASQ-RD Treasurer's Report

John Bowles, ASQ-RD Treasurer

The Division continues to have a strong balance sheet with over \$60,200 in its checking and ASQ Investment Program accounts at the end of September 2014. Investments in ASQ's Reserve Fund were slightly more than \$97,700. There are also \$3,500 advances on the balance sheet for the ASTR seed money and for the RAMS 2015 seed money. Income from all sources for the 9 months ended September 30<sup>th</sup> was \$59,083 and expenses totaled \$47,189; membership revenue for the 9 months was \$18,594.

ASQ, like most businesses, uses "accrual" accounting, where income and expenses are "booked" at the time the funds are committed rather than when a deposit is made or a check is written. The Reliability Division uses "cash" accounting for tracking revenues and expenses and managing the budget. This means that income and expenditures are recorded at the time the funds are received or a check is written. This is the type of accounting most people and households use for their personal accounts. This difference in accounting methods accounts for some of the differences in the revenues and expenditures reported above and those used to track adherence to the budget discussed below. It also gives rise to some "budget anomalies", such as when revenues and expenses for a conference or course are budgeted for one year and received or spent in a different year.

The figure at right shows our 2014 budget, and revenue and expenses for the nine months ended September 30, 2014. A comparison with the first nine months of 2013 is also shown. On the revenue side member dues are somewhat less than at this time last year's and registrations are both higher than anticipated and almost double what they were at this time last year. Several changes this year account for most of the difference: the surplus (or profit) , \$8,070, from the 2013 ASTR conference was not received until February 2014 and is counted in the first quarter 2014 instead of the fourth quarter 2013; we added pre- and post-conference courses taught in conjunction with RAMS and also a reliability course during the summer with the Connecticut Section; these yielded \$12,169; and RAMS itself returned a surplus of \$9,571. We've also had 17 new members join our website as of December 1<sup>st</sup>.

Expenses are also running ahead of 2013. Contract and Professional services reflect the development of our new website which is now up and running; Partner Payments, as noted above, consists of the seed money for ASTR as well as for RAMS. Some of the payments to the winners of the 2013 RAMS Best Paper by an RD member and the best *Quality Engineering* paper for 2013 were not made until 2014. Travel is also running ahead of last year due to greater attendance at the various leadership meetings and instructor travel to various courses. We also reduced our webinar and on-line meeting expenses by increasing the number of partners for our shared Go-To-Meeting/Go-To-Webinar service from four to six members; however the budget entries for paying for the service, receiving reimbursements from our partners, and then returning part of that reimbursement as we increased the number of partners resulted in some confusing entries in the summary budget in the 6100 (Telephone, where webinar expenses are categorized and 6200 (Partner Payments) categories.

In summary, the division finances are in excellent shape. We are able to meet most of our expenses from the cash flow from revenues; we've reduced some expenses; and we have been able to manage several new initiatives such as building and operating our new website and introducing several new reliability courses.

## Division Budget Update (continued)

[illegible]



## SOFTWARE, EDUCATION AND CONSULTING TO EMPOWER THE RELIABILITY PROFESSIONAL

ReliaSoft Corporation is the global leader in reliability engineering software, training and services that combine the latest theoretical advances with essential tools for the practitioner in the field. We are dedicated to meeting the reliability, quality and maintenance planning needs of product manufacturers and equipment operators worldwide.



TOOLS TO EMPOWER  
THE RELIABILITY PROFESSIONAL

### SOFTWARE

Acclaimed for their ease of use, analytical power and unparalleled technical support, ReliaSoft's software facilitates a comprehensive set of reliability-related analysis techniques. The **Synthesis Platform®** facilitates intelligent integration between analysis tools.



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Life data analysis



**ALTA**

Accelerated life testing data analysis



**DOE++**

Experiment design and analysis



**RGA**

Reliability growth analysis



**BLOCKSIM**

System analysis using block diagrams or fault trees



**RENO**

Visual stochastic event simulation and risk analysis



**λ PREDICT**

Standards based reliability prediction



**XFMEA**

FMEA/FMECA and related analyses



**RCM++**

Reliability centered maintenance analysis



**RBI**

Risk based inspection analysis



**MPC**

MSG-3 aircraft systems and powerplant analysis



**XFRACAS**

Web-based FRACA/FRACAS and related activities



**Orion eAPI**

Web-based asset performance management



**ENTERPRISE PORTAL**

Web-based Synthesis Portal



**SYNTHESIS API**

Application Programming Interfaces (APIs)

THE  
**SYNTHESIS**  
PLATFORM

INTEGRATION TO EMPOWER THE RELIABILITY ORGANIZATION



EDUCATION TO EMPOWER  
THE RELIABILITY PROFESSIONAL

### EDUCATION

ReliaSoft offers an extensive curriculum of reliability training courses that provide thorough coverage of the underlying principles and theory as well as the applicable software. The complete course list and calendar of upcoming public seminars are published on the web.



