



SuperfliteTM

Aircraft Recovering Manual

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SuperfliteTM

WWW.SUPERFLITE.COM



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SPECIAL THANKS TO

Wilbur & Orville Wright for
covering the first airplane

Since 1949, Superflite has been helping aircraft enthusiasts everywhere build and fly their personal aircraft. We started by developing System I, a butyrate dope system, and expanded that to include System II, the first FAA-approved urethane aircraft finishing system. We now introduce to you System 7, a new urethane system, offering a superior finish never before seen in an aircraft urethane!

Superflite is the company you can turn to for help. We speak your language. We offer experience to help you do it the right way – the easy way – the first time.

With Superflite, you'll like what you see – fair prices, knowledgeable advice, and top-quality products.

By reading this manual, and taking our step-by-step journey of aircraft recovering, you've chosen to create a first class finish. You can count on us to help make your dream of owning a showpiece aircraft a reality.

Enjoy!



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BEFORE YOU BEGIN

PRE-FLIGHT CHECKLIST



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OVERVIEW

This manual is designed to give you easy-to-follow steps for recovering your aircraft using Superflite System 7.

The sequence of the book takes you through the material in a step-by-step form, ending with a handy troubleshooting guide and glossary of terms. Each tabbed chapter begins with a Pre-Flight Checklist, or mini table of contents, to let you know which subject will be covered in that section, and ends with a summary of the information you should know before moving to the next chapter.

There are several symbols and icons that you should watch for to help you maneuver your way through the material presented here. Of course, all the information is important, but be especially aware of the warning symbols. These are there to keep you and others around you safe. The “tip” symbols are there to make the process easier, and are proven techniques

from the experts. Terms that may be unfamiliar to you are set in bold. To help clarify these terms, you will also find their definitions in our glossary. Our detailed illustrations and charts are titled and numbered for easy reference in addition to helpful important notes.

In this manual we provide you with all the information necessary to ensure a safe, durable, and airworthy covering and finish. Superflite System 7 is FAA certified, and you must follow this manual to have the covering on your airplane approved by the FAA.

Our goal is to make the Superflite System 7 as easy as possible for everyone to apply – from the first time user to the professional. Recovering an aircraft can seem like a daunting task, and we’re here to help make it as easy as possible.

Throughout this manual you should pay attention to the following symbols, as they will help you navigate the steps of aircraft recovering.

**The Warning Symbol**

Whenever you see this, it means serious injury, or death, could occur if you do not obey this warning.

**The Terminology Symbol**

Whenever you see this, it means this is important terminology specific to the aircraft recovering process.

**The Tip Symbol**

Whenever you see this, it includes helpful information from our experts that will make your job easier.

Advantages of using Superflite System 7 Urethane:

- Exceeds government standards
- Provides an excellent finish
- Wet-look finish offers superior flexibility and durability
- Easy to apply and easy to repair

Superflite System 7 Materials:

- Have state-of-the-art UV protection
- Have excellent adhesion qualities
- Have resistance to chemicals and aviation fuel
- Are FAA-approved

SUMMARY

Before taking off to the next chapter you should know:

The most important thing to remember is that the Superflite System 7 is FAA certified and you must follow this manual to have the covering on your airplane approved by the FAA. This message will be reinforced as you proceed with the recovering of your airplane.

SAFETY

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WARNINGS

As you read through this manual you will encounter the safety symbols below. The triangular-shaped symbols, with yellow backgrounds, represent a potential hazard. The red circular-shaped symbols are remedies, or actions you should take, to protect yourself. As with any airplane recovering system, you will encounter material and substances that present risks, and if not handled properly may

cause injury or health problems. Safety is no accident. Accidents are usually caused when people don't follow instructions, are in a rush, or are complacent when handling materials and operating tools. It is your responsibility to protect yourself and others from potential hazards. Use common sense and think about safety before you act.

SAFETY SYMBOLS



Explosion hazard may cause serious injury or death. Provide proper ventilation, and keep explosive material away from ignition sources.



Fire hazard may cause serious injury or death. Keep flammable material away from ignition sources.



Flying objects hazard may cause serious injury. Wear eye protection.



Chemical exposure hazard may result in serious injury. Wear appropriate personal protective equipment.



Inhalation hazard may result in health problems, or serious injury, from poisonous fumes. Do not inhale. Wear appropriate personal protective equipment.



Burn hazard may result in minor injury. Allow hot surfaces to cool before touching.



Air pressure/skin puncture hazard may result in serious injury. Keep body parts away, and wear appropriate personal protective equipment.



REMEDIES

**READ AND UNDERSTAND THIS MANUAL THOROUGHLY.**

Failure to do so may result in personal injury or your airplane could be deemed unairworthy by the FAA.

**WEAR EYE PROTECTION.**

Failure to wear eye protection may result in serious injury or blindness. Always have eye wash available.

**WEAR PROTECTIVE CLOTHING.**

Failure to wear protective clothing may result in skin irritation, burns, or rashes, as well as damage to clothing.

**WEAR DUST MASK.**

Inhaling fine dust, airborne particles, and chemical vapors may result in respiratory problems.

**WEAR PROTECTIVE GLOVES.**

Failure to wear protective gloves may result in skin irritation, burns, or rashes. Always wash your hands thoroughly before touching other areas of the body, other people, or areas of the coating, sensitive to foreign substances.

**WEAR A FRESH-AIR BREATHING SYSTEM.**

Failure to do so, when spraying substances (e.g., primer, paint), may result in injury to the eyes and/or respiratory system.

Note: You must use a spray booth for spraying all primers and paints containing isocyanates.

GOVERNMENT REGULATIONS



Federal Aviation Administration (FAA) rules and regulations, related to the recovering of an airplane, are very important, and are used as a guide for this manual. All recovering systems must be approved by the FAA. Upon approval, the aircraft is given a Supplementary Type Certificate (STC).

To have your airplane certified under a Superflite STC, it is mandatory that you only use the material approved in the Superflite STC/PMA. Application of the Superflite materials cannot deviate from the process outlined in this manual. Failure to comply will void the STC and the airworthiness certificate of the aircraft. For additional information about aircraft inspection and repair, we recommend you obtain a copy of the Advisory Circular AC 43.13, available on the FAA web site.

Inspection and Certification

There are two required FAA inspections and approvals when recovering an airplane. The first inspection comes after the old fabric has been removed, and the airframe has been reconditioned and prepared for recovering. At this stage the airframe must be approved for recovering.

The second FAA inspection comes after the recovering of the airplane is complete. The purpose of this inspection is to authorize the return of the aircraft to service. During both stages, a licensed Airframe & Power Plant Mechanic with Inspection Authorization (A&P/IA) or an FAA Designated Airworthiness Inspector (DAR) must conduct the inspections. We recommend that you use the same individual or service for both.

Forms and Logs

When you finish recovering your airplane, you will need to fill out the following forms and submit them for final approval:

FAA Form 337: Must be completed by the A&P/IA or FAA/DAR authority upon completion of the recovering.

Log Book: An A&P/IA must make appropriate entries.

LOGBOOK INSERT

This aircraft was recovered using the
Superflite System 7 process in accordance
with Manual D-102, Revision 03-13.

Date: _____

STC: _____

Fabric Type: _____

Paint Color Codes: _____

I/A or A&P: _____

Signature: _____

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PROTECTIVE GEAR

One of the most important questions to address before recovering the airplane is: what protective clothing and gear do you need? During the process of recovering your plane, you will be using potentially dangerous chemicals. The correct protective apparel is essential for minimizing health risks and for creating a safe work environment.

The following is a list of the recommended gear you should use during the recovering process:

Respirator System: Fresh air supply or combination unit that supplies both fresh air and pressure to the spray gun.

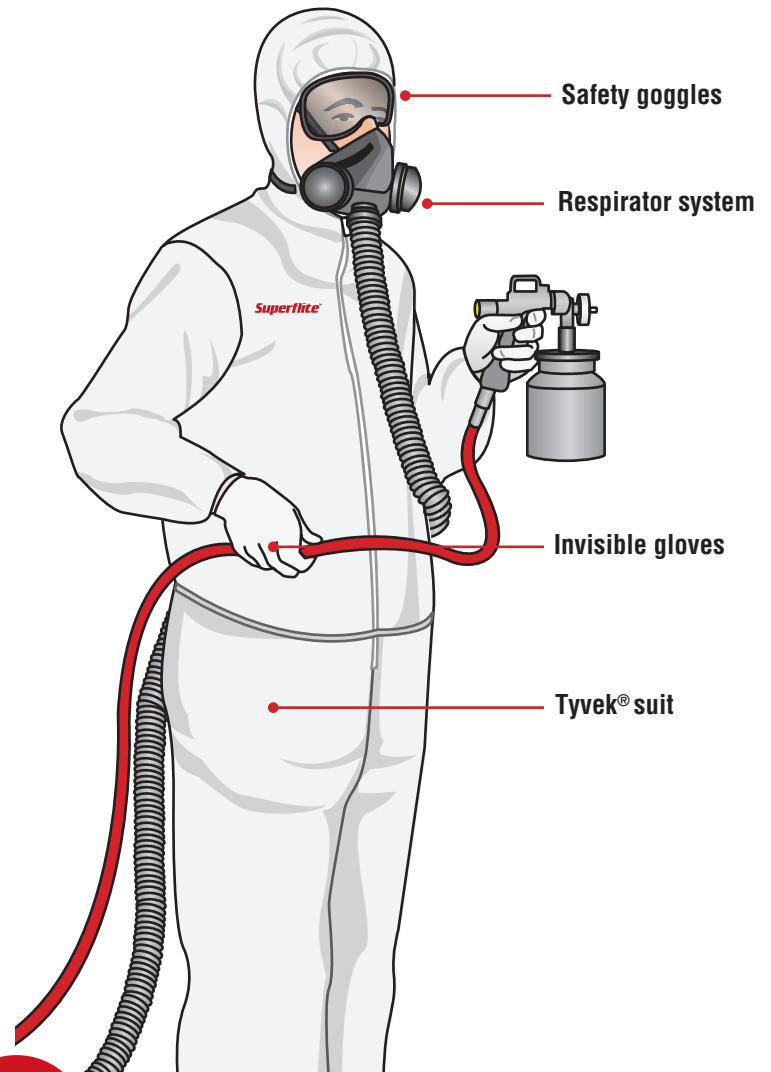
Gloves: Invisible or latex gloves.

Eye Protection: Safety goggles.

Protective Clothing: Tyvek® suits.

All of the above items listed are available through Superflite. Call or visit our website.

Figure 2.1 | Protective Gear



To protect you and your clothing, the Tyvek® suit should cover you from head to toe.

SUMMARY

Before taking off to the next chapter you should know:

- Safety is the number one priority as you recover your airplane. It is important to have the proper protective clothing and gear along with keeping the work environment clean, organized, and secure. We'll talk more about the work environment in the next chapter.
- Be familiar with the FAA regulations, the inspections that are required, and the forms you need to submit for airworthiness approval.



Visit www.superflite.com, or scan this QR code with your smartphone or tablet, for a complete listing of your aircraft covering needs!



GETTING ORGANIZED

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OVERVIEW

“Preparation is half the battle...” Don Quixote’s quote says it all when getting started with recovering your airplane. Like a good flight plan, preparation will help you navigate through the project, make the flight smoother, and ensure a successful landing. Here are some important topics we will be discussing in this chapter to get your project organized:

- The ideal workspace
- Building a spray booth
- Climate control
- Equipment, tools, and materials

THE WORKSPACE

Preparation

For the best results, you need to take the time to properly prepare your workspace. The first item to determine is the square footage you will need. When calculating this area be sure you have enough room for storage of disassembled parts, recovering and painting of the frame, tools, and re-assembly of the plane.

Ventilation

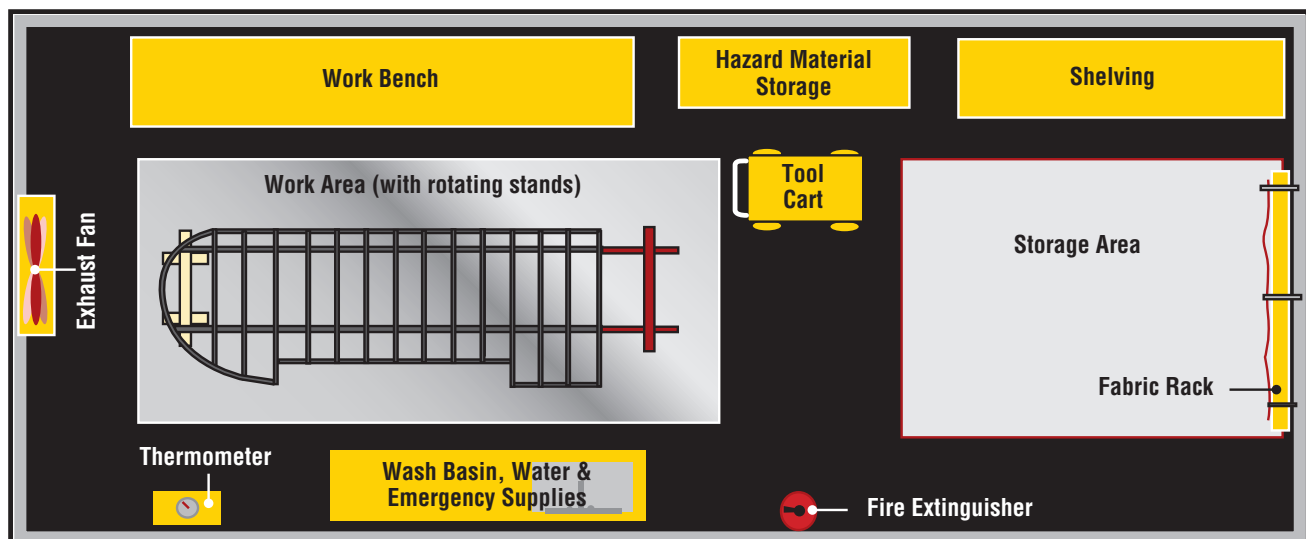
The next consideration is ventilation. During the process of recovering your plane, you will generate spraying mist, sanding dust, and vapors. Ideally, the workspace will have a fan built into the wall. Another option would be

to use window fans. If possible, avoid open-air ventilation while painting due to airborne particles that will contaminate the new finish.

Lighting

Proper lighting is very important. From finding frame defects during initial inspection, to checking the evenness of the final coat of paint, you will need balanced “explosion proof” lighting. Supplement existing lighting if necessary. Be certain all lighting used is approved for a paint booth environment. Avoid units that centralize the light to a small area.

Figure 3.1 | Ideal Workspace



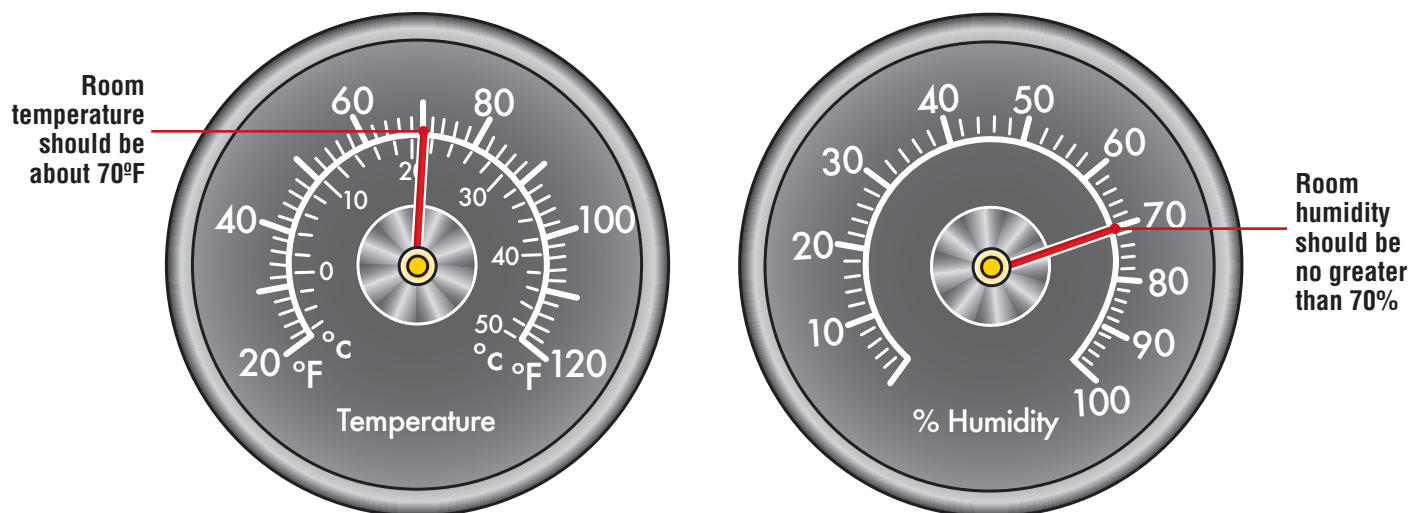
Make sure there is a source of water available. This is important to have in case there is an emergency. Check the number and location of the electrical outlets. Heavy-duty electrical cords may be needed to reach the work areas. Portable work lights may present a fire hazard resulting in property damage or injury. Follow manufacturer guidelines for proper use.

Climate Control

As a general rule, you do not want to recover an airplane in extreme weather conditions (e.g., below 40°F). Ideal painting conditions are

70°F with no greater than 70% humidity. One of the advantages of Superflite System 7 is that humidity is not a significant factor. Humidity and the Superflite System 7 will not create condensed water vapor, or “blush”, on the paint as it dries. Temperature, on the other hand, is a factor when mixing the paint with the reducer and it can affect the curing of the paint. We will discuss this in more detail later in the manual.

Figure 3.2 | Recommended Temperature and Humidity

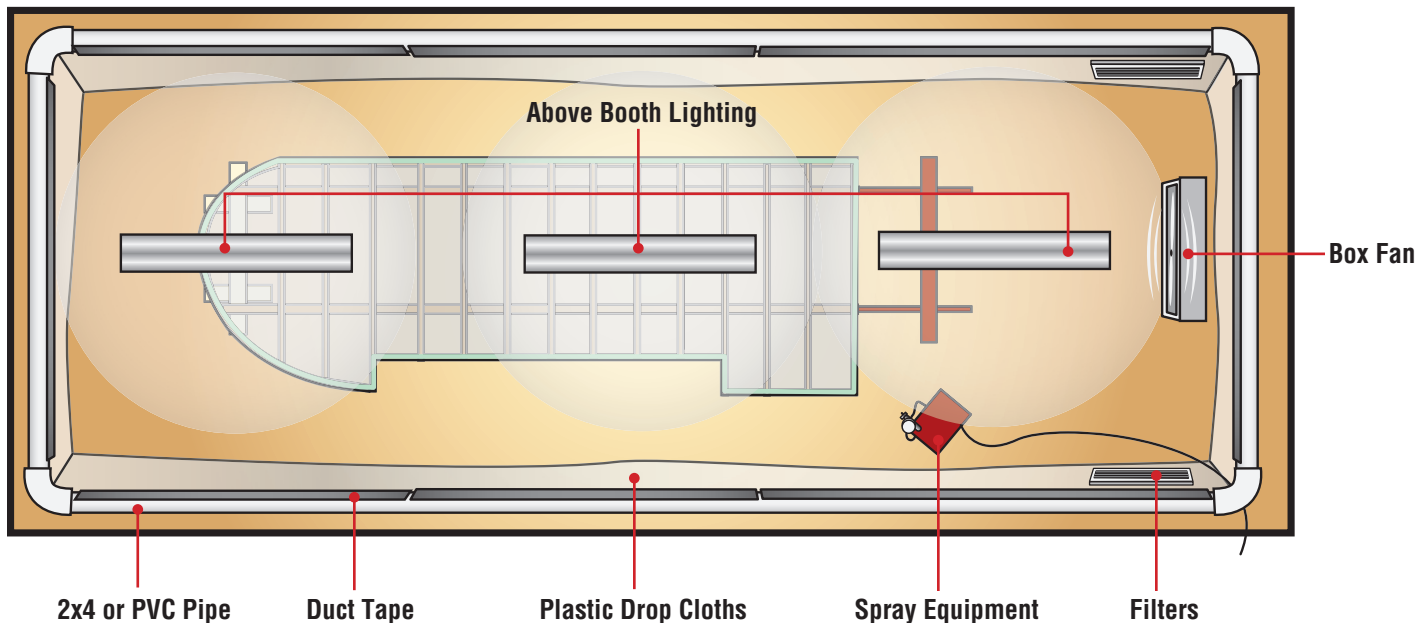


Custom Spray Booth

You are going to need a spray booth for spraying primer and paint. Creating a make-shift paint booth can be fairly inexpensive. The most popular booths use 2x4's, or PVC pipe, and plastic drop cloths. A box frame can be built out of these materials. The size of the frame really depends on your aircraft. Once the frame is built, cover it with plastic drop cloths using a staple gun, or duct tape, to hold the plastic in place. A simple box fan at the inlet

will produce enough air flow to inflate the walls of the booth and keep the air moving through. On each side of the box fan, filters should be cut into the plastic drop cloths to filter the air. Proper lighting will need to be available above the booth. You may even want to consider side lighting. If you'd like to get more advanced, drywall can be installed instead of plastic. Ports can also be added for both compressed air, for spraying, and a vacuum for vacuum bagging.

Figure 3.3 | Custom-Built Spray Booth



EQUIPMENT, TOOLS, AND MATERIALS

The recovering of your airplane with Superflite System 7 can be done with everyday equipment and tools. We will discuss the tools and equipment that you'll need in each section as well. The exact materials and quantities depend on the type of airplane and airframe on which you're working (e.g., wood, aluminum, steel, or composite). Here are some general shop fixtures we recommend you have:

Shop Carts: Sturdy construction with wheels.

