



**NEMA**

*81 years of excellence*



## AUSA Army Installations Symposium Kansas City – April 28, 2009

- NEMA & ESFi Solutions
- Improving Electrical System Safety

# Electrical System Safety Review

## Problem

- Electrical systems are:
  - Complicated
  - Aged/aging
  - Out of sight
  - Potentially dangerous
- Total system expertise is rare
- Uptime is mandatory
- Single system and project responsibility is critical
- Extending system and equipment life saves money
- Energy management and monitoring is complicated

## Solution

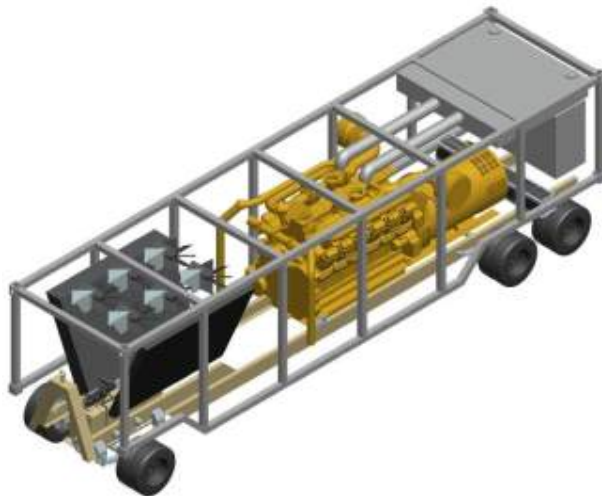
- Electrical safety products range from plug in to easy-to-install
- Awareness, compliance and diligence
  - Safety/NEC
  - Counterfeits and “gray market”
- Diagnosis and recognition of issues
- Replacement and renovation products and services
- New products and services
- Predictive service technologies and crisis response expertise

# Available Solutions

- Utilize existing organizations
  - Electrical Safety Foundation International (EFSi)
  - Institute of Electrical and Electronics Engineers (IEEE)
  - National Fire Prevention Association (NFPA)
- Hire and utilize professionals to assess and diagnose electrical safety needs
- Prioritize target improvements
  - Systems 15+ years old
  - Packaged/pre-wired solutions
  - Plan for future needs (pending energy bill potentially passed in August)
- Create safety specs and implement diligently (NEC 2008)

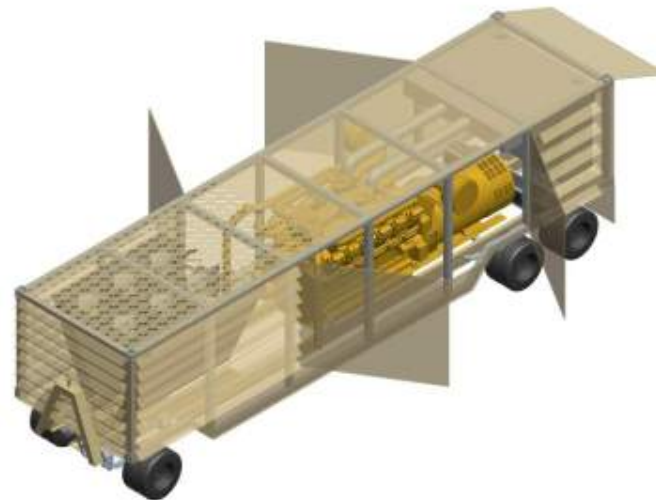
## Problem

- **Need for Safe Air Transportable Electrical Power**



## Solution

- **Custom Designed For USAF**
- **1100 EkW**
- **Diesel or JP8**
- **Safe Connectability**
- **Durable**



# Problem

# Solution

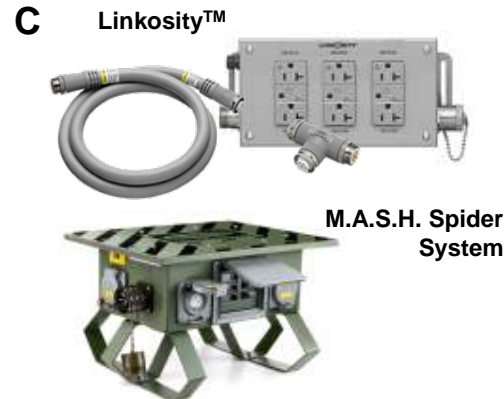
- A** Ground Fault Receptacles (GFCI) are not being tested to confirm they still work properly; fewer staff to inspect.
- B** Metal electrical components lose grounding or enclosures become energized due to loose connections or improper installation.
- C** Portable / temporary power is often mis-wired and unreliable when constructed in the field. Set up of wiring system is time consuming.
- D** Electrical Outlets could present potential safety hazard, if plugs not fully inserted or objects are pushed into power slot openings.

Self-Diagnostic GFCI receptacles - test every 60 sec's. Flashing Red light provides indication if GFCI protection is lost.

Non-metallic systems option. Safety interlocked switch and non-metallic plugs / connectors will not energize unless properly connected.

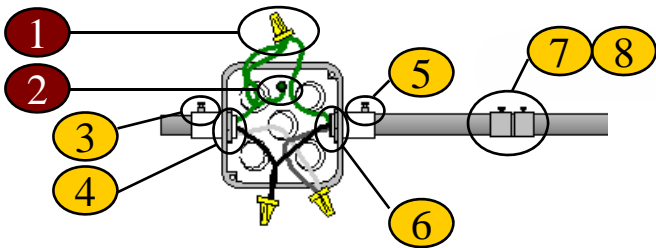
Pre-fabricated, factory wired system, Linkosity & Spider Power Distribution offers portable, quick change alternative to hard-wired installations.