CONSULTING TO EMPOWER  
THE RELIABILITY PROFESSIONAL

### CONSULTING

ReliaSoft's expert reliability consulting services team offers a uniquely powerful combination of industry insight, unparalleled subject mastery and, most important of all, direct access to all of ReliaSoft's global resources, expertise and contacts.

[www.ReliaSoft.com](http://www.ReliaSoft.com)



## EDUCATION TO EMPOWER THE RELIABILITY PROFESSIONAL

*MASTER THE SUBJECT, MASTER THE TOOLS™*

### Two Focused Tracks

To address the growing needs and diversity of our attendees, we have expanded, restructured and reconfigured ReliaSoft's training course offerings. Courses are now divided into two main tracks, one maintaining our traditional focus on reliability in product development and the other focusing on reliability engineering from an asset management perspective.



### For Beginners, Experienced Practitioners and Management

The unique blend of theory, practical examples and software application will greatly enhance the knowledge and skill set of new and practicing engineers alike. Many of the available courses can also be instrumental for management personnel who wish to understand the tenets and tools of the discipline.

### Public or Onsite

ReliaSoft's training courses are offered as public seminars scheduled throughout the year in a variety of locations worldwide, and our expert instructors are also available to present the training at a time and location that meets your organization's specific needs.

### New State-of-the-Art Reliability Training Center - RTC

ReliaSoft is proud to announce the opening of our Reliability Training Center, located at our corporate headquarters in Tucson, Arizona. This brand new facility uses state-of-the-art technology to provide an enhanced experience for you. Come see what the cutting edge of reliability education looks like with our great selection of seminars!



### Course List

|                                                                               |                                                                                                   |
|-------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|
| <b>G300</b> Introduction to Probability and Statistics                        | <b>D490</b> Standards Based Reliability Prediction                                                |
| <b>D301</b> Introduction to Reliability 3.0 (DFR Focus)                       | <b>G511</b> Application of Reliability Growth Models in Developmental Testing and Fielded Systems |
| <b>M301</b> Introduction to Reliability 3.0 (APM Focus)                       | <b>D521</b> Advanced Quantitative Accelerated Life Testing Analysis                               |
| <b>G400</b> Foundations of Reliability Engineering Data Analysis and Modeling | <b>G522A</b> System Reliability and Maintainability Analysis and Optimization                     |
| <b>M440</b> Reliability and Maintainability Analysis for Repairable Systems   | <b>G522B</b> Simulation Modeling for Reliability and Risk Analysis                                |
| <b>D470A</b> Foundations of Effective FMEAs                                   | <b>D560</b> Design for Reliability (DFR) Program Planning and Implementation                      |
| <b>D470B</b> FMEA Facilitation and Application Skills                         | <b>M560</b> Reliability-Based Program Planning and Implementation in Asset Management             |
| <b>G475</b> FRACAS Principles and Applications                                | <b>G588</b> Applications of Experiment Design and Analysis in Reliability Engineering             |
| <b>M480A</b> RCM Principles and Applications                                  | <b>G902</b> Introduction to the Synthesis API                                                     |
| <b>M480B</b> RCM Facilitation and Application Skills                          |                                                                                                   |
| <b>M485</b> RBI Overview and Application                                      |                                                                                                   |

For more information, please visit: <http://Seminars.Reliasoft.com>

**ReliaSoft®**



The Global Voice of Quality™

## A Message From Community Development

At the November 2014 ASQ Board of Directors meeting, the decision to increase member dues by \$13--just over \$1-per-month--for new members as of January 1, 2015, and beginning July 1, 2015, for renewing members was approved. The increase allows ASQ to make a significant investment into member value, and more specifically, to improve ASQ's aging technology infrastructure, including the ASQ website and the ease of accessing ASQ's Body of Knowledge (BoK). In listening to the voices of your fellow members, the board determined that a significant upgrade was necessary, and therefore, a more modest increase would not have sufficed.

