[PIPE FORMING]



The Floating Flange can prevent roll scratch which occurs due to the difference of circumferential speed between the top and bottom of the profile.

Are forming methods crucial for welded stainless steel pipes?

Various roll forming methods are available to produce welded stainless pipes. While W-Bend Forming and PSF (Partial Step Forming) techniques are now considered the standard, these methods were seen as novel and ground-breaking when first developed.

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During the manufacture of welded stainless steel pipes, it used to be essential to achieve a uniform structure by applying a heat treatment process before bending and other secondary processing. However, the introduction and running cost of heat treatment processes are high. Sanyo Seiki, a forming roll manufacturer in Japan, invented Partial Step Forming (PSF) and contributed to removing the heat treatment process.

The same roll maker also invented and developed W-bend forming. This technique brought about an enormous improvement in seam weld quality in the production of welded steel pipes. PSF methods were developed by focusing on the characteristics of stainless steel, the quality of the final products, and reducing customer's manufacturing costs.

PSF aims to minimise work hardening and residual stress in pipes. It achieves high pipe quality and enables the secondary bending and hydroforming of the pipe without requiring a heattreatment process. A fine example of the benefits of PSF is exhaust pipes in the automotive industry.

Furthermore, pipes can be formed using a narrower strip. For instance, rather than using a 120-mm-wide strip, PSF can produce the same diameter tube from a 118.2-mm wide strip.

Floating Flange roll

Sanyo Seiki also developed the Floating Flange (F/F) roll, which is indispensable to avoid roll marks and scratches during the manufacture of welded stainless steel pipe. Forming defects on the pipe surface are created by the difference in peripheral speed between the drive point of forming rolls and roll flange. The drive point is in the centre of the roll; as it has the smallest diameter, it turns more slowly than the largest diameter outer edge, causing roll marks on tubes

Existing pipe mill +

Evolving stainless steel + Final Product specification + X FACTOR* = Quality welded stainless pipe

*X Factor is roll design (PSF, F/F rolls) where the right roll maker can make a difference.

and pipes near the faster-spinning roll flanges. The larger the pipe, the more noticeable the marks become, necessitating costly and timeconsuming polishing. The Floating Flange principle divides

the flange part of forming rolls into separate pieces connected by bearings, so the flange part rotates freely. As the drive point in the centre is fixed, it turns at the speed of the mill. However, the two outside rolls spin freely at the same speed as the pipe material. Floating Flange rolls, therefore, prevent the creation of marks on the outside of the pipe.

[PIPE FORMING]



W-BEND FORMING

PARTIAL STEP FORMING

Hiro Watanabe is Overseas

Partial Step Forming (PSF) decreases work hardening by avoiding repeated bending in the same part of the strip.

Meeting evolving specifications

Ideally, a pipe forming mill should have the equipment specifications to match the product quality required. However, in reality, existing mills must tackle new materials and product tolerances for each order received. Therefore, the feasibility of achieving product quality often depends on Forming Rolls. Today, the various innovative roll forming methods and roll structures that one roll maker in the Far East invented and developed are accepted as the industry standard. However, not all pipe manufacturers will succeed even if these standard forming methods are applied. In short, the ability to analyse an existing pipe mill's specifications, the quality of the final product required by the end-user, and knowledge of roll design and roll quality, are all essential for superior pipe making.

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information, please visit www.sanyoseiki.co.jp