

# Stinson

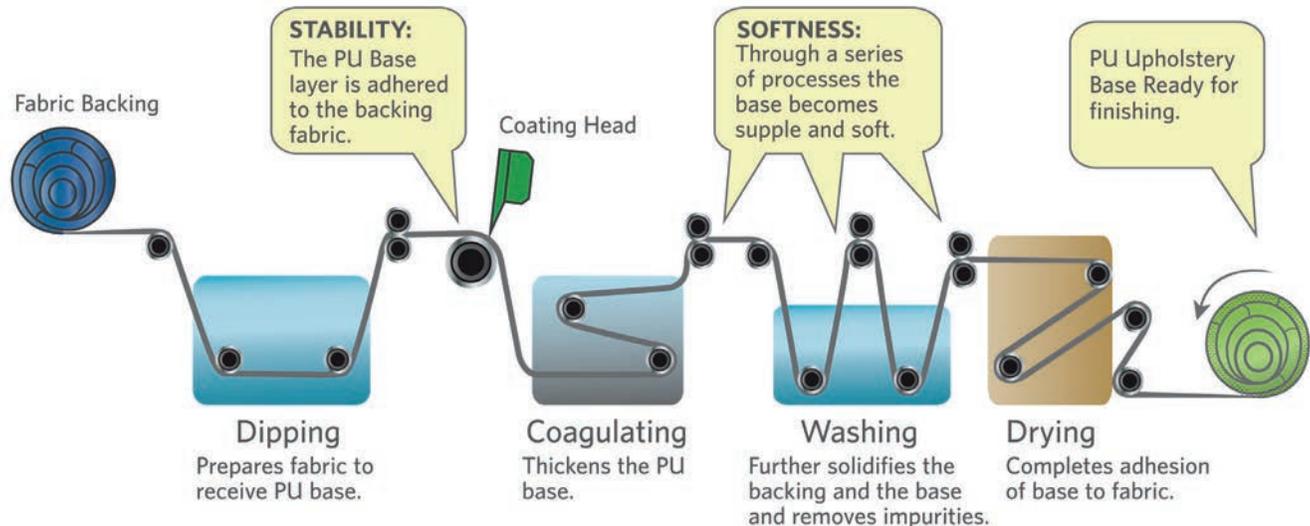
A GUIDE TO HIGH PERFORMANCE  
**POLYURETHANE**  
**UPHOLSTERY**  
**FABRICS**

# WHAT IS POLYURETHANE AND HOW IS IT MADE?

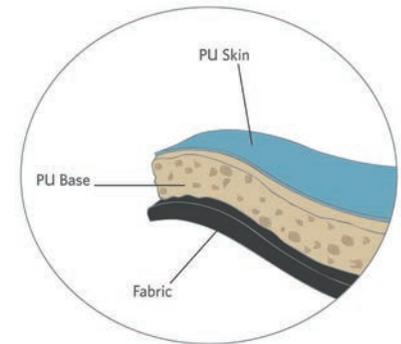
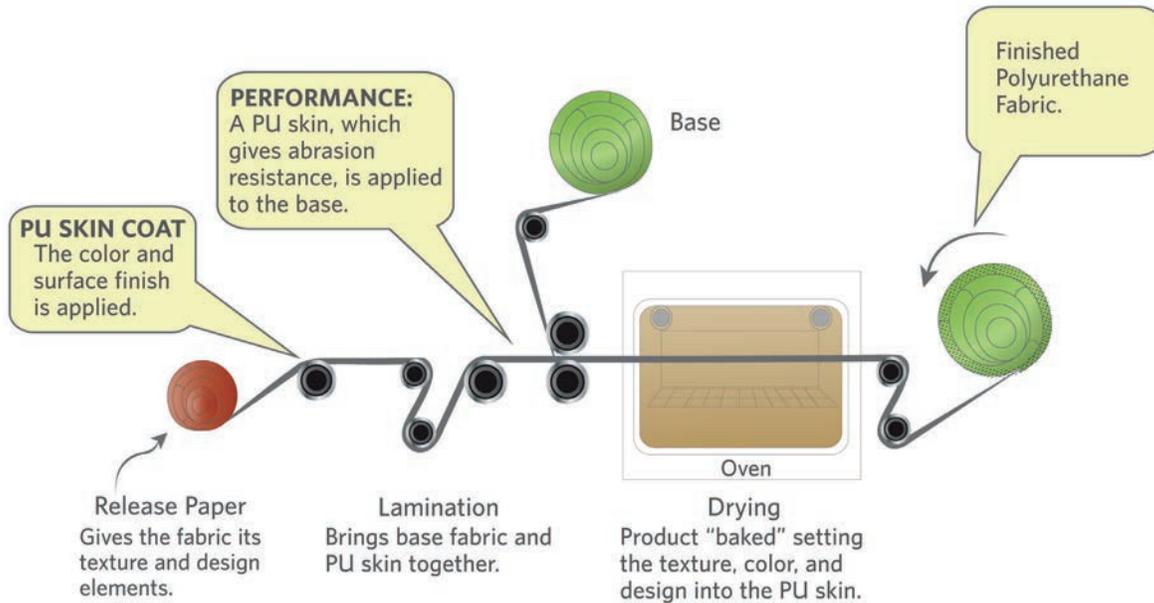
Polyurethane, commonly referred to as 'PU', is a polymer that is considered to be a highly resilient, flexible and durable material. PU is very versatile and can be manufactured in various forms - to be hard like fiberglass, spongy as upholstery foam, robust and protective when used as varnish, elastic like rubber, or very sticky as an adhesive. Polyurethane is becoming increasingly popular as an upholstery material, as it is PVC free and offers a combination of unique benefits including durability, suppleness, breathability, and an attractive appearance.

## Polyurethane Upholstery Fabric: How it's Made

### Phase I



## Polyurethane Upholstery Fabric: How it's Made Phase II



*Magnified view of finished Polyurethane fabric.*

*This schematic is an abbreviated overview of one method for manufacturing Polyurethanes. It has been condensed for the purpose of demonstrating the key points and basic flow of the polyurethane manufacturing process.*

# WHY USE POLYURETHANE?

## Performance

- **Strength & Durability:**

When the upholstery is produced using high grade resins, only a thin PU coating is needed to provide very high abrasion resistance and toughness.

- **Stain Resistance:**

Using high grade PU resins will provide outstanding inherent stain resistance.

- **Resistance to Cleaners:**

