

SCS SiC FIBERS

Process, Properties, and Production

OUTLINE OF PRESENTATION

- History of SCS Silicon Carbide Fibers
- Manufacturing Process
- Physical and Mechanical Properties
- Current Production and Sales Price
- Future Plans

HISTORY OF SPECIALTY MATERIALS' SCS FIBER

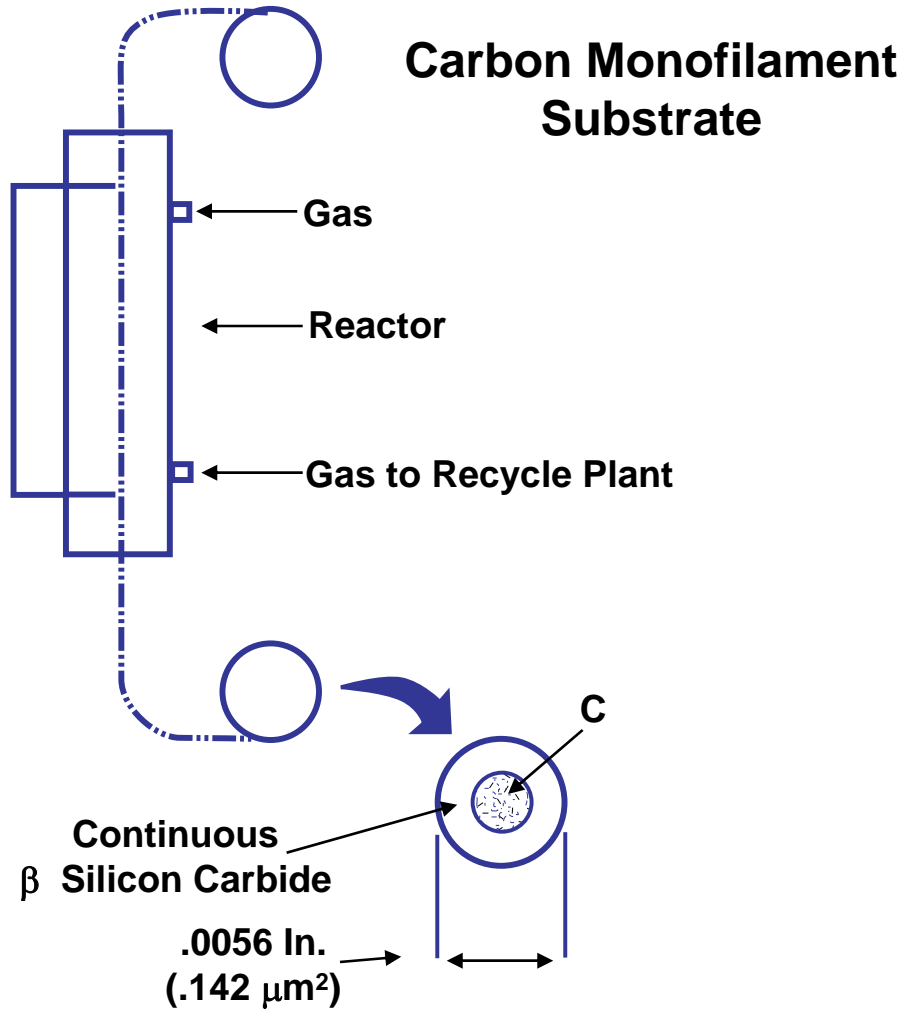
- Boron was ineffective in metal matrices
- The Air Force wanted a fiber for titanium
- AFML funded work in the early 70's
 - Initially, SiC on W substrate
 - Developed SiC on C substrate
 - Improved high temperature strength retention
 - Optimized surface for handling and bonding

