Supplier Development

CONTAMINATION PREVENTION

Supplier Awareness Training
Supplier Development

AGENDA

- Introductions
- Purpose
- Contamination and Craters
- High Risk Areas that Need Attention
- Tools for Reducing Risk
- Next steps for PPG and Supplier

3/1/2011
CODE OF CONDUCT

Phone and other distractions
- Turn off or mute cell phones
- Limit background noises
- Mute conference call to for side conversations

Participation and Courtesy
- Let people finish their thoughts
- Be open to ideas and change
- Share your thoughts, questions and suggestions
PURPOSE

Why are we doing this?

- PPG has demanding customers and we’re committed to meeting their requirements

- This particular initiative is focused on preventing contamination in our raw material supply chain, including cleaning facilities, containers and tank wagons

- We are also committed to partnering with our suppliers in a proactive approach to prevent issues from occurring
FOCUS ON RISK REDUCTION

• Work Closely with suppliers to understand each others’ processes

• Review historical problems to help assess current risks

• Agree on risk reduction strategies to reduce costs associated with contamination events
CONTAMINATION

What do we mean by contamination?

- Traditional view of contamination - visible foreign material such as dirt and fiber
- Highest cost to PPG is contamination that causes craters in paint
- Can come from raw materials, containers, process equipment or tank wagons
What is a crater?

Craters are dish shape deformations in a paint surface that may, in extreme cases, penetrate to the layer below, typically 1 - 4 mm in diameter.
CAUSES OF CRATERS
Low surface tension material that is insoluble or marginally soluble in the paint

As the solvent flashes off, tiny droplets or particles of low surface tension contaminant cause the paint to “de-wet” and form craters.
CAUSES OF CRATERS

- The most aggressive contaminants are
  - Silicones – e.g. Poly Di Methyl Siloxane (PDMS)
  - Fluoro compounds – e.g. Teflon sealants
  - Sulfonates – detergents and surfactants

- Silicone based compounds have increased in popularity due to the benefits in many products – lubricants, plastics, creams, lotions, etc.
COST OF CRATERS

Production disruption at OEM - $10,000/min
COST OF CRATERS

- Additional labor for repairs and rework
- Car bodies scrapped - $3000 each
- Paint system at OEM dumped & cleaned - $4000 + disposal costs
- Scrapped inventory at PPG
- Laboratory forensics, contamination investigation and supplier claims
BIGGEST COST OF CRATERS

Loss of customer confidence in PPG as a supplier

Loss of business to PPG

Loss of business to PPG’s suppliers
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PPG’S STRATEGY
Continuous Improvement - Internal

- QC testing – incoming and outgoing
- New product development testing
- Housekeeping – Five S fundamentals
- Process design and error proofing
- Extensive analysis and investigation of crater events
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PPG’S STRATEGY

Continuous Improvement - External

- Supplier qualification process
  - Audit and testing process to qualify a new supplier

- Supplier Development initiative
  - Audit activities and awareness training
  - Contamination Risk Assessment Survey
  - Annual Supplier Quality Bulletin
  - Supplier Scorecard review with Corporate Purchasing
Silicone infused thread was used to sew filter bags

- Filter bag manufacturer changed thread suppliers without notification
- Silicone in thread from filter leached into thousands of gallons of resin
- Resin was used in PPG paint and caused severe craters in our customers’ automotive plants
- Four months of investigative work was done to isolate the cause
New valves lubricated with silicone

- Solvent supplier upgraded their tank farm to add an inline filter system that incorporated five new valves.
- Valve manufacturer had standard procedure of lubricating valves in silicone before packaging.
- Solvent from upgraded system was used in PPG clear coat paint, causing craters on our customer’s lines.
- Two automobile assembly lines were shut down for almost two days.
Valves, Gaskets, Seals, Packing

New gaskets were installed at the tote cleaners. The gaskets contained silicone and contaminated the entire tote.

