

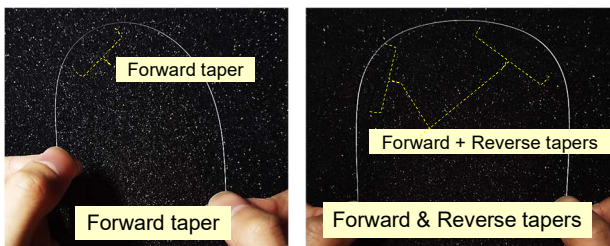
Ultrafine-diameter tapered-wires with various bending properties

1. Ultrafine-diameter tapered-wire

Ultrafine-diameter tapered-wires are used in medical equipment for endovascular treatment. The main role of the device is to accurately deliver a treatment device to the diseased site by passing through meandering blood vessels without causing damages to the vessels. Various shapes of tapered wires are required to suit different treatment device for different diseases and treatment methods. FUTA-Q can design ultrafine-diameter tapered wires in 3D and handle everything from prototyping to mass production for them.

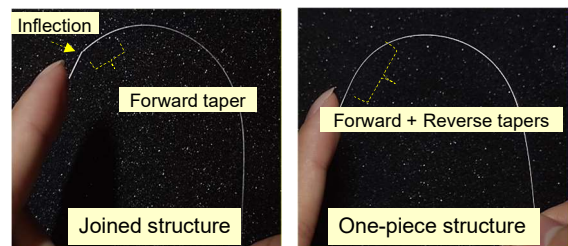
2. The features and merits of ultrafine-diameter tapered-wires

The wire shape desired by a customer can be achieved by designing a combination of forward and reverse tapers to match the size and rigidity of the functional components to be assembled, which can improve the operability of the final product.



A. Comparison of a bend shape between forward and reverse taper

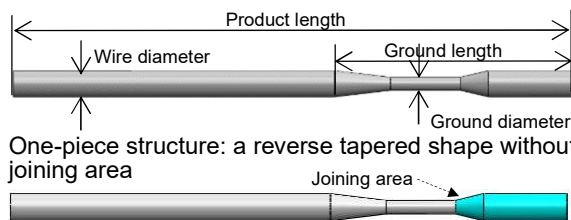
Combining forward and reverse tapers provides complex bending properties to the wire.



B. Comparison of a bend shape between with and without a joining part

While the wire with jointed structure has inflection points, one with both forward and reverse tapers can provide smooth bending characteristics.

3. Examples of component structure



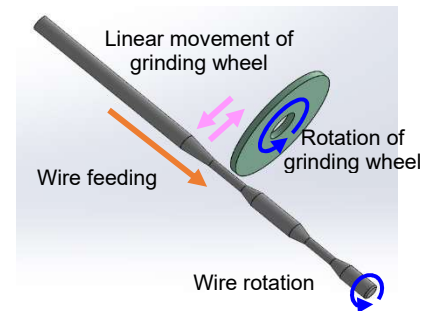
Joining structure: a reverse tapered shape formed by joining a forward tapered part

Wire material and processing device specification

Wire material	Stainless steels (e.g. SUS304V) NiTi, β -titanium, cobalt alloys
Wire diameter	0.24 - 1 mm
Grindable diameter	0.04 mm - wire dia. $\pm 4 \mu\text{m}$
Work length	30 - 3300 mm (incl. grinding length)
Grinding length	Max. 2250 mm
Grinding work	Forward, reverse, and multistage tapering

4. The processing method

The outer diameter of the wire is ground into a conical shape by programmatically controlling the position of the grinding wheel. Various taper shapes can be formed by synchronizing the linear movement of the grinding wheel with the wire feeding. The position, outside diameter, and angle of the taper can be adjusted by combining a forward and reverse taper.



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