Specialty Materials' Family of SCS Fibers

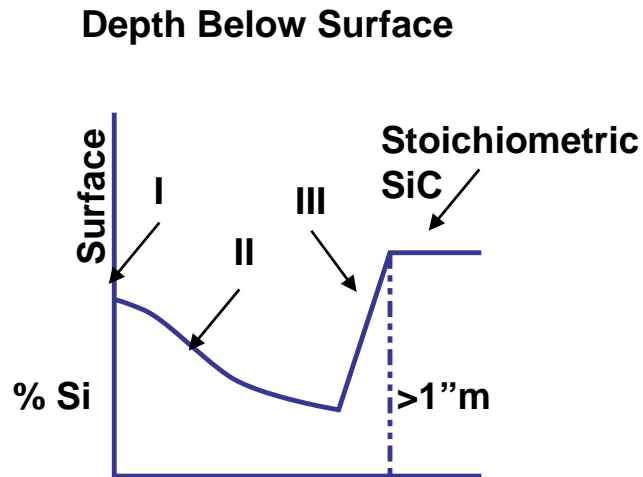
- SCS-6
 - Developed for titanium and ceramic matrices
 - 5.6 mil diameter
- SCS-9A
 - Developed for thin-gauge face sheets for NASP
 - 3.1 mil diameter
- SCS-ULTRA
 - Developed to achieve highest strength
 - 5.6 mil diameter

