

# KISWIRE ADVANCED TECHNOLOGY

Superconducting Technology,  
The key to open peaceful and bountiful future, is here.

## K A T



Kiswire Advanced Technology Ltd.(KAT) is a sole superconducting wire manufacturer in Korea.

KAT was established in 2004 by KISWIRE Ltd. which is the largest high carbon steel wire manufacturer in the world.

We had supplied Nb<sub>3</sub>Sn strand to KSTAR (Korea Superconducting Tokamak Advanced Research) and performed chromium plating service in 2006.

In 2008, we earned the first qualification status as Nb<sub>3</sub>Sn strand supplier for ITER project.

We had supplied Nb<sub>3</sub>Sn strand to ITER KOREA from 2009 to 2015.

We are supplying Nb<sub>3</sub>Sn strand to ITER JAPAN QST from 2018.

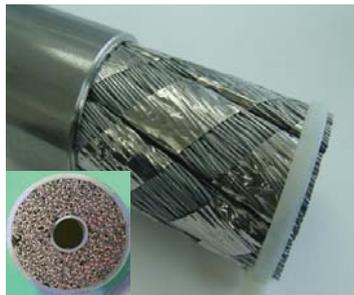
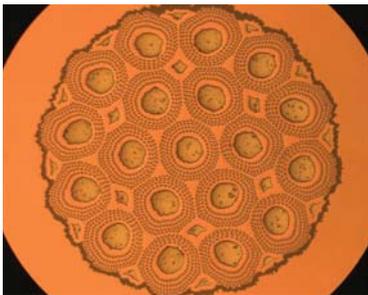
We are making a constant effort to become the best company in superconductivity business field.

# KAT



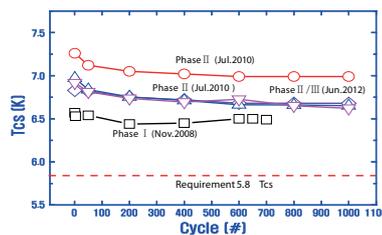
### Nb<sub>3</sub>Sn strand for fusion

KAT produces Nb<sub>3</sub>Sn strands by using internal tin method for fusion application. We are one of the most respected manufacturers of Nb<sub>3</sub>Sn strand in the world. More than 150 tones of Nb<sub>3</sub>Sn strands were supplied for ITER TF and CS coils. The facilities are equipped to cope with complex manufacturing processes of superconducting wires.



CICC(Cable in Conductor Conduit)

Parameter	ITER TF
Piece length	> 1000m
Plated dia.	0.820 ± 0.05
Cu/non-Cu	1.0 ± 0.1
Ic@12T,4.2K	> 250 A
n value	> 20
RRR	> 100
Q <sub>h</sub> (± 3T)	< 6000mJ/cc



Sultan test result



Gun Drill Machine



Deep Hole Machine



Cr Plating Machine



Cast Furnace



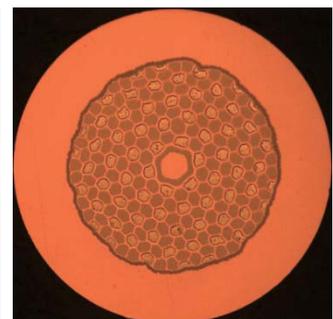
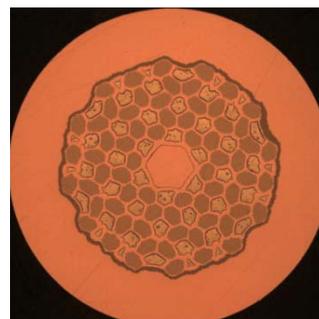
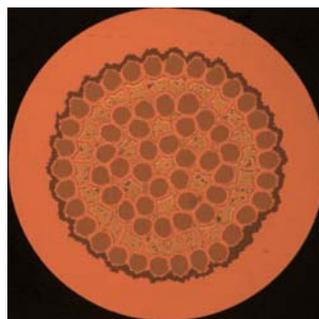
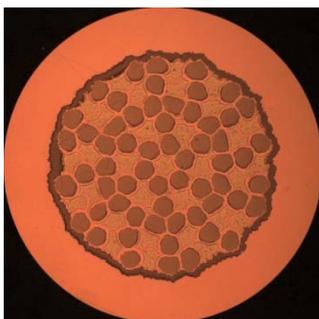
High Vacuum Furnace



Ic Measurement System

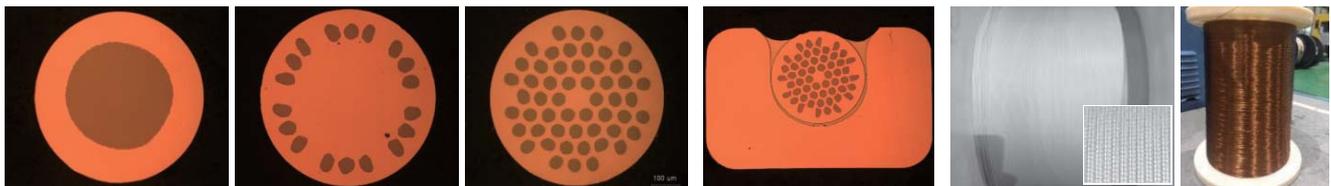
### High Jc Nb<sub>3</sub>Sn strand

We are continuously doing R&D to manufacture high-Jc Nb<sub>3</sub>Sn strand for accelerators and high field magnets, and it is now possible to manufacture Nb<sub>3</sub>Sn strand higher than Jc 1,000A/mm<sup>2</sup>@16T, 4.2K. We can also produce a variety of size and number of filament in accordance with the requirement of our customers.



