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## Contents

### Introduction

Obligations To The Customer And Liability .......................................................... 7

### Module 1 - Waterborne Refinish Materials

What Is Waterborne? ................................................................................................. 13

Why Waterborne? ..................................................................................................... 18

Waterborne At The OEM Level .............................................................................. 19

Clearcoats .................................................................................................................. 20

Module Wrap Up ...................................................................................................... 20

### Module 2 - Waterborne Refinish Systems

Surface Preparation And Equipment ....................................................................... 23

Spray Guns .................................................................................................................. 32

Primers ......................................................................................................................... 37

Application Consideration ......................................................................................... 38

Drying .......................................................................................................................... 42

Air Movement Equipment ......................................................................................... 44

Module Wrap Up ...................................................................................................... 49

### Module 3 - Storage, Waste Disposal, And Waterborne Conversions

Waterborne Storage Recommendations ..................................................................... 53

Waterborne Waste Disposal Considerations .......................................................... 55

Converting To Waterborne ....................................................................................... 56

Module Wrap Up ...................................................................................................... 59
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Introduction
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Obligations To The Customer And Liability

The collision repair industry has an obligation to correctly repair the customer's vehicle. Collision repairs must be performed using:

- recommended or tested procedures from vehicle makers, I-CAR, and other research and testing organizations.
- quality replacement parts and materials.
- repair processes and parts as written and agreed upon in the repair order. If items on the repair agreement are not consistent with the repair order, it can be considered fraud.

Performing proper collision repairs requires using parts and procedures that keep remaining warranties intact.

Collision repairs must restore:

- safety.
- structural integrity.
- durability.
- performance.

Throughout the damage analysis and repair process the repairer and insurer must:

- communicate with each other.
- maintain constant communication with the customer.
- be in agreement with each other and the customer on how repairs will be performed.
- inform the customer of any changes in the repair plan from the original repair agreement, and explain the changes and why they have to be made.

To reduce liability:

- make sure that all repairs are performed thoroughly, correctly and as listed in the damage report.
- follow proper procedures.
- have documentation of required repairs with detailed record keeping available for customers.
Technicians are considered the 
experts and are expected to be 
knowledgeable on how to perform 
a quality repair.

Liability insurance that covers the repair 
facility may not always cover all damages. 
For example:

- the policy may not cover 
  faulty repairs, leaving liability 
  responsibility completely on the 
  facility.
- a shop owner may find that repair 
  facility liability coverage may not 
  cover the full amount awarded in 
  a lawsuit. The shop owner would 
  have to pay the difference.

It is difficult to reduce the risk of liability 
exposure. The part that the repairer can 
control is the chance of being found at 
fault. Chances can be minimized by:

- using recommended or tested 
  procedures from the vehicle 
  makers, I CAR, or other research 
  and testing organizations.
- using quality replacement parts 
  and materials that restore fit, 
  finish, durability, and perform at 
  least as well as the original.
- keeping thorough records.

Keeping thorough records includes more 
than recording the date, mileage, and pre-
existing damage. Record keeping also 
includes:

- making sure all notes are legible.
- verifying the repairs that were 
  made or not made.
- having the customer sign a 
  waiver for repairs that they do 
  not want performed. Repairers 
  must determine their liability on 
  not repairing safety systems such 
  as restraint and anti-lock brake 
  systems.
- keeping computer printouts or 
  worksheets on file showing wheel 
  alignment readings or vehicle 
  dimensions before and after 
  repairs.
- keeping scan tool printouts and 
  records of computer codes for 
  airbag, anti-lock brake, emission, 
  and powertrain control module 
  (PCM) systems.
• attaching the OEM or other tested procedure printout to the vehicle repair order.
• keeping receipts for all sublet work performed.

Refer to "Video: Topics Off Limits" in the presentation. This video identifies topics that should not be brought up in class.
Module 1 - Waterborne Refinish Materials
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What Is Waterborne?

Learning objectives for this module include:

- explaining the definition of waterborne refinish material.
- identifying differences between waterborne and solvent-borne refinish material.
- explaining technical characteristics of waterborne refinish material.
- explaining what waterborne refinish materials are available.
- explaining why waterborne refinish material is used.
- explaining vehicle makers use of waterborne refinish material.

Water is the primary ingredient in waterborne refinish materials.

Waterborne refinish materials were developed to reduce the amount of organic solvent content in refinish materials. Water is also a solvent. Automotive refinish materials described as waterborne are products using:

- water as the main ingredient. Solid ingredients are dispersed in the water.
- reduced amounts of organic solvents. Waterborne finishes still contain some organic solvents (also known as co-solvents).

Waterborne refinish materials and / or systems may be called water-based by some sources.

Solvent-borne refinish material contains 85% organic solvents, while waterborne contains about 10% organic solvents.

Some characteristic comparisons between waterborne and solvent-borne refinish materials are that:

- there may be a difference in solid content. The solid content in some product lines is higher in waterborne refinish materials than in solvent-borne refinish materials.
- there is a difference in the reducers that are used. Solvent-borne reducers are blends of solvents. Some waterborne basecoat is reduced with water.
or water with an additive that is designed to slow the evaporation rate in hot weather.

- waterborne refinish materials tend to be more sensitive to humidity, temperature, and surface contamination.
- the flammability risk is reduced.

Because a main ingredient is water, and the organic solvent content is lower, waterborne refinish materials may pose less of a risk of flammable issues than solvent-borne products. However, always use caution when working with any refinishing materials.

With solvent-borne refinish material, many of the recommendations between paint makers are similar, but this is not the case for waterborne refinish materials. When working with waterborne refinish materials, each product maker has their own recommendations, and it is important not to generalize. Refer to the technical data sheets for product-specific information.

Other characteristic comparisons between waterborne and solvent-borne refinish materials are that:

- waterborne refinish materials may have a higher pigmentation amount. This content may vary depending on the product and product maker. There are fewer gaps between the color molecules. The pigment part of basecoat provides the color, and gives the basecoat the ability to hide what is underneath. Axalta waterborne refinish materials have a slightly higher pigmentation amount that allows the waterborne basecoat to cover with fewer coats compared to their solvent-borne product. Other paint makers, such as AkzoNobel, have a comparable pigmentation amount between their solvent-borne and waterborne refinish materials.
- there may be a difference in final film thickness, as it may be thinner, thicker, or about the same thickness as solvent-borne material. For example, PPG states that the film thickness of their waterborne basecoat is about half of their solvent-borne. Axalta states that their waterborne basecoat is thicker than their solvent-borne. 1.5 - 2.5 coats of Axalta waterborne results in a film thickness of 20 - 30 m, whereas it takes 2 - 4 coats of their solvent-borne to achieve the same film thickness. Others, however, state that the film thickness of their waterborne and solvent-borne
products is similar. AkzoNobel, for example, states that the film thickness of their two product lines is about the same.

- there is a difference in appearance when wet, compared to solvent-borne materials.

A thermoplastic coating:

- may be refloowed using heat or a solvent. A dried thermoplastic coating can be softened, or returned to liquid state, by reintroducing solvents.
- cures by solvent evaporation.
- does not change chemically after it has cured.
- is prone to environmental damage, cracking, checking, and shrinking.

