Technical Assistance for REACH Compliance

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3/2012 Granta EMIT
What are the practical effects of materials regulation?

- Classifying more and more chemicals as SVHCs
  - Chemicals drop from market as soon as put forward as SVHCs – market deselection
- Many chemicals will no longer be sold as not worth the cost/risk of registration, even at 1,000 tonne/yr level
  - Many more will be lost as go to 100, 10, 1 tonne levels

<table>
<thead>
<tr>
<th>Chemical</th>
<th>%</th>
<th>Brian Norton, Indestructible Paint, SUR/FIN 2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>Epoxy Resin</td>
<td>31.30</td>
<td></td>
</tr>
<tr>
<td>Strontium Chromate Pigment</td>
<td>20.00</td>
<td>At Risk: SVHC Listing</td>
</tr>
<tr>
<td>Other Colour Pigments</td>
<td>3.38</td>
<td></td>
</tr>
<tr>
<td>Anti-Settlement Agent</td>
<td>1.17</td>
<td>At Risk: Volume/Cost</td>
</tr>
<tr>
<td>Dispersing Agent</td>
<td>0.50</td>
<td>At Risk: Volume/Cost</td>
</tr>
<tr>
<td>Extender</td>
<td>17.30</td>
<td></td>
</tr>
<tr>
<td>Aromatic Hydrocarbon</td>
<td>15.85</td>
<td>At Risk: Solvent Emissions</td>
</tr>
<tr>
<td>Esters</td>
<td>10.50</td>
<td>At Risk: Solvent Emissions</td>
</tr>
</tbody>
</table>

- List of SVHCs will constantly increase
- Even completely benign chemicals are being lost from the market as a result of REACH
- Constant uncertainty, high R&D cost, high qualification and implementation costs
Recent issues and lessons learned

<table>
<thead>
<tr>
<th>Chemical</th>
<th>Applications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chromium trioxide, Acids generated from chromium trioxide</td>
<td>Hard chrome plating, chromate conversion (Al, Zn, Cd, etc), chromic acid anodizing – High priority</td>
</tr>
<tr>
<td>Sodium dichromate</td>
<td>Chromate conversion (Al, Zn, Cd, etc) – High priority</td>
</tr>
<tr>
<td>Sodium chromate</td>
<td>Extensively used in chromates and trivalent chrome passivates – High priority</td>
</tr>
<tr>
<td>Potassium chromate</td>
<td>Used in Al chromates, limited use in other chromates, impacts chromate conversion – Medium priority</td>
</tr>
<tr>
<td>Ammonium dichromate</td>
<td>Not commonly used – Low priority</td>
</tr>
<tr>
<td>Potassium dichromate</td>
<td>Not commonly used – Low priority</td>
</tr>
<tr>
<td>Cobalt(II) sulphate</td>
<td>Trivalent passivates, Co plating – medium priority</td>
</tr>
<tr>
<td>Cobalt dichloride</td>
<td>Trivalent passivates – medium priority</td>
</tr>
<tr>
<td>Cobalt(II) dinitrate</td>
<td>Trivalent passivates – medium priority</td>
</tr>
<tr>
<td>Cobalt(II) carbonate</td>
<td>Co plating – medium priority</td>
</tr>
<tr>
<td>Cobalt(II) diacetate</td>
<td>Not commonly used – low priority</td>
</tr>
<tr>
<td>Trichloroethylene</td>
<td>Vapor degreasing, now seldom used – Low priority</td>
</tr>
</tbody>
</table>

This is just the latest batch
If Annex XIV chemicals are not in the list of Authorized uses by the Application dates, they can no longer be used in the EU after the sunset dates.

Annex XIV: Feb 2013
Chromates: Nov 2014
Authorization Applications due for Chromates: May 2016
Co Salts: Feb 2017
Loss of large number of surface treatments

- There is a lot more to this than the obvious future elimination of chrome plating, chromate conversion and chromated primers
  - **Every** use of these chromic acid and Na chromate and dichromate must be included in Authorization Applications
    - CAA, sealants, steel pickling solutions and passivates, etc.
- Some of these chemicals are minor, but critical constituents of conversion coatings and passivates
  - If those uses are not included in Authorization Applications by the Application date, they will be gone, together with the products that rely on them
    - Trivalent passivates, non-chrome primers
Never-ending story

Note what is happening here:
- Ni electro and electroless plates, Ni alloys, Ni composites, nCo–P, Ni–W electroplate have all been developed/qualified/used in place of hard chrome
  - Co alloy electroplates no longer viable in EU
  - Most Ni salts have also been declared SVHCs under REACH and will eventually be Authorizable or Restricted
- Result – no electroplating alternatives
- Many trivalent passivates use Co inhibitors
  - Other inhibitors inc Mn, Zr, Ce, Pr
  - Inhibitors must be chemically active – ESOH potential

Danger – cyclic substitution
- The trick will be to make best technical/business choices
Handling the risk of cyclic substitution

- Can we avoid substituting substitutes?
  - No, but the trick will be to make the best choices to balance technical, regulatory, market risk
    - E.g. choose substitutes with least use of SVHCs but adequate performance
    - Or choose best performance or closest to today’s product, with expectation that next generation will be ready in time
Anticipation and planning

Awareness
- What is in your products
- How they are made
- Where are the potential SVHCs

