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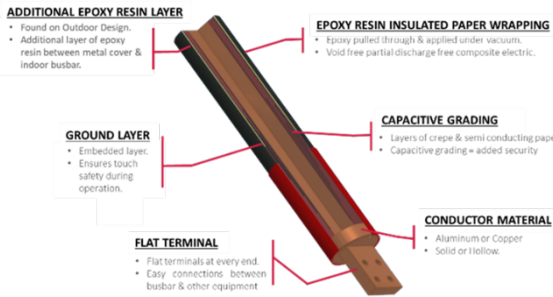
# TECHNOLOGY FACT SHEET – Insulated Bus Pipe (IBP)

## BACKGROUND/CHALLENGES OF STANDARD SHIPBOARD CABLES

- Cables used since advent of electrical distribution in 1800's
- Primary advancements only in standardization and insulation
- Supplying high current loads requires numerous parallel cables
- Bend radius is over twelve times the overall diameters
  - 26.4" minimum for typical 400 MCM cable
- Does not support modular construction
  - Cables are pulled after a ship is fully assembled
- Cable repulls costly and time-consuming
  - Must pull whole cable to repair



Cables (Top) vs. IBP (Bottom)



Design Elements of Standard IBP



Flexible connection method

## TECHNOLOGY OVERVIEW OF IBP

- Touch-safe power distribution method, capable of being manufactured into complex shapes
- Multiple size available
  - AC applications up to 36 kV and 6.5 kA
  - DC applications up to 60 kV and 7 kA
- Shielding/Protection options
  - EM shielding
  - High Temperature capability
  - Stainless steel outer layer
- Prefabricated sections installed similarly to pipes
- Bend radius limited by mechanical strength of conductor at four times the diameter
- Directly supports 2019 Naval Power and Energy Systems Technology Development Roadmap from the Electric Ships Office



IBP undergoing successful 3 HR Flame Test (Not passed by cables)

## ADVANTAGES OF IBP IN PLACE OF CABLES

- Provides SWAP-C savings for increased endurance and design margin
- Supports modular ship construction
- Manufactured into complex shapes that can be placed in tight spaces
- Easily repaired; only damaged section is replaced
- High abrasion resistance and increased survivability

**> 20%**

Labor Savings over Standard Cables

**72%**

Weight Savings over Standard Cables

**40+ years**

Designed lifespan of IBP

**11**

Known applications in Foreign Military & Commercial Ships

**16 years**

Research and Development for U.S. Navy Applications

**3**

Active IBP Development & Testing Efforts (NSRP & SBIR)

**6**

Technology Readiness Level

**~\$1.5M**

Savings assessed for UK Queen Elizabeth Class Aircraft Carrier

(Value Analysis Report, Nov. 2003)