

# **TURBO LINER Inc.**

## **POLYUREA ELASTOMERIC COATINGS**

### **Training Manual Graco 2012**



**TURBO LINER Inc.**

**(877) 67TURBO**

**(8-8726)**

**[www.turboliner.com](http://www.turboliner.com)**





Dear Customers and Students:

Welcome to Turbo Liner, advanced spray-in bedliner training program. We have created this curriculum to give you the advantage of a comprehensive working knowledge in this industry.

Each day will bring into focus new techniques for the competent application of plural component materials. We hope that you will take the time to complete the questionnaires provided. This will help us to help you and those students attending future training programs. In addition, if you require something not provided or not covered in this course, feel free to ask your instructor for additional information.

The basis of Turbo Liner's business policy is service, service, and service. We want you to be completely satisfied with all of our products and equipment. We also want to provide you with the best technical support in the industry. If you require any assistance after this course is completed feel free to contact our technical staff at any time.

Good luck and best wishes for a prosperous future.

Vince Self,  
Marketing Manager  
Turbo Liner

# Turbo Liner Training Agenda

## 1. Orientation

## 2. Safety

- MDI's & 7 Important points when working with MDI's
- PPE & Model Respiratory Protection Program

## 3. Chemicals

- The basics of Polyurea
- Polyurea Spray Coatings Systems
- Support Chemicals
- How to use Cil Bond 41 and NMP for repairs
- Remember This

## 4. Technical Training

- Spray guns (setup and usage)
- Watch DVD on Probler and Probler P2 guns
- Machines (Pneumatic, Hydraulic setup, usage & Troubleshooting)
- Transfer pumps (setup and usage)
- Start-up and shut-down
- Troubleshooting the spray system.

## 5. Liner shop

- Watch How to Spray A Bedliner DVD
- Using string line tape

## 6. Review

- Question & Answer (lets talk about what we just went over)

## 7. Technical support

- Other technical documents (related to pumps, hoses, guns & machines)
- All of our tech support staff Vinny, Johnny or Mark can be reached at 877-678-8726 ext. 1 or by cell phones.
- Vinny 208-755-1714
- Johnny 208-755-2934
- Mark 208-755-2958
- If you need assistance please call.

# **COURSE OBJECTIVE**

1. Understand the basic chemicals and how they work.
2. Using plural component materials correctly.
3. Learn the proper troubleshooting procedures to avoid costly mistakes and downtime.

**You are the manufacture of the completed product!  
You are responsible for the proper application of the finished product!**

## **OUR SUGGESTION TO IMPROVE YOUR ABILITIES**

1. Follow start up and shut down procedures.
2. Keep the troubleshooting guide in this book and equipment manuals as a reference.
3. Understand the project and its requirements before proceeding.
4. Never begin the application until the gun and equipment are operating normally.
5. Fill out a log for each day. Keep track of your materials.
6. Never start to spray without doing a test shot first. Check that the material sets up correctly and check your gauges, heat and material supply.

## **GETTING THE MOST FROM THIS COURSE**

Answer the following questions for yourself and make sure you get those answers before you leave.

1. Why are you here? Really.
2. What problems have you had that were never solved or not dealt with fully?
3. Is your gun operating like it did when it first came out of the box?
4. Is your machine operating as it did when it was new?
5. What heat and pressure settings do you use, and are they correct?
6. What is the minimum storage temperature for your material?
7. What is the first thing you should do when an off ratio problem occurs?
8. Do you throw everything in the truck and go home at the end of the day without cleaning and maintaining your equipment?

## SAFETY

### RESPIRATORY PROTECTION AND SAFE HANDLING PRACTICES

1. Avoid breathing vapor without proper protection as sensitization can occur.
2. Use a spray suit with a hood.
3. Use your full faced fresh air mask.
4. NO SMOKING
5. Take every precaution to avoid contact with skin.
6. KEEP THE CHEMICALS OUT OF YOUR BODY!
7. Have a copy of all MSDS sheet readily available in case of an emergency.
8. Remove all waste materials (test spray patterns) and solvents from the work area when done.
9. Use solvents compatible with Aluminum. **DO NOT USE HALOGENATED SOLVENTS** (i.e., Methylene-chloride)!

**ABSLOUTELY NO OPEN FLAMES** – Display placards

### SEVEN IMPORTANT POINTS FOR WORKING WITH MDI LINER MATERIALS

Here are seven important points you will want to know when applying spray-on truck bed liner (TBL) products containing MDI (methylene diphenyl isocyanate) and/or polymeric MDI (PMDI).

**The Alliance for the Polyurethanes Industry (API)**, prepared this guide to help remind professionals like you about important health and safety aspects of working with MDI during spray-on truck bedliner applications. Although MDI is a commonly used material in truck bed liner systems, it is not the only material in the system that may be potentially harmful to your health; therefore, it also is important to read all the information contained in your supplier's Material Safety Data Sheets (MSDS) for the particular TBL product you are using. MSDS sheets are the primary sources of extensive and specific information on MDI, PMDI and other TBL system ingredients.

This guidance document is intended to help truck bed liner companies educate its workers and provide appropriate worker protection related to MDI/PMDI. Neither API nor its member companies are responsible for worker protection, or worker protection programs, for truck bed liner companies.

1. **WHAT IS MDI?** The acronym MDI was derived from one of the chemicals many names, methylene diphenyl diisocyanate. Polymeric MDI is a mixture of monomeric MDI and polymeric MDI and is a brownish liquid at room temperature. MDI/PMDI is one component used in the application of polyurethane and polyurea coatings, which are used in truck bed lining (TBL) products; typically referred to as the "A-side" or the "iso-side" of the system. Although the spray application of these products protects the truck bed, the actual spraying of the truck bed liner requires special handling and care.
2. **RECOGNIZING POTENTIAL HEALTH HAZARDS** Contact with excessive amounts of MDI can be harmful to your health. When MDI is sprayed, you may be overexposed by:
  - Breathing high airborne concentrations of MDI
  - Getting MDI on your skin
  - Getting MDI in your eyesSwallowing MDI In addition to what is identified in the product's MSDS, here are some examples of the effects of overexposure and some recommended first-aid procedures: Inhalation: If MDI is sprayed or heated, there is a chance of overexposure. MDI can irritate your nose and lungs. With overexposure, you may feel tightness in your chest and have difficulty breathing. If you continue to be overexposed, you may become sensitized (i.e., allergic) to MDI. Once sensitized, the effects

