



GRANOC

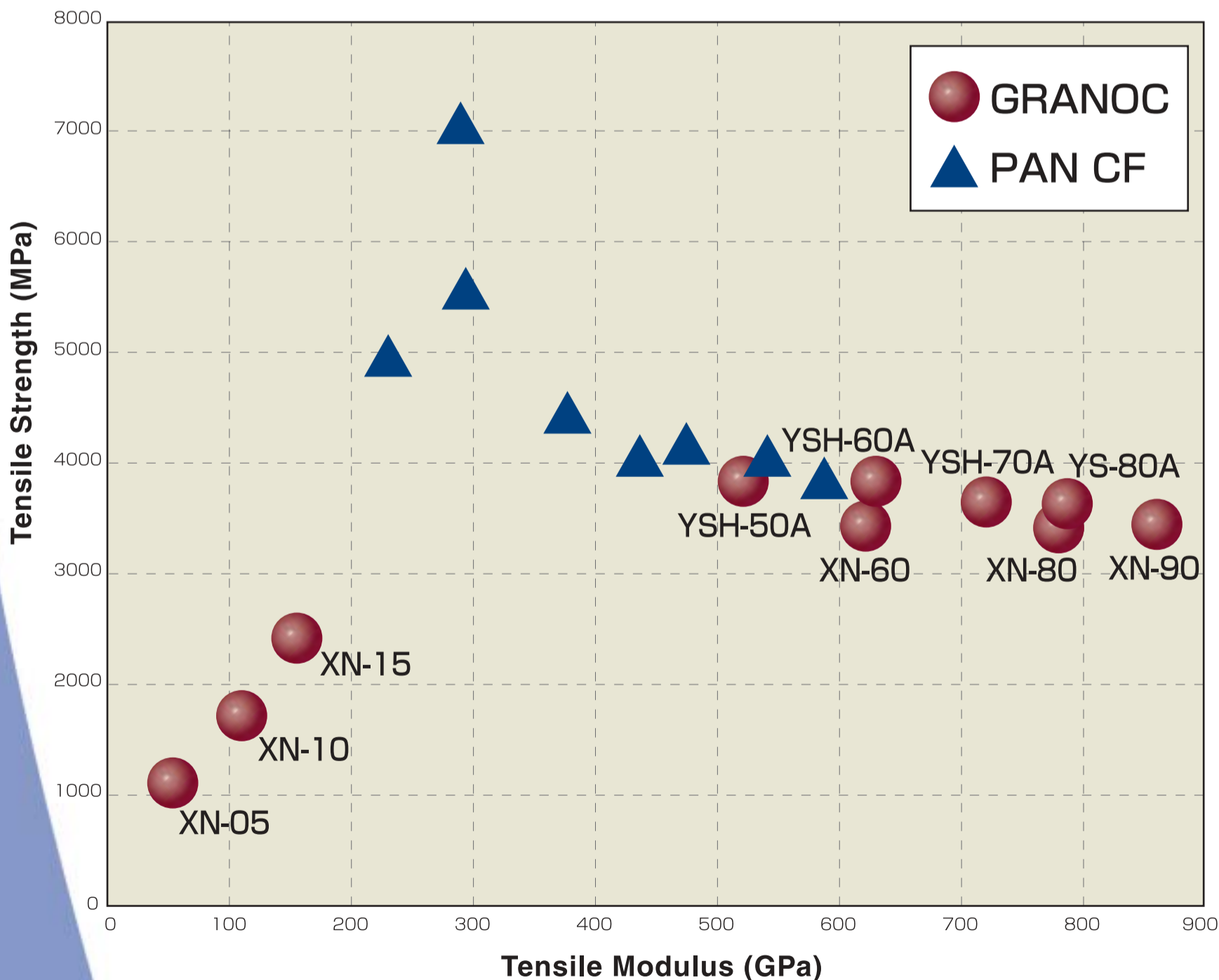
Wide variety in modulus and tow count

Modulus → 55 GPa to 860 GPa (PAN CF → 230GPa to 580 GPa)
Tow count → 1k to 12k (75 g/km to 1780 g/km)

