



POETON

21st Century coating solutions

Poeton Industries presents to – WEAFF REACH Event

Presentation Format

- A few facts about the surface coating sector
- Introduction to Poeton Industries
- REACH Presentation
- Summary
- AOB / Q&A



A few facts

- The aerospace sector employs circa 120,000 in the UK
- The UK aerospace sector is ranked No 1 in Europe and exports 69% of production
- The aerospace sector is expected to have spent circa £983M on coatings in 2010
- The engineering coating industry was estimated to be worth £10bn in 2010
- This £10bn was estimated to affect products worth **£140bn**
- Circa 10M of the UK workforce would be out of work if their coatings did not turn up

Imagine the effect on UK plc alone, if many key coatings are banned under REACH

Information - British Coating Federation report August 2010

It's already started

Manufacture of crack free chrome solution ceased in 2010 – Parts supplied to Airbus & Boeing

Special sealant used on sub assemblies on Boeing 787 no longer available



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POETON

A Major Player in Surface Treatments

About Poeton:

- Founded in 1898
- Business stability
- Production sites in Gloucester & Cardiff.
- Employ total of 115 people
- Turnover £7m per annum
- Global customer base
- Unique support services
- Accredited Training house for Institute of Metal Finishing
- Annual Apprentice Intake, Master Craftsmen, Greenbelt (6 Sigma)

Coating range:

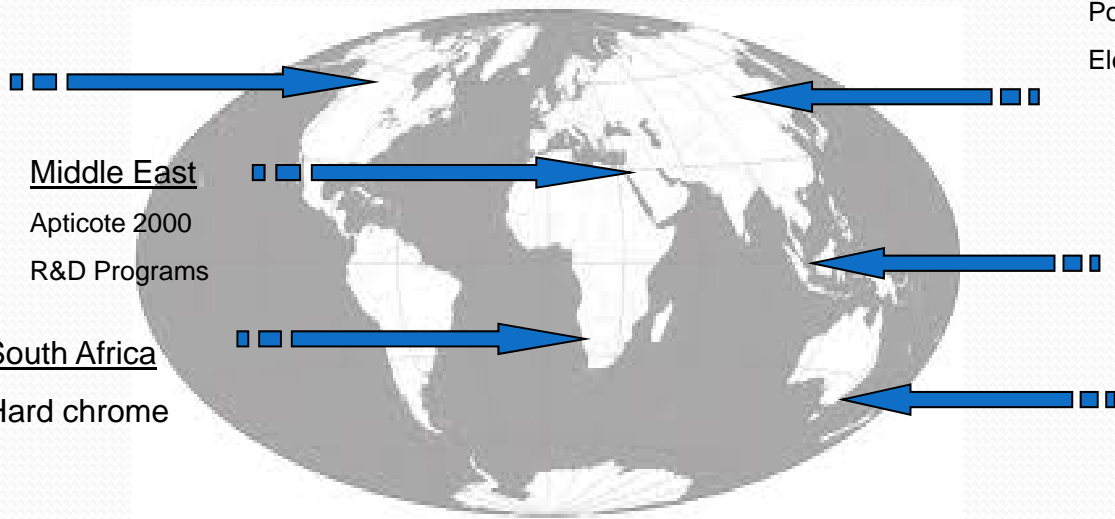
- Poeton offer a One Stop Shop for Aerospace & Defence sectors with Nadcap approval
Hard Chrome, Cadmium, Plasma Spray, ENP, Anodising, Silver, Paint & more
- Globally recognised Apticote range of wear & corrosion resistant coatings
- Wide range of food contact (FDA compliant) coatings



Poeton – A global player

USA & Canada

Hard Chrome
Hard Anodising
Apticote 3000M
Electroless
Nickel/PTFE
R&D Funded
Programs



Middle East

Apticote 2000
R&D Programs

South Africa

Hard chrome

China & Korea

Polymer coating
Electroless Nickel

Singapore

Electroless
Nickel/PTFE

Australia

Electroless
Nickel/Polymer (FDA
Compliant)
R&D funded Programs



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Quality

- Nadcap (NDT, Plasma Spraying & Wet Processes) – Merit Awards
- AS 9100 Rev C
- ISO 9001 – 2008
- ISO 14001 / IPPC Accredited
- Customer 'eyes' inspection