In an effort to help member units share the Society's enhanced focus on increasing member value, we have put together this short message that can be shared on your websites and in your newsletters and emails.

### **Increasing Member Value**

At its November 2014 meeting, the ASQ Board of Directors affirmed that investing in and improving member value is and will continue to be its top priority. The Board approved plans to significantly enhance the ASQ website performance and capabilities through a new content management platform. The planned 2015 platform deployment and continued work on search engine optimization will deliver easier, more rapid access to content and the Quality Body of Knowledge (QBoK®). The ASQ website and the member experience will also be improved in the next year through planned implementation of a new e-commerce platform and system, enabling a single shopping cart for online purchases and easier management of member renewal and dues payment options, among a host of enhanced services. These important improvements are part of multiple projects being implemented over the next 12 – 24 months.

These value enhancements will not only benefit your individual experience, but they will help member units attract and engage new and diverse audiences to our Society, including young professionals. As the Global Voice of Quality, ASQ is committed to improving the experience it offers its members around the world.



The 61st Annual Reliability & Maintainability Symposium

**Attend RAMS® 2015:**

## **Unleash the Power of R&M Knowledge and Advance the R&M Industry**

January 26-29, 2015  
At the Innisbrook Golf & Spa Resort  
Palm Harbor, Florida, USA

### **5 Reasons to Attend:**

1. Gain new insights into creating more efficient and effective reliability programs
2. Take actionable knowledge back to your organization
3. Make valuable contacts by networking with industry leaders and professionals
4. Gain new skills, CEUs and certifications that can advance your career
5. Extend your stay and enjoy a fabulous family vacation on the sunny coast of Florida, close to dozens of attractions

RAMS® is the leading global symposium for Reliability, Availability and Maintainability engineering professionals. Unleashing R&M Knowledge through the rich exchange of information at RAMS® 2015 will empower you to deliver and sustain efficient and effective reliability and maintainability programs.

- Tutorials basic to advanced
- Technical paper sessions
- Panel sessions
- Exhibits program
- Certificate program
- Networking opportunities



*Register at [rams.org](http://rams.org)*

# **UNLEASHING R & M KNOWLEDGE**



#### **SPONSORED BY:**





# International Applied Reliability Symposium

## International Applied Reliability Symposium (ARS)

April 21-23, 2015 - Amsterdam, Netherlands

June 2-4, 2015 - Tucson, AZ

**“Sharing applications, success stories and lessons learned in reliability and maintainability engineering”**

<http://www.arsymposium.org/northamerica/index.htm>

**CRE exams on location on April 20 & June 1**

**We invite presentations on the following topics:**

- \* Reliability Programs
- \* Design for Reliability (DFR)
- \* Life cycle cost analysis
- \* Experiment design and analysis
- \* Return on reliability investment
- \* Warranty data analysis
- \* And many more... <http://www.arsymposium.org/northamerica/topics.htm>

Find a sample proposal and the proposal submission form at :

<http://www.arsymposium.org/presenters/index.htm>.

Submit proposals via e-mail :

[Present@ARSymposium.org](mailto:Present@ARSymposium.org).

**2015 North American  
ARS, June 2-4, 2015**

Where?

[Loews Ventana  
Canyon Resort](#)

7000 North Resort Dr  
Tucson, AZ 85750

**ARS Hotlinks:**

[Submit Papers](#)

[Register Now](#)

[Archive of Past Presentations](#)



**Reliability  
Division**

With a choice of presentations and expert tutorials from experienced professionals representing a variety of perspectives, the ARS is yours to configure to meet your own interests and needs! This is a great opportunity to network with experts from around the globe, explore the industry's most exciting topics and connect with friends old and new.

**SEE YOU THERE!!**



# STATISTICS AND QUALITY: SOLVING PROBLEMS TODAY AND TOMORROW

59TH ANNUAL FALL TECHNICAL CONFERENCE | OCTOBER 8 – 9, 2015 | HOUSTON, TX

## Fall technical Conference—Houston TX Oct 8-9, 2015



### Call for Papers for 59th Annual Fall Technical Conference

We invite you to submit papers for presentation to the 59th Fall Technical Conference to be held in October 8-9, 2015, in Houston, TX. The Fall Technical Conference has long been a forum for both statistics and quality and is co-sponsored by the American Society for Quality and the American Statistical Association. The goal of this conference is to engage researchers and practitioners in a dialogue that leads to more effective use of statistics to improve quality and foster innovation.