may start as soon as you begin to work with the product, or later on in the day after you've stopped working with the product (e.g., when you've left work). If you are sensitized you may experience health effects even when airborne MDI levels are very low and may be at risk for experiencing an asthma attack. If this happens, **DO NOT CONTINUE TO WORK WITH MDI**; asthma attacks can be life-threatening. If you start to feel any of the symptoms listed above, let your supervisor know immediately and seek medical attention. If you suspect someone has become overexposed, remove the person to an area with fresh air, and try to keep them calm and warm, but not hot. If they are having difficulty breathing, a qualified person may provide oxygen. If they stop breathing, have trained first aid personnel give artificial resuscitation. Seek emergency medical attention. Skin Contact: Getting MDI on your skin may result in allergic sensitization. In addition, animal tests have indicated that skin contact, followed by an inhalation exposure, may result in lung sensitization. If these symptoms occur seek immediate medical attention. Repeatedly getting MDI on your skin may cause discoloration, redness, and swelling or blistering; this also could lead to skin sensitization. It is best, therefore, to conduct your work to avoid skin contact, but if you get MDI on your skin, wash it thoroughly with soap and flowing water as soon as possible after exposure. Eye Contact: Getting MDI in your eyes can be painful and could cause tearing and irritation. If you get MDI in your eyes, wash them immediately with a continuous flow of lukewarm, low pressure water, preferably from an eyewash fountain, for at least 15 minutes. Seek immediate medical attention. Ingestion: Swallowing MDI can cause irritation. If you swallow MDI, do not induce vomiting. Wash out the mouth with water. The person affected should be made to rest and seek immediate medical attention. Additional information about these potential health hazards is available through the product's MSDS and in literature on the API website at [www.polyurethane.org](http://www.polyurethane.org).

3. **PROTECTING YOURSELF FROM MDI EXPOSURE** With proper precautions and the use of personal protective equipment (PPE), you can protect yourself from overexposure to MDI during the application of your TBL system.

A: For tasks that do not involve spraying (such as cleaning equipment), but where you may have direct contact with MDI liquid (at room temperature), you should use:

- Safety glasses or goggles
- MDI-resistant chemical gloves (i.e., nitrile)
- MDI-resistant clothing (i.e., apron or coveralls)
- Safety shoes or boots

B: When spraying a truck bed liner system, you should use:

- An approved supplied air respirator (as outlined in your company's Respiratory Protection Program)\*
- Safety goggles (where applicable)
- MDI-resistant chemical gloves (i.e., nitrile)
- MDI-resistant long-sleeve coveralls or full body suit with hood
- MDI-resistant fitted boots/booties

For other tasks where there is the potential for exposure to MDI vapor/mist, follow the guidelines suggested in Point 3B. Workers not wearing the correct PPE should not enter the spray enclosure until the airborne MDI levels are below the allowable limits. Additional information to help protect you is available through the product's MSDS and in literature on the API website at [www.polyurethane.org](http://www.polyurethane.org).

4. WEARING A RESPIRATOR According to the Occupational Safety and Health Administration's (OSHA) Respiratory Protection Standard, you are required to have a medical evaluation and receive medical approval before using a respirator. After approval is given, a fit test is required. The fit test is conducted using the respirator you will be wearing on the job. Each time you use a tight-fitting facepiece, you must conduct a 'user seal check'. However, tight-fitting facepiece respirators are not permitted for use if:

- You have facial hair that interferes with either the sealing surface of the respirator and the face, or interferes with the valve function;
- You wear corrective glasses/goggles or if other personal protective equipment interferes with the seal of the facepiece; and,
- Any other condition interferes with the facepiece seal.

Respirators should be regularly cleaned and disinfected according to the instructions provided by the respirator manufacturer. Deteriorated parts must be replaced prior to equipment use. Respirators should be inspected regularly for:

- Cracks, tears, holes, facemask distortion, cracked or loose lenses/face shield
- Breaks, tears, broken buckles/clasps, over-stretched elastic bands in head strap
- Residue/dirt, cracks or tears in valve and absence of valve flap; and,
- Breathing air quality/grade, condition of supply hoses, hose connections; settings on regulators and valves.

Defective respirators or those with defective parts should be taken out of service immediately. Notify your supervisor about all respirator defects. Additional information about respirators is available through the product's MSDS, in your company's Respiratory Protection Program, and in literature on the API website at [www.polyurethane.org](http://www.polyurethane.org).

5. CONTAINING THE OVERSPRAY Appropriate ventilation, combined with a properly designed spray enclosure, is needed in the TBL industry to help minimize exposure to MDI. The use of a ventilated enclosure helps to contain spray mists and vapors that develop during TBL application. Further, exhaust ventilation systems with efficient filters help to capture the spray mist, which reduces the potential exposure to people outside the building. While there is no "set" standard as to which truck bed liner enclosure design is most effective at controlling MDI vapors/mists, here are some guidelines that are known: 1) the enclosure should maintain a negative pressure with respect to the outside environment (i.e., the air should be pulled into the enclosure not pushed out of the enclosure); 2) it should be sized to allow the truck bed to fit, while giving you space to move safely within the enclosure; and 3) as previously mentioned in Point #3, you should wear the appropriate level of personal protective equipment. A preventive maintenance program for the ventilation system will help you to know when to change filters, check the airflow, etc. A truck bed liner should not be sprayed until the ventilation system is operating properly and the right level of PPE is being used. Workers needing to enter the enclosure while an applicator is applying a bed liner, or shortly after the application has stopped, also should wear the appropriate level of PPE.

6. COMPLETING THE JOB PPE should be removed only after exiting the spray booth and completion of cleanup. PPE also should be worn while cleaning MDI-contaminated equipment and while handling any containers with MDI (i.e., drums, buckets, etc). The type of PPE needed should follow the guidelines presented in Point #3. It is a good work practice to keep all work clothing at work. Any clothing contaminated with MDI should be removed and properly disposed of or cleaned. Leather items cannot be decontaminated. Any contaminated leather items including shoes, belts, and watch bands or clothing, which have been exposed to MDI, should be properly discarded. MDI is a reactive chemical; therefore, the MDI container should be kept sealed to reduce

contamination. However, resealing MDI containers contaminated with water or polyol can cause a buildup of pressure in the container due to the generation of carbon dioxide. A pressurized container may rupture. MDI can self-react in a fire or at very high temperatures and release carbon dioxide. Carbon dioxide can build pressure in sealed containers sufficient to cause rupturing of the container. Additional information to help protect you is available through the product's MSDS and in literature on the API website at [www.polyurethane.org](http://www.polyurethane.org).

7. **RESPONDING TO EMERGENCIES** Fires, spills, and other emergencies involving MDI require an immediate response by trained and knowledgeable personnel. If you have not been trained to respond to an emergency, leave the area immediately and notify the appropriate emergency response personnel. If you need additional guidance, call CHEMTREC® at 1-800-424-9300. CHEMTREC® operators are available 24 hours a day, seven days a week. CHEMTREC® is a communication center dedicated to assisting emergency responders handling incidents involving hazardous materials.

The seven important points in this guidance document are not all-inclusive and do not identify all the safety measures or legal requirements that may apply to your particular worksite. Consult the supplier's MSDS for additional information. This document is not designed or intended to provide, define or create legal advice, rights or obligations. API, part of the American Chemistry Council, does not make any warranty or representation, either express or implied, with respect to the accuracy or completeness of the information contained in this document; nor does API assume any liability of any kind whatsoever resulting from the use of or reliance upon any information, conclusions, or opinions contained herein.

The next section is a Model Respiratory Protection Program for you to take back to your shop for review only. These types of programs are a good tool to make sure that everyone that will be in the area where our linings are being sprayed will be protected properly.

More information can be found in our Health & Safety manual.