New packing was installed on PPG’s leaking pumps, before the crater testing was completed. All products that passed through the pumps showed low level craters. The rope packing listed silicone on the MSDS and the completed testing failed severely for craters.
RECOMMENDATIONS – PROCESSING EQUIPMENT

Review all equipment and control any changes

- Ensure that filter bags are not sewn with silicone infused threads
- Equipment purchasing policy – ensure valves, pumps, etc. are silicone free or “dry”
- Ensure replacement parts such as O-rings or seals are not crater causing materials
- Check MSDS and literature for silicone
- Notify PPG of all changes to process
De-bug all new or repaired equipment

- New or repaired de-bugging procedure
  - Disassemble and clean all parts that touch the product
  - Use an appropriate solvents (MEK, xylene or acetone) to soak and degrease parts
  - See PPG Annual Supplier Quality Bulletin for procedure
Prior Contents – Prohibited Detergents

- Elevated crater counts were reported at multiple locations of a PPG customer (same paint formula)
- Batches were quarantined, systems were cleaned out and material was replaced
- Contamination in the batches of paint was traced to a specific lot of solvent that was purchased in drum quantities
- Previous loads in tank wagon of solvent used by re-packager were detergent blends
High Risk Area – Tank Wagons

Prior Contents – Prohibited Resin

- Tank wagon was filled with solvent, but prior contents in tank wagon was a resin on PPG’s prohibited list
- Resin gels remained after tank wagon cleaning that leached into the solvent
- Solvent failed PPG’s QC testing and tank wagon was rejected
- Contaminated solvent could have been added to PPG’s bulk tank system
**HIGH RISK — TANK WAGONS**

**QC Sampling and Testing of Solvent Tank Wagons**

- Sampling attachment used on incoming solvent tank wagons
- Filter allows us to assess amount of particle and fibers
- Visible contamination can be an indicator of crater causing contamination
- Excessive contamination will result in a rejected tank wagon
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RECOMMENDATIONS – TANK WAGONS

Prior Contents Prohibited List

- Silicones
- Fluorocarbons and fluorine based additives
- Pigment dispersing agents
- Release agents and adhesion promoters
- Refrigerants
- Waxes and cleaning compounds
- Greases and oils
- Epoxy resin, cationic epoxy and aqueous epoxy
- Acrylic emulsions
- Strong acids and bases
- Slurries, dry powders and dispersions
RECOMMENDATIONS – TANK WAGONS

Control of prior contents and cleaning methods

- Use dedicated tank wagons where possible.
- If not dedicated, must have a system of reviewing prior contents of each tank wagon used for PPG Material.
- Use PPG list of prohibited materials in review of prior contents - contact PPG if there are ANY questions!
RECOMMENDATIONS – TANK WAGONS

Control of prior contents and cleaning methods

- Ensure correct cleaning methods
  - Caustic clean (no detergent) + thorough rinsing
  - External bottom valve and dome lid disassembled and cleaned
  - Inside inspection – visual and feel

- Procedure for de-bugging a new tank wagon must be in place – preliminary testing required before filling
Re-cycled Drum Usage

- Solvent distributor used re-cycled drums for temporary storage before pumping solvent back into bulk storage vessel.
- Solvent sent to PPG caused craters on the customer line.
- Review of re-cycled drum process revealed prohibited materials as prior contents.
- Use of re-cycled drums are now banned from all Automotive PPG and supplier locations.
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HIGH RISK AREA – CONTAINERS

Drum lining formulation changed

- New drum liner supplier made a formula change without notifying drum manufacturer
- New liner formulation contained a crater causing ingredient
- Virgin drums were lined with new liner and sent to PPG for filling paint
- Over time, crater causing ingredient leached into paint and caused craters on customer’s line
RECOMMENDATIONS – CONTAINERS

Containers for PPG product must be pre-approved

- All containers types for PPG product must be pre-approved
  - Totes, drums, pails
- Container linings must be tested
- No re-cycled drums or pails
- New totes must be debugged
- Notify PPG of any changes
HIGH RISK AREA – MAINTENANCE MATERIALS

Products that scare us!

- WD-40 widely used but causes craters
- Silicone –caulk, adhesives, lubricants
- Greases with low surface tension components
RECOMMENDATIONS – MAINTENANCE MATERIALS

**Materials Registration**

- All maintenance materials are crater tested
- Materials that FAIL are eliminated where possible
- System created with visual controls that is understood by all employees
RECOMMENDATIONS – MAINTENANCE MATERIALS
**RECOMMENDATIONS – MAINTENANCE MATERIALS**

**Materials Registration**

“Materials Registration List” is published and distributed it to PPG and supplier locations