MANUFACTURING PROCESS

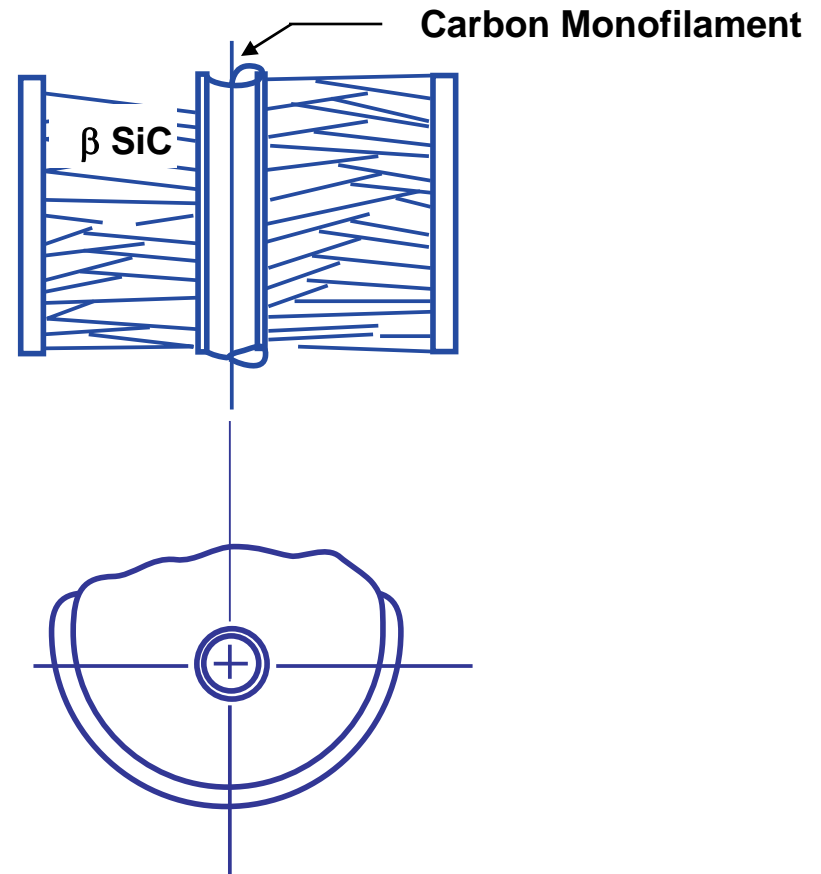
SCS FIBER MANUFACTURING PROCESS



CONSTRUCTION OF FIBER FOR STRENGTH AND MATRIX COMPATIBILITY

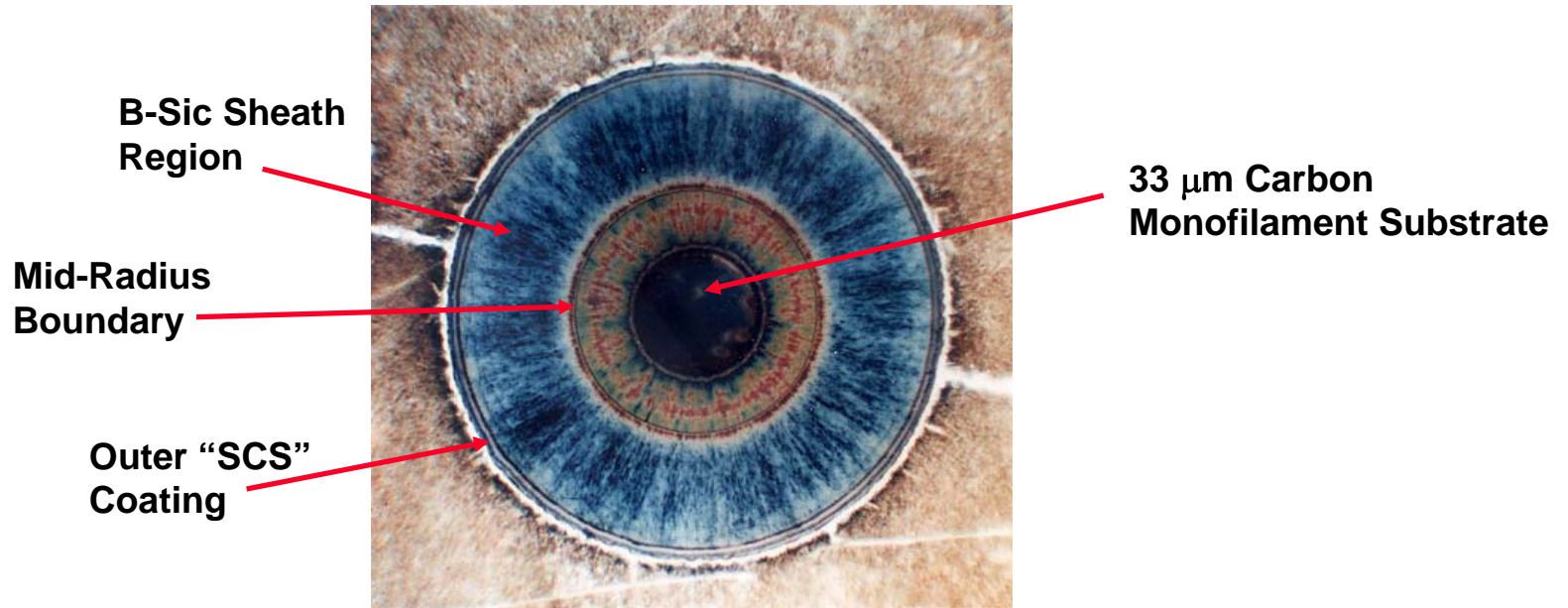


- **Zone I** - Surface Bondable & Wettable By Matrix
- **Zone II** - Broad Forgivability Zone
- **Zone III** - Inner Gradient - Necessary for Maintaining Filament Strength



