Picking the “Right” Glove is Wrong

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What is the “Right” Glove?

• Primary Consideration: Quantitative Chemical Characteristics
  – Breakthrough Time
  – Permeation Rate

• Secondary Consideration: Work Performance
  – Comfort
  – Dexterity
  – Durability
“Right” Glove = Long Breakthrough Time

• Quantitative Belief
  – Changing out gloves before chemical breakthrough time prevents skin exposures

• Qualitative Reality
  – Good work practices must be established and enforced to minimize skin exposures long before chemical breakthrough becomes a concern
  – Breakthrough time will not protect against sensitizers
Example: Advanced Composites

• “Sticky” Sensitizers
  – Two Part Epoxies
  – Polyurethane Systems

• One facility studied by the author had an increase in sensitization after gloves became mandatory

  WHY?

  Providing gloves, without other controls, promotes risky behaviors that can increase exposures.
Just Providing the “Right” Glove Can Promote Risky Behaviors

- Increased direct chemical/glove contact due to decreased perception of risk
- Prolonged use and reuse since impairment of glove integrity is not always readily apparent
- Glove removed for intricate tasks
The “Right” Glove Can Increase Surface Contamination Exposures

Gloving a Contaminated Hand Greatly Increases Exposure
Problem: Incomplete Permeation Data

• “In many advanced composites processes, several chemicals or mixtures are involved.”
• “There are essentially no permeation data available for chemical mixtures.”
• “This means that in many cases, glove and clothing selection must be a trial and error process.”
Problem: “Right” Glove Not Compatible With Task Performance

• “In some advanced composites processes, close hand work and contact is required and a glove must provide good tactility.”

• “Often this type of glove provides the least protection against the resin and the curing agent.”
What to Do When “Right” is “Wrong”?

• Practice Qualitative Industrial Hygiene
• Don’t Just Prescribe a Glove From a Book
• Control Skin Exposure Instead
Sage Advice Stands the Test of Time

October 1958, the *Industrial Hygiene Journal* published a hygiene guide for “Epoxy Resin Systems”. Their recommendations reflect a qualitative approach to industrial hygiene:

• Special Work Areas
• Decontaminate Equipment
• Proper Waste Handling
• Covering of Work Surfaces and Containers With Paper to Aid Cleanup
Control Skin Exposure

- Work with skin-absorbed materials in controlled areas
- Minimize contact with proper material handling
- Don’t touch the chemicals, even with gloves
- Carefully handle tools and equipment
- Double glove for messy tasks
- Isolate messy tasks
- Don’t spread contamination
- Clean up
- Evaluate glove efficacy in workplace
Work With Skin-Absorbed Materials in Controlled Areas

• Delineate boundaries with nonabsorbent materials
• Assume all surfaces are contaminated
• Monitor skin and surface contamination
• Establish worker and equipment decontamination stations
Minimize Contact With Proper Material Handling

• Minimize variety and amount of chemicals used
• Consider bulk systems to limit material handling
• Contain materials through engineering
• Minimize solvent, mold release, and oil usage
Don’t Touch the Chemicals, Even With Gloves

• Use tools, such as spatulas, to keep hands off materials
• Design work to minimize direct chemical to gloved hand contact
• Treat outside of containers as contaminated
Carefully Handle Tools and Equipment

• Establish a separate set of marked tools for the controlled area
• Use non-absorbent tool handles and tool holders (metal preferable)
• Cover tools with disposable covers where practical
• Treat tools and equipment as potentially contaminated
• Decontaminate tools and equipment before removing from controlled area
Double Glove for Messy Tasks

- Wear a loose outer glove for messy tasks and remove immediately after contamination
  - Thin and loose for short tasks
  - Thicker and heavier for longer tasks
- Treat the inner glove as if it were a bare hand
  - Keep inner glove clean at all times, never directly touching the chemicals
  - Remove immediately if chemical contact made
- Consider cloth inner gloves
  - Minimizes occlusion and reduces skin absorption
Isolate the Messy Tasks

• Mixing Two-Part Epoxy
  – Exterior of epoxy storage containers are typically contaminated
  – Wear loose fitting outer glove when pouring and mixing
  – Do not contaminate exterior of disposable mix container
  – Discard outer gloves immediately after mixing

• Hand potting
  – Don’t touch the mix, even with gloved hands
  – Use spatulas to spread and apply
  – Discard glove if chemical contact occurs
Don’t Spread Contamination

• Put removable covers over frequently contaminated surfaces (tables, switches, control panels)
• Treat scrap, wipers (rags), and debris as potentially contaminated
• Do not use wipers without an outer glove
• Frequently decontaminate surfaces
Clean up

• If soap and water won’t solubilize the materials, it won’t effectively clean the skin
• Select skin cleaners that solubilize the materials, but do not promote skin absorption
  – Higher molecular weight products
  – Should not contain lanolin or other chemicals which promote absorption
Evaluate Glove Efficacy in the Workplace

- Get extensive employee input on control measures to ensure practicality
- Conduct passive dermal monitoring
- Evaluate surface contamination
Using The “Wrong” Glove May be Right

“Finally, is it worthwhile for a non-sensitized person to wear polyethylene gloves when working with epoxy resins?”

“Perhaps it is because although not impermeable to the resin the glove will almost certainly reduce the amount absorbed because the glove can be discarded immediately and will carry away the surplus of material which would otherwise remain on the skin.”
Summary

• Just picking the “right” glove can promote poor work practices and spread surface contamination
• Sometimes there isn’t enough data available to pick the “right” glove
• Control skin exposure
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