<table>
<thead>
<tr>
<th>Status</th>
<th>Material Name</th>
<th>Manufacturer</th>
<th>Type</th>
<th>SKU UPC CAS Number</th>
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<td>Lubricant</td>
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<td>Corroflex</td>
<td>Pipe/Hose/Tubing</td>
<td>Chemical Hose</td>
<td>06/12/08</td>
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<td>Corroflex</td>
<td>Pipe/Hose/Tubing</td>
<td>Chemical Hose</td>
<td>06/12/08</td>
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<tr>
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<td>Bioflex</td>
<td>Pipe/Hose/Tubing</td>
<td>Chemical Hose</td>
<td>06/12/08</td>
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HIGH RISK AREA – PERSONAL

Personal Care Items

- Over 50 hand lotions were tested for craters - 95% failed crater testing
- Ingredients to avoid: dimethicone or simethicone
- Many toiletries have large amounts of silicone (hair products, deodorants, etc.) – excessive amounts near automotive production lines have caused craters
RECOMMENDATIONS – PERSONAL HYGIENE PRODUCTS

Personal Care Items

- Ensure soaps and lotions used in manufacturing, maintenance and equipment cleaning areas are the brands that do not cause craters.

- Review manufacturing, maintenance and equipment cleaning processes for potential contact with excessive amounts of personal care items (hair products, deodorants, etc.).
RECOMMENDATIONS – PERSONAL HYGIENE PRODUCTS

Personal Care Items

Consult PPG for approved silicone-free products
Operator’s Clothing

- Ensure garment cleaning process does not use additives that could contaminate clothing with silicone
- Ensure manufacturer did not use silicone lubricated needles or silicone infused thread for sewing
- Contact PPG for testing any garments – reusable or disposable
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**FIVE S**

**Sorting (Cleanup) Seiri (整理):**
- Sort out needed/unneeded

**Simplifying (Arranging) Seiton (整頓):**
- A place for everything and ...........

**Systematic Cleaning (Neatness) Seiso (清掃):**
  Clean equipment, workplace, tools

**Standardizing (Discipline) Seiketsu (清潔):**
- Maintain cleanliness and efficiency

**Sustaining (Ongoing improvement) Shitsuke (躾):**
- Stick to it.
- 5S the new status quo.
**Sorting**
- Remove unnecessary to reduce clutter
- Sort necessary by frequency of use
  - Rarely, Occasionally, Frequently

**Simplifying**
- Point of use storage for quick retrieval
- Visual controls
  - Line markings for storage and work areas
  - Tool boards, labeling, signage
FIVE S Systematic Clean-Up

- Scheduled clean-up times
  - Consistent practice even when busy
- Maintain value of equipment
  - Regular cleaning and maintenance
  - Immediate reporting of abnormalities related to use of equipment
- Reduce risk of contamination
  - Minimal clutter, dirt, debris
  - Improved error proofing
FIVE S

Standardizing
- Assign responsibilities
  - Shift to shift hand-offs
- Consistent procedures
  - Debugging, replenishment levels

Sustaining
- Ensure procedures are habit
- Training and auditing
- Ongoing support from management
TOOLS FOR REDUCING RISK

Resources and Guidelines in our Annual Supplier Quality Bulletin

https://buyat.ppg.com/suppliernetwork/frmSNWebPortal.asp

- Materials Registration List (MRL)
- Crater De-bug Procedure
- Silicone Valve Warning & Lube Free Letter
- Bulk and Bulk Solvent Prior Contents Requirements
- Change Notification Instructions and Form
FOCUS ON RISK REDUCTION

• Work Closely with suppliers to understand each others’ processes
  – Supplier audits
  – Process mapping
  – Contamination Risk Assessment Survey
  – Supplier awareness training
  – Annual Supplier Quality Bulletin
  – PPG’s processes and QC testing
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**FOCUS ON RISK REDUCTION**

- **Review historical problems to help assess current risks**
  - Processing equipment
  - Valves
  - Containers
  - Transport vessels
  - Maintenance materials
  - Personal hygiene products
Focus on Risk Reduction

- Agree on risk reduction strategies to reduce costs associated with contamination events
  - Policies and procedures
  - Housekeeping – Five S fundamentals
  - Process design and error proofing
  - Notification of change system
  - New employee training
# Supplier Development

## Next Steps for PPG and Supplier

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<thead>
<tr>
<th>Item</th>
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<th>Done</th>
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<td>Supplier audit &amp; process mapping</td>
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<td>New employee training</td>
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</table>

**Example**

3/1/2011
Next Steps for PPG and Supplier

- Contamination Risk Assessment Survey and improvement plan
- Crater Awareness training for employees
- Completion of PPG audit findings
QUESTIONS & COMMENTS
THE END

TO CLOSE OUT THE WEB MEETING!