With waterborne refinish materials:

- a latex resin is used. Latex resin is neither a true thermoplastic nor thermoset, but shows characteristics of both. According to one paint maker’s technical information, the latex resin does not “reflow” with heat or solvent, but will “wash off” with water or solvent when fresh. Also, once the coating flashes, it will not turn back into a liquid.
- as the water evaporates, the latex particles form and bind together. There are also co-solvents left behind to help melt the resin particles together. The latex particles are cell-like structures with a solid core. The cell, or core, dissolves outwardly to an outer shell with threadlike “fingers” or “tendrils” that bind together.

These cells are made of binder, pigment, and co-solvent and are dispersed in the water that serves as a carrier. As the water evaporates, the cells align on the surface and the co-solvent will start to evaporate, link the cells together, and create the paint film. These cells have an identical weight.
so they do not sink or move, creating a mottling effect. Mottling is when the metallic flakes are not oriented uniformly or evenly on the panel. It typically occurs in metallic colors and appears as dark spots or blotches in the color.

**Personal Safety**

Due to the latex resins used in waterborne paints and primers, latex allergies may be an issue when working with waterborne materials.

Reducers are water-based and used to make sure the refinish material has the correct viscosity to be properly sprayed.

With waterborne basecoats:

- specific water-based reducers act as a carrier, so the refinish materials can be transferred from the spray gun to the surface to be refinished.
- reducer helps with final leveling and allows suspended materials, such as metallics, to orient properly and distribute evenly across the surface. Reducers may also be referred to as thinners.
- tap water should not be used to reduce waterborne basecoats for spraying because it contains various minerals that will affect finish durability. This durability may not be apparent immediately after applying the finish or after the finish has dried. Improper binding that can result from water contamination may cause basecoat failure well after the vehicle has been delivered to the customer, causing an increased volume of paint-related warranty claims. It is also important to note that using tap water to reduce the basecoat may void the paint maker warranty.
  
  - specific water-based reducers are recommended by some paint makers. For example, the water-based reducer used with the PPG system is PH balanced, de-ionized, de-mineralized, and has an added anti-fungal agent.

With traditional solvent-borne refinish materials, a petroleum-based thinner or reducer is used. The solvent acts as both a reducer and carrier.
Waterborne automotive refinish materials are available to collision repair facilities for various applications such as:

- primer-surfacer.
- primer-sealer.
- basecoat.
- clearcoat.

Waterborne basecoats may require a specific type of clearcoat. Depending on the paint maker, the clearcoat may have to be chemically compatible, and / or VOC compliant. Be sure to reference the technical data sheet, or consult with the local jobber, to determine which clearcoat is recommended.

Manufacturers of waterborne clearcoat products include, but may not be limited to:

- AkzoNobel (Sikkens Autoclear WB).
- Lechler (Hydrofan Clearcoat HF950).
- PPG (D8186 Waterborne Clearcoat, NEXA AUTOCOLOR Waterborne Clearcoat P910-5510).

Proper personal protection equipment includes (clockwise) a supplied-air respirator, a full body paint suit, and chemical-resistant gloves.

**Personal Safety**
Isocyanates are contained in catalyzed materials, have no smell or taste, and are considered a severe irritant.

It is important to be aware of all safety considerations when working with waterborne refinish materials. As previously mentioned, waterborne basecoats still contain some solvents and other hazardous materials, which may include, but are not limited to, 2-Butoxyethanol, Ethylene Glycol, and Propylene Glycol.

National / local regulations will require employers to provide the proper personal protective equipment (PPE) to protect the workers from potential hazards. Recommended PPE for refinish technicians include:

- respiratory protection. Supplied-air respirators provide the best protection and are mandated in most states when applying refinish materials.
- eye protection.
• chemical-resistant gloves, such as nitrile.
• a full-body paint suit.

Always read all instructions and cautions before using waterborne refinish materials. Safety data sheets (SDS) and product information sheets are good sources to determine PPE requirements when using waterborne refinish materials.

When there are activators, isocyanates may be present depending on the paint maker material specifications.

Why Waterborne?

Reducing the amount of volatile organic compounds in refinish materials results in fewer hazardous air pollutants released into the atmosphere.

The U.S. Environmental Protection Agency (EPA):

• has identified paint stripping operations and product surface coatings as sources of hazardous air pollutants (HAPs). Collision repair and refinishing facilities are included in these HAP sources.

• defines an air pollutant as any substance in the air that is harmful to humans and / or the environment. The HAPs are emitted when the refinish materials are atomized during spray application, and during the evaporative drying process.

• focus is to reduce the amount of HAPs emitted into the environment by recommending alternative methods and materials, such as the use of waterborne refinish materials.

Waterborne basecoat contains almost half the amount of VOCs per gallon of material.

Advantages of using waterborne basecoats over solvent-borne basecoats include that:

• they emit fewer volatile organic compounds (VOCs) than solvent-borne basecoats, and therefore help collision repair facilities to be more compliant with increasingly stringent VOC regulations. The VOC level is reduced by almost one-half compared to
conventional solvent-borne basecoats. The VOCs:
- in refinishing products are released into the environment when solvents in the product evaporate during the drying process.
- contribute to depletion of the ozone layer, smog production, and cause adverse health effects. Using waterborne refinish materials is an obvious solution to reducing the amount of VOCs being emitted into the environment.
- waterborne basecoats may flash faster than solvent-borne basecoats.
- there is improved metallic control.

**Waterborne At The OEM Level**

Vehicle makers have claimed that the use of waterborne material has reduced the amount of energy used during the refinishing process.

In addition to reducing HAPs, vehicle makers are realizing other benefits from using waterborne refinish materials. Some vehicle makers see a reduction in energy use with waterborne systems compared to solvent-borne systems by adjusting the bake cycle on the assembly line.

Based on performance at the production level, some vehicle makers consider waterborne finishes to have a better appearance than solvent-borne finishes.

Several vehicle makers are using waterborne technology during vehicle production. Vehicle makers that use waterborne basecoats at the production level include, but may not be limited to:

- Audi.
- BMW.
- Chrysler.
- General Motors.
- Honda.
- Mercedes-Benz.
- Toyota.

This 2006 Chevrolet HHR has a waterborne finish applied by the vehicle maker.
Clearcoats

When choosing a clearcoat, stay within the paint line. Some clearcoat chemistry may not be compatible with other paint makers' waterborne basecoats.

Clearcoat is the final step for refinishing. Clearcoat provides the gloss for the finish, and protection from UV and chemical damage. When using waterborne basecoat, considerations for clearcoat applications include that:

- the clearcoat may be specific to the paint-system line.
- the clearcoat will be recommended by the paint maker.
- some clearcoats used for solvent-borne may not be recommended for waterborne refinish materials.

Because of the different chemistries between waterborne basecoats and solvent-borne clearcoats, it is less likely that the basecoat will move with a run in the clearcoat. Always check the material technical data sheet or ask a jobber about product compatibility.

Module Wrap Up

Topics discussed in this module included:

- the definition of waterborne refinish materials.
- differences between solvent-borne and waterborne refinish materials.
- technical characteristics of waterborne refinish materials.
- what waterborne refinish materials are available.
- why waterborne refinish materials are used.
- vehicle makers use of waterborne refinish materials.
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Surface Preparation And Equipment

Learning objectives for this module include:

- identifying proper surface preparation steps.
- identifying consumable products specific to waterborne refinish materials.
- determining how waterborne refinish materials are affected by temperature and humidity.
- listing the requirements for waterborne spray guns.
- listing proper mixing and application techniques.
- determining how air movement affects drying.
- identifying the different types of air movement equipment.

