The Detailed Forming Behavior of ERW Tube and Pipe Making Process

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INTRODUCTION

Steel tube and pipe are widely used in oil and gas exploration, automotive industry and construction field. TMK IPSCO manufactures seamless and welded tubes mainly for oil and gas industry. At the welding tube division, TMK IPSCO uses the electrical resistance welded (ERW) mills to make broad ranges of the welded tubes for various applications. The ERW mill is a quite popular tube rolling process used worldwide. To improve ERW mill operation and tube quality it is important to understand tube forming characteristics and behavior. Recently there has been an increase in demand for higher strength and thin wall tubes. During production, there are two common difficulties encountered during forming; one is the existence of flat spots on the tube surface, the other being edge buckles while forming thin wall products. This paper presents general understanding of these two common issues in order to optimize the tooling design and mill setup for making high quality tubes and improving the mill performance.

TWO TYPICAL ERW PIPE MILLS

Typically, there are two types of ERW mills according to forming method. One type uses individual stands in each forming section without a cage forming section. Another type mill has a cage forming section before the first Fin pass. The forming behavior of these two types of mills will be discussed in greater detail.

An 8” Pipe Mill without Cage Forming

A typical ERW pipe roll forming process consists of the uncoiler, accumulator, forming stands, welding stand, seam annealing, cutoff, finish and inspection for making pipes used on the oil and gas industry. The forming part of a pipe mill generally includes the breakdown passes, Fin passes, welding pass, sizing passes and turkshead (TH). The incoming flat sheet is continuously formed as it goes through each pass until it reaches the required shape. The forming section is the key part of the pipe mill to ensure consistent dimension and weld quality. The proper forming up to the weld box is very critical to insure good quality of the products. This paper focuses on the forming behavior up to the weld box. Figure 1 shows a TMK IPSCO 8” pipe mill layout before the weld box, which includes four breakdown passes and two side passes, followed by three Fin passes. This mill will be used for analyzing forming characteristics.

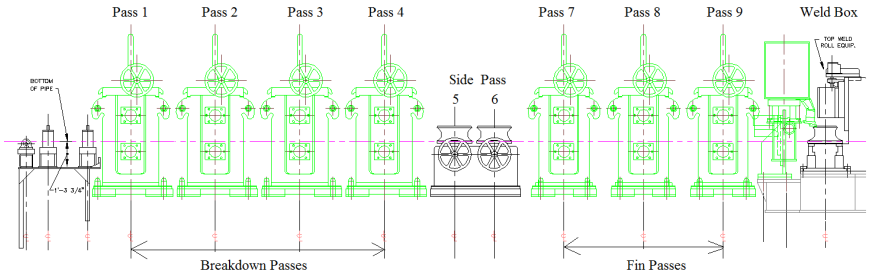

Figure 1 TMK IPSCO 8” pipe mill layout