If you are interested in presenting an applied or expository paper in any of three parallel sessions (Statistics, Quality Control, or Tutorial/Case Studies), contact Marc Banghart at [marc@asqrd.org](mailto:marc@asqrd.org). The abstract submission deadline is February 28, 2015.

Work should be strongly justified by application to a problem in engineering, manufacturing, big data, process/chemical industry, physical sciences, or a service industry. The mathematical level of the papers may range from basic to that of the *Journal of Quality Technology* or *Technometrics*. Please note which level of audience is targeted (Introductory, Intermediate, or Advanced) so the committee can assign papers appropriately and plan a balanced program. The program committee also welcomes any suggestions for special session topics or speakers.

## **ASQRD.ORG — Providing Member Benefit**

- Wealth of Reliability Education and technical content right at your fingertips!
  - Free of charge for ASQ Reliability Division Members
  - Available at a nominal yearly fee for non-members
- Earn Recertification Units (RUs) directly online!
- Content includes:
  - English, Chinese and Spanish Webinars
  - Short courses on topics such as FMEA, Fundamentals of Reliability Engineering and understanding reliability from a Quality Engineering perspective
  - RAMS Past Proceedings (2003-present)
  - Reliability Review Journal (2006 – 2010)
  - Newsletters
- Visit us today at [ASQRD.org](http://ASQRD.org)!

| Benefits                                                           | ASQ Reliability Division | ASQRD.org |
|--------------------------------------------------------------------|--------------------------|-----------|
| Cost                                                               | \$159                    | \$20      |
| ASQ membership                                                     | ✓                        |           |
| Discount on CRE exam                                               | ✓                        |           |
| Eligible to hold position of ASQ-RD elected officer                | ✓                        |           |
| Eligible to hold position of ASQ-RD appointed (DMC or RC) position | ✓                        |           |
| Eligible to hold position of ASQ-RD appointed position             | ✓                        | ✓         |
| ASQRD.org Members Only access                                      | ✓                        | ✓         |
| Discounts for ASQ-RD sponsored conferences & training events       | ✓                        | ✓         |
| Eligible for ASQ-RD annual best paper awards (RAMS & QE)           | ✓                        | ✓         |

# Webinars for your future

Field leaders in reliability offer continuing education to further your global awareness.



Now available in English, Spanish,  
and Chinese translations.

## English webinars:

1. *Counterfeit Electronics*, January 8, 2015, Noon (EST)  
Presenter: **Diganta Das**
2. *Conducting Effective Supplier Assessments*, January 15, 2015, 0900 US Pacific Coast time  
Presenter: **R. Dan Reid**
3. *Chi-Squared Accelerated Reliability Growth (CARG) Testing: Method & Applications*, February 12, 2015, 0900 US Pacific Coast time  
Presenter: **Alec Feinberg**
4. *Finding Causes that Checklists Don't Find*, March 12, 2015, 0900 US Pacific Coast time  
Presenter: **Jack Hipple**
5. *Effective Reliability Test Plan Development*, April 9, 2015, 0900 US Pacific Coast time  
Presenter: **Cheryl Tulkoff**

## Chinese webinars:

1. *Decision Diagrams and their Applications in System Reliability Analysis* (决策图及其在系统可靠性分析中的应用)  
January 11, 2015, 10:00 AM Beijing Time  
Presenter: **Liudong Xing**

## Spanish Webinars:

1. *Determining the Experimental Sample Size*, February 12, 2015, 0900 US Pacific Coast Time  
Presenter: **Jorge Romeu**

