



REACH Impacts to F-35

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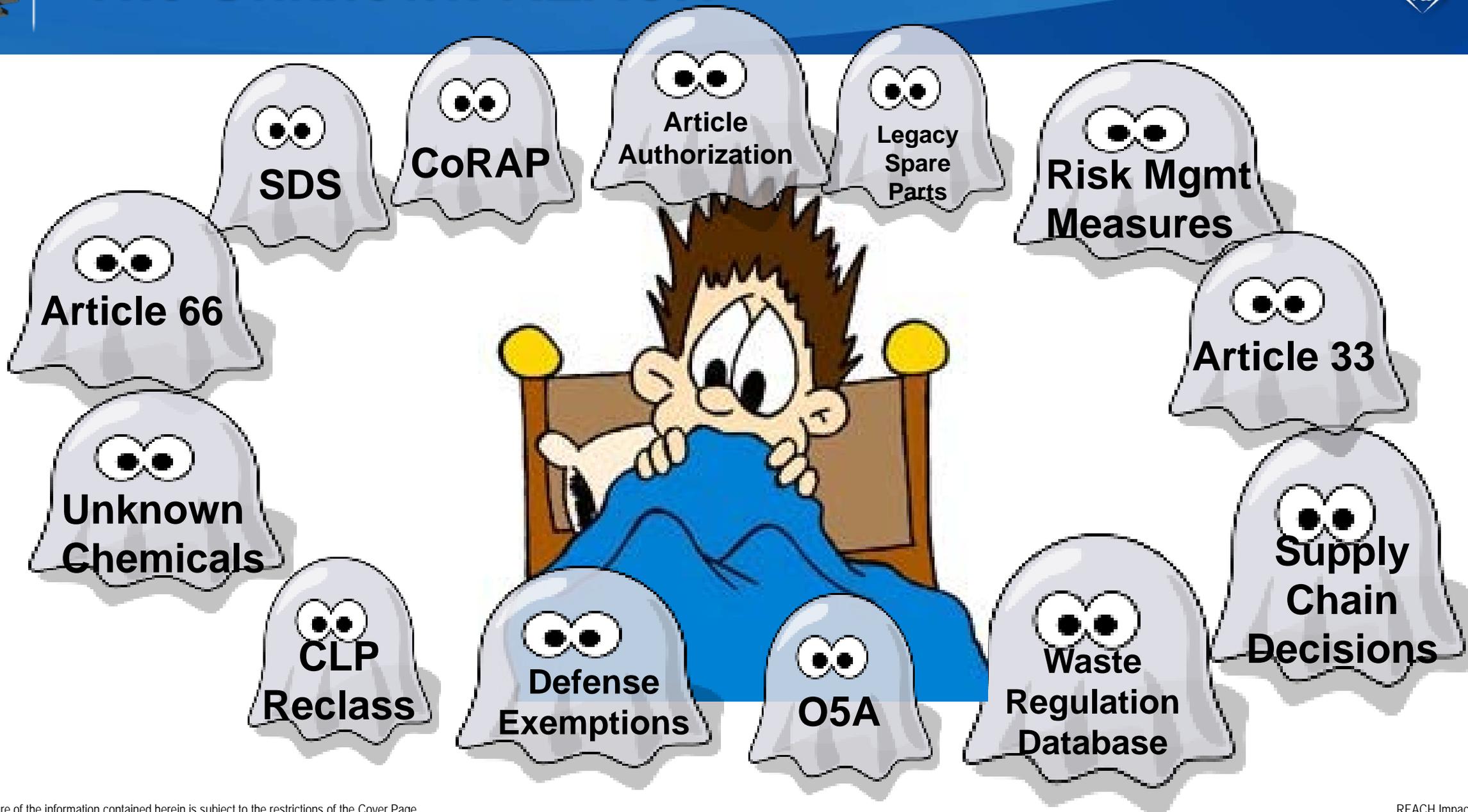
Topics