The key to a quality finish is ensuring the panel surface is smooth.

When preparing a surface for refinishing, the surface that will have the basecoat applied must be as close to flawless as possible. With waterborne finishes, surface defects such as sandscratches are typically more visible. These defects will cause the metallic flakes to lie in an orientation that will show the imperfection. These cannot be buried with the basecoat and clearcoat. There are no shortcuts when working with waterborne refinish materials, and creating a nearly flawless surface will ensure the repair area is hidden.

To help eliminate this problem, surfaces that will have basecoat applied must be sanded according to the paint maker’s recommendations. Grit recommendations will depend on the surface material being sanded, such as existing finishes, bare metal, primer, etc. Grit recommendations may also depend on the equipment being used. For example, when applying Cromax Pro, Axalta recommends P500 grit when using a DA sander, P600 grit when hand sanding, and P800 or finer if wet sanding. Blend panel areas will need finer preparation. For example, Sherwin-Williams AWX recommends a random orbital sander using P800 - P1000 grit for blend areas.

Surface cleaners that have a water base are available.

When working with waterborne refinishing materials, surface cleaners
must also be used to clean contaminants from the panel surface. These cleaners:

- are used on freshly prepared surfaces before the basecoat is applied.
- typically have a water base.
- must be totally removed before the application of the basecoat. Failure to do so may cause finish defects. Additionally, the cleaner should not be allowed to dry before being wiped off the panel. If this occurs, more cleaner should be applied and wiped from the panel surface. Be sure to follow the directions as stated on the technical data sheet.

Spraybooths must be able to reach a minimum temperature of 68°F for application of waterborne refinish materials.

In regards to spraybooth requirements needed for spraying waterborne refinish materials, existing spraybooths that can be set to reach temperatures of 68 - 75°F can be retrofitted to meet the needs of refinishing materials. Retrofitting may include installing new air:

- movement systems.
- hoses.
- filters or upgrading existing filters for the sprayable air.

Tack cloths used with waterborne refinish material are made from a specific fabric that does not create any wipe marks on a panel surface.

Similar to working with solvent-borne refinishing materials, tack cloths:

- are used to remove contaminants from the surface being refinished.
- recommended for waterborne refinish materials are designed to help remove surface contaminants without leaving any wipe marks in the area being refinished. Waterborne basecoats are more sensitive to contamination compared to solvent-borne basecoats and the wipe marks can show through the new finish or cause finish defects.
- of a specific type may be recommended by the paint maker. If no tack cloths are specifically recommended, use tack cloths that are compatible with waterborne finishes. This may be indicated by the tack cloth maker.
Spraybooths that are being purchased new may already be equipped with the necessary air movement devices and heaters. Waterborne finishes are also more susceptible to dirt and debris. Therefore, spraybooth cleanliness is vital. Areas where dirt and debris can hide are called dirt traps. These areas may include:

- air hoses. To help control contaminants in a spraybooth, replacing the air hoses may be helpful. When to change the air hoses in a spraybooth is a decision based on use of the spraybooth and the contaminants on the hoses.
- spraybooth walls.
- air movement devices. Whenever equipment is added into the spraybooth environment, it provides another rest area for dust or dirt. Periodic cleaning of the equipment is recommended to reduce finish contamination.

In a typical downdraft spraybooth (without an air movement system), there can be areas where there is very little air movement. Dirt and debris can rest in these areas during normal operation. However, when the retrofitted air movement devices are engaged for the first time, contaminants that have been resting in these areas will be lifted up and can settle on the newly applied refinish. For this reason, it is important to thoroughly clean all areas of the spraybooth during a conversion to waterborne, such as walls, corners, and hoses.

Compressed air for spraying or drying waterborne material:

- must be clean and dry, free of oil droplets and oil vapors.
- may require additional compressed air volume, depending on the design and / or maker of the drying system.
- requires proper in-line filters.

Filter requirements for removing moisture and contaminants from compressed air include a:
• 2-stage minimum to dry the air. A 3-stage filter offers better drying ability. Beyond a 3-stage filtering system, other systems might be available and offer drier air with reduced oil vapors.
• regular change-out schedule. This is critical.
• 6 - 12% acceptable humidity level. In some cases, this is preferred. Some desiccant air dryers can achieve a 0.5% relative humidity or -40°F dew point. The drier the air, the lower the dew point. Paint maker representatives may have access to an airline moisture tester. Spraybooth compressed air should be tested for excessive moisture and contaminant levels.

Like most types of filters, compressed air filters also have life spans and limitations. By locating the filters as close to the spraybooth as possible, cleaner, drier air can be available. Excessive water contamination from compressed airlines can cause improper binding of waterborne basecoats that will result in long term failure. The problem with excessive or contaminated moisture is not always apparent when spraying. Problems with the finish may appear well after the vehicle is released to the customer, potentially creating a high volume of paint-related warranty claims.

Mixing sticks made from plastic or steel are recommended for mixing waterborne basecoats.

Mixing sticks for waterborne materials should:

• not be wooden. Wooden mixing sticks are not recommended because the dry wood can absorb parts of the refinishing material and alter the color. Additionally, waterborne basecoats can potentially draw sap out of a wood mixing stick and create contamination issues.
• be metal or plastic, as they do not absorb any materials.

Paint mixing strainers should be between 125 - 200 microns.
Choosing the proper strainer can be critical to achieving a proper waterborne finish. Strainers that have screens with holes that are larger than the recommended micron size will not filter out the impurities. These impurities will show up in the finish. Holes that are too small will not work well with the thicker viscosity associated with waterborne materials.

When straining waterborne refinishing materials, the recommended strainer type is listed on the paint maker’s technical data sheet. Most strainers for waterborne finishes are recommended to be 125 - 200 microns. Strainers used with waterborne material have more surface area than those used for solvent-borne material.

When using a strainer that is separate from the paint cup, such as a typical paper strainer, make sure the strainer is compatible with waterborne refinish materials. If it is not, the glue may soften and / or the paper may get soggy as the refinishing materials pass across the filter.

Some strainers may be built into a disposable cup lid. This requires specific lids depending on the paint maker’s recommended micron size. Other systems will provide the screen separate from the lid.

Some built-in strainers may be specific to a paint system, spray gun maker, or equipment maker.

One example of a spray gun maker that has a built-in strainer is 3M. SATA provides screens separate from the lid.

Masking material should be resistant to moisture.

The recommended masking for use with waterborne materials is similar to that used for applying solvent-borne materials. The main concern is to use masking material that will not become waterlogged. This can cause the refinish material to bleed through the masking and contaminate the existing finish.

To avoid this, use coated or treated masking materials.
Spray-on masking can be used, however, generally it should not be used adjacent to the panel being refinished.

Using a quality masking tape ensures the tape is durable against the high moisture content of the waterborne refinish material.

Masking tape could possibly be overlooked as a critical part of a waterborne refinishig process. A name-brand, quality masking tape should not be adversely affected by waterborne refinish materials. Using economy masking tape can lead to problems with adhesion. Low-tack tape is available for use over freshly refinished surfaces.