High Modulus and High Strength

High Thermal Conductivity

ZERO CTE



CARBON FIBER

YSH and YS Grade (7 micron diameter) : Aerospace and sports application

Grade	Filament	Tensile Modulus		Tensile Strength		Elongation %	Density g/cm ³	Yield g/1000m
		GPa	MSI	MPa	KSI			
YSH-50A-10S	1000	520	76	3900	570	0.7	2.10	75
YSH-50A-30S	3000	520	76	3900	570	0.7	2.10	250
YSH-50A-60S	6000	520	76	3900	570	0.7	2.10	520
YSH-60A-10S	1000	630	92	3900	570	0.6	2.12	75
YSH-60A-30S	3000	630	92	3900	570	0.6	2.12	250
YSH-60A-60S	6000	630	92	3900	570	0.6	2.12	520
YSH-70A-10S	1000	720	105	3630	530	0.5	2.14	75
YSH-70A-30S	3000	720	105	3630	530	0.5	2.14	250
YSH-70A-60S	6000	720	105	3630	530	0.5	2.14	520
YS-80A-30S	3000	785	114	3630	530	0.5	2.17	250
YS-80A-60S	6000	785	114	3630	530	0.5	2.17	520
YS-90A-30S	3000	880	128	3530	510	0.3	2.18	250
YS-90A-60S	6000	880	128	3530	510	0.3	2.18	520

XN / CN Grade (10 micron diameter) : Industrial and sports application

Grade	Filament	Tensile Modulus		Tensile Strength		Elongation %	Density g/cm ³	Yield g/1000m
		GPa	MSI	MPa	KSI			
XN-60-60S CN-60-60S	6000	620	90	3430	500	0.6	2.12	890
XN-60-A2S CN-60-A2S	12000	620	90	3430	500	0.6	2.12	1780
XN-80-60S CN-80-60S	6000	780	114	3430	500	0.5	2.17	890
XN-80-A2S CN-80-A2S	12000	780	114	3430	500	0.5	2.17	1780
XN-90-60S CN-90-60S	6000	860	125	3430	500	0.4	2.19	880

XN Grade (10 micron diameter) : Low Modulus and High elongation

Grade	Filament	Tensile Modulus		Tensile Strength		Elongation %	Density g/cm ³	Yield g/1000m
		GPa	MSI	MPa	KSI			
XN-05-30S	3000	54	8	1100	160	2.0	1.65	410
XN-10-30S	3000	110	16	1700	250	1.6	1.70	450
XN-15-30S	3000	155	22	2400	350	1.5	1.85	450

Pitch Based High Modulus Carbon Fibers

XN-80-A2S, XN-60-A2S

Advantage :

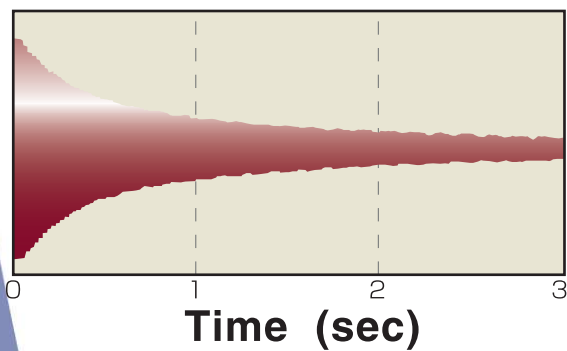
- Ultra high modulus
XN-80 : 780GPa XN-60 : 620GPa
- Competitive performance in (Modulus/Euro)
- Excellent handling
- Zero CTE
- High thermal conductive

Application :

