Phosphating the bare surface of one-side electrocoated high strength steel

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Abstract


Modern steels sometimes behave poorly when submitted to a full-sequence phosphating treatment performed on carmakers' production lines. This project developed electromechanical tests for use by steel and automotive manufacturers as phosphatability assessment tools and as methods to assess more reliably the porosity of the phosphate layer. The research involved electrochemical tests, reproduction of the phosphating treatment in laboratory devices and evaluation of the phosphate layer characteristics.

The results showed that limiting the sensitivity to passive behaviour is a prerequisite for a good and homogeneous response to phosphatation. However, the crystal size and homogeneous distribution are more influenced by industrial phosphating-line parameters than by steel surface oxide composition. Probably the visual fluctuations observed by carmakers are related to some variability of the passive film layer combined with insufficient control of the phosphating line. Contrary to prior expectations, problems of phosphatability are not correlated with the presence of 'high-strength steel' as such.

A number of factors were identified that could cause the production of non-adequate phosphated products, Perhaps none of these factors is sufficient by itself to induce bad phosphation, but the combination of two or more of them can produce unacceptable defects on the phosphate layer deposited on the steel surface. Two helpful electrochemical methods, useful for predicting the phosphating ability of a given steel surface and to evaluate the porosity of a phosphate layer were developed. These methods represent effective tools for both steelmakers and car producers.

Additional information

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