

MST Long Tubes



At Mannesmann Stainless Tubes we are proud of our commitment to the continuous innovation and development of our production range to support the most demanding of Customer needs, across the globe.

Adapting manufacturing technologies to changing markets and Customer needs is a key focus for the Team at MST.

In the context of the Power Generation sector, the accelerating migration towards renewable energy forms such as Solar represents a part of our innovation drive. However, recognizing the balance and contribution of gas-fired power stations is important.

With this goes an emphasis on increasing the efficiency of gas power generation and further improvement through combining a gas turbine with a heat recovery steam generator (HRSG). These generators utilize exhaust heat from the gas turbine to produce steam that drives the steam turbine, creating a significant amount of additional power. When combined with the primary energy produced by the gas turbine it enables the efficiencies of the plant to exceed 60%. In a typical modern combined cycle gas turbine (CCGT) about 40% is typically generated by the steam cycle.

Similar to coal-fired power plants, a gas turbine becomes more efficient as the combustion temperature increases. The latest generation of gas turbines operate with waste gas temperatures around 1500C (2700F) enabling superheated steam to be produced within the heat recovery steam generator (HRSG). A significant consequence of these high exhaust and steam temperatures relies on both the development of material selection and tube length.

Conventional steels, when exposed to HRSG environments, suffer oxidation on the inside (steam side) of the tube. This lead to the migration towards austenitic stainless steels for the hottest zones and now, as HRSG improves still further, the use of special alloys such as DMV 304HCu.

Tube Length also becomes an increasingly important factor. As HRSG's increase in size to reflect improved cost and energy efficiencies, so the shell-and-tube heat

exchangers are becoming more and more compact. As the drive towards improved operational efficiencies continues many end-users can no longer accept the consequences of welded joints in any of the straight tube sections and instead require exceptionally long tubes.

Whilst the cold processing part of seamless tube manufacturing is a key process for manufacturing “long” lengths the hot extrusion process is equally important. MST utilizes two extrusion presses within its facilities:

Remscheid, Germany - from 44.5 to 122mm Outside Diameter and

Montbard, France – from 33.4 to 280mm Outside Diameter

Hot Extrusion is a key determinate process in the structure, quality, mechanical properties and ultimately length of a seamless stainless steel or Nickel alloy tube or pipe.

Supporting the need for longer tube lengths, in both hot and cold finished products, the extrusion press located in Montbard, France has recently been upgraded. This press upgrade enabled an increase in ultimate extrusion force to 4300 tonnes but additionally to increase the maximum admissible billet diameter and length.

This was achieved by changing pistons and cylinders to increase the force and by increasing the press stroke whilst maintaining the existing functionalities and capabilities of the extrusion press.

This major evolution in the Montbard press has enabled significant increases in length capability.

The driving factor for the improvements came from being able to use bigger and longer extrusion billets with higher ratios resulting from the increased ultimate force.

The production process by extrusion of short, heavy tubes and pipes has its own well-known constraints but the production of longer tubes and pipes creates other types of constraints and challenges. Due to the higher extrusion ratios, the glass powder lubrication system has to be adapted to guarantee the soundness of the products. The increased billet length necessitates that the time needed for processing shall be controlled in order to obtain the metallurgical properties of the material, allowing optimized corrosion behavior with regard to the selected chemistry. The final properties and the dimensional characteristics such as straightness, roundness and eccentricity limits must be maintained along the complete length. All these facts needs to be considered and validated.

With our upgraded extrusion press, the combination of both effects, bigger and longer billet helps to deliver up to +30% longer tubes and pipes.

From the important starting point of the hot extrusion we have a product that can either go through the finishing process as a hot finished product or be used as a mother tube or “hollow” – which forms the starting point for the cold manufacturing process.

Cold Processing within MST enables the production of tubes up to 43m (141ft) long.

The two technologies we use are:

Cold Pilgering, up to 60.3mm Outside Diameter, within our Costa Volpino, Italy facility

Cold Drawing, from 0.3mm Outside Diameter, within our Issoudun, France facility.

Cold Pilgering is also used within our Houston, US facility.

Production of “Long” tubes within Costa Volpino is focused on Heat Exchanger (straight or U bent), Instrumentation, HRSG and Umbilical tubing; with HRSG Boiler Tubes up to 30m (98ft) long.

Recognizing the need for longer tube lengths and benefiting from the increased extrusion capabilities, a number of process improvements have been made:

Pilgering: upgraded pilger mills to handle increased input hollow sizes

Degreasing: increased capability to handle the longer tube lengths and ensure complete cleanliness prior to the heat treatment process.

Annealing: development of our bright annealing capabilities to ensure we obtain the required metallographic structure in an inert environment, removing the need for acid pickling.

NDT: fully automated, in-line, Non Destructive Testing (Ultrasonic and Eddy Current) for both dimensional and compliance to specification testing.

Handling Equipment: ensuring our internal handling equipment and processes respect the often high specification requirements for straightness and surface condition.

Once the “cold pilgered” tube production is complete, logistical solutions were studied and developed to offer door-to-door ground and over-sea shipping, to destinations across the globe.

Production of long tubes at our Issoudun, France facility is focused on cold drawing technology with tube diameters as small as 0.3mm and lengths up to 43m (141ft).

The cold drawing process utilizes hollows from the extrusion of cold pilgering process and reduces these to the required dimensional size in a number of draw passes. In the context of handling long tubes the manufacturing steps of drawing, degreasing, annealing, testing and final inspection all had processes developed.

In the case of small diameter tubes, it is also a solution to provide Customers with either straight tubes or tubes formed in accordance with individual requirements, shipped door-to-door.

A significant part of the production from our Issoudun facility is focused on the high specification applications serving the Aerospace, Nuclear, Oil & Gas and Medical markets

with applications including Instrumentation, hydraulic systems, actuation to high-pressure controls.

Across MST's core markets, the development of "long" tube capabilities provides another solution to meet the needs of our Customers.

With a product range from 0.3mm Outside Diameter to 280mm Outside Diameter combined with tubes ranging from cut pieces to tubes 41m (141ft) long the Team at MST are well placed to meet the challenge of today and innovations of tomorrow.

From the origins of the Mannesmann brothers and their invention in 1885 of the rolling process for the production of seamless tubes, in Remscheid, Germany, Mannesmann Stainless Tubes has developed into a global organization with one important common purpose – our commitment to the production of seamless Stainless Steel & Nickel alloy Tubes & Pipes.

Today we are proud to be **Tube Experts – it's what we are, it's what we do.**

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