High Performance PU's offer resistance to many commonly used commercial cleaners and disinfectants as well as alcohol and bleach solutions. The material will withstand repeated cleaning without becoming brittle or discoloring. *To avoid permanent damage to PU's or any other upholstery material, use only cleaning solutions recommended for soft surfaces and in accordance with the manufacturers application instructions.*

## Comfort

- **Softness:**

Polyurethane provides for a soft, supple seating surface.

- **Breathability:**

PU's offer some breathability (vapor transmission) whereas most PVC based faux leathers do not.

- **Temperature Control:**

High Grade PU's will remain cool on the surface, even after being sat on for long periods of time.

Pattern: Solitaire



# WHAT ARE THE ENVIRONMENTAL BENEFITS OF PU?



Polyurethanes are preferred over PVC based faux leathers for several reasons:

- PU's will decompose over time, whereas PVC is more environmentally persistent.
- PU is more safely incinerable, whereas vinyl can release hydrochloric acid and other toxic compounds when burned.
- PU's typically contain a significantly lower level of VOC's (Volatile Organic Compounds) than PVC, resulting in improved indoor air quality.

Many manufacturers of contract quality Polyurethane are as attentive to environmental stewardship as they are to improving the long term performance of their products. The following are benefits typically offered by PU's :

- Phthalate Free
- BPA (Bisphenol A) Free
- Lead & Heavy Metal Free
- Energy Efficient Production
- Water Efficient Production
- 99% of all Water and Raw Materials used in production is reclaimed and recycled.

# WHAT MAKES A POLYURETHANE FABRIC SUITABLE FOR CONTRACT USE?

Not all Polyurethane upholstery fabrics are created equal. There are significant inherent performance differences between those made with lesser quality resins and higher quality ones. These differences can't be necessarily seen or felt.

