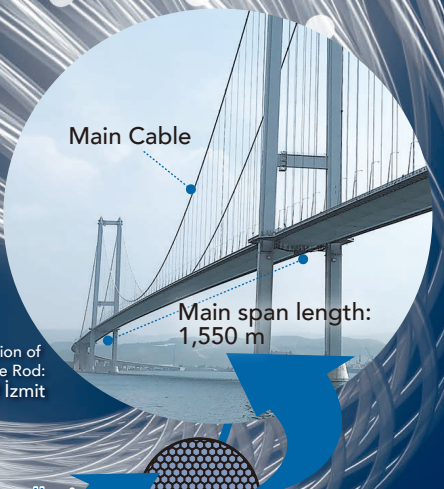
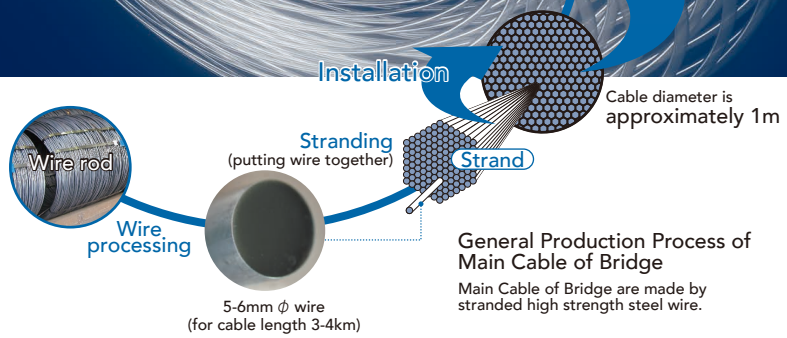
Environmentally-Friendly Super-High-Strength Wire Rod

In the infrastructure and construction industry, along with safety assurance and cost reduction, there is always a demand for higher strength and improvement of production efficiency. To meet this demand, Nippon Steel Corporation developed and commercialized the world's highest strength wire rod utilizing our unique and environmentally-friendly production process (DLP, Direct in-Line Patenting).

This development was awarded Main Prize of Ichimura Award, Keidanren Chairman's Prize of National Commendation for Invention, and the Okochi Production Award.



Examples of the application of our Super-High-Strength Wire Rod: Osman Gazi Bridge spanning the Gulf of İzmit



General Production Process of Main Cable of Bridge

Main Cable of Bridge are made by stranded high strength steel wire.

What is DLP (Direct in-Line Patenting)?

In-line heat treatment enables omission of the heat treatment (LP, lead patenting) process on the customer's side. In addition, this enables manufacturing of a highly-balanced wire rod with strength, toughness and ductility using the method excellent in productivity and environmental response.

	Wire rod manufacturing process (NIPPON STEEL CORPORATION)		Wire manufacturing process (customer)		
	Hot rolling	Cooling and heat treatment	Heat treatment	Wire drawing	Hot dipping
Conventional method	800～900°C	Hot coiling, Wind furnace	LP: Low Productivity, Not environmentally-friendly (Heating, Lead bath, Cool coiling)	12mmϕ, Dies	5mmϕ, Zinc bath, Wire
	CO_2 100kg/t-steel	Lead	1,000t/month/factory	Impossible	Restriction of wire size
	CO_2 Emissions	Lead free	Productivity	Production of high strength wire in lead restricted areas	Enables larger diameter of wire
Current development	CO_2 30kg/t-steel	Nitrate	30,000t/month/factory	Possible	Enables flexibility in designing bridge
	800～900°C	Lead free patenting process (first in the world)	Unnecessary	12mmϕ, Dies	5mmϕ, Zinc bath, Wire