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## Equipment Operation: **Importance of Material Agitation in Drums**

When you receive a drum shipment of the polyurea spray elastomer systems, the resin component is packaged in a drum such that there is a center 2" bung in the lid. While many polyurea system suppliers strive to be the best in the business, this center bung is not just for looks or a second vent source. This bung serves a major importance as it is designed to accept a drum mixer for the material.

The resin blend component of the polyurea spray elastomer systems is normally the pigmented side. Solid pigments are used so as to increase the performance characteristics of the elastomeric coating produced. As is the case with all pigmented systems, the pigment will have a tendency to settle to the bottom over time. Even though a high shear dispersion technique is used for most system preparations, this can still occur.



Another alternative method suggested by some polyurea system manufacturers is the use of a re-circulation loop on the resin supply side. This works provided there is proper dispersion of the pigments in the system. This process allows the drum pump on the resin side to circulate material in the drum. A 3-position valve is used to divert the material flow to the smaller drum bunghole. The valve **must** always be placed in the machine delivery position for spray work. Use of this technique should only be at the recommendation of the system supplier.

**NOTE:** This technique (drum re-circulation) should **NOT** be used for drums that have sat for extended periods!

If you do not mix the material and the pigment has settled, you will still achieve the proper 1:1 volume flow to the spray equipment but the mix is not right.

Think about it! If the pigment has settled and you are delivering a 1:1 volume ratio, the high pigment level will displace the reactive resin level and yes, you guessed it,



## **You Will Be Shooting Off Ratio (by Equivalents)!**

Remember, the drum pumps suck material from the bottom of the supply drums.

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This could cause a variety of problems: foaming, blister formation in the coating system, poor spray pattern, color variances and poor coating performance.

It is recommended that the following procedure be used:

- Drums **must** be mixed for a period of at least 1/2 hour before use  
DO NOT MIX for just 5 minutes like you do with epoxies!
- It is good practice to leave the mixer on at low speed during spraying
- The mixing shaft should have a minimum of two 8" collapsible blades and one 5-6" blade at top of shaft. This will provide the proper agitation and mix within a standard material supply drum as 8" is 1/3 the diameter of the drum.
- It should be noted that auger type mixers Must be ran daily to pull up and mix the material in the drums completely.



It should be noted that the resins themselves will not separate in the resin blend component. This mainly applies to the pigment.

Reference:

“Mixing Technology for Two-Component Coatings”, **Finishing Technology**, The Sherwin-Williams Company, Spring 2000, pages 8 – 9.

## **POLYUREA SPRAY COATING SYSTEMS**

The prospects of landing a major coatings application loomed before the contractor who could meet the requirements of the job. But how could these areas be efficiently coated/repared in a seven-day-a-week, 10 – 14 hour-a-day, setting without some portion of the area use or daily traffic? It was clear that by preparing and installing repairs on a limited area during each work cycle, partial openings could ne installed during off hours and would be cured with minimum downtime. The needs of the customer required that the installations be not only tack free, but also have the ability to return the area to normal service.

It was early 1993 and the selection of coating materials which could meet the needed specifications was exceedingly meager. Polymer systems based modified polyurethanes, epoxies, methacrylates, polysulfided or silicones might be products to consider except that curing times, which at best, ranged into 12 hour time zones with many in the 24+ hour zones. None of these products could fully meet the restraints of the projects.

During this time, a handful of products were being developed based on a polymer chemistry referred to as polyurea. Cure times of 1 to 3 hours were being touted with product properties for installation and repair which met or exceeded most polyurethane, epoxy and silicone based technologies. What are these new polyurea polymers for coating applications?

## **POLYUREA CHEMISTRY**

In the early 1980's several discoveries and developments in elastomeric polymer chemistry were made based on reactive amine terminated resins and high performance isocyanate prepolymers. These resulting polymer systems were referred to as polyureas and had certain characteristics suitable for rapid process application. The major application being Reaction Injection Molding (RIM) for use in automotive body panel production. Certain characteristics of this technology could prove useful if utilized in coating applications. Some of these are:

1. Fast, consistent reactivity and cure.
2. Moisture and temperature insensitivity during processing.
3. Excellent physical properties/elastomeric qualities.
4. Very low water absorption qualities, hydrolytically stable.
5. High thermal stability.
6. Auto-catalytic, no solvents.

While this technology became very well suited for RIM applications, applying this concept to coating applications became the task at hand. The typical 2 – 3 second gel times of these polyurea RIM systems makes for very difficult conventional spray processing techniques. System modifications were required to slow the effective reactivities without compromising the unique characteristics and performance properties of these polyurea elastomer systems.

By1990, the development of polyurea spray systems had progressed to a point where possibility of use as coatings and sealants was foreseeable. The prospects of a moisture and temperature insensitive product with extremely rapid curing properties continued to lure formulators into the chemistry.

In 1993, there were several polyurea and hybrid polyurea products on the market which were generally consistent in application and performance. These products exhibited characteristics such a those set forward

previously. The pot life or working times for these coating systems is limited to 1 minute. This definitely classifies the products as technical but by using proper installation procedures and equipment, polyurea systems can be considered a viable alternative to many coating materials. Cure times ranging from 1 to 3 hours made these type of products the only possibility for the maintenance requirements of many situations. The discovery that product curing will take place in temperatures as low as 40° F without significant changes in developed properties opens many new avenues for efficient repair in cold conditions. The further discovery that the ultimate properties of the products could be varied in a controlled manner through varying the chemical makeup, without loss of the desirable qualities. This has led to the development of products for various uses ranging from high impact thermal cycling installations.

## **COATING SYSTEMS**

The use of polyurea systems as spray coatings has been made possible through the development of proper application equipment. These polyurea systems must be processed through high pressure, high temperature impingement mix type equipment in order to achieve the optimum atomization and qualities for a coating. These systems are generally much faster in reactivity and are unaffected by changes in humidity and ambient temperature.

For coating applications, the elastomer system must have excellent mechanical properties to insure extended serviceability. These systems must also be stable to their environments. Not only is the performance of the elastomer system important, but the material should be able to easily applied in a variety of conditions and give comparable performance. The elastomer system should also be free of volatile compounds which could be released into the environment.

**Turbo Liner Inc's** line of fast set spray polyurea materials addresses these concerns for many coatings applications. These fast set spray materials can be applied as low as 40° F with the ability to open the area to service within 1 hour. Excellent substrate adhesion is also noted. Coated substrate service temperature can easily approach near 400° F without detrimental effects to the coating system. Polyurea coating systems are still new technology today and have a limitless degree of applications and versatility in concrete, metal and wood coatings. Other applications include flooring, decking, secondary containment, corrosion protection and moisture barrier systems. Given the fast reactivity and cure as well as the 100% solids nature of the polyurea elastomer technology, repairs can be made in food contact applications. No fugitive materials are present in the technology which would contaminate foodstuffs. Some of our products have been approved by the USDA incidental food contact applications.