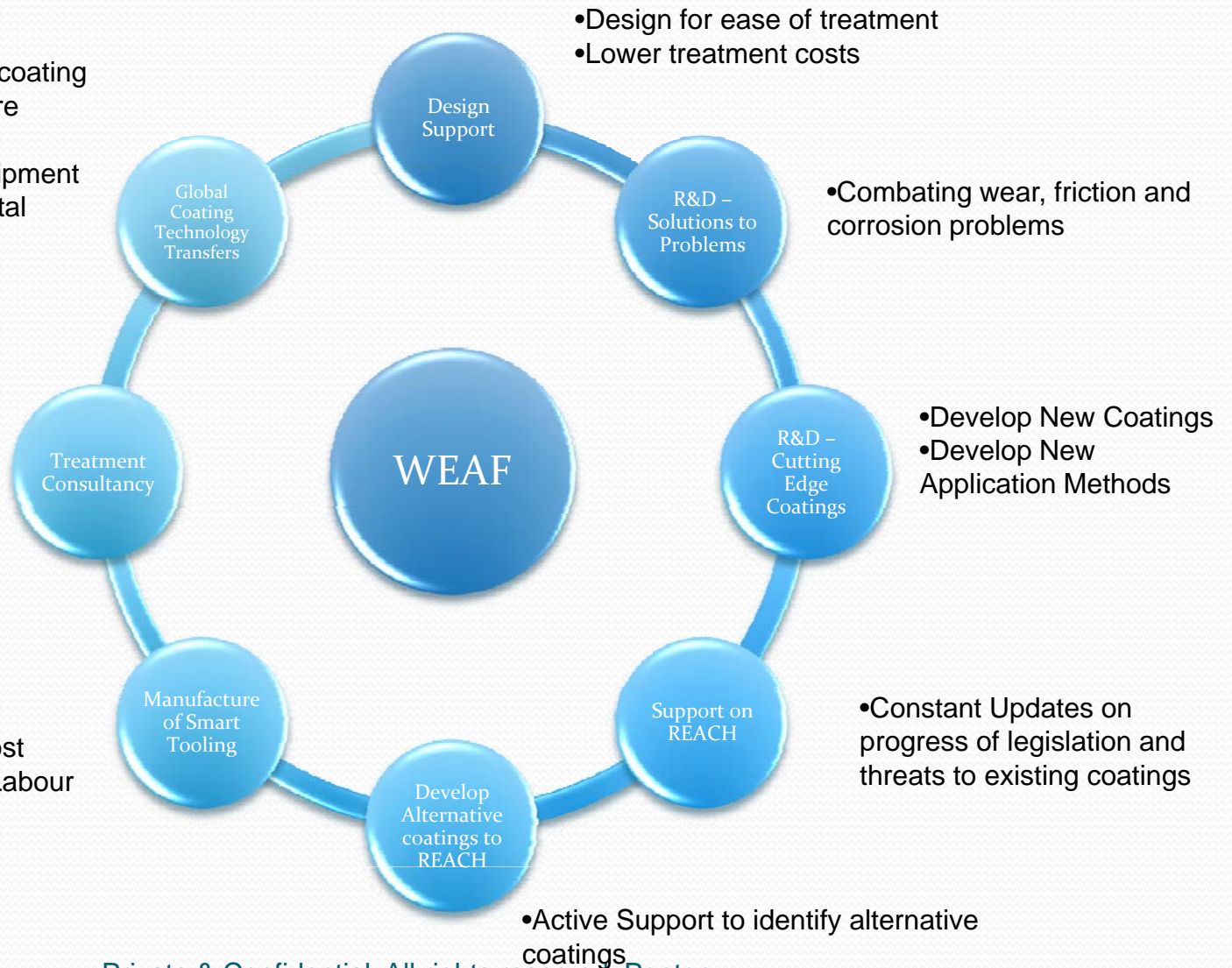
Continuous Improvements / Lean Initiatives

- 6 Sigma – 5 trained Green belts
- Committed to SC 21
- State of the Art equipment (CNC rectification, Plasma robot etc)
- Smart tooling (Cost reduction, process repeatability, de-skill)
- Proactive working with customers on innovative processing changes and R&D activities



Unique Support Services

- Support in moving coating technologies offshore
 - Training
 - Plant & Equipment
 - Environmental
 - Processes



REACH

Legislation and current status



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What is REACH?

