

Arc Fault Detection NSRP Brief

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- ❖ Arc Flash Detection (AFD) Background
- ❖ Mitigating Steps
- ❖ AFD in the current fleet
- ❖ Future efforts

- Mid 1980s to early 1990s there were 51 reported arcing events in the Fleet.
- Root cause attributed to:
 - Dirt
 - Moisture
 - Loose or Corroded Connections
- Due to low magnitude of arcing currents when compared to short circuits, installed breakers could not detect arcing faults.

- Design and implementation of a system capable of minimizing damage during arcing events
 - Johns Hopkins University APL initiated studies and developed Generation 1 of AFD systems
- Replacement of doosert connections where possible
- Increase in Preventive Maintenance
 - Clean and Inspect periodicity increased
 - Thermographic Imaging MRC developed as quantitative diagnostic tool for loose or dirty connection

AFD System Requirements

- Automatic detection of arc faults in switchboards at inception
 - Detect series arcs (load dependent) to prevent phase to phase arcs (source dependent)
- Automatic isolate faulted equipment in less than 100 mS
- Minimize the extent of shut-down of the ship's electrical system
- No false tripping of circuit breakers
- Minimize damage to shipboard equipment

Three generations of AFD systems

- JHU Generation 1
 - SSN, SSGN, SSBN

- JHU / Powertronics Generation 2
 - CVN 68, CVN 78, LCS 1-3

- DRS ADACS Generation 3
 - CVN 79-80, CLB Class, VA Class new construction / back fit, LCS 5AF, DDG 1000(in progress)

Issues with Current AFD

- Obsolescence issues exist with generation 1 and generation 2 AFD systems.
- Qualified vendor options are limited
 - Leads to increase total ownership cost

Navy AFD IPT has been established

- MIL-PRF AFD spec under development
 - Qualify commercial AFD systems for shipboard applications.
 - Reduce overall lifecycle cost for the fleet and shipbuilding programs.

- Provide guidance for photo sensor placement in electrical enclosures.

- Provide guidance on where to use AFD systems. Primary focus is high voltage applications.

- Submit SCDs to replace all generation 1 and generation 2 AFD obsolete systems with DRS ADACS system.