

# The Benefits of Automation and Control Software for EMI/EMC Testing

Flynn Lawrence

Applications Engineer

(215) 723-8181 x434

[flawrence@arworld.us](mailto:flawrence@arworld.us)

August 24<sup>th</sup>, 2015





# Agenda

- Overview of traditional approaches without the use of software
- Negative aspects of EMC test software
- Benefits of EMC test software
- Attributes necessary for a successful software package
- The future of EMC Test Software

# Overview of Traditional EMC Test Approaches Without the Use of Software

Traditional testing required juggling of an enormous amount of information

- Equipment calibration data / calibration dates
- Correction factor data (cables, attenuators, preamps, etc.)
- Frequency Data
  - Step sizes, Notches and Dwells
- Limit Data
- Injected signal and Field Calibration Data
- Recorded Emissions Data



# Overview of Traditional EMC Test Approaches Without the Use of Software (continued)

Traditional manual approach provided data, but was susceptible to human error.

- Performing measurement calculations incorrectly
  - Incorrect calculations can lead to missed outages and out-of-spec conditions
- Large volume of data can be overwhelming to handle manually
- ‘Autopilot’ - Carelessness due to repetitive nature
- Depending on the EUT, failure detection could easily be missed
- Mitigation efforts relied heavily on experience of the test engineer/technician



# Overview of Traditional EMC Test Approaches Without the Use of Software (continued)

The traditional manual approach was more time consuming

- Manual data reduction
- Lack of automation of probe positioner / antenna positioner makes field calibration unruly
- Forgetting to set antenna polarization / position
- Incorrect probe position
- Have to constantly reload correction factors into measurement receiver
- Reports are created manually
- Human reaction times lead to longer field leveling and dwelling



# Overview of Traditional EMC Test Approaches Without the Use of Software (continued)

There has been a transition from purely manually performed testing to full implementation of complete software packages.

- As budgets decrease, need for efficiency is always increasing

Many labs created their own software using various languages and implementations

- Tools such as Microsoft Excel were used to perform data manipulation
- LabVIEW gained popularity for instrument control



# Negative Aspects of EMC Test Software

## *Overuse of valuable test resources*

- Ongoing training of test lab personnel, to maintain skill set of complicated software
- Homegrown software
  - Generally one person developed and managed the software
  - Development takes test resource away from testing
  - If developer leaves, maintenance and support most likely ends, or learning curve with next resource
- Time required to enter correction factors, calibration due dates, equipment drivers



# Negative Aspects of EMC Test Software

## *Overuse of valuable test resources (cont.)*

- Software Validation
  - ISO 17025
  - Internal Quality Management System
  - Can be a monumental task if software developer provides no validation documentation
- Software that is not out of the box ready to use requires setup and configuration
- Lack of customer support from software company





# Negative Aspects of EMC Test Software

## *Cost associated with some software packages*

- Often times, several add-ons are needed to achieve desired functionality
- Expensive Initial AND recurring support costs
  - Even with support contracts, getting sufficient support can still be a challenge
- Potential additional cost associated with software updates
- Modular software (CE, CS, RE, RS) (i.e. separate packages for each test)



# Negative Aspects of EMC Test Software

## Technical issues with software

- Unexpected bugs and crashes
- Software wide open to user changes, often increases complexity and introduces errors
  - Poor software security could allow people to make changes (intentional or unintentional) to test procedures
- Software functionality was not fully tested before being made available to the public

## Some tests are not conducive to full automation

- ESD Testing



# Benefits of EMC Test Software

## Better repeatability

- Consistent approach across test personnel
  - Test methods are either pre-programmed or programmed by the user once and stored in the software
- Some software packages provide System Administrator functions which allow improved security by restricting user ability to edit or modify the test
- Less opportunities for error
  - Input data and parameters are only entered once
  - Discreet frequency stepping



# Benefits of EMC Test Software

## Better accuracy

- Some packages offer EUT monitoring capabilities through DAQ (data acquisition) interfaces to quickly report failures at the precise moment of failure
- Less opportunity for rounding errors
- Determination of susceptibility thresholds and emissions outages are more precise
  - Clear and discreet frequency steps



# Benefits of EMC Test Software

## Reduces overall test time

- Eliminates the 'human factor'
  - Inaccurate frequency steps
  - Longer dwells
  - Longer leveling times

## Simplifies mitigation efforts

- Software can maintain a record of all mitigation steps taken to avoid backtracking
- Some software packages offer automated functions to determine susceptibility thresholds



# Benefits of EMC Test Software

## Simplifies reporting efforts

- Allows the transfer of information and data to multiple software platforms (e.g. Microsoft Excel and Word)
  - Can also allow integration of all data into one report
- Consistent formatting
- Software provides all equipment calibration information
- Frees up test resource to continue testing efforts rather than writing a formal report
- Calculations are error-free
- Avoid missing any key information or data



# Attributes Necessary for a Successful Software Package

Software that offers flexibility without complexity

Software containing full test suites (e.g. MIL-STD-461, FCC, EU standards, IEC, automotive, Telecom, ISM, etc.)