- **R**egistration **E**valuation **A**uthorisation and restriction of **C**hemicals
- Legislation covering the EEA not just the EU
- Came into force in the UK on 1st June 2007
- Comprehensive and complicated legislation covering approximately 140,000 substances imported into or manufactured in the EEA above 1 tonne per annum
- By June 2018 every single substance above the threshold will have to be registered with the European Chemicals Agency (Echa)



Why was it introduced

- Very little data on health/environmental effects of the 140,000 substances used in the EEA
- The usage and emission of hazardous materials in controlled processes does not correspond to levels found in the environment
- Concern over lowering of fertility rates across Europe
- Instances of watercourse contamination by banned PCB's still occurring
- Presence of trace amounts of DDT still found in a large proportion of the population
- Replacement of hazardous materials with safer alternatives to protect the health of workers and the environment

Exemptions

- Some substance are exempt from REACH legislation including:
 - Radioactive
 - Dangerous goods in transit
 - In customs
 - Waste (as defined in 2006/12/EC)
 - Human and veterinary medicines
 - Polymers
 - Foodstuffs
 - Naturally occurring substances

Enforcement

REACH contains many duties but these can be divided into:

REGISTRATION RELATED DUTIES

- HSE in its role as Competent Authority

SUPPLY-CHAIN RELATED DUTIES

- HSE/HSENI until retail sale (then Trading Standards)

USE RELATED DUTIES

- existing UK enforcement regime and enforcing authorities for health, safety and environmental legislation

Enforcement

	Environmental protection	Health and safety
England & Wales		 & Local Authorities
Scotland		 & Local Authorities
Northern Ireland		 & District Councils
Offshore		

Registration

- To register a substance a registration dossier has to be submitted to Echa along with a registration fee
- The dossier has to be submitted by one of the following 3 deadlines:
 - 1st December 2010
 - Substances supplied at >1000 tpa; classified under CHIP as Very toxic to aquatic organisms at > 100 tpa; classified under CHIP as Cat 1 or 2 CMR at > 1 tpa
 - 1st June 2013
 - substances supplied at >100 tpa
 - 1st June 2018
 - substances supplied at >1 tpa

Registration

- The registration dossier is very comprehensive and must include details on:
 - What product or article is the substance used for
 - How it is used
 - How will it be released to the environment
 - Exposure scenarios for each use of the substance
 - The effects on human health for each scenario supported by vertebrate test data if required
- The labour costs associated with submission of dossiers far exceeds the registration fee

Registration

- To minimise the costs and amount of vertebrate testing involved in registration, all interested parties are required to form a SIEF (Substance Information Exchange Forum) to submit substance registration
- It is the duty of the SIEF to flow information down the supply chain on registration issues
- It became clear early in phase 1 of registration that aspects of SIEF operation conflicted with European competition law
- Supply chains have greater complexity than was envisaged when the legislation was drafted
- As an end user, it was next to impossible to obtain information on the registration status of substances from the SIEF during the first stage of registration



Registration

- Once the registration deadline for a substance has passed it is illegal to manufacture import or place on the market that substance in quantities above 1 tonne per annum if it has not been registered
- It is also illegal to do the above if the use of the substance is not covered by the registration dossier
- Supply of substances to the market can occur in a relatively short timescale with registration issues
- Experience with the lack of information from the SIEF to the end user in phase 1 has shown such issues may only come to light 1-2 months before cessation of supply
- This can lead to very short timescales to find an alternative

