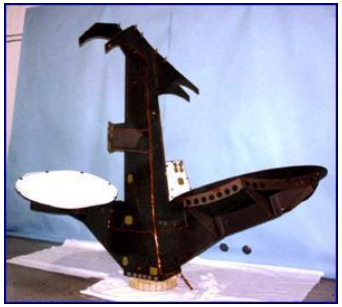
GRANOC

Nippon Graphite Fiber Corporation

Pitch based Carbon Fiber

is Coal Tar based Carbon Fiber.
has very unique properties vs. PAN based CF



Advantages of Pitch based Carbon Fiber

- Light weight and High modulus
- Low vibration
- Dimensional stability : low thermal expansion
- High thermal conductivity
- Electrical conductivity

	Pitch Based CF	PAN Based CF
Tensile Modulus	55 - 900 GPa	160 - 600 GPa
Tensile strength	up to 4000 MPa	up to 6400 MPa
Density	2.0 – 2.2 g/cm^3	1.7 – 1.9 g/cm^3
Thermal Conductivity	up to 900 W/mK	up to 200 W/mK
Applications	Sporting Goods Industry Satellite	Aerospace Sporting Goods Industry

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Company Name : Nippon Graphite Fiber Co.
Established : April, 1995
Head office : Himeji, Hyogo, Japan
Factory : Himeji, Hyogo, Japan
Share holder : Nippon Steel Sumikin Materials Co.
JX Nippon Oil & Energy Co.
Products : Pitch Based Carbon Fiber
Capacity : 200 MT/Y

History :

1995 : Established as joint venture between Nippon Steel and Nippon Oil

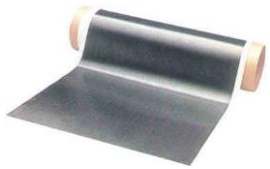
2001 : ISO9001 acquired

2010 : New production line started (200 MT/Y)