- **What keeps us up at nights?**
- **Future Risks**
- **F-35 progress**

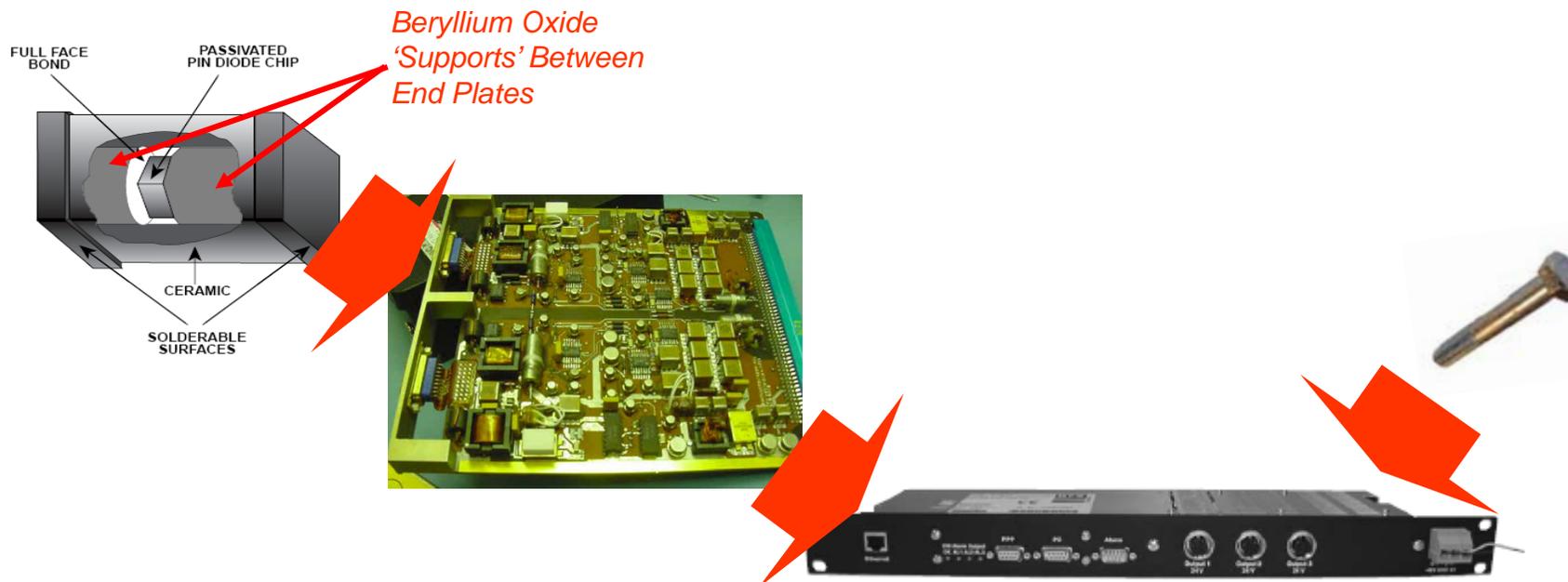


The Unknown REACH





Once An Article Always An Article (O5A)



