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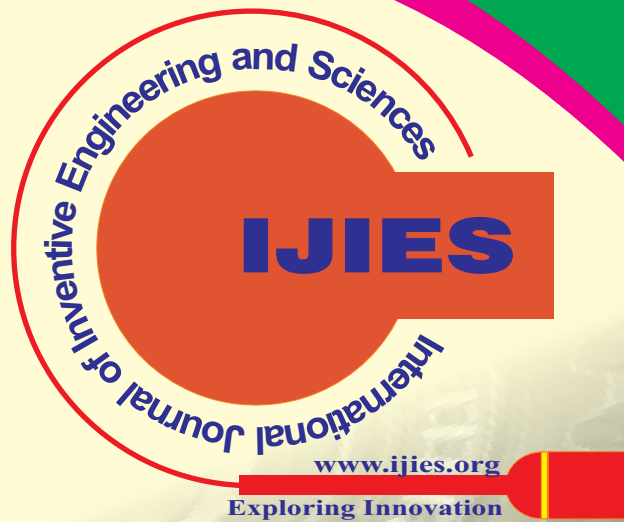
**ISSN : 2319- 9598**

**Website: [www.ijies.org](http://www.ijies.org)**

**Volume-5 Issue-9, MAY 2020**

**Published by:**

**Lattice Science Publication**



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**Paper Title:** Characterization of Surface Coating Techniques for Improved Performance

**Abstract:** Surface coating has evolved with time, tracking the demands of the processing industry. This research activity, studies the significance of powder coatings in the evolution of existing conventional surface coating technology for their practical applications in the field of metal coating, particularly office and home appliances. The first objective of this work involves a systematic comparison between polymer powder coatings with liquid-based coatings. In the second objective, a comparison between the polymer coatings with additive filled powder coating was performed. Various conventional substrates (such as copper, aluminium, galvanized iron, brass, cement plank, wood block) were used for this study. The materials were first dry scuffed and then dipped in 3 in 1 chemical (zinc phosphate chemical and magnesium phosphate) for the primer coat. The prepared substrates were surface coated with liquid paint (on one side of the panel) using spray gun and powder paint (on another side of panel) using electrostatic spraying. The coated panels are then subjected to various standard (ISO) characterization techniques such as Scratch hardness test, Flexibility test, Thickness test, Adhesion test, Impact resistance test etc to analyze the effectiveness of the coatings applied. The quantitative and qualitative results thus obtained using powder coatings were promising (e.g: As the load progressively kept increasing i.e. 1000-2000 gm, mild scratches were noticeable on liquid coated substrates whereas powder coated metal panels have shown a greater resistance to scratch damage) as the test values determined high strength quality and durability (in-line with the standards) in comparison with liquid coatings. Also, the doping of additive (graphene) in small quantity has improved characteristics and qualities of the powder coated materials (e.g: graphene based powder coating has endured scratch hardness test beyond 2500 gms load force compared to simple powder coating). The findings of the current research study has confirmed the advantage of the powder coating technology and also deliberated the effect of fine powder flow ability. The important future prospects of this research work is that, powder coatings will stand on the threshold of exciting breakthroughs thus opening new frontiers by being able to coat thick steel components and even non-metal substrates. Also, the recent advances in powder coating technology with anticorrosive additives will result in bonded metallic coatings that deliver a unique, quality appearance.

**Keywords:** Powder coatings, Additive (graphene), Scratch hardness test, Impact resistance test.

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