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Continuous Annealing and Galvanizing Line electrification: decarbonation as a new opportunity to produce HSS and AHSS by flash annealing

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new production routes. Different scenarios for the substitution of gas-fired furnace with electrical powered solutions can be considered. In particular, flash annealing –so far only considered at laboratory scale –can be introduced at industrial level providing substantial benefits in terms of productivity and material properties. The beneficial effect of flash annealing on the material properties - either conventional or advanced high strength steel grades - have been documented in the past decades based mainly on laboratory experiments. New mechanical and ductility / forming compromises can be achieved thanks to flash annealing, while limiting the alloying content. Some metallurgical uncertainties remain, mainly related to phased distribution and homogeneities.
Induction and quenching technologies are now mature enough to consider flash annealing and galvanizing at industrial scale:
- Induction technologies (transverse and longitudinal flux) allow rapid heating (~500°C/s.mm) over a large temperature range as requested for the processing of multiphase material containing retained austenite. Moreover, they allow efficient strip re-heating in the case of complex annealing cycles such as for example Q&P concepts.

- Dry-H2 fast cooling and Wet quenching cooling (up to -1000°C/s.mm) enable metallurgical control of all required phases as well as management of full requested product dimensional ranges and similar annealing cycle for single alloy chemical concept whatever the strip thickness. The presentation will review different CAL-CGL electrification scenarios depending on energy prices and product mix. In particular, the metallurgical benefits of flash annealing on flat-C steels and the related key technologies enabling such cycles at industrial scale will be evaluated and considered.

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