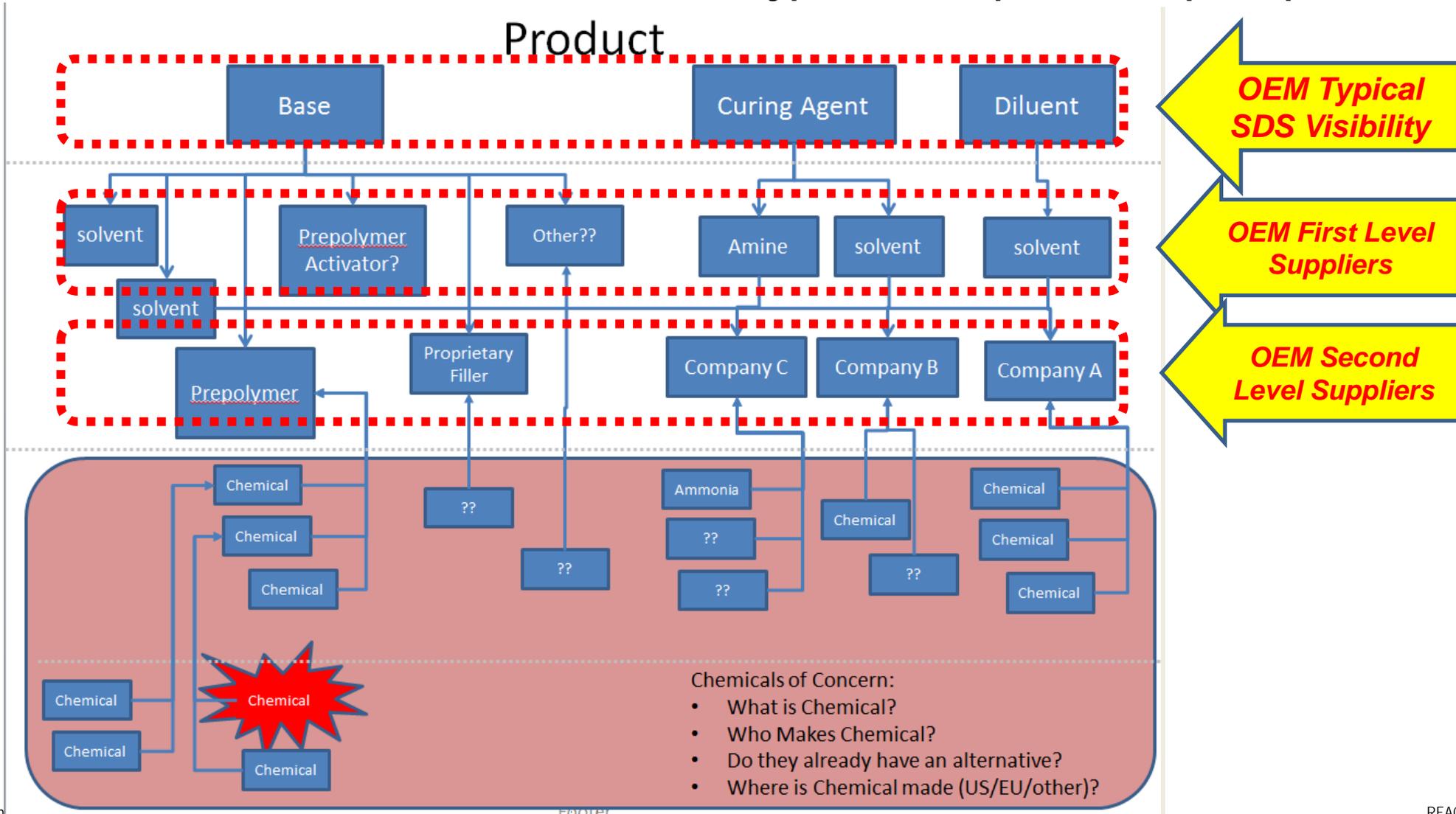
- **May 2015 ECJ Decision that Candidate list materials exceeding thresholds at a piece part level must be reported via Article 33 even if included in Article**
- **Introduced 'complex object'**
- **June 2017 guidance available**
- **Have you started preparing a total Article parts list?**



Unknown Chemicals



- Supply Chains and CMRs/EDs/PB/vPvB/ELC etc. in typical multi-part Aerospace products





Continuing REACH Chemical Risks

- In addition to hex chrome sunset dates, other potential aerospace impacts from:
 - Nonylphenol Ethoxylates and Octylphenol Ethoxylates - surfactants, emulsifiers, solubilizers, precursors
 - Authorization Consortium formed
 - Hydrogenated Terphenyls – building block of most sealants
 - Bisphenol-A – adhesive films, epoxies, coatings
 - D4/D5 silanes – silicon precursors
 - Lead compounds – explosives, flares, dry film lubes, high temperature fabrics, solder
 - Heptylphenols – lubricant precursors
 - Hydrophthalic anhydride MHPA/HHPA - epoxy resin hardener
 - Perfluorohexane sulphonic acids and Salts (PFHxS) – water proofing agents, metal plating, electronics
 - Microplastics - fillers
 - Refractory Ceramic Fibers(RFC) – high temperature coatings/insulations, moving toward OEL
 - Cadmium – focusing on intermediates
 - Expansion of Annex XVII restrictions for organic nickel compounds