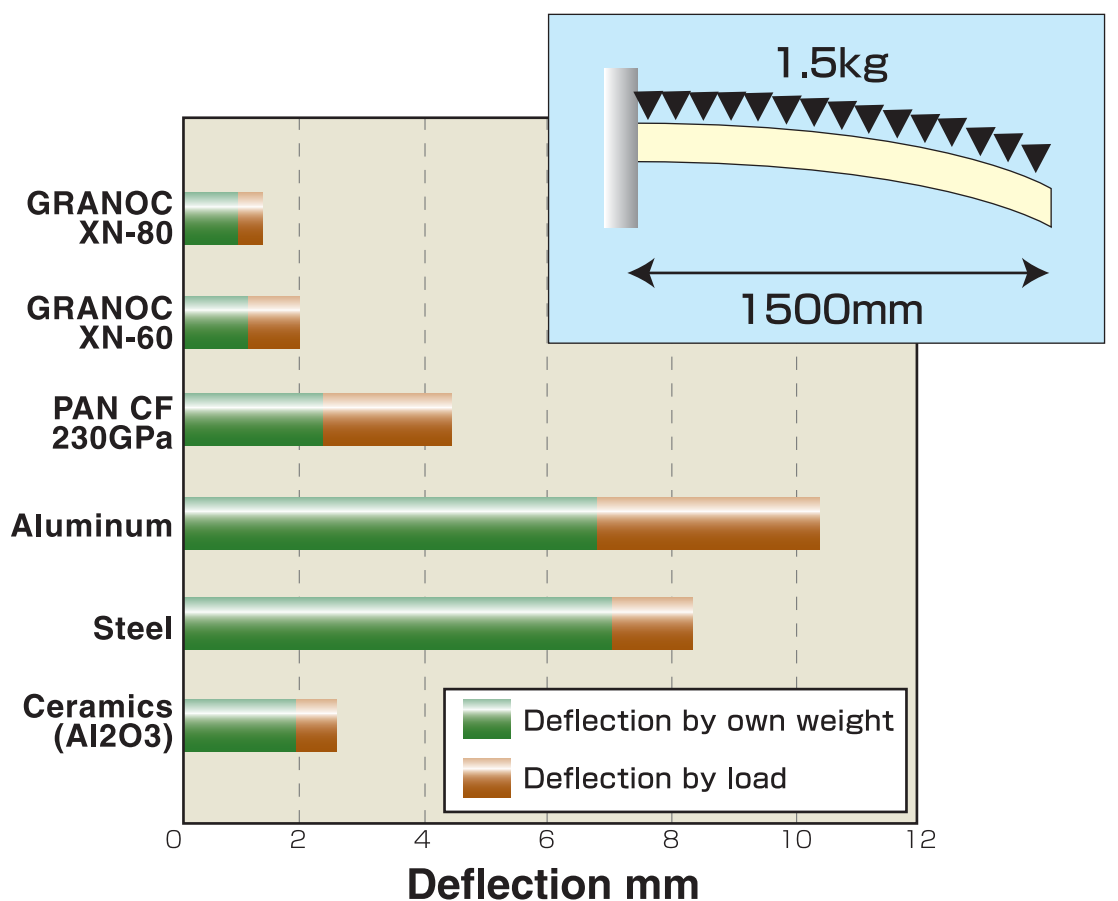
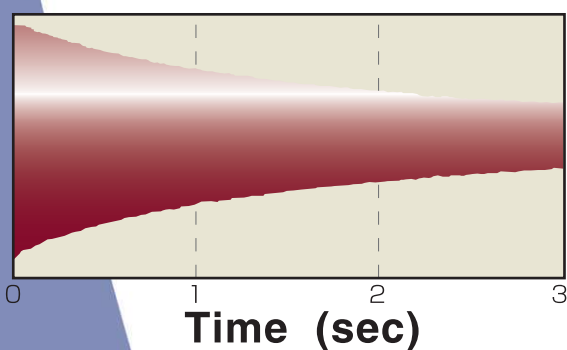
- Roller
- Robot hand
- Drive shaft
- Construction and Engineering
- Fishing rod
- Bicycle

Grade	Filament Diameter	Filaments per Yam	Tensile Modulus	Tensile Strength	Elongation %	Density g/cm ³	Yield g/1000m
	μm		GPa	MPa			
XN-60-60S	10	6000	620	3430	0.6	2.12	890
XN-60-A2S	10	12000	620	3430	0.6	2.12	1780
XN-80-60S	10	6000	780	3430	0.5	2.17	890
XN-80-A2S	10	12000	780	3430	0.5	2.17	1780

