



The Fastener Engineering and Research Association

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Issue 11

Welcome to the re-launch of FERA under the new home of the Confederation of British Metalforming. Firstly we intend to continue with the concept of reaching out to those who require information on mechanical fastenings and to enhance the opportunities for the fastener industry at large.

Updates that may have prevalent awareness for some, and for others, it might stimulate us to a wider subject that may be capable of provoke new products and technology. That's the challenge for us all, and FERA is just a platform to help championing the ideas and innovations, both from the designer or the fastener specialists. We need your input!

Other than the material cost escalations, the other issue that is not truly understood is the hexavalent chrome elimination issues. Our Newsletter Number 7 was the last time we mentioned the subject so by necessity, we need to update you.

There are changes and issues regarding the need for compliance within the European directive "End of Life Vehicles" and the related elimination of hexavalent chrome. Indeed, there have been amendments to the original directive and this update will be of help for some, and to others, it maybe new. So briefly, what is the "End of Life Vehicles directive"? Fundamentally it's the management of preventing waste from the end-of-life vehicles and to have a system of recycling component parts and to provide an environmental conclusion.

For the fastener industry these issues centre on the allied automotive sector and the aspects of plated finishes and the need to have safe, new friendly environmental coatings, thus eliminating the hazardous hexavalent chromates from the equation. Over the last four years new advanced surface coatings have been developed and the market awareness is set to grow rapidly as other industries become involved as a result of further European directives begin to evolve along similar lines.

Table 1 indicates the contents of fastener coatings and the amount of hexavalent chrome.

Table – 1 Hexavalent Chromium (Cr+6) Contents in Fastener Coating Systems.

Finishing Process	Amount of Hexavalent Chromium Cr +6,mg/m ²
Blue bright - On Zinc and Zinc Alloys	0
Clear Chromate - On Zinc and Zinc Alloys	90
Yellow - Iridescent Chromate	180
Dacromet TM	280
Bronze - Deep Yellow Chromate	300
Black Chromate - On Zinc and Zinc Alloys	400
Olive Drab Chromate - On Zinc and Zinc Alloys	400

The Directive and the Changes. Directive EU 2000/58/EG - Annex II.

One of the changes in the directive EU 2000/58/EG Annex II of June 27th 2002 now states that "a maximum concentration value of up to 0.1% by weight and per homogeneous material, for lead, Hexavalent chromium and mercury and up to 0.01% by weight per homogeneous material for cadmium shall be tolerated, provided these substances are not intentionally introduced". This is a change from the original position, which proposed a limit of 2 grams per vehicle. The new

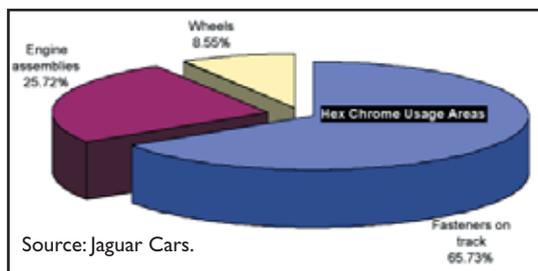
directive, which is now European wide and therefore EU Law, effectively excludes Hexavalent Chromium. The implementation date of the Directive has also changed from to a new effect date of 1st July 2007 after which the limit to the amount of hexavalent chromium will be ZERO. The major automotive manufacturers have already taken this into account and all new components are now being specified to be Hexavalent Chromium free materials.

Hexavalent Chromium Elimination - Managing the Change.

The impact and the inclusion of the "End of Life Vehicle Directive" (EOLVD) into EU law is now beginning to impact throughout the worldwide automotive supply chain. Originally intended to reduce the amount of scrap material going to land fill sites the EOLVD imposed new targets for re-use and recycling of automotive components at the end of the vehicles life.

Whilst this is a common sense measure, the EOLVD however has gone further by introducing the concept of restricting the use of certain materials in vehicle construction by classifying them as 'hazardous' in order to prevent leaching into the water table from land fill sites. Contained in the group of hazardous materials is "hexavalent chromium" the traditional passivate finish used in fastener coating systems.

The Presence of Hexavalent Chromium (Cr+6) Processes in the Automotive Industry.



Since fasteners account for 66% of the hexavalent chromium found in vehicles, as revealed in the chart, managing the change is one of the most serious challenges facing the fastener industry today.

