



# Transition **Impact**

## Conductive Adhesives Improve Aircraft Microelectronics



- **SBIR technology will greatly enhance F/A-22 electronics performance**
- **Cost savings estimated at \$40-45 million**
- **Elimination of unique and time consuming microelectronics assembly and processing**

## Air Force Requirements

The Air Force uses a vast array of advanced electronic devices, including those used in microelectronics for advanced fighter aircraft like the F/A-22. While extremely effective, this new generation of electronics generates more heat due to increases in performance. It is also more costly. To avoid temperature damage, this increased heat must be dissipated. The Air Force requires better thermally conductive adhesive materials to address the problem. Further, the elimination of grounding wires, solder joints and galvanic corrosion from sub-array systems allows for additional design freedom in the placement of components during assembly. This combination of advanced materials and greater design options are expected to save millions of dollars.

## SBIR Technology

While addressing the overall Air Force technical requirements the SBIR program also used the opportunity to focus on optimizing the production assembly processes in order to provide substantial cost savings. A polymer-based adhesive formulation and a fabrication process was developed that uses continuous fibers uniformly aligned and dispersed through the thickness of the adhesive. This innovative process significantly increases the adhesive's thermal and electrical conductivity performance at significantly reduced costs. The new formulation also eliminates certain unique Air Force microelectronics assembly and processing requirements, resulting in considerable production cost savings.

## Air Force Transition Payoff

The SBIR Phase II program is in its final stages of development and testing for the F/A-22 SPO and some other (several) DoD radar product customers. The F/A-22 Radar IPT is looking at supporting the use of these adhesives as part of a Production Improvement Program (PIP) candidate. The PIP candidate would allow funding to add full robotics to the existing radar circulator and sub-array production lines. Estimates have been made that the new adhesives could save \$40M to \$45M in materials costs alone to a fighter aircraft system such as the F/A-22 with further unidentified savings to date in manual assembly and rework costs over production lots 3 to 11. The development of this SBIR-sponsored technology has enabled important new design characteristics for other avionics subsystem components not heretofore possible.

**SBIR Topic:**

AF01-121

**Title:**

Combined Thermally and Electrically Conductive Adhesives

**Contract #:**

F33615-02-C-5010

**SBIR Partner:**Browne Technology Inc.  
(Btech Inc.), Longmont, CO**Technical Project Management:**AFRL Materials &  
Manufacturing Directorate**Transition Office:**

ASC/YF

# SBIR

AF SBIR Program Manager  
AFRL/XPTT  
1864 4th Street, Room 1, Building 15  
Wright-Patterson AFB, OH 45433AF SBIR Program Manager: Steve Guilfoos  
e-mail: [stephen.guilfoos@wpafb.af.mil](mailto:stephen.guilfoos@wpafb.af.mil)Website: [www.afrl.af.mil/sbir](http://www.afrl.af.mil/sbir)DSN Fax: 785-2329  
T: (800) 222-0336  
F: (937) 255-2329**Air Force  
Research Laboratory | AFRL**  
*Science and Technology for Tomorrow's Air & Space Force***U.S. AIR FORCE**