Easy to implement or modify test profiles

- Modify existing test profiles
- Create new profiles from scratch

Wide array of drivers

- Driver updates and additional drivers are readily available



# Attributes Necessary for a Successful Software Package

Software that is fully functional and supported

- Check company's commitment to the software
  - Years in business
  - Number of software resources devoted to maintenance and developing new features
  - What level of verification has the company performed on their own software?
- As with any software, test personnel must review and verify software's capabilities to ensure it is appropriate for use

Thorough report generation and data extraction





# Attributes Necessary for a Successful Software Package

Support, either through direct contact with software or applications engineers, or embedded help features

Willingness of software developers to enhance features based on customer requests.

Awareness of standards and willingness to evolve software based on new standards and standards updates



# The Future of EMC Test Software

Many 'complete' software packages do not offer conducted transient or magnetic field susceptibility testing

- The majority of 'complete' software developers do not directly manufacture equipment to perform these tests
- A lot of test equipment that is designed specifically for these tests contain embedded software packages or narrow-scope software



# The Future of EMC Test Software

## Integration of emerging technologies

- FFT receiver capabilities
- Multi-tone radiated immunity techniques

## Remote Testing

- The marriage of automated EMC test software, EUT monitoring and EUT control can lead to fully remote testing



# emcware®

## EMC Test Software Suite

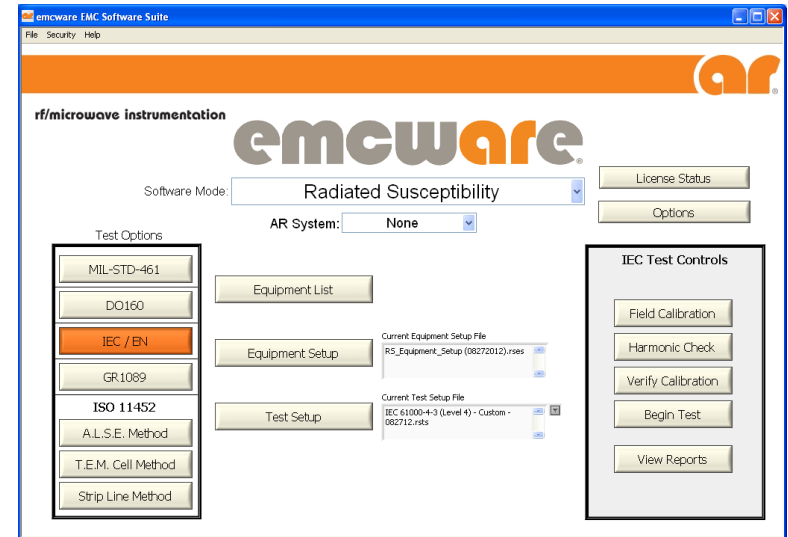


*The Competitive Edge in Innovation & Automation.*

# Overview

## What is emcware?

- Software that automates Electromagnetic Compatibility (EMC) testing and report generation
  - ✓ Radiated Susceptibility
  - ✓ Conducted Immunity
  - ✓ Radiated Emissions
  - ✓ Conducted Emissions

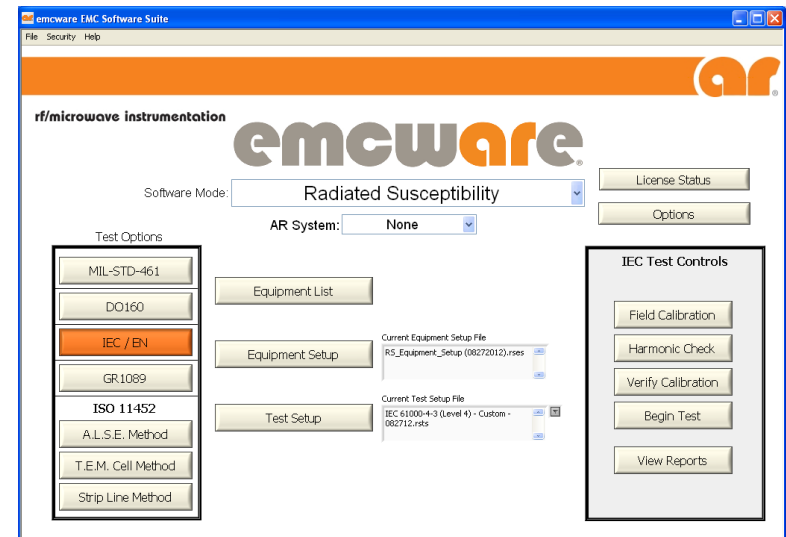


- Designed to have the flexibility to control small and large systems

# Overview

## Why is emcware better than other EMC automation software?

- It's **FREE!**
- It's User Friendly!
- Guaranteed to work with all AR products
- Unparalleled customer service
- Validation of each release
- Ever-expanding standard features list
- Supports many past and present EMC test standards
  - Over 500 Pre-defined test setups for IEC, CISPR, MIL-STD-461, DO-160, Auto, etc.



# Conclusion



Many factors must be considered when moving from a manual to automated test approach

- Different factors for different levels of testing (compliance, pre-compliance, contract acceptance, etc.)
- Depending on specific needs, software value should not necessarily be judged on cost

Important to consider what your current and future needs will be when selecting a software solution

A well-designed EMC test software package should increase the quality of testing while reducing overall test time