NASA ACADEMY OF AEROSPACE QUALITY

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Auburn University
AAQ Basic Information

http://aaq.auburn.edu

AAQ is an internet based forum to provide quality assurance training to students and faculty at all educational levels from K-12 through higher education involved in planning, designing, building, launching and operating payload projects for space. These include Cube Sats, Small Sats, International Space Station, high altitude balloons, rockets, and more. The AAQ curriculum comprises interactive, multi-media educational modules for all aspects of quality assurance necessary to ensure mission success including the capacity to customize and store on line quality assurance plans. AAQ also provides a community for networking and sharing of lessons-learned and case studies, and sponsors annual workshops.
Many educational entities are involved in space bound payloads.

These payloads are designed, constructed and tested under diverse conditions and by largely “amateur” teams.

AAQ’s goal is to provide assistance in assuring that payloads are “successful” from a quality standpoint.
AAQ is for...

Students and faculty involved with payloads – on cube, small and micro satellites, ISS, balloons, rockets, and more

Those interested in becoming involved

Future scientists and engineers interested in space
AAQ Team

- Sponsored and led by NASA Headquarters Office of Safety and Mission Assurance (OSMA) with participation from Marshall and Glenn Space Flight Centers
- Auburn University leads development and deployment
- Expert User Group formed in 2014
AAQ Expert Users

Jonathan Black
• Virginia Tech

Paul Darby
• University of Louisiana – Lafayette

Andy Hollerman
• University of Louisiana – Lafayette

Glenn Lightsey
• Georgia Tech

Iqbal Shareef
• Bradley University

Clayton Smith
• Johns Hopkins University

Francis Wessling
• University of Alabama – Huntsville

Justin Yates
• Texas A&M University
46 Educational Modules

- Technical material
- Interactive self quizzes
- Figures and photographs
- Videos
- Links to Standards and supplemental materials
# AAQ Topic Grouping

## Before you Start
- NASA’s Quality Program
- Configuration Management
- Documentation Management
- Process Control
- Quality Planning
- Records Management
- Software Quality
- Standards
- Systems Engineering

## Design
- FMEA/FMECA
- COTS
- Continuous Improvement
- Parts Reuse
- Problem Solving
- Risk Management for Quality Assurance
- Robust Design
# AAQ Topic Grouping

## Implementation
- Part Selection, Purchasing and Procurement
  - Supplier Auditing
  - Acceptance Data Package
  - COTS
  - PEMs
  - MEMs
  - Counterfeit Parts
  - IEEE Parts
- Part Assembly
  - Additive Manufacturing
  - Soldering
  - Wire Crimping and Harness
  - Staking, Bonding and Conformal Coating
  - Connectors
  - Fasteners
  - Mechanical Parts
  - Fiber Optics
  - Workmanship
- Quality Assurance
  - FOD Control
  - Electrostatic Discharge
  - Fracture Critical
- Safety
  - Flammability
  - Offgassing
  - FMEA

## Testing
- Inspection and Testing
- Non-destructive Evaluation (NDE)
- Corrective Action and Root Cause Analysis
- Statistical Quality Control
  - Metrology
  - Regression Analysis
  - Inferential Statistics
  - Statistics with Excel
  - Design and Analysis of Experiments (DoE)
  - Control Charts and Process Capability

## Deployment
- Shelf Life Control
- Packaging and Delivery
# AAQ Module Status – Color Code

<table>
<thead>
<tr>
<th>Stage</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Defined</td>
<td>Idea for the module exists. No research/content currently.</td>
</tr>
<tr>
<td>Content Collection</td>
<td>Topic is being researched. Content is being collected.</td>
</tr>
<tr>
<td>Content Publication</td>
<td>Satisfactory level of content has been collected and is being published to the site, including media.</td>
</tr>
<tr>
<td>Module Enhancement</td>
<td>Module quiz, Lessons Learned, glossary, and acronyms links are being added. “Site” aspects of the module are functional at the completion of this stage.</td>
</tr>
<tr>
<td>Expert User Testing</td>
<td>Module is being checked by AAQ expert users.</td>
</tr>
<tr>
<td>NASA Vetting</td>
<td>Module is being checked by NASA subject matter experts.</td>
</tr>
<tr>
<td>Approved</td>
<td>Module is considered ready for public use. Errors/bugs found by users are being remedied. Content updated as necessary.</td>
</tr>
<tr>
<td>Needs Revision and Revetting</td>
<td>Approved but needs major revision and revetting.</td>
</tr>
</tbody>
</table>
Current Module Status

2 approved
15 in or ready for expert user testing
11 in module enhancement
7 in content publication
3 in content collection
7 defined
1 in need of revision and vetting
Other Site Resources

• Interactive Quality Assurance Plans
• 31 Lessons Learned
• 3 Case studies
• Acronyms and definitions
• Links to Standards
• Interactive user forum for posts (Q&A, news)
Quality Assurance Plan

• Customizable, interactive template for project teams

• Can upload files – text, spreadsheet, pictures, etc.

• Permissions granted by project leader (faculty member)

• Need volunteers to trial this during their payload projects
Networked Community of Users

Expert User Advisory Group

Annual AAQ Workshop

• September 1, 2015
• Huntsville
• Travel stipends available
• Look for an email announcement soon!
The Future

Continue module inception, development, trialing, review

Complete and trial interactive Quality Assurance Plan and develop samples/templates

Add case studies and lessons learned

Customize to different categories of users

Add features and modify content according to feedback from the user community – **YOU!**