The single most important factor in determining the quality of a PU is the type of resin that is used both in the skin and base. There are three basic categories of resin available:

## 1. Polycarbonate PU based Material

Higher cost, durable with high resistance to humidity, heat and light. Suitable for commercial upholstery applications. Will withstand 7+ Years Hydrolysis testing.

## 2. Polyether PU based Material

Mid-range cost, average resistance to humidity, heat and light. Suitable for some commercial applications. Will withstand 3-5 Years Hydrolysis testing.

## 3. Polyester PU based Material

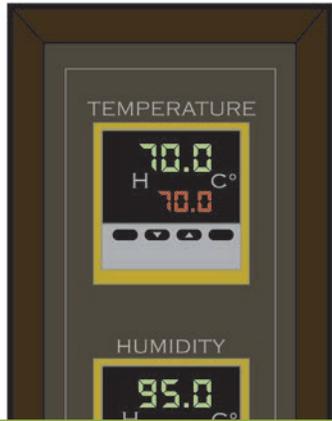
Low cost, low resistance to humidity, heat and light. Not suitable for commercial upholstery. Will withstand 1-2 Years Hydrolysis testing.

The cost of the material is directly correlated to the quality of the resin that is used, as well as the other performance additives that are required to consider a Polyurethane suitable for commercial use. It is important that both the base and skin layer be made of high grade resin.

*The photograph below shows a Hydrolysis related failure of a low-grade Polyurethane in a restaurant installation after 18 months of use.*



# WHAT IS HYDROLYSIS AND HOW DO WE DETERMINE RESISTANCE TO IT?



Hydrolysis resistance is the single most important factor in determining if a PU is suitable for commercial seating applications. Hydrolysis is the process by which humidity and heat breaks down the cell structure of a Polyurethane, resulting in a flaking, brittle surface. Warm weather and humidity can act as the catalyst for the degradation of the material, but even in an air-conditioned indoor environment, body heat and sweat can over time be sufficient to break down a poor quality Polyurethane.

Using high grade resins such as Polycarbonate, ensures lasting Hydrolysis resistance, extending the useful life of an upholstery fabric. The test standard which is used to measure the hydrolysis resistance is-ISO 1419:1995 Accelerated Aging Test - or commonly referred to as the Jungle Test.

In the Jungle Test a sample of the material is placed in a controlled air-oven & humidity apparatus (pictured left). The material is subjected to relative humidity of at least 95% and a temperature of 70° C (158° F) for one week. Each week that the material endures in the apparatus without degrading is equivalent to one year Hydrolysis Resistance. The aged material is compared to the control sample for degradation of various physical properties following protocol as set forth in CFFA-110.



Hydrolysis Test Chamber

**A minimum of 5 Year Hydrolysis Resistance is recommended for any commercial upholstery application.**

# CONTRACT UPHOLSTERY MATERIAL COMPARISON

	Polyurethane (PU)	PVC	Woven Textile	Leather
Durability	High Abrasion Resistance	High Abrasion Resistance with top coat finish	Medium to High Abrasion Resistance	High Abrasion Resistance
Stain Resistance	Excellent Inherent Stain Resistance	Requires Specialty Top Coat for Good Stain Resistance	Varies according to soil resistant finish applied	Medium
Resistance to Stringent Cleaners	Good resistance when PU is produced with Polycarbonate Resins	Good resistance when vinyl includes high performance top coat finish	Dependent upon specific fabric construction and finish	No
Breathability	Some	No	Yes	Yes
Seating Comfort	Soft, Comfortable, Dissipates Heat	Traditionally firmer, tends to get hotter	Mostly Comfortable	Comfortable
Cost	Medium to High (Low cost qualities typically not Contract Grade)	All Price Levels	All Price Levels	High
Environmental Impact	Will Degrade over time. Phthalate Free. PVC Free. Low VOC. Incinerable	Does not Decompose. Contains Phthalates. May contain heavy metals	Varies depending on type of Fabric	Animal Product. The Tanning process often uses harmful chemicals and wastes water

- This comparison chart reflects the typical properties of contract upholstery materials. There may be products available in each category that perform differently than outlined above.

