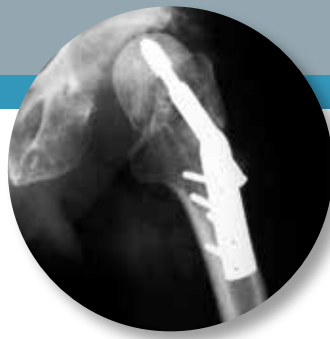
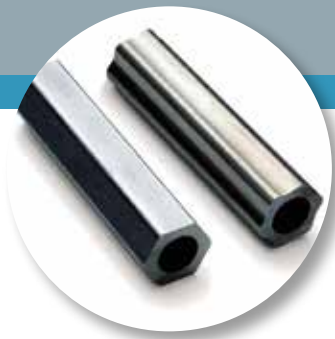


MEDICAL

High Specification Tubing Solutions
for Critical Medical Applications

HIGH PRECISION TUBES FOR DEMANDING ENVIRONMENTS

MEDICAL



TUBING EXCELLENCE

With over 70 years of engineering expertise in supplying high precision tubes, Fine Tubes and Superior Tube work closely with customers worldwide, developing high specification tubing solutions to help them solve their technical challenges. We manufacture high performance tubes for supercritical medical applications in an ever expanding range of stainless steel, titanium and other specialty alloys.

V

TUBING INNOVATIONS

Fine Tubes and Superior Tube benefit from a world-class reputation for innovative and high quality tubing solutions geared towards the medical industry. Here are a few examples:



1936

Superior Tube manufactures hypodermic needle tubing for critical medical instruments including catheters and cystoscopies.



1970

Superior Tube develops 316 stainless steel tubing for life-saving artificial kidney machines.



1980

Superior Tube produces precision needle tubing for the "Radiation Implanter" - a medical device for the treatment of cancerous tumours.



1997

Superior Tube receives its first order for advanced L605 (cobalt-chromium) alloy tubing related to coronary stents.



2002

Fine Tubes develops profiled implant tubing for medical applications.



2003

Superior Tube's proprietary tube rolling process is used to produce titanium alloy tubing for artificial heart valve frames.



2004

Fine Tubes manufactures Ti 6Al-4V (Grade 5) tubing for femur and tibia bone nail implants.



2009

Superior Tube receives an award for its role in the development and market introduction of innovative transaortic valve replacements.



TUBING SOLUTIONS

TUBING SOLUTIONS

MEDICAL

For over seven decades, design engineers have been relying on Fine Tubes and Superior Tube, two of the medical industry's most technologically advanced manufacturers of highly engineered, small-diameter, precision alloy tubing.

The demand for high performance stainless steel and titanium alloys that can offer excellent strength-to-weight ratios is constantly increasing. This, in combination with high levels of microbiological corrosion resistance and fatigue life properties, is the challenge that has been exceeded by our biocompatible medical materials.

We have the technical capability to achieve an OD surface finish down to $0.4\mu\text{m}$ ($16\mu\text{in}$) Ra or better with centre-less grinding and an ID surface finish down to $0.2\mu\text{m}$ ($8\mu\text{in}$) Ra or better with electropolishing.

From advanced alloy precision tubing development to every day inventory management challenges, we're ready to partner with you to help develop solutions for your unique requirements.



MEDICAL APPLICATIONS:

- Angioplasty and embolism
- Auto injection systems
- Biopsy needles
- Catheters
- Cannulas
- Cardiac electrodes
- Cardiac rhythm management
- Coronary and peripheral stents
- Dental implants
- Drug delivery
- Endoscopy equipment and instruments
- Heart valves
- Lag screws
- Neuromodulation devices
- Nuclear medicine
- Peripheral stents
- Spinal cages and screws
- Surgical implants
- Surgical instruments and tools
- Trauma nails and screws
- Trauma and orthopedic implants

