

SP Wire



SP Wire is a hybrid double-layer electrode wire consisting of a high strength special steel wire core and a copper alloy outer layer with excellent electrical properties, having similar advantages of both tungsten wires and brass wires. SP Wire, produced by bringing together the fine wire technology and the plating technology developed by us over many years, will meet your needs in all respects with its superior properties such as tensile strength, electrical discharge characteristic, processing performance, mechanical/electrical properties, cost performance, etc. This high-performance electrode wire replaces conventional tungsten wires and brass wires in the precision and micro-cutting field.

1. SP Wire Features

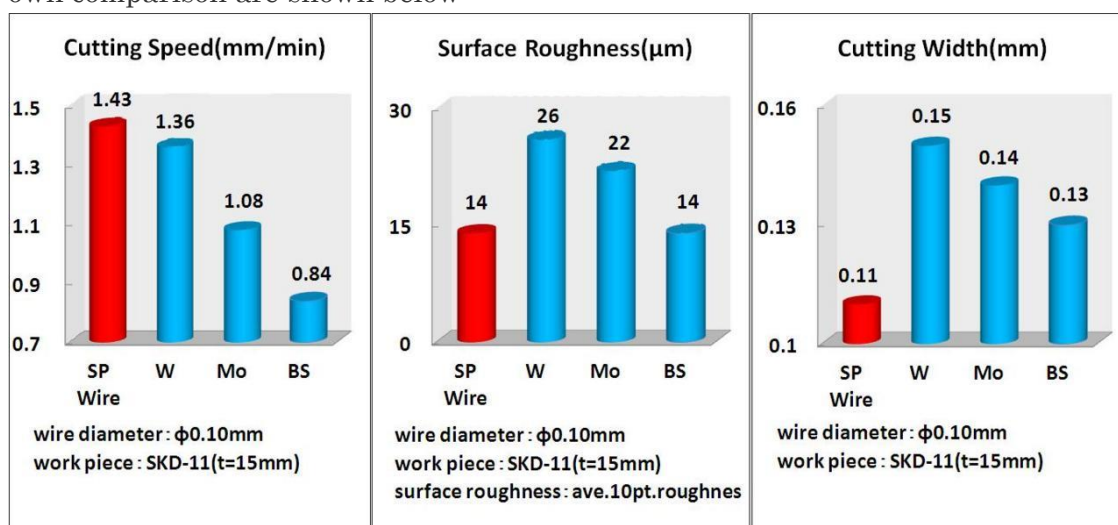
SP Wire is a hybrid electrode wire consisting of a high tensile strength steel core and a brass outer layer with excellent electrical discharge characteristic. This provides advantages of both tungsten wires and brass wires to have tensile strength equivalent to tungsten wires, and to have higher electrical discharge characteristic than brass wires, which makes the wire less abrasive to rollers and pins in the wire transportation system of EDM. SP Wire is sure to outshine tungsten wires in the ultra-precision cutting field, and also enables a more precise cutting by its high tension in the brass wire territory. The same corner R could be cut with a wire with diameter one rank thicker, because of the narrower cutting widths by SP Wire, thus the cutting speed is far much increased with SP Wire.

Further, in the field of fine wire below $0.1\text{mm } \phi$, times of replacement of electrode wire in a cutting process can be far reduced with SP Wire. Together with features described above, SP Wire enables to shorten cutting hours, reduce costs, and shorten delivery lead time.

2. SP Wire Properties

SP Wire, which exerts great power in precision and micro cutting, has a double-layered structure consisting of a high tensile strength steel core and an outer layer with high electrical discharge characteristic. The high voltage working current tends to flow through the outer layer, therefore, this double-layered structure enables the SP Wire excellent in electrical properties. The wire has superior cutting properties combining advantages of both conventional tungsten wires and brass wires.

The cutting results vary depending on cutting conditions, but some examples by our own comparison are shown below :



3. SP Wire Advantages

①High Tensile Strength

Tensile strength largely affects cutting precision and speed. SP Wire has a special piano wire core with high tensile strength, and its sufficient tension enables high precision, high speed cutting with less breakage.

②Cutting speed

Improvement of 10% over tungsten wire, thanks to SP wire's high electrical conductivity.

③Surface roughness

Due to its excellent ED stability and high tensile strength, SP wire provides fine surface roughness as good or better than that of brass wire.

④Cutting width (clearance)

With its high tensile strength and stable ED characteristics, SP wire provides precise fine cutting whose cutting width (clearance) is narrower than that of tungsten wire or brass wire, and the corner radius is smaller than that with tungsten wire. Thus, the same cutting accuracy can be obtained with one size larger SP wire, to make a much faster cutting speed

⑤Abrasion of wire guides

Since SP wire has a smooth and soft surface, abrasion of the wire guides (electro-feeding pins, guide rollers, etc.) of EDM is far less than that with tungsten wire, reducing operating costs.

⑥Automatic wire joining

SP wire has excellent straightness, allowing a high rate of automatic wire joining.

⑦Surface stability

Unlike tungsten wire, SP wire is rather hard to cause surface oxidation. Remained wire can therefore be stored easily.

