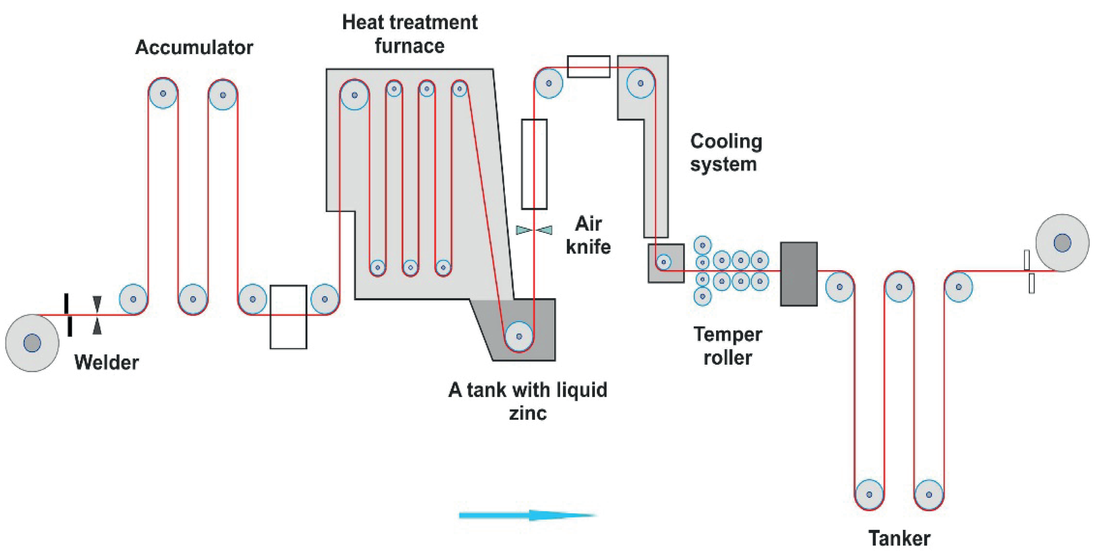
Łukasiewicz
Instytut Metalurgii Żelaza

EDITION 15 INTARG®

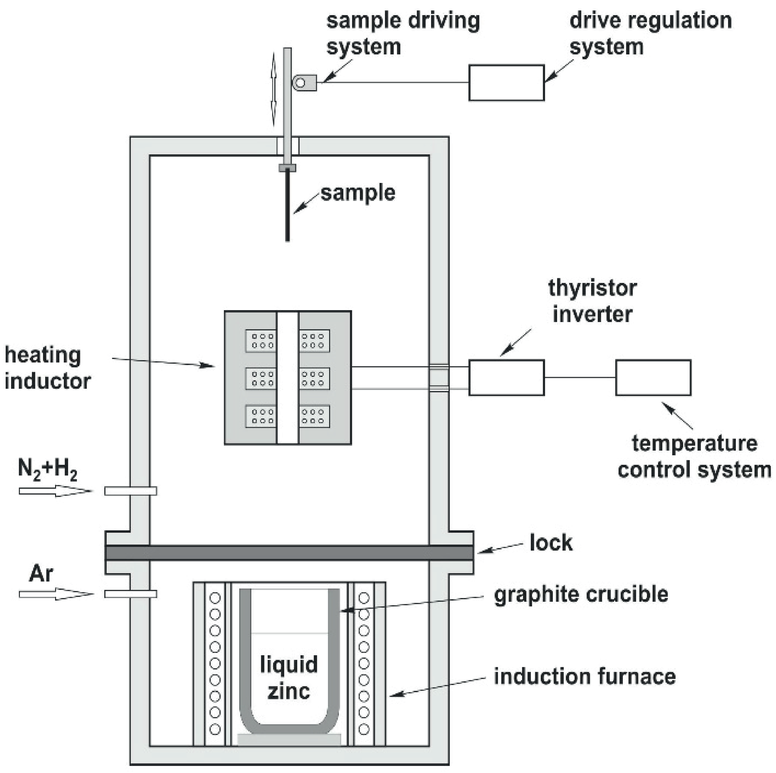
LABORATORY SIMULATOR OF THE DIP GALVANIZING PROCESS

The present invention relates to the hot dip galvanizing process simulator, that has been constructed and implemented in Research Network Łukasiewicz – Institiute for Ferrous Metallurgy, Gliwice, Poland. The simulator reproduces the process conditions occurring in industrial continuous annealing lines for the production of sheets of AHSS used in the automobile industry. Simulator is composed of two working areas. In the upper part, a sample taken from the sheet is heated by means of an induction coil in N_2+5%H_2 atmosphere. The use of this atmosphere reduces the iron oxides present on the surface of the sheet, which is a necessary procedure before dipping the sample in the molten alloy from witch the coating is made. In the lower part of the simulator, there is a graphite crucible placed in an induction furnace, in which the alloy used for galvanizing, protected by the atmosphere of argon, is melted. The temperature of the molten alloy is fixed to achieve required temperature difference from that of the sheet sample and is measured using thermocouples. When the sample and bath reach the desired temperature, the sample is dipped mechanically in the bath. The minimum bath dipping time for the sample is approximately 1 second. The simulator is used in physical experiments aimed at selecting the chemical composition of coatings and parameters of hot dip galvanizing to be applied in industrial lines.



Simulated galvanizing process using the developed solution

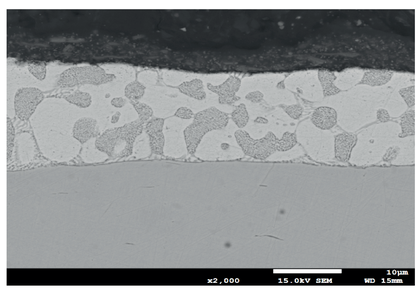
Laboratory simulator



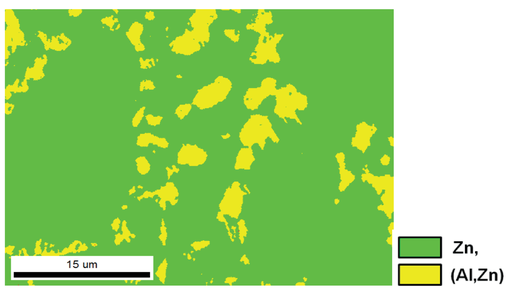
Schematic picture of the simulator

Operating simulator parameters:

- Melting temperature of zinc 440-470°C
- Immersion time in bath 1-2 sec.
- Cooling rate after galvanizing 0.5-30°C/sec.
- Controlled difference between sample and coating temperature



Zn-Mg-Al coating on steel



EBSD phase mape of coating

Application:

- Selection of coating material
- Selection of coating process parameters for industrial lines

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