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Al-Si automotive components hard coating implementation by electrochemical process.

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The anodization processes related to the formation of protective (Al_2O_3) layers were first used on 1854. Ever since, new aluminum alloys were developed and this electrochemical process is widely used for most surface protection applications. The intake and exhaust ducts' surfaces of internal combustion engines are prone to chemical agents and significant temperature variation. In order to extend the working life of these components it is necessary to implement covering protective layers all over the internal duct's surface. The present research work encompasses both, the required development phases for both, the mechanical and corrosion resistances improvement. The process was undertaken to allow the anodization of a small internal surface of a much larger part, which is the internal exhaust duct of a cast aluminum-silicon cylinder head. The anodizing was obtained using H_2SO_4 solution 10% in volume and a DC current starting with 20 V. The Al_2O_3 layer attained, inside the cylinder head's ducts, had an average thickness of 120 μm in accordance with the proposal of providing a suitable surface protection during the component's lifecycle.