



SEAMLESS NICKEL AND STAINLESS STEEL ALLOY COIL TUBING

When system design engineers specify tubing for fluid delivery systems, they expect it to be reliable, leak-free and cost-effective. Engineers have many tube types to choose from, including seamless and welded straight lengths, as-welded coils and straight lengths, welded and drawn coils and straight lengths, and the highest quality choice: seamless coils. On the surface, selecting tubing for critical applications seems insignificant. However it's not just a tube! HandyTube seamless nickel and stainless steel alloy coil tubing is manufactured to exceed the most stringent industry standards and specifications.

When applications require corrosion and/or high temperature resistance, HandyTube's seamless coil tubing performs exceptionally and is the best choice.

MANUFACTURED FOR RELIABILITY AND EXCEPTIONAL PERFORMANCE

HandyTube utilizes seamless nickel alloy and stainless steel tube hollows to produce the longest seamless coils available in the world today. The HandyTube manufacturing process consists of sequential cold draws, cleaning cycles and solution anneals to achieve the finished size requirements specified by system design engineers. HandyTube's manufacturing process does not include welded raw materials, in-process welds or welds at finish to achieve the spectacular lengths offered.

In a typical welded tube manufacturing process, coils of flat strips are formed into a tubular shape. The raw edges of the formed tube pass under the weld point where they are melted and held together until the molten pool solidifies, creating a continuous longitudinal weld seam. Although advances in welding technology have improved weld integrity, many welding process variables can contribute to welded tube defects.

Continuous longitudinal welds are susceptible to failure and poor tube quality, such as:

- strip edge damage before welding, resulting in leaks and holes.
- strip edge contamination with lubricant, creating porosity.
- misaligned strip edges and/or off-seam condition, resulting in incomplete penetration.
- improperly adjusted or worn weld box rolls, causing improper weld seam thickness.
- weld bead protrusion into the tube's inside diameter, impeding flow.

In-addition, welded tube manufacturers often butt-weld adjacent strip coils together to produce welded products. When assessing a welded tube's manufacturer, consider the risks. Ask if they:

- produce each coil from a single heat.
- identify the location of strip weld joints.
- produce perpendicular strip joint welds.
- utilize bias welds.

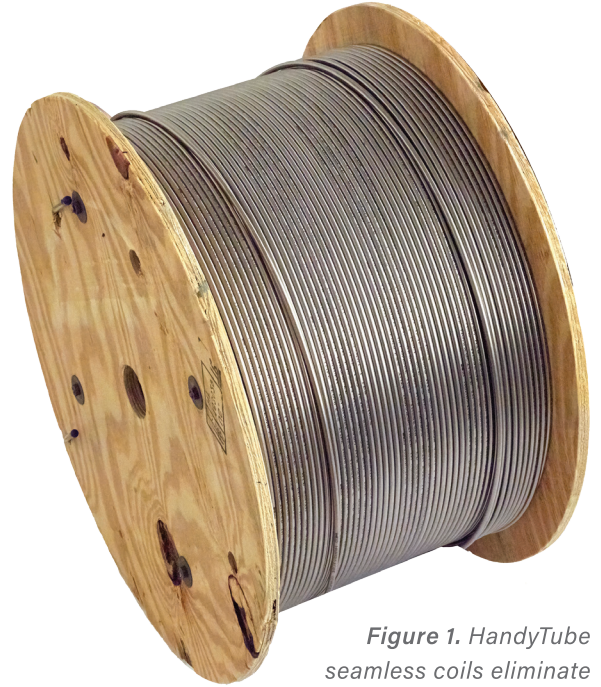


Figure 1. HandyTube seamless coils eliminate costly orbital welds and fitting joints to achieve very long lengths.