## Webinar Outreach

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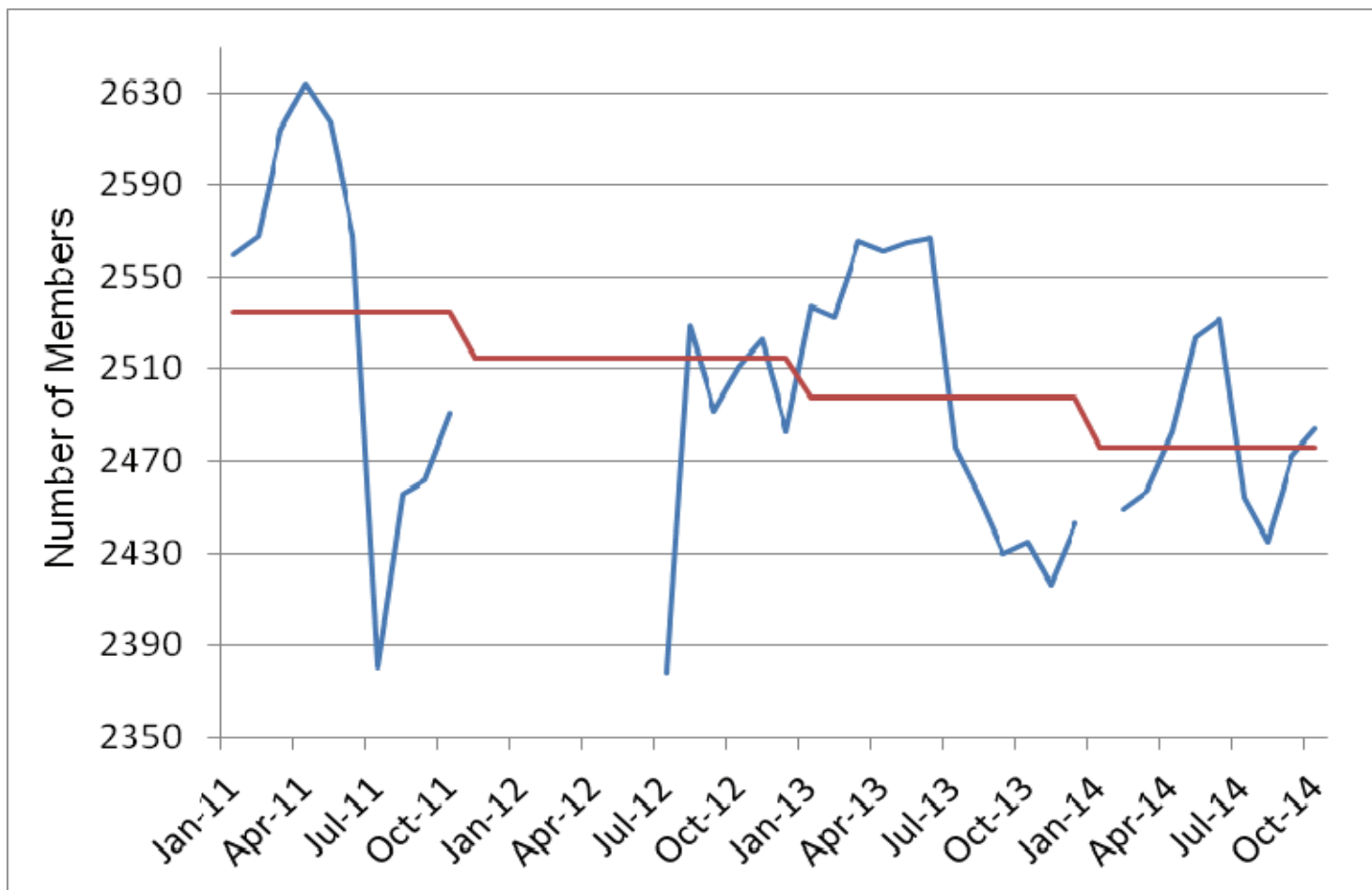
### ASQ- Reliability Division Webinar Series

- Held monthly (live), registration at ASQRD.org
- 122 webinars or 10,806 hours of instruction archived for members!
- Video and Presentation slides available.
- Earn Recertification Units (RUs) automatically by watching webinars (RU's for 5853 people given to date).

For previously recorded webinars on topics relevant to reliability engineers delivered by subject matter experts. Visit : <http://www.asqrd.org/past-webinars>



### ASQ-RD Membership trends since 2011



### CRE Exam Information

#### Current CRE statistics:

There are currently >3000 people holding CRE certification, For calendar year 2013 there were 393 newly certified CRE's.

