

## The Global Niche Top Company in Manufacturing Small-diameter Pipes

### 1. The Global Niche Top Company

We have been selected as one of **The Global Niche Top 100 Companies** by the Ministry of Economy, Trade and Industry, which proves our unique technology, the market share, and the important position in the supply chain. Among our technologies for making small-diameter pipes, this report introduces our unique pipe making technology and the non-destructive inner surface inspector.

### 2. FUTA-Q's small-diameter pipe of $\beta$ -titanium, Ti-6AL-4V, or cobalt alloy (CoCr)

We succeeded in producing a pipe made of  $\beta$ -titanium having light-weight, high strength, and excellent springness in 2011. Last year, we also succeeded in making a pipe made of Ti-6AL-4V which had been considered as a hard-to-form material into a pipe shape (photo on the right). A cobalt pipe (TS\_2470MPa) is also available as a further tough material.

With the inner surface polishing technique for mirror surface and the cleaning technique for removing foreign matters, outstanding high quality small-diameter pipes can be produced. Stainless steel pipes for general use can be produced in volume. Our product line-up is as the table right.



[Properties & applications of titanium, stainless-steel, and cobalt]

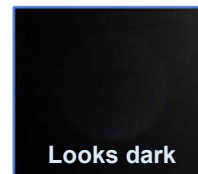
Materials		Properties (A: excellent, B: good, C: average, D: poor)							Device approval	Applications
Material Names	Compositions	* anti-corrosion	toughness	elasticity	non-magnetic	weldability	lightness			
$\beta$ -titanium	Ti-22V-AL4 Ti-15V-3Cr-3Sn-2AL	B	B	B	B	B	A	No	needle, nozzle, endoscope, spring medical/analysis/leisure uses plant, environment, space industries	
Titanium alloy ASTM B348 Gr5	Ti-6AL-4V	B	B	C	B	B	A	Yes	artificial joint, implant, car, golf club chemical, space industries	
Nickel titanium NTI	Ni56-Ti44	C	B	B	B	C	B	Yes	guide wire, stent, glasses, memory shape spring	
Pure titanium JIS 1st grade	Ti-Fe0.2- O0.15	B	C	D	B	B	A	No	industrial titanium, petrochemical plant industrial instrument, press forming	
Pure titanium JIS 2nd grade	Ti-Fe0.25- O0.2	B	C	D	B	B	A	No	dental implant, pipes for analyzer building material, sanitary piping	
Stainless steel SUS316L	Cr18-Ni8	B	B	D	C	B	C	Yes	high-corrosion resisting stainless steel used in medical/analysis equip.	
Stainless steel SUS304	Cr18-Ni12- Mo2.5	C	B	D	C	B	C	No	for general purpose use including widely used injection needle	
Cobalt alloy ELGILOY	Co40-Cr20- Ni15-Mo7	A	A	D	B	B	C	Yes	medical use clip, implant, and spring rivet for airplane	
Cobalt alloy MP35N	Ni38-Co35- Cr-20-M10	A	A	D	B	B	C	Yes	artificial joint, stent, dental product ocean plant	

\* against chloride aqueous solution

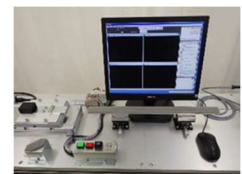
### 3. The non-destructive inner surface inspector

A surface roughness is calculated from the captured image of the inside of a needle, and displayed on the screen in real-time. Needles on the market have wrinkles on the inner surface caused through pipe making process, and show a dim white image as a rough surface.

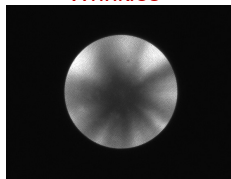
Mirror finishing of Ra 0.06



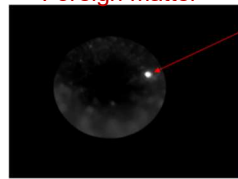
Inner surface inspector



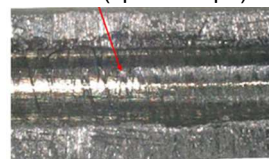
Wrinkles



Foreign matter



Scratches on inner surface (spiral shape)



Captured image of the scratches



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