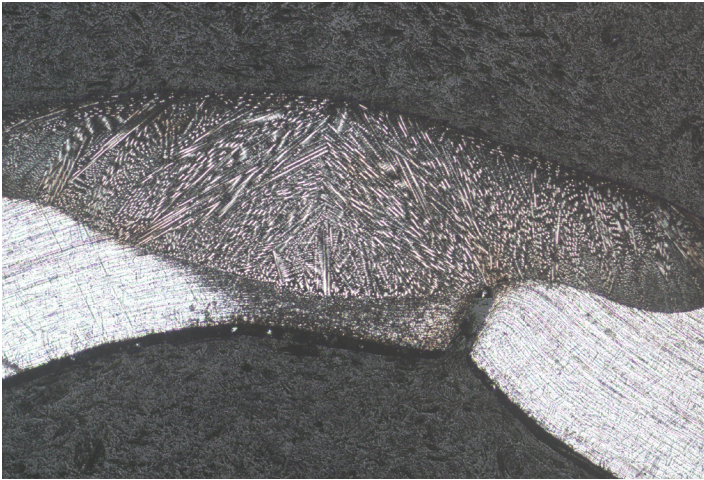


Figure 2a. Misaligned strip edges create an off-seam condition and incomplete penetration.

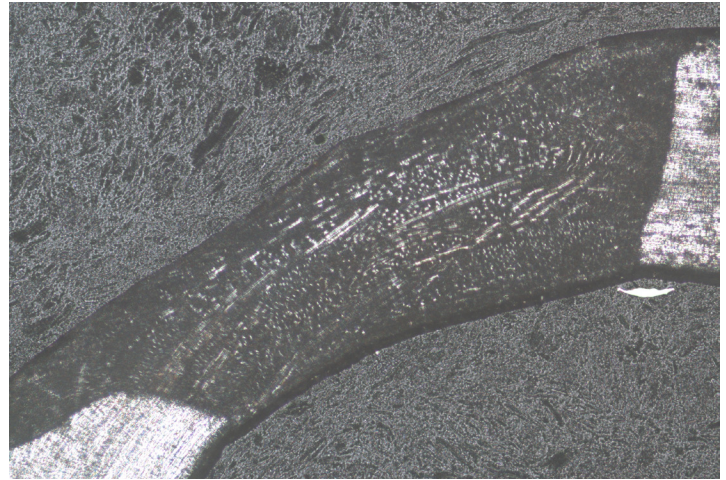


Figure 2b. Improperly adjusted or worn weld box rolls cause incorrect weld seam thickness.

These practices and procedures can create quality issues that design engineers may not realize. There are many other weld process parameters that can introduce other types of weld defects. Tubing system design engineers should have one main concern with welded tubing: the continuous weld seam in every inch of every type of welded tube.

In comparison, HandyTube's seamless coil tubular products are homogeneous along the entire length and cross-section. Seamless coil eliminates costly orbital welds and fitting joints to achieve lengths beyond what is typically offered by straight length tube manufacturers. ASME recognizes the superiority of seamless tube with a 20 percent increase in working pressure as compared to welded tubing. Seamless coil tubing eliminates the potential leak points of welds, fittings or both, providing the highest integrity tubing-runs available.