PHYSICAL AND MECHANICAL PROPERTIES

Schematic of SCS CVD SiC Monofilament



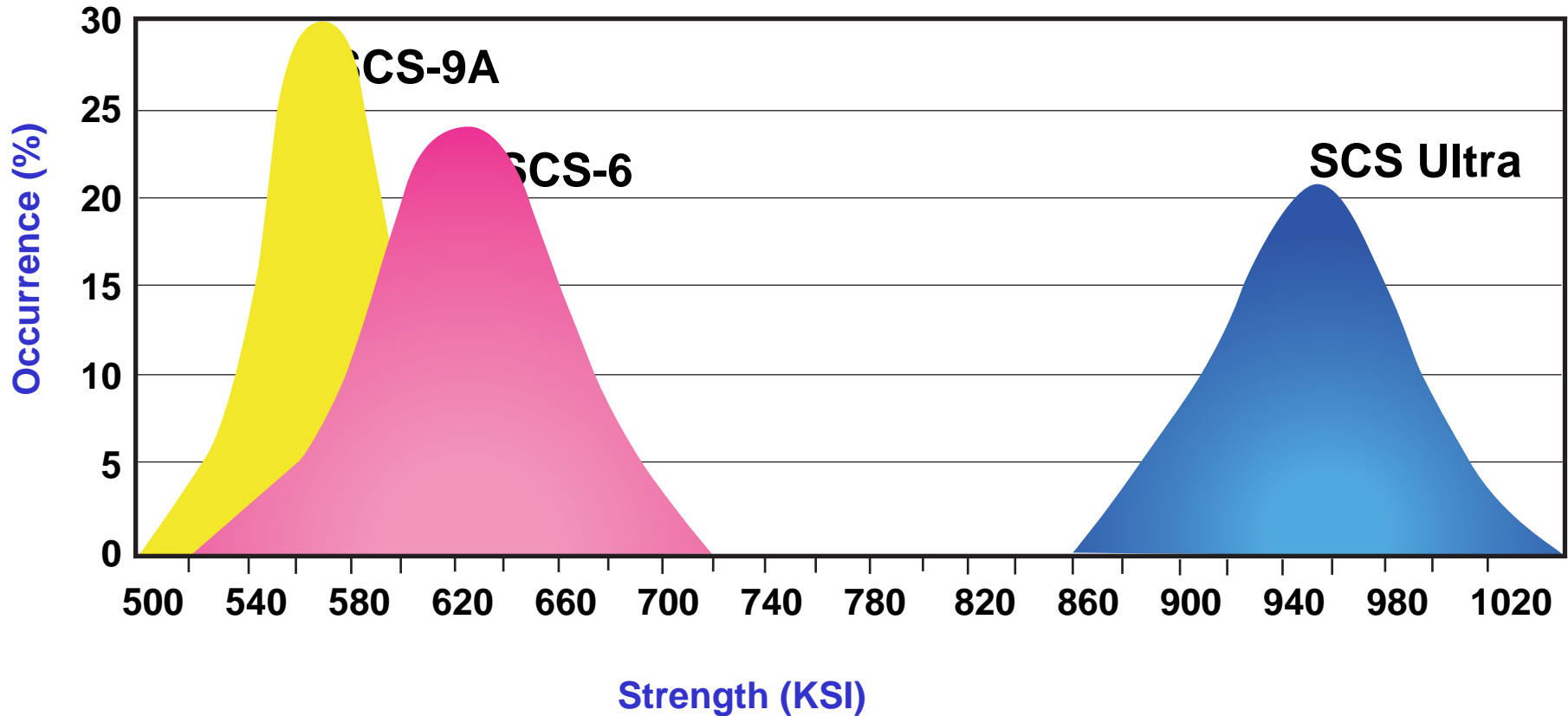
CVD Silicon Carbide

Filament Properties (SCS-6)

• Diameter	5.6 mils	140 μm
• Tensile Strength	500 + ksi	3450 MPa
• Modulus	56 msi	400 GPa
• Density	0.11 lb/in ³	3.0 gm/cc