Shaking the basecoat material by hand may be recommended by the paint maker. Refer to the technical data sheets for recommended mixing techniques.

Some waterborne refinish material mixing techniques to consider may include:

- determining if the product can be shaken or stirred. This recommendation is particular to certain paint makers. Some paint makers do NOT recommend shaking on a paint shaking machine as the material may foam. The technical data sheet for Nexa Aquabase Plus waterborne basecoat states to NOT shake the product after the toners have been mixed. Stir only.
- mixing and storing in corrosion-resistant containers.
- making sure additives are mixed in the proper order. Depending on the product maker, failure to do so may cause the refinish material to clump, causing problems with sprayability.

Some paint makers recommend the basecoat be shaken and/or stirred immediately after the additives and tints are poured into the cup. Letting the material sit may cause the different parts to separate permanently. For material savings, make sure to mix only enough refinish materials for the panels being sprayed. Some paint makers provide a mixing chart that shows how much material to make based on the panels being refinished.
DuPont and PPG waterborne basecoats are examples of pre-mixed basecoat materials.

Waterborne basecoats may be provided as pre-mixed or not pre-mixed. Basecoats that do not have the reducer / mixing base added are not pre-mixed. They are essentially pigment and solvent. An advantage to this is that the product can be shipped and stored without potentially freezing. Reducer / mixing base must be added during the mixing process.

Waterborne basecoats that are shipped pre-mixed have the reducer / mixing base added. This saves time during the mixing process, but also makes the product susceptible to freezing during shipping and storage.

For example, PPG waterborne basecoat is provided pre-mixed, while the BASF 90-Line is not pre-mixed.

Both types of products (pre-mixed and not pre-mixed) require additional reduction before the material is sprayed. The amount used is dependent on the ambient temperature and humidity.

Temperature considerations include:

- spraying materials in an optimum temperature range of 68 - 75°F. However, in warmer climates where temperature cannot be controlled, the basecoat may need additional or a different reducer to compensate for the effect of higher temperatures.
- a shorter flash time with higher temperatures. Some paint makers state that the basecoat may skin over with higher temperatures, or if forced air is applied too quickly after basecoat application. To prevent this from happening, make sure to add the proper type and amount of reducer, and follow the product maker’s recommendations for applying forced air. Sherwin-Williams states to wait 1 - 2 minutes before application of forced air after application of their basecoat. This allows the particles to come in close contact before the solvent begins to evaporate. Failure to do this may result in small voids, which will show up when the clearcoat is applied.
• a longer flash time with lower temperatures. Realize that the chances of finish contamination increase with a longer basecoat dry time.

For Aquabase Plus Basecoat (metallic), in temperatures above 95°F, an additional 10 - 15% reducer may be added to help with application, metallic orientation, and overspray absorption.

In general, cold creates more application problems than too much heat.

Many paint suppliers / jobbers can supply a chart with reducing recommendations that also include reducing using a viscosity measuring cup. A viscosity measuring cup is used to measure the viscosity of refinish materials. This is done by the refinish technician clocking the amount of time it takes for refinish material to flow through the hole in the bottom of the viscosity measuring cup. For example, Standox has a recommendation that in lower humidity conditions, the refinish material viscosity should take 20 - 23 seconds. In high humidity conditions, the refinish material viscosity should take 24 - 26 seconds.

Makers of viscosity measuring cups include:

• Ford.
• FRIKMAR.
• Gardco / Fisher.
• SATA.
• Shell.
• Zahn.

Some of the charts also denote proper needle and cap size and the suggested reduction rate.
Hygrometers such as this are available to measure spraybooth humidity.

Humidity is a variable when spraying waterborne refinish materials. When considering humidity:

- the optimum spraying humidity is 30 - 60%.
- too much or too little humidity affects the drying time. Since humidity in the spraybooth typically cannot be adjusted, paint makers may provide charts on the amount of reducer to add to compensate for variations in humidity and / or temperature. Lower humidity may require additional reducer. Following these recommendations will ensure the refinishing material dries.
- remember that compressed air that has too much humidity can cause increased drying time. Occasionally test the compressor air to determine if the filters and dryers are operating properly. Humidity is tested using a hygrometer.

Also, higher viscosity (thicker) basecoat may be recommended in humid situations.

According to Standox, relative humidity between 30 - 60% is ideal and will require the addition of 10% reducer. Lower relative humidity will require 15% reducer, while a higher relative humidity requires 5% reducer.

Refer to Module 2, “Demonstration: Sherwin-Williams AWX Solvent Selection Chart” in the presentation for an example of the Sherwin-Williams AWX solvent selection chart.

Refer to “Video: Repair Facility Equipment” in the presentation. This video shows examples of equipment and
consumables required when working with waterborne refinish materials.

Spray Guns

This spray gun has corrosion-resistant parts so it can be used for waterborne application.

There are special considerations when selecting a spray gun for waterborne refinish materials. Waterborne spray guns:

- must have corrosion-resistant parts. Some solvent-borne spray guns may be retrofitted with corrosion-resistant parts, such as the cap and needle, rather than purchasing a new spray gun.
- may be used to spray solvent-borne materials and vice versa. When switching between solvent-borne and waterborne refinish materials, the spray guns should be flushed with the same type of material that will be sprayed, and dried thoroughly. For example, water is used with waterborne, solvent is used with solvent-borne. Interchanging the materials will cause sludge to form inside the spray gun. Having dedicated spray guns for waterborne refinish materials may be the best way to avoid cross-contamination with solvent-borne refinish materials. Do not use compressed air during the solvent-borne flushing process to minimize VOC emissions.
- must have fluid tips that are the proper diameter. Spray guns should be cleaned immediately after use. If waterborne refinish materials dry inside the spray gun, acetone is required to loosen the dried material. Proper cleaning of the spray gun can ensure longevity.

Spray guns for waterborne refinish materials:

- have a needle and nozzle typically made of stainless steel.
- have paint cups that are plastic or stainless steel. Most plastic paint cups are disposable, reducing the amount of cleanup required.
- are typically not aluminum. Aluminum may corrode over time from repeated exposure to waterborne refinish materials. It
is important to follow the spray gun maker's procedures to avoid premature corrosion.

Refer to “Video: Spray Guns” in the presentation. This video shows a typical waterborne spray gun that is available for spraying waterborne materials.

The air caps on spray guns may be nickel plated to prevent corrosion.

Spray gun:

- fluid tips are 1.2 mm - 1.5 mm. According to SATA recommendations, when the temperature is higher than 90°F, with less than 10% humidity, fluid tip size should be increased to one size larger than normal recommendations.
- air caps are typically coated with a nickel plating on the outside, and brass on the inside. This special coating helps when cleaning waterborne refinishing materials from the spray gun in addition to providing corrosion resistance.
- parts are specially coated to help with ease of cleaning.