SEAMLESS TUBES GO A LONG WAY

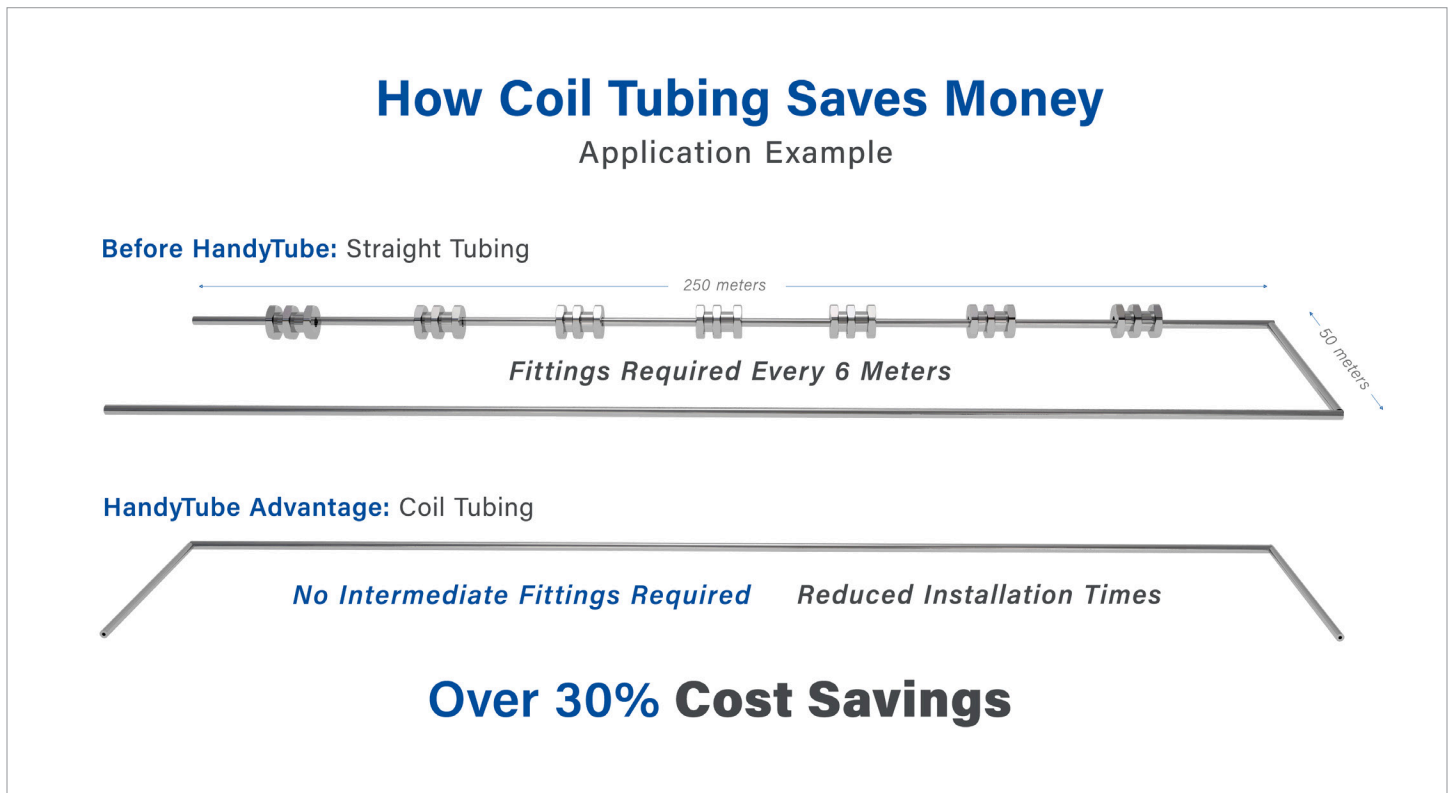
Nickel and stainless steel seamless coils really shine in high-pressure applications. Some sizes of HandyTube coil can exceed 6,000 feet in length without longitudinal or orbital welds.

Every HandyTube seamless coil product length eliminates all longitudinal welds from 500 feet to 6,000 feet in length. System design engineers can install and start up their systems with the peace of mind that they will never experience weld seam quality issues or weld failures. The coils arrive at the job site having been 100 percent hydrostatically tested and positive material identified (PMI) before leaving the factory.

Traditionally, seamless nickel and stainless steel alloy tubing was only available in 17- to 24-foot straight lengths. HandyTube also offers straight length tubing, but many customers recognize the benefits of long seamless coils for today's demanding applications. When system performance measured by employee safety, environmental protection and reliability are critical, seamless coil is the ideal choice.

When evaluating engineered solutions, cost is always a factor. A recent HandyTube customer chose seamless 316L stainless steel coil as the most cost-effective solution for a process automation and control application. The project required 42 sections of 20-foot long tubes orbitally welded together. Installing HandyTube's long seamless coil reduced the installation cost by 30 percent, reduced the number of fittings by 75 percent and significantly reduced installation time.

HandyTube coiled seamless product can easily be de-coiled and straightened for installation using commercially available tools. HandyTube coil installs in a fraction of the time it takes to perform field welds or make field joints of fittings, compared to using straight-length tubing runs during installation.



