Combined annealing and hot-dip galvanising line to match all market situations

Hyundai Hysco is establishing a new cold-rolling complex at its site in Dangjin, South Korea. The plant includes a hot-dip galvanising line as well as a combined annealing and hot-dip galvanising line. Both line types are extremely flexible as they permit the South Korean user to produce varying quantities of hot-dip galvanised and annealed material. SMS Siemag is responsible for the lion’s share of the mechanical and process-technological equipment. The air knives and wiping equipment will be supplied by FOEN – Fontaine Engineering und Maschinen GmbH.

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HIGH PROCESS SPEED
A special feature is the high process speed of 180m/min for galvannealed grades. Both lines will go on stream at the beginning of 2013. They are designed to treat material that has previously been descaled and cold-rolled in a combined pickling line/tandem cold rolling mill. Once in operation, the Hysco Dangjin combined line will be the fastest galvannealing line worldwide.

HOT-DIP GALVANISING LINE
500,000t/yr of strip can be coated with zinc in the hot-dip galvanising line, with the option to heat it again in an induction furnace directly after coating to obtain galvannealed steel strip. Prior to coating, the strip is subjected to recrystallisation annealing and then cooled down to zinc-bath temperature. An integrated ultra-fast cooling system allows for high cooling rates.

ANNEALING AND HOT-DIP GALVANISING LINE
In the combined annealing and hot-dip galvanising line the strip may either run through liquid zinc or through an overaging zone after recrystallisation annealing. This approach makes the line very flexible. Meeting the high quality demands, it can be used for two different product groups (annealed and galvanised). Rapid adaptation of production to the market requirements makes this type of plant an example for cost-effectiveness and flexibility. The line is designed for an annual production of 1,000,000t of annealed strip. If it is also used as hot-dip galvanising line, it can produce for instance 400,000t of annealed and 300,000t of hot-dip galvanised strip per year including galvannealed grades.

PROCESS SECTIONS OF BOTH LINES
The process sections of both lines are equipped with an air-knife system and bath rolls manufactured by FOEN. This equipment includes most of the latest developments in coating technology such as touchless edge baffle system for edge quality improvement and air knife variable gap adjustment system for energy savings, noise reduction and top dross minimising. All bath rolls are equipped with motorised scanable scrapers.

Fig 1 Hysco team during workshop tests
Fig 2 Upper illustration shows the annealing and hot-dip galvanising lines arranged side by side in one bay, while the lower illustration shows the combined annealing and hot-dip galvanising line, where the strip will either pass a zinc pot (lilac strip colour) or run to an overaging zone after fast cooling.

### Technical data

#### Annealing and hot-dip galvanising line
- **Capacity**: 400,000t/yr (annealed) + 300,000t/yr (galvanised)
- **Steel grades**: CQ, DQ, DDQ, EDDQ, HSS, IF-HSS
- **Strip width**: 800-1,650mm
- **Strip thickness**: 0.3-2.3mm
- **Coating**: 30-300gr/m/side GI, 30-90gr/m/side GA
- **Speeds**:
  - Entry section: 700m/min
  - Process section: 350m/min (annealing) 200m/min (galvanising)
  - Exit section: 800m/min

#### Hot-dip galvanising line
- **Capacity**: 500,000t/yr
- **Steel grades**: CQ, DQ, DDQ, EDDQ, HSS, IF-HSS
- **Strip width**: 800-1,650mm
- **Strip thickness**: 0.3-2.3mm
- **Coating**: 30-300gr/m/side GI, 30-90gr/m/side GA
- **Speeds**:
  - Entry section: 300m/min
  - Process section: 200m/min
  - Exit section: 350m/min