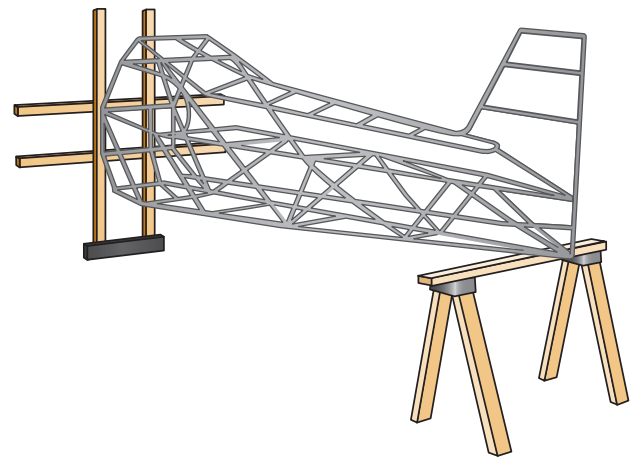
Sawhorses: Heavy duty, standard 30-1/8" high with plywood on top.

Rotating Stands: We recommend using a rotating stand (or stands) for work on the fuselage and wings. This will assist in moving the part as you work on it. You can build a simple stand out of 2x4 lumber, or purchase them commercially. With either choice, it is important to make sure the mounting holes for the engine mount and rotating stand are centered. Otherwise, the fuselage will turn unevenly.

The Superflite System 7 is approved for use on most certificated aircraft. Consult the charts on pages 20–22 for the general materials and tools you will need. Call Superflite for specific materials that pertain to your airplane.

Figure 3.4 | Examples of Rotating Stands

Wood Stand & Sawhorse



Rotating Stand & Sawhorse



MATERIALS

Superflite Materials	Part Number	Purpose
Heavy Certified Fabric ^{1 2}	SF101	Covering
Medium Certified Fabric ^{1 2}	SF102	Covering
Lightweight Uncertified Fabric	SF104	Covering
SF102 Surface Tapes ¹	See Tape Chart	Covering
SF104 Surface Tapes	See Tape Chart	Covering
Round Rib Lacing Cord ^{1 2}	SF693-400	Rib stitching
Flat Rib Lacing Cord ^{1 2}	SF694-500	Rib stitching
Rib Bracing Tape	1/4" to 1/2" wide	Airframe preparation
Anti Chafe/Reinforcement Tape ¹	1/4" to 1" wide	Airframe preparation and covering
Standard Drain Grommets ^{1 2}	L274	Covering
Seaplane Drain Grommets ^{1 2}	L271	Covering
Inspection Rings ¹	483-15	Covering
Domed Inspection Plates ^{1 2}	SF-225	Covering
Recessed Inspection Plates ^{1 2}	SF-325	Covering
Machine Sewing Thread ¹	SF-69	For sewing fabric envelopes
Hand Sewing Thread ¹	SF-207	For sewing fabric envelopes
Adhesive ¹	U-500	Attaching fabric and tapes to the structure
Acetone	Acetone	Thinning the U-500 adhesive
Superwash	Superwash	Surface clean up before priming and painting
Primer Base ¹	SF7500	Fabric filler, primer, and UV protection
Primer Catalyst ¹	SF7600	Catalyst for SF7500
Mid Temp Reducer ^{1 2}	SF7870	Used with SF7500 fabric primer, SF80 epoxy primer, and Superflex topcoat
Warm Temp Reducer ^{1 2}	SF7885	Used with SF7500 fabric primer, SF80 epoxy primer, and Superflex topcoat
Hot Temp Reducer ^{1 2}	SF7895	Used with SF7500 fabric primer, SF80 epoxy primer, and Superflex topcoat
Epoxy Primer	SF80	Frame preparation and priming of metal parts
Epoxy Primer Catalyst	SF820	Catalyst for SF80
Epoxy Varnish	SF90	Wooden frame preparation
Epoxy Varnish Catalyst	SF920	Catalyst for SF90
Superflex System 7 Color ¹	Topcoat	Call or visit our website for color chart
Superflex Color Catalyst ¹	SF7950	Catalyst for System 7 topcoat

¹ These items are part of the FAA-approved Kit SF-D.

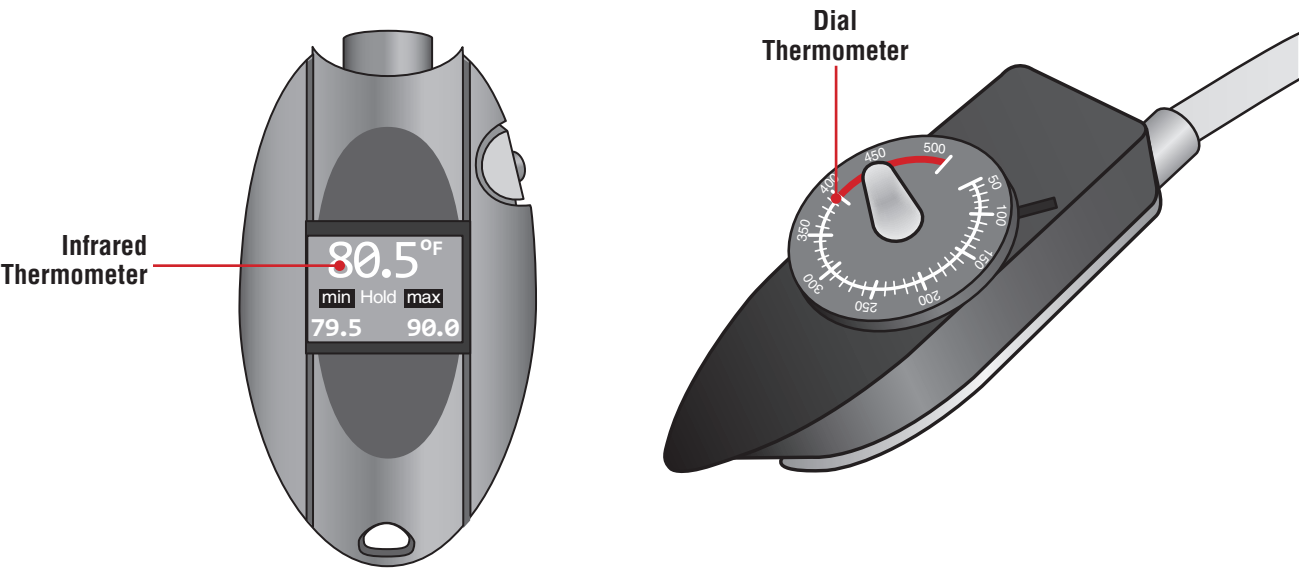
² Optional per application or other requirements, such as air temperature.

TOOLS

Superflite Tools	Part Number	Purpose
Viscosity Cup	SF-W3530	Measuring primer
Gluemaster Glue Gun	KA25B25	Attaching fabrics and tapes
Infrared Thermometer*	SFT1000	Covering
Pocket Thermometer*	SFT1001	Covering
Rib Stitching Needles	2½” to 18” Length	Rib stitching
Small Hobby Sealing Iron	SF361	Fabric tautening for surface tapes and edge
Mesh Strainer	SF-010601	Straining paint and primer

*Only one thermometer is required. You may choose between an infrared or dial-type.

Figure 3.5 | Examples of Iron Thermometers



GENERAL SUPPLIES

Supplies	Description	Purpose
Buckets	5 Quart	Cleaning and mixing
Chalk Line	Standard blue from hardware store	Marking stitching points
Clamps	Soft jawed	Hanging and clamping
Cleaning Products	Non-sudsing cleanser and dish detergent	Cleaning parts and surfaces
Drop Cloths	Non-abrasive or plastic	General protection
Gloves	Latex or rubber	Skin protection
Household Iron	1,100 Watt minimum	Fabric tautening
Masking Paper	Automotive type	Painting trim
Notebook	Any spiral bound book	Notes on project
Pencil	No. 2	Marking
Razors	Straight edge	Cutting
Sandpaper	320-600 Grit	Sanding surfaces
Scissors	Pinked and sharp straight edge	Cutting fabric, tapes, and cords
Striping Tape	Fine line	Painting trim
Respiratory System (with fresh air)	Single fresh air breathing system with mask and hose	Priming and painting
Sprayer System (with fresh air)	HVLP spraying system and fresh air breathing unit	Priming and painting
Tape Measurer	6 Feet	Rib stitch spacing
Terry Cloths	Clean and lint free	Cleaning surfaces

SUMMARY

Before taking off to the next chapter you should:

- Know how to organize your work area. It should have proper lighting, ventilation, and space. There should be storage space, shelving, and secure protective containers for glue, primer, and paint mixtures, as well as a spray booth.
- Have made (or purchased) the fixtures and gathered all the tools and materials you will need.

PREPARING THE AIRFRAME

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OVERVIEW

We are just about ready for the first leg of our flight to make your pride and joy look like a million bucks. We have organized this chapter into the steps you need to take, depending on the type of airframe (e.g., wood, aluminum, steel, and fiberglass), and what you need to do specifically for each.

By the time you land you will have:

- Removed the old fabric from the airframe
- Inspected, cleaned, and repaired the airframe
- Primed the airframe
- Applied anti-chafe tape and inter-rib bracing cord
- Conducted an FAA-approved type of inspection

REMOVE THE FABRIC

The process of removing the fabric is common to all types of airframes. Before you begin to remove the fabric, do a visual inspection of the outside surface. Look for cracks and bleed-through caused by rust, tears, and external damage. These will be prime locations for internal damage. Record your findings with a sketch or mark up the old fabric.

All you need at this stage is a sharp razor knife (with replaceable blades) or single edge razors. The golden rule when removing the fabric is – **Do not rush! Take your time!** You will be using the old fabric as a template for placement of new inspection rings, rib stitching, and possible envelope patterns. So, take special care with the old fabric.



This is a great time to take pictures and/or videos – before, during, and after the removal of fabric, hardware, parts, etc. This is extremely important on rare airplanes that don't have reference data.

To remove the fabric:

- 1 Using the razor knife, or single edge knife, cut the old fabric. **Note:** Cut as few pieces as possible.

Be careful to **NOT** cut into metal structure. Cutting deep grooves into the metal while attempting to remove the fabric can compromise the integrity of the airframe.

- 2 Carefully roll and pull the fabric back. If there is resistance, **STOP**. Use the chart on page 27 to help solve your problem.

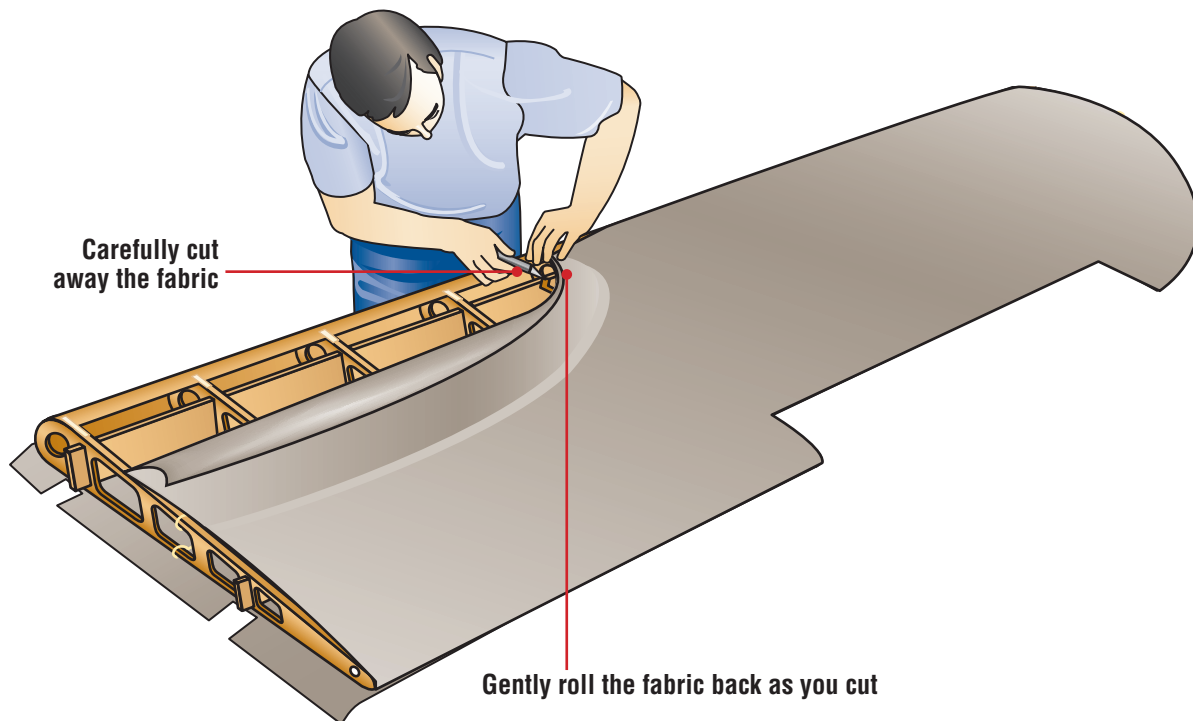
- 3 Record the width of the rib caps. You will need this information later when you lay out the rib stitches in Chapter 5.

- 4 Store the old pieces in an area where you can hang or lay them flat. Remember, you will need them for future reference.



Pulling the fabric before removing a source of resistance may damage the airframe. Eliminate sources of resistance before removing the fabric. For example, remove the pk screws, martin clips, or rib stitches before detaching the fabric.

Figure 4.1 | Cut and Roll Back the Fabric



FABRIC REMOVAL TROUBLESHOOTING

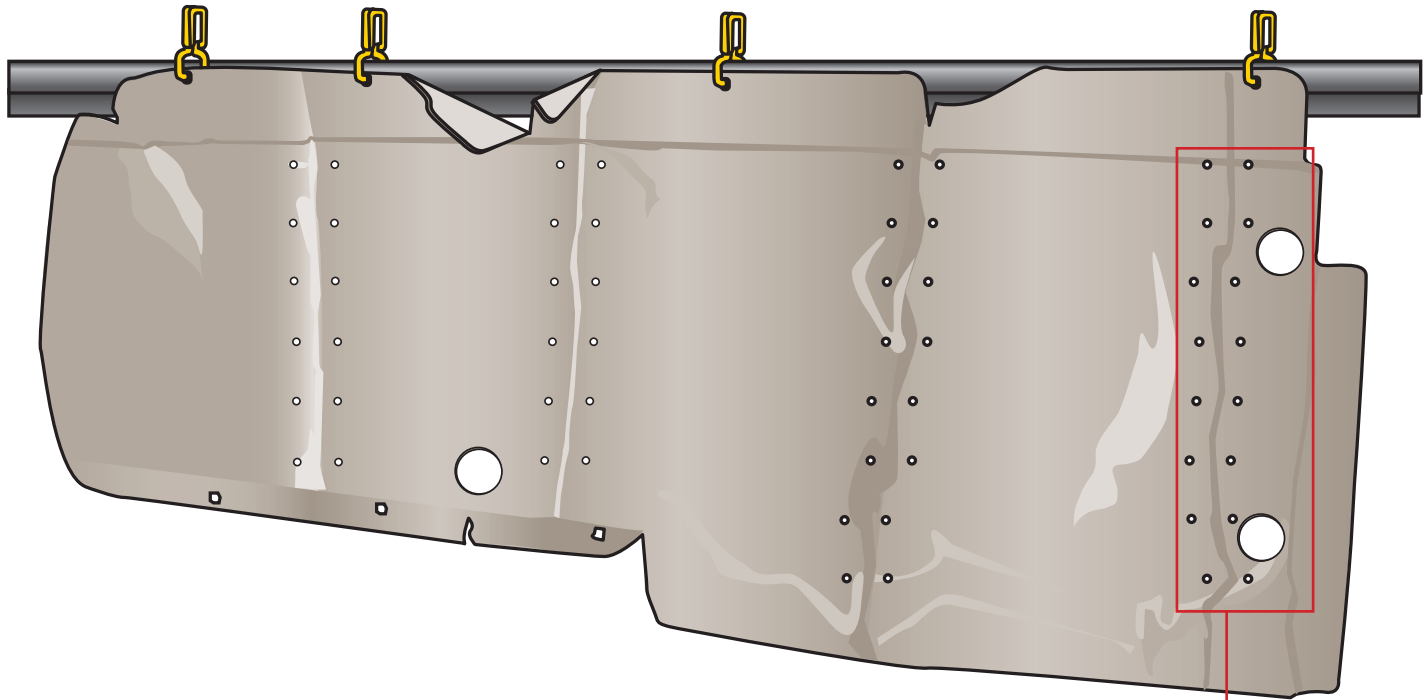
Problem

The fabric is still bonding to the frame
Clips, screws, or fasteners are in the way
Stitching is present

Solution

Use Acetone, or some other solvent, to help soften the area
Remove them before pulling the fabric
Carefully cut the stitching with a razor knife

Figure 4.2 | Hang the Removed Fabric



IMPORTANT!

Note the location of inspection holes, drain grommets, and rib stitch spacing

INSPECT, CLEAN & REPAIR AIRFRAME

Once the old fabric is removed, you can do the initial inspection of the airframe, begin the clean up, and perform any necessary repairs. Although it is not required at this stage, we strongly recommend that you have an A&P mechanic go through this inspection with you. Utilizing this expertise will help ensure necessary repairs are identified to potentially save you time and money. Another invaluable resource to have during this inspection is the FAA Advisory Circular 43.13.

With all airframes, you should inspect for corrosion, cracks, loose or broken parts, and physical damage. On a wood airframe, you should also check for decay, bond failure in the joints, and varnish finish. Inspection is normally done visually, by touch, or by gently probing with a pointed instrument, such as an awl or a scribe. Be careful not to damage the structure by tapping or prying too hard. If there is an area of concern we recommend it be inspected and repaired by a mechanic, or in the case of a non-certified aircraft, a knowledgeable expert.

Major structural repairs to the airframe (wood decay, extensive rust, etc.) are outside the scope of this manual. Follow the directions of an A&P mechanic or refer to AC 43.13. Minor issues, such as elimination of sharp edges and points, should be repaired.

At this time, the clean up and preparation is unique to the type of airframe you have. Follow the directions that pertain to the materials used in your particular project.

Before starting, be sure to protect yourself with the proper safety clothing and gear.



Tyvek® Suit



Gloves



Safety Glasses



Dust Mask

Note: Although this manual describes recovering an aircraft, these prep procedures apply to new aircraft/airframes as well.

PROBLEMS AND SOLUTIONS

Cleaning Problem	Cleaning Solution	Suggested Cleaner
Grease pencil, crayon marks	Wood cleaner	Wood Cleaner® Oil Soap Multiuse Wood Cleaner
Surface oil and grease	Industrial solvent	Naptha
Penetrated oil and grease	Absorbent-type cleaner	Gunsmith Whiting Clothing Spot Lifter K2r™

Wood Frame Preparation

Clean Up: After all the repairs and inspections have been made, you need to clean and prepare the wood for the epoxy varnish. Start by cleaning any grease or lumber crayon marks. Finish cleaning by sanding off any varnish that is flaking. It's not necessary to remove all of the old varnish. The new coats of varnish will adhere to existing varnish. It is important to be sure the existing varnish has good adhesion.

- 4
- Spray or brush on a light coverage coat
See Figures 4.8 and 4.9 for spraying details.
- 5
- Closely inspect your wood pieces for total coverage and touch up those areas that were missed or need additional coverage.
- 6
- Allow the varnished parts to dry/cure overnight before attaching fabric.

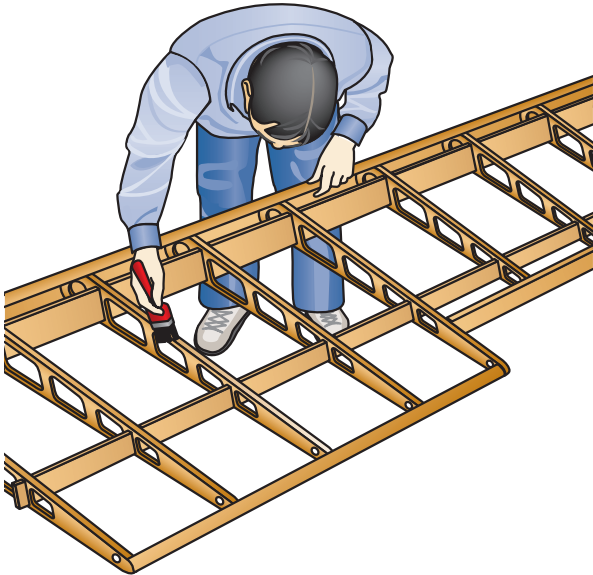
To varnish the wood frame:

- 1
- Thoroughly shake the can of SF90 varnish.
- 2
- Mix 1 part SF90 varnish to 1 part SF920 varnish catalyst and 1 part SF7800-Series reducer. When mixing, if 1 part reducer makes your varnish mixture too thin, cut that to a 1/2 part of reducer.



- 3
- Thoroughly shake or stir the varnish mixture.