Lower vibration for damping Pitch CF laminate XN-80



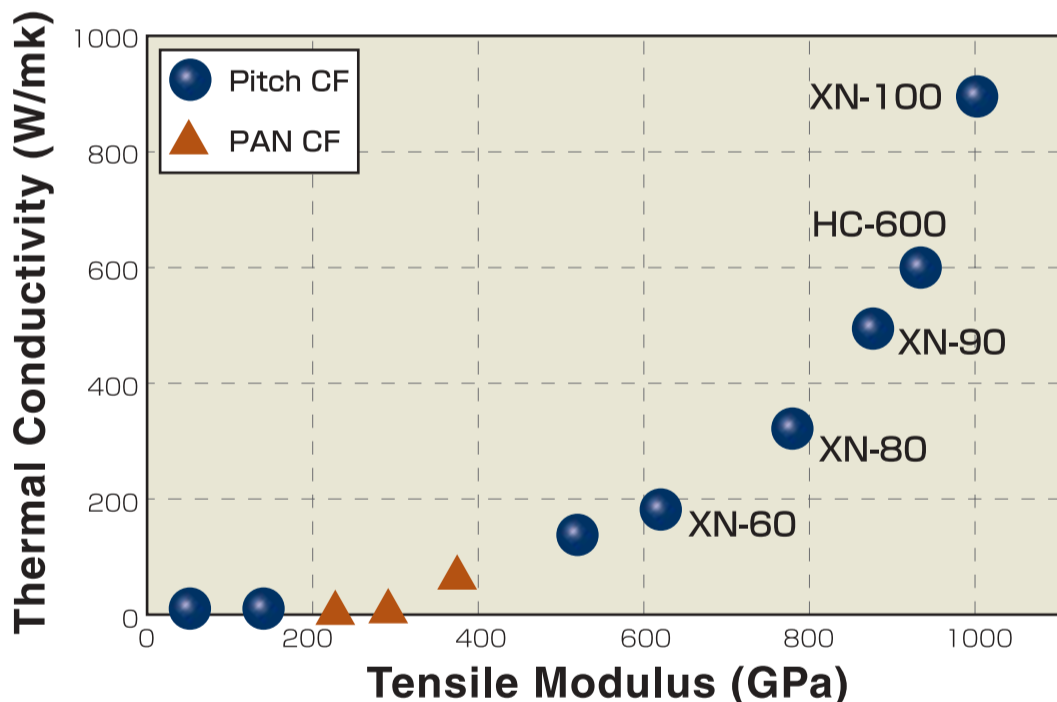
PAN CF 230GPa



High Thermal Conductive Fiber

Product line up

- 900 W/mk: XN-100/chopped, milled fiber
- 600 W/mk: HC-600/milled fiber
- 500 W/mk: XN-90/continuous fiber



Material	Thermal conductivity (W/mk)	Density (g / cm ³)
XN-100	900	2.22
HC-600	600	2.22
XN-90	500	2.19
XN-80	320	2.17
Copper	400	8.9
Aluminum Alloy	100-200	2.7
Boron Nitride (BN)	60	2
Carbon Fiber (PAN regular grade)	10	1.7

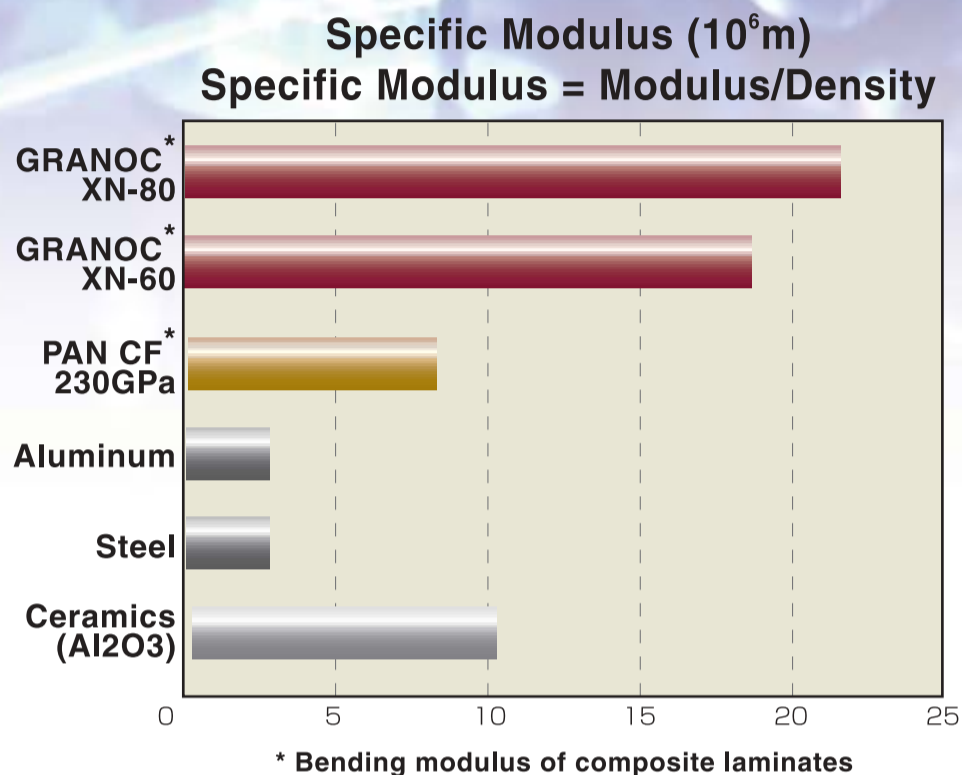
GRANOC high thermal conductive products

	Thermal conductivity	Available form			
	W/mk	Yarn	Fabric	Chopped	Milled
XN-100	900			○	○
HC-600	600				○
XN-90	500	○	○	○	
XN-80	320	○	○	○	
YS-90A	500	○	○	○	
YS-80A	320	○	○	○	

