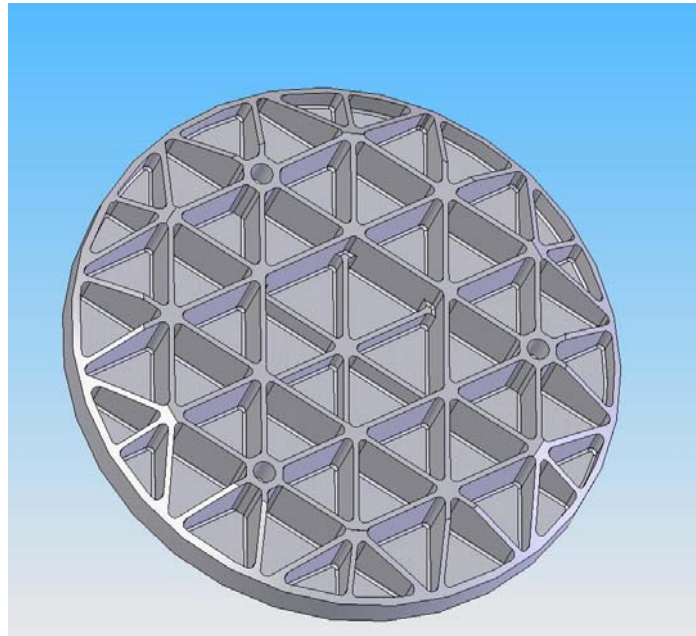


Final Report:
 Project: 300 mm TMT Prototype Segment
 November 2, 2004

Executive Summary:

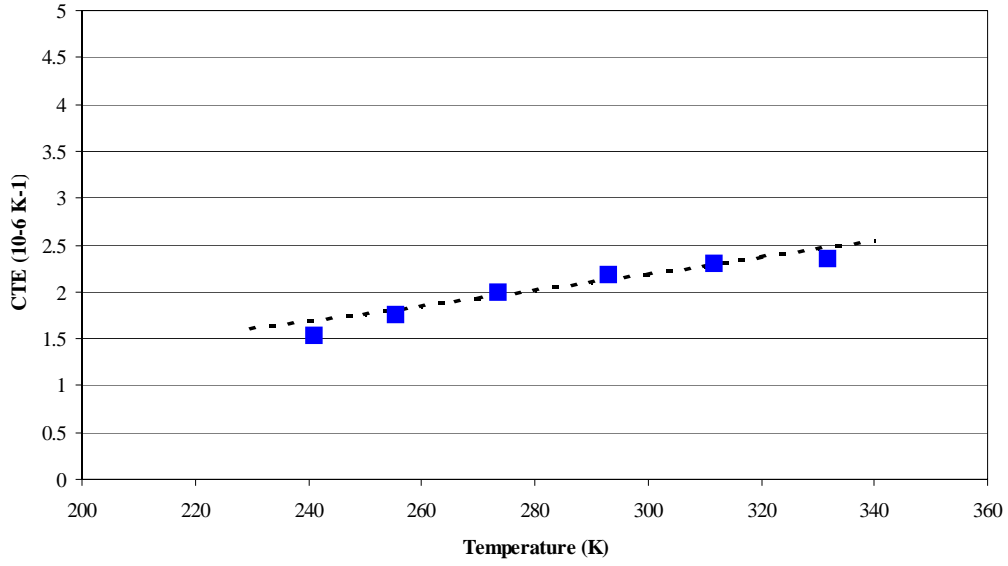
CoorsTek is pleased to complete our contract (C10454A) for AURA. This document will review CoorsTek’s relevant experience and capability for manufacturing silicon carbide (SiC) optical components and report on the final quality of the TMT Prototype mirrors. CoorsTek manufactured 2 prototype mirror segments for the AURA TMT project. Below is graphical representation of these mirror segments.