Products

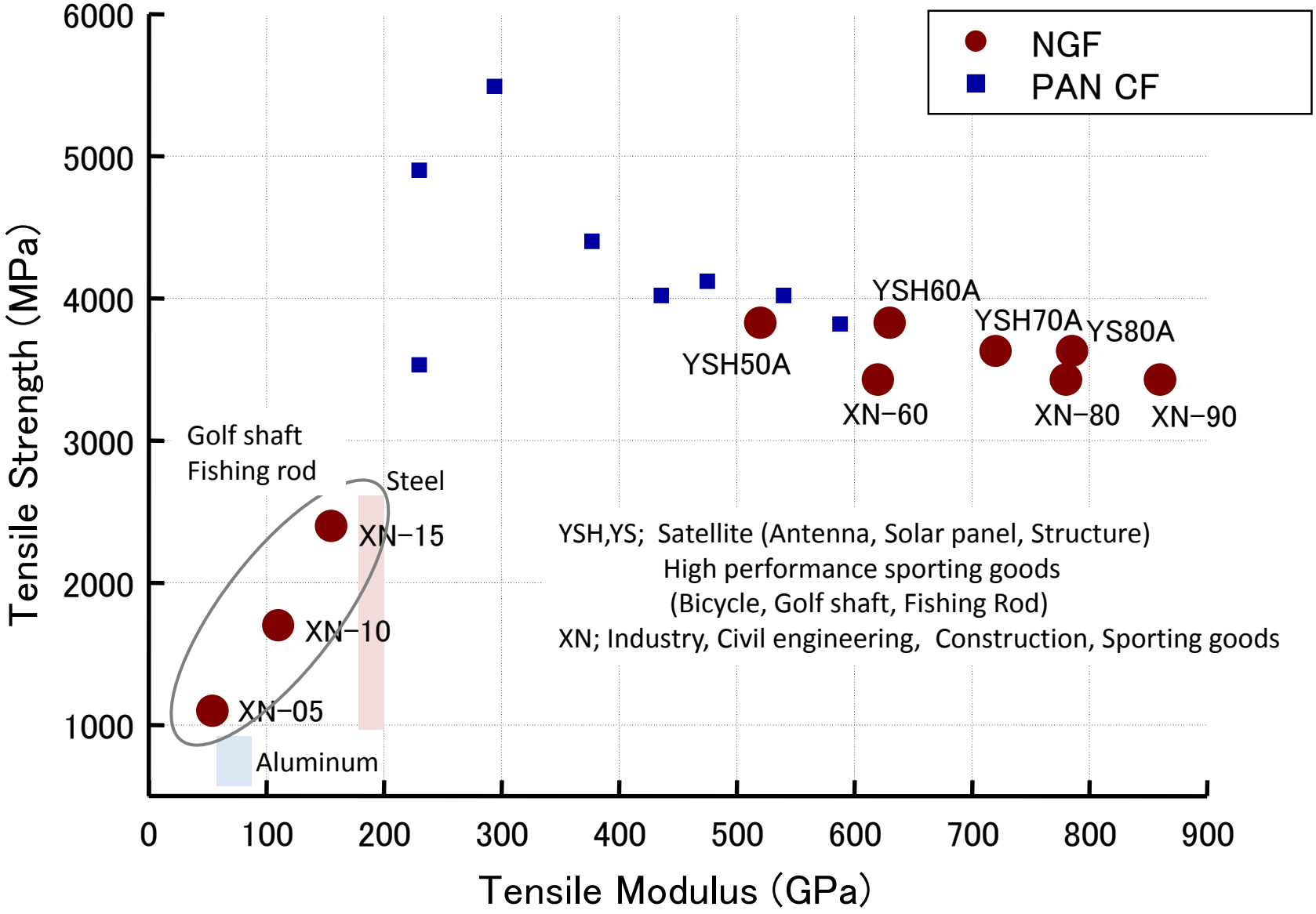
YARN

Prepreg

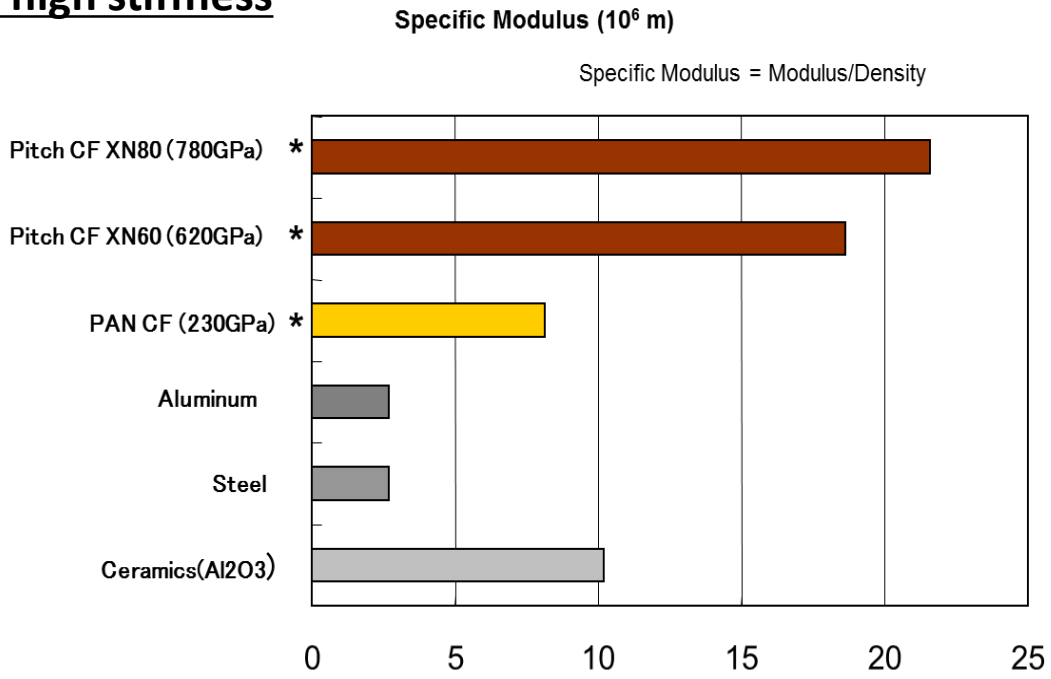


Fabric

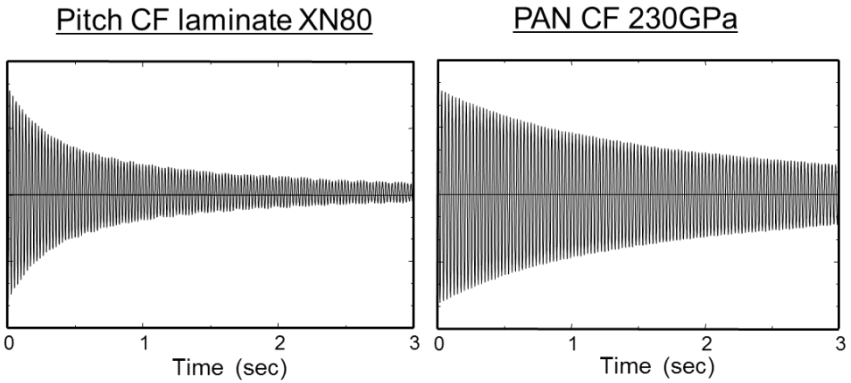
Chopped
Milled


NGF
PAN CF
Tensile Strength (MPa)
Tensile Modulus (GPa)
6000
5000
4000
3000
2000
1000
0
100
200
300
400
500
600
700
800
900
YSH60A
YSH70A
YS80A
YSH50A
XN−60
XN−80
XN−90
Golf shaft
Fishing rod
Steel
XN−15
XN−10
XN−05
Aluminum
YSH,YS; Satellite (Antenna, Solar panel, Structure)
High performance sporting goods
(Bicycle, Golf shaft, Fishing Rod)
XN; Industry, Civil engineering, Construction, Sporting goods