Industrial Application

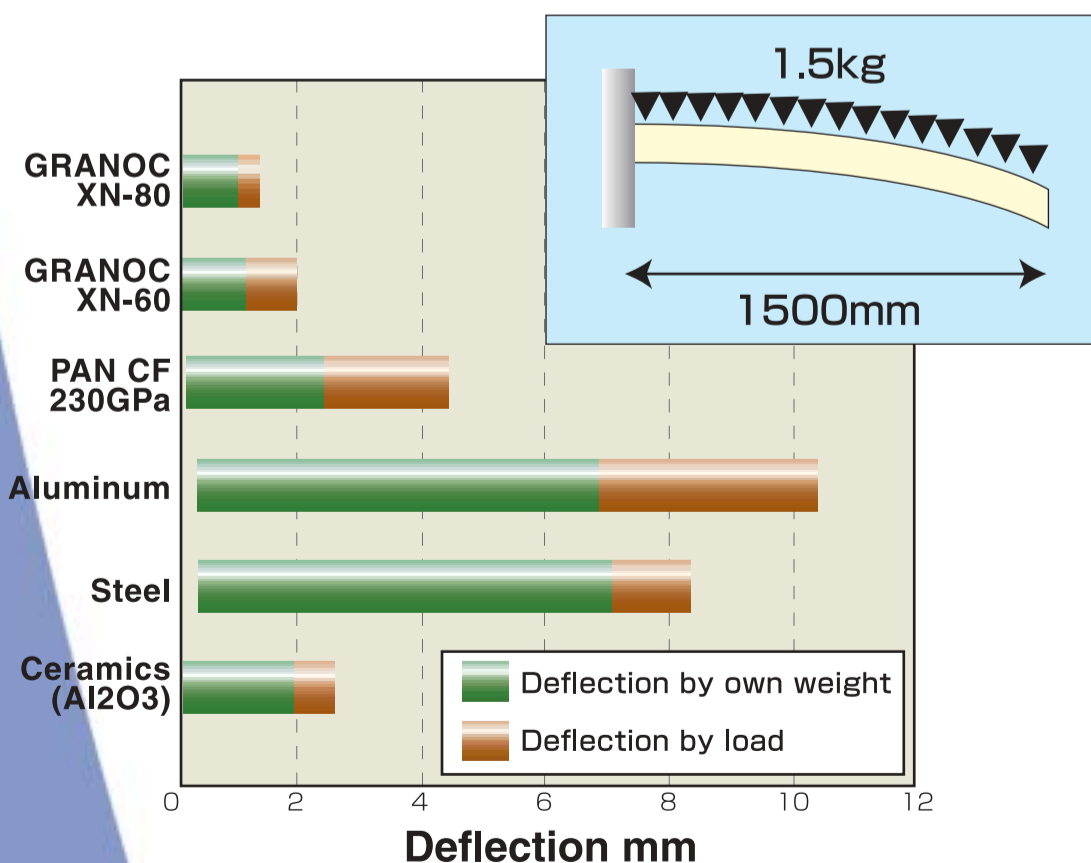
Application :

- Roller
- Robot hand
- Drive shaft
- Construction and Engineering
- Fishing rod
- Bicycle

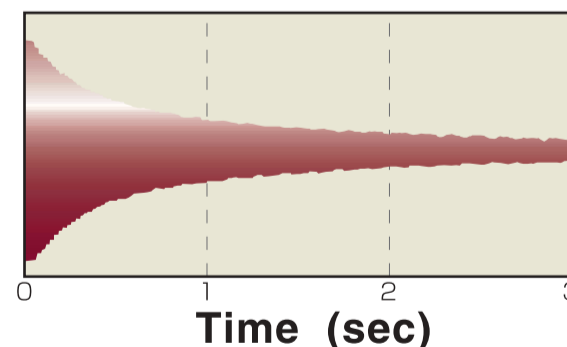


Advantage :