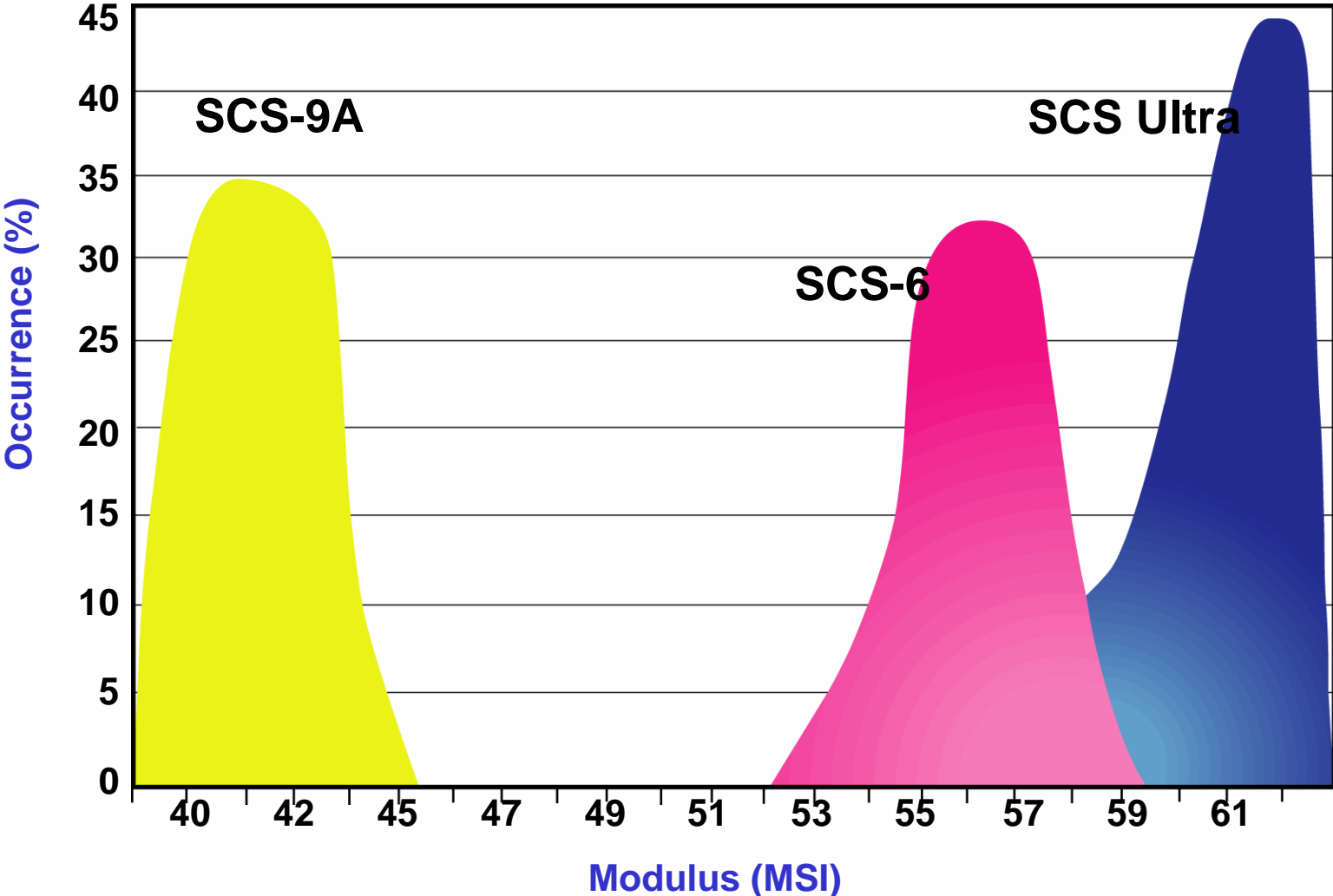
COMPARISON OF SCS SILICON CARBIDE FIBERS