Figure 4.3 | Varnishing the Frame

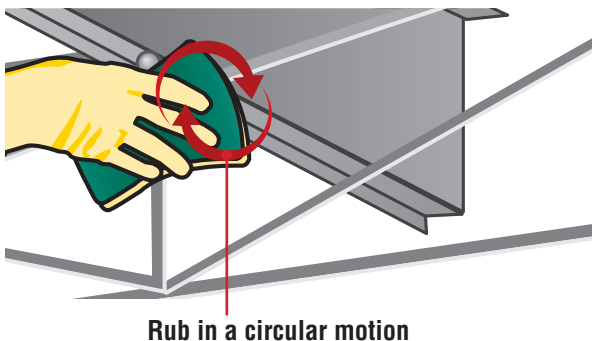


Aluminum Frame Preparation

Clean Up: After all the repairs and inspections have been made, you need to clean and prepare the aluminum for priming:

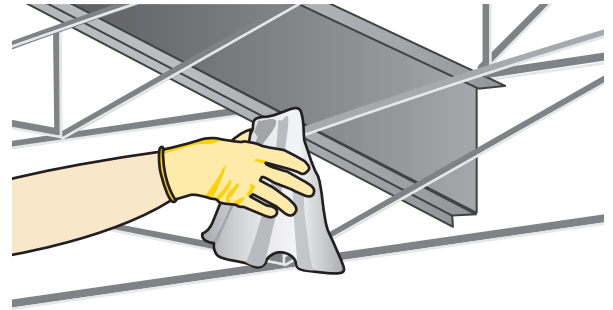
- 1 You will need the following cleaning products:
 - Alumiprep 33 (for new aluminum parts)
 - Alodine
 - Scotch-Brite™ pads
 - Paper towels
- 2 Remove all corrosion with a general purpose Scotch-Brite™ pad or an aluminum wool pad. **IMPORTANT! Do not use a steel brush or steel wool. It will imbed the aluminum with steel particles and promote future corrosion. Avoid blasting the aluminum. It may result in unnecessary surface damage.**
- 3 Using Alumiprep 33, and a general purpose Scotch-Brite™ pad, clean the surface. Rub in a circular motion. Clean small areas at a time. Do not allow the phosphoric acid to dry. Rinse the frame thoroughly with water.

Figure 4.4 | Clean Surface



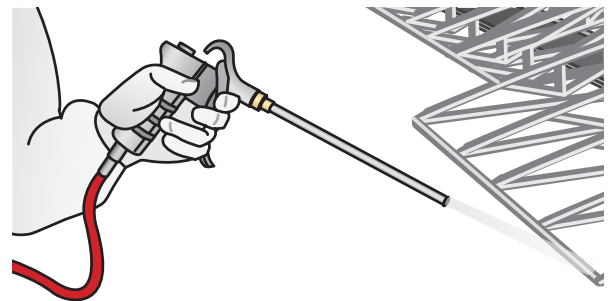
- 4 Dry with paper towels.

Figure 4.5 | Dry Surface



- 5 Blow dry entrapped moisture with compressed air.

Figure 4.6 | Blow Dry Surface



Wear safety glasses and gloves during this procedure.

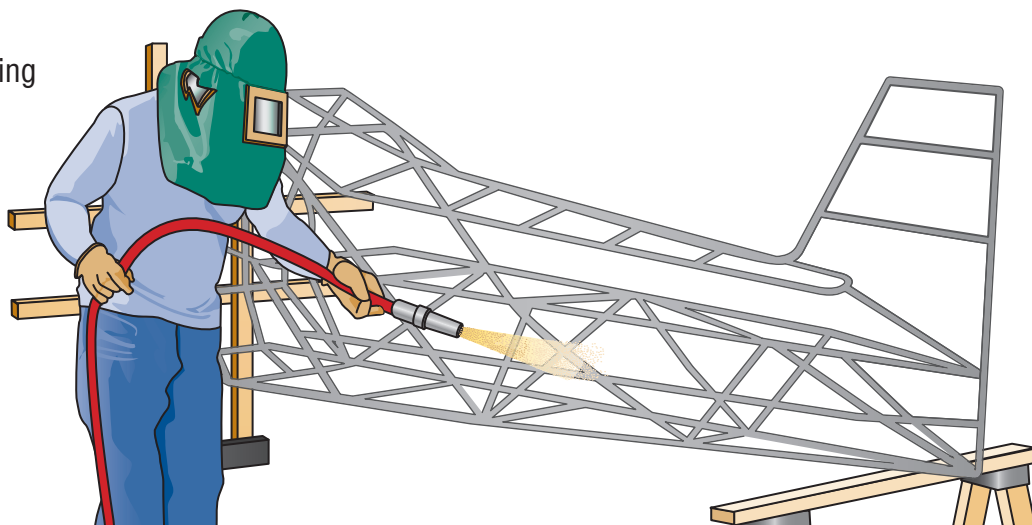
Steel Frame Preparation

Clean Up: After all the repairs have been made, we recommend that the tubes be coated internally against corrosion. Use an approved corrosion inhibitor such as hot linseed oil or Par-al-ketone. Follow the internal tube treatment by cleaning and preparing the frame for priming. This includes internal parts (e.g., attach fittings, steel compression ribs).

IMPORTANT! You should clean, and immediately prime, the aluminum and steel parts as rust forms very quickly.



Figure 4.7 | Media Blasting



MEDIA BLASTING – A cleaning process that uses high pressure air and a variety of media (e.g., sand, plastic) to remove paint, rust, or oxide from a surface.

Media blasting causes airborne particles and dust which may result in eye injury or respiratory problems. Wear protective gear.

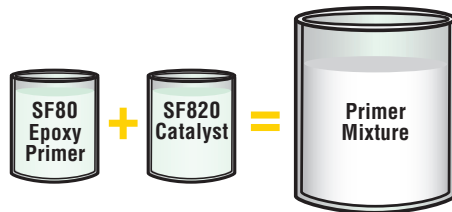
- 1 Media blast the frame with a low abrasive media (e.g., sand). Test the air pressure before blasting the frame. Excessive pressure may cause erosion of the part surface or frame.

IMPORTANT! Only media blast the steel parts. Never the aluminum parts.

- 2 Blow excess debris off the frame with compressed air.
- 3 Wipe down with a clean rag.

To prime the frame:

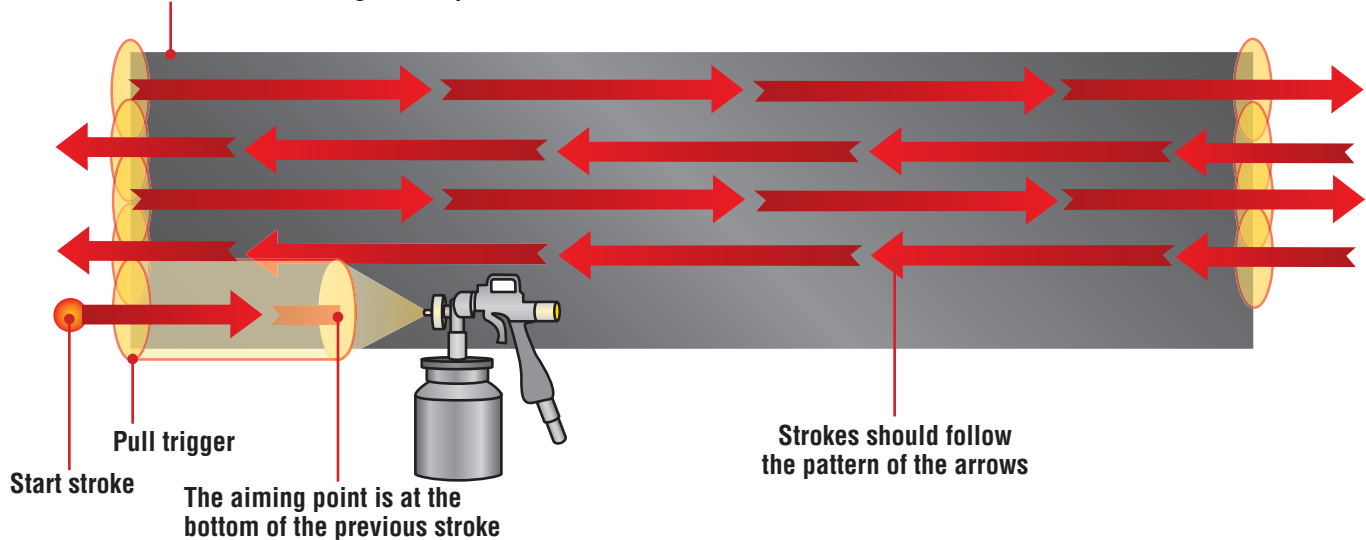
- 1 Thoroughly shake the can of SF80 primer.
- 2 Mix 1 part SF80 Epoxy Primer with 1 part SF820 Catalyst. **Note:** If necessary, thin with any of the SF7800-Series reducers. The amount of reducer used is to your preference. There is no need to use a viscosity cup, but be sure to strain your mixture before spraying.
- 3 Thoroughly shake, or stir, the primer mixture.
- 4 Spray a light coverage coat. See Figures 4.8 and 4.9 for spraying details.
- 5 Closely inspect the frame for total coverage and coat areas that were missed or need additional coverage. **Note:** In order for the epoxy primed parts to cure overnight, the ambient temperature needs to remain at 65°F or above.



CATALYST – A substance that increases the rate of a chemical reaction without itself undergoing any change. Without a catalyst, neither the primer nor the paint will dry.

Figure 4.8 | Spray Pattern

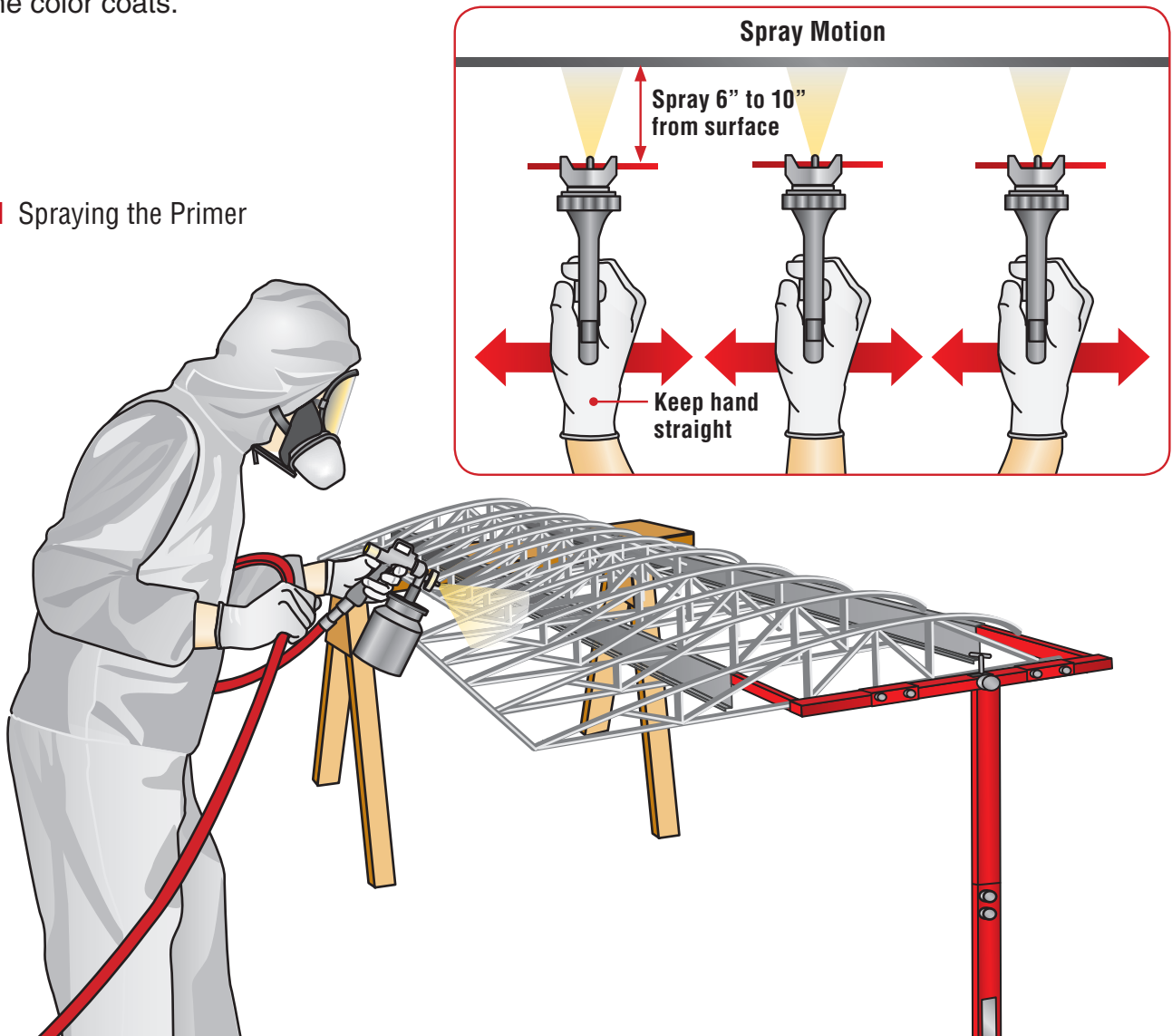
First stroke is aimed at the edge of the piece



Priming

The objective of applying the epoxy primer is to protect the surfaces from corrosion. Although the primer can be sprayed or brushed on, we recommend spraying. Spraying will eliminate extra sanding that you will have to do before applying the color coats.

Figure 4.9 | Spraying the Primer



Composite and Fiberglass Preparation

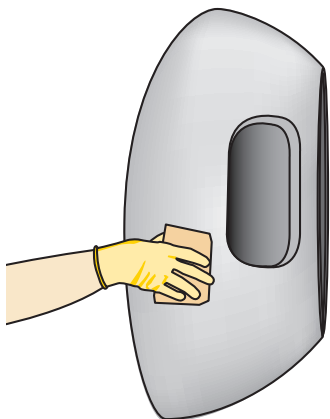
1 You will need the following cleaning products:

- 320 wet/dry sandpaper
- Clean tack rags
- Superflite 7800-Series reducers

2 Before sanding, you will need to clean the fiberglass, or composite, with a 7800-Series reducer. At this point, the temperature of the reducer that you use doesn't matter.

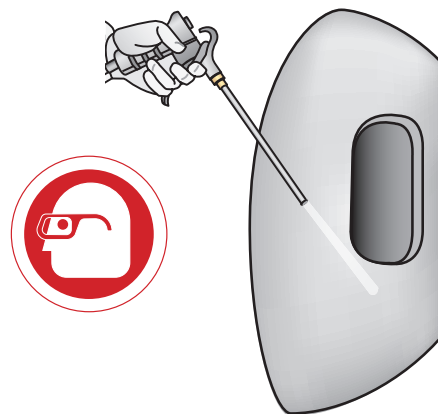
3 Wet sand the fiberglass, or composite, with 320 wet/dry sandpaper.

Figure 4.10 | Wet Sand



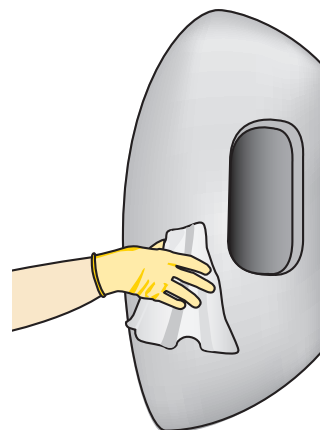
4 Blow off any excess debris with compressed air and allow to completely dry before priming.

Figure 4.11 | Blow Off Debris



5 Wipe with a clean tack rag.

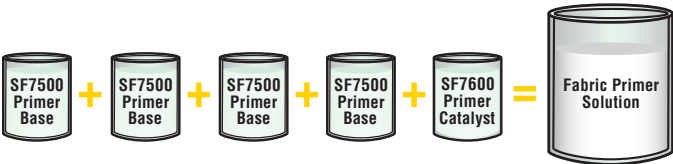
Figure 4.12 | Wipe Surface Clean



i

The Superflite SF7500 fabric primer is the perfect base and filler for fiberglass and composite parts. It has excellent filling properties, which helps to eliminate the pin holing that often occurs on fiberglass and composite. The Superflite SF80 epoxy primer will work well if a good gel coat is already on the fiberglass part.

- To prime fiberglass:**
- 1** Mix 4 parts SF7500 Primer Base with 1 part SF7600 Primer Catalyst. Add reducer for 17 seconds through a No. 2 Zahn cup, or 10.88 seconds through a No. 4 Ford cup.



REDUCER TEMPERATURES

Reducer	Temperature
SF7860	60–70° F
SF7870	70–80° F
SF7885	75–85° F
SF7895	85° F +

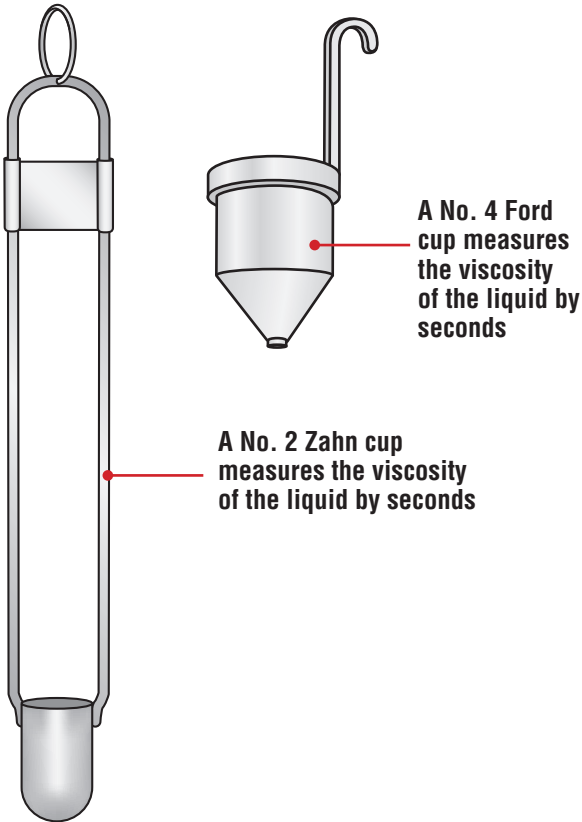
VISCOSITY RATES

Zahn Rate	Ford Rate
17 Seconds	10.88 Seconds
23 Seconds	14.72 Seconds

Viscosity Cups

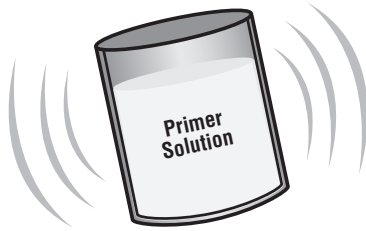
A viscosity cup is a calibrated version of a soup ladle with a hole in the bottom. The size of the hole is different for each type of cup. The ladle is dipped into your primer or paint mixture and filled. Be sure the liquid is level. Timing starts when you lift it out of the mixture and stops when the steady stream breaks up into drips or droplets.

Figure 4.13 | Zahn and Ford Cups



- 2 Thoroughly shake the can of primer mix.

Figure 4.14 | Shake Can of Primer Mix

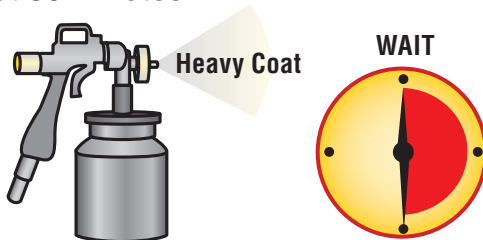


- 3 Pour the mixture through a mesh strainer. Straining the mixture gets rid of any impurities that might compromise the primed finish.

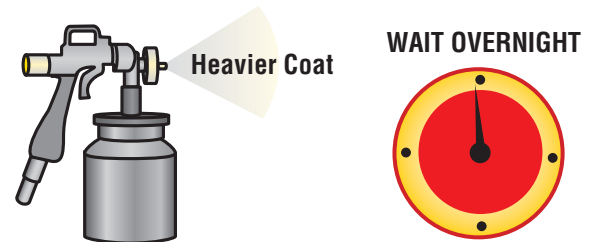
Figure 4.15 | Strain Mixture



- 4 Spray the first coat, it should be on the heavy side (23 seconds through a No. 2 Zahn cup or 14.72 seconds through a No. 4 Ford cup). Allow it to dry to the touch, or “tack-up”. Wait about 30 minutes.

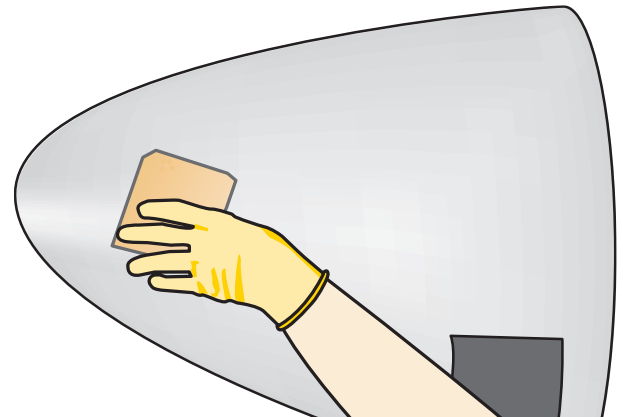


- 5 Spray a second, also heavy, coat of primer mix (23 seconds through a No. 2 Zahn cup or 14.72 seconds through a No. 4 Ford cup). Allow the primer to dry overnight at room temperature.



- 6 Smooth the surface, and remove any dust or debris that may have collected by VERY lightly wet sanding with 320 grit wet/dry sandpaper.