## **THE POLYUREA ADVANTAGE**

One may ask, why use the polyurea elastomer technology over conventional coating technologies? There are several reasons as mentioned in the previous section, the most important being that this technology is 100% solids. **NO VOLATILE ORGANIC COMPOUNDS (VOC'S)**. During application and once the material is applied, no vapors, fumes or chemicals are released. This makes the technology applicable for confined space applications as well as coating in food processing/ handling applications.

With respect to 100% solids, polyurea elastomer systems contain no catalyst for cure development even down to ambient temperatures of at least -20° C. Systems which require a type of catalyst for cure, i.e.

polyurethanes and some epoxies, are adversely affected by low ambient temperatures. Polyurea elastomer systems cure readily at a broad range of ambient temperature conditions.

The lack of a catalyst also gives improved performance when exposed to UV light. The catalyst in a system will promote polymer degradation when the system is exposed to high temperatures or UV light. Polyurea elastomer systems exhibit exceptional performance with only slight color changes being noted in accelerated weatherometer testing. Elastomer physical property retention is excellent. **NOTE ABOUT COLORS:** In real life polyureas and hybrid materials base color vs. UV situations on medium to darker colors may get a little darker over time and lighter colors will actually change colors over time. You must keep in mind polyureas are still in the end just plastics. You can however get excellent color holdout and UV stability from aliphatic polyureas, the problem with the aliphatic polyureas is that they are in most cases 3 times the price of regular polyureas.

## **SUPPORT CHEMICALS**

### **Acetone:**

Acetone is used as a final wash on the sanded surface. We use acetone due to its fast evaporation time and it does not leave a residue on the surface. It can be used as a general cleaner for gun, equipment and to clean up either A or B side products in their liquid states.

### **Cilbond 41 Primer:**

Cilbond 41 is an ISO based primer that works great for repairs or re-sprays over an old liner. It is a high solvent primer with fast cure times for use with plastics.

### **DPM:**

DPM is a glycol based cleaner that has a low vapor pressure and evaporation rate. It can be used as a general cleaner for gun or equipment. It is the main solvent used for a cycling flush of spray machines prior to storage.

### **DOP:**

DOP is a plasticizer designed to keep the ISO product from getting completely hard. It is used in the lube cup or lube pump system on the A-side proportioning pump to keep the shaft from seizing in the pump. It is also used as a test and storage fluid for spray machines.

### **NMP:**

NMP is a polyurea re-activator and solvent. It is used to re-activate cured polyurea for repairs and can also be used as a soaking solution to remove cured polyurea or ISO from gun parts. RS-98 is the preferred solvent for parts.

### **RS 98:**

RS-98 is a solvent used to liquefy hardened poly at a rapid pace. It can be used in a stainless ultra-sonic cleaner that heats up the RS-98 which accelerates the process. Cured poly or ISO will start to come off the parts in a short period of time.

For Health and Safety information on any of these support chemicals please view SDS/MSDS sheets located in the dealers section of our website: [http://www.turboliner.com/dealers\\_only.html](http://www.turboliner.com/dealers_only.html)

# Cilbond 41 Primer Usage in Bedliner Repairs

**Note:** Please read the MSDS and data sheets before using this product. State and local restrictions may apply.

Cilbond 41 primer is a plastics primer that was designed for cast molded plastics market but has proven to work very well with high pressure spray polyureas.

Cilbond 41 can be applied by brush, roller or spray. In most bedliner repairs a simple disposable brush or roller is the best way to go.

Prepare the repair area as needed with a solvent wipe and scuff with 40 grit paper. Brush on a light coat of Cilbond 41 (see the data sheet for directions). Coat the affected area as needed.

All repairs will differ and a judgment call will have to be made on the best way to proceed. A combination of masking, string-line, cutting and/or sanding to remove bad material, sanding edges to blend the repair area into the existing coating, texture, etc...

Be creative, you will find that polyurea is easy to work with and repairs can be done in a variety of ways as long as the finished product looks good and makes your customer happy.

# **Repairing Liner Material With NMP**

## **How To Repair Polyurea: Within 6-8 Hour Window.**

**The following letter contains information on repair and repair of polyurea coatings. For making a repair within the early hours after a coating has been applied, the steps are as followed:**

Step (1): Cut out area to be repaired.

Step (2): Sand and wipe down the repair area with acetone.

Step (3): Mask off the area to be sprayed and string tape around the edge.

Step (4): Spray material in area to be repaired until the area is level with existing coating.

Step (5): Pull string tape and sand new material until it is level with old surface, blow the area out with air.

Step (6): Spray over the old and newly repaired section, then retexture the surface. This completes the repair for polyurea that is uncured.

## **How To Repair Polyurea: After 6-8 Hour Window**

**For making a repair after the 6 hour window has passed (using NMP to make a repair), the steps areas followed:**

Step (1): Cut out area to be repaired.

Step (2): Wipe a light coat of NMP on the surface (do not soak the surface with NMP) to be repaired you will need to go beyond the actual repair areas as you will need to blend into the undamaged area.

Step (3): Let NMP sit on surface for 15-20 minutes (you cannot rush this process)

Step (4): Wash with acetone 2to3 times really well to neutralize the NMP (if you don't neutralize all the NMP it will cause bubbles when you spray over the surface. Follow steps 3 through 6 in above section to complete the repair.

## REMEMBER!

### YOU ARE THE FABRICATOR! WE ARE THE RAW MATERIAL SUPPLIER!

**Turbo Liner MPL11™** is one of the most user-friendly, forgiving, heated plural component elastomeric products made. This fact is a double-edged sword.

**Turbo Liner MPL11™** will react and set at even 25% off-ratio and may look good; but the following characteristics may be noted:

If the finished product is **ISO (A) rich**, you may observe any or all of the following:

1. Lighter in color or striations (marbling); will eventually darken with sunlight.
2. Harder surface and less flexible.
3. Higher surface gloss (not always a key).
4. Firmer at higher temperatures.
5. ISO pop blisters due to CO<sub>2</sub> generation of non-reacted isocyanate.
6. Localized foaming in slower systems (pour applications especially).
7. Lab analysis of the elastomer will show higher tensile strength, higher modulus and less elongation.

If the finished product is **RESIN (B) rich**, you may observe any or all of the following:

1. Darker color or striations; may turn color in some areas.
2. Softer surface and more flexible; may feel “tacky”.
3. May have incurred or liquid areas beneath the elastomer surface.
4. Lower surface gloss.
5. Softer at higher temperatures.
6. Air or liquid filled blisters between the elastomer and the coated substrate when used in a liquid containment application.
7. Lab analysis of the elastomer will show lower tensile strength, possible higher elongation, lower tear strength and higher M.V.T rating.

If the Turbo Liner MPL11™ is sprayed **ON RATIO**, but not effectively mixed at the gun due to lack of heat and/or pressure, or improper impingement, it may look good, but some of the above noted characteristics may be observed as well as the following:

1. Elastomer “cheesy” nature, cracks when bent.
2. Blister formulation, especially at spray overlap areas.
3. Localized foaming.

## **IT'S MOVIE TIME!**

### **UNDERSTANDING THE STANDARD PROBLER AND PROBLER P2 SPRAY GUN**

Now at this time you will be watching both the standard Probler and Probler P2 gun videos. Even if you never spray with the standard Probler it is very wise to watch this video. What you need to understand about these two guns is this; even though they are different guns they use the same basic principles for their operation. The information in the Probler gun video will help you troubleshooting both guns.