Fiber Strength

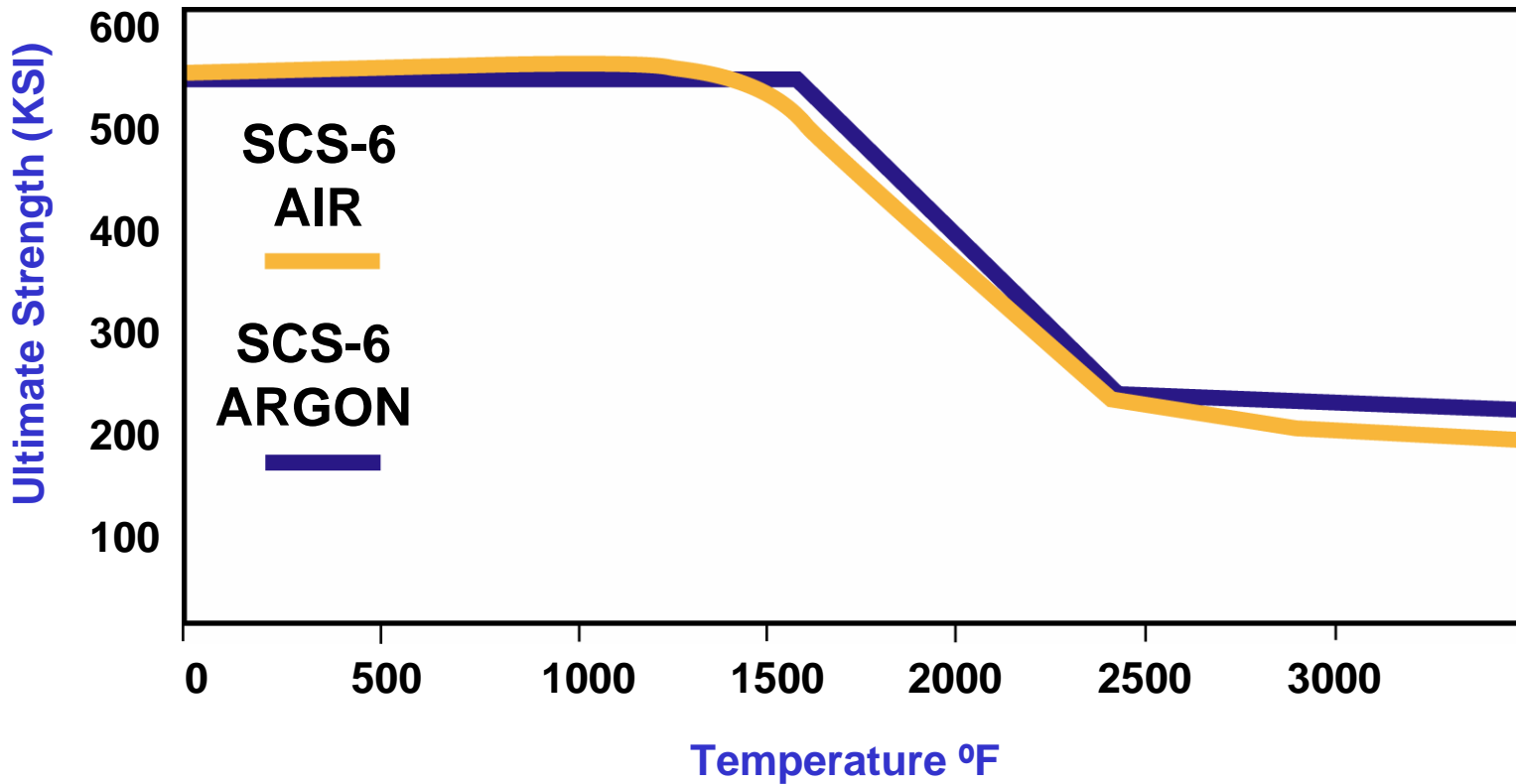


COMPARISON OF SCS SILICON CARBIDE FIBERS

Fiber Modulus

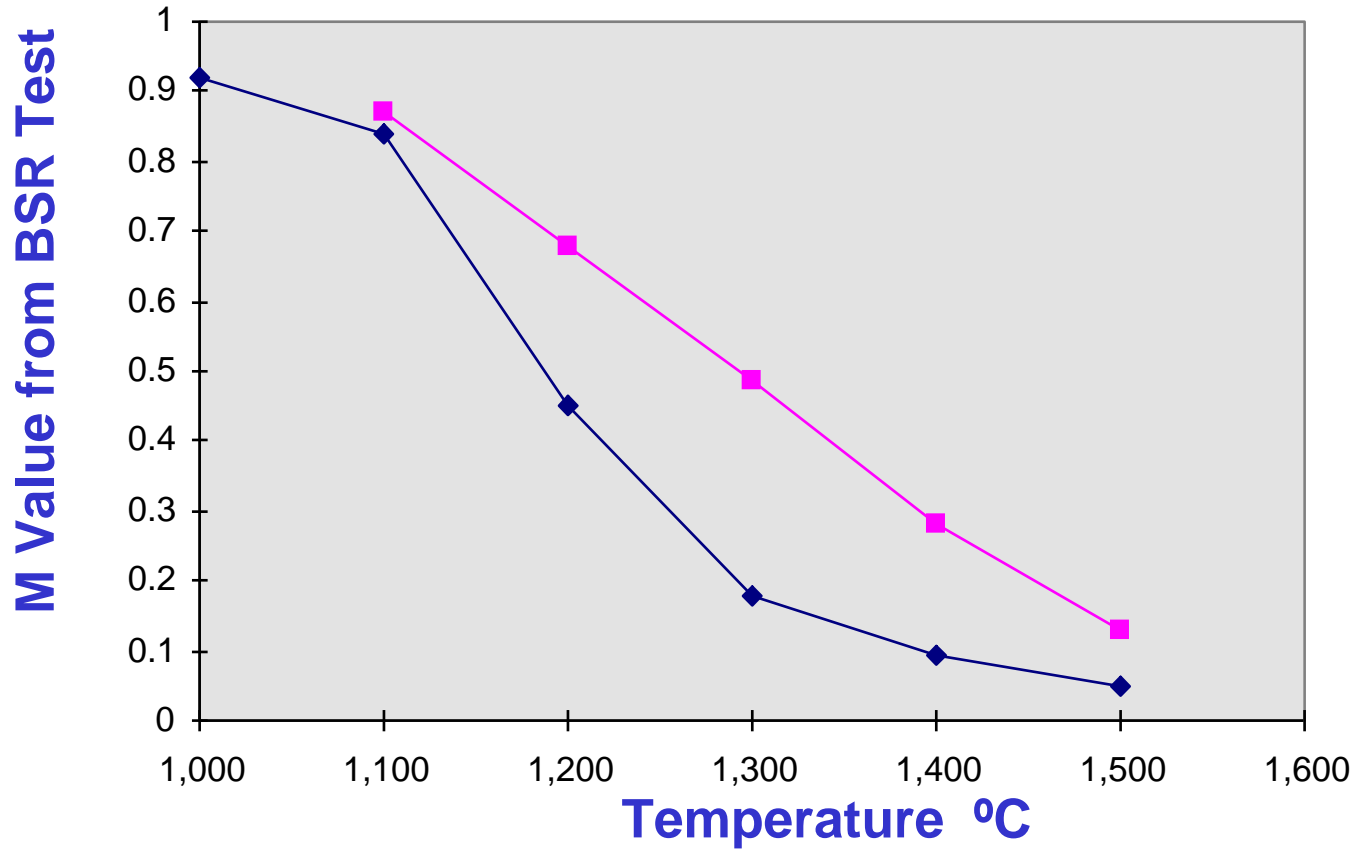


SCS-6 STRENGTH VS. TEMPERATURE

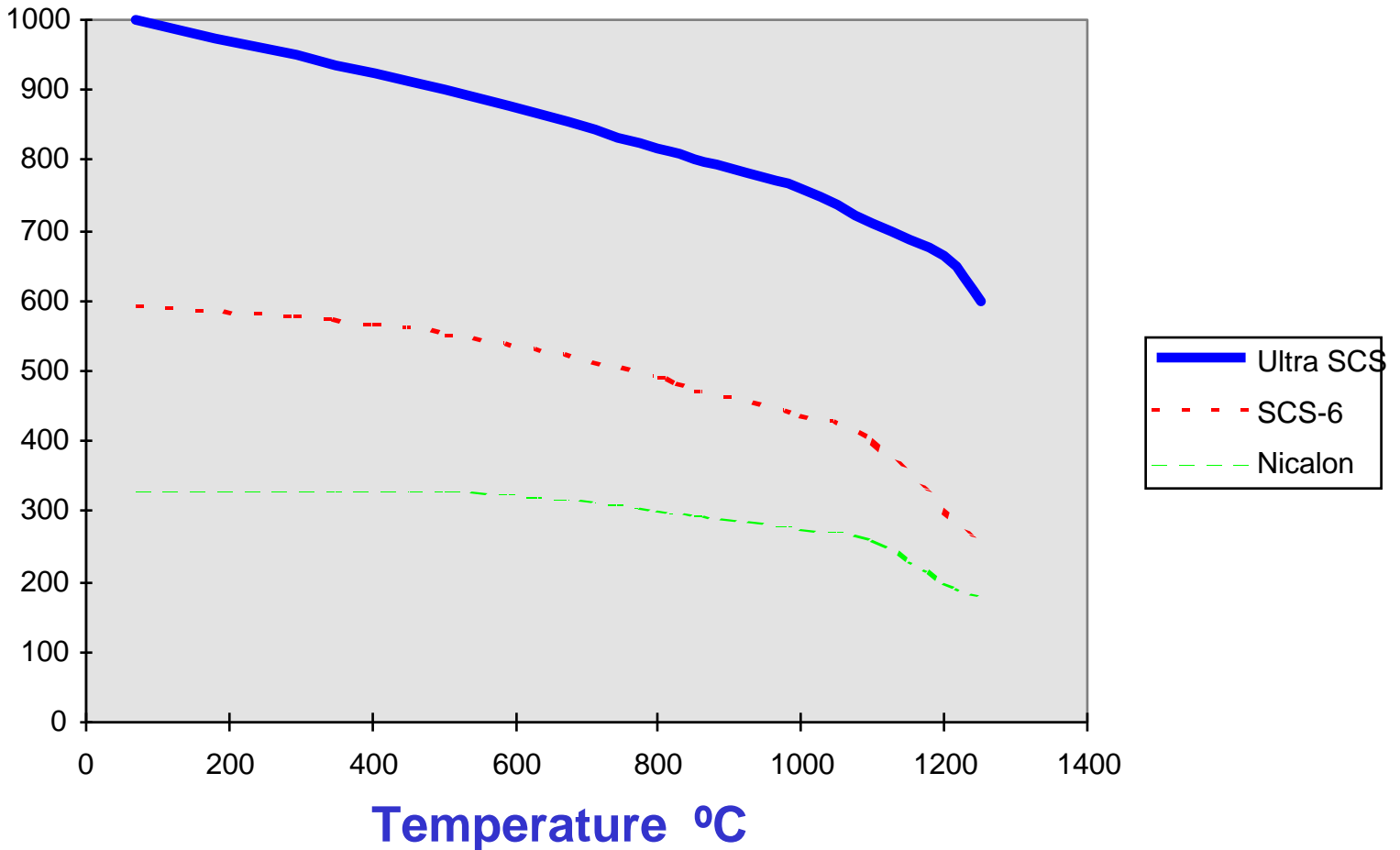


Approximate soak time at temperature - 3 minutes

BEND STRESS RELAXATION CREEP OF SCS-6 AND ULTRA SCS



COMPARISON OF TENSILE STRENGTH VS. TEMPERATURE



Approx. soak time at temperature - 3 minutes

CURRENT PLANT AND FUTURE PLANS

- Currently producing 6,000 pounds per year
- Gas recovery system can handle 10,000 pound per year
- Scale-up forecasts through 2010 have been well established
- Capacity will be added as fiber demand continues to increase