Figure 4.16 | Lightly Wet Sand



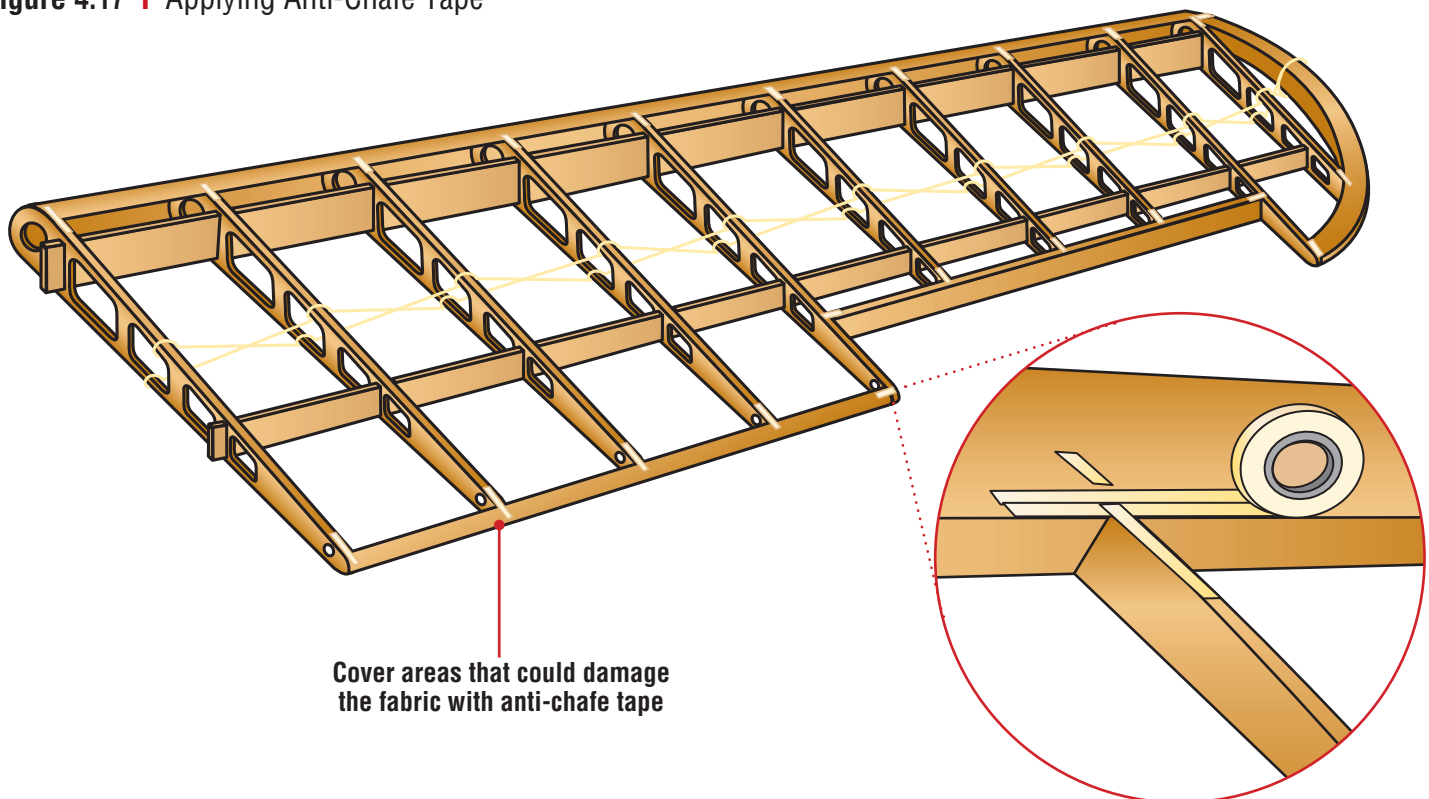
ANTI-CHAFE TAPE & INTER-RIB BRACING

Anti-chafe tape is used to protect the fabric from cutting, chafing, and tears. It is very important to either tape over, or remove, potential problems such as sharp edges, metal seams, protruding screws, bolt heads, nails, and rivets. The tape is an easy-to-use self-adhesive, and it comes in various widths (from $\frac{1}{4}$ " to 1").



Use Superflite anti-chafe tape (Superflite PN: SF-REINF) and inter-rib bracing cord (Superflite PN: SF-TWILL) only. Tapes such as paper masking tape, duct tape, and aluminum-faced tape will cause problems such as mold, corrosion, and it could have bond failure due to heat.

Figure 4.17 | Applying Anti-Chafe Tape



Inter-rib bracing cord helps keep the ribs straight and parallel when the fabric is heat tightened. It should be centered between the spars.

To apply the inter-rib bracing cord:

- 1 Loop the cord around the top capstrip of a rib. **Note:** Use two separate strips of cord.
- 2 Proceed to loop it around the bottom capstrip on the next rib. This sequence is repeated until the entire wing is braced.

- 3 Check that the ribs have not moved and are parallel.

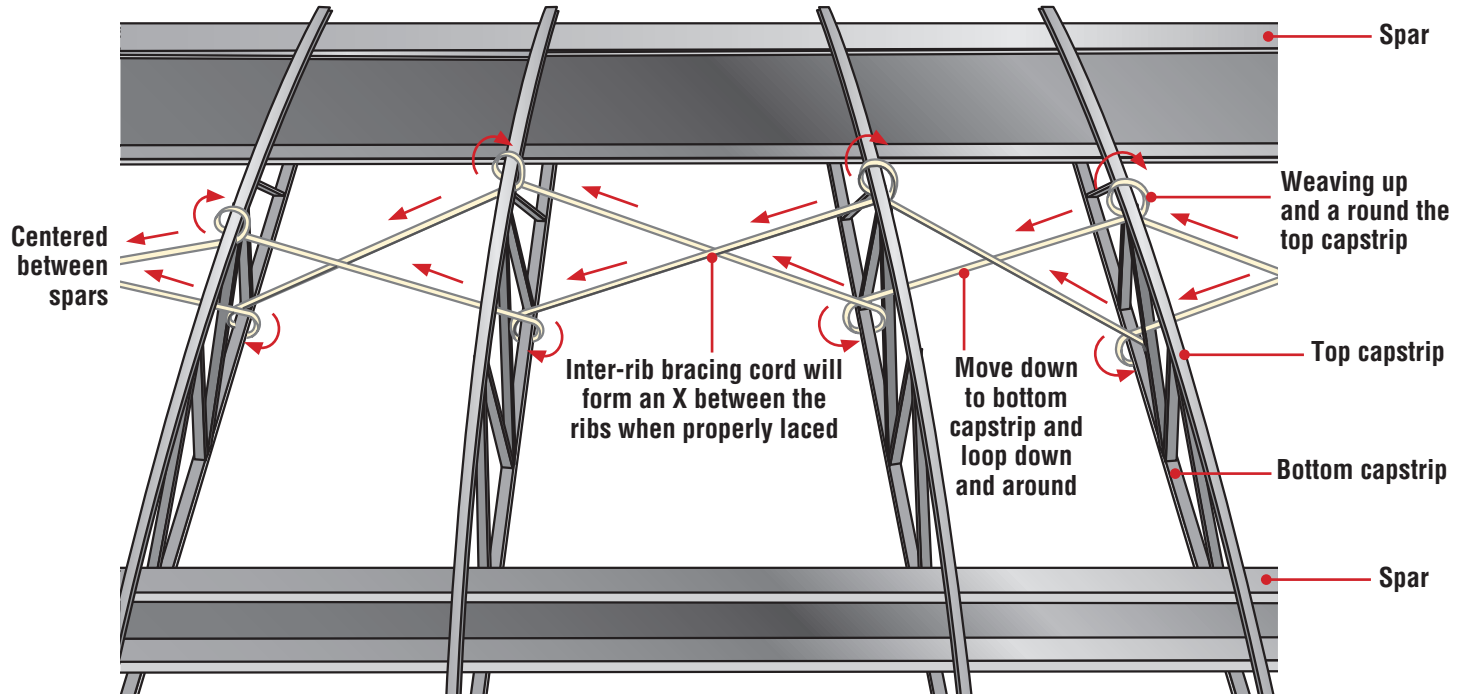
- 4 Tighten the inter-rib bracing cord and tie ends together. **Note:** The cord now has an “X” configuration.

STOP

FAA-APPROVED INSPECTION REQUIREMENT

Before moving on to covering, you will need to have a licensed A&P/IA inspect and approve any work performed.

Figure 4.18 | Bracing the Inter-Rib Bracing Cord



SUMMARY

Before taking off to the next chapter you should have:

- Prepared the airframe so it can be approved for covering by your A&P with inspection authorization. This includes everything from removing and storing the old fabric, to applying primers and anti-chafe tape.
- Cleaned the frame, inspected it, and made any necessary repairs. It is very important to do a thorough job and double check. The old saying “measure twice, cut once” is appropriate here.
- Received approval from your A&P/IA, and now you’re on your way to covering the frame.



Always ready to help you find the aircraft covering supplies you need, our sales representatives are available Monday–Friday, between 8am and 5pm CST, or visit www.superflite.com to see a complete listing of your aircraft covering needs!

COVERING THE AIRFRAME

PRE-FLIGHT CHECKLIST

	Overview	41
	Covering Methods	42-62
	Fabric Tautening	63-66
	Rib Stitching	67-73
	Drain Grommets & Inspection Rings	74-76
	Finishing Tape & Patches	77-82
	Summary	82

OVERVIEW

Congratulations, your airframe has been approved for covering! We understand that it was a lot of hard work, but it will result in a longer life for your aircraft covering.

Now we're going to get into the nuts and bolts of the project – preparing and attaching the fabric. At the end of this leg, your plane will be ready for that awesome paint job.

By the time you land you will have:

- Attached the fabric to the structure
- Tightened the fabric (tautening)
- Secured the fabric with rib stitching or other mechanical fasteners
- Installed inspection and drain holes
- Applied finishing tape and patches

COVERING METHODS

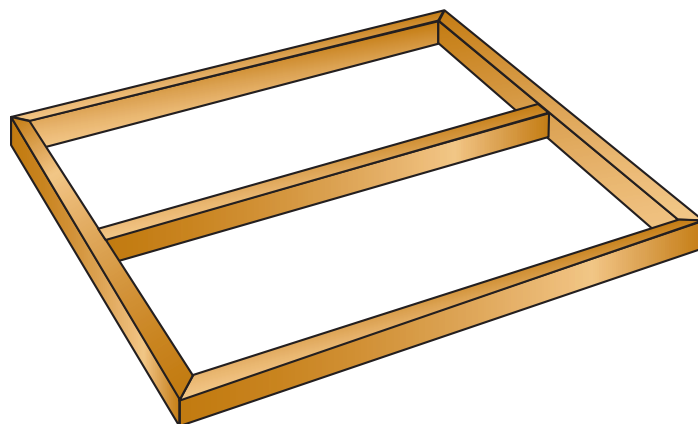
Your first step will be to attach the fabric to the frame. This includes determining which method you want to use, measuring and cutting the fabric, applying adhesive to the frame, and finally attaching the fabric. When you have completed these, you should have covered the frame with a smooth and taut surface. Again, it is important to **take your time** and prepare before starting. If you do make a mistake, don't panic. The Superflite System 7 is easy to adjust and repair.

Test Panels

For the beginner, we recommend that you make a test panel. Make a square frame with a rib, either out of wood or metal, to practice on before starting the actual procedure. After making the frame, see pages 42–62 for the steps to attach the fabric. You will use the test panel(s) to practice:

- Attaching the fabric
- Rib stitching
- Applying the primer and paint

Figure 5.1 | Practice Frame



Covering

Before diving into the covering of a wing, or fuselage, start with a control surface, like a rudder or a flap. If you make a mistake, or mess up the covering on a smaller piece, you won't feel as bad taking it apart and starting over.

Materials and tools you'll need:

- Fabric (see page 20)
- Adhesive (Superflite U-500)
- Acetone
- Sharp straight-edge scissors
- Pinking shears
- KA25B25 Superflite glue gun

Approved Methods

There are two approved methods for attaching the fabric to the airframe. They include pre-sewn envelopes, and the all-adhesive cement method. You may use one method, or a combination, depending on your aircraft. The all-adhesive method is the most popular. In the following pages, we will describe the basic steps of attaching the fabric for each method.

Covering a Wing With a Pre-Sewn Envelope

If cosmetics are not an issue, then envelopes can save a little time. If you plan to sell the airplane someday, that thick seam on the

leading edge could be an issue with the purchaser. If cosmetics are important, you should consider using the blanket method.

- 1 Be sure the wing is properly prepared as discussed in the previous chapter.
- 2 Mix 2 parts Acetone with 1 part U-500 to create a reduced U-500 adhesive solution.

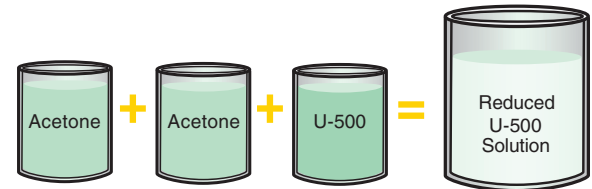
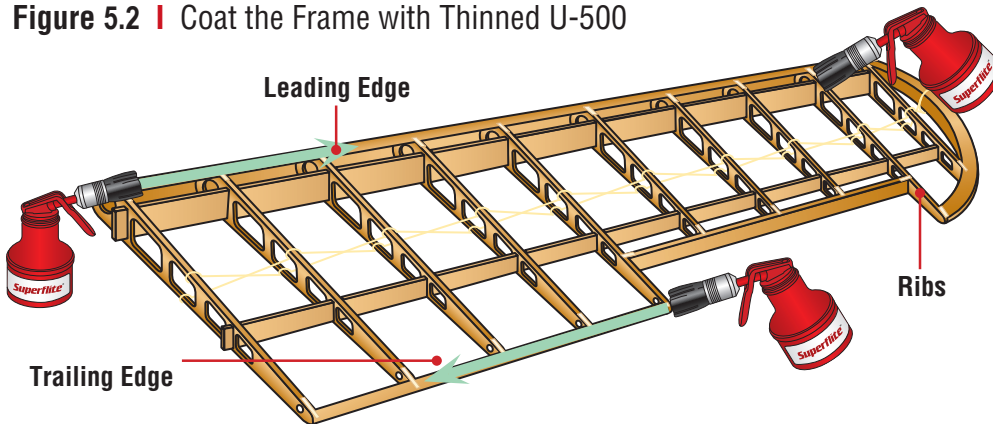
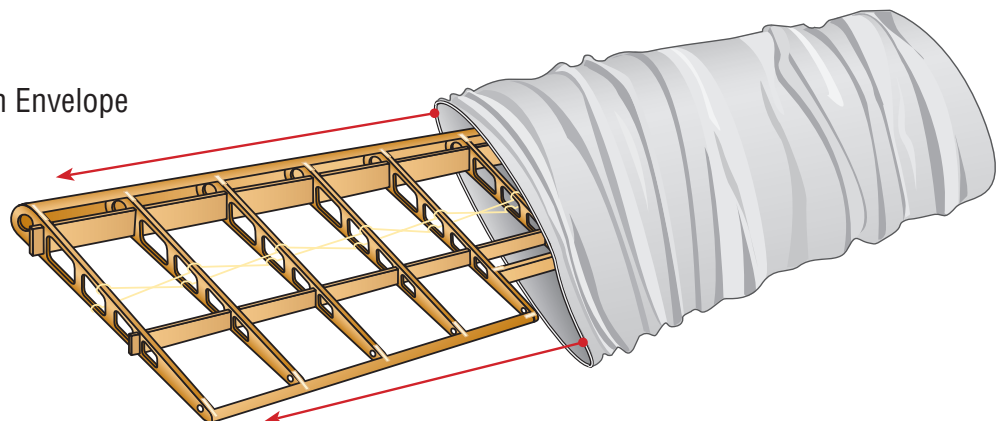


Figure 5.2 | Coat the Frame with Thinned U-500



Note: U-500 adhesive needs to be applied to all sections of the frame that will come in contact with the fabric. This helps seal the fabric, and prevents wicking when the fabric primer is applied. If you drip any glue on the fabric, wipe it off with acetone. Leaving glue drips on the fabric will cause imperfections in your primed and painted surface.

Figure 5.3 | Slide on the Pre-Sewn Envelope



- 3 Coat the leading edge, trailing edge, and tops and bottoms of the ribs with the reduced U-500.
- 4 Slip the pre-sewn envelope over the wing and close all open seams with reduced U-500. This will ensure that adequate material is available for those areas. If these areas are not glued before tautening, you could run the risk of no material left to glue after the fabric is tautened.
- 5 When glued areas have dried, tauten the fabric on both sides of the wing. See page 63 for fabric tautening.

- 6 Now that the fabric is tautened, apply a coat of thinned U-500 glue to the same areas detailed in Step 3. After tautening the fabric, move onto page 67 for rib stitching and continue the process of covering the wing through the end of Chapter 5.



Keep in mind, the seam on the leading edge will slip in different directions as the fabric shrinks under the heat of the iron. This can result in an unsightly uneven seam on the leading edge of the wing. Use the Superflite Gluemaster Glue Gun for a steady flow of adhesive.

Figure 5.4 | Tauten the Fabric

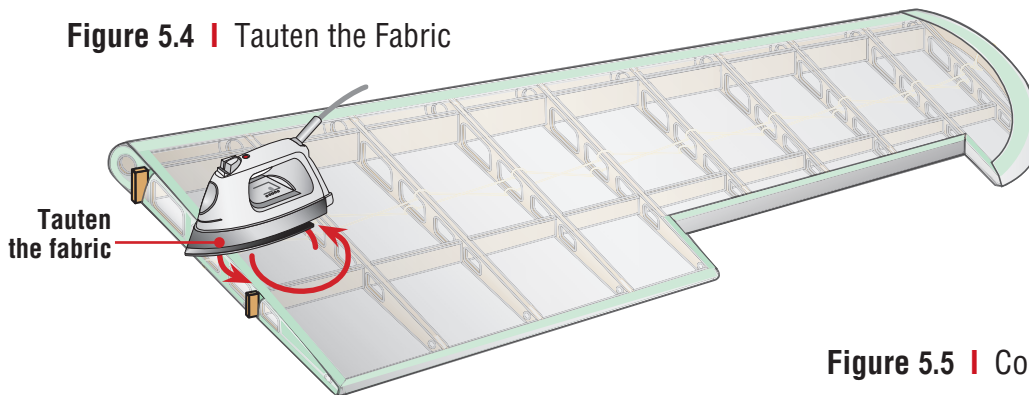
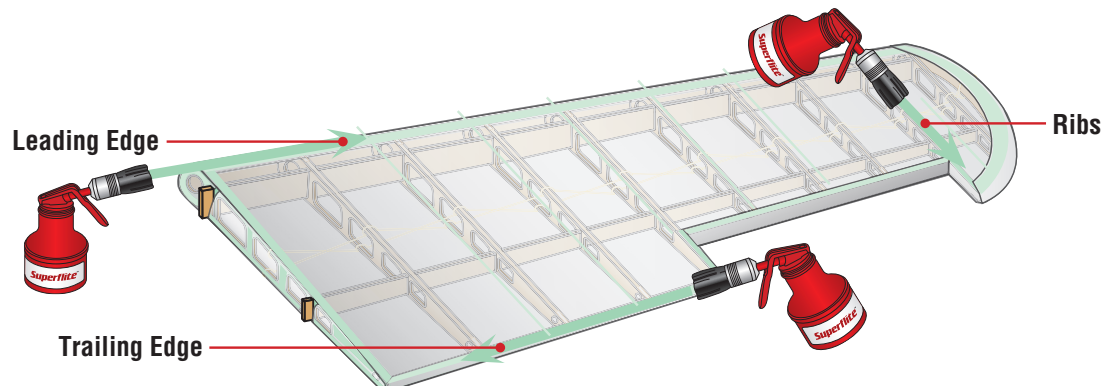


Figure 5.5 | Coat the Frame with Thinned U-500

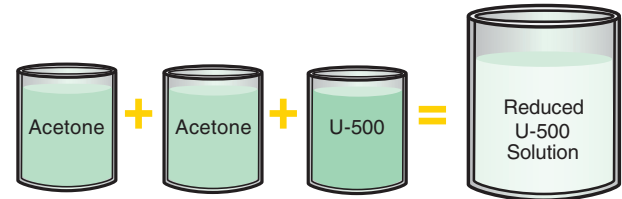


Covering a Fuselage with a Pre-Sewn Envelope

This is generally the most popular method of covering a fuselage. Pre-sewn fuselage envelopes are open on one side – the bottom, or belly. A separate piece of fabric is used to cover the belly of the plane. The belly of the fuselage takes quite a beating and often requires fabric repair. Instead of tearing off the entire envelope, the belly section can be torn off and recovered. The sewn seam runs along the top of the fuselage.

- 1 Before attaching the pre-sewn envelope, be sure the fuselage frame is properly prepared as discussed in Chapter 3.

- 2 Mix 2 parts Acetone with 1 part U-500 to create a reduced U-500 adhesive solution.

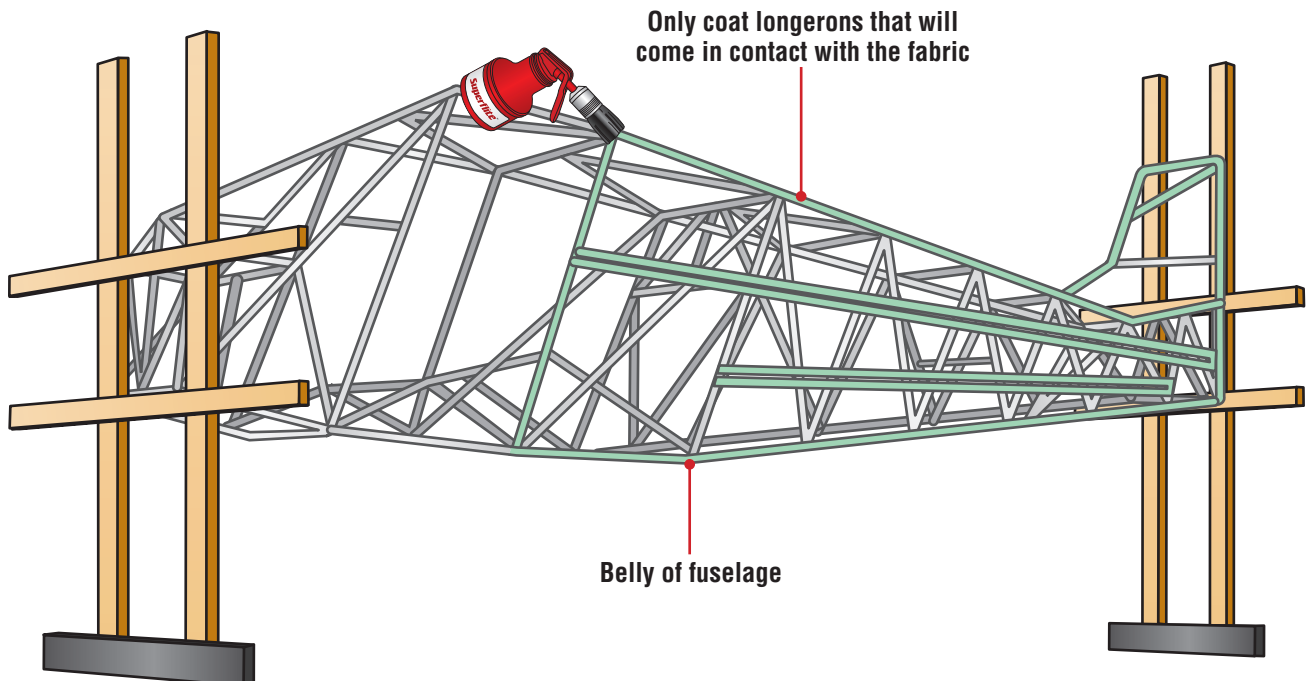


- 3 Coat all the longerons and surfaces that will contact the fabric with the reduced U-500 adhesive solution.