## **START-UP PROCEDURES**

1. CLEAN AND ORGANIZE AREA.
2. CHECK SYSTEM FOR LEAKS, KINKED LINES, EXPOSED WIRES OR ANY OTHER POTENTIAL HAZARDS
3. **CHECK BARRELS FOR MATERIAL QUANTITY!!!**
4. TURN MAIN SWITCH ON.
5. TURN HOSE HEATER ON.
6. TURN AIR ON.
7. DRAIN WATER SEPARATOR.
8. TURN AIR MIXER ON HIGH SPEED.
9. TURN PRIMARY HEATERS ON 10 MINUTES PRIOR TO SPRAYING.
10. CHECK HEATERS TO MAKE SURE HEAT IS COMING UP.
11. MATERIAL MIXING AND HOSE HEATING TIME IS APPROX. 30 MINUTES

## **PRESpray CHECK LIST**

1. CHECK TO MAKE SURE FRESH AIR SYSTEM IS WORKING PROPERLY AND REPLACE TEAR-OFF (IF NEEDED).
2. TURN ON HYDRAULIC SWITCH.
3. CHECK HEATER TEMPS.
4. CHECK GAUGES.
5. SWITCH FROM RETRACT TO RUN.
6. TURN ON AIR VALVE ON GUN.
7. TEST SPRAY GUN.
8. CHECK GAUGES AND LEVEL OUT PRESSURES.
9. CHECK ALL MASKING.
10. SPRAY
11. **TURN OFF BALL VALVES WHEN GUN IS NOT IN USE!!!**
12. TURN AIR MIXER TO LOW SPEED AND LEAVE AT THAT SETTING UNTIL SHUTDOWN.

## **SHUT DOWN PROCEDURES**

1. SWITCH FROM RUN TO RETRACT AND DROP PRESSURE TO PSI 500.
2. TURN OFF BALL VALVES.
3. TRIGGER GUN SEVERAL TIMES.
4. TURN OFF HYDRAULIC SWITCH.
5. TURN OFF HEATERS AND MAIN SWITCH.
6. TURN OFF AIR TO MACHINE AND PUMPS.
7. CLEAN AND MAINTAIN GUN!!!!!! OR GREASE THE TIP ON THE P2 GUN!!
8. DRAIN WATER SEPARATOR.
9. CLEAN BOOTH, MACHINE AND HOSES IF NEEDED.
10. SPRAY RELEASE AGENT (PAM COOKING SPRAY) WHERE NEEDED.
11. INSPECT AND CLEAN FRESH AIR SYSTEM.

## **GENERAL MAINTAINANCE**

1. CLEAN A & B SIDE GUN SCREEN EVERYDAY, BEFORE YOU SPRAY \*NOT\* AT THE END OF THE DAY.
2. CHECK FRESH AIR FILTER EVERYDAY.
3. TEAR DOWN GUN HEAD, CLEAN AND INSPECT DAILY.
4. DOP (PUMP LUBE) THE TOP OF THE A-SIDE PROPORTIONING PUMP ONCE A DAY.
5. LUBE AIR MIXER ONCE A WEEK.
6. CLEAN T-FILTER SCREENS THEN BLEED THE AIR FROM THE LINES WHEN YOU CHANGE BARRELS OR ONCE A MONTH.
7. BLOW OUT ELECTRICAL MOTOR ON MACHINE ONCE A MONTH.
8. CHECK ALL ELECTRICAL CONNECTIONS ON MACHINE EVERY OTHER MONTH.

# EQUIPMENT OPERATION AND TROUBLESHOOTING

The correct temperature and pressure of the materials contribute significantly to a proper spray pattern. A full spray pattern enables the applicator to make uniform passes of mixed material.

For a given pressure, materials that are too cold will cause a rather narrow spray pattern or stream of material and affect the spray process. If this occurs you should stop and check to see if you have both primary and hose heat. You should also consider this, did you just change a barrel or set. If the Drums are stored in an area that the temp is below 70° or the shop is very cold you may have to recirculate the material back to the drums to heat it up to its operating temperature (70° minimum).

## TEMPERATURE SETTING TOO LOW

Equipment will display the following effects if you have too low temperature setting.

**Problem:** A stream of material will exit the spray gun, not a spray pattern.

**What to do:**

A: To troubleshoot this, increase the temperature as necessary. If the problem is not corrected within a reasonable time, then

B: Troubleshoot the equipment electrically.

## TEMPERATURE SETTING TOO HIGH

If the materials are too hot they will react too fast causing the sprayed material to be almost dry before it hits the surface. When this happens you end up with a very sharp spiky texture.

**Problem:** Material appears to be drying too fast.

**What to do:**

A: Reduce the temperature as necessary. If this does not resolve the problem within a reasonable amount of time, then

B: Troubleshoot the equipment electrically.

## INCORRECT OPERATING PRESSURE

Incorrect pressures will create incorrect mixing ratios. The equipment will produce the following effects from incorrect operating pressures, whether it is an air or hydraulic driven machine.

**Problem:** Not enough spray pressure or pressure drops off while spraying.

A: What are your fluid pressures at? Your machine should run at approximately 2000 psi to 2,200 psi. If your machine is dropping pressure equally on both A and B while spraying check your air supply on a pneumatic machine (you should have at least 100 psi air

pressure) and on hydraulic machines, check the hydraulic pressure (you should have at least 1000 psi hydraulic pressure)

B: Is the machine in run or retract?

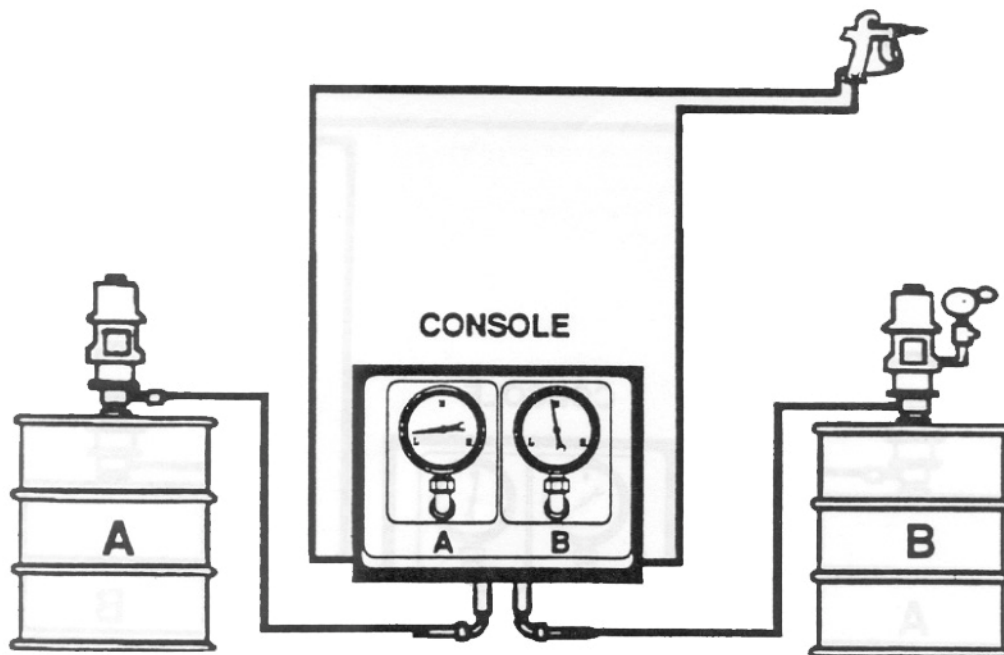
C: If your pressures are dropping and the gauges are not equal move to the next section.

