Health & Safety Concerns:
Coating Application & Removal

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Introduction:

The intent of the paper is to provide a very brief summary of potential safety and health concerns/hazards associated with the coatings industry for inclusion in this publication. This paper is far from a detailed, thorough assessment of any and all hazards associated with the practices of this industry.

Extremely simplified, the application of a coating involves the removal of any previous coatings/paints, followed by surface preparation, and subsequently, the application of new coating.

Removal of old coatings and surface preparation is usually accomplished via water blasting, steam blasting or abrasive blasting. This process often creates a large debris cloud of both blasting media and removed product.

The application of a coating involves either spraying or brushing the material onto the prepared surface. This frequently results in an atmosphere with high concentrations of aerosolized coating material.

Most coatings, paints, and protective agents are comprised of a long list of materials, many of which have properties that make them potentially harmful to human health. Ingredients will likely include some type of solvent (aromatic and aliphatic hydrocarbons) mixed with pigments and additives. The additives may include organo-mercury compounds, copper oxide, arsenic, organo-tin compounds, cadmium, chromium, lead, zinc chloride, and others.

The process of surface preparation and application of the coating, coupled with the potentially hazardous materials used in the coating, create occupational health risks that could cause both acute and chronic illnesses to workers.

General Safety Concepts:

The most effective way to assess the potential hazards associated with utilizing a product is by consulting its Material Safety Data Sheet (MSDS). The application of coatings is no exception. It is imperative that workers that will be handling the

coatings acquire the appropriate MSDSs and gather information on the hazards, handling procedures, PPE requirements, etc.

Utilizing controls is essential. The control hierarchy dictates that engineering controls should be considered first, followed by administrative controls, and finally the use of Personal Protective Equipment (PPE).

Engineering controls are those that can eliminate the hazard through technology. Installing blockades, shields, local ventilation, or isolation booths are engineering controls that isolate the hazard from the worker or the worker from the hazard.

Administrating controls are policies or procedures aimed at limiting or minimizing workers exposure to hazards. Work rest cycles, warning signs, and worker training are all admin controls that can reduce the likelihood of injury or illness due to hazard exposure.

The last control is the use of PPE. Often times unavoidable due to procedures and practices, the use of respirators, gloves, coveralls, etc will minimize workers exposure to certain chemicals/hazards.

The control hierarchy should always be addressed prior to commencing a job to determine the best way to protect the workers and the surrounding area.

Fire and Explosion Hazards:

The vast majority of paints and coatings contain some type of solvent. These solvents are commonly the carriers of any pigments and additives used in the coating. Examples of commonly used solvents include mineral spirits, benzene, toluene, acetone, methyl ethyl ketone (MEK), and others. Though all have differing physical and chemical characteristics, one property common among most solvents is that they are extremely flammable.

Whether applied via spraying, brushing or other technique, all are likely to create a potentially explosive atmosphere. This atmosphere combined with a source of ignition may result in a catastrophic explosion.

Sources of ignition could include hot-work (welding, cutting, grinding), non-intrinsically safe equipment/tools, human error, etc.

Often times sources of homogenous to the job site and cannot be eliminated. As such, the best preventive measure is to aggressively ventilate the space. Exhaust ventilation must be utilized to ensure flammable solvent vapor concentrations are <10 percent LEL.

Respiratory Hazards:

Solvents, pigments and additives may all be respiratory hazards.

Application or removal of coatings in confined or enclosed spaces could result in an oxygen deficient atmosphere or an atmosphere with high levels of toxic material. Potential health effects due to exposure to some products may include irritation, sensitization, organ damage, cancer, neurological damage, asphyxiation, or death. Therefore, respiratory protection in the form of air-purifying respirators (APR), supplied air respirators, or self-contained breathing apparatus is a must in most situations. In confined spaces and enclosed spaces without ventilation, airline respirators are required. In well-ventilated areas, air-purifying respirators with appropriate cartridges are acceptable.

The best preventive measure is again ventilation and real-time air monitoring to ensure toxics remain below OSHA's Permissible Exposure Level (PEL) and ACGIH's Threshold Limit Value (TLV).

Contact with Coatings or Solvents:

Components of many coatings can cause irritation, sensitization, allergic reactions, chemical burns, organ damage, etc. if they come into contact with skin or eyes. Proper PPE should always be utilized including utilizing full body coverall, face and eye protection, gloves, boots etc. Eyewash stations and emergency showers must be available for worker use.

Limited Access/Egress and Confined Space Entry:

Painting and coating operations that take place inside tanks and other voids commonly result in blocked access openings and limited egress. It is imperative that these entry and exit points remain clear to avoid the hindrance of escape in the event of an emergency.

Proper confined space entry procedures must be followed when entering space to apply or remove coatings. Certified Marine Chemists and shipyard competent persons must be used to test the spaces for oxygen content, flammable atmosphere, and the presence of toxics.

Work Environment Temperature and Related Hazards:

If not properly accounted for, both heat and cold stress can create dangerous work environments.

The most important action required is the monitoring of the environment. Utilizing a Wet Bulb Globe Temperature (WBGT) monitor, a health tech can determine whether temperature related stress is an issue. Administrative controls should also be considered which include work / rest cycles, frequent breaks, hydration, and awareness training.

Slip, Trip, and Fall Hazards:

Injuries due to simple trips and falls are by far the most common injuries occurring in the occupational environment. The field of coatings and paint application is not an exception to this trend. It is imperative that all workers are familiar with their environment and are aware of the uneven work surfaces, deck openings, platforms, overhead hazards, etc that are potential sources of injury.

High Pressure Hazards:

High-pressure pneumatics is routinely called upon for the application/removal of coatings and paints. Pressurized steam, water and abrasives are commonly used to remove old product and otherwise prep surfaces for new coatings. This exposes workers to noise, thermal, injection, physical (eye & skin), and inhalation hazards.

Electrical Hazards:

The coatings industry obviously relies heavily on electrical power to run equipment, tools, lighting, ventilation, etc. With this reliance, come the associated hazards. These hazards may include shocks, arc burns, blasts and sparks resulting in electrocution, vapor ignition, and secondary injuries such as falling after a shock. Vigilance must be applied to the inspection of equipment, cords, tools and potential static build-up.

Detailed Health and Safety Information:

As stated above, this information is a very broad, simplified look at potential health and safety issues that may be associated with the coatings industry. The following references are valuable sources for more detailed information:

http://www.osha.gov/SLTC/etools/shipyard/shiprepair/painting/index_paint.html

http://www.cdc.gov/niosh/homepage.html

http://www.epa.gov