The REACH Regulation and the materials obsolescence for the Space Activities

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WHERE ARE WE ON THE REGULATION GLOBALLY?

REACh: some challenges for materials

- Processes and surface preparations of metals (degreasing), processes of conversion

- Organic materials (glues, solvents, composites)

- Materials for the electronics

- Substances and preparation for ergols (solid, liquid: hydrazine)
- …

NEW CONSTRAINTS FOR THE SPACE PROJECTS?

Penal and financial risks

CNES = as importer of certain raw materials and specific scientific equipments (from outside EU)

→ Obligation of knowledge and communication (through the supply chain) if substances of the Candidate List are present in more than 0.1 % in imported articles

⇔ Technical data sheet and MSDS up to date

⇔ Compliance letter updated at each update of the candidate list

“The capacitors contain dibutyl phthalate”

NEW CONSTRAINTS FOR THE SPACE PROJECTS?

Risks of obsolescence of materials, processes and technologies qualified

Disappearance of substances/materials on the European market

- Production stop
- **In case of authorisation/exemption, the obsolescence risk is still pending because space domain is a very small market for suppliers**

Quality Risk : performances decrease

- materials composition change with an impact on properties
- manufacturing processes change

➢ Long duration of qualification procedure on space systems (several years)

➢ Increased use of commercial products (electronic components, glues ..), use in a specific environment.

OBSOLESCENCE ANTICIPATION , INCRIMINATED SUBSTANCES AND ASSOCIATED ACTIONS

Existence of a cross-functional CNES project group

- Follow-up evolutions of the REACh regulation through interactions with ministries and other industries (Aerospace, army)
- Follow-up other regulations such as RoHS, CLP…
- Internal/external distribution of information
- CNES participation in working groups on substances and strategic materials for the space activities (ex: Hydrazine, Chromates) at European level
- Integration of REACh in our technical activities:
  - Materials choice review for space projects,
  - Awareness-raising activities for suppliers and laboratories,
- Technical specifications and commercial contracts upgrade

OBSOLESCENCE ANTICIPATION , INCRIMINATED SUBSTANCES AND ASSOCIATED ACTIONS

REACh activities inside the CNES Toulouse on materials, technologies and processes (M&P)

- Obsolescence risks anticipation by cross-checking of ECHA lists, NGO list and space materials lists
- Establishment of materials list with REACh risk
- Follow-up MSDS evolutions
- MPTB Member (ESA/CNES/ Industrials)
- Research and development for new products (R&T started since 2009)
- Projects and space actors information
- Information capitalization in order to help new projects and industrials (MATREX)

OBSOLESCENCE ANTICIPATION , INCRIMINATED SUBSTANCES AND ASSOCIATED ACTIONS

REACH Activities
MPTB WG

Construct a list of materials used in the satellites, launchers, and balloon projects

Close to 1700 materials

List substances included in these materials = list of space substances

Approximately 760 space chemical substances

Cross check lists of space substances with lists of critical substances

- Short term = Annex XIV & Recom. Annex XIV
- Midterm = candidate List & SVHC
- Long term = SIN list

Identify critical materials for space projects

Prioritize

Entries from other partners, activities fields

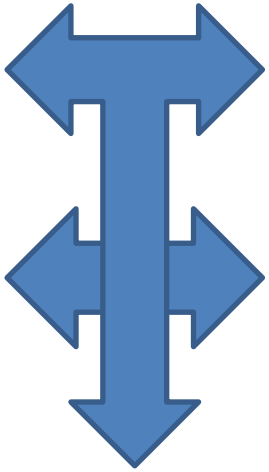
OBSOLESCENCE ANTICIPATION , INCRIMINATED SUBSTANCES AND ASSOCIATED ACTIONS

Impacted space materials prioritization = High Concern materials list

Is it always used?
For which application / process?
Importance and quantity used?
Is there an alternative for every application? If not, is an alternative technically accessible?

Investigation into the uses within the MPTB WG

Investigation into the CNES uses



Investigation into the subcontractors uses

Other studies results
Cross test campaign (NASA)

Road Map, R&T studies, Actions

OBSOLESCENCE ANTICIPATION , INCRIMINATED SUBSTANCES AND ASSOCIATED ACTIONS

Last CNES R&T studies (since 2009):

- R-S09/TG-0003-009 Recherche de nouveaux traitements de surface sans Cr VI
- R-S10/TG-0003-010 : Substitution obsolescence liées à REACH pour les matériaux et procédés de Systèmes Orbitaux
- R-S11/TG-0003-016 : Alternative vernis Solithane 113
- R-S11/TG-0003-019 : Collage aux propriétés structurales et thermiques
- R-S12/PF-0005-039 : Hypergols verts avec H2O2
- R-S12/TG-0003-020 : Nouvel apprêt pour matériaux composites
- R-S12/TG-0003-022 : Préparation de surface métallique laser
- R-S13/MT-0004-157 : Evaluation encres couches épaisses conformes aux règlements RoHS/REACh

OBSOLESCENCE ANTICIPATION , INCRIMINATED SUBSTANCES AND ASSOCIATED ACTIONS

Last CNES R&T studies :

- R-S13/TG-0003-009 : REACh : alternative au BR127
- R-S13/TG-0003-022 : REACh : exploration traitement de surface en voie sèche
- R-S14/TG-0003-030 : Remplacement Solithane S113 pour batteries
- R-S14/TG-0003-034 : Identification de nouveaux produits Polyuréthanes sans isocyanate (NiPUr)