<table>
<thead>
<tr>
<th>Company</th>
<th>HVLP</th>
<th>RP</th>
<th>Hot &amp; Dry Weather</th>
</tr>
</thead>
<tbody>
<tr>
<td>DuPont</td>
<td>3000 HVLP WSB</td>
<td>3000 RP 1.2</td>
<td>HVLP 1.3 RP 1.3 Lower Pressure</td>
</tr>
<tr>
<td>Spies Hecker</td>
<td>3000 HVLP WSB</td>
<td>3000 RP 1.2</td>
<td>HVLP 1.3 RP 1.3 Lower Pressure</td>
</tr>
<tr>
<td>Standox</td>
<td>3000 HVLP WSB</td>
<td>3000 RP 1.2</td>
<td>HVLP 1.3 RP 1.3 Lower Pressure</td>
</tr>
<tr>
<td>PPG</td>
<td>3000 HVLP WSB</td>
<td>3000 RP 1.2</td>
<td>HVLP 1.3 RP 1.3 Lower Pressure</td>
</tr>
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<td>Sherwin-Williams</td>
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<td>3000 RP 1.2</td>
<td>HVLP 1.3 RP 1.3 Lower Pressure</td>
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</tbody>
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Refer to Module 2, “Demonstration: SATA Fluid Tip Recommendations” in the presentation for an example of different fluid tip recommendations.

Refer to “Video: Spray Gun Fluid Tips” in the presentation. This video shows how fluid tips on waterborne spray guns differ slightly compared to spray guns used for solvent-borne material.
Use the recommended waterborne cleaning solvent to clean the spray gun.

When cleaning the spray gun:

1. Clean the spray gun immediately after use. If a spray gun is left to sit with refinishing material still inside, the waterborne material may etch the inner surfaces, making future cleaning difficult. It may be recommended to prevent cleaning solution from entering the air passage. This prevents any etching of the air passage walls.

2. Clean the spray gun with the paint maker’s recommended solution. If the proper solution is not used, note that some cleaning solvents may cause foaming in some spray gun washers.

3. Use compressed air to dry the inside and outside of the spray gun.

If switching from solvent-borne to waterborne material, or vice versa, make sure the spray gun is properly flushed and dried thoroughly before use. Failure to do so can alter the new refinish material and create sludge in the spray gun.

Spray gun washers may be equipped with stainless steel parts so they are compatible with waterborne material.

Spray gun washers may be specially designed for waterborne material. These include automatic or manual spray gun washers.

Some spray gun washers may have special cleaning features. For example, BECCA automatic spray gun washers come with Power Clean and Power Clean Plus features, which use pulsating air in the air passage and fluid in the fluid passage to completely clean the spray gun. This effectively cleans the needle and fluid nozzle of the spray gun with cleaning solution while putting compressed air into the air passages.

Currently, some spray gun washers can be used to clean either solvent-borne material or waterborne material, depending on which material the system is set up to clean. It is important that spray gun washers used to clean waterborne refinish materials have corrosion-resistant parts.
Some spray gun washer makers, such as BECCA, and paint makers, such as AkzoNobel, Axalta, and PPG, recommend using separate cleaning machines, one for waterborne refinish materials, and one for solvent-borne refinish materials.

Refer to “Video: Spray Gun Cleaning” in the presentation. This video shows the importance of cleaning the spray gun with the proper cleaning methods and materials.

Flocculating powder, also called coagulating powder, is used with spray gun washer systems to remove solids from the filtrate.

Flocculating powder can be used to help separate solid waste from the spray gun cleaning solution (filtrate). Flocculating powder causes paint waste to clump together (coagulate) and can be strained from the cleaning solution. Removing the paint waste from the spray gun cleaning solution extends the life, potentially reducing hazardous waste disposal costs. Cleaning solution can be reused until it becomes tacky to the touch. Flocculating powder is effective for the treatment of waterborne waste only and should not be used with solvent-borne waste.

Steps for adding flocculating powder:

1. When the reservoir is full, add the appropriate amount of flocculating powder as per the manufacturer’s recommendations.
2. Mix thoroughly with a rotary mixer for 5 - 10 minutes.
3. Let the coagulated solid waste material separate from the cleaning solution for 5 - 10 minutes.
4. Filter the solid waste from the cleaning solution and follow local waste handling laws for disposal.

Clarification chemicals can be used to separate solid waste from the cleaning solution in systems where continuous filtration is used. A clarifying chemical is added to cause the remaining pigment in the material to become heavy and settle to the bottom of the collection container. This “clarifies” the cleaning solution for continual use.

Steps for clarifying the cleaning solution in an automatic spray gun washer with filters:
1. Follow the equipment maker’s instructions. When the clarification chemical is added to the spray gun washer, it slowly dissolves into the cleaning solution, allowing the clarifying chemical to react with the remaining solid pigment. This makes the pigment heavy and settle to the bottom, providing a clear cleaning solution for continual spray gun cleaning.

2. The spray gun washer may be used during this process. It typically takes about an hour for the clarifying process to occur.

3. Cleaning of the collection container will be necessary after buildup of the solid material. Follow local waste handling laws for disposal.

At least one spray gun washer is marketed as a dual-purpose machine. According to the equipment maker, with this type of system both solvent-borne and waterborne refinish equipment may be cleaned in the same fluid. There is no lacquer thinner required to clean up the solvent-borne materials.

The solution used for cleaning is never discarded, but requires about 2 quarts to be added weekly. According to the equipment maker, this results in a cleaning solution that:

- is nonflammable.
- has zero HAPs.
- has low VOCs.

This system is air operated and requires no electric hookup or venting. The cleaning solution is filtered while it is being used.

Every 1 - 2 months, the cleaning solution is drained into buckets so the basin can be cleaned and the pre-filter changed.

Some areas of the U.S., such as southern California, may prohibit the use of this type of gun washer as it does not meet specific VOC requirements. Research local and state regulations when purchasing a gun washer to ensure VOC compliance.

The name of this system is Bonny Marlin. For more information on this system, access www.bonnymarlin.com.
Primer-surfacer and primer-sealer are available as a waterborne product.

Some waterborne primers include:

- primer-surfacer.
- primer-sealers.

When working with primer-surfacers, surface preparation is key. Make sure the panel surface is properly cleaned and sanded, generally using P180 - P320 grit, depending on the product maker’s recommendations and surface type (body filler, refinished panel, or bare steel). Paint makers may recommend a surface prep, such as etch primer, before applying a primer-surfacer.

For application of primer-surfacers or primer-sealers, inlet air pressure of 35 - 45 psi on conventional spray guns is fairly common, and around 30 psi for high-volume low-pressure (HVLP) (around 10 psi at the air cap). Refer to the product maker’s technical data sheet for specific recommendations.

Generally 1 - 3 coats of primer-surfacer is acceptable, with a flash time between each coat. Recommended film thickness varies. Some product makers recommend 1.6 - 1.8 mils while another recommends 2.0 - 2.5 mils.

For primer-sealer, such as Sherwin-Williams Aqua Seal, one medium wet coat is acceptable with a film build of 0.5 - 1.5 mils. If a second coat is desired, make sure the first coat has dried before application. There are similar recommendations for Nexa’s Autocolor HS Plus.

Drying time for primer-surfacers or primer-sealers depends on the drying method – either air dry, forced dry (heat), or infrared.

Waterborne primers may be able to be applied to bare steel, or used as a barrier coat. When applying to bare steel, the surface is cleaned with a wax and grease remover. Sherwin-Williams states that their Aqua-Fill 1K waterborne primer-surfacer is recommended over repair areas where there is the chance of the undercoat primer lifting, edge mapping, or similar defects.
If an etching primer is used, do not apply waterborne basecoat on top of the etching primer. A primer-sealer should be applied over the top of the etch primer.