# TIPS FOR UPHOLSTERING WITH POLYURETHANE

It is important to note the upholstery methods for Polyurethane differ from vinyl but they can also differ from Polyurethane to Polyurethane based on the quality of resin, total weight and the backing fabric used.

## **A few things to remember when upholstering with Polyurethane...**

Polyurethanes have more inherent stretch than vinyl and may show a sagging or puddling effect when not upholstered correctly. A few things that may assist in minimizing this would be to:

- Always use a good quality high density foam.
- Consider cutting the foam at least one inch oversize in both directions.
- Thick foam applications should have breathing holes to allow for maximum foam recovery.
- Consider wrapping the foam to assist the backing fabric to slide freely over the foam which will assist in recovery.
- Never railroad a Polyurethane.

Polyurethanes are thinner and lighter in weight than vinyl. Therefore they upholster differently around sharp corners or edges.



## **A few things to remember when sewing are:**

- Avoid extreme folding of the material around tight corners or sharp radius' without foam backing support. This may place undue stress on the PU film creating a potential wear point regardless of the abrasion rating.
- Consider using a minimum of six stitches per inch using a light ball tip needle.
- Consider double stitching key seam areas.

All manufacturing processes differ. These tips are offered as general helpful hints that should be considered prior to upholstering with Polyurethanes.

# CARE AND CLEANING GUIDE

Polyurethanes that are made with polycarbonate resins are inherently very stain resistant. The best way to keep these materials looking great is to maintain them by cleaning regularly with soap and water. When stains or spills occur, wipe them clean as quickly as possible.

The following are typical care instructions for high performance PU's:

## **Regular Cleaning and Maintenance**

Clean the soiled area with mild soap and water then rinse with fresh water and wipe dry.

## **Food Stains / Oils**

Wipe affected area with a soft cloth using a non-abrasive cleaner, for example Formula 409 or Fantastik. Rinse with fresh water and wipe dry.

## **Healthcare Stains**

Clean the soiled area with a 20% solution of household bleach and water. Rinse the cleaned area with fresh water after applying the bleach solution and wipe dry.

## **Other Difficult Stains**

Clean the soiled area with 50% solution of Isopropyl Alcohol (Rubbing Alcohol) and water. Alternately, use a 20% solution of bleach and water. Rinse the cleaned area with fresh water after applying the alcohol/bleach solution and wipe dry.

## **Ink Stains**

Rub the marked area with undiluted Isopropyl Alcohol (Rubbing Alcohol). Rinse the cleaned area with fresh water promptly after applying the alcohol, and wipe dry. Note: To achieve best results, it is recommended to clean the stain immediately. Removal of ink stains is not guaranteed, as this may depend on the type of ink, and the promptness of cleaning.

# THE FOUR QUESTIONS TO ASK WHEN SELECTING A POLYURETHANE

## **What Type of Resin is it Made of?**

The resin dictates the overall performance/quality of the material. If the product is being used in a contract, hospitality, healthcare or other commercial environment, a polycarbonate resin (in both the skin and base layer) is recommended.

## **What is the minimum Hydrolysis Resistance required for commercial upholstery?**

Hydrolysis resistance is the single most important performance characteristic of a PU. For a Polyurethane to perform in commercial environments it must have a minimum of 5 year hydrolysis resistance in both the skin and foam layer of the product. The Hydrolysis Resistance should be determined by the Jungle Test.

## **How can the Material be Cleaned?**

Polyurethanes that are manufactured with polycarbonate resins offer excellent stain resistance and excellent clean-ability. For the tougher stains they can be cleaned with a bleach or alcohol solution.

## **What is the minimum lightfastness required for commercial upholstery?**

Polyurethanes for commercial grade upholstery should meet the minimum A.C.T. standard of 40 hours for resistance to ultra violet light.

## **Best Answer:**

Polycarbonate

Minimum of 5 years

Diluted bleach or alcohol  
(Be sure to include fresh water rinse step)

Minimum 40 hours

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