## RESTRICTION AND STARVATION PROBLEMS

With today's spray equipment, the applicator will not be able to develop a consistently proper spray pattern through the spray gun if the transfer pumps malfunction, or if the materials are not supplied to the proportioning pumps on a constant basis.

Short-term blockage of material in the spray gun, or momentary proportioner pump cavitation may escape detection by the applicator and will result in bad spots in the coating that will appear later if not detected right away. If the applicator should see a short break in the spray pattern, he should stop what he is doing immediately and investigate the situation.

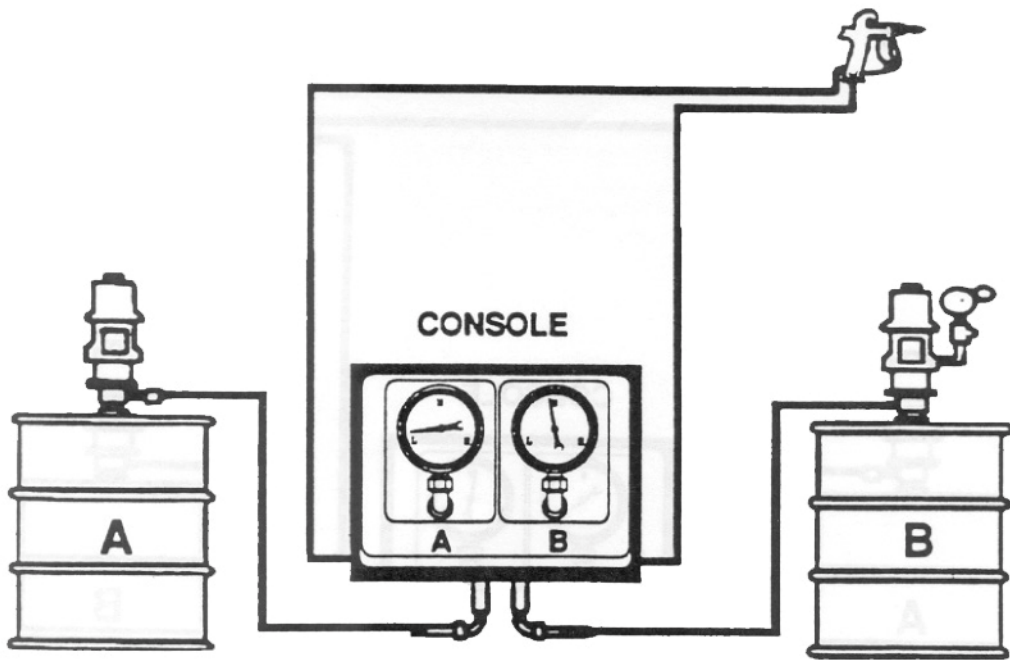
**Problem 1: Momentary starvation** of the equipment. The lacking Material Gauge will show low pressure.



**What to do:**

A: To correct this problem, check from the console to the material supply system.

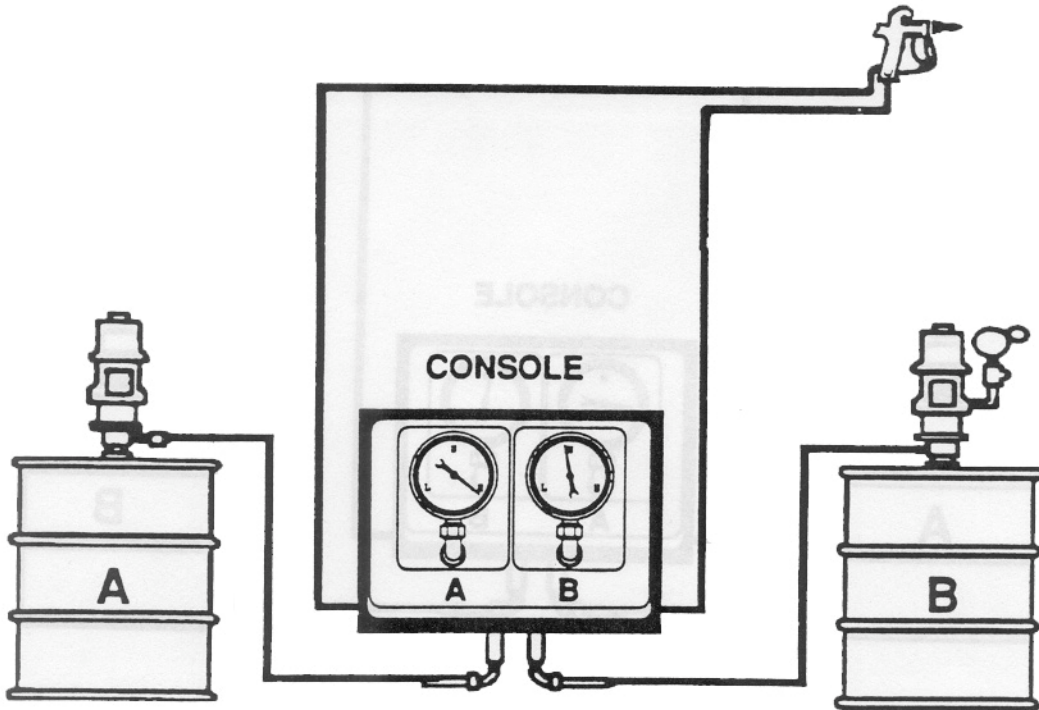
**Problem 2: Cavitation** momentary drop in the Lacking Material Gauge.



**What to do:**

- A: Check from the console to the material supply system.
- B: Check the transfer pump on the lacking material side.
- C: Check the proportioning pump on the lacking material side.

**Problem 3: Momentary restriction,** the Restricted Material Gauge will show a higher pressure.



**What to do:**

- A: Check between the console and the gun for restrictions.