Depending on the paint system being used, waterborne primers may be tintable.

If a waterborne basecoat is being applied, a waterborne primer is not required, as long as the materials being applied are compatible within the specific system.

**Application Consideration**

Spray techniques only need to be slightly modified for spraying waterborne refinish material.

Just like spraying solvent-borne materials, there are a number of application considerations for waterborne refinish materials. Application considerations for spraying waterborne refinish materials are similar to solvent-borne materials, including:

- using sprayout panels to help determine color match.
- surface preparation. Make sure the area to be refinished is properly sanded, cleaned, and primed.
- overlap percentage.
- the use of a control coat when spraying metallics or pearls.

Using proper spraying technique will help achieve proper film build and a nearly invisible blend area if blending.

Other spray application considerations include:

- understanding how the color of the basecoat will change as it dries.
- having the correct air movement to ensure the proper drying process.
- using a blending technique that the refinish technician is comfortable with. The blending techniques are similar to solvent-borne blending.
- using a clearcoat that is recommended for the refinishing system being used.
Basecoat material should be applied 6 - 8" from the panel surface using a 75 - 80% overlap.

Spray gun distance when spraying waterborne refinish materials is about the same as for spraying solvent-borne refinish materials, 6 - 8". This may be true for most products, but not for all. Requirements may differ by paint maker.

Just like with solvent-borne refinishing materials, most paint makers recommend using a 75% - 80% overlap when spraying waterborne basecoat.

A control coat is used when spraying metallics to ensure that the metallic flakes are properly oriented. A control coat is not required when applying solid color basecoats. Make sure the basecoat has flashed off before applying the control coat. When applying a control coat:

- apply the material at 85% - 90% overlap, and reduce inlet air pressure for the spray gun by about 40%. Requirements may differ by paint maker.
- the spray gun-to-work piece distance is about 10" - 12".
- apply the material for complete coverage.
- the finish will have a mottled appearance until the material dries.
- the material should look flat and uniform when dry.
- some paint makers, such as Sherwin-Williams and PPG, recommend to NOT use increased airflow for drying. Allow the control coat to dry naturally.

Waterborne basecoat sands easily. If sanding is necessary, waterborne basecoat sands easily. If the basecoat is still wet, problems may be washed off with water. However, do not let the
washed off refinish material drain into the sewer. The best method is to wipe the refinish material off the panel surface to avoid waterborne material from dripping on the floor.

According to PPG, after their waterborne basecoat has fully flashed, dry sanding with P1000 - P2000 grit sandpaper works well for removing imperfections. Do not use wet sanding with PPG waterborne basecoat. This can wash off the fresh waterborne basecoat.

According to Sikkens, remove dust particles from their waterborne basecoat by carefully dry sanding with P500 - P600 grit sandpaper. Dry sanding is preferred. Wet sanding (although not recommended) can be done using a minimum amount of water, with P1000 - P1200 grit sandpaper. Allow sufficient water evaporation time before basecoat application.

Do not compare wet basecoat with dry. Wet basecoat appears darker than dry basecoat. Some waterborne basecoats may have a different hue when applied, but that hue disappears when the material dries. For one example, PPG Envirobase has pigments suspended in a blue gel-like substance that gives the basecoat a light-blue tint when applied. After the material dries, this blue-like tint disappears.

According to Sikkens, remove dust particles from their waterborne basecoat by carefully dry sanding with P500 - P600 grit sandpaper. Dry sanding is preferred. Wet sanding (although not recommended) can be done using a minimum amount of water, with P1000 - P1200 grit sandpaper. Allow sufficient water evaporation time before basecoat application.

When using waterborne refinishing materials, special sprayout cards are required that are resistant to water. If these are not properly coated to prevent water absorption, the cards tend to curl as they dry.

Do not use a covered, wet mixing stick to verify color match. Many basecoats dry to a different color, using a wet mixing stick is a bad choice to determine color match.

Some paint makers provide pre-made sprayout cards / color variant decks to help determine color match. These cards have the color match code on the card, which is used with the paint maker system to determine the paint formula.

Sprayout panels are used to:

- compare basecoat color with the existing color on the vehicle.
Refer to “Video: Drying Waterborne Basecoat” in the presentation. This video discusses on how waterborne basecoat changes appearance as it dries.

Blending basecoats requires the material to dry before applying clearcoat.

When blending waterborne basecoats:

- allow the basecoat to dry before applying clearcoat.
- use techniques similar to those used for solvent-borne.
- apply the recommended clearcoat for the paint system being used.

A reverse-blending technique may be considered. Reverse blending is done by applying the color over the repair area and blending it out to the farthest areas on the first or initial coat. The following coats are applied in smaller sizes inside the preceding coats, until the repair area is covered. Determining whether or not to use a reverse blend is specific to the refinish technician’s preference. Some may feel that a reverse blend works best, while others may have success with a traditional blending technique.

Some blends may require a blending bed. A blending bed is typically a transparent basecoat with no pigment. It is applied to the surrounding areas and adjacent panels where blending will be done. The blending bed is typically applied to the complete panel. It is commonly used when blending metallic and pearl basecoats, but can be done when blending any basecoat color.

Refer to “Video: Waterborne Finish Mixing And Application” in the presentation. This video shows the steps and techniques for mixing and applying waterborne refinish materials.
Drying

Drying is the evaporation of carrier materials such as solvents or water, without chemical cross-linking occurring. Waterborne drying occurs as the carrier materials evaporate. When this occurs, the molecules bind together to form a solid film.

Curing, which occurs in solvent-based refinish materials, is the chemical cross-linking of specific particles and the evaporation of carrier materials such as solvents.

For the drying of waterborne basecoats to occur:

- large volumes of air movement are required. This is important for improved cycle times since lower airflow increases the evaporation time.
- proper turbulent air movement can reduce dry time considerably. For example, airflow at 250 feet-per-minute (fpm) can dry waterborne basecoats in about 4 minutes. Sherwin-Williams states that when their AWX product dries without the forced air, it may take up to 10 minutes to dry dust free. With venturi blowers, it may take up to 2 - 3 minutes to dry dust free.
- baking of the basecoat is not as critical as air movement.
- it is not recommended to aim the air blowers / multipliers directly at the refinished area (90° to the panel). For best results, angle the blower to the panel.

Air movement systems should not be engaged to force cure solvent-based clearcoats. This may result in the clearcoat skinning over and cause solvent popping. Follow the curing recommendations that are stated in the technical data sheets.

To achieve proper drying of waterborne basecoats, there are various types of dryers available for moving air. Items to consider when purchasing airflow equipment include the:

Venturi blowers, handheld or mounted on a stand, use compressed air and the venturi effect to create the necessary air movement in the spraybooth.
• cost of the equipment.
• energy costs for operating the equipment.
• acceleration of dry times.
• ease of use.
• needs of the paint shop. Choice of the airflow equipment will depend on the type and size of the repair. For example, if a facility sprays a large number of completes, a more elaborate system may be required. But if most of the work is spot repair, a more modest airflow system may be adequate.

Infrared heating equipment may be used for drying waterborne refinish materials. Make sure the paint maker recommendations are followed.

