

## **TRI-STAR TECHNOLOGIES WIRE PROCESSING EQUIPMENT**

For almost 40 years, California based Tri-Star Technologies has been supplying the aerospace and defense industry with laser marking capabilities, crimping solutions, and adhesion improvement systems. Designed, built, and tested in El Segundo, CA., the full range of UV Laser and Inkjet Wire Marking Systems will dereel, measure, mark, cut, and coil in one continuous, sequential process. These systems are Boeing and Airbus approved and conform to international standards for legibility of print SAE ARP5607 and SAE AS5649. These systems are indelible, robust, non-damaging, and MIL-SPEC compliant.

How do our M100L-FG-TT-A laser wire markers work to non-destructively mark wire? Tri-Star Technologies' Chief Scientist Dr. Igor Murokh explains. "UV lasers leave a permanent indelible high-resolution mark on the substrate surface. The question of how a light-colored polymer surface turns dark under laser exposure without burning or melting is due to a commonly used pigment called Titanium Dioxide (TiO<sub>2</sub>). The TiO<sub>2</sub> has intense absorption of UV radiation and under UV light permanently turns TiO<sub>2</sub> particles from white to blue/black. The short nanosecond laser pulses prevent heat exchange between the TiO<sub>2</sub> and surrounding material, therefore causing no damage to the structural integrity of the material as a whole."

For wires that do not contain TiO<sub>2</sub> (such as black wires), Tri-Star Technologies offers MIL-SPEC compliant M100J Inkjet systems that will plasma pre-treat the wire for enhanced adhesion and then print and UV cure the ink on the fly to ensure chemical and mechanical durability. The plasma treatment for wire is an integral part of ensuring proper ink adhesion when doing any ink printing on wire. This is due to the fact that for most wire insulation, the intermolecular forces on the solid surface are too weak to attract the liquid of the ink. Think of your freshly waxed car. Water beads up on the finish instead of spreading over the surface. The same principle holds true for wire insulation. Treating the wire with plasma (an ionized gas) is enough to modify the very surface layer of the wire insulation, without altering or damaging the bulk material properties. The plasma treated wires now have an improved wettability factor, allowing the ink to spread out on the surface, rather than bead up. Once the message is printed, the wire quickly passes through a UV oven which cures the ink, making a permanent, well adhered mark.

Once the wires are marked, cut, and stripped, they are ready to be crimped and made into a harness. Automation for crimping closed barrel contacts for both MIL-SPEC and commercial connectors has always been a tricky endeavor. Since they tend to be machined individually, orienting them poses many obstacles. But that is exactly the problem Tri-Star Technologies has managed to solve. Our TAC-X, PORTA-TAC, and TAC-ULTRA series of automated crimpers typically increase productivity by a 10:1 ratio. With the ability to crimp up to 1,800 crimps/hour with consistency and quality across all the crimps, the operator is freed to focus on other processes.

Tri-Star Technologies is proud to supply a full range of innovative, MIL-STD compliant products for the aerospace and defense industry.