ASC 2016 (Denver, USA, Sep. 5, 2016)

HTS Cable Projects in Japan

- **Yokohama HTS Cable Project**
- **New NEDO HTS Project**

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Application of HTS Power Cables

Application Targets:

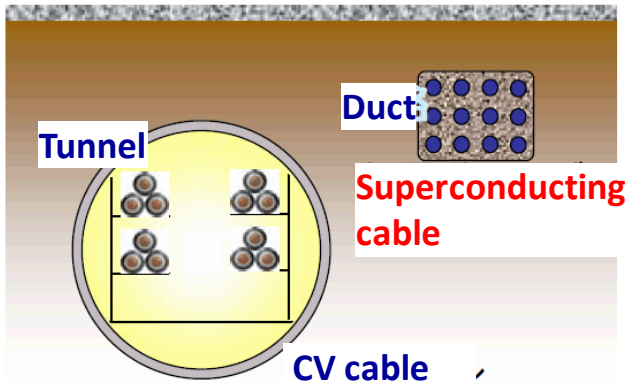
Power sector

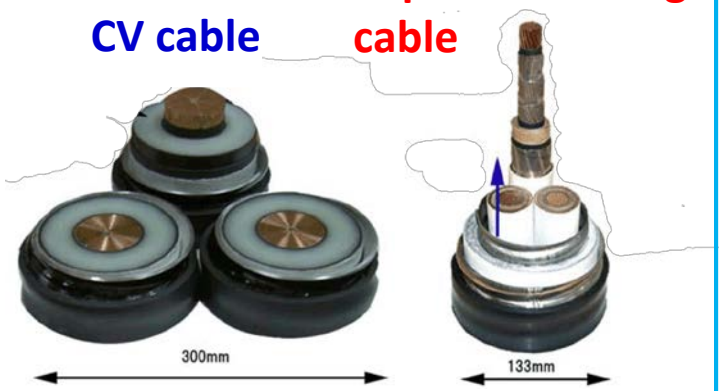
- ✓Compact cables for high power transmission in urban areas
- ✓For connecting between power generator output terminals and a step-up transformer
- ✓For supplying electric power to a high energy demand building or area
- ✓For long distance transmission

Industrial sector

Transportation sector

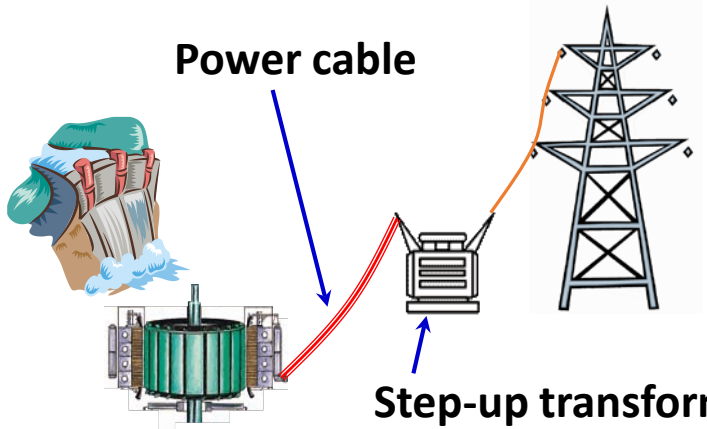
- ✓DC cables for railway feeders





275 kV, 500 MVA

66 kV, 500 MVA



Pumped-storage power plant

Yokohama HTS Cable Project

Phase I: July 2007 – March 2014

HTS cable demonstration project in a real grid

- **Verified the reliability and stability of HTS cable operation in a real grid for about one year, and**
- **the system controllability for load fluctuation**

System: 66 kV, 200 MVA, 3-in-One, 240m

Phase II: July 2014 – March 2016

Verification tests and study on safety and reliability of HTS cables

- Testing for Safety and Reliability of HTS cable system
- Ground fault test
- Development of High performance refrigerator

66 kV, 200 MVA, 3-in-One, 240m

In-grid operation: Oct. 29, 2012 – Dec. 25, 2013

Yokohama HTS Cable Project

Phase I: July 2007 – March 2014

HTS cable demonstration project in a real grid

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System Target : 66 kV, 200 MVA, 3-in-One, 240m

