ATC Nuclear

I&C Reverse Engineering
NRC Regulatory Information Conference
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ABOUT ATC
DELIVERING INNOVATION

- Founded in 1996 by Clyde Keaton-CEO
- Corporate Headquarters in Lyndhurst, NJ
- Divisional Headquarters
  Aerospace - Pompano Beach, FL
  Industrial Supply Chain - Lyndhurst, NJ
  Nuclear - Oak Ridge, TN; Schenectady, NY
  Distribution & Services - Lyndhurst, NJ
- Highly Regulated
  - Federal Aviation Administration (FAA)
  - Nuclear Regulatory Commission (NRC)
- Integrated Quality Processes in Place
  - 10 CFR 50, Appendix B
  - ISO 9001:2008 Certification
- Living Our Values: Quality, Customer Satisfaction, Innovation, Teamwork, Integrity

4 GLOBAL BUSINESSES

Why Reverse Engineering (RE)?

- Solve Obsolescence
- Avoid the High Cost of Upgrades
- Maintain Proven Reliability of Analog Instrumentation and Control (I&C) Design
- Avoid Digital Obsolescence and Cybersecurity Issues
- Keep Familiar Operator Interface
- Maintain Long Term Support for RE Products

Reverse Engineering Creates Significant Value for Utilities

What is Reverse Engineering?

- EPRI TR-107372
  - "The process of developing technical information sufficient to duplicate an item by physically examining, measuring, or testing existing items; reviewing technical data; or performing engineering analysis."
- ATC Nuclear
  - Create a design that replicates, to the extent practicable, the form, fit, and function of the original specimen and prove the design through rigorous testing and analysis.

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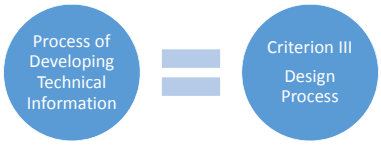
Over-Arching Requirements



- Criterion III is applicable
- In RE the starting point changes from a concept to an existing specimen that meets design requirements

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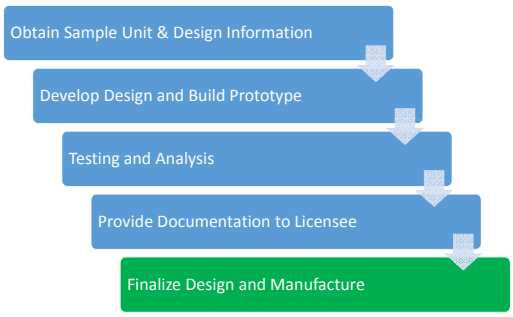
High Level RE Process



Quality is Built into Each Step

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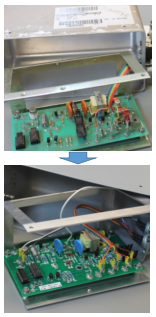
First Steps

- Analyze the specimen on a sub- component basis
- Review operating experience (OE) (licensee provided internal and external)
- Review Part 21 history
- Obtain host system design information from the licensee
- Develop basis for tolerances and acceptance through circuit analysis and applicable standards



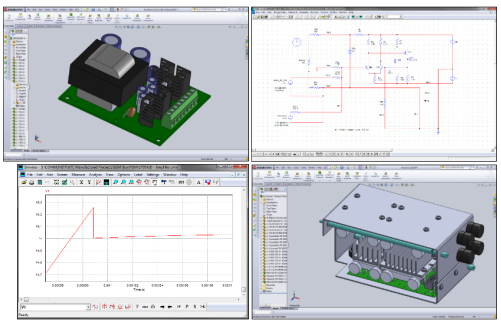
Ensure All Required Information is Collected

Documenting and Managing the Process

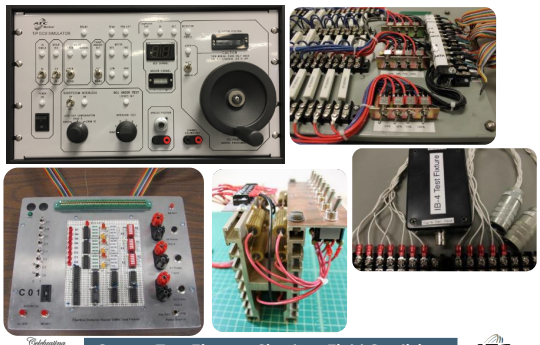
- Initial Documents
  - Design Management Plan
  - Design Specifications
  - Specimen Evaluation Report
- Test Documentation
  - Subcomponent Acceptance Testing
  - Design Limit Testing
  - Qualification Analysis and Testing
- Project Management
  - Design Reviews and Approvals
  - Project Team Meetings

Communication and Approval Points with Licensee is Key to Success

3D Modeling and Circuit Analysis



Custom Test Fixtures



Custom Test Fixtures Simulate Field Conditions

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Conclusion

- Reverse Engineering is a viable and proven means to solve obsolescence
- Suppliers must have a quality program that supports Reverse Engineering activities
- Use of robust testing and analysis validates the Reverse Engineered product
- Licensee involvement and approval is needed to assure success

Reverse Engineering enables licensees to operate safely, reliably, and economically

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Questions?

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