A recent application example shows the cost benefits of HandyTube coil tubing versus straight tubing.

COST SAVINGS AND INSTALLATION EFFICIENCY

One length of tube reaching between device connections is obviously more efficient than connecting numerous short lengths. Installation savings result from the elimination of all intermediate joints (welds or fittings) and reduced installation labor costs. Since maintenance of intermediate joints is eliminated, the cost of ownership is also reduced.

HandyTube's seamless coil is available in spool-less configurations or level wound on wooden spools, ready to be placed on a customer's payoff. The product is easily payed-off and field straightened with a simple roll straightener, so the leading end of the tubing-run can be guided into position. Bends can be made using benders designed for tubing or electrical conduit. Lengths can be cut using handheld tubing cutters, hack saws or grinders. Of course, inside diameter cleanliness must be considered when selecting a cutting method.

Customers report that using HandyTube's seamless coil reduces installation times from days to hours. One customer installed two 200 foot-long runs of 316L tubing, connecting a compressed natural gas supply to distribution points, in less than one day. The mechanical contractor estimated 15 days would have been required to install the runs had traditional 20-foot straight length product been used.

ENGINEERED SOLUTIONS FOR A WIDE RANGE OF APPLICATIONS

Seamless nickel and stainless steel alloy coil tubing is well-suited for a variety of applications that require reliable, corrosion-resistant, long tubing runs. Many industries utilize HandyTube's seamless products for demanding applications, including:

- **Chemical Processing.** Many chemical and petrochemical processors utilize HandyTube's seamless nickel and stainless steel alloy coils for their process monitoring and control applications. Remote devices sensing pressure, flow rate, process vessel levels, product quality and stack emissions are connected to control and monitoring equipment. HandyTube corrosion-resistant products can be reliably applied in harsh environments and elevated temperatures. Long seamless lengths make interconnecting remote devices simple. And, there are no hard-to-access joints or fittings to inspect or leaks to repair since there are no intermediate connections.



- **Hydrogen Fueling.** Facilities employing large fleets of battery operated forklifts are actively transitioning from battery powered units to hydrogen fuel cell-powered vehicles. Battery charging and maintenance requirements significantly reduce unit operation times. Hydrogen-powered vehicle engines are clean burning and can be operated for an entire shift before refueling is required. Hydrogen fuel cells can be refilled in minutes due to the high operating pressure of cryogenically supplied hydrogen systems. HandyTube's seamless coil products provide safe interconnections of remote hydrogen storage and dispensers with only two connections in each tube-run; one at the source and one at the dispenser.
- **Firefighting.** Firefighter Air Replacement Systems (FARS) is an emerging technology enabling firefighters to replenish self-contained breathing apparatus in large structures in minutes. RescueAir, a leading FARS system provider, selected HandyTube's seamless stainless steel coil tubing to connect remote breathing air filling stations to an exterior connection panel to provide monitoring and breathing air supplies. To satisfy all the requirements of this life-critical system, HandyTube's long seamless coil capability provides leak-free service between refill points and requires no fittings in long runs.

Other applications of HandyTube's seamless nickel and stainless steel alloy coil tubing include hydraulic controls on some of the world's largest ships, fuel and hydraulic control lines for aerospace and defense, heat trace bundles for chemical and petrochemical processing, offshore oil well subsea safety valve controls, compressed natural gas (CNG) and chemical injection lines for oil and gas wells. In gas and high-pressure liquid chromatography equipment, tubing with diameters as small as 0.020" Ø minimizes system volumes and reduces sample size and testing times.

THE SMART CHOICE FOR TUBING

Although system design engineers must choose from various types of metal tubing, HandyTube seamless nickel and stainless steel coil is the logical choice. Its long length and seamless construction inherently provides the safety, reliability, efficiency and economy engineers require for both established and cutting-edge applications. As you consider metal tubing for your fluid and gas transfer application, HandyTube can work with your engineering team to help develop a seamless coil tube solution.

For more information about HandyTube Seamless Nickel and Stainless Steel Alloy Coil Tubing, visit www.handytube.com.

