

Advances in Automated Manufacturing of Aerospace & Military Fiber Optic Cables

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As the insertion of photonics technologies into DoD platforms increases, reliable manufacture of the basic infrastructure, fiber optic interconnect cables, becomes more imperative. Current techniques for the assembly and manufacture for fiber optic cables are extremely manually intensive, and can potentially impact yield and performance. Advances are being made in automated manufacturing methods and equipment to overcome these issues and to provide fast, reliable, and cost effective production of fiber optic cables.

The main goal of the Fiber Optic Interconnect Technology (FOIT) program is to insert advanced automation technologies into military fiber optic cable manufacturing to increase yield/performance while reducing touch labor costs. kSARIA has developed automated equipment for the manufacture of commercial grade fiber assemblies and was selected to adapt this base technology for use in military fiber optic cable fabrication. The development effort will encompass equipment that takes raw materials for cables, (fiber, termini, epoxy, etc), and converts them into a complete finished and tested cable product with guaranteed performance. A block diagram of the overall automation system is shown in figure 1.

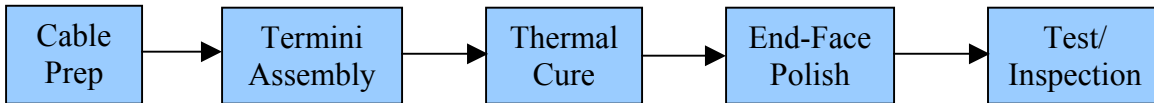


Figure 1

The raw cable will be cut to length and placed in a carrier at the Cable Prep Station. The carriers will contain the cable throughout the entire assembly process and provide accurate location of the cable ends for processing tools. The carriers with raw fiber are loaded into the Assembly Station where the fiber ends are stripped and a terminus is installed on each end. The assemblies then thermally cured and proceed to a Polishing Station where the ends of the cables are polished to the desired specifications. Lastly, the cables pass through the Test/ Inspection Station where each cable end is inspected for proper visual characteristics, geometry, and optical performance.

Due to the consistent nature of automated processing, it is expected that this technology will allow higher cable performance specifications to be obtained, similar to that experienced in automated processing of commercial grade cables. This technology is a key enabler for the deployment of the required interconnect infrastructure for photonics insertion in military platforms on a large scale and by providing increased performance, future system needs can be satisfied.

As part of a program risk mitigation activity, a termini assembly prototype station is being developed. This station was chosen to demonstrate automation of a number of key, high skill assembly processes (Kevlar cut, strip, termini attach, cleave). Figure 2 shows initial prototype of the equipment, which is undergoing performance testing currently. Results will be presented at the workshop.

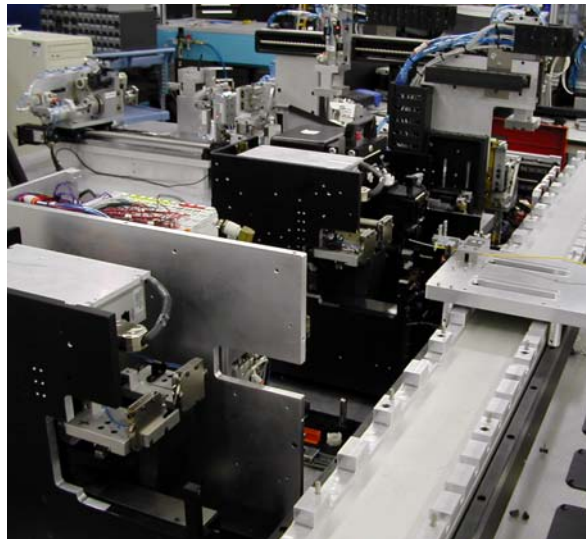


Figure 2 Automated Termini Assembly Prototype Station