# OFF-RATIO PROBLEMS

**Problem 1: Excess Iso or “A” Side Component.** The effects of Polyurea applied which is off ratio or misproportioned on the Iso or A-side are more difficult to discover unless the condition is extreme. Poly applied with a slight excess of Iso is not as seriously affected as when there is an excess of polyol, because in the former case the polyol is totally reacted. The more extreme condition of Iso will exhibit one or more of the following effects:

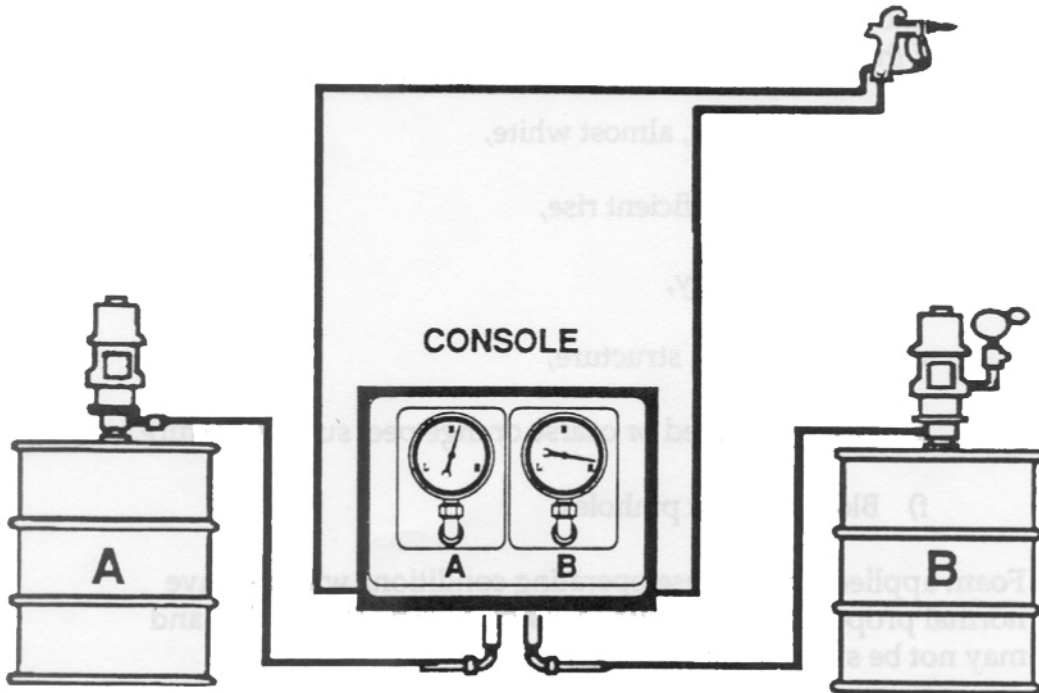
A: Yellow in appearance,

B: A more brittle material

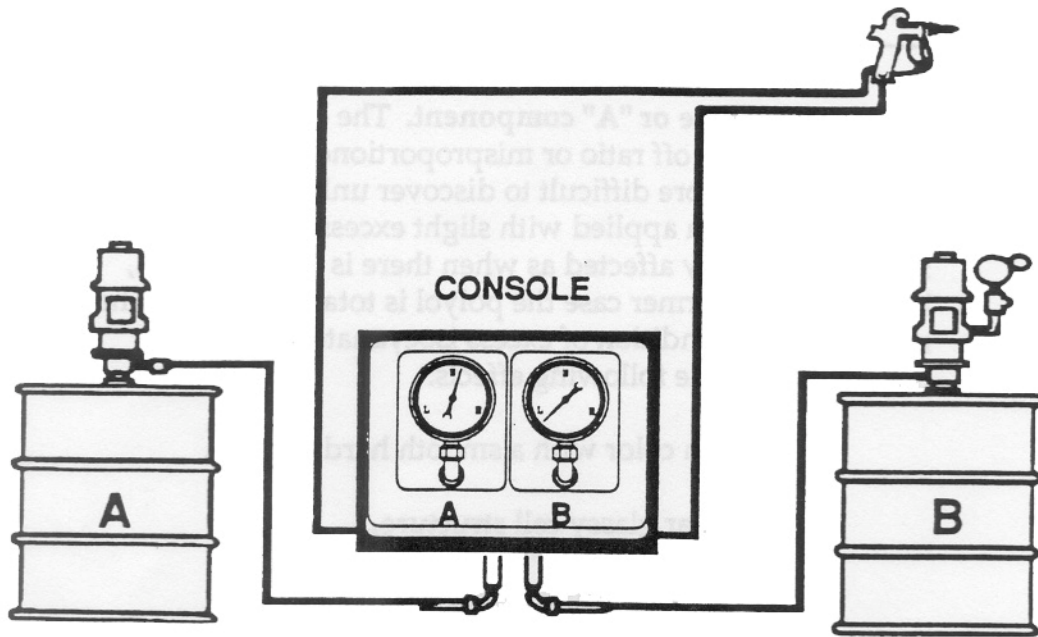
C: In more severe cases bubbles, In this case you will not have enough poly to react with the Iso causing, you guessed it bubbles.

## What to do:

These effects may be caused by either restriction or starvation.



A: When there is a restriction on the B-side, you will see high pressure on the polyol gauge. To correct, check for the restriction between the gun and the console on the B-side.



B: When there is a starvation issue, you will see low pressure on the polyol gauge. To correct this, check from the console to the material supply system.

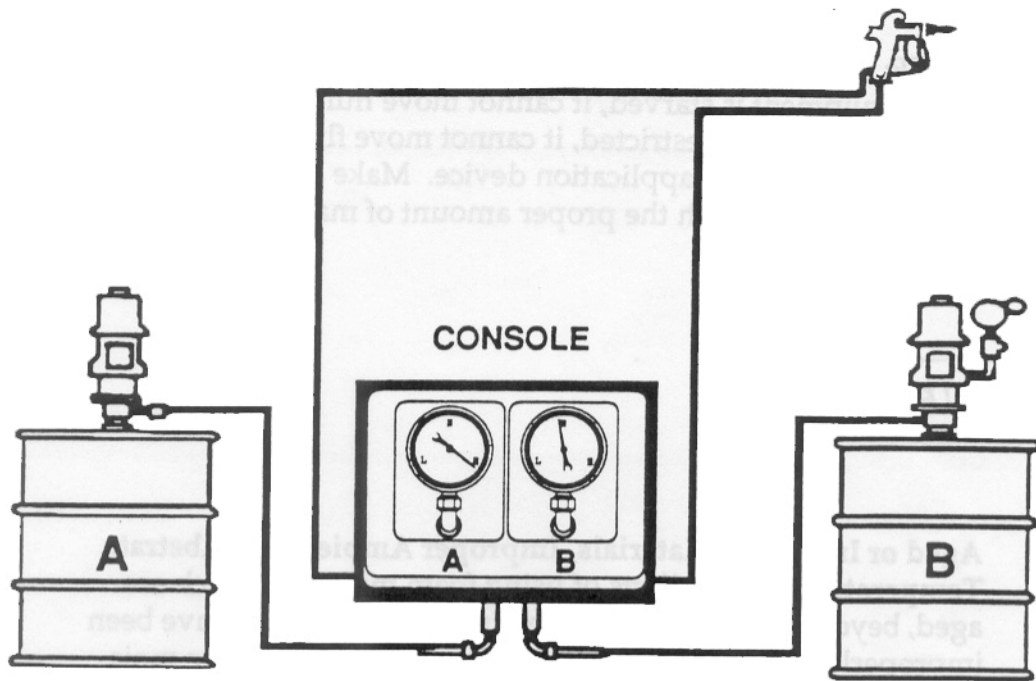
**Problem 2: Excess polyol or “B” Side Component.** The effects of Polyurea that is applied off-ratio or misproportioned on the polyol side will be one or more of the following:

- A: Material will be very soft
- B: Material may be tacky or sticky to the touch
- C: Material may Bubble, when bubbles are cut open you will find goeey black un cured material in them.