Registration

- At a chemicals conference in Brussels earlier this year a large chemical supplier reported registering 600 substances in phase 1 at a cost to them of €60m
- Another company reported being involved in the registration of 59 substances involving 20,000 working hours with an estimated cost of €3.5m
- The process is not cheap

Registration

- For many substances in phase 1 the costs of registration can be spread as usage is in excess of 1000 tonnes per annum
- Phase 2 substances are for uses above 100 tonnes per annum and phase 3 for substances above 1 tonne per annum
- The concern is in future the cost of registration of a substance will exceed any profit generated from it, particularly when only a few tonnes per annum are involved
- It is likely that the next 2 phases of registration will see many substances withdrawn from the market. Not because they are hazardous but because it is uneconomic to register them

Restriction

- The provisions of the Marketing & Use Directive which prohibit the use of some substances in certain applications have been taken over by REACH
- Annex XVII of the REACH Regulation contains the list of all restricted substances, specifying which uses are restricted. The existing restrictions set out in the Marketing and Use Directive e.g. the ban on asbestos and restrictions on the uses of certain azo-dyes, were carried over to REACH
- Proposals for restrictions will be prepared by Member States or by the Agency on request of the Commission
- Restrictions can be applied to substances that do not require registration

Restriction

- In addition to restrictions carried over from the Marketing and Use Directive there are 5 proposals currently in consultation
 - Use of 5 phenyl mercury compounds above a limit of 0.01wt%
 - Use of mercury in measuring equipment
 - Use of lead and its compounds in jewellery
 - Use of DMFu above a limit of 0.1mg/kg
 - Use of DIBP, DBP, BBP, DEHP above 0.1wt% of plasticised material for use indoors or where contact with skin or mucous membranes may occur

Authorisation

- One of the aims of REACH is to control the use of substances which have hazards that have serious consequences, e.g. they cause cancer (carcinogenic) or other harmful properties, remain in the environment for a long time (persistent), or gradually build up in animals (bioaccumulative)
- These are classified substances of very high concern (SVHC's)
- This category also includes substances demonstrated to be of equivalent concern such as “endocrine disruptors”.
- The control of such substances is via authorisation and encouragement of industry to substitute these substances for safer ones
- Approximately 3,500 substances meet the SVHC criteria
- The authorisation process is expensive, time consuming and difficult in an attempt to encourage substitution to safer alternatives

The Candidate List

- The first stage in the authorisation process is a substance is added to the candidate list
- Substances are added to the list by member states or Echa at the request of the commission
- The candidate list is updated on a regular basis and currently contains 53 substances with a further 20 being proposed by the end of 2011
- When a substance is added to the candidate list, legal obligations are automatically triggered
- If you supply a substance mixture or article containing an SVHC above 0.1wt% you have to inform your Customer when it appears on the candidate list

Authorisation

- When a substance appears on the candidate list there follows a period of public consultation
- Echa submit a dossier to the European Commission to include substances from the candidate list into Annex XIV of the legislation
- There is a period of public consultation between Echa publishing the dossier and its submission to the Commission
- The dossier includes a sunset date for the substance after which it cannot be imported manufactured or placed on the market

Authorisation

- Once submitted, the Commission decides on whether to accept the inclusion substances in Annex XIV
- The sunset date begins when a substance is included in Annex XIV
- Sunset dates are expected to be 24-48 months from inclusion in Annex XIV
- To use a substance after the sunset date will require an authorisation
- A request for authorisation has to be submitted 18 months before the sunset date to ensure continuation of supply

Authorisation

- The fee for authorisation is €50,000
- The authorisation will be time limited and substance/use specific
- Authorisation will not be granted if there is a commercially available viable alternative
- The authorisation dossier will have to include a substitution plan for the substance
- As with registration the costs associated with preparation of the authorisation dossier will be far more than the fee

Authorisation

- The first 14 substances were added to the candidate list in October 2008
- 7 of these substances were proposed for inclusion in Annex XIV in June 2009
- 6 of these substances were included in Annex XIV
- The sunset dates for these 6 substances are between August 2014 and August 2015
- A second proposal was submitted by Echa in December 2010 covering 8 substances
- Public consultation on the third proposal covering 13 substances has just closed