NIPPON STEEL

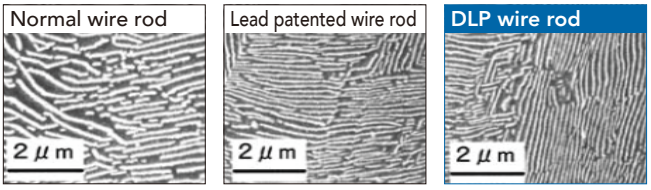
SteeLinC™ NEW STEEL AGE

About our DLP wire rod

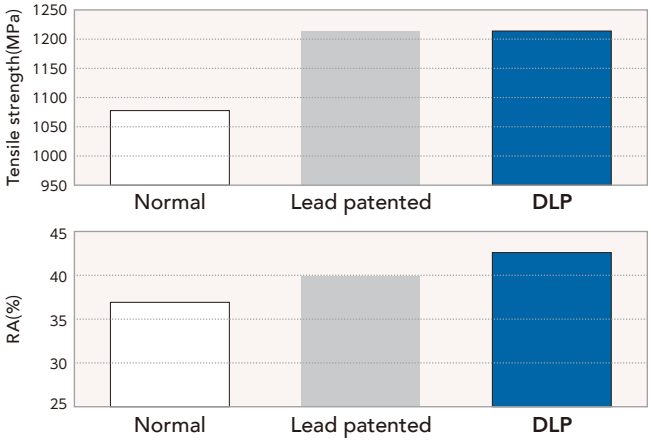
DLP wire rod can omit the lead patenting process done at our customers, which results to lower carbon emission. DLP wire rod is best fit to applications which needs both high strength and high ductility.

■DLP wire rod has good balance of tensile strength and ductility, because of its fine and homogeneous microstructure achieved in the cooling and heat treatment process.

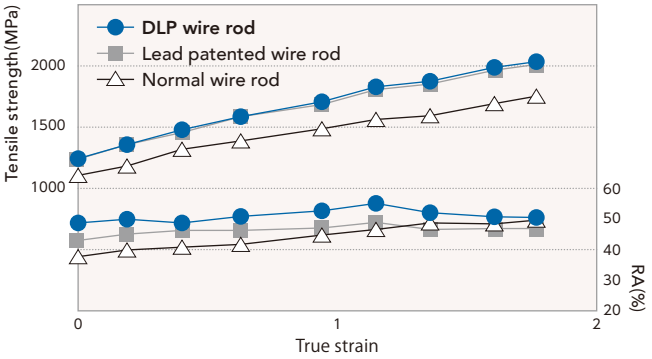
(1) Microstructure



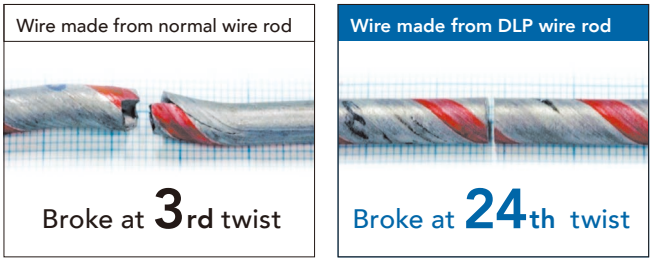
(2) Mechanical properties of wire rod (SWRS82B 11mm)



(3) Mechanical Properties of processed wire

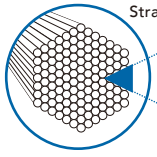


(4) Torsion test of drawn wire



Major Applications

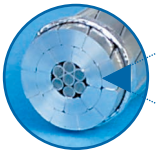
Bridge cable



Made by putting together super-high-strength wire rod

Many business record
- Domestic: Toyoshima Bridge
- Turkey : Osman Gazi Bridge
- China : Dongting Lake Bridge
- Norway: Halogaland bridge

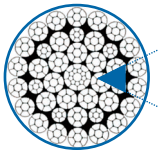
Overhead conductor



The core is made from super-high-strength wire rod

Stronger and smaller diameter core steel wire enables to expand the dimension of aluminum , which leads to lower power loss by 10-30%.

Crane wire rope



Made by putting together super-high-strength wire rod

Used in wire rope such as mobile crane, which requires high strength due to safety.

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