

Micro steel mill project implemented in Iceland

A compact steel meltshop has been commissioned in Iceland. The plant comprises a modern EAF with 15 t (30 t) capacity equipped with an ultra-high performance electrode control system and a single-strand continuous caster. The blooms and mini slabs are directly used as electrodes in the aluminium melting industry. The initial capacity of the meltshop is only 30,000 – 40,000 t/year, expandable up to 200,000 t/year, matching current regional scrap availability and market requirements.



EAF with ultra-high performance electrode control system

Iceland is a beautiful country. Its inhabitants are a people of few words and with a strong will to show how concepts based entirely on the utilization of locally available resources can be brought to industrial success. In a clean-up campaign, scrap dumped in the environment is collected all over the country. The collected scrap is considered a precious resource that can be used to limit the expensive imports of large-size hot rolled bars.

At present, Iceland exports all the scrap. The high freight costs involved reduce the margins for the scrap exports. At the same time, steel products are 100% imported, again requiring the payment of freight costs. Also for strategic stocks, steel products need to be imported. Therefore it is quite logical to use the scrap locally to produce a finished product critical to the local aluminium and other industries. This idea becomes even more attractive as the cheap locally available electrical energy can be used to make the product, reducing an otherwise major cost factor in steelmaking. Arthur Gudmundsson and his partners were faced with many obstacles in convincing a bank about this idea in order to secure solid financing in the aftermath of the country's financial crisis.

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From the very beginning, STS has been a strong supporter of the idea, joining forces with the team of Geothermal Metal Recycling (GMR) located in the Grundartangi industrial area to come up with a suitable plant solution. The result is a steelmaking plant, equipped with most modern machinery but covering the smallest imaginable area to minimize the initial investment. As a suitable industrial area was extremely expensive, the facility covers an area of only 81 m x 46 m and uses no more than two cranes running at a height of only 10 m.

Another technical challenge was to initially produce only 30,000 – 40,000 t/year of steel at an acceptable yield and at competitive production costs, allowing a gradual expansion to an internationally more viable output of approximately 200,000 t/year.

This was not the first unusual progressive project attracting STS. 13 years ago, the company commissioned a complete and unique steel meltshop in Cape Town based on induction melting technology – with yields and an efficiency still unsurpassed despite the heavily growing number of induction meltshops built in recent years.

STS felt attracted by the challenge of setting up another steel meltshop on the opposite side of the world, especially as this project was completely different from the first one in terms of both melting technology and the type of finished products, namely blooms and slabs as a substitute for rolled material.

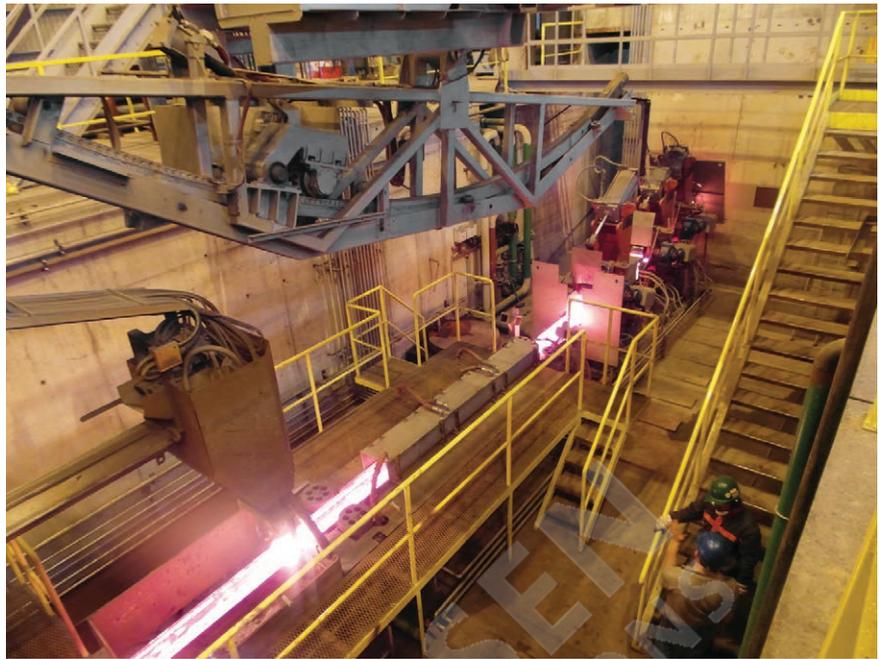
Meltshop and continuous casting plant

Electric arc furnace. From the very beginning, the EAF was designed

for 15 – 30 t capacity and the requirement of very fast-acting controls and ultra-high power concentration. In the design, extra fast electrode movements and controls were adopted to reduce power and electrode consumptions without increasing the need of maintenance. The vessel is lined with RHI refractories. The meltshop produces low and medium carbon steel, mainly for anodes and cathodes to be used in primary aluminium production. Ladles of 20 t (30 t) capacity are equipped with a sliding gate system and porous plugs. A ladle car is used to sequence the two ladles in operation.

Single strand CCM. The continuous casting machine is designed with an 8-m radius. The single-strand machine can optionally be expanded by a second strand in future. Tundish capacity is 3 t. Casting dimensions include rounds from 130 to 180 mm diameters and squares from 90 to 180 mm (casting equipment: 160 mm dia., 180 mm dia., 120 mm x 120 mm, 140 mm x 140 mm, 150 mm x 150 mm, 100 mm x 150 mm, 107 mm x 122 mm, 90 mm x 200 mm).

The curved, tubular, multi-tapered mould is 800 mm long. The hydraulic mould oscillator operates with various patterns optimized for each casting shape and steel grade. The cast blooms are cut to lengths between 2.5 and 6 m. The plant is automated with



Single-strand bloom caster

a sophisticated level 1/level 2 system including HMI.

Conclusion

STS supplied the most compact modern steel meltshop ever commissioned in Iceland. The meltshop is installed in two steel buildings 12 m high and covering an area of 26 m x 81 m and 20 m x 81 m respectively. The EAF is equipped with a unique ultra-high performance electrode con-

trol system. The plant includes a single-strand bloom caster. The blooms and mini slabs are directly used as electrodes in the aluminium melting industry. The initial capacity meltshop is only 30,000 – 40,000 t/year to match current scrap and market requirements. Production can be expanded in phases to up to 200,000 t/year. Future options for a capacity increase include adding a second strand, a ladle furnace, additional cranes and other auxiliaries. ■



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