



Improve the Reliability of Fiber-Optic Assemblies

New technologies promote high reliability and long life for many fiber-optic applications



NASA Goddard Space Flight Center invites companies to license new technologies that can improve the quality and reliability of fiber-optic assemblies:

- **Chemical stripping of optical fibers:** The stripping fixture holds a cable end for immersion in a chemical bath, allowing a precise length of fiber to be stripped, preparing it for assembly.



Chemical Stripping of Optical Fibers

Benefits

- **Accurate:** Can set fixture stripping length dimensions to approximately 0.01 inches
- **Repeatable:** Strips coatings accurately without having to depend on chemical levels or holding devices
- **Versatile:** Is adaptable to a wide variety of fiber-optic cables
- **Durable:** Is compatible with many cold and hot chemicals (e.g., sulfuric acid), and is not damaged or affected by contact with most chemical stripping solutions
- **Simple:** Is easy to use

- **Reduced bubbles in adhesives:** The bubble remover holds and seals a liquid-adhesive filled connector for use in a centrifuge. Spinning forces drive out problem-causing bubbles.



Reduced Bubbles in Adhesives

Benefits

- **Inexpensive:** Is made from readily available, high-quality materials
- **Time- and cost-saving:** Reduces or eliminates assembly failures due to non-uniform encapsulation stresses caused by adhesive bubbles and voids
- **Versatile:** Is adaptable to a wide variety of fiber-optic connectors and centrifuges, and can be used as a liquid-adhesive filled connector holding fixture as well as a bubble and void remover
- **Durable:** Is compatible with most adhesives
- **Simple:** Is compact and easy to use

Applications

Goddard's manufacturing devices for fiber-optic assemblies are ideal for an application requiring very high reliability and long life.

- Aerospace
- Commercial aircraft
- Commercial satellites
- Military
 - Secure data transmission
- Telecommunications
 - Synchronous Optical Network (SONET)
 - Automated Teller Machine (ATM) networks
 - Ethernet and Internet provider (IP) networks
- Cable television
- Medical
 - Probes
 - Laparoscopy
- Industrial
 - Level sensing
 - Part inspection
 - Process control
- Optics/photonics
 - Lasers
 - Illumination

Chemical Stripping of Optical Fibers

This device strips coatings from optical fibers so that they may be assembled with other components. It fits over the cable or fiber end. The coated fiber portion to be stripped protrudes from the fixture and is placed in a chemical bath. By protecting the portion of fiber that should remain coated, the fixture allows a precise length of fiber to be stripped, leaving a distinct, well-defined interface. The device is particularly useful for removing hard, thin coatings (e.g., polyimide coatings).

Alternative stripping techniques include mechanical stripping processes, which may nick or scratch extremely small and fragile optical fibers, resulting in latent defects and future failures. Hand-stripping techniques do not provide enough control to strip the fiber to precise, well-defined lengths of approximately 0.01 inches. Other stripping techniques including laser stripping may adversely affect fiber strength. Goddard's device helps remove fiber coatings at clearly defined lengths without nicking the optical fiber, providing precise optical fibers for high-reliability applications. Proper chemical stripping is proven to maintain good fiber strength.

NASA Goddard Space Flight Center has patented the Chemical Stripping Fixture (U.S. Patent No. 5,451,294).

Reduced Bubbles in Adhesives

This device helps remove injection bubbles and voids that can be introduced during termination processes. These bubbles and voids may cause performance degradation, fatigue-induced fractures in the field, or may lead to premature fiber breakage under environmental extremes. Goddard's technology features a fixture that holds and seals a connector filled with liquid adhesive. The device holds the connector without clamping onto it, minimizing potential connector damage such as scratching or cracking. The fixture is then placed in a centrifuge. Spinning the filled connector in a centrifuge drives bubbles and voids out of the adhesive, making the connector ready for bonding.

Other means of removing bubbles and voids from adhesives, such as the use of vacuum, present several disadvantages. In some cases, a vacuum may remove volatile components from the adhesive along with the bubbles, adversely affecting the chemistry of the adhesive and possibly making it unreliable. Vacuum chambers can also be cumbersome, inefficient, time consuming, and costly. In contrast, Goddard's Adhesive Bubble Remover is constructed with inexpensive, quality materials and has a simple-to-use design.

NASA Goddard Space Flight Center has patented the Adhesive Bubble Remover Method (U.S. Patent No. 6,287,404).

Licensing and Partnering Opportunities

These technologies are part of NASA's Innovative Partnerships Program, which seeks to transfer technology into and out of NASA to benefit the space program and U.S. industry. NASA invites companies to consider licensing these manufacturing device technologies for fiber-optic assemblies for commercial applications.

For More Information

If you are interested in more information or want to pursue transfer of either of these technologies (GSC-13644 or GSC-13874), please contact:

Office of Technology Transfer
NASA Goddard Space Flight Center
fiber-optic-assemblies@gsfc.nasa.gov

More information about working with NASA Goddard's Office of Technology Transfer is available online:
<http://techtransfer.gsfc.nasa.gov>

www.nasa.gov