Other Simmering REACH Issues

- **2018 Amendment of EU Waste Directive (2018/851/EC) requires public database of Article 33 submittals**
 - *Defense industry information generally not public (proprietary, competition sensitive, ITAR, etc)*
 - *Defense Exemption required*
- **2015 Amendment to REACH Annex II eliminated allowance for proprietary information in safety data sheets (SDS)**
 - *Key materials impacted*
 - *No U.S. Legal or Contractual Authority to demand disclosure*
 - *Defense Exemptions required for each F-35 EU partner*
- **Potential Extension of Authorization to Articles**
 - *Offshoot of O5A and competitiveness concerns (EU vs US)*
- **European Defense Agency (EDA) and Defense Exemption**
 - *Released Defense Exemption Code Of Conduct*
 - **Essentially requires Authorization package for Annex XIV chemicals**



F-35 Baseline Airframe Non-Chrome Primer



AF-1 First Flight



BF-1 First Flight



CF-1 First Flight



Airframe Interior/Exterior
Over 180,000 Flight Hours
Enables Production Moving Line
Enables 'Shirt Sleeve' Maintenance*

* Except fuel tanks



Chrome Replacement and Authorization?



- **Chromium Trioxide/Chromic Acid – Henkel Alodine 1200(S)RTU conversion coating**
 - Continuously testing new products for compatibility with non-chrome airframe primer, i.e. Surtec 650V
 - **Chromium Trioxide Acids – Chromic Acid Anodize in supply chain**
 - Qualifying Boric/tartaric-sulfuric acid anodize ECD 2019
 - Qualifying TCP as anodize seal
 - **Strontium Chromate – PPG 833K086/930K088 Fuel Tank Coating, 3M EC 3917 adhesive film, BR-127 adhesive bonding prime, MIL-PRF-23377 primer used by supply chain**
 - Neutral/SO2 salt fog testing completed, starting flight test demonstration of non-chrome fuel tank coating
 - Replaced BR-127 with 6747-1NC for titanium adhesive bonding, working on aluminum adhesive bonding
 - Continuously testing non-chrome -23377 formulations esp. Hentzen 16708TEP
 - **Zinc Chromate – PPG 515x408/910x937 Super Koropon Quick Cure Touch-up Primer**
 - Lab testing several different alternatives
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- **Sodium Dichromate – PPG PR-1425 B-1/2 Canopy Sealant**
 - B-2 with Calcium Dichromate no sunset date yet
 - PR-2061/PR-1861 adhesion promoter and other options in qualification/implementation ECD 2018

**Authorizations
Pending**

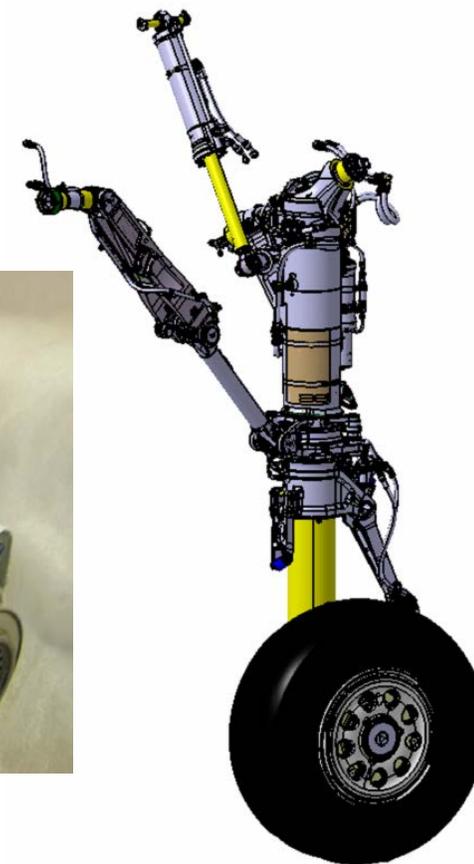
**Continue
to use B2**



Cadmium P2 Projects



- **Landing Gear, Leading Edge Flap, Arresting Gear**
 - Landing Gear and Leading Edge Flap AFLCMC funded demonstration/validation projects for Dipsol IZ-C17+ LHE zinc-nickel to verify F-35 neutral/SO₂ salt fog corrosion resistance requirements, ECD 2018
 - Already implemented at OO-ALC landing gear depot





Summary



- ***Proactive Management – start looking for alternatives early***
- ***Monitor Regulatory Developments***
- ***Stay engaged in your industry trade associations***
- ***Monitor the chemical SIEFs***
- ***Get Used to an Evolving Process***