HIGH PRECISION TUBES FOR DEMANDING ENVIRONMENTS

MEDICAL



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MANUFACTURING CAPABILITIES

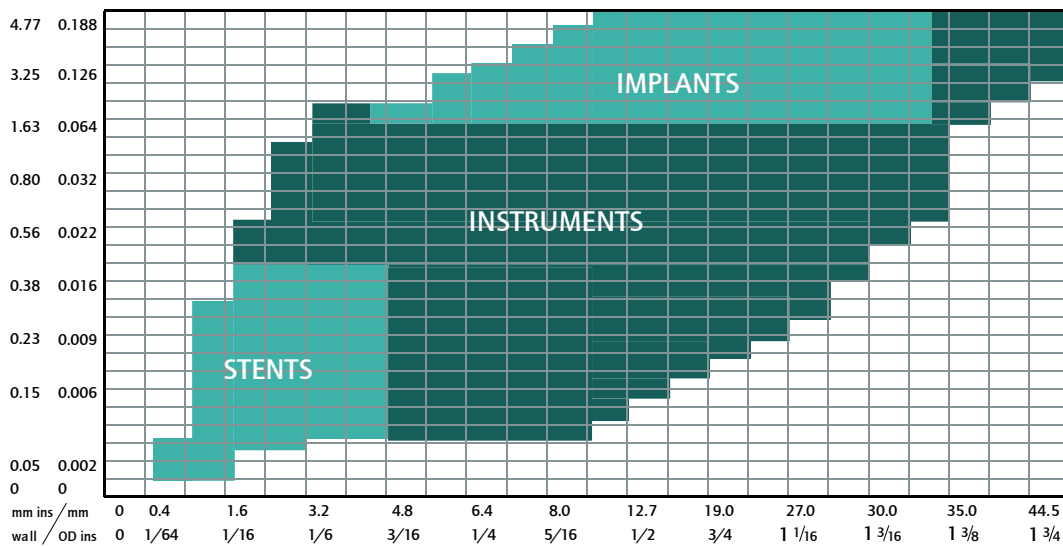
ALLOYS

Fine Tubes and Superior Tube produce a wide range of custom-sized tubing in an ever expanding range of alloys – available in three different forms, i.e. seamless, welded or welded & redrawn (Weldrawn®) finish.

SEAMLESS, WELDED, WELDED & REDRAWN	
Stainless Steel	304L, 316L, 316LVM, 15-5PH, 17-4PH, 17-7PH
Titanium	Ti CP (Grade 1 and Grade 2), Ti 3Al-2.5V (Grade 9), Ti 6Al-4V (Grade 5), Ti 6Al-4V ELI (Grade 23)
Specialty	35NLT, L605, MP35N™, Nitronic 50™, Tantalum

We also manufacture tubing in many other grades. Please contact us for more details.

SIZE RANGE



Size range for medical products is based upon manufacture of cold drawn tubing from 0.30 mm (0.012 in) to 50.8 mm (2 in) OD. Tolerances: OD and ID up to 0.0127 mm (0.0005 in) are achievable.

PRODUCTION FACILITIES

- Pilger mills
- Multi-roll rolling mills
- Draw benches
- Tube welding mills - In-line weld mills
- Controlled atmosphere heat treatment
- Bright annealing/hydrogen furnace
- Vacuum annealing
- Pickling & passivation plant
- NDT ultrasonic & eddy current testing
- Hydrostatic testing
- Radiographic examination
- Electropolishing capabilities
- Full chemical and physical laboratory analysis

HIGH PRECISION TUBES FOR DEMANDING ENVIRONMENTS

MEDICAL



TUBING QUALITY

INTEGRITY ASSURANCE

The quality control process at Fine Tubes and Superior Tubes is critical in respect of consistently achieving the highest level of specification requirements.

Reduction control through pilgering and drawing is specific to each product dimension and specification requirements. This is the driver for tolerance control, OD and ID surface finish control, inclusion levels and final grain size.

- OD surface roughness typically better than $0.75\mu\text{m}$ ($30\mu\text{in}$) Ra.
- ID surface roughness typically better than $1.5\mu\text{m}$ ($59\mu\text{in}$) Ra.

Rigorous process control ensures that grain sizes typically achieve levels finer than ASTM 8 per ASTM E112. Testing capabilities include non-destructive ultrasonic, eddy current and hydrostatic testing.

TUBE ADVANTAGES

High levels of ID and OD surface finish, tolerance and ovality controls yield a product which is a cost competitive alternative to the gun drilled technology. At the same time, it can offer additional benefits of consistency and small inside diameters over typical lengths of 3 m (10 ft).

- OD surface roughness can be further refined by centre-less grinding down to $0.4\mu\text{m}$ ($16\mu\text{in}$) Ra or better.
- ID surface roughness can be further refined by drawing down to $0.4\mu\text{m}$ ($16\mu\text{in}$), then electro-polished to achieve $0.2\mu\text{m}$ ($8\mu\text{in}$) Ra or better.

ID defect levels: UT tested to levels down to 50 microns ($0.05\text{mm}/0.0020\text{in}$).

Fatigue life: Control of texture combined with extra low levels of interstitial impurities leads to higher fatigue performance than equivalent drilled bars.

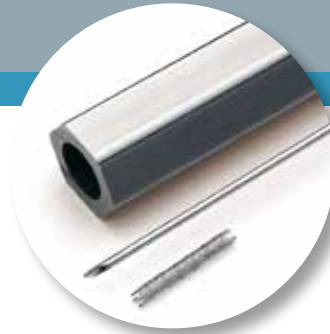
Tolerances: In-house control to ISO 286-2 h8.