Local ASQ Sections and international organizations host exams all over the world. You will be asked to designate a preferred examination site on your application. If you are not a member of ASQ, please [find the Section that is closest to your location](#). If you live in a country other than the United States, Canada or Mexico, international certification affiliates administer certification exams. [Find an international certification exam location](#). ASQ will make every effort to accommodate your request. ASQ offers some [translated certification exams](#).

#### Volunteer Opportunities for CRE Exam Review:

As a workshop participant for the CRE exam you will assist the team in preparing the next CRE exam and you will receive 2 RUs towards recertification. Some pre-work is required and participants must sign a nondisclosure agreement which limits CRE exam preparation training for a period of two years. ASQ refunds travel expenses for the workshop.

#### When is the next Reliability Certification exam?

The ASQ certification exam dates  
(by type of certification) is at :

<http://prdweb.asq.org/certification/control/dates>

## Other Information

### LINKS

#### ASQ-RD new website:

<http://www.asqrd.org/>

For up to the minute news and reminders of what's going on in the Reliability Division world.

#### The LinkedIn groups Reliability Calendar

<http://www.linkedin.com/e/-mpj7v-gq000w4o-54/vgh/3997941/>

#### Tech Briefs

<http://www.linkedin.com/groups?about=&gid=3994573>

#### ASQ Reliability Division(1500+ members on LinkedIn)

<http://www.linkedin.com/groups?about=&gid=1875217>

### Upcoming Events

Click on Reliability Calendar for a current calendar:

<http://www.asqrd.org/>

1. **RAMS** url: [www.rams.org](http://www.rams.org) (page 7)
2. **ARS** url: <http://www.arsymposium.org/northamerica/topics.htm> (page 8)
3. **Fall technical Conference (FTC)**: url: <http://asq.org/conferences/fall-technical/>

## ASQ Learning Institute™ Spring Training

The ASQ Learning Institute™ provides you with career enhancing training to help you make an impact in your career and your organization. Take advantage of member pricing, and register for one of these upcoming courses. To register, [click here](#) or call **800-248-1946** and provide promo code **MFGEM**.

### Onsite Training

Customize ASQ learning to meet your organization's unique needs and eliminate travel expenses with [on-site training](#).

### Courses

[Certified Quality Engineer Certification Preparation](#)

[Failure Modes and Effects Analysis -- Design](#)

[Failure Modes and Effects Analysis -- Process](#)

[Lean Six Sigma Black Belt Training](#)

[Lean Six Sigma Green Belt Training](#)

[2014 Learning Institute Training Catalog](#)

### International Courses

[See ASQ courses offered outside of the United States and Canada.](#)

**Are you interested in volunteering?** Would you like to develop your leadership and team work skills, in a team where you can make a difference?

ASQ Reliability Division leadership team is looking for a **secretarial co-chair and treasurer co-chair**

Responsibilities include documentation and communication within the division, with the members and with ASQ Global. You will find the requirements for the position in this document

<http://asq.org/member-leader-community/positions/division-secretary/details/index.html>

<http://asq.org/member-leader-community/positions/division-treasurer/details/index.html>

If you are interested, please send your details to [chair@asqrd.org](mailto:chair@asqrd.org).

## Final Excerpt from “A History of Reliability” by Jim McLinn

The Challenger disaster in 1987 caused people to stop and re-evaluate how they estimate risk. This single event spawned a reassessment of probabilistic methods. Pacemakers and implantable infusion devices became common and biomedical companies were quick to adopt the high reliability processes that had been developed by the military. The Air Force issued the R&M 2000 which was aimed at making R&M tasks normal business practice [26]. David Taylor Research Center in Carderock Maryland commissioned a handbook of reliability prediction procedures for mechanical equipment to Eagle Technology in 1988 [30]. This was typically called the Carderock Handbook and was issued by the Navy in 1992 as NSWC 92/L01[31]. Altogether, the 1980s demonstrated progress in reliability across a number of fronts from military to automotive and telecommunications to biomedical. RADC published their first Reliability Tool Kit and later updated this in the 1990s for COTS applications. The great quality improvement driven by competition from the Far East had resulted in much better components by decade end.