Because the belly of the fuselage usually sees the most wear and tear, use the SF101 heavy fabric for extra reinforcement.

Figure 5.6 | Coat the Longerons with Adhesive



- 4 Drape the pre-sewn envelope over the fuselage, leaving the belly open.



Always keep the belly of the fuselage open. You will be covering it with another piece of fabric.

- 5 Mix 3 parts Acetone with 1 part U-500 to create another reduced U-500 adhesive. Attach all envelope edges with this solution.

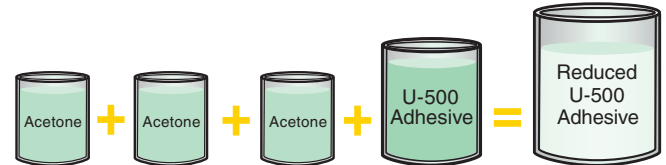


Figure 5.7 | Cover the Fuselage with Pre-Sewn Envelope

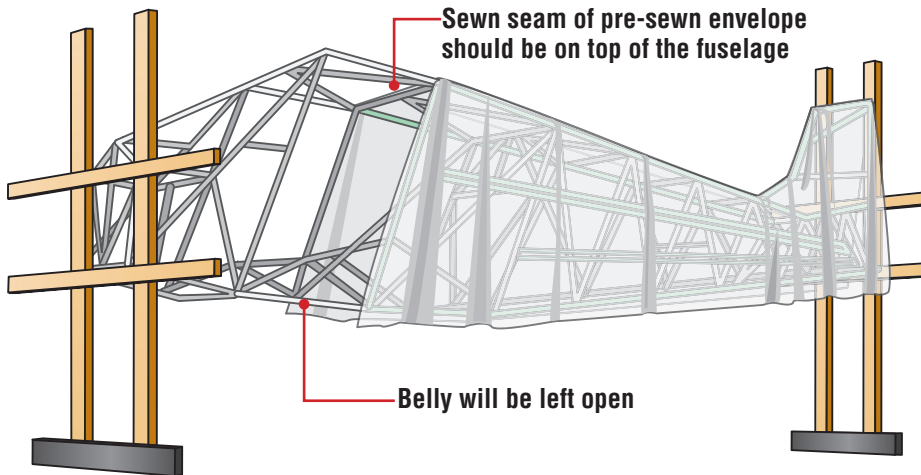
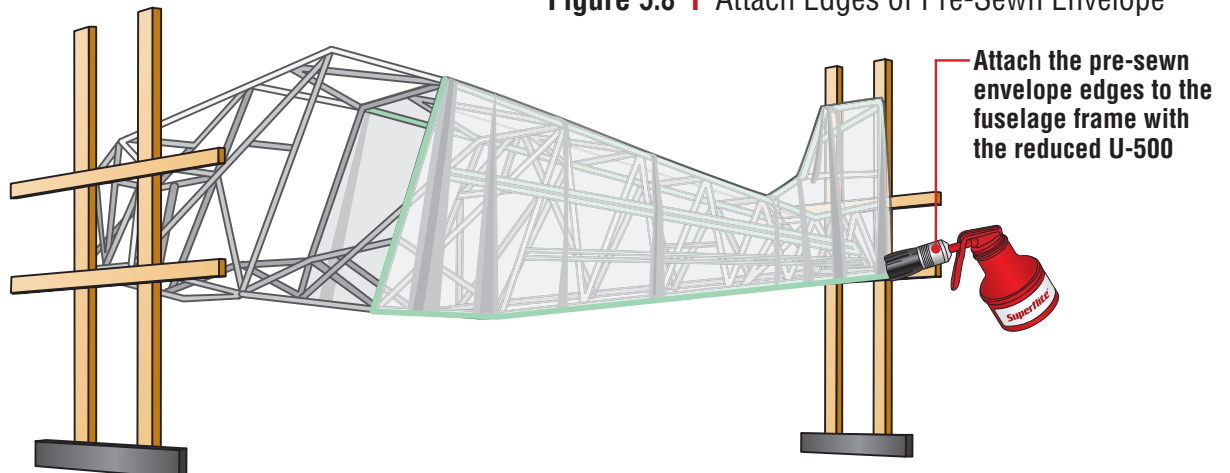


Figure 5.8 | Attach Edges of Pre-Sewn Envelope



- 6 Cut a piece of fabric large enough to cover the belly of the fuselage, plus a 2" overlap on all sides.
- 7 Attach the fabric piece using the U-500 adhesive mixture (2 parts Acetone and 1 part U-500).
- 8 After the glued areas have dried, which usually takes about 5 to 10 minutes, tauten the fabric on the fuselage. See page 63 for details on fabric tautening.
- 9 Now that the fabric is tautened, it's time to apply a coat of thinned U-500 adhesive to the same areas indicated in Step 3 on page 45.

Figure 5.9 | Apply Fabric to Fuselage Belly

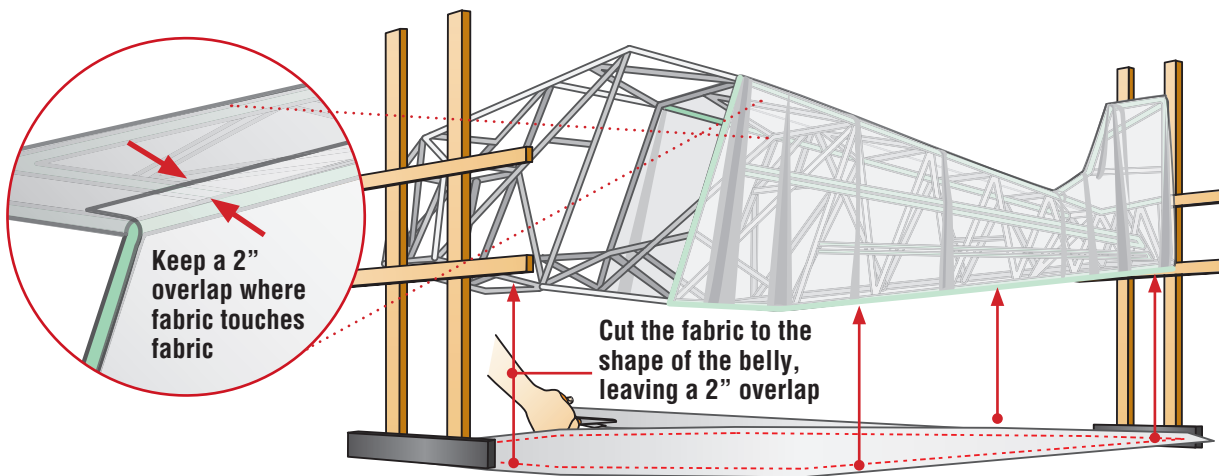
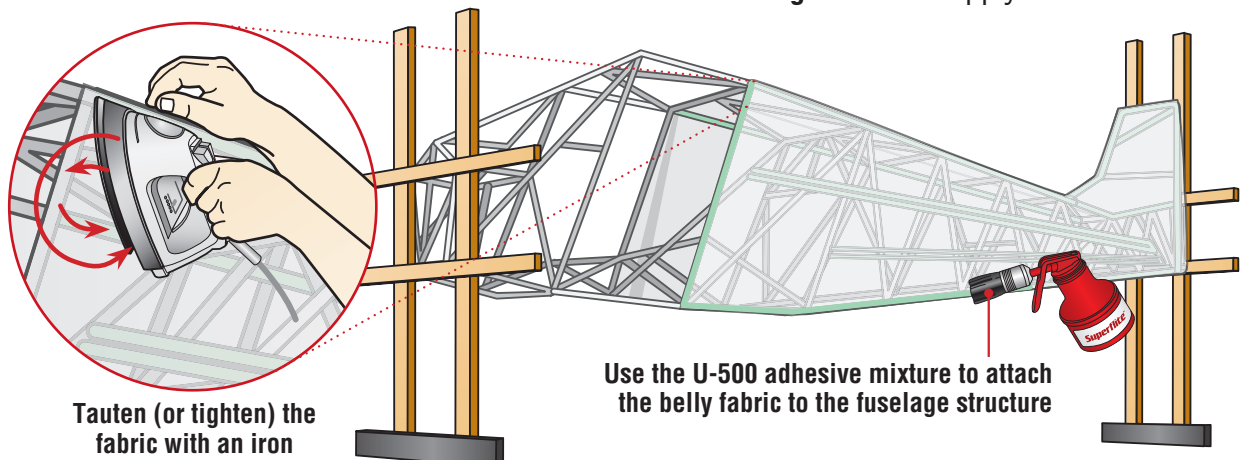


Figure 5.10 | Apply U-500 Adhesive



- 10** As a rule, anytime fabric is touching the structure, a double layer of fabric is needed. This is where finishing tapes and dollar patches come into play. Finishing tapes will be used along all of the longeron tubes.

Any other solid structure that a tape won't cover can benefit from a patch. See the finishing tapes and patches section on page 77 for more details on this procedure.

Figure 5.11 | Apply Thinned U-500 Adhesive

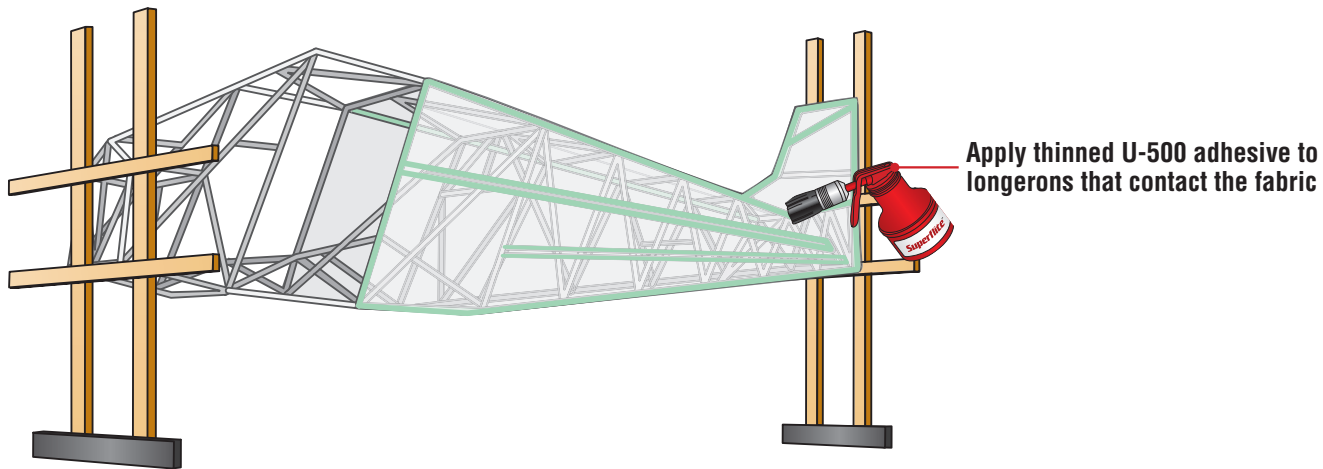
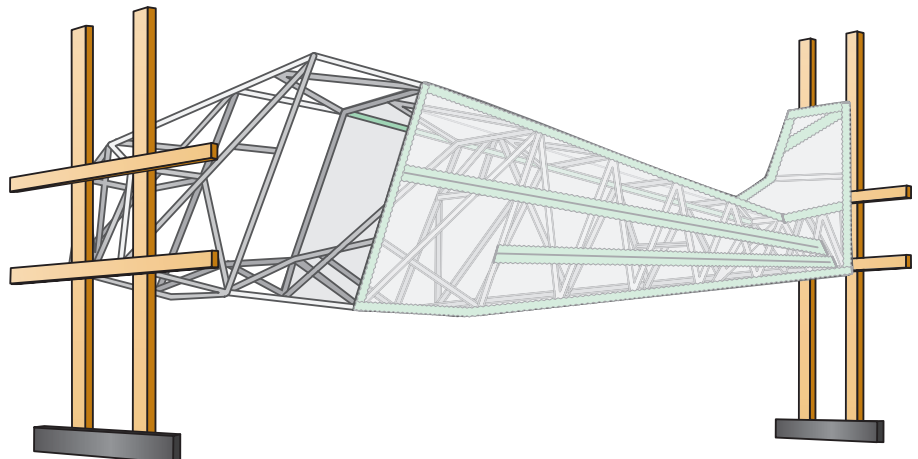


Figure 5.12 | Pre-Sewn Fuselage Envelope with Finishing Tape

i Most fuselages do NOT require rib stitching – there are some exceptions, and they are model specific. Check the original manufacturer's specifications to see if your plane qualifies.



Covering a Wing Using the Blanket Method

There are two ways to cover a wing using the blanket method – one-piece cemented attachment and two-piece cemented attachment. Either method is acceptable.

1 To start-off using either method:

Be sure the wing is properly prepared as discussed in Chapter 4.

2 Coat the following areas (See Figure 5.2) with reduced U-500 and let dry:

- Leading edge
- Trailing edge
- All outside edges of the frame

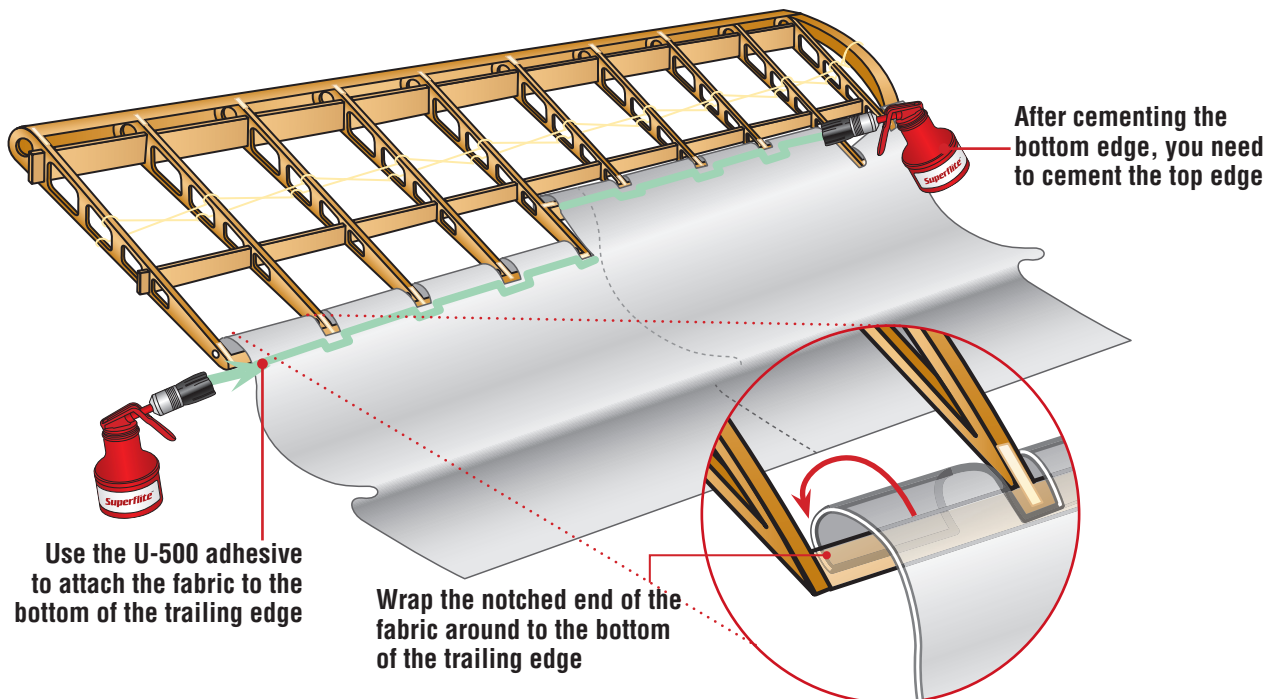
To use one-piece cemented attachment:

1 Use a thinner coat of U-500 (3 parts Acetone to 1 part U-500), lay the fabric on the bottom of the trailing edge, and attach.

i

Be careful to avoid the ribs – **DO NOT** attach the fabric to the ribs with adhesive. Rib stitching, pop rivets, PK screws, or martin clips will attach the fabric to the ribs.

Figure 5.13 | Wrap the Fabric Around the Trailing Edge



- 2 Cement the top of the trailing edge and bring the fabric around and over the edge.
- 3 Completely wrap the fabric all the way around the wing.
- 4 Bring the fabric back over the trailing edge until there is a 1" to 2" overlap.
- 5 Once again, cement across the entire bottom of the trailing edge.

Figure 5.14 | Wrap the Fabric Around the Wing

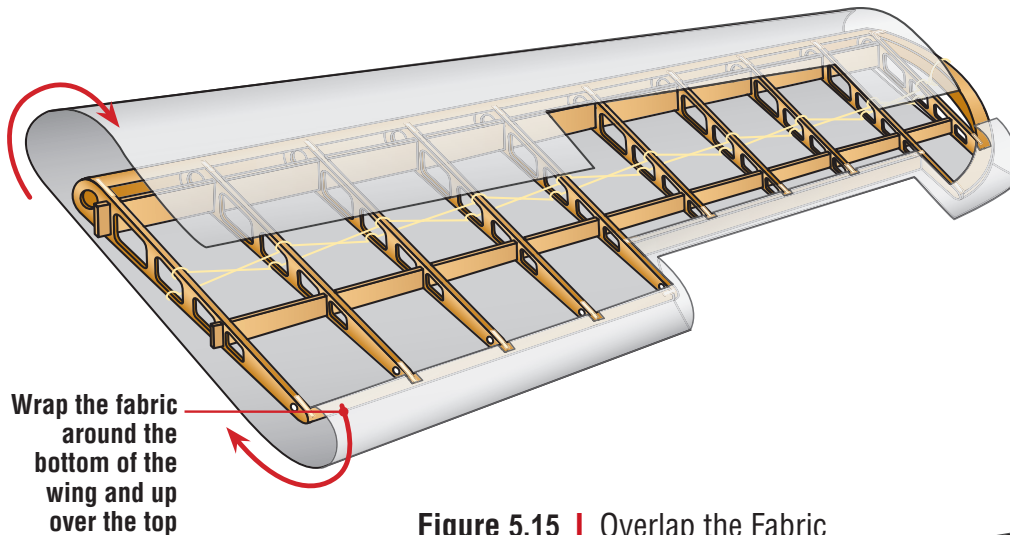
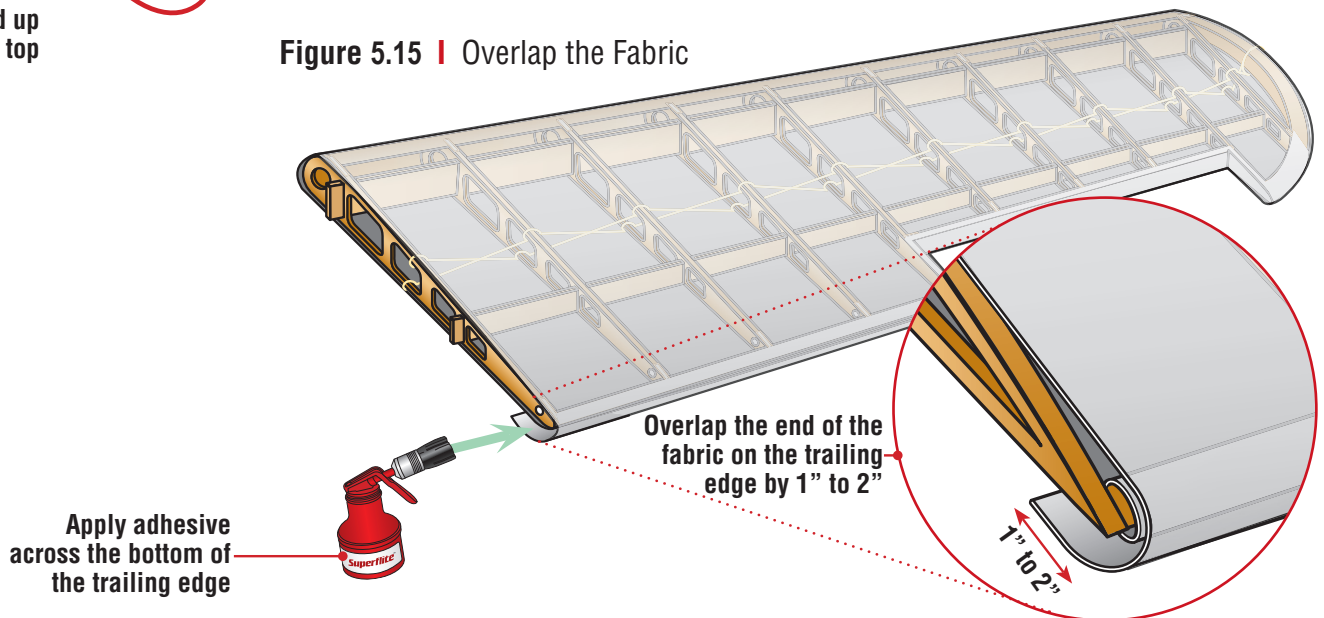


Figure 5.15 | Overlap the Fabric



Two-piece cemented attachment:

- 1** Determine the amount of fabric needed to cover your wing. Leave 12" of extra fabric all around for the finish cut after it is glued to the frame. If you have a high wing airplane, cover the top of the wing first. If you have a low wing airplane, cover the bottom first.
- 2** Place the bottom surface of the wing on the fabric. Leave 12" of extra fabric on the butt rib and wing tip. Leave a 2" fabric overlap on the leading edge of the wing, and a 1" fabric overlap on the trailing edge when the wing is completely covered.
- 3** Cut the fabric.

