

# Improved Engine Performance Via Use of Nickel Ceramic Composite Coatings (NCC Coat)

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## Abstract

In seeking to produce lightweight aluminum block, based engines, a variety of metallurgical and surface modification techniques for cylinder bores, pistons and piston rings are available. This paper discusses these various alternative methods while placing particular emphasis on electroplated nickel ceramic composite coatings (NCC). NCC Coating properties are characterized by high hardness, high corrosion resistance, high temperature wear and scuff resistance and low frictional coefficients.

The application of NCC Coatings in 2-stroke motorcycle and diesel engines has resulted in benefits in the following areas:

- Elimination of cast iron liners.
- Reduced cylinder wall temperature, engine weight and increased power.
- Lowering of oil consumption.
- Improved fuel economy.
- Reduction in emissions.
- Improved scuff and wear resistance on cylinder bores, pistons and piston rings.
- Friction reduction.
- Combating of piston ring groove microwelding and pound out.
- Thermal barrier protection on diesel piston domes.
- Reduction in carbon deposition on piston domes.
- Reduced noise from piston slap.
- Ability to operate in corrosive environments.

The sum of the above stated benefits holds much potential for contributing towards greater flexibility in materials selection for the design of lightweight, fuel efficient vehicles based upon the use of aluminum engines.

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