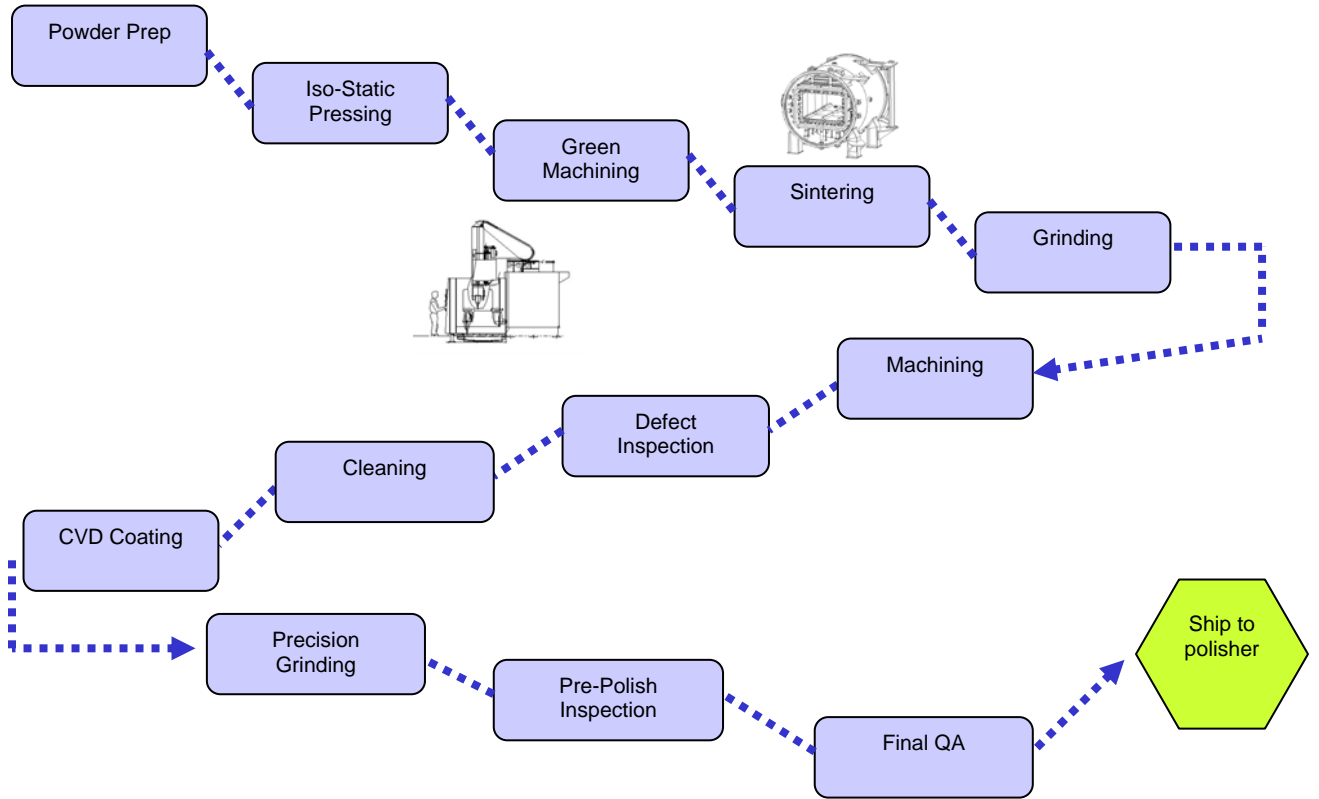
Critical Material Properties of SCDS Silicon Carbide for Optical Applications

Property	Units	Test Method	Value
Density	gm/cc	ASTM-C20	3.15
Flexural Strength (MOR) @ 20 °C	MPa	ASTM-F417	480
Elastic Modulus @ 20 °C	GPa	ASTM-C848	410
Poisson’s Ratio @ 20 °C		ASTM-C848	0.21
Thermal Conductivity	W/m °K	ASTM-C408	150
CTE @ 20 °C	1 x 10 ⁻⁶ / °C		2.0

CTE SC30 SiC Recent Sample with typical values



General Manufacturing Process



Fabrication Schedule

See attached document: MS Project – TMT 300 mm Proto Fab

CoorsTek's relevant experience:

In the last two years, CoorsTek has focused on building competency in manufacturing SiC optical products. In addition to developing our internal technology we have formalized our relationship with Boostec the leading supplier of SiC optical structures in Europe, dedicated a core SiC engineering development team, and made a substantial investment commitment to this product line.

CoorsTek, Oregon Operations is part of CoorsTek, Inc., the largest US based technical ceramics manufacturer. Over our 90 year history we have developed long-standing tradition of developing highly engineered application specific materials and manufacturing processes. In 2003, CoorsTek committed to starting a development program for silicon carbide optics at the Oregon site.

