Used stainless steel plant benefits Indian project

As rationalisation in the steel industry continues, opportunities arise for investors to take advantage of the increased availability of used plant and give it new life. As Paul R Osborne explains, Parkegate is playing a major role in one such opportunity, where an Indian investor is setting up a 2.4 million tons/year cold rolled stainless steel plant at Kuranti in Dhenkanal, Orissa.

With an overall investment of Rs4250 million (£60 million), Rabirun Vinimay (Private) Ltd (part of the BRG group) is building a plant that will integrate a range of used equipment with some new. Parkegate has not only been instrumental in securing a range of used lines and mills for the project but will also provide engineering expertise to upgrade the two anneal and pickle lines (one for hot band, the other for cold).

Example of a stainless steel coach.

Background

Situated on an 8 ha site, the plant will produce cold rolled stainless steel coils to meet the needs of local downstream industries, with approximately 85% of production going to meet demand for train carriages in India.

The project envisages taking hot rolled coils and after a series of process steps, transforming them into thin cold rolled products, with the required surface finish and physical properties. The first process prepares the coils for cold rolling by passing them through a hot anneal and pickle line (HAP) to soften and descale the strip. The cold rolling process then reduces the strip to the desired thickness in about five/seven passes on a 20hi Sendzimir mill or Z hi reversing mill, following which the strip is fed on to the cold anneal and pickle line (CAP). Here, the heat treatment returns the strip to a workable condition, which is followed by a further descaling process, before it passes to the finishing lines. Within the plant, a range of finishing processes is available, depending on the finished product requirement. This includes slitting, tension levelling and cut-to-length. Finally, there is a packing line to prepare the product for shipping.

Having acquired a range of used plant to perform this process, one of the remits was to utilise as much of the existing equipment as possible, while still meeting the required product mix (see Table 1). As such, it was apparent that while the mills would largely meet requirement, the focus would be on enhancing the performance of both the HAP and CAP lines and this is where Parkegate was able to offer its engineering services. Having undergone a number of improvements since installation in the 1970s, the lines were comparatively up-to-date but still had a number of inherent compromises; chief among these were the space constraints between key pieces of processing and terminal equipment. The relocation of equipment gives the opportunity to eliminate a number of these compromises, which will go some way to enhancing overall performance.

Engineering expertise

Identifying the need to extend and modify the existing pickle sections to suit defined product requirements and annual production needs led Rabirun Vinimay to contract Parkegate, using the company's engineering skills and process knowledge to define this critical process area. The scope associated with this aspect of the project was to provide the following engineering services:

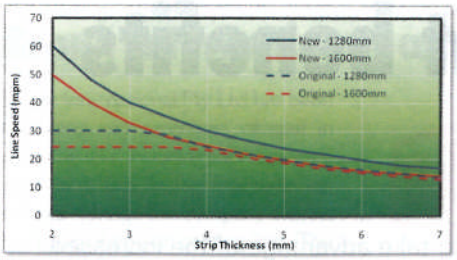
- Overall process definition of the pickling and pre-pickling processes.
- Mass balance with energy and flow calculations.
- Process diagram of pickle sections.
- Proprietary equipment specifications.
- Design layouts of pickle sections.
- Process and instrumentation diagrams (P&ID).
- Detail drawings (new tanks and fume extraction ductwork).
- Bills of materials for new equipment.
- Support structure information for pickle sections.
- Utility pipework routing.
- Foundation drawings with loading data.

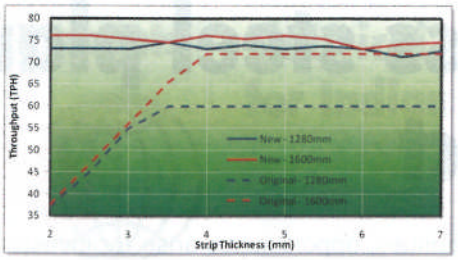
Hot anneal and pickle line (HAP)

A review of the original line capabilities to process the product mix highlighted that the performance at thinner gauges was a key issue for the HAP. Modelling of the process section was undertaken and the accompanying graphs show the improvements in speed and throughput necessary

HAP line	Material	HR stainless steel strip – Austenitic grades - AISI types 304 and 201 – Ferritic grades - AISI type 430
	Process speed	60m/min maximum
	Production rate	72 tons/h based on 2.00mm x 1280mm HR strip
	Capacity	400,000 tons/year
CAP line	Material	CR stainless steel strip – Austenitic grades - AISI types 304 and 201 – Ferritic grades - AISI type 430
	Process speed	90m/min maximum
	Production rate	33 tons/h based on 0.60mm x 1280mm HR strip
	Capacity	200,000 tons/year

Table 1. Product mix.





HAP line parameters – original versus new.

to achieve the required production. In summary, in order for the HAP line to meet the required performance, the analysis of the pickle section showed that it would be necessary to run the process section twice as fast and add three new pickle tanks to the existing three tanks (consolidating the tank designs).

As a consequence of reviewing the existing equipment to meet these requirements and with respect to maximising the re-use of the existing equipment, the following issues needed to be addressed:

- Replacement of the mixed acid tank section with a new section (three tanks), as the original was difficult to remove and transport.
- Addition of brushing equipment to improve scale removal.
- Increase the steering capacity to cater for the longer tank length.
- Increase rinsing capacity (high and low pressure systems).
- Incorporate new NOx reduction equipment.
- Modify the associated fume extraction equipment.

With Parkegate designs and specifications in hand, Rabirun Vinimay was able to procure all the necessary parts locally, including six pickle tanks and associated lids.

Cold anneal and pickle line (CAP)

Unlike the HAP line, the basic analysis of the original CAP line performance showed that it was essentially good enough to meet product mix requirement. However, looking to possible future needs, it was felt prudent to engineer the line to allow the later inclusion of an additional mixed acid tank and an electrolytic pickling tank. This requirement meant that it would be necessary to run the process section 50% faster, design the line for seven tanks (three mixed acid and four electrolytic) but initially install only five tanks (two mixed acid and three electrolytic) and incorporate space for the future installation of additional rinsing.

Again, after a detailed review of the existing equipment, the final list of equipment changes was drawn up for the CAP line which is summarised as follows:

- Replace the three electrolytic pickling tanks with new tanks, as the originals was difficult to remove and transport.
- Additional brushing equipment.
- Increase steering capacity.
- Increase rinsing capacity.
- Incorporate new NOx reduction equipment.
- Modify the associated recirculation systems.
- Modify the associated fume extraction equipment.

The relocated CAP line will reuse the two existing polypropylene turbulent mixed acid tanks and the three lids from the electrolytic tanks which, coincidently, were supplied by Parkegate as part of an upgrade to the original line.

Summary

With the line currently in the installation phase, it is expected that this plant, with its combination of appropriate used plant and state-of-the-art engineering, will show that it is possible to provide a cost-effective solution to meet today's market needs. Companies like Parkegate can offer producers expertise across the full range of mill and line technologies, covering all aspects from process definition through engineering to recommissioning. With the current market situation, it is likely that there will be further, similar opportunities for investors and hopefully, for Parkegate.

Reader Reply No.29

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