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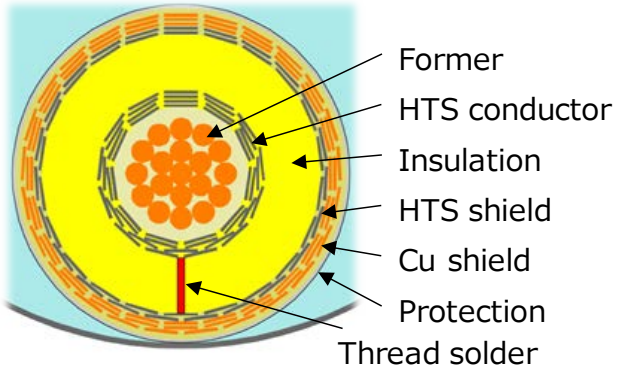
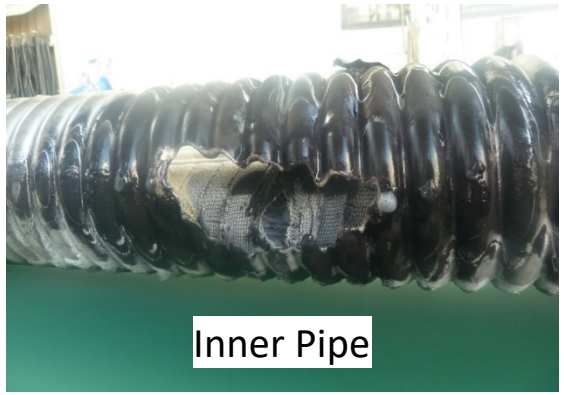
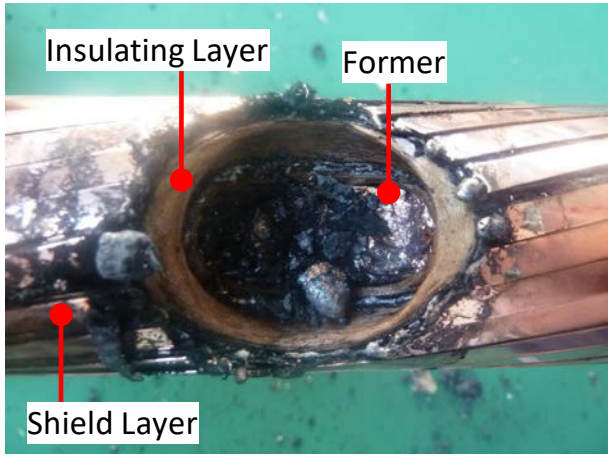
Verification tests and study on safety and reliability of HTS cables

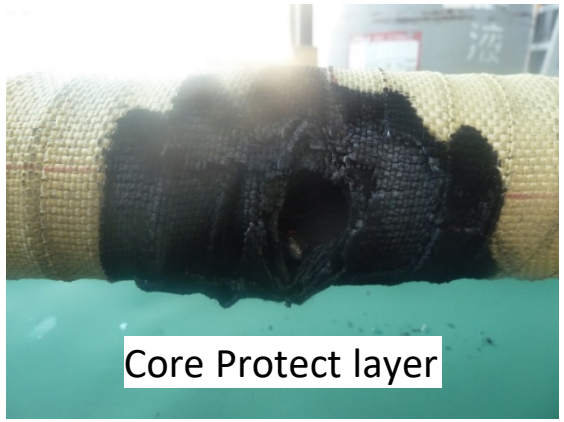
- **Testing for Safety and Reliability of HTS cable system**
- **Ground fault test**
- **Development of High performance refrigerator**

Ground fault test (1.5 kA – 2 sec)









Yokohama HTS Cable Project

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Verification tests and study on safety and reliability of HTS cables

- **Testing for Safety and Reliability of HTS cable system**
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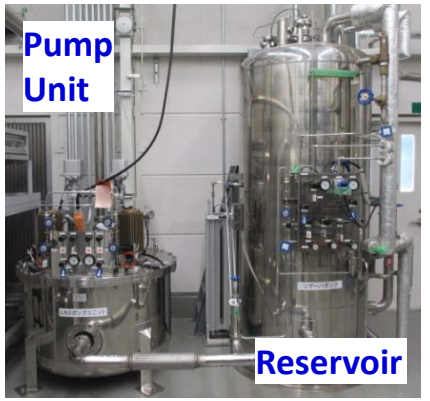
- **Development of High performance refrigerator**

Brayton refrigerator cooling system

Capacity: 5 kW
COP: 0.1
Maintenance interval is > 30,000 hours



New NEDO HTS Project

Project for Promoting the Practical Application of HTS Technology

Period: June 2016 – February 2021 (5 years)

Budget: 8.1 B yen (1.5 B yen for FY2016)

Development Targets:

HTS Power Transmission Cable System Development

- **Development of HTS power transmission cable systems for practical application**
- Basic technology development of HTS power cable systems for transportation

High Magnetic Field Magnet System Development

- Technology development of highly-stable high-magnetic-field HTS magnet systems
- Commercialization development of HTS wire for high magnetic field coils

HTS Power Transmission Cable System Development (2016 –)

Items	Subsidy	Targets	Contractor
Development of HTS Power Transmission Cable Systems for Practical Application (2016 – 2018)	50%	• Development of safety evaluation test methods for HTS cable systems • Development of guidelines for quick recovery of HTS cable system from accidents and failures • Development of low heat invasion technology for HTS cables • Development of highly efficient cooling systems COP > 0.11, Inspection period: 40,000 h • DC Power Transmission Cable System: Operational tests, and development of design/operation/maintenance guidelines (2016)	Tokyo Electric Power HD, Sumitomo Electric Industries, Furukawa Electric Industries, Mayekawa MFG I-SPOT