By the 1990s, the pace of IC development was picking up. New companies built more specialized circuits and Gallium Arsenide emerged as a rival to silicon in some applications. Wider use of stand alone microcomputers was common and the PC market helped keep IC densities following Moore's Law and doubling about every 18 months. It quickly became clear that high volume commercial components often exceeded the quality and reliability of the small batch specially screened military versions. Early in the decade, the move toward Commercial Off the Shelf (COTS) components gained momentum. With the end of the cold war, the military reliability changed quickly. Military Handbook 217 ended in 1991 at revision F2. New research developed failure rate models based upon intrinsic defects that replaced some of the complexity-driven failure rates that dominated from the 1960s through the 1980s. This effort was led by RAC (the new name for RADC) and resulted in PRISM, a new approach to predictions. Reliability growth was recognized for components in this document. Many of the military specifications became obsolete and best commercial practices were often adopted. The rise of the internet created a variety of new challenges for reliability. Network availability goals became “five 9s or 5 minutes annually” to describe the expected performance in telecommunications. The decade demanded new approaches and two were initiated by the military. Sematech issued Guidelines for Equipment Reliability in 1992 [34]. The SAE issued a handbook on the reliability of manufacturing equipment in 1993 [32]. This was followed in 1994 by the SAE G-11 committee issuing a reliability journal [35]. Richard Sadlon, at RAC, produced a mechanical application handbook the same year [33]. The Army started the Electronic Equipment Physics of Failure Project and engaged the University of Maryland CALCE center, under Dr. Michael Pecht, as part of the process. The Air Force initiated a tri-service program that was cancelled later in the decade. On the software side, the Capability Maturity Model (CMM) was generated. Companies at the highest levels of the model were thought to have the fewest residual faults [14]. RAC issued a six set Blueprint for Establishing Effective Reliability Programs in 1996 [35]. The internet showed that one single software model would not work across the wide range of worldwide applications, which now includes wireless. New approaches were required such as software mirroring, rolling upgrades, hot swapping, self-healing and architecture changes [15]. New reliability training opportunities and books became available to the practitioners. ASQ made a major update to its professional certification exam to keep pace with the changes evident. ISO 9000 added reliability measures as part of the design and development portion of the certification. Nonparametric maximum likelihood failure rate estimates and forecasts based upon shipments and returns were developed for renewal processes in 1999.

The turn of the century brought Y2K issues for software. The expansion of the world-wide-web created new challenges of security and trust. Web-based information systems became common, but were found not to be secure from hacking. Thus, the expanded use of the web to store and move information could be problematic. The older problem of too little reliability information available had now been replaced by too much information of questionable value. Consumer reliability problems could now have data and be discussed online in real time. Discussion boards became the way to get questions answered or find resources. Training began the move toward webinars, rather than face-to-face classes. Insurance, banking, job hunting, newspapers, music, baseball games and magazines all went online and could be monitored in real time or downloaded. New technologies such as micro-electro mechanical systems (MEMS), hand-held GPS, and hand-held devices that combined cell phones and computers all represent challenges to maintain reliability. Product development time continued to shorten through this decade and what had been done in three years was now typically accomplished in 18 months. This meant reliability tools and tasks must be more closely tied to the development process itself. Consumers have become more aware of reliability failures and the cost to them. One cell phone developed a bad reputation (and production soon ceased) when it logged a 14% first year failure rate. In many ways, reliability became part of everyday life and consumer expectations. RAMS and other reliability related conferences became sources for learning and training of the next generation. The Reliability Analysis Center became Reliability Information Analysis Center (RIAC) and expanded its mission to continue research and publication of reliability topics, tools and techniques.

## Final Excerpt from “A History of Reliability” by Jim McLinn(continued)

By decades end, most conferences had moved to proceedings and tutorials on digital CD. No more collection of thick books. Hand held semiconductor memory devices were in wide use and had replaced rotating memories in some applications. This transition was smooth and with few glitches because of the accumulation of knowledge.

The decade of the 2010s opened with the production of small smart phones and hand held devices intermediate between smart phones and computers. Known as iPads® and by other names, these devices continued to present challenges to cost, packaging, features as well as reliability. By 2013, instant messaging and text could be sent around much of the world instantly. Webinars produced by the Reliability Division of ASQ made it possible to regularly attend monthly training classes through a high speed computer connection a wifi hook up or even direct from satellite. Three languages were offered (English, Spanish and Chinese). The past 10 years had observed a tremendous improvement in device function with no loss of reliability. This growth extended to products and systems from India and China. No longer were there common reliability questions with far East manufacturing.