Tracking
- Keep up with regulatory changes
- Keep up with available technology
- What others are adopting

Planning
- What is worthwhile – change, move, quit
- What are the options – testing needed
- How and when to change
Approaches to substitution

Today’s technology

- High VOC topcoat
- Cr6+ primer
- Cr6+ pretreat
- Substrate

Small step change

- High solids topcoat
- Rare earth primer
- Cr3+ pretreat
- Substrate

Large step change

- High solids topcoat
- Mg-rich primer
- Non-Cr pretreat
- Substrate

- Technology change
  - Low T or UV cure powder coat
  - Non-Cr pretreat
  - Substrate

- Small step – easiest change, least technical risk, higher risk of early modification needed
- Large step or tech change – higher technical risk and cost, lower risk of early modification
Rowan expertise and capabilities

Rowan already consults for about a third of the EMIT Consortium member organizations
## Summary of Rowan expertise

<table>
<thead>
<tr>
<th>Organization/Project</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Granta Design</td>
<td>Coatings/treatments database</td>
</tr>
<tr>
<td>ASET SDefense (Advanced Surface Engineering Technologies for a Sustainable Defense)</td>
<td>DoD initiative, database of clean coatings and surface treatments, assistance to DoD and supply chain. “Impact of REACH on DoD”</td>
</tr>
<tr>
<td>National Association of Surface Finishers (NASF)</td>
<td>Includes Board of Directors, Technology Advisory Committee, Resource Center</td>
</tr>
<tr>
<td>Technical management of US/Canadian Hard Chrome Alternatives Team (HCAT)</td>
<td>Validated, qualified HVOF for hard chrome replacement on defense and commercial aircraft</td>
</tr>
<tr>
<td>Numerous commercial materials projects with organizations in North America, Europe, Australia</td>
<td>Materials consulting, process development, testing, market analysis, cost analysis</td>
</tr>
<tr>
<td>JSF/Lockheed–Martin</td>
<td>On-demand coatings consultant</td>
</tr>
<tr>
<td>Corrdesa LLC</td>
<td>Computational galvanic corrosion</td>
</tr>
</tbody>
</table>

Rowan widely recognized as the experts in clean materials, coatings and surface treatments to meet REACH and other environmental regs
Outline of proposed Granta/Rowan services for REACH consulting

- **Materials for Compliance**
  - Monthly newsletter
  - Regulatory news
  - Technology updates
  - Articles
  - Answers
  - "Clean" materials
  - Technologies
  - Reports
  - Granta Materials Database
    - Materials info
    - Manufacturing info
    - Regulations, regulated materials

- **Consulting**
  - Evaluation, tracking product chemicals
  - Assistance with identifying, adopting alts
  - Galvanic corrosion design

**Subscriber services**

**Consulting services**

Website: www.rowantech.com
Email: klegg@rowantech.com
Successful substitution requires data + people

- What this does is combine the power of Granta’s database of materials and coatings with Rowan’s expertise in technical consulting.
- The database shows what materials have existing and potential ESOH issues, and provides insight into what alternatives are available.
- However, every situation is different, making expert analysis a critical part of ensuring that the right choices are made.
- Sometimes these choices involve complete changes in technology, where outside expertise is critical to successful production.
  - E.g. Replacing hard chrome plate with HVOF.
Granta is at the center of all of the information on regulatory requirements related to materials and properties of materials.

Rowan is at the center of much of the materials and coating substitution in the US and Europe – commercial, aerospace, defense – since we keep track of all this for DoD (www.asetsdefense.org, http://db.asetsdefense.org)

- Technical data, Authorizations, Implementations

We keep track of a lot of commercial coating technology through NASF (Technology Advisory Committee chair).

Granta and Rowan track regulatory changes, impact.

Would there be interest in a tracking service for new materials tech and alternatives (e.g. monthly newsletter and constantly updated website)?
We do this a lot for JSF

- What are the most viable technologies for your specific application?
- How well-developed are they?
- What are the technical, regulatory, market risks?
- What is the best option and what will it take to bring it to production?
- Will it be next against the wall when the revolution comes?
Outline of Services – Quick Answers for Subscribers

Combine Granta database with Rowan aero/defense info (unlimited distribution)

- Provide immediate phone/e-mail answers to simple questions
- Provide short analyses (couple of days work) for a small set fee
- More detailed reports (at higher cost, of course)
Outline of Services – Qualification and Implementation

We do a lot of this for teams, DoD, companies

- Understand the requirements of the applications
- Develop a test protocol
- Pull together the necessary test houses
- Manage or help manage test and evaluation
- Develop necessary specs
- Identify the best vendors of equipment, services
- Identify specialists who can help bring to production
Many new materials and surface treatments have very different galvanic potentials
- C fiber composites
- Electroless Ni–PTFE on connectors
- CRES alloys in place of Cd-plated HSS
- Trivalent in place of hexavalent conversion

Substitutions can lead to very bad galvanic corrosion

Computational galvanic prediction available
What of this would be of real value?

- Tracking and keeping you updated
  - Regulatory changes (new SVHCs, etc)
  - Compliant technologies
  - Ongoing RDT&E
- Technology assessment
- Quick answers
- Short reports on issues specific to your products
- Assistance with testing
- Assistance with implementation of clean technologies
- Other?
Contact information

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