CoorsTek Oregon is a leading supplier for high precision air bearing guideways for silicon wafer inspection and lithography, ultra flat vacuum chucks, and machine tool calibration standards. We have equipment designed manufacturing large, up to 5 meter, precision structures. Our finishing technologies allow finish geometries at the sub-micron level. One of CoorsTek's unique strengths is to develop application specific machines for metrology and precision machining to process non-standard product geometries.

CoorsTek's Oregon strength in high precision ceramics allowed natural adoption of the SiC optical product line when the corporate management team targeted this market segment for growth opportunities in 2003. Since, entering this market CoorsTek has shipped over 50 SiC mirrors to leading optical finishing companies, large defense contractors, academic research groups, and satellite integrators for testing and analysis. The market response to CoorsTek's presence in this segment has tremendous. We expect that this market will produce long-term growth for CoorsTek as well as enable rapid development of many new technologies for SiC optical products.

In addition to developing our own unique design and process technology for SiC optics, CoorsTek has entered into a cross licensing agreement Boostec, SA of Bazet, France (www.Boostec.com) for silicon carbide optical technology. Boostec has been researching SiC for optical applications with their partner EADS Astrium for 10 years. Boostec is the leading manufacturer of silicon carbide optical products in Europe. They have two all-SiC telescopes in space, Rosetta and ROCSAT2, and they recently completed the all-SiC 3.5 meter Herschel space telescope structure. Furthermore, Boostec is currently a supplier to ESO's OWL project for meter class prototype mirror segments.

CoorsTek has assembled a team of highly trained engineering professionals with over 75 years of combined experience in high precision mechanical structures, non-oxide ceramics material engineering, and high precision machining. CoorsTek's development engineering staff works with our customers to assist in the design of high performance, cost-effective products to meet their ever-increasing performance requirements. We have recently focused on developing engineering competencies in 3D modeling, FEA, and material testing to facilitate optimal designs for our customers. Our commitment to this effort in the last year is demonstrated by significant investment in advanced engineering software, hardware, and training to get all of our engineering staff on the cutting edge of engineering technology.

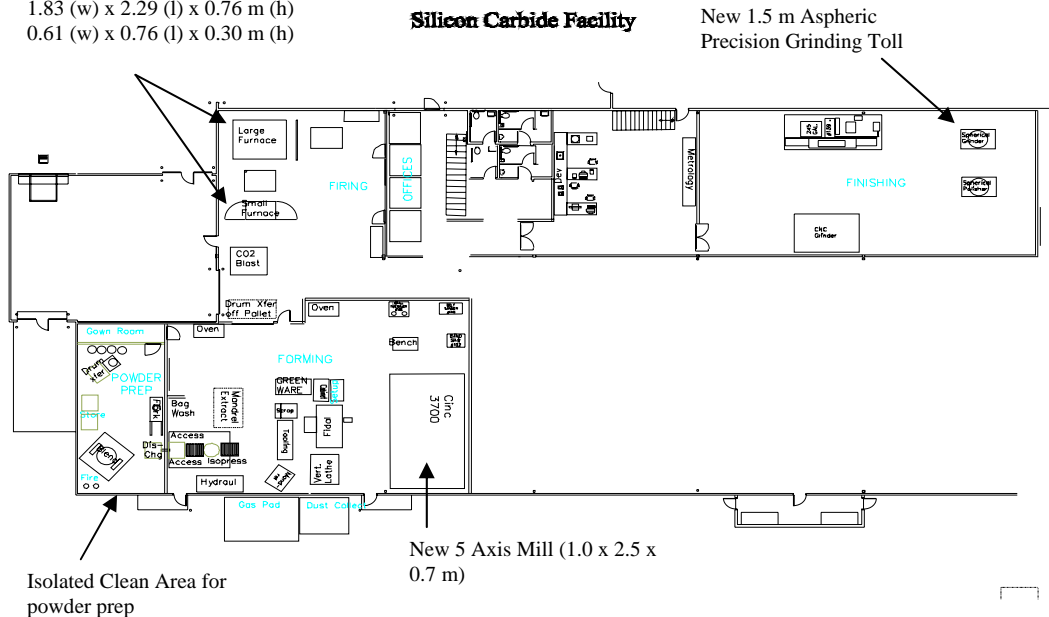
CoorsTek has made a multi-million dollar commitment to produce SiC optical products. The corporate management recently approved a major capital expansion of our SiC production capacity at our Oregon site. By June 2005, CoorsTek will have production size capacity for meter class SiC optics as well as free form net shaping, and high precision aspheric machining. The expansion project includes two large furnaces, 5 axis milling center, aspheric precision grinding tool, and material analysis equipment. A 25,000-ft² area of our current facility is being remodeled specifically for SiC optic production. It will include a dedicated material handling to avoid cross contamination, temperature controlled precision machining area, and world-class surface analysis and material testing equipment.