Replace standard outlets with Safety or Tamper-Resistant outlet, available in Commercial and Residential grade.



## Problem

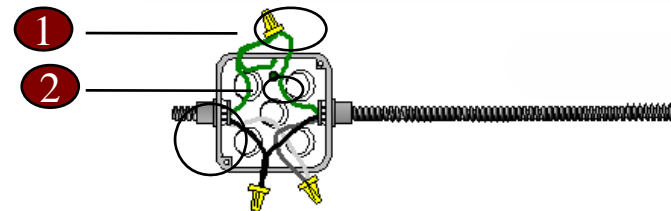
- Exposed insulation may result in damaged conductors.
- Numerous conduit connections (10' lengths).
- Poor terminations.
- Wrong connectors are used.
- Can be misapplied outdoors.



## Solution

### HCF MC<sup>AP</sup>™ Cable with Connectors

- Factory installed metal armor - protects conductors.
- Two connections vs. 12 on a 100' run.
- 25' to 10,000' lengths.
- Two grounding paths.
- One ground is built-in providing fail safe protection.
- Proper connectors shipped with product.
- No mechanically tightened connections.
- Available for wet location applications.
- NEC 517.13 approved in health care facilities.



## Problem

- Damaged wires during installation
- Improper phase termination (Fire / Damage)
- Wet conditions with electrocution
- Need for grounding assurance

## Solution

- Elimination of couplings makes outer armor ground path more reliable than conduit.
- Separate ground conductor provides additional grounding protection.
- Continuous corrugated welded armor protects conductor from damage during installation.
- Wet locations, concrete encasement, and direct burial with PVC jacket.
- Reel lengths vary from 500' to 2000'.
- Color conductors ensure proper phase termination.

600v. Armor-X Cable



5 Kv Armor-X Cable



15Kv Armor-X Cable



A similar product Solution is also available in larger conductors (#8 gauge to 750kcmil) and higher voltages (15Kv).

# Problem

- **Unreliable Power: installation damage or voltage surge damage fails months later.**
- **100% failure rate.**
- **Crews called back for replacement of damaged conductor.**
- **Lost productivity due to cable replacement.**
- **Inefficient use of limited resources.**
- **Skilled talent unproductive: redoing a job.**
- **Unplanned maintenance drives a reactive focus preempting other tasks: safety.**



# Solution

- **Reliable Power: Prevents damage from causing outage.**
- **2% failure rate.**
- **Sealant provides extended cable life after minor mechanical cable damage.**
- **Provides extended cable life when pinholes are caused by voltage surges.**
- **Cable repairs itself avoiding the cost and time of cable replacement.**
- **No crew or resources required.**
- **Crews are more productive on planned productive tasks and *quality assurance*.**
- **Enables a shift to planned maintenance focused on safety.**

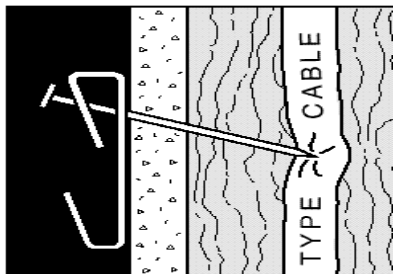


# Safety Solutions for Housing and Barracks

## Problem

### Electrical shock and residential fires

- Electrical problems are responsible for 53,000 residential fires in the U.S., and more than 500 deaths
- Risk of electrical shock and electrocution in areas where water or moisture is present
- Damaged, abused or worn electrical wiring create hazards that may result in electrical fires



## Solution

### Intelligent circuit breaker designs

- Arc fault breakers protect against dangerous faults, and reduce the risk of electrical fires
- Arc fault breakers reduce energy consumption
- Protects against incorrect wiring or connected loads
- Ground fault breakers protect people from shock hazard and save lives.



Type CH Residential Loadcenter



Type CH Residential Breaker

# Outdated Equipment Safety Solutions

## Problem

**Low and medium voltage equipment failure can injure people and damage property**

- **Arc flash incidents can result in critical burns, collapsed lungs, loss of vision, ruptured eardrums, puncture wounds and even death**
- **Approximately 2,000 injuries per year in U.S.**
- **\$10,000 to \$15,000,000 cost per injury**



**Personal Protective Equipment (PPE)**

## Solution

**Arc flash resistant. Low and medium voltage switching equipment.**

- **Reduces human interface with equipment**
- **Arc flash hazard analysis**
- **Arc flash safety training**
- **24 Unique Products to**
  - **Limit frequency of arc flash incidents**
  - **Reduce arc flash event durations**
  - **Reduce arc fault current**



**FlashGard® Motor Control Center Bucket**



**Remote Power Racking**



# Access to Solutions

## Solution Provider

## Contact Info

## Capabilities

NEMA

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NEMA  
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Identify companies that sell “genuine” products / Generic Specifications

ESFi

Brett Brenner, President  
Electrical Safety Foundation  
International  
703-841-3296 / bre\_brenner@esfi.org

Safety Awareness / Counterfeit Identification

WESCO

Lee Osterman, General Manager  
WESCO Government Business and  
CSC MidAtlantic Region  
301-444-3799

Authorized Distributor for over 240 Companies  
Safety Programs (Member of ESFI)

IEEE

ieee.org

White Paper Review / Best Practices

ENGINEERING SERVICES

Gabe Paoletti, Eaton  
Corporation  
GabrielJPaoletti@eaton

Diagnosis / Repair / Commissioning

Enerwise.com  
Demand Response Company