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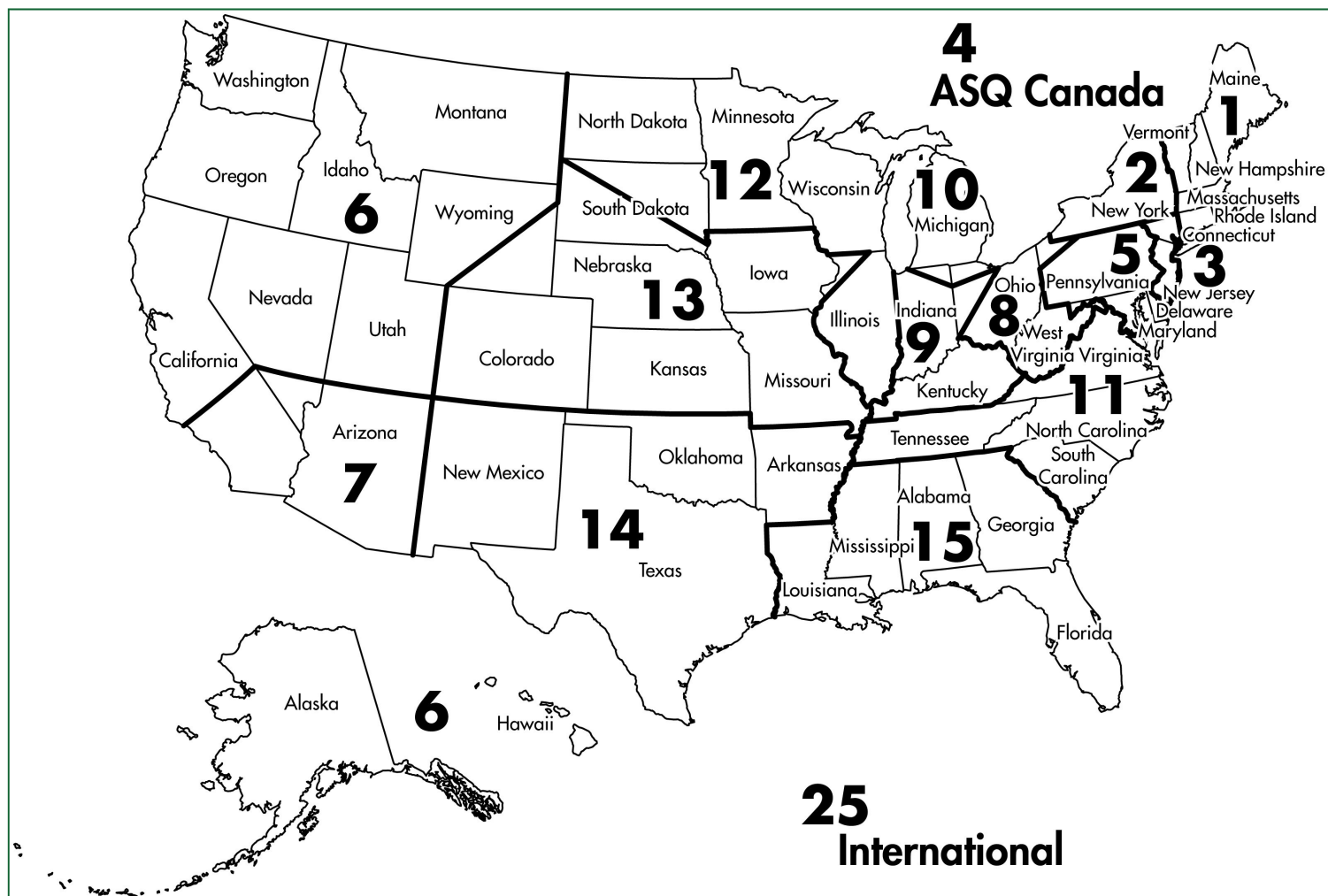
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## ASQ-RD Mission

### **The mission of the Reliability Division is:**

- \* Provide a global forum for networking among practitioners of reliability engineering, management and related topics,
- \* Facilitate growth and development of division members,
- \* Promote reliability engineering principles and serve as a technical resource on reliability engineering for ASQ, standards agencies, industry, government, academia and related disciplines.
- \* Sponsor, present and promote reliability, maintainability, and related training materials for courses, symposia, and conferences.