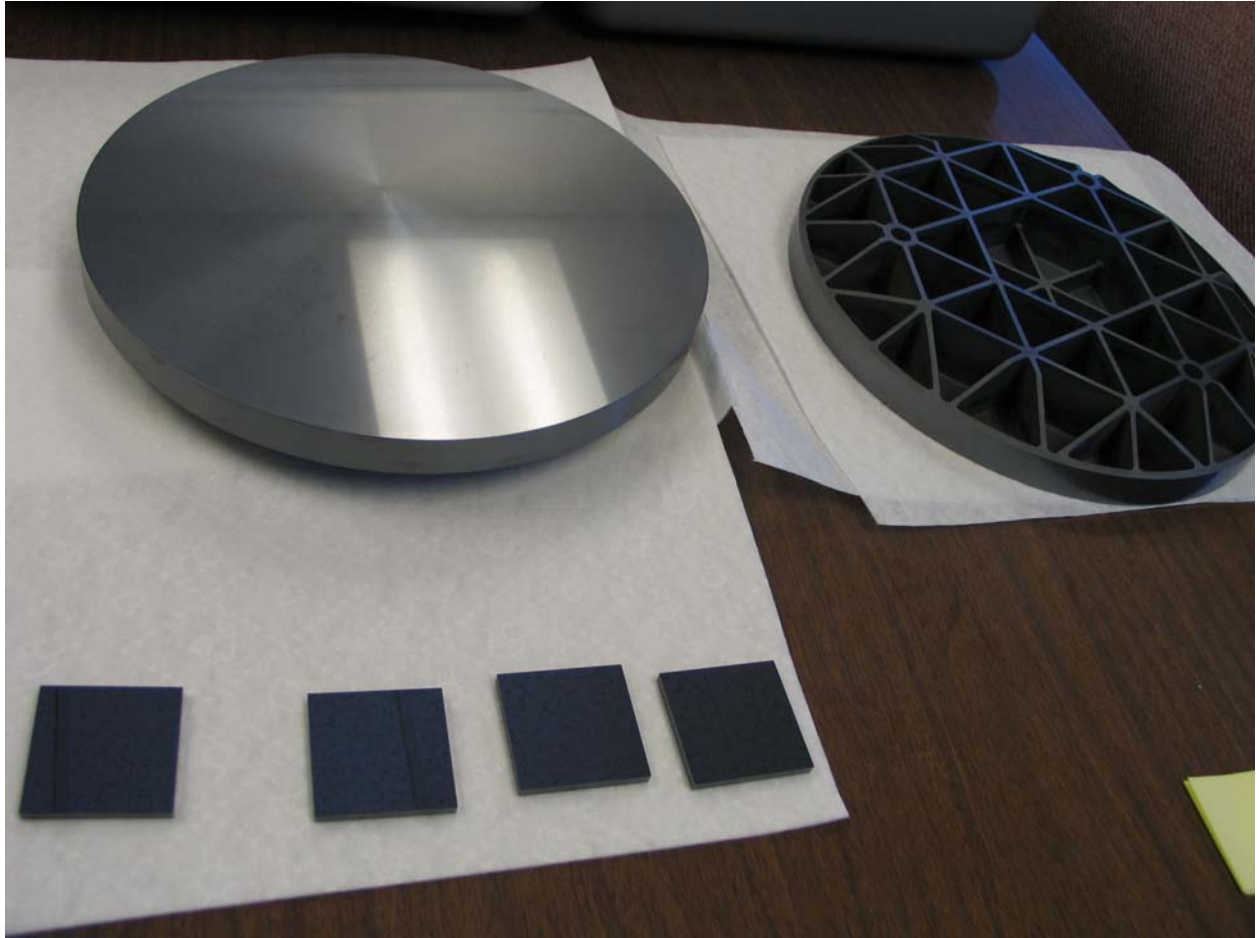
Current capital expansions for SiC optical production Area

