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Particular Defect Analysis of Semi Finished Component (Lesser Size Defects)

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Abstract--- *Rejection of finished or semi-finished products in any industry is always undesirable and intolerable. The study is carried out to examine the root causes of various defects and imperfections of products in industries that arise during different stages of manufacturing. After identification of flaws by experiments, research remedies are also determined to reduce the intensity and potential of its occurrence. In pursuance, a detailed study of manufacturing process was performed. Bottlenecks and weak points of the systems have been noted. The success of the study not only enhanced productivity of the industry but also reduced the production cost of the final product by minimizing wastage in terms of rejection thereby increased the competitiveness.*

Keywords--- *Lesser Size Defects, Semi Finished Component, Particular Defect Analysis.*

I. INTRODUCTION

The purpose of these experiments was to rapidly assess the feasibility of using ionic liquids to electroplate steel with chromium metal from a non-aqueous chromium-III plating bath. The chromium metal coating will function as a corrosion barrier, so the coating must be contiguous with no cracks; high thickness uniformity and minimal inclusion of impurities is also desired. Published literature indicates crack-free coatings of chromium have been deposited using chorine chloride and chromium(III)chloride hex hydrate eutectic mixtures. The experimental tasks are meant to use the published methodologies for electro deposition of chromium with ionic liquids as a base-line to develop a commercially useful process for plating chromium onto steel with an electrolyte containing chromium-III salt and ionic liquid. Later we decided to do some testing in 1-ethyl-3-methylimidazolium chloride ([EMIm]Cl) with anhydrous chromium chloride to avoid the possibility of introducing hydrogen embrittlement into the substrate. In Developing Countries like India, Chromium coating plays an important role in many coating application.

Chromium coating has found extensive use as a final finishing operation on many articles. It may be divided into two categories. In the first category, generally known as decorative chromium, in which chromium is coated as a thin coating on bright nickel to serve as a non tarnishing, durable surface finish on metals for decorative purposes. The second category is known as hard chromium coating wherein heavy deposits of chromium are directly coated on a base metal so as to take advantage of the special properties of chromium.

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Defect in any product is not acceptable .Defective parts will not only produce resource losses but spoils the Image/ Identity of an Industry. At the same time in some processes defects always become a part of the production . Decorative chromium deposits are used on such items as automobile bumpers and trim, household appliances, furniture and many other articles that require a bright and aesthetic appearance. The normal thickness for decorative chromium is in the range of 0.000020'1 -0.000070". The total deposit including the copper and nickel under-layers is typically 0.0005" thick.

II. DEFECT ANALYSIS

The defect can be defined as any deviation from the appearance, form, size, macrostructure or provided in the technical standards. Defects are detected at the billets reception, by checking their surface quality on the inspection beds, or by checking the macrostructure of the test samples. A defect is not always the result of a single case. Often, the defect is the result of multiple interacting causes, depending on a variable number of parameters. Similar defects, as "appearance", may have one or more different causes, and apparently different defects may have one or more common causes. Therefore, there are often found several defects on the same billet. The defects arising from the steel continuous casting can be classified as follows:

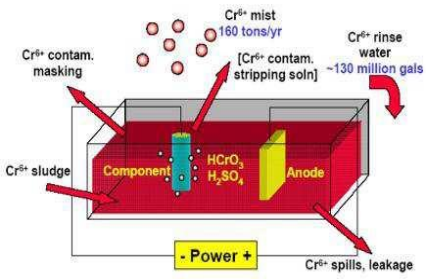
Surface defects, internal defects, form defects, mechanical defects and deviations from the prescribed chemical composition of steel.

III. COATING

Coating may be defined as a coverage that is applied over the surface of any metal substrate part/object. The purpose of applying coatings is to improve surface properties of a bulk material usually referred to as a substrate. One can improve amongst others appearance, adhesion, wet ability, corrosion resistance, wear resistance, scratch resistance, etc.

IV. HARD CHROME COATING PROCESS

The coating process consists of Chrome Chemical Bath, Anode, Cathode potentials, part to be coated, Heaters, rectifiers & Electrical control systems. Initially the bath has to be heated up to the required temperature. Cathode potential has to be connected to the part to be deposited and anode electrode has to be connected to the + potential .Before starting the process the part should be thoroughly cleaned and it should be ensured that it is free from all kinds of surface marks/defects. Then deposition of hard chrome deposit is started by separation of ions from the chemical bath due to the flow of current to the part to be deposited.



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V. COATING DEFECTS

The various types of coating defects are listed below.

In Industrial hard chrome coating the following coating problems are observed through data collection.