- R-S15/TG-0002-110 : Obsolescence MoS2 / règlementation REACh
- R-S15/TG-0002-015 : Développement et qualification de nouveaux revêtements de contrôle thermique
- R-S15/TG-0003-038 : Nettoyage plasma pour des pièces mécaniques

OBSOLESCENCE ANTICIPATION , INCRIMINATED SUBSTANCES AND ASSOCIATED ACTIONS

Multi-approach strategy necessity = Compromise

- Project status

	Risk	*Propositions*
Ongoing projects and materials manufactured	- Problems for changes / repairs	- Low risk - Hazard studies are to be carried out if necessary
Ongoing projects and materials not manufactured	- Planning & cost risk - Loss of performance	- Alternative search and re-qualification if necessary - Back to designer
New project	- Project stop if it is a strategic material (no material= no function)	- Take into account from the conception - Alternative search - New materials choice - New designs choice - How to requalify

- Substitution

Yes but long process and need large budget

- Authorization/Exemption

Reserved to strategic Defense materials, need anticipation and common approach from users and suppliers.

OBSOLESCENCE ANTICIPATION , INCRIMINATED SUBSTANCES AND ASSOCIATED ACTIONS

For space activities, we are working on different approaches. Regarding REACh procedure, we plane to use the authorization/exemption possibility in order to secure critical materials. Substances targeted are very strategic in the field of propulsion and surface treatment.

The files are jointly prepared by Reach Law (Consultant) + agencies + industrials. EC answer is not yet planned

In case of authorization procedure:

- The substance must be recorded
- Attention on the dates (latest application dates)
- High cost: RH, complex file, tax

OBSOLESCENCE ANTICIPATION , INCRIMINATED SUBSTANCES AND ASSOCIATED ACTIONS

Multi-approach strategy necessity = Compromise

- New projects: take into account from the conception (design)

  e.g. propulsion: chemical propulsion/electrical propulsion, new products "green propellants"

- Several solutions to assure each function

  e.g. surface treatment: multi-materials for aluminum alloy protection, new processes without chemicals = laser surface preparation

- Manufacturing processes changes

  e.g. additive layers manufacturing to avoid chemicals

- Processes changes

  no toxic solvents inside paints => water based paints (AQ PU1)

- …

→ Need also to change our approach on how to manage our materials/processes and how to qualify them

CONCLUSIONS

- Chemical substances landscape evolution → important works to make on materials, processes and technologies
- REACh, new constraint in the current and future space developments
- Anticipation and follow-up evolutions are essential for the space actors
- Communication / information and sharing to optimize and limit the costs induced by M&P substitution / requalification studies
- Do not forget other regulation concerning substances such as RoHS, CLP, … linked to REACH regulation

  - Join groups working on the impacts of the REACh regulation
  - Participate in organized meetings multi-domains or specialized on the subject:
  - helpdesk on the REACh regulation : http: // echa.europa.eu or www.reach-info.fr
  - Contact EU space agencies (ESA/CNES) for any changes or evolutions in materials/processes link with chemical composition

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Thank you for your attention

OBSOLESCENCE ANTICIPATION , INCRIMINATED SUBSTANCES AND ASSOCIATED ACTIONS

Annex XIV: 14 substances in 2012, 27 in 2013, 37 in 2014

→ 12 space substances and 69 impacted space materials

Short term impacted technological domains :

Surface treatments: anti-corrosion protections, adhesion primer, solvents, surfaces activation processes, cleaning agent

Examples:

Chromic acid (N°CAS: on 1333-82-0), 13 impacted materials, surface treatment ex Alodine® 1200 for the protection of the aluminum alloys, *sun set date = in August, 2017*

Chromate of strontium (N°CAS: 7789-06-2), 9 impacted materials, preparations of surface with properties of activation as the BR®127, *sun set date = in January, 2019*

→ Strategic substances for the space domain are concerned

OBSOLESCENCE ANTICIPATION , INCRIMINATED SUBSTANCES AND ASSOCIATED ACTIONS

Candidate List: List of substances liable to be introduced in Annex IV

= 164 substances concerned by the process of authorization. 1000 substances aimed before 2020

→ 21 space substances and 67 impacted space materials

Technological domains impacted in the midterm:

Surface treatments, Lubricants (solvent), Inks, Polymer for PCB (solvents, resins) and adhesive systems (solvents, constituent of glues), Propulsion of satellites and launchers

Examples:

Hydrazine (N°CAS: 302-01-2): Mono-ergol for the control of attitude of the launchers and the satellites

Diboron trioxide (N°CAS: on 1303-86-2), used in Cho-term®1671, very used as thermal conductive elastomer

Araldite 2014 : presence of 1,3,5-tris(oxiranylmethyl)-1,3,5-triazine-2,4,6(1H,3H,5H)-trione, (N°CAS : 2451-62-9), used as adhesive

OBSOLESCENCE ANTICIPATION , INCRIMINATED SUBSTANCES AND ASSOCIATED ACTIONS

M&P impacted in the long term

Use of the SIN list (NGO list) to anticipate substances to appear in the candidate list and after in the Annex XIV.

833 substances are concerned including 87 space substances

→180 space materials impacted