### NbTi Strand

NbTi Strand Type is generally 54 module consists of 54 mono filament and 7 copper spacer in copper tube. For WIC NbTi strand, NbTi strand is combined with copper channel and then plated with Lead -free solder. The diameter of NbTi strand is less than 1.0 mm. It can be customized depending on the needs of customers.



Cross section of NbTi core

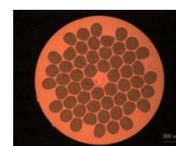
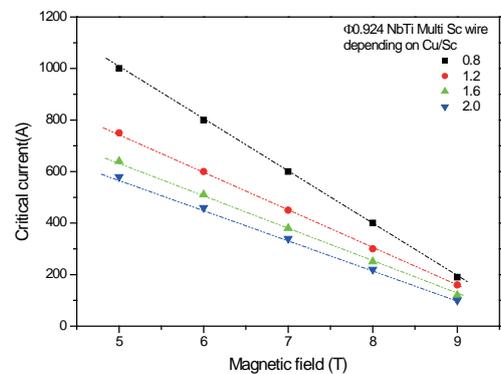
Wire in channel

Insulated wire

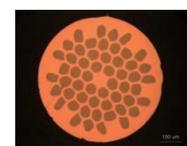
KAT has developed several different types of strand for applications in high field magnet.

### Specification

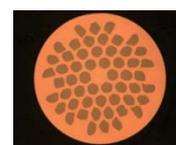
Superconductor	Nb-47%±1wt%Ti
Diameter of Bare wire (mm)	1.20~0.40 (±0.01)
Filament	
- Filament	18~60
- Twist pitch (mm)	15, 50
Matrix	Oxygen free copper
Cu-to superconductor ratio	0.8~12.0 (±0.2)
Insulation	
- Material	PEW (Polyester) PAI (Polyamide-imide)
- Thickness (μm)	100~250
RRR at 273K/10K	> 80



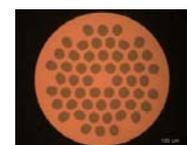
Cu/Sc 0.8



Cu/Sc 1.2



Cu/Sc 1.6

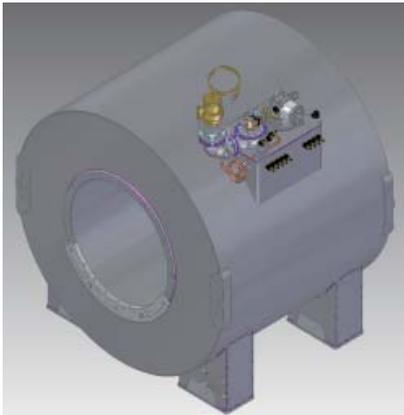


Cu/Sc 2.0

The size of Core wire can be customized depending on the needs of customers.

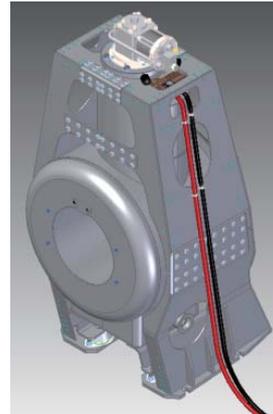
### Magnet of MRI

1.5T MRI magnet consists of NbTi superconducting wires, LHe vessel, thermal shield, outer vacuum can, cryocooler interface, main neck turret, etc. It has been certificated with required regulations, ASME Sec.VIII Div.1, ISO-9001, IEC-60601.



- ✓ Homogeneity:  $\leq 2$  ppm @50x50x45cm DSV
- ✓ Cryostat: Zero boil off
- ✓ Drift rate:  $\leq 0.1$ ppm/hr
- ✓ Dimension
  - Bore ID: 902mm
  - Length: 1,600mm
  - Ceiling height: > 2.4m
  - Weight: 4.6 tones
- ✓ Stray field: 4m x 2.5m

Whole body magnet



- ✓ Homogeneity:  $\leq 2$ ppm @15x15x14cm DSV
- ✓ Cryostat: Conduction cooling
- ✓ Drift rate:  $\leq 0.1$ ppm/hr
- ✓ Dimension
  - Bore diameter: 300mm
  - Length: 528mm
  - Ceiling height: > 2.3m
  - Weight: 0.5 tones
- ✓ Stray field: 1.85m x 1.15m

Extremity magnet

### Cryomodule

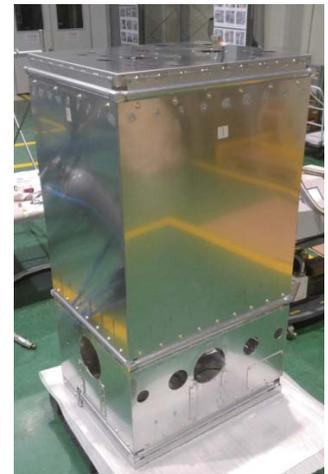
KAT supplied HWR B cryomodule prototype to RISP, and parts of cryomodule (vacuum vessel / thermal shield) of QWR cryomodule to MHI-MS for SRILAC at RIKEN RIBF. Cryogenic technology, Clean-room assembly, Alignment technique have been applied on cryo-module assembly.



Cryomodule prototype of HWR B for RAON accelerator



Vacuum vessel and thermal shield of QWR Cryomodule for SRILAC at RIKEN RIBF





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