HOW DO I FIND THE RIGHT PRETREATMENT FOR MY PROCESS?

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All users of hexavalent chromium passivation know that the number of different replacement passivation's products are many. To choose is not easy. It takes both time and patience not to mention investigation of all different demand you find in the market. This presentation will show the experience Candor has regarding different demand the market has in order to choose and to find a suitable replacement passivation process. A replacement passivation product has also different basic formulations for different demands. This presentation will also show different industry project that started already in the beginning of 2000 to find replacement for hexavalent chromium and what questions they had to find the best product for their demands.

Questions and demands on the Scandinavian market

In Scandinavia came questions from the market already in middle of the 90:th. To find alternatives to environmental hazarders chemicals like hexavalent chromium and alternatives to phosphate. The industry was looking for products to reduce the environmental impact of sludge, hazarders' chemicals, waste to air and total cost reduction.

Demands for a product were:

- Be used on both powder paint and wet paint
- For telecom industry came a demand on low resistance in the metal layer
- The product has to work on different metals – "multimetal" capability
- Minimize sludge
- Simple waste water treatment
- Low investment cost. Be used in "old" process lines

Candor has since 1997 been evaluating different passivation products to the aluminium profile market, automotive, telecom, fork lift, house-hold appliance products and furniture industry.

The basic reason for the search for alternative products came from European union demands. First came **WEEE (**Waste of electrical and electronic equipment) which was a directive from 2002. After **WEEE** came the **RoHS (**restricting the use of hazardous substances in electrical and electronic equipment) directive.

The **RoHS** sets a demand to minimize certain elements from 1 July 2006. Elements like hexavalent chromium but also lead, cadmium and mercury.

Today the basic demand is REACH (Regulation for Registration, Evaluation, Authorization and Restriction of Chemicals) which push the development for hexavalent free passivation products.

This led to the following “wish list” for a modern technology product.

1. Equal corrosion protection as hexavalent chromate based products
2. Equal adhesion bonding as hexavalent chromate based products
3. Equal bonding and corrosion result as an iron phosphate
4. Coloured surface
5. Chromium (VI) free
6. Conductive layer
7. Sludge free process
8. Heavy metal free process
9. Easy waste water treatment

Different market areas have different demands. There are many different alternatives and they are formulated different depending on demand and experience

Modern technology passivation products today can be based on:

- Titanium ?
- Zirconium ?
- Combination Titanium/ Zirconium ?
- With or without polymers
- Cr 3+ ?
- Silanes ?
- Coloured surface ?

Question: How to choose from all these alternatives?

This question can be answered by any chemical supplier company who has experience and knowledge but also choose trough successful Industry projects

Industry project experience

Photo 1

Telecommunication company

This project started more than fifteen year ago. The demand was a passivation product to replace hexavalent chromium on aluminium and zinc. It had to fulfil corrosion performance equal to hexavalent chromium on painted material. Another demand was to have better conductivity in the layer then hexavalent chromium.

The company had an internal demand that the replacement of hexavalent chromium had to be completed by January 2006 worldwide. In November 2005, all tests were completed and from 2005/2006 it has successfully been replacing hexavalent chromium passivation worldwide.

Experience has showed that we could replace hexavalent chromium with a totally chrome free process and titanium based passivation product. The result has been very good and we have set up a control system for quality standard that gives the same high quality, no matter where in the World the material is produced.

House-Hold Industry Company

A Company that has been using a trivalent based chrome passivation after phosphating. This company produces washing machines World Wide in aluminium and Zinc. The strongest demand has the hatch at the front. A detail that is heavily exposed to strong alkaline cleaning solution and made of aluminium. Because of these demands they have developed their own test procedure in order to secure the quality.

Environmental issues lead to the question to how to first replace the trivalent chromium passivation and then later due to sludge problems also replace the phosphate product in the line.

Test procedure is based on practical experience. The hatch is put into very warm and high concentrated washing powder for some time and no loss in adhesion is accepted. A simple but tuff test.
Dominating product as paint base is phosphate.

- After an extended period of many different test they finally approved a Silane based pretreatment that in the end both replaced hexavalent and trivalent chromium passivation but also replaced the phosphate stage in the line.

Photo 2 & 3

Replacement was performed in two steps. First issue was to replace chromium sealer process after the phosphating with a Silane product but continued with phosphate as pretreatment.

This replacement was done without any loss in quality. Later was investigated with lab test how to replace the phosphate process and to choose the right pretreatment.

The best choice for pretreatment was to replace phosphate with an alkaline cleaning product, suitable for both aluminium and zinc and we kept the Silane product as a last step in the line before painting.

The quality today is equal or even better then to use a phosphate with chromium sealer. Also, the economy is improved. The cost/m2 is lower today than before.

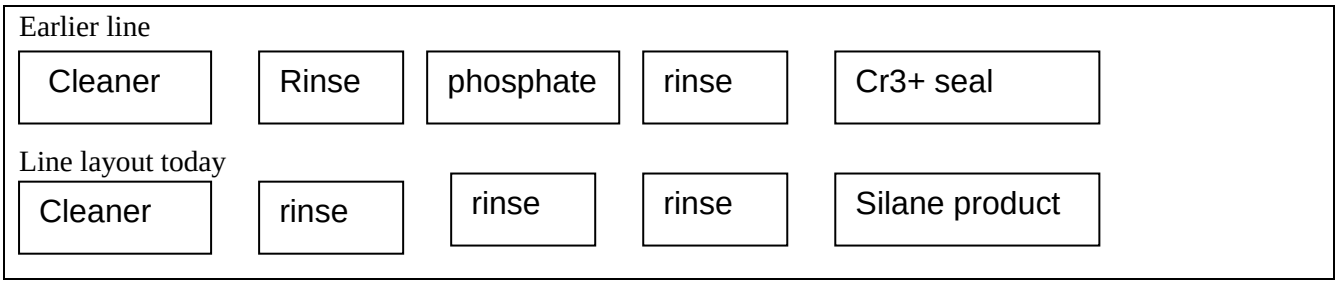

Fig 1

Summaries of experience

- The initial discussion with a user is to go through what demand they have on the material today and what expectations they have after a change. From this discussion both a supplier and the customer knows the demands and a supplier can choose the correct alternative.

- Another experience we have its many times very difficult to meet all demands with one single process. It is important to be clear in the priority of the demands and to be clear what a new modern process can do.

- Most of the “chrome free” products are transparent in appearance and the industry is thinking “colour”. It takes time to adapt to a colourless product. As a chemical supplier, one has to be clear how the product is controlled so the user can be sure that the process gives the performance

- To be sure of the performance it takes a lot of lab tests and every market area has their own special test methods.

- New modern technology puts higher demands on pre-treatment. It´s necessary to have a good cleaning and rinsing of the material before the passivation.

- It is one thing to introduce a new modern technology into a fresh and new built process line. But reality is that most users are working in old lines and that puts a demand how to convert an old line with old technology to introduce a “new” modern technology

- But the most important experience of all is that one must be clear and to explain the process technology. To be clear what kind of change that is necessary in the line to make the process to work. To educate personal and to build up a control system.

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