To find out more, we were invited to examine some of the practical aspects of the situation and to have an opportunity to hear first hand on how the Anochrome Group perceives the current position, and the future. Andrew Bliss, Group Sales Director, was clear on the amount of information that has been put out by the plating industry, which is now reaching the market as the new hexavalent free coatings begin to be specified by the OEM's. Andrew Bliss points out that the process change is still on going and issues remain with PPAP and specifications on the drawings, as specifiers become more accustomed with the new finishes. He indicated that with the advanced work on new model design, the new coatings would be acknowledged and familiar too most as the changes take place. Whilst this is an EU directive, all vehicles manufactured outside the Union must comply.

Capital investment by the finishers has been a challenge well met. New technology upgrades have been instigated in terms of improvement in finishes and the understanding of the customer need in order to comply with the directive. Overall these new horizons are taking shape and are becoming prominent. As a whole, the finishers have showed that such technical change can be achieved, and understanding the issues is vital.

Issues Facing the Fastener Supply Chain.

Managing the change away from hexavalent chromium initially depends upon raising the awareness of the key people that influence the decision making process. This article offers the following three questions and poses answers that could help to manage the change to the commercial benefit of the European fastener industry and the automotive market.

What is available?

Replacement technology has been developed and is in place. Electroplated zinc plus yellow passivate has been replaced by electroplated zinc plus thick film Trivalent Passivates. Zinc flake dip spin coatings replaced by hexavalent chrome free systems.

How much does it cost?

In virtually all cases, replacing a specific process containing hexavalent chrome with a different process for the new trivalent coatings will incur an added processing cost. Cost down may be achieved by substituting a relatively high cost process with an alternative, but the cost-effective issue is the compliance to the directives, plus longer life corrosion factors for the consumer.

How does it perform?

It should be noted that despite the anxiety expressed by the automotive specifiers about the cost of hexavalent chrome free alternatives, the performance requirements have significantly increased. There is a four times improvement in performance!

Other Implications.

To aid selection we have listed the benefits of the new hexavalent chromium free coatings. Just a few of the prominent brand names and performance attributes are given.

Company MacDermid
Product ZinKlad

Attributes

ZinKlad 250 is the exclusive electroplated zinc plus thick film trivalent passivate plus lubricant approved for the Ford S-437 specification available only from quality approved surface finishes. S437 is the hexavalent chrome free replacement for S-309.

Dorken MKS-Systeme GmbH & Co KG

Company Dorken MKS-Systeme GmbH & Co KG
Product Delta Protekt KI 100, Delta Tone
Protekt VH 300 series, Delta Seal

Attributes

Delta Protekt KI 100 zinc rich base coat which is the successor to the well established Delta Tone base coat and a water based top coat, the Delta Protekt VH 300 series which increases the performance of the KI 100 base coat. With this combination salt spray results of up to 1000 hrs can be met with a coating thickness of only 12-14 microns. The base coats can also be used with well know Delta Seal solvent based top coats, which are available in a variety of colours and some of which have an integral lubricant to satisfy the automotive industries torque tension requirements. The latest accomplishment for these coatings is the release by Ford of S442, which is the preferred coating for the European Car Design group. Ford have also released S443, which specifies Dorken's VH 352 coating applied upon zinc-iron and chrome 6 free black passivate.

Company Anachrome Group
Product GEOMET®

Delta Protekt KI 100
Delta Tone
Protekt VH 300 series, Delta Seal
Magni - Dorrtech

Attributes

GEOMET® is a family of non-electrolytic water based thin-film coatings for the corrosion protection of articles made from steel, cast iron, or other iron metals. The coating contains zinc and aluminium flakes in an inorganic binder, which is 100% chromium free hexavalent and trivalent chrome. The coating is metallic silver in appearance.

The GEOMET® product range exists in several versions according to the end-user requirements.

Magni - Dorrtech is an aluminium-based organic coating developed by the Magni Group Inc USA. It is applied as a topcoat or zinc electroplated components giving a matt silver appearance. Performance data for corrosion resistance: 1000 hrs' neutral salt spray to ASTM B117 or BS 7479. Torque Tension Control μ 0.15 +/- 0.02. Thin coating (approx. 6 microns) having good ductivity. Good corrosion performance in contact with aluminium. Dorrtech has been adopted as a Ford Motor Company worldwide finish and is specified as S426 with Deltatone undercoat and S427 with zinc electroplate (or mechanical zinc) undercoat.





With the high importation of fasteners, brings the issue of offshore procurement and a situation of conformity and assurance regarding specifications. Licensing outside the EU to fastener finishers in Asia has implications that need to be monitored, particularly traceability.