⑧HOMO phenomenon

The HOMO phenomenon, an unstable ED that occurs when cutting a tungsten-containing work piece (e.g., tungsten carbide) with a tungsten wire, does not occur with SP wire.

⑨An easy method for setting the cutting conditions

To find the optimum cutting conditions for SP wire, first set the cutting conditions for a brass wire electrode having a diameter equal to SP wire. Then gradually increase the wire tension until the SP wire breaks. The optimum tension is that just before breakage. Recommended cutting condition data for SP Wire could be obtained from major ED machine manufacturers.

⑩Longer continuous length

SP wire provides a longer continuous length per reel: 5,000m/reel, 10,000m/reel, 20,000m/reel, 30,000m/reel and 40,000m/reel, while that of tungsten wire is 3,000 – 5,000m/reel. Thus, longer continuous operation and higher productivity could be achieved.

⑪Cost performance

In addition to the excellent properties above, SP wire is far less expensive than tungsten wire, providing an excellent cost performance.

4. SP Wire Uses

SP Wire turns out to be excellent when used in the ultra-precision and the super fine microcutting (wire diameter below 0.1mm ϕ), that had been made possible only by tungsten wires or molybdenum wires.

SP Wire is approved and recommended by major EDM manufacturers as the best electrode wire.

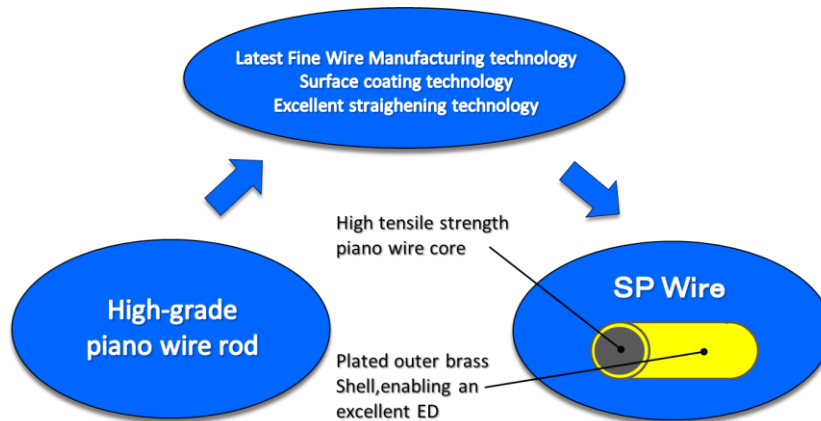
① Electrode Wire for Ultra-precision Metal Molds

Lead frame molds, connector molds, engineering plastic molds, precision parts molds

② Electrode Wire for Micro cutting

precision gears, textile nozzles, shaped dies, precision parts processing, pinhole processing

5.SP Wire Specifications and Performance



SP Wire Specifications and Performance

Product code	Wire dia. (mm)	Dia. tolerance (mm)	Tensile strength (N/mm ²)	Conductivity (%)	Length/reel (m)					Weight g/5,000m
					5,000	10,000	20,000	30,000	40,000	
SP30S	0.03	0.000 -0.003	2160 \leq	13 \leq	○	○	○			28
SP40S	0.04				○	○	○			50
SP50S	0.05				○	○	○	△	△	78
SP60S	0.06				○	○	○			111
SP70S	0.07				○	○	○	△	△	152
SP80S	0.08				○	○	○			198
SP100S	0.10	0.000 -0.004	1960 \leq		○	○	○	△	309	

△ These items are made to order

SP Wire Length/Reel and Reel Dimensions

Length/reel (m)	Type of reel	Reel dimensions (mm)					R / Package
		Flange	Barrel	Traverse	Total length	Bore	
40,000	Type A (P5)	160	80	90	110	20	4
30,000	Type A (P3)	130	80	90	110	20	6
20,000							
10,000							
5,000	Type B (JAPAX)	130	60	30	37	13	-

* Weight of reel --- P3 = 250g/R, P5= 356g/R

SP Wire Z Series

Introducing New Type SP Wire for High Speed , Super Precision Cutting

The SP Wire Z-Series has been developed to maximize the functions of the highly advanced ED machines, in which zinc is utilized on the surface of the wire. This is achieved by our long-cherished SP Wire production technology.

Mechanical and Electrical

Product code	Wire dia. (mm)	Dia. tolerance (mm)	Tensile strength (N/mm ²)	Conductivity (%)	Length/reel (m)		
					5,000	10,000	20,000
SP30Z	0.03	0.000 -0.003	2160 \leq	15 \leq	○		
SP40Z	0.04				○	○	○
SP50Z	0.05				○	○	○
SP70Z	0.07				○	○	○
SP100Z	0.10	0.000 -0.004	1960 \leq		○	○	○

Cutting Time Comparison for Example

Type of wire	Main cutting	Trim cutting	Total
SP Wire Z	60 h	90 h	70 h
Existing SP Wire	100 h	100 h	100 h

※ Existing SP Wire taken as 100 h

- ◎ High speed, super precise cutting
- ◎ Shortened cutting time
- ◎ High automatic wire joining ratio achieved with a good wire straightness

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