



JSWAG Conferences/ Announcements

The next JSWAG/JFOWG Meeting is scheduled for August 16-18 2011 in Lexington Park, MD. If interested in attending, please contact the committee chair or co-chair for any chit you are able to assist with.

Nominations for the 2011 Lu Roberts award recipient has begun. Please visit www.navair.navy.mil/jswag and login to make your nomination. Nominations will close in August.

Other Conferences

- MRO -- Miami, Fla.
April 12-14, 2011
- Quad A -- Nashville, Tenn.
April 17-20, 2011
- AA&S -- San Diego, CA
April 18-21, 2011
- NHA Symposium
-- San Diego, CA
May 9-12, 2011
- AUSA Sustainment Symposium -- Richmond, Va.
May 10-12, 2011
- DMSMS & Standardization -- Hollywood, FL
August 29-September 1, 2011

Newsletter Contacts

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NAVAIR Wiring Systems Branch Qualifies New Wire for Aircraft

Naval Air Systems Command engineers have been working with industry to find a suitable replacement wire for the infamous Kapton polyimide wire insulation which was thought to have been responsible for several aircraft mishaps throughout the years.

The initial replacement polyimide wire insulation being used in aircraft electrical systems, built to the AS22759/80-92 specifications, is constructed with an outer polytetrafluoroethylene (PTFE) tape wrap over an inner layered PTFE/polyimide/PTFE tape. Known simply as composite and utilizing an improved Oasis polyimide layer, it was chosen for use in military aircraft because the wire's insulation construction can withstand extremely high temperatures, has a thin-walled, light weight outer layer that has high dielectric strength and is abrasion resistant. But as it ages the protective outer layer separates along tape seams and peels away leaving the inner layers more susceptible to chafing and water absorption. The composite wire outer layer was created by using a tape on a spool and wrapped around the wire. Heat was applied to the tape wrap securing the adhesive. However, it was still different layers of tape overlapping and in the right circumstances there can be some separation. So, maintenance professionals have to handle with care to avoid insulation damage.

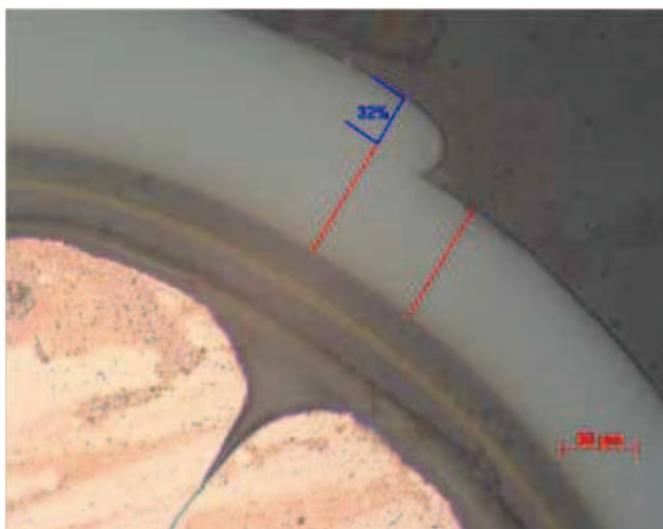
According to NAVAIR Wiring Systems Branch, wiring system problems are one of the leading causes of aircraft downtime or non-mission readiness.

"The nature of the outer tape layer produced discrete edges that risk being damaged during installation, maintenance activity and cumulative incidental contact to surrounding surfaces," said Brian Vetter, a NAVAIR Wiring Systems Branch electrical engineer. "This outer layer damage exposes the underlying polyimide material and leaves it susceptible to fluid contact in the maritime environment."

Vetter said that what the Navy is using now, on its aircraft is from technology approximately 20 years old. There have been substantial developments in polymer chemistry since then, he

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AS22759/80 Cross Section



AS22759/180 Cross Section

said, so NAVAIR studied the issue to see if the advancement in technology met the Navy's aviation needs.

Existing Kapton polyimide insulated wire was banned and the existing composite wire construction was unable to meet stringent marine wire construction requirements. In order to meet the requirements for a high temperature wire with good electrical properties and a thin-walled construction to ease weight constraints, NAVAIR charged industry to come up with a new product that could withstand the vigorous maritime environment experienced in Navy aircraft.

The new specification called for fully-sealed wire insulation that involved a fused top layer that was continuous with no edges that allowed no moisture to penetrate to the inner layers and the conductor. An additional requirement called for the insulation to be smooth-jacketed, seamless wire for easier handling. Standard composite wire is seamed along its surface making it susceptible to being snagged and subsequently tearing.

NAVAIR worked with the Air Force Research Laboratory to test the wire in different environments. In addition, NAVAIR is looking at three different manufacturers to create the

seamless product. According to Vetter, NAVAIR is not so much interested in the process as they are in the fact that the product will be seamless construction wire insulation.

To derive the benefit from a composite construction without the damage risk in a marine environment, a new specification series was developed, AS22759/180-192. It utilizes existing materials, but fuses the outer layer into a smooth continuous jacket, eliminating a significant protruding tape edge in the outer wall construction. New wire constructions qualified to this specification meet all existing requirements of the AS22759/80 thru /92 series and undergo additional performance testing for jacket smoothness and abrasion resistance.

The main benefits are; increased durability, and increased resistance against hydrolysis which happens when the primary insulator absorbs moisture destroying its chemical properties. Oliviu Muja, the NAVAIR Wiring Branch Logistics lead, stated that for the maintenance professional, there should be little to no learning curve when replacing existing composite wire with this new wire specification. The maintainers can be expected to use the same tools when

performing inspections and repairs. The wire insulation is un-changed; as such the wire strip tools are the same. But when working with, and repairing an extruded thicker-walled insulated wire, like that of a cross-linked ethylene tetrafluoroethylene (XETFE) wire, the maintainer will have to select a different wire stripper tool with a different set of blades in order to properly perform repairs, such as splicing, or contact installation.

"The new seamless wire specification provides a better quality wire in regards to the resistance of scrape abrasions and water absorption," Vetter said. "With the top layer more durable, it's going to provide maybe twice the wear protection. But no wire is going to be abrasion proof. Proper installation is still the key to reducing chafing issues, but this new wire specification will provide a greater margin of protection which we hope will provide greater reliability." 🛡️