Two SiC New Furnaces

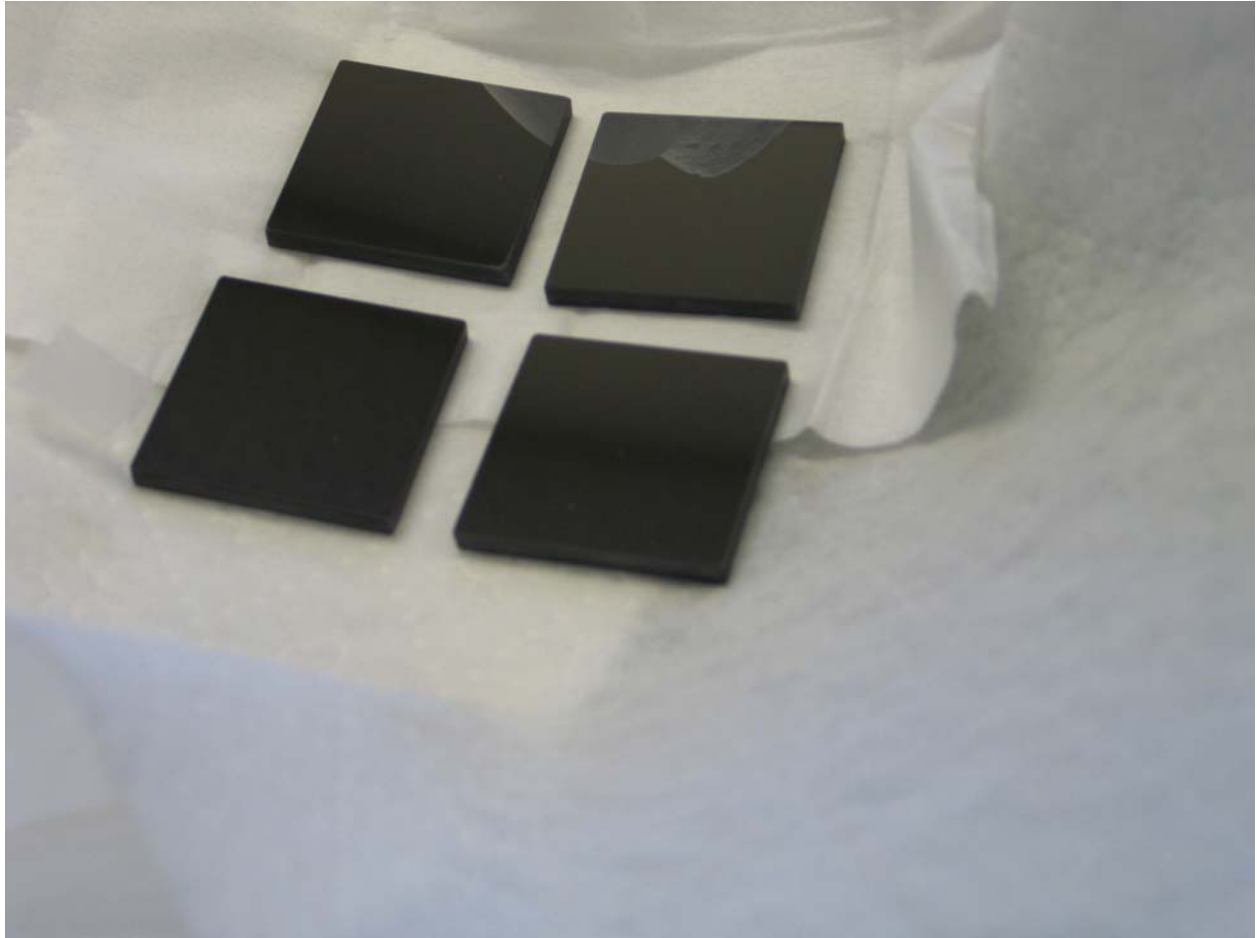
1.83 (w) x 2.29 (l) x 0.76 m (h)

0.61 (w) x 0.76 (l) x 0.30 m (h)





SiC blanks with witness coupons, manufactured by CoorsTek



**Witness coupons of SiC, manufactured by CoorsTek
(Top two samples polished to $\sim 10^{\text{nm}}$ surface RMS)**