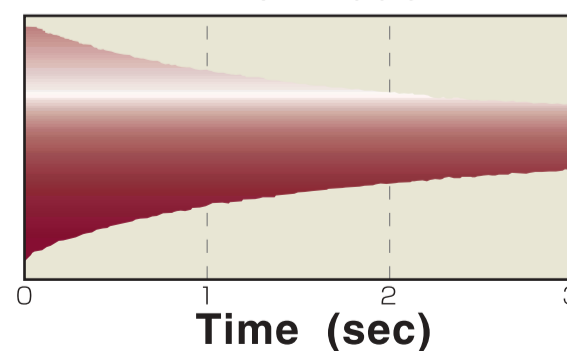
- Light weight and high stiffness
- Low Deflection
- Lower Vibration
- Thermal Stability (Zero CTE)



Lower vibration for damping Pitch CF laminate XN-80



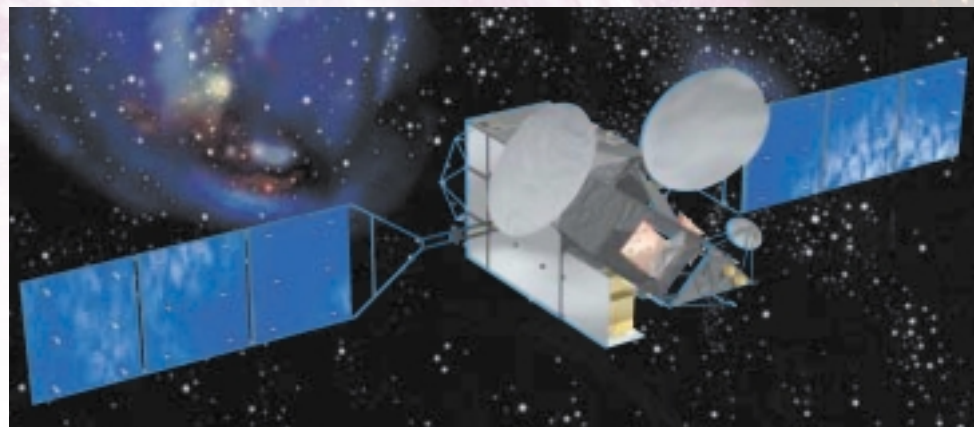
PAN CF 230GPa



Satellite and Aerospace Application

Application :

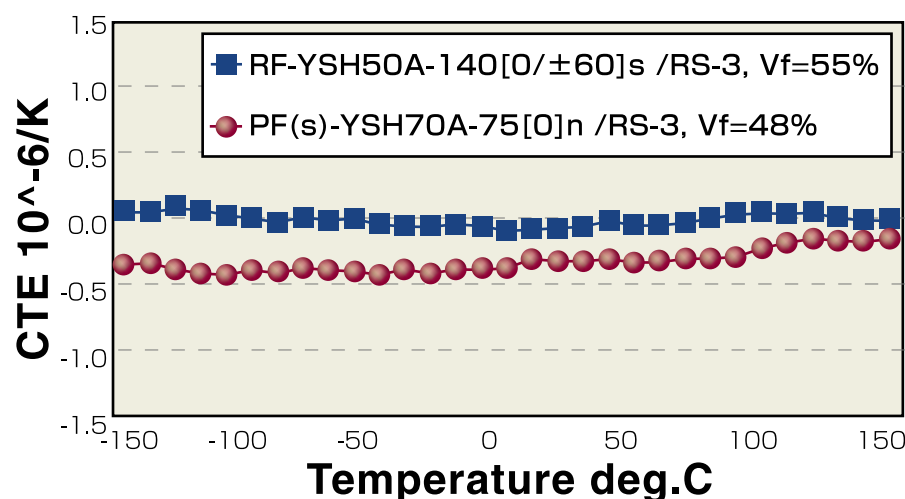
- Antenna / Reflector
- Solar Array, Optical Bench
- Bus / Payload / Support Structure



WINDS -©JAXA

Advantage :

- Light weight and high stiffness
- Thermal stability (Zero CTE)
- High thermal conductivity



GRANOC Fabric

Weaving Structure :

Plain, Spread , Plain with mild spread, 5 Harness satin

- Light Weight
- No Gap Fabrics
- Spread Fabrics using Patented Technology

< Typical products >

Grade	Fiber	FAW (g/m ²)	Weaving structure	Width
5HS-YSH50A-140	YSH-50A-10S	140	5 Harness stain	1000 mm
PF-YSH50A-140	YSH-50A-10S	140	Plain	1000 mm
SF-YSH50A-75	YSH-50A-10S	75	Spread	500 mm
PF(S)-YSH70A-75	YSH-70A-10S	75	Mild spread	1000 mm
5HS-YS80A-140	YS-80A-10S	140	5 Harness stain	500 mm