1. Coating peeled off
2. Coating Chipped off
3. In sufficient coating thickness
4. Absence of coating.
5. Uneven coating thickness
6. Rough coating Deposition
7. Dual colour coating
8. Marks/Scratches in coating
9. Dent
10. Pitting

VI. REASON FOR DEFECTS

1. Improper selection of Electrical parameters.
2. Improper anode setting
3. Usage of old/discarded anodes.
4. Improper anode size and shapes.
5. Improper bath temperature selection
6. Poor chemical conditions
7. Insufficient/poor cleaning of parts before coating
8. Improper/Insufficient pre and post heat treatment cycle
9. Frequent fluctuation of power supply.
10. Too high machining
11 .Lack of polishing
12. Lack of poor testing Gauges/Tools
13. Improper pre coating conditions
14. Too high testing conditions.
15. Poor Working Conditions of equipment

VII. OBJECTIVE

The main objective of the project is to improve the hard chromium coating quality of components thereby increase in productivity by preventing the production of defective components. Other objectives are:-

1. Reduction in defective parts.
2. Reduced workmen fatigue.
3. Reduction in amount of waste generation.

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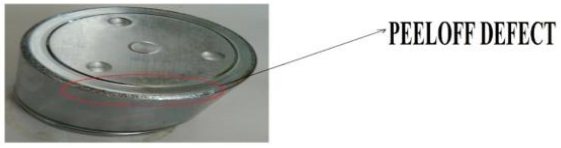
4. Enhanced job satisfaction
5. Establishing plating standards for different parts.

VIII. DEFECTS AFTER CHROME PLATING

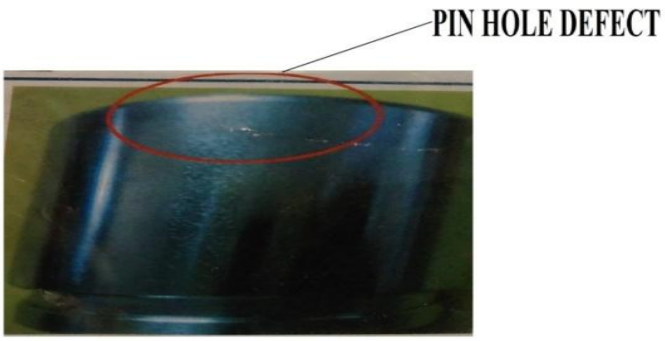
1.HALFPLATING DEFECT

2.PEELOFF DEFECT



3.OVERSIZE DEFECT

4.PIN HOLE DEFECT



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IX. Properties And Applications Of Hard Chrome Plating Properties Of Hard Chromium

Elemental Chromium is a hard and brittle metal with high lustre, greyish-white appearance and has a high melting point of 1850 °C. Electroplated chromium can withstand heat up to 400 °C and has a lustrous appearance. Properties of chrome plating vary with a number of factors including plating parameters, testing environment, and components of electrolytic bath. A range of values of hard chromium plating properties which make them attractive for numerous applications typical properties of hard chromium are

These properties make the underlying industrial component perform satisfactorily under conditions like high temperature, impact forces, grinding, etc. Hardness values cannot be considered to be a direct indication of the resistance to abrasion or wear. The wear-resistance is determined by ductility and elasticity also. The types of mechanical abrasion may vary when testing by different methods. The condition of the substrate or the coating below a chromium deposit can very often have an influence on its abrasion resistance. Internal stress in chromium deposits spans a broad range from compression to tension. Stress reaches an equilibrium value when the thickness is 30-50um. Chromium with a high tensile stress, eg.35 kg/mm2 contains relatively few cracks (of about 20 cracks/cm), whereas that with a low tensile stress or a compressive stress contains more than 400 cracks/cm.

X. Suggestion

Before or after the chrome plating, we found several defects, such as cracks, pin holes, over size, etc. In the study we found the rate of defects are minor at whole. Among these the rate of OVER SIZE DEFECTS is at the top as other defects. We found out of 100 only 1-3% of the component are having pin hole, cracks, peel off defects, which is minor. But the major defects found in "OVER SIZE". out of 100 there are almost 27-30% having these defects. so we cannot leave it this types of defect.

In the size defect we found two types;

1. OVER SIZE 2. LESSER SIZE.

XI. Conclusion

The length of the component is less than the required length is called lesser size defects. If the length of the components is less than required size we cannot increase by any methods, so these type of component are rejected by the chrome plating industries.

This types of defects are cause mainly due to the man power or unskilled labour/workers, who does not know what length is given in the chart or how to control the machine. the unskilled labour without inspection the OD & length sent to the next process or next industries for grinding, surfacing, chrome plating.

Due to unskilled worker or without inspection the OD/length; problem is facing by the chrome plating workers. manufacturing , costs, labour costs, time are totally waste.

Component will not dispatch at time Due to this the relation between customer and seller comes at breaking point.

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After the study our team have found some ideas which has more benefit for industries:

There are several size of piston/components (like;5inch,3.5inch) are required in several places. The components which have lesser size than required size, instead of reprocessing we made the component of another size.

Suppose that the company X makes the piston of size 5inch,after the making company X found out of 100 there are 27-30% of component are of 4 inch, so instead of reprocessing that 30% component and make it again, its better to make it 3.5inch components.

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