When using heat for drying waterborne refinishing materials:

• follow the recommendations by the paint and / or equipment maker when using infrared (IR) heating equipment.
• heat must incorporate air movement.
• do not use heat lamps. Heat lamps can cause the waterborne basecoat to skin over and trap water in the underlying layer, causing a possible blistering problem.

These arrows show how laminar and turbulent air movement differ.

There are two types of air movement, such as:

• laminar. Laminar air movement is the movement in a uniform pattern or straight path. Laminar air movement is the type found in the traditional spraybooth environment.
• turbulent. Turbulent airflow is the erratic and non-uniform movement of air.
Refer to “Video: Type Of Air Movement” in the presentation. This video shows how turbulent air breaks up the boundary layer that seals in moisture and inhibits the drying process.

Laminar airflow (top) is used during the refinish material application, and turbulent air (bottom) is used during the flash off and drying cycle.

With waterborne refinishing materials, there are guidelines for air movement during:

- application, when 120 - 400 fpm of laminar air is recommended.
- the flash off and drying cycle, when 200 - 600 fpm of turbulent air movement is recommended.

Not enough airflow can result in extended work times and reduced productivity. Another negative effect of extended drying times is the increased possibility of contaminants in the wet basecoat.

Too much airflow may displace the wet refinishing material. Airflow must be properly directed so the turbulent air does not push the wet refinishing materials out of position. The air movement equipment must also be a specific distance from the panel surface.

**Air Movement Equipment**

Wall-mount air multipliers (left) and handheld air multipliers (right) provide the turbulent air necessary for quick drying of waterborne refinish materials.
Types of air movement equipment that may be used for drying waterborne finishes include:

- handheld air multipliers / venturi blowers.
- high speed and adjustable ceiling fans.
- wall-mount air multipliers or towers, which also have venturi blowers.

Spray guns should not be used as an air movement system. This can cause the basecoat material inside the spray gun to dry, creating a spray gun maintenance issue.

Handheld air multipliers:

- make use of compressed air, therefore, may require a compressor upgrade to handle increased cfm depending on how many multipliers are used. If the compressor is able to handle the increased cfm, the compressor may run longer to keep up with the increased demand, which can cause increased wear on the compressor. One equipment maker’s ratings are that each air multiplier operates at a range of 8 - 9 cfm at 30 - 35 psi. This varies slightly according to each equipment maker.
- employ the venturi effect to multiply volume / velocity, which can be up to 12 times the airflow from the compressed air system. The venturi effect can be described as an increase in the volume / velocity of air passing through a constriction due to higher pressure on the intake side of the constriction and lower pressure on the output side of the constriction.
• are moved manually over the panel surface. For best results, angle the air multiplier to the panel, do not position directly at the panel. Keep the air multiplier approximately 20" - 40" from the panel surface.
• may be available with adjustable stands.
• have a debris filter in back of the multiplier.
• are generally the less expensive option compared to ceiling fans and the wall-mounted towers.

Refer to “Video: Venturi Effect” in the presentation. This animation shows how the venturi effect multiplies air volume / velocity.

Ceiling fans are mounted in the center of the spraybooth, with the motor located outside to comply with fire codes.

Spraybooth ceiling fans:
• have bladed fans with safety cages. The cages provide personal protection when working with higher profile vehicles such as trucks and vans.
• move around ambient air.
• are mounted through the ceiling in the center of the spraybooth.
• have fan motors mounted outside of the spraybooth.

Refer to “Video: Handheld Air Multipliers And Compressed Air Requirements” in the presentation. This video discusses proper techniques for using a handheld air multiplier and the considerations for compressed air requirements.
• must be routed around the fire-suppression system in the spraybooth. Interference with the fire-suppression system can temper the effectiveness of the system.
• require even spacing in the spraybooth. To be evenly spaced during installation, the spraybooth air plenum in the ceiling may need to be modified.

Considerations for spraybooth ceiling fans include that:

• the fan blades and cages should be cleaned periodically. How frequently depends upon the use of the spraybooth.
• they should not be run while spraying waterborne refinish materials. This can affect the spray pattern from the spray gun.

Refer to “Video: Ceiling Fan Installation” in the presentation. This video will show one process for retrofitting a spraybooth with an air movement system.

Wall-mount air multipliers are positioned in the corner of the spraybooth and have adjustable venturi nozzles that should be positioned to optimize air turbulence on the vehicle panels.

Wall-mount air multiplier retrofits:

• are installed in a spraybooth, midway between the floor and ceiling.
• generally draw from ambient air. A squirrel cage-type fan creates air movement and venturi nozzles are used to multiply the air volume / velocity.
• have adjustable nozzles. The nozzles must be properly directed
to optimize drying efficiency. In some instances, nozzles on opposite sides of the spraybooth can cancel out the air movement, creating still air over the vehicle.

- are typically placed in the spraybooth corners.
- should be cleaned periodically. How frequently depends upon the use of the spraybooth.

Depending on the requested options, new spraybooths may be equipped with the air multiplier systems built into the spraybooth.

Wall-mounted air multipliers installation considerations include the:

- wiring requirements.
- fire code considerations.

With waterborne systems, infrared (IR) lamps are:

- combined with air movement systems, but not inside a spraybooth, as this equipment is typically not explosion proof.
- generally for spot repairs.
- should not be positioned too close to the panel. Follow the equipment maker recommendations. Trisk recommends 22 1/2" - 24 1/2" from the panel.

Follow the paint maker recommendations for IR lamp usage.

When using an IR lamp, consider that:

- PPG states that if using IR to cure clearcoat, the basecoat should also be dried with IR. This allows any residual moisture to be removed from the basecoat film.
- different paint makers have different use recommendations. For example, Sherwin-Williams states that a waterborne basecoat can be dried with an IR lamp at 120° - 140°F for 5 - 10 minutes. For waterborne primer-surfacer, BASF states to apply IR short wave
for 3 - 5 minutes, and apply IR medium wave for 10 - 15 minutes.

Module Wrap Up

Topics discussed in this module included:

- proper surface preparation steps.
- consumable products specific to waterborne refinish materials.
- requirements for waterborne spray guns.
- how waterborne refinish materials are affected by temperature and humidity.
- proper mixing and application techniques.
- the different types of air movement equipment.
- how air movement affects drying.
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Module 3 - Storage, Waste Disposal, And Waterborne Conversions
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Waterborne Storage Recommendations

Learning objectives for this module include:

• identifying proper storage techniques for waterborne refinish materials.
• identifying problems that may occur from waterborne refinish materials stored at improper temperatures.
• listing proper disposal procedures of waterborne waste.
• identifying types of assistance offered by paint companies to make the conversion to waterborne.
• listing steps required for a conversion to waterborne.

• excessive heat, or temperatures between 102° - 122°F should be avoided.

Proper storage of waterborne refinish materials can prevent the destruction of these materials if exposed to extreme temperatures. For example, waterborne refinish materials exposed to temperatures over 140°F may be unusable.

Because of the water factor, waterborne refinish materials are packaged and stored in corrosion-resistant containers.

When storing waterborne refinish material, avoid excessive heat and cold.

When choosing a storage location for waterborne refinish materials, note that:

• the optimum storage temperature is 68°F.

