Nano-ceramic Technology

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I.Introduction

With the ever-increasing importance of the environmental requirement, problems on P, Ni, and precipitate treatment in the traditional phosphate technology can not meet the present environment needs. Nano-ceramic technology provides nano-level ZrO thin layer on metal surface with enhanced coating strength and corrosion resistant properties, and the advantages of treating different materials simultaneously, such as Fe, Zn and Al-alloy, etc.

II. Nano-ceramic technology

Description on the stainless steel and aluminium alloy nano-ceramic technology

1) stainless steel treatment technique

pre-degrease→main degrease→water wash 1→water wash 2→nano-ceramic treatment →water wash 3→water wash 4→water shear and dry

Procedure	Instruction
Pre-degrease	Alkaline degrease, room temperature~50°C
Main degrease	Alkaline degrease, room temperature~50°C
Water wash 1	Tap water, room temperature
Water wash 2	Low conductance water, room temperature
Nano-ceramic treatment	Low conductance water, room temperature
Water wash 3	Low conductance water, room temperature
Water wash 4	Low conductance water or pure water, room temperature
Water shear and dry	130~150°C

2) Al-alloy treatment technique

pre-degrease→main degrease→water wash 1→water wash 2→surface adjusting→water

wash 3→nano-ceramic treatment→water wash 4→water wash 5→water shear and dry

Procedure	Instruction
Pre-degrease	Alkaline degrease, room temperature~50°C
Main degrease	Alkaline degrease, room temperature~50°C
Water wash 1	Tap water, room temperature
Water wash 2	Low conductance water*, room temperature
Surface adjust	Acidic surface adjusting, room temperature
Water wash 3	Low conductance water*, room temperature
Nano-ceramic treatment	Low conductance water*, room temperature
Water wash 4	Low conductance water*, room temperature
Water wash 5	Low conductance water *or pure water, room temperature
Water shear and dry	130~150°C

* water conductance rate <300μs/cm, higher conductance may cause more precipitate in the tank solution and affect properties of the transformed film.

The two above techniques could be applied for treating steel and Al-alloy simultaneously. The nano-ceramic treatment techniques do not have the problem of Al ion accumulation which existed in the traditional phosphate treatment techniques, and prevent the effect of Al ion on the phosphating efficiency for steel materials.

Notices for application:

1. the color change from non-color to yellow in the tank solution during the processing, indicating the produced Fe ions in the reaction, which does not affect the property.

2. adding solution to keep normal pH and film forming concentration of the tank solution
3. the tank solution needs to pass circulating filtration equipment to prevent contaminant accumulation.
4. to change the tank solution is suggested when too much impure materials in the tank (the turbidity is too high).

III. Property of nano-ceramic treatment

Comparison of salt sprat test after nano-ceramic treatment for cold plate and aluminum plate

Treatment type	Material type	Corrosion width (mm)	
		Coating material with high proportion of solid composition ASTM B-117 500hr	Polyester powder coating ASTM B-117 750hr
Nano-ceramics	cold plate	3.3	4.1
Zn-phosphating	cold plate	3.1	2.9
Nano-ceramics	Al-plate	<1	<1
Zn-phosphating	Al-plate	<1	<1

Corrosion resistant property of nano-ceramic treated cold plate is close to that of Zn-phosphating , but nano-ceramic treated Al-plate displayed lower corrosion resistance comparing to Zn-phosphating treatment.

IV. Conclusion

Currently, nano-ceramic treated products have become the important topic in the area of pre-coating metal surface treatment industry. Nano-ceramic treated products developed by Ching-Feng company accord with the requirements in environmental protection and process technology as a better choice to replace traditional phosphating techniques.