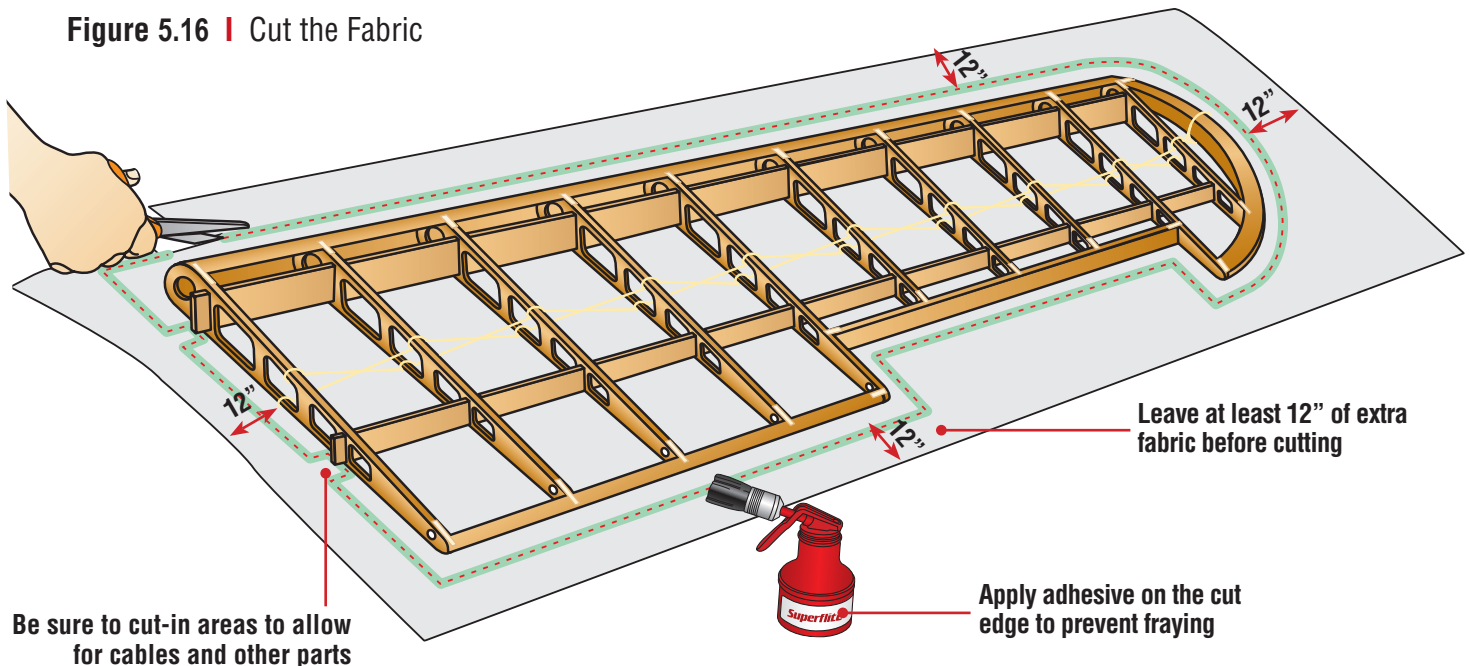


Apply thinned U-500 along cut line to keep the fabric from fraying. Always use sharp straight-edged scissors to cut the fabric.

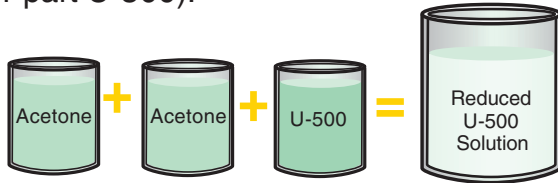


Apply Superflite invisible gloves (PN: SF1211) or use latex gloves to protect your hands from solvents.

Figure 5.16 | Cut the Fabric



- 4 Mix U-500 with Acetone until it is properly thinned (approximately 2 parts Acetone to 1 part U-500).



- 5 Brush two coats of thinned U-500 on the trailing edge where bonding is desired.

- 6 Wrap the fabric up and over the top of the trailing edge and apply the thinned adhesive.

IMPORTANT! To avoid unsightly seams, and obtain maximum gluing contact, the fabric should be wrapped around a tubular structure. Do not allow the fabric edge to contact the fabric on the bottom surface. Doing so may cause an unattractive low spot on the finished surface.

Figure 5.17 | Attach to the Trailing Edge

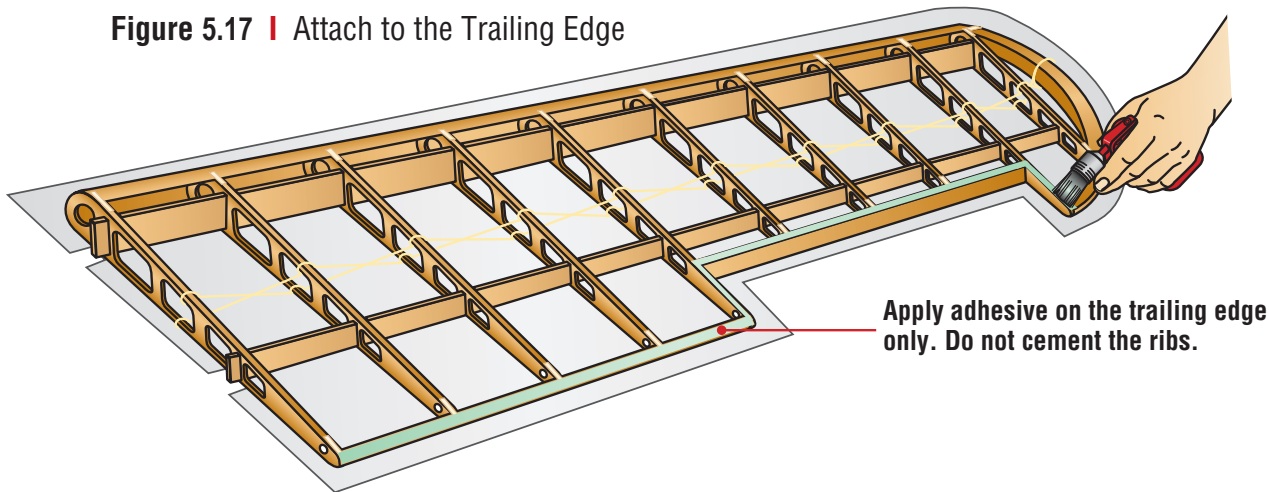
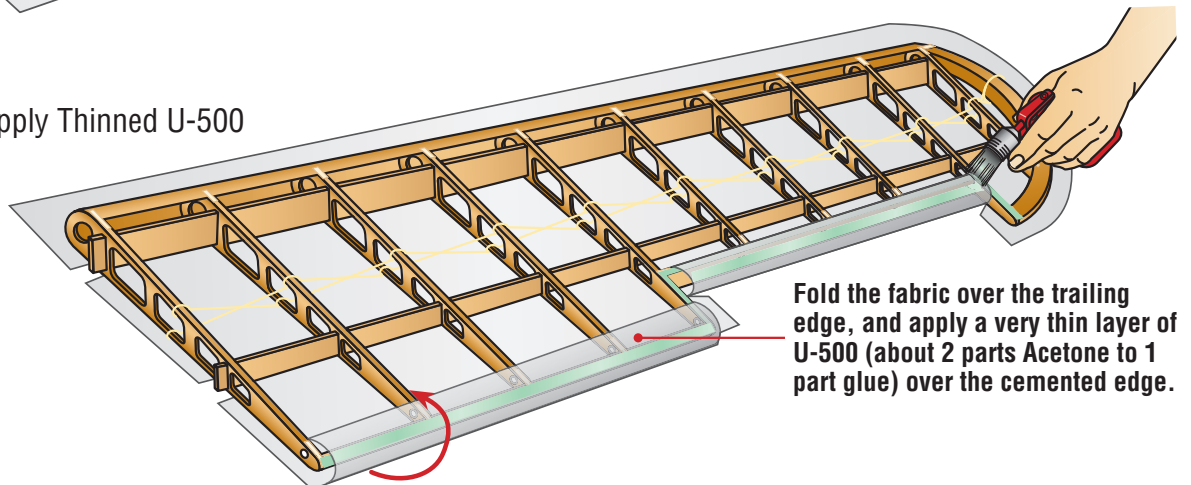


Figure 5.18 | Apply Thinned U-500



Cemented seams must lie over a structural part (e.g., leading and trailing edges, wing tip, and butt rib) of the airplane, and that structural part must be at least as wide as the seam.

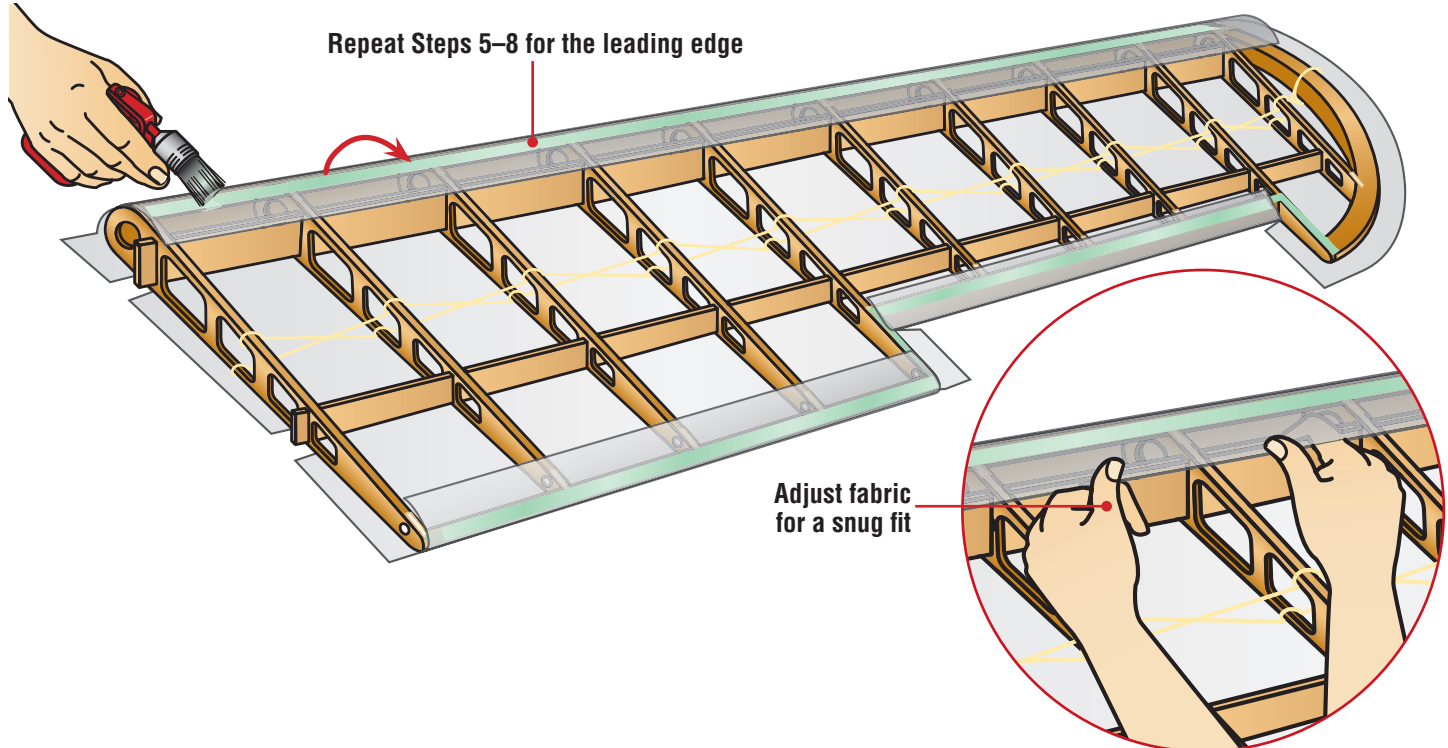
- 7 Brush a very thin layer of U-500 on top of the fabric, along the cemented area.
- 8 Work out any wrinkles. If necessary, use a sealing iron (calibrated to 250°F) to assist in working tight spots.

- 9 Pull the fabric over the leading edge, and repeat the previous Steps 5–8. You will want to adjust the fabric until the surface has a snug fit, not tight, with no wrinkles. Heat tautening will take care of any missed wrinkles and tighten the surface – like the face of a snare drum.

i

Apply the thinned U-500 over the area where a protrusion (over 2" high) might break through. Make a small razor cut at the peak. Applying the U-500 will keep the fabric from fraying when cut.

Figure 5.19 | Attach to the Leading Edge



After attaching the fabric to the leading and trailing edges, you'll need to attach the fabric to the butt rib and wing tip.

1 Brush thinned U-500 (2 parts Acetone to 1 part U-500) on the side surfaces and top edge of the butt rib.

2 Pull the fabric over the top edge of the butt rib, along with the fabric, for any recesses, wire, or other parts.

3 Work out any wrinkles or bumps until the fabric is smooth. Use the iron if necessary.

Figure 5.20 | Brush U-500 Onto Frame

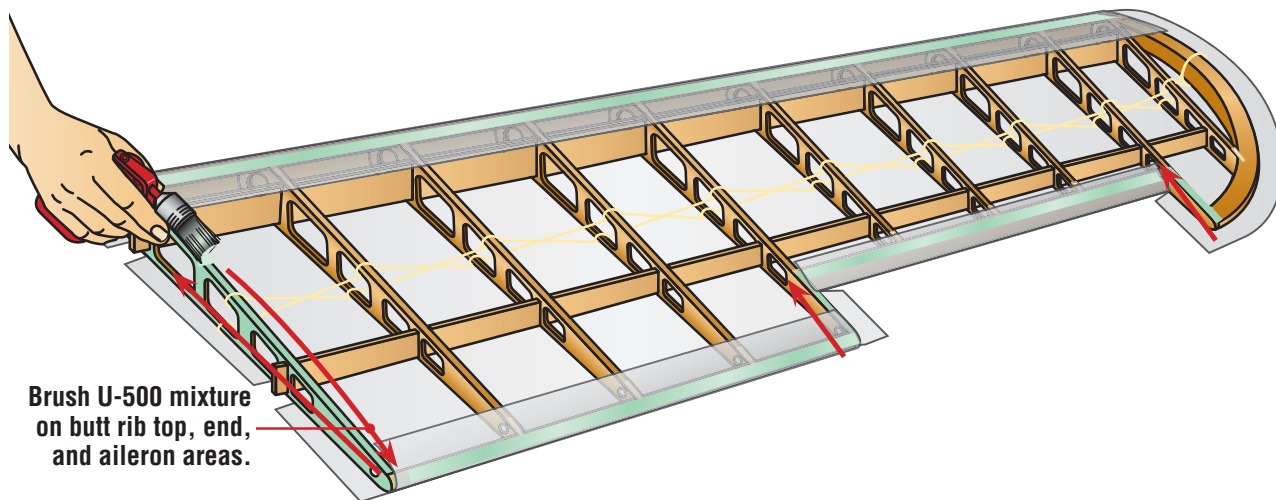
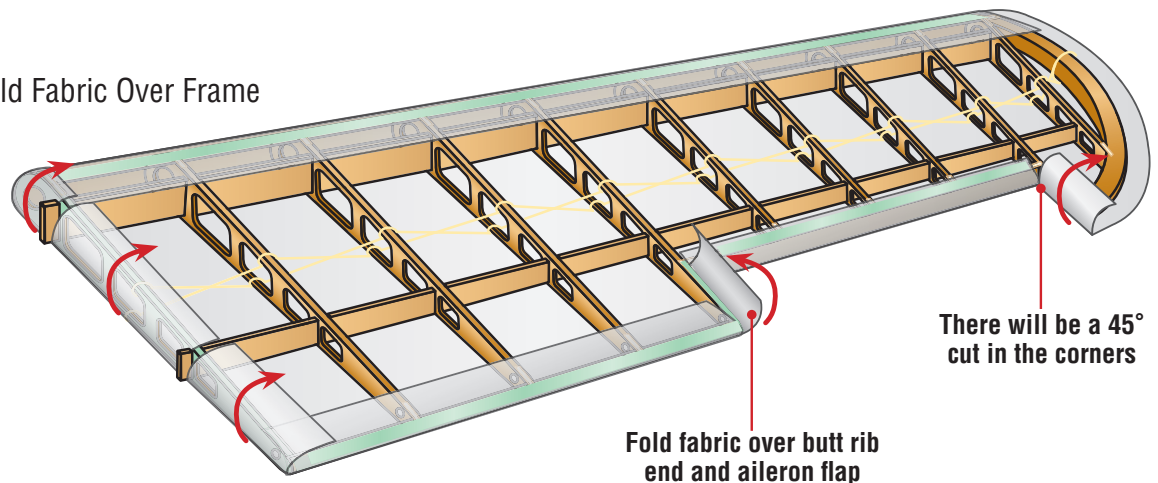


Figure 5.21 | Fold Fabric Over Frame



- 4 Brush thinned U-500 (about 3 parts Acetone to 1 part U-500) on the outside of the fabric, along the cemented area.

- 5 Trim off the excess fabric.

Figure 5.22 | Brush the Adhesive Mixture Over Folded-Over Fabric

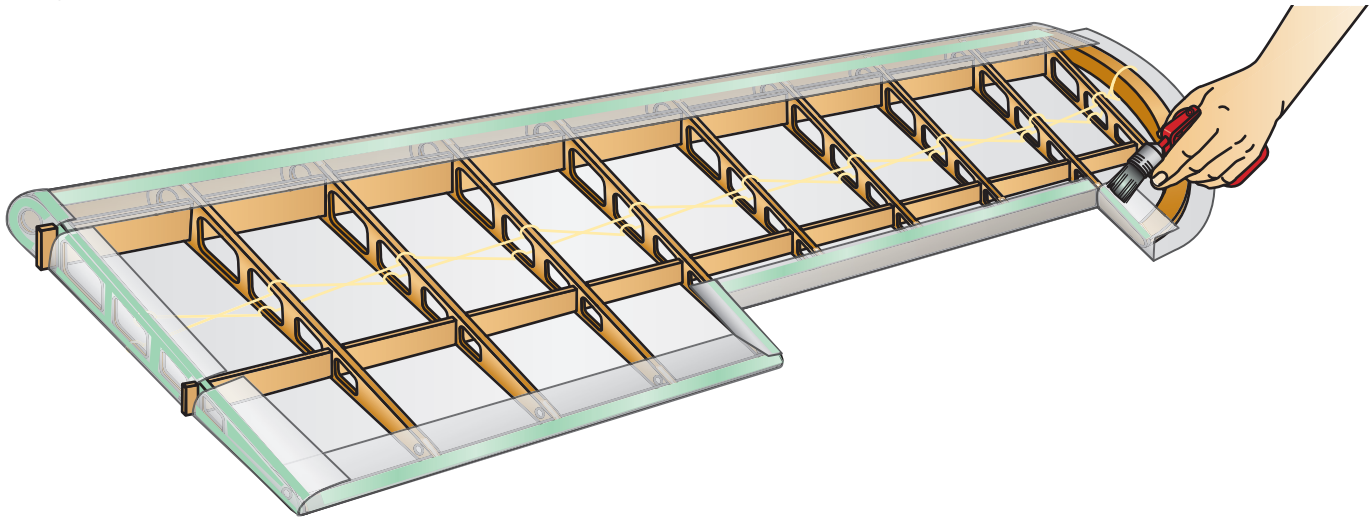
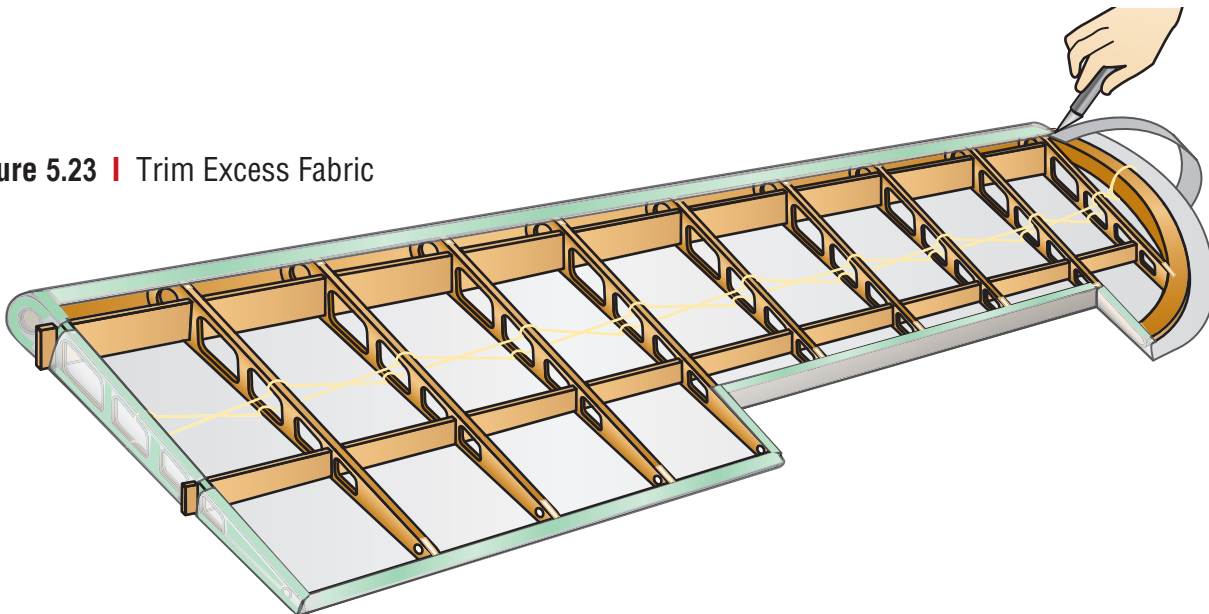


Figure 5.23 | Trim Excess Fabric



The last edge onto which you need to attach the fabric is the wing tip. Forming the fabric to the bow of the wing tip can be done by working it with an iron, cutting V-shaped notches in the fabric, or a combination of both. Ultimately, the heat from the iron will smooth the surface and eliminate any wrinkles or bumps.

