



The world's largest push-pull pickling line at voestalpine Stahl

Push-Pull Technology For New Advanced Steels

In 2008, Siemens VAI commissioned a new pickling line of the push-pull type with an inline skin-pass mill at voestalpine Stahl in Linz, Austria. The new line offers a capacity of approximately one million tons per year for strips thickness ranging between 2 mm and 12 mm. Some 40 percent of its capacity serves for the production of feedstock for subsequent cold rolling in a continuous tandem cold mill in the gauge range from 3 mm to 5.5 mm. The remaining portion of the product mix is dedicated to pickled and oiled hot strip. The maximum tensile strength of the feed material can reach up to 1,150 MPa.

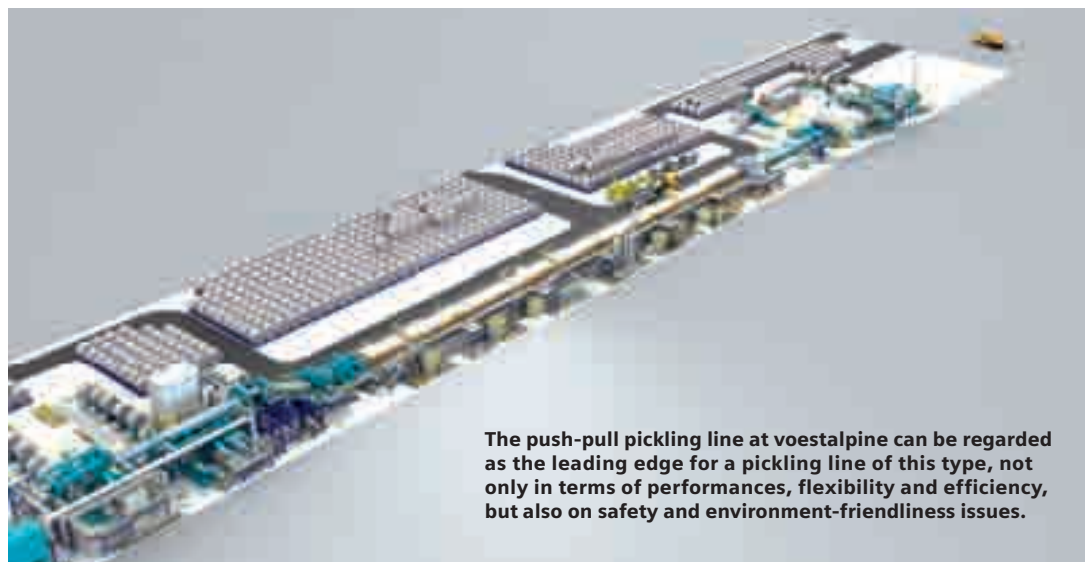
The trend to pickle particularly advanced high-strength steels (AHSS) is leading to higher-order equipment requirements in all kinds of pickling lines. Especially hard-to-weld steel grades raise the demand for (discontinuous) push-pull pickling lines. Besides, lines of continuous designs are usually limited to 6.5 mm. For thicker products, there is no way around push-pull pickling lines to cover a growing range of applications. For the pickling of up to approximately one million tons of strip per year, push-pull pickling lines offer significant advantages in regard to investment costs and operational flexibility, especially in the case of frequently changing strip dimensions and steel grades.

As a result of rigorously developed design and

automation concepts, Siemens VAI made it possible for voestalpine to substantially increase capacity and offer an extremely varied product mix. voestalpine's requirements for this line exceeded the standard industry demands by far, but as today's results show, it proved to be a smart concept to combine the production of highest-quality cold-mill-substrate hot band with the niche of special pickled-and-oiled, heavy-gauge coils into one line. In the past, it was only possible to accommodate such a product mix by separate pickling lines. Today, though, a single line can accomplish both tasks. This provides a substantial benefit to this major steel producer in terms of capital investment and quality yield.

1 View to the entry section and the pickling tanks

2 Process section of the PPPL



The push-pull pickling line at voestalpine can be regarded as the leading edge for a pickling line of this type, not only in terms of performances, flexibility and efficiency, but also on safety and environment-friendliness issues.

Top-grade pickling and rinsing process

The five pickling tanks, as well as the subsequent five-cell rinsing tank, feature a highly efficient counter-stream cascade process. The continuous combination of these pickling and rinsing sections leads to a fully pickled, washed strip. Each pickling (or rinsing) section features a pair of wringer rolls to minimize unwanted acid (or water) drag out, opposite to the cascade process.

The uniquely designed V-shaped flat pickling tank increases strip stiffness during its passage through the tank. This eliminates strip buckling and flattening, and assures reliable threading. To prevent strip staining in the rinsing section, Siemens VAI developed a special anti-stain system that does not require chemical additives. The energy-efficient design of the fume extraction and sealing system significantly reduces energy costs and acid losses.

Advanced automation for optimized conversion cost

The acid temperature and the strip speed is calculated and selected with the aid of a reference model in order to ensure a proper pickling process. The Siemens VAI Automatic Pickle Liquor Analyzing and Control System (Faplac®) automatically controls the main parameters of the process (concentrations, flows, temperature) and optimizes them in real time using data derived during the running process about the chemical formula and other parameters. This minimizes fluid and heat consumption, adjusts the iron content of the waste acid for optimum regeneration, and optimizes the reuse of waste rinse water and steam condensate.

Reducing maintenance and operating costs

Wringer rolls always prove to be the major source of maintenance costs. To improve their life expectancy, the pickling line features a taper shear ahead of the process section. By cutting the edges of the strip's head ends, a safe threading of the strip through the pickling tanks and onto the wringer rolls' chambers can be ensured.

To minimize the operating downtimes, the entry section features two pass lines: the upper one is dedicated to thin strips (up to 6 mm) while the lower one, equipped with two inline flatteners, can handle both thin and thick strips. After pickling and rinsing, and contrary to the common push-pull pickling line standard, the material is passed through a turret-type side trimmer whose dual rotating heads allow worn knives to be changed safely while the active ones continue cutting the strip edges.

To improve the surface quality and saleability of the finished product, the voestalpine pickling line features an in-line skin-pass mill. The 4-high dry-type mill can operate with two work-roll diameters to adapt for the hardness of the grades rolled and to allow a suitable control of roughness transfer versus elongation properties of the strip. Work and back-up rolls are equipped with cleaning devices to avoid dust pick-up on their barrels and to achieve the best surface conditions on the strip. ■

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