Light weight and high stiffness

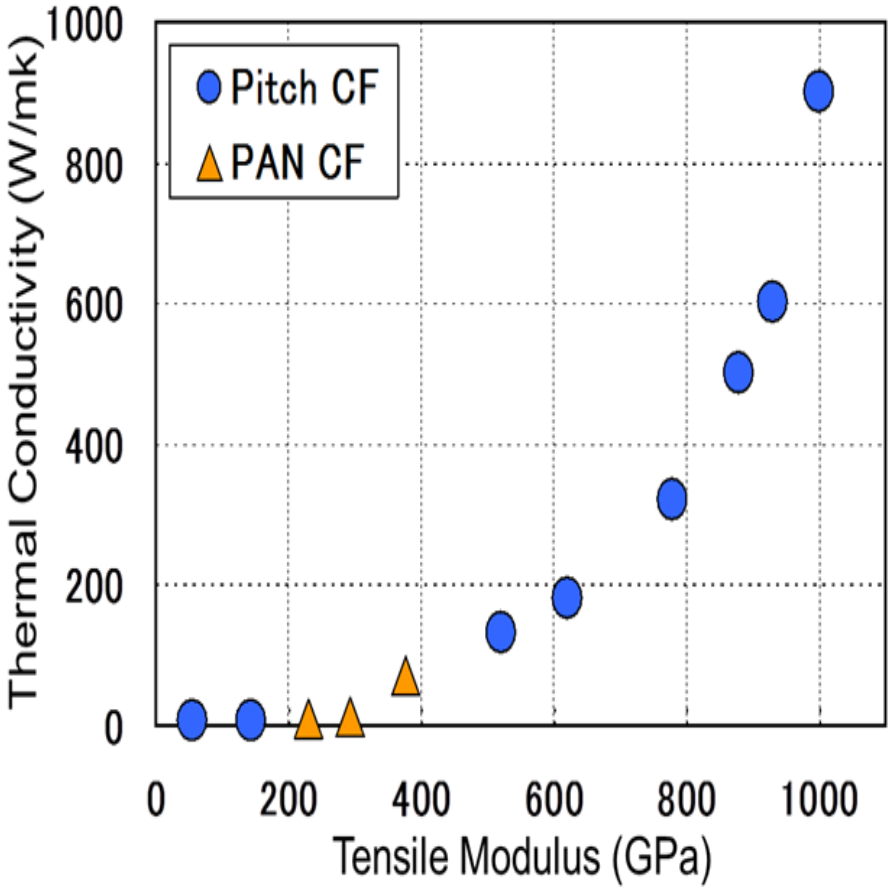


Low vibration



Vibration damping pattern

High Thermal Conductivity



Material	Thermal Conductivity (W/m k)	Density (g / cm³)
XN-100	900	2.22
HC-600	600	2.22
XN-90	500	2.19
XN-80	320	2.16
Copper	400	8.9
Aluminum	100-200	2.7
Boron Nitride (BN)	60	2
PAN CF(HM)	70	1.8
PAN CF (230GPa)	10	1.8

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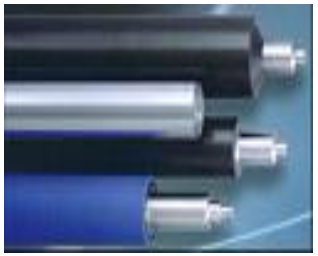
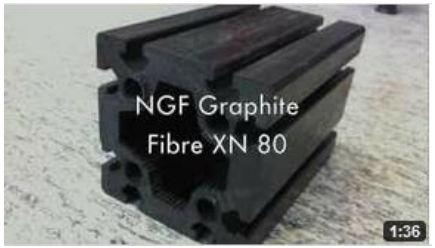
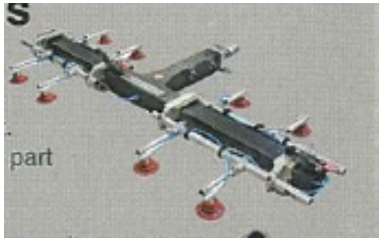
Roller



Automotive automation ; transfer press line





Robot arm

C/C composite

Thermal conductive parts

Civil engineering

Satellite parts