Because of the high water content, most pre-mixed waterborne refinish materials are susceptible to freezing at temperatures below 32°F. When a waterborne material has frozen, a change in the product chemistry occurs that typically makes the product unusable. However, some products can freeze several times before the product should not be used. For example, Sherwin-Williams states that their product can freeze and thaw up to seven times before the product is unusable.

The temperature indicator on the right shows what happens when it has been exposed to temperatures below freezing for a short period of time.
When products are shipped, they may be equipped with a freeze indicator on the bulk packaging that changes color if the materials were exposed to below freezing temperatures for an extended period of time. 3M makes a freeze indicator that has a small vial of red material that, when exposed to 25°F for a short period of time, the vial breaks open and stains the backing paper red.

Some products, such as BASF, are shipped with no water added, and therefore are not prone to freezing. The water is added by the refinishing technician during the mixing operations. These materials may be called “no-freeze” or “frost-resistant” products.

Basecoat that has a shift in color or has started to gel is a good indication that the material has been exposed to extreme temperatures.

As with solvent-borne material, a mixing bank stores the waterborne toners. Depending on the product used, the mixing bank may or may not have stir paddles to agitate the toners. Toners with paddles are not pre-mixed with water. With one particular mixing bank system that has paddles, the paint maker recommends engaging the stir paddles once every 4 hours for 15 - 30 minutes.

If the product is pre-mixed with water, there are no paddles, and the mixing bank resembles a bookshelf. For pre-mixed toners, a simple shake of the canister is all that is required to prepare the material for use, rather than stirring the product.

As a general rule, the shelf life for waterborne material is not quite as long as solvent-borne material, but there are exceptions. Waterborne shelf life:

- varies depending on each product maker.
- can be as short as one year, to a virtually unlimited shelf life.
- is considerably shorter after the material has been reduced.

Some products may have an activator / hardener that can be added. When this
material is added to the waterborne refinish material, the shelf life is reduced to minutes or hours depending on the paint maker. Processing of these wastes is very different. Mixing the two together may create a waste that is not accepted by waste disposal companies. For example, aluminum flakes and solvent-borne refinish materials mixed with waterborne refinish materials may form hydrogen gas and create an explosion risk.

<table>
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<tr>
<th>Product</th>
<th>Before Reduction</th>
<th>After Reduction</th>
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<tr>
<td>DuPont Cromax Pro</td>
<td>2 Years</td>
<td>Use When Reduced</td>
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<td>Standex Standhyd</td>
<td>2 Years</td>
<td>3 – 6 Months</td>
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<td>Sherwin-Williams AWX</td>
<td>36 Months - Chromatics 24 Months - Aluminums 36 Months - Micas / Pearls</td>
<td>4 Days</td>
</tr>
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<td>Glasurit 96 Line</td>
<td>Never For Toner 6 Months On Mixed Color</td>
<td>6 Months</td>
</tr>
<tr>
<td>PPG Envirobase</td>
<td>4 Years</td>
<td>90 Days</td>
</tr>
</tbody>
</table>

Refer to Module 3, “Demonstration: Shelf Life Chart” in the presentation for an example of a shelf life chart.

**Waterborne Waste Disposal Considerations**

Waterborne and solvent-borne waste must be kept separate.

Waterborne refinish material waste should be treated like a hazardous material. Waterborne refinish materials still contain solvents and other hazardous materials. When disposing of waterborne refinish material:

- it should be discarded in a designated corrosion-resistant waterborne waste container.
- do not intermix waterborne and solvent-borne waste. The processing of these wastes is very different. Mixing the two together may create a waste that is not accepted by waste disposal companies. For example, aluminum flakes and solvent-borne refinish materials mixed with waterborne refinish materials may form hydrogen gas and create an explosion risk.

Determining disposal methods of gun washer filtrate is dependent on the toxicity of the filtrate in addition to local and state regulations.

The spray gun washer filtrate will vary in toxicity depending on if a flocculating agent is used. If a flocculating agent was used in the spray gun washing system, the majority of hazardous refinish material should have been removed by filtering the filtrate. In some instances, this waste can be disposed of as non-hazardous wastewater, however, state and local regulations may vary. Regulations may require the wastewater be tested to determine the toxicity.

If a flocculating agent was not used, the material is more hazardous and should be treated as controlled waste.
The disposal costs between solvent-borne and waterborne may differ, with waterborne disposal cost generally higher.

Using the flocculating agent is an easy way to decrease spray gun cleaner costs and hazardous waste disposal costs. Coagulating the paint waste cleans the filtrate in the spray gun washer, allowing for the filtrate to be used for a longer period of time before the spray gun washer is drained and refilled.

Paint sludge collected from the flocculating process must be treated as controlled waste.

Paint sludge is:

- the material collected after the spray gun washer filtrate has been treated with the flocculating powder.
- classified as “controlled waste.”
- disposed of in accordance with local, state, and regional regulations.

Converting to Waterborne

Mixing banks and air movement systems may be some of the larger investments required to make the conversion.

Converting a repair facility to a waterborne facility is not a complicated process. While some facilities may require a large capital investment, most are able to do it with little to moderate expense and disruption. The amount spent varies, and is determined by a facility’s existing equipment. Also, there are different tools than traditionally used, such as strainers, mixing sticks, tack cloths, and sprayout cards.

Spray guns need to be equipped with corrosion-resistant parts.
Filters are needed to remove moisture, oil, and oil vapors from the spray gun airline.

Tack cloths used with waterborne refinish material are made from a specific fabric that does not create any wipe marks on a panel surface.

Waterborne cleaning solvent.

Masking supplies are needed that hold up to water.

Turbulent air may be supplied with venturi blowers or wall-mounted air multipliers.

Turbulent air may be supplied in the form of ceiling fans.
A heated spraybooth is needed to keep the temperature consistent for waterborne applications.

The following equipment is recommended for a waterborne conversion:

- Spray guns equipped with corrosion-resistant parts
- Filters to remove moisture, oil, and oil vapors from the spray gun airline
- Tack cloths that do not leave wipe marks
- Non-cellulose-based wipes
- Spray gun washer, which may need to be dedicated to waterborne
- Cleaning solvent
- Masking supplies that hold up to water
- Turbulent air, in the form of ceiling fans, venturi blowers, or wall-mounted air multipliers
- Heated spraybooth

Spraying waterborne material is not much different than solvent-borne, but there are a few refinishing techniques that are slightly different. All paint companies offer product-specific training to help with this transition, and the training is generally part of the I-CAR Industry Training Alliance, meaning I-CAR credit hours can be obtained upon successful completion of the training and submission of the Industry Training Alliance application form.

In addition to the training, paint companies offer technical support hotlines and on-site support.
Refer to “Video: Making The Conversion” in the presentation. This video discusses helpful tips that can be used if considering switching a repair facility from solventborne materials to waterborne materials.

Almost all paint makers offer waterborne refinish materials as part of their paint line.

Makers of waterborne refinish materials include, but are not limited to:

- AkzoNobel.
- BASF.
- Axalta.
- PPG.
- Sherwin-Williams.
- Standox.

Click on a company name for more information.

**Module Wrap Up**

Topics discussed in this module included:

- proper storage techniques for waterborne refinish materials.
- problems that may occur from waterborne refinish materials stored at improper temperatures.
- proper disposal procedures of waterborne hazardous waste.
- types of assistance offered by paint companies to make the conversion.
- steps required for converting to waterborne.
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