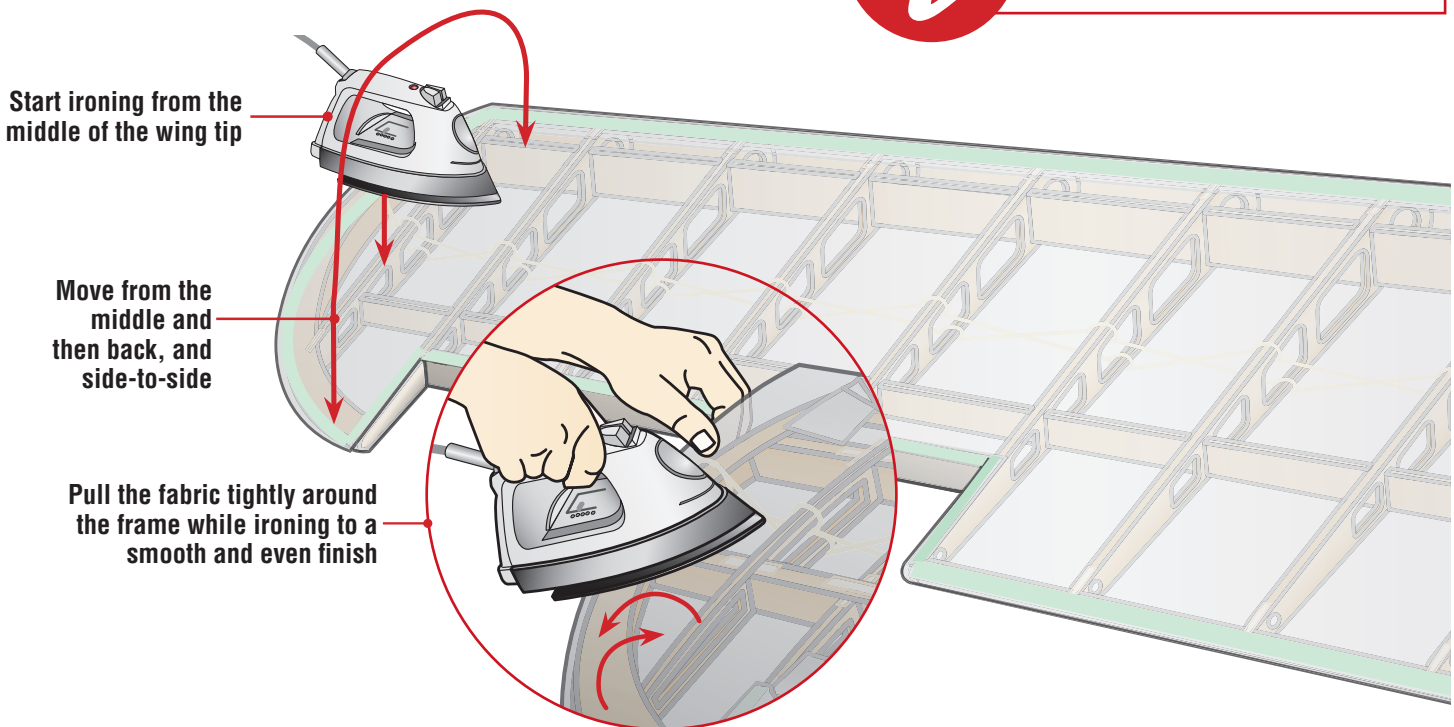
To cover the wing tip:

- 1 Calibrate the iron to 250°F (see page 64 for instructions on calibrating an iron).

- 2 Flip the wing over to the side that is already covered with fabric. Starting in the center of the wing tip, pull the fabric tightly around the frame while applying heat from the iron to the area. Alternate the ironing from side to side, around the bow, until the fabric has formed itself to the frame. **Note:** If a wrinkle or bump forms, slice a small V-shape with a razor. The smaller the better.

IMPORTANT! DO NOT iron any further than the wing tip at this stage.

Figure 5.24 | Ironing the Wing Tip



Use a Coverite Sealing Iron (PN: SF361) to help fit the fabric into tight corners. See page 65 for temperature settings.

- 3 Turn the wing over, brush thinned U-500 (2 parts Acetone to 1 part U-500) onto the frame, and pull the fabric firmly until it's in place. Apply clamps.
- 4 Iron out any remaining wrinkles or bumps.
- 5 Brush thinned coat of adhesive (3 parts Acetone to 1 part U-500) on the outside of the fabric, along the cemented area.
- 6 Trim off the excess fabric.

Figure 5.25 | Cement the Wing Tip

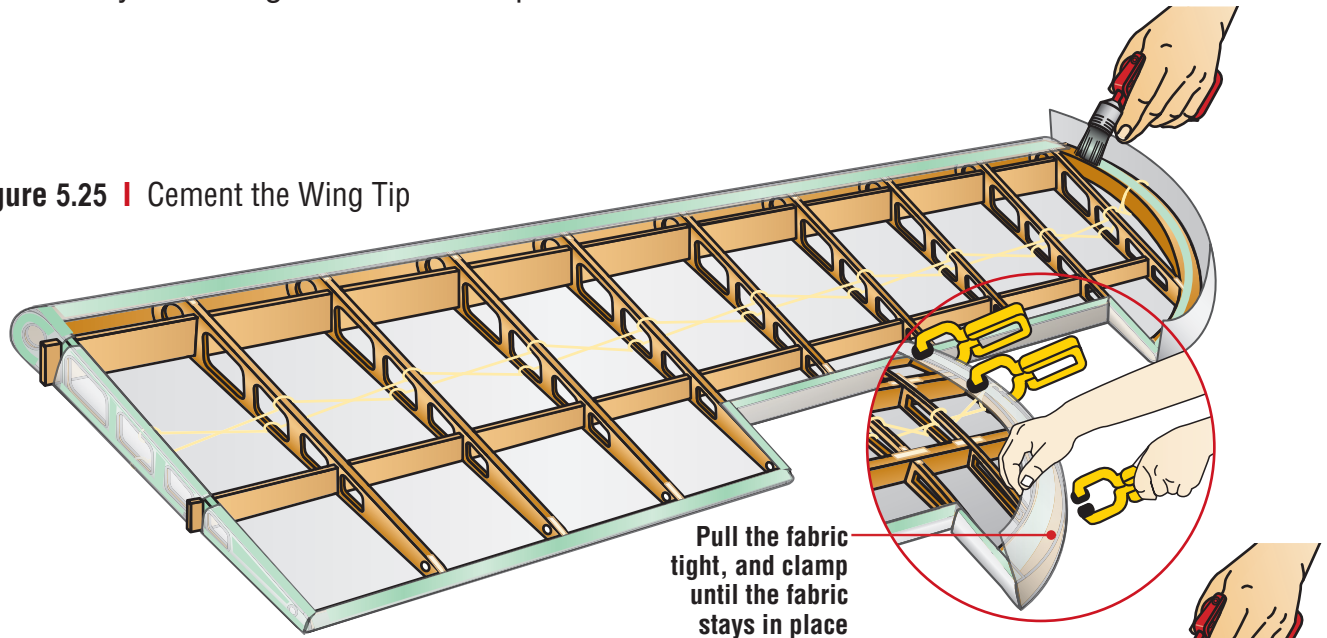
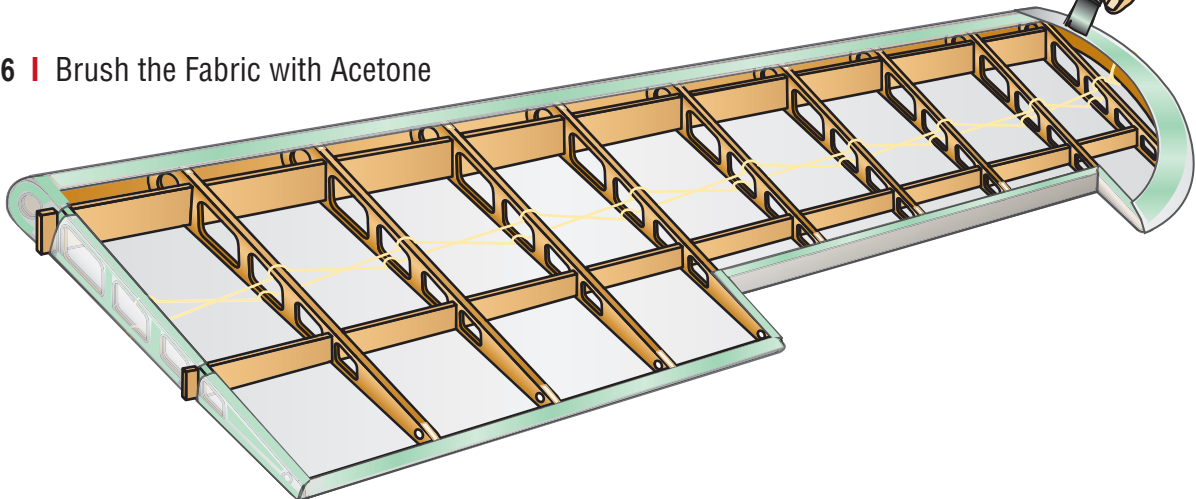


Figure 5.26 | Brush the Fabric with Acetone



Now, let's finish the top surface. The steps you follow are the same steps for covering the bottom surface. Refer to pages 49–57.

Some important points to keep in mind:

- Cut the fabric, leaving extra material, approximately 12" on each end. Remember, when cutting material for the chord direction, AC43.13 requires an overlap with the fabric on the bottom surface (2" overlap on the leading edge and a 1" overlap on the trailing edge).
- Apply a coat of adhesive (3 parts Acetone to 1 part U-500) along the path you will cut for the edge of the fabric. This will reduce the possibility of frayed edges. Remember, the cut edges will show on the bottom surface. So, you'll want to take your time, and make it as straight as possible.
- Cement and align the fabric on the leading edge. Work out the wrinkles and bumps. Use an iron if necessary.

Figure 5.27 | Fabric-Overlap Covering a Low Wing

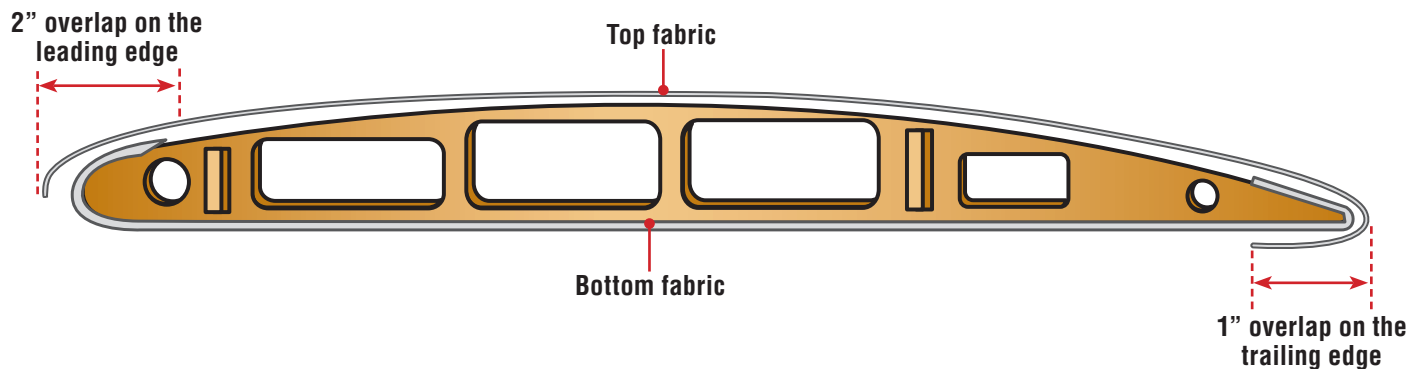
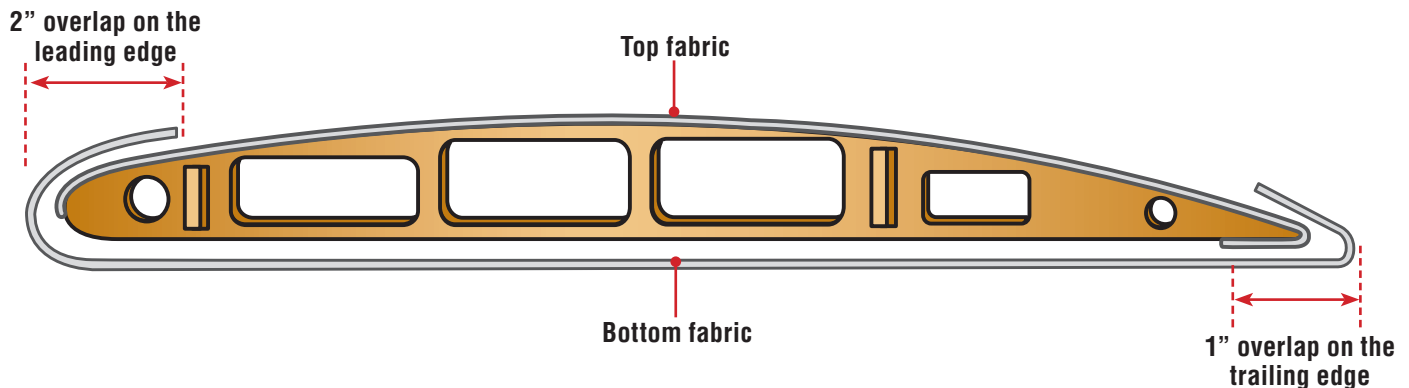


Figure 5.28 | Fabric-Overlap Covering a High Wing



Covering a Fuselage Using a Blanket Method

There's only one way to cover a fuselage using the blanket method, and you most likely won't be able to do it using just one piece of fabric. Covering a fuselage blanket-style usually requires 3 to 5 pieces of fabric. It's best to measure and cut these pieces ahead of time.

1 Prepare the fuselage tubing properly, as discussed in Chapter 4.

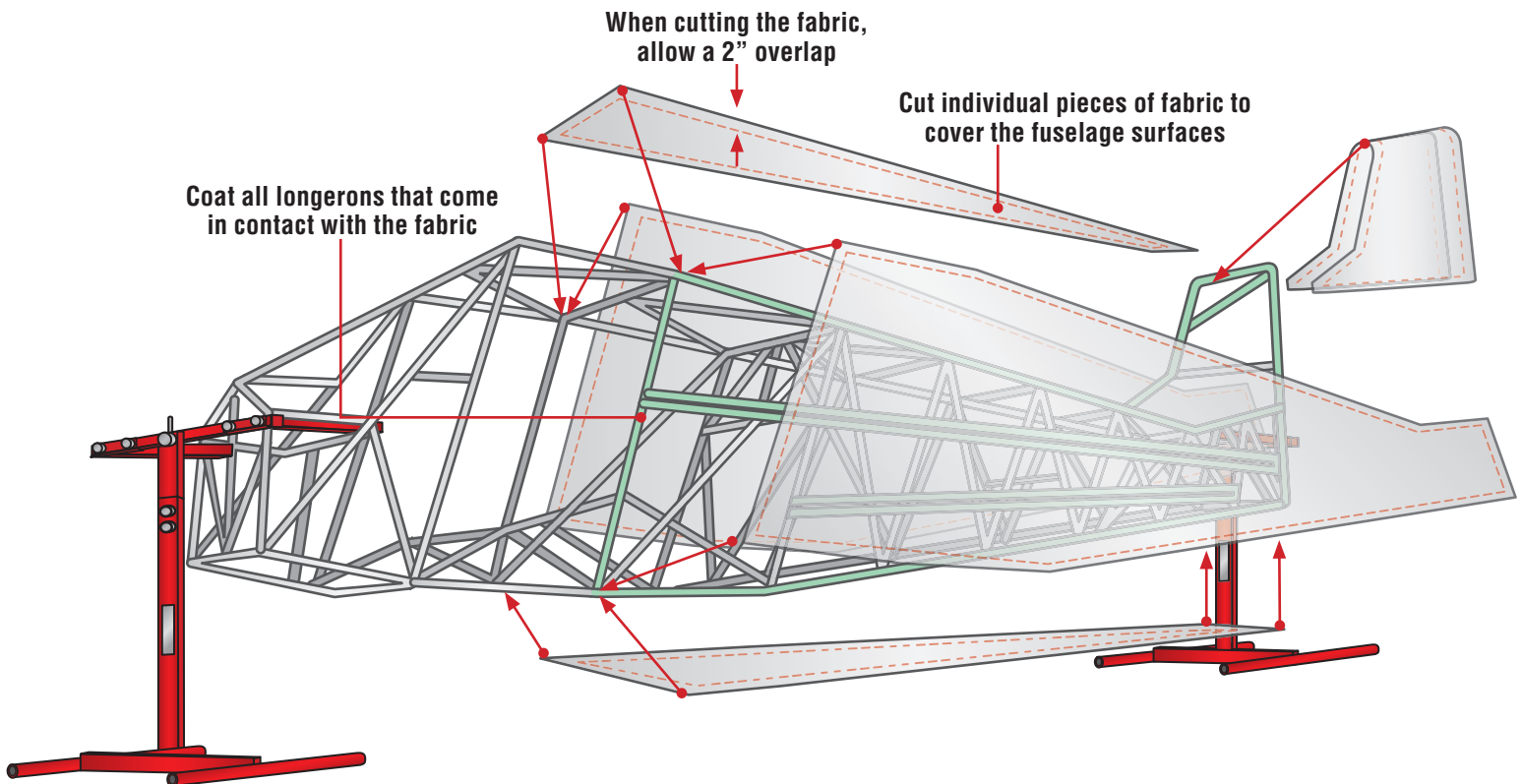
2 Cut the fabric pieces to the size of the area you are covering, allowing for a 2" overlap. You may need as many as five pieces depending on your aircraft.

3 Coat all the longerons, and any other pieces that will come in contact with the fabric, with reduced U-500 (2 parts U-500 to 1 part Acetone) and let dry for 5 to 10 minutes.



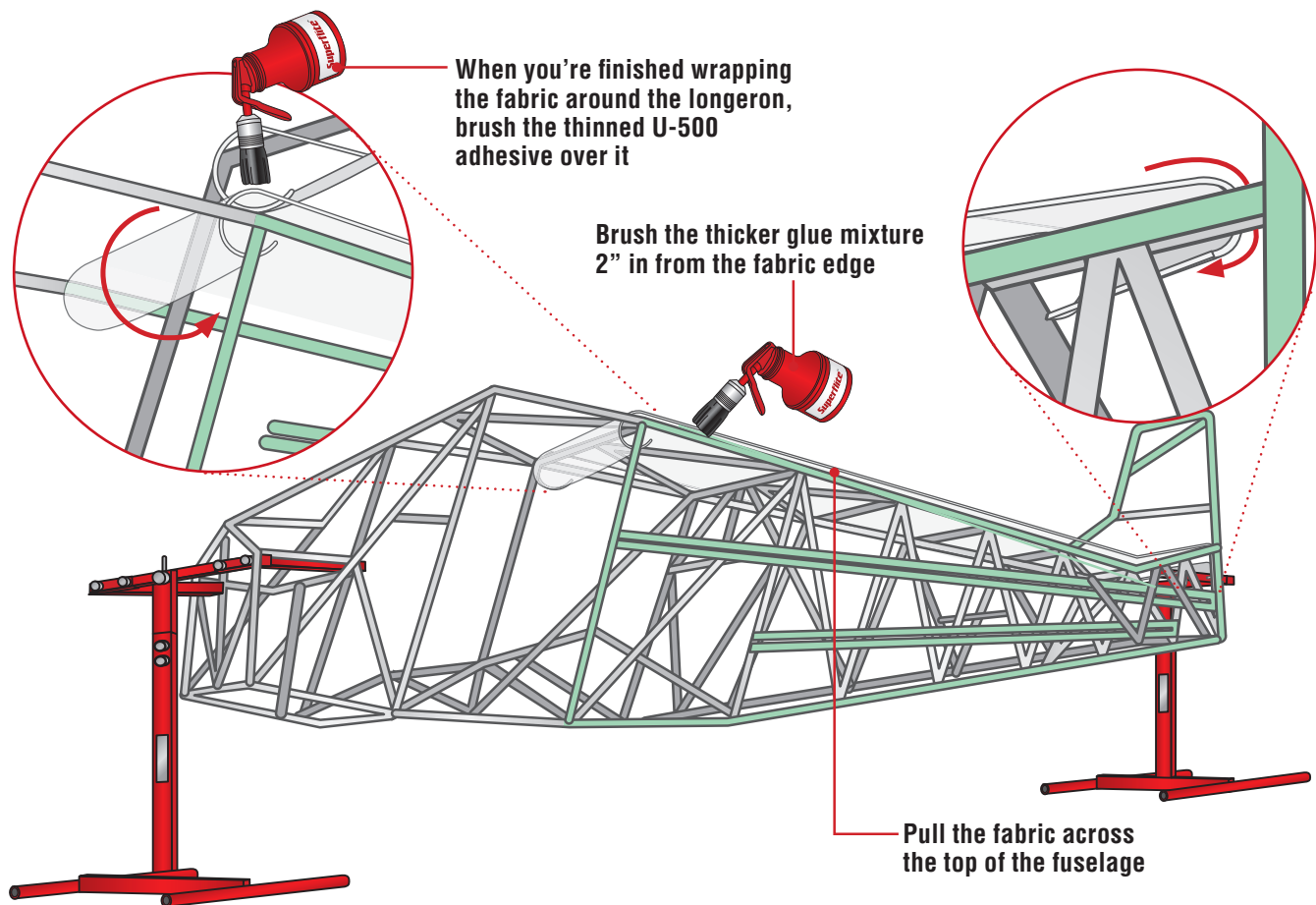
It's best to use a rotating stand when covering the fuselage with any method.