Evaluation

- Objective is to clarify if the uses of a substance pose a risk to human health or the environment
- This is done by means of 3 year Community rolling action plans (CoRAP)
- Echa has submitted the first draft plan for evaluation of 91 substances from 2012 – 2014
- Some substances covered are:
 - Methanol, toluene, formaldehyde, diallyl phthalate, silver, diethyl phthalate, gallium arsenide, titanium dioxide

The rest of the world

- At a conference earlier this year, the DG Enterprise said the aim of the legislation was not to export hazardous processes to other parts of the world
- Similar legislation is in various stages of implementation in other countries
- It is unclear whether other legislation will be as complex or have the same impacts as REACH
- People not involved in paying for it seem proud of the fact that other countries are using data generated by REACH and financed by European Industry



REACH

Impacts and alternatives in Surface Engineering

The cost to Poeton

- Fortunately, we have quite a small inventory containing about 130 substances/mixtures
- Some of the mixtures we purchase contain up to 10 different substances
- One of the first tasks we undertook was to create a database containing a substance inventory, supplier details with REACH contact, Customer details and an updatable list of substances on the candidate list
- As the list is updated we can quickly identify raw materials that are affected and contact the supplier

The cost to Poeton

- As a downstream user we have not incurred the costs associated with registration although we expect these to be passed down the supply chain in the form of raw material costs
- Our costs are associated with administration:
 - Tracking the status of candidate list/Annex XIV
 - Communication with suppliers
 - Communication with Customers
 - The dreaded questionnaire
 - Workshops/awareness sessions
 - Now starting work on Authorisation requests



The cost to Poeton

- REACH compliance currently requires approximately 700 working hours per year for us
- Labour and other costs work out at approximately £20k per year
- This will rise as more effort will be required in the search for alternative processes and authorisation
- As this is all happening in straitened economic times, recruiting extra personnel to deal with this has not been possible
- Of greater impact to Poeton is the loss of 700 working hours per year that would have been spent on R&D activities

Phase 1 Registration impacts

- Due to the lack of information flowing down complex supply chains it was impossible to find out from suppliers if substances would be registered on time and for our uses
- At Poeton, the main effect on us was all processes using potassium or sodium dichromate
- It was only discovered 2 months before the deadline that these substances were not going to be registered for our use

Phase 1 Registration impacts

- Following lobbying from ADS members increasing stock levels and being able to use them after the deadline date allowed us to mitigate the effects of this issue until a late registration was submitted by another supplier
- This did not do wonders for our cash flow in October and November 2010
- Due to the problems with registration of potassium/sodium dichromate 2 proprietary solutions used to coat aerospace components were withdrawn from sale in November 2010
- Alternative coatings have to be found in the time it takes to run current stock levels down

Phase 1 Registration impacts

- A similar situation arose with strontium chromate
- It was discovered at a very late stage that this strategic substance was not going to be registered at all
- It was only the intervention of aerospace companies and an alternative registrant that prevented removal of this substance from the market in December 2010



Possible future registration impacts

- The problem with registration issues is the timescales to find and qualify alternatives are measured in weeks and months
- A report issued by Echa on phase 1 registration concluded that everything went very smoothly and there were no issues
- Hopefully the results of a European Commission survey of Companies on their experience of registration will show this perception to be not entirely accurate and changes will be made for phases 2 and 3
- Phases 2 and 3 involve many more substances
- Quantities are smaller and it is thought the size of registrants is smaller
- The cost burden per kg of material is likely to be much higher making the economic case for registration more difficult to justify
- We may see many non-hazardous materials disappear from the market at very short notice



Impacts due to Authorisation

- Unlike registration issues, removal of hazardous materials from the market by inclusion in Annex XIV or restriction provides a timetable for finding replacement substances in years
- For some processes this will be fine, for others where aerospace has been searching for alternatives for over 20 years, different strategies will be required

Processes affected by candidate list substances

- ▶ Substances already on the list but not included in proposals for inclusion in Annex XIV

Substance	Use
Boric acid	All nickel and nickel alloy electroplating solutions. Decorative trivalent chrome solutions. Anodising solutions for certain customers.
1-Methyl-2-pyrrolidone	Solvent in many polymer coatings such as Xylan, etc.