OUTSIDE DIAMETER		TOLERANCE +/-	
mm	inches	mm	inches
6 - 10	0.23 - 0.39	0.022	0.00086
>10 - 18	> 0.39 - 0.70	0.027	0.00011
>18 - 30	> 0.70 - 1.81	0.033	0.0013

ID/OD ratio: Tube production can be controlled over full length to maintain small IDs from 0.3 to 0.15 of OD.

TUBING QUALITY STANDARDS

- ASTM F136-Ti6-4 ELI
- ASTM F138-316L-316LVM
- ASTM F1314-22Cr-13Ni-5Mn
- BS ISO 5832-9
- ISO-DIS 25832-1



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GLOBAL PRESENCE

GLOBAL PRESENCE

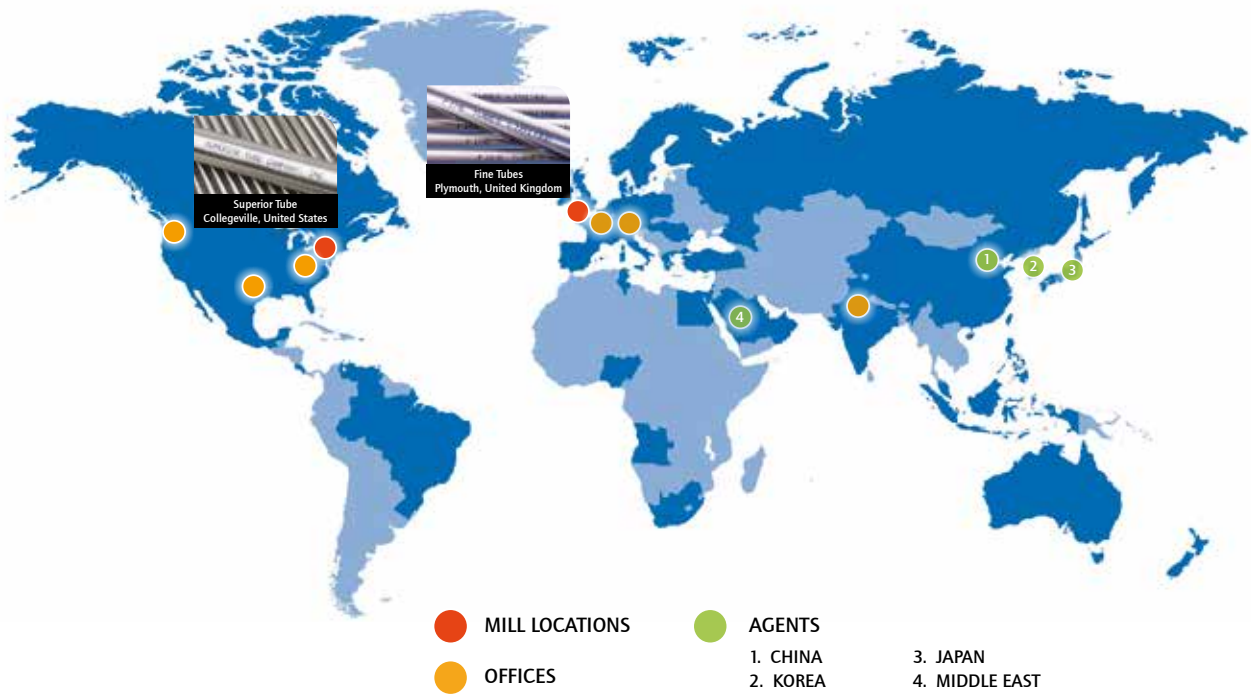
Through the partnership between U.K.-based Fine Tubes and U.S.-based Superior Tube, both companies can offer increased capabilities, leading to significantly reduced lead times, an extended product portfolio, increased global reach and outstanding customer service.

Fine Tubes and Superior Tube are collectively a unit of AMETEK, Inc., a leading global manufacturer of electronic instruments and electromechanical devices.

In addition to tube mills in the United Kingdom and the United States, we have sales offices in Germany, France, India and the United States, as well as an extensive network of partners in Asia, Europe and the Middle East.

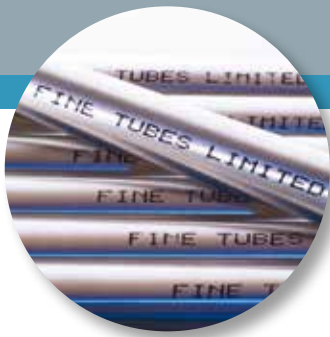
Our tubing experts deliver high precision tubing to customers in over 35 countries worldwide.

GLOBAL SALES OFFICES AND AGENTS NETWORK



HIGH PRECISION TUBES FOR DEMANDING ENVIRONMENTS

MEDICAL



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