Improved Transparent Armor and Optics

Technology Assessment and Transfer, Inc. (TA&T) developed innovative hot isostatic pressing methods that produce 4-inch by 4-inch magnesium aluminate spinel transparent armor tiles that exceed the ballistic performance capabilities of sapphire. TA&T extended this capability to 11-inch diameter plates, the largest transparent spinel plates ever produced. This breakthrough established the pathway for transparent armor plates and windows potentially as large as 30 inches. This successful effort required ingenuity in several areas including powder handling, sintering aid concentrations and powder blending, die design and selection, hot pressing and hipping protocols, and quality control procedures.

The resulting technology led to incredibly rapid spin-offs for the Sniper XR tracker production lenses for Air Force aircraft and Army Common Missile prototype domes. Under a separate but parallel project, TA&T refined techniques for spinel multimode tracker and seeker optics, achieving unprecedented levels of refractive index homogeneity for a transparent polycrystalline ceramic. This property combined with in-line transparency above 80% produced spinel lenses with superior imaging quality. The performance and potential cost advantages of spinel created immediate opportunities for insertion into numerous military electro-optical systems. As many as 300,000 transparent missile domes may be required for future Army aircraft, ground vehicles and infantry armament. Technology Assessment and Transfer, Inc. also demonstrated the potential of producing larger size transparent armor which could result in sizeable military and civil transparent armor markets.

Phase III IMPACTS

- Over 136 units sold generating over $1.01M in sales.
- Current customers include Lockheed Martin Missiles and Fire Control and Northrop Grumman Electronic Systems.
- Over $704K in Government/DoD investments for Phase III.
- Over $1.7M in non-DoD contributions for Phase III.