- ▶ Substances proposed for inclusion in next update of candidate list

Substance	Use
N,N-dimethylacetamide (DMAC)	Solvent in many polymer coatings such as Xylan, etc.

- ▶ DMAC was removed from many coating systems many years ago because of its classification and replaced with 1-methyl-2-pyrrolidone

Processes affected by possible future candidate list substances

- The French CA will probably be looking to add the following in 2012:

Substance	Use
Cadmium oxide	Cadmium plating
Cadmium metal	Cadmium plating
Beryllium	Beryllium copper components

- ▶ We do not know what the other CA's are considering adding

Processes affected by possible future candidate list substances

- ▶ Following lobbying by the Nickel Institute, the French CA have delayed putting nickel salts on the list until 2013.
- ▶ This does not mean another CA will not add them anyway, particularly in light of the recent court case on classification of nickel salts.
- ▶ Nickel salts under threat are:

Substance	Use
Nickel Sulphate	All electroplating and electroless nickel and nickel alloy processes including zinc/nickel
Nickel Chloride	High chloride nickel baths for pretreating metals such as stainless steel and titanium
Nickel carbonate	pH adjustment in some nickel processes

- ▶ It is likely that once on the candidate list, these substances will be prioritised for inclusion into Annex XIV

Substances of interest in third consultation for inclusion in Annex XIV

Substance	Use
Chromium trioxide/chromic acid	Hard chrome plating. Chromic acid anodising. Dip Alochrom/Alodine 1200. Chrome phosphoric stripping of anodising. Etching of some plastics prior to plating.
Cobalt(II) sulphate	Cobalt and cobalt alloy plating (Including Zn/Co plating solutions for Cd replacement). Some hexavalent passivate replacements
Potassium/sodium dichromate	Dichromate sealing of anodising. Pretreatment of aluminium prior to anodising. Passivates for cadmium and zinc. Passivation of stainless steels
Trichloroethylene	Vapour degreasing

Substances of interest in third consultation for inclusion in Annex XIV

- If we assume Echa will submit the proposal for inclusion of hexavalent chrome and cobalt compounds to the commission in June 2012, they will probably be included into Annex XIV by June 2013 (based on current timescales)
- If nothing is done and the maximum sunset date is given, all processes shown on the previous slide will cease in the EEA in June 2017
- If authorisation is required to continue these processes after this date, dossiers must be completed and submitted by December 2015
- There is no guarantee an authorisation will be granted

Replacements for under threat processes

- ▶ Poeton have embarked on some programmes looking at replacement technologies
- ▶ We are severely limited when looking at alternatives for Aerospace use. As we have to work in accordance with Customer specifications, any coatings have to be approved by the end user.
- ▶ We would be unwilling to embark on an expensive in-house R&D programme without some sort of commitment that a final coating will be approved.

Replacements for under threat processes

- ▶ There needs to be some degree of coordination between prime contractors. The situation with chromic acid anodising is there are around 4 alternative replacement coatings depending on the application and the Prime. It is unlikely that any subcontract coater will replace a single CAA tank with 4 similar tanks containing different electrolytes. They will pick on and work for that Prime only. This will reduce the overall processing capability of the industry.
- ▶ The problem with this is how to achieve this without breaking EU competition/anti trust laws

Poeton replacement programmes

- ▶ Chromic acid anodising
 - ▶ Tartaric/sulphuric anodising
 - ▶ A production facility for small parts has been installed in our Cardiff facility. Test panels treated with acetate and dichromate seals have been evaluated for corrosion resistance by various Aerospace Customers.
 - ▶ It cannot be used as a base for structural bonding.
 - ▶ Mil-A-8625 Type IIB
 - ▶ Can be done with existing production facilities.
 - ▶ Is being evaluated by some Aerospace Companies as a possible replacement.
 - ▶ Concerns exist on thickness/coating weight control for fatigue sensitive parts.