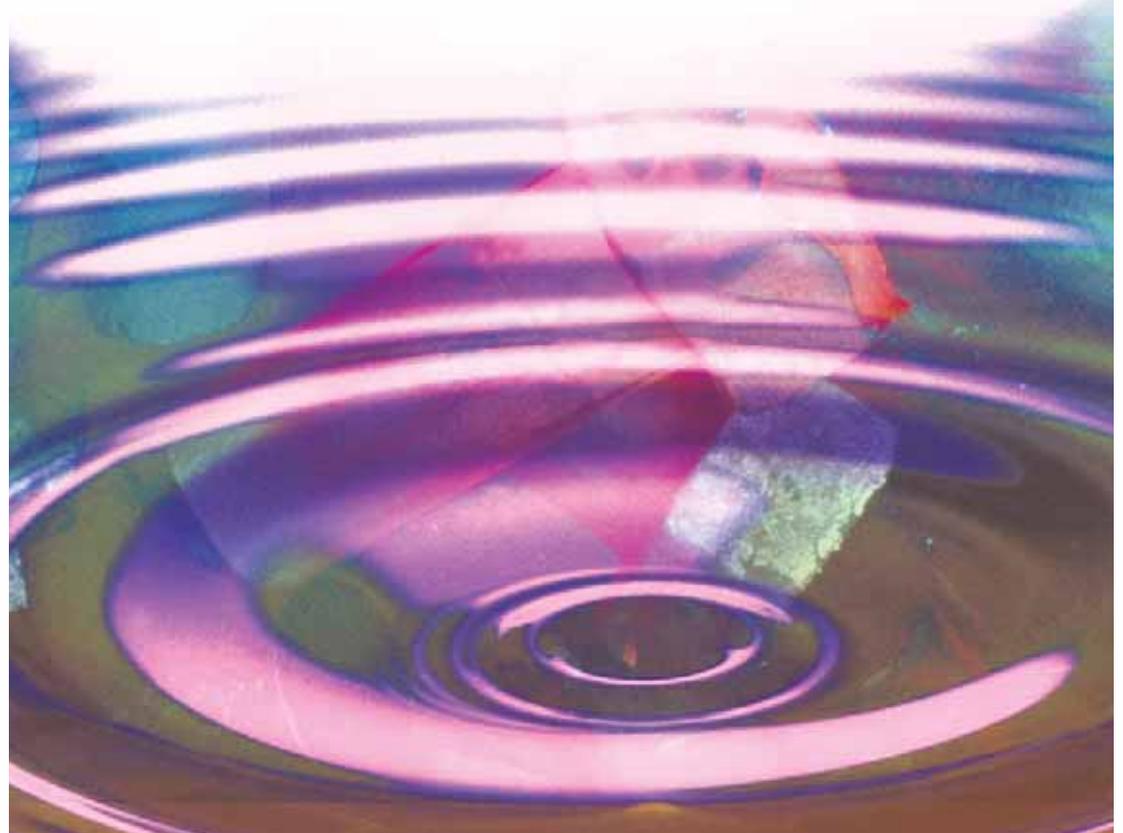
The steps towards the changeover of the old system to the new will task the management of any company. If left too long, serious inventory issues will require attention now. The situation is building and measures have to be taken to ensure compliance.

Reflections.

In 2004 the EU will introduce legislation on "Waste Electrical and Electronic Equipment (WEEE)" in relation to its composition and the levels to which it should be recycling waste. This legislation has its origin in the EU directives relating to both WEEE and to the "Restriction of Hazardous Substances (RoHS)" in the WEEE products that are within the legislation.

With regard to these EU directives, the WEEE protocols, which are targeted to be in place and effective by 2016, will, it's feared, be unsustainable. The differing market segmentations will not be capable, in a pragmatic and methodical manner, to comply with the size of the tasks required particularly product selection. Just on the issues of ongoing the requirements of the legislation are expected to be overwhelming in the details, according to fastener industry experts!

Consultations are underway within member states and the major concern for the European fastener industry is the need to have dialogue with customers, who will need to be aware of the advanced ecological friendly plated finishes. But before all that, the industry needs to have a position on the subject, particular the distributors who will be right at the forefront of the customer interface. This is not an easy task, but in the best interest of all, we need to see the fastener Trade Associations taking the lead and enlightening the OEM customers.



Submitted by FERA Members, David G James of Surface Engineering Specialists Ltd,
Richard E Davies UK Consultant Doerken MKS-Systeme GmbH & Co KG, and Andrew Bliss Anochrome Group.