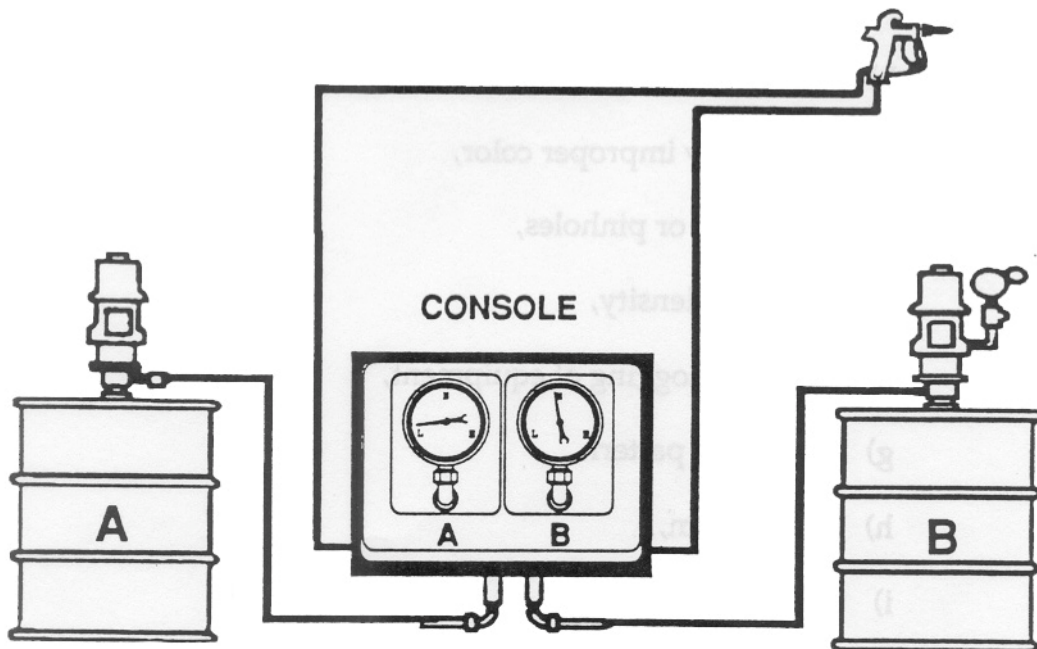
Material applied during either a restriction or a starvation issue will not have the normal properties and will not be suitable for a finished coating.

**What to do:**

These effects may be caused by either restriction or starvation.



A: When there is restriction on the A-side, you will see high pressure on the Iso or A-Side Gauge. To correct, check between the gun and machine for a restriction on the A-side.



B: When there is starvation the A-side, you will see low pressure on the Iso or A-side Gauge. To correct, check from the console to the material supply system on the A-side.

NOTE: Blockage problems of any kind must be handled quickly. If the equipment is starved, it cannot move fluid if there is no fluid there. If the equipment is restricted, it cannot move fluid it cannot get to the tip of the gun. Make sure your equipment is fed with the proper amount of material at all times.

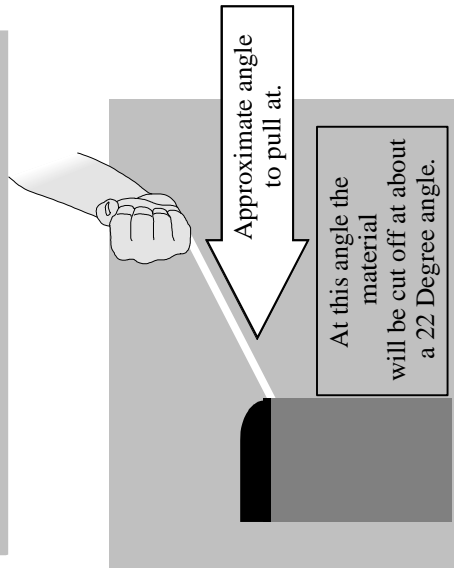
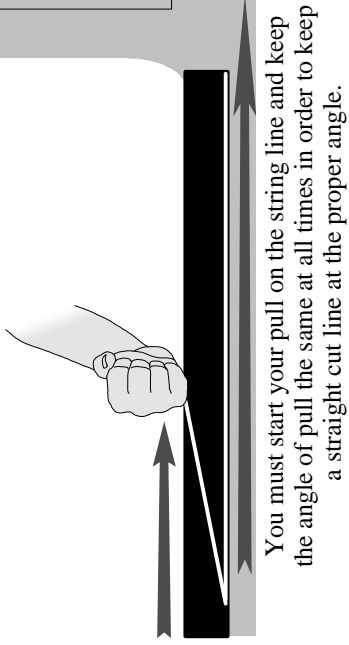
## SUMMARY

Review, the major points or just use for notes:

## **IT'S MOVIE TIME!**

### **HOW TO SPRAY A BEDLINER START TO FINISH**

Now at this time you will be watching a video that shows a bedliner from start to finish. You will be following a spray tech through the process. In the video we will cover the basics in preparation, masking, and spraying the bedliner.



## REMEMBER!

### YOU ARE THE FABRICATOR! WE ARE THE RAW MATERIAL SUPPLIER!

**Turbo Liner MPL11™** is one of the most user-friendly, forgiving, heated plural component elastomeric products made. This fact is a double-edged sword.

**Turbo Liner MPL11™** will react and set at even 25% off-ratio and may look good; but the following characteristics may be noted:

If the finished product is **ISO (A) rich**, you may observe any or all of the following:

1. Lighter in color or striations (marbling); will eventually darken with sunlight.
2. Harder surface and less flexible.
3. Higher surface gloss (not always a key).
4. Firmer at higher temperatures.
5. ISO pop blisters due to CO<sub>2</sub> generation of non-reacted isocyanate.
6. Localized foaming in slower systems (pour applications especially).
7. Lab analysis of the elastomer will show higher tensile strength, higher modulus and less elongation.

If the finished product is **RESIN (B) rich**, you may observe any or all of the following:

1. Darker color or striations; may turn color in some areas.
2. Softer surface and more flexible; may feel “tacky”.
3. May have incurred or liquid areas beneath the elastomer surface.
4. Lower surface gloss.
5. Softer at higher temperatures.
6. Air or liquid filled blisters between the elastomer and the coated substrate when used in a liquid containment application.
7. Lab analysis of the elastomer will show lower tensile strength, possible higher elongation, lower tear strength and higher M.V.T rating.

If the Turbo Liner MPL11™ is sprayed **ON RATIO**, but not effectively mixed at the gun due to lack of heat and/or pressure, or improper impingement, it may look good, but some of the above noted characteristics may be observed as well as the following:

1. Elastomer “cheesy” nature, cracks when bent.
2. Blister formulation, especially at spray overlap areas.
3. Localized foaming.

# **TURBO LINER INC.**

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