Poeton replacement programmes

- ▶ Hard chrome
 - ▶ Trivalent hard chrome
 - ▶ Poeton working closely with a major supply house to bring to the market a hard chrome coating produced from CrIII chemistry.
 - ▶ Processes currently only available for decorative chrome applications.
 - ▶ We are the only Company worldwide who were given solution to evaluate outside of our suppliers R&D facilities.
 - ▶ We have installed a 25 litre plating tank to evaluate the process suitable to coat test pieces to examine corrosion, hardness, wear and grinding ability.
 - ▶ First results were promising in terms of thickness, appearance and hardness.
 - ▶ Mark II solution currently on test at Poeton.

Poeton replacement programmes

- Hard chrome
 - Nickel based processes
 - Nickel/hard particle composites
 - Electroless nickel (with and without heat treatment)
 - Commercially available processes
 - Laboratory based wear testing shows they do not meet the properties of hard chrome but may prove 'fit for purpose' in some applications
 - All processes use soluble nickel so there are question marks about their long term viability under REACH.
 - Cobalt based processes
 - R&D done by Poeton in the past on cobalt and cobalt alloy coatings.
 - Processes involving cobalt are not advisable as cobalt salts are already on the candidate list.
 - Plasma/Triplex spraying of tungsten carbide/cobalt
 - Health concerns now being raised from post coating grinding of cobalt in these materials



Poeton replacement programmes

- ▶ Cadmium
 - ▶ Zinc/nickel
 - ▶ We have identified a suitable system to produce this coating
 - ▶ Installation is on hold pending a viable business case to justify installation costs
 - ▶ All systems based on soluble nickel so have question marks about their long term future
 - ▶ Inorganic aluminium spray
 - ▶ Commercial products already available Sermetal and Ipcote
 - ▶ We are currently working towards including Ipcote into our coating portfolio
 - ▶ Material reformulation in progress to eliminate CrVI content
 - ▶ Aluminium deposition from Ionic liquids
 - ▶ Investigated briefly during IONMET project
 - ▶ Is a considerably safer process than Alumiplate
 - ▶ Further EU funding currently being sourced to develop a more industrial friendly process.

Poeton replacement programmes

- ▶ Dichromate sealing of anodising
 - ▶ First option would be to switch to nickel acetate
 - ▶ Longer term project required if soluble nickel salt are likely to be banned
 - ▶ Poeton have had success using polymer sealing for some automotive applications
 - ▶ There is a McDonnell Douglas specification (13208) for duplex polymer sealing of hard anodising
 - ▶ The technical problem is the long term corrosion testing required. Using standard 2024 test panels, 5000+ hours salt spray are required to differentiate between hot water sealing, acetate sealing and dichromate sealing.
- ▶ CrVI free passivates and primers
 - ▶ These are already available from paint suppliers. Trivalent passivates for zinc have been used by the automotive industry for a number of years
 - ▶ Poeton need guidance from end users on what materials to use

Summary

- REACH is not going to go away and it is going to cost you a lot in terms of labour time and raw materials
- You are going to see some materials simply disappear from the market at little or short notice
- You are going to find some things you buy have been reformulated without your knowledge
- Processes are going to disappear in Europe from 2016 onwards
- You need to start thinking now about how you are going to plan for this as changing drawings is not a 5 minute operation
- If you supply coated parts to an end user what are you going to do from 2016 when you can no longer get the part coated in Europe

Useful website addresses

- European Chemicals Agency
 - http://echa.europa.eu/home_en.asp
 - Candidate list of SVHC's
 - http://echa.europa.eu/chem_data/authorisation_process/candidate_list_table_en.asp
 - Annex XIV recommendations
 - http://echa.europa.eu/chem_data/authorisation_process/annex_xiv_rec_en.asp
- HSE (UK Competent Authority)
 - <http://www.hse.gov.uk/reach/>
 - Bitesize advice
 - <http://www.hse.gov.uk/reach/bitesize.htm>
- IMF REACH club
 - http://www.uk-finishing.org.uk/reach_mins.htm