

Topic: N152-105

## OptiPro Systems LLC

Metrology of Visibly Opaque, Infrared-Transparent Aerodynamic Domes, Conformal Windows, and Optical Corrector Elements

UltraSurf is a 5-axis non-contact metrology system capable of measuring the surface irregularity of aspheric and freeform optics, conformal windows and ogive shaped domes to sub-micron accuracies in addition to measuring transmitted wavefront, optical thickness, tilt, wedge and decenter. This enables Defense customers and prime contractors to measure the optical figure and transmitted wavefront error of visibly opaque, infrared-transparent aerodynamic domes, conformal windows, and optical corrector elements, providing feedback for optical figure correction on their manufacturing floors. OptiPro is the only US-based manufacturer designing and building 5-axis computer controlled grinding, polishing, and measuring machines for precision optics and advanced ceramics and our collaboration with Prime Contractors has set a solid foundation that we can build upon to further improve the performance and precision of UltraSurf.

### Technology Category Alignment:

EO/IR Components for sensing, transmission and communication

Sensors, Electronics and Photonics

Electro-Optical/Infrared (EO/IR)

Radio Frequency Weapons (RFW)

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**SYSCOM:** NSMA

**Contract:** N68936-17-C-0006

 Corporate Brochure: [https://navystp.com/vtm/open\\_file?type=brochure&id=N68936-17-C-0006](https://navystp.com/vtm/open_file?type=brochure&id=N68936-17-C-0006)

# Department of the Navy SBIR/STTR Transition Program

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## WHO

**SYSCOM:** NSMA

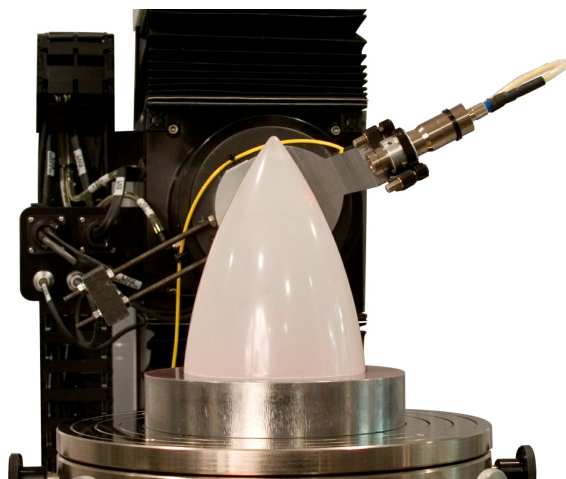
**Sponsoring Program:** Air-to-Air Missiles Program Office (PMA-259)

**Transition Target:** AIM-9X

**TPOC:**  
(760)939-7323

**Other transition opportunities:** Other optical guided missiles, corrector optics or conformal windows.

**Notes:** Since receiving our first SBIR grant, OptiPro has grown from less than 15 employees to more than 80 today. Through the SBIR program, OptiPro has developed new machines and processes which are commercialized in sales to Prime contractors, small to medium sized optics manufacturers, and exported around the world. All profits earned since receiving our first SBIR grant have been re-invested in the company to increase technological improvement and commercialization of technologies.



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## WHAT

**Operational Need and Improvement:** In order for Defense customers and prime contractors to produce visibly opaque, infrared-transparent aerodynamic domes, conformal windows, and optical corrector elements, an instrument is needed to measure the optical figure and transmitted wavefront error of these components to provide feedback for optical figure correction on their manufacturing floors.

**Specifications Required:** To be able to measure large conformal windows and domes to sub-micron tolerances

**Technology Developed:** UltraSurf is a 5-axis non-contact metrology system capable of measuring the surface irregularity of aspheric and freeform optics, conformal windows and ogive shaped domes to sub-micron accuracies in addition to measuring transmitted wavefront, optical thickness, tilt, wedge and decenter. OptiPro will be able to improve the performance and precision of UltraSurf, as well as refine and enhance usability and analytical tools. This will allow Defense customers and prime contractors to cost-effectively manufacture aerodynamic domes.

**Warfighter Value:** Modern optical designs can deviate from traditional spherical and aspherical shapes in order to maximize overall system performance. For the case of missile domes, the overall system performance can include other factors aside from optical performance such as aerodynamic drag, time to target, and damage sustained from environmental conditions. To account for these factors, the traditional spherically shaped dome is replaced by a bullet like ogive shape.

## WHEN

**Contract Number:** N68936-17-C-0006 **Ending on:** January 25, 2019

Milestone	Risk Level	Measure of Success	Ending TRL	Date
Upgrade UltraSurf to measure larger optical components	Low	Measure 30 in tall ogives and >15 in conformal windows	7	December 2019
Develop error compensation models	Med	Improved model accuracy mechanical and thermal errors	6	February 2018
Qualify system accuracy and repeatability	Low	Accurate measurement of a complex optical shape	5	May 2018
Develop fully integrated data analysis package capable of measuring and analyzing any shaped optical component	Med	Measures spheres, aspheres, domes, ogives, conformal windows, and any freeform geometry	7	December 2017

## HOW

**Projected Business Model:** OptiPro Systems has 35 years of experience developing and manufacturing precision optical fabrication machines and metrology systems. We are a global leader in designing and building computer controlled grinding, polishing, and measuring equipment for the precision optics and advanced ceramics industries. Our Advanced Process Development (APD) department focuses on fabrication solutions for precision optics. These solutions are designed to yield parts that can be manufactured from a variety of commercially available materials including optical glasses, ceramics, crystals, and alloys.

OptiPro will be manufacturing and selling the UltraSurf at our facility in Ontario, NY. Because of the investment required to manufacture each unit, we will begin building each system immediately after the purchase order is received. Typical lead time to build the UltraSurf is currently 24-32 weeks.

**Company Objectives:** OptiPro will be looking to provide insight on the latest developments with UltraSurf as well as other optical manufacturing technology advancements being driven by the SBIR program. By continuously advancing our technology, OptiPro will be the leader in providing solutions for Defense companies and prime contractors that will enable cost-effective production of components with defense applications.

**Potential Commercial Applications:** Companies in the precision optics and advanced hard ceramics industries can benefit from OptiPro's manufacturing and metrology equipment. Components that are able to be produced with OptiPro technology serve a variety of applications, including aerospace, automotive, medical, and consumer electronics.

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