Figure 5.29 | Cut Fabric Pieces



- 4 Using the fabric piece for the top of the fuselage, wrap one end of the fabric around a longeron on the top of the structure. Apply a thinner mixture of U-500 (3 parts Acetone to 1 part U-500 adhesive over the fabric, and let it dry for 5 to 10 minutes.
- 5 Pull the fabric somewhat tight across the top of the fuselage. Wrap the other end of the fabric around the opposite piece of structural longeron tubing. Apply the glue mixture over the attached fabric.
- 6 Spread 2 coats of the thicker glue mixture (2 parts U-500 to 1 part Acetone) about 2" in from the fabric edge. Allow the adhesive to dry for 5 to 10 minutes.

Figure 5.30 | Attach Fabric to Longerons

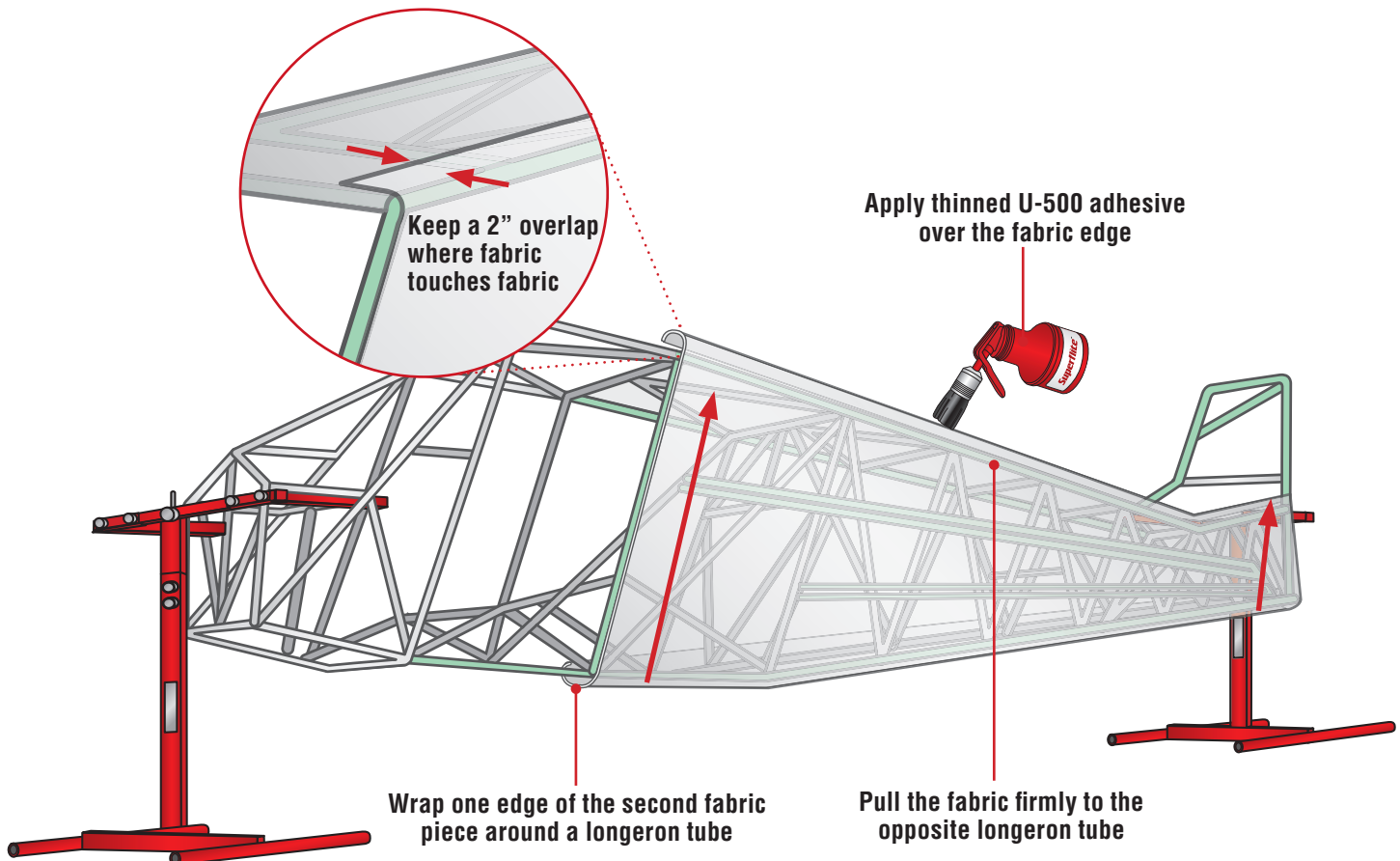


- 7 Attach the next piece of fabric by wrapping one edge of the new piece around the longeron for that surface. Brush on the thinned U-500 mixture and let it dry for 5 to 10 minutes.
- 8 Pull the fabric somewhat tight, and wrap the fabric end around the opposite structural longeron tube. Apply the thinner (3 parts Acetone to 1 part U-500) adhesive over the top of the fabric.
- 9 Continue to attach the remaining fabric pieces, as described in Step 4, until all the necessary fuselage surfaces are covered.
- 10 Apply a coat of thinned U-500 adhesive to the same areas indicated in Step 3.



It's important to have a 2" overlap when attaching fabric to fabric on the fuselage.

Figure 5.31 | Attach a Second Piece of Fabric



- 11 After the coat of adhesive is dry, you will need to tauten, or tighten, the fabric with an iron. See page 63 for a detailed description of this process.
- 12 As in the pre-sewn envelope method for the fuselage, you will need a double layer of fabric over areas where the fabric touches structure. This is where finishing

tapes and dollar patches are applied. See the finishing tapes and patches section on page 77 for more detail on this procedure.



Most fuselages do NOT require rib stitching – there are some exceptions, and they are model specific. Check the original manufacturer's specifications to see if your plane qualifies.

Figure 5.32 | Ironing the Fabric

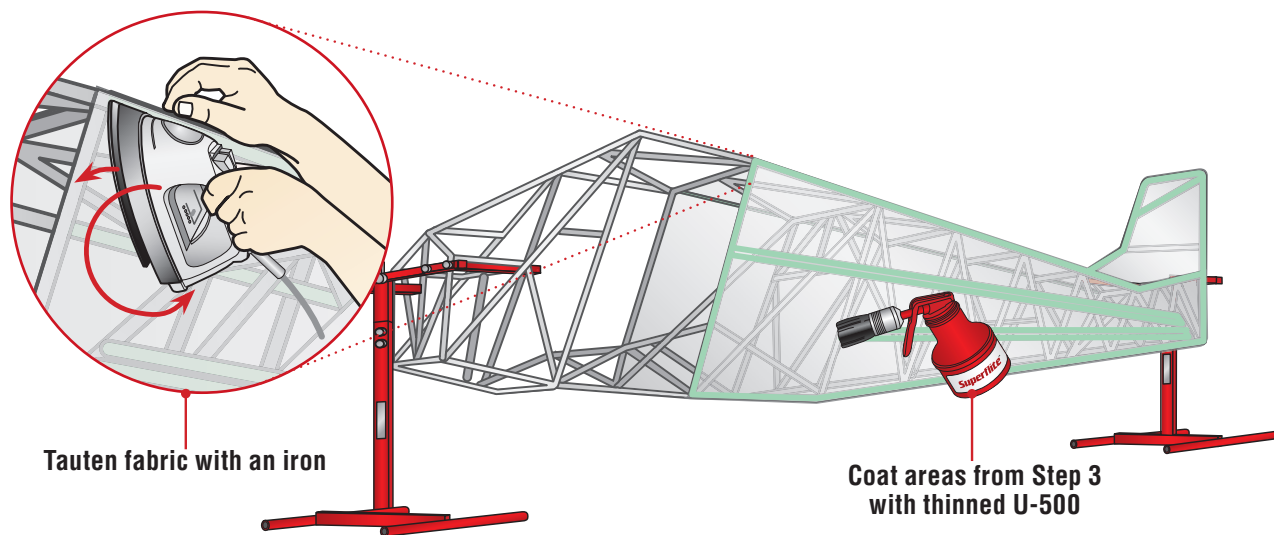
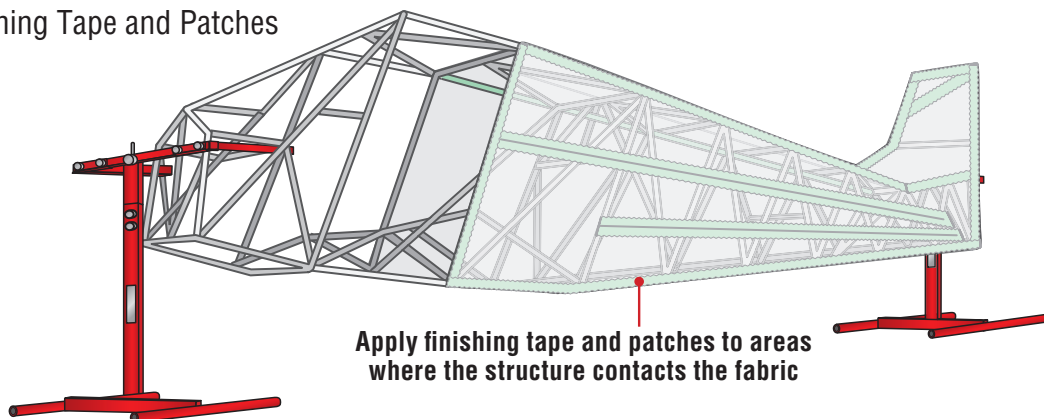


Figure 5.33 | Apply Finishing Tape and Patches



FABRIC TAUTENING

Now that the fabric is attached, the next step is to tauten or heat shrink it. This is achieved by using a calibrated household iron and applying heat to the fabric.

IMPORTANT! Never use a heat gun, hair dryer, or uncalibrated iron to tauten the fabric.

The most important considerations in this step are the temperature of the iron, the touch when applying the heat, and how you progress from one area of the surface to another.

Once again, **take your time**. Read through this section, and practice on your test panel before starting. Try the different temperature settings, and get a feel for the iron. To complete this next step you will need the following:

- New household iron without automatic shut off or steam function (1,100 watts minimum with temperature control)
- Thermometer (see page 21)
- Coverite sealing iron (PN: SF361)
- Adhesive (Superflite U-500)
- Acetone



TAUTEN – To become tightly stretched, or to pull something, such as a piece of fabric, tight.

Calibrating the Iron

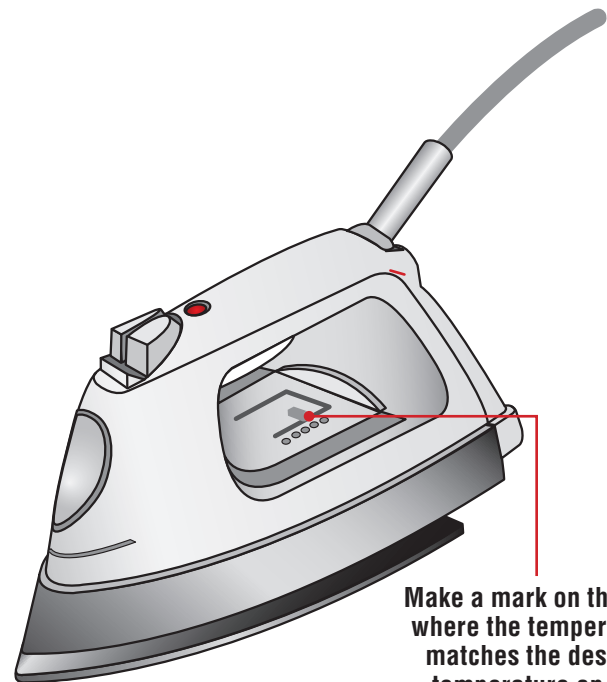
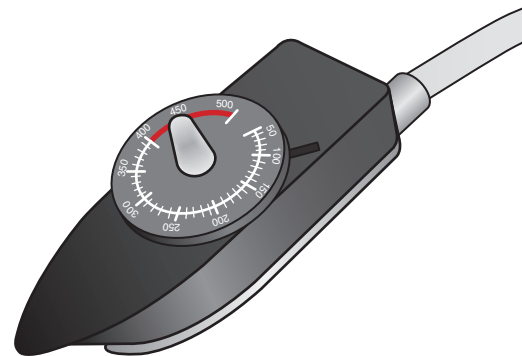
The temperature of the iron does affect the shrinking rate of the fabric. Factors such as extension-cord length, and voltage fluctuations affect iron performance. This is why it's critical to recheck and maintain temperature calibration at all times. You can use a pocket or digital/infrared thermometer to calibrate the iron (see page 21).

- 1 To calibrate with a pocket thermometer:** Set the thermometer on the heat plate of the iron.
- 2** Adjust the temperature control on the iron until the thermometer reads 250°F. Make a mark on the iron housing.
- 3** Repeat Steps 1 and 2 for 300°F and 350°F. Follow the manufacturer's instructions to calibrate with a digital/infrared thermometer.



Hot irons may cause burns or injury. Follow manufacturer safety warnings.

Figure 5.34 | Thermometers and Irons



Make a mark on the iron where the temperature matches the desired temperature on the thermometer

Tautening the Fabric

Now it's time to apply heat to the fabric and tighten it. Applying heat to the fabric will cause it to shrink onto the frame. The objective is to apply the heat so that the tension of the fabric is evenly distributed across the surface.

There are three stages to this step – one for each of the temperature settings you calibrated earlier (e.g., 250°F, 300°F, and 350°F). Each temperature setting will shrink the fabric at a different rate. So, it's important to apply the heat in the correct order. For example, a 60" span of fabric will shrink 3" at a shrinkage rate of 5%, and 6" at a rate of 10%.

SHRINKAGE RATES

Temperature	Shrinkage
250°F	5%
300°F	7.5%
350°F	10%

Stage One

Begin the shrinking process by setting the iron to 250°F. Remember to check your calibration. Hold the iron so it makes contact with the fabric.

- 1 Start at one end of the part (e.g., butt rib or wing tip). Hold the iron in the center of the fabric, near the end.
- 2 Slowly move the iron back and forth on the fabric – first vertically, then horizontally. Evenly distribute the heat. Don't push down on the iron.
- 3 Begin removing large wrinkles. Iron over hard surfaces, such as a leading edge, and move to the opposite end.

Important! Do not start at one end and continuously work towards the other. This may bend the frame, or cause dips in the fabric between the ribs. Start from the center and work outwards.



Do not "over shrink" the fabric. Doing so may result in damage to the frame, such as bowed strings and curved wing tips.

- 4 Repeat Steps 1 through 3. Keep switching from end to end, moving toward the middle.
- 5 Turn the part over and repeat the steps on the opposite side. Remember to check the temperature of the iron.

Stages Two and Three

The next two stages are the same as the first, except you set the temperature to 300°F during the second stage, and 350°F during the third.

It's very important to check and recalibrate, if necessary, the temperature of the iron for the final stage. Temperatures over 350°F will cause permanent damage to the fabric, like melting the weave, or in extreme cases, burning a hole in the fabric.

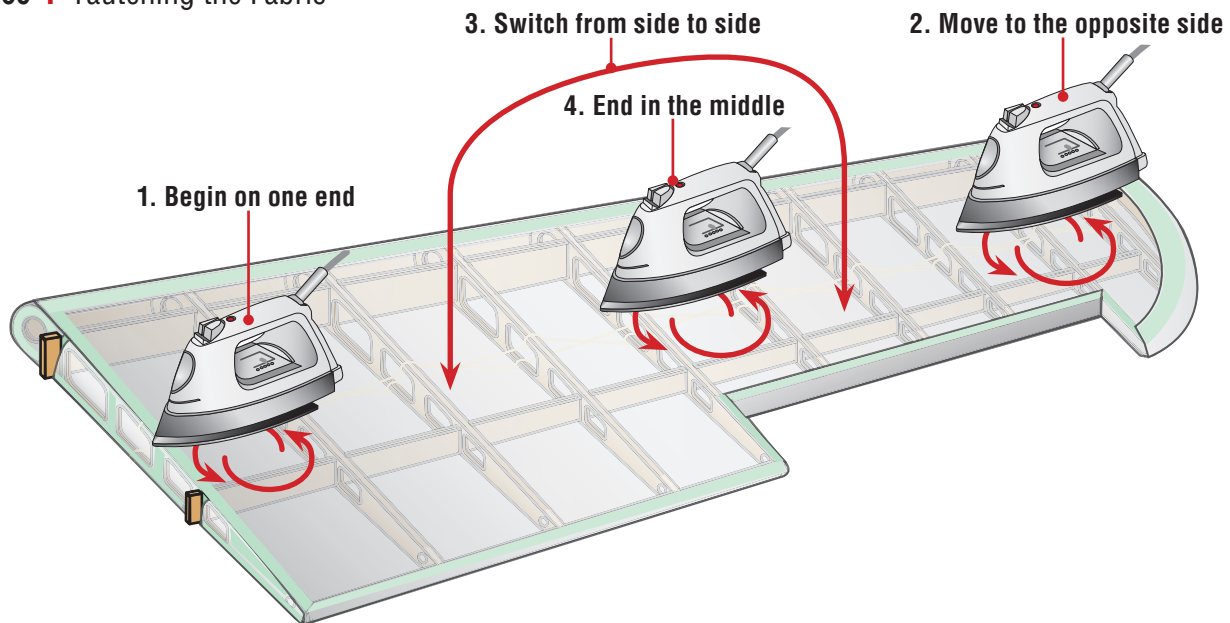
Shrinking the fabric is a gradual process. Be sure that **every** inch of the surface is completely ironed. Some areas may appear taut due to shrinkage of a nearby area but are actually loose.

It's okay to iron everything twice at 350°F, or mark areas with a No. 2 pencil as you complete them. Don't use pens, markers, or crayons for marking, as they will bleed through the fabric.



Do not get distracted or take a break when shrinking the fabric. You may forget where you left off and miss an area!

Figure 5.35 | Tautening the Fabric



RIB STITCHING

In the rib stitching stage, you will be mechanically fastening the fabric to the wing, control surface, or maybe even the fuselage, depending on your aircraft. The method you use (rib stitching, pop rivets, P. K. screws, or Martin clips) depends on your airplane. In this section, we'll explain how to stitch the fabric to the frame. If your plane uses another method, refer to an approved maintenance manual, or AC 43.13.

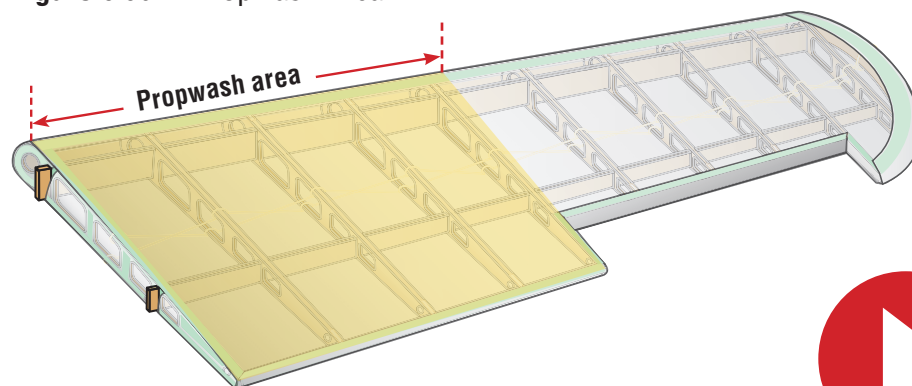
The first step to rib stitching is to determine which parts of the airplane need it, and the spacing needed. You can determine which parts need it by looking at the original fabric you removed and stored. If you see rib stitches used on an original area, then you **must** rib stitch the same area.

Rib stitch spacing can be calculated several different ways. The key is to determine the maximum distance they can be spaced and keep the distance shorter than that. Typically, the maximum spacing for sport aircraft is 2½" in the propwash area (e.g., first 3 to 4 ribs out from the butt rib), and 3½" in the non-propwash. The higher the Vne, or greater the loads, the tighter the spacing between stitches should be.

Note: The exact propwash area depends on the aircraft. Smaller planes have a smaller propwash area, and larger planes have a larger propwash area.

You can refer to the original fabric to see what spacing was used in each area, or see the AC 43.13 chart on the following page to help you calculate the spacing. To be on the safe side, you can always use spacing under the maximum (e.g., 2¼" throughout the whole surface).

Figure 5.36 | Propwash Area



To have the new covering FAA certified, the aircraft should use the original mechanical attachment, or get FAA approval to use an alternative.



PROPWASH – The slipstream of an aircraft.

Before we get going, let’s take inventory of what you will need:

- Sticky-back (reinforcing) tape
- Rib lacing cord (round or flat)
- Needles (straight or curved tip)
- Tape measurer
- No. 2 pencil
- Chalk line

Note: Both the round and the flat rib lacing cord are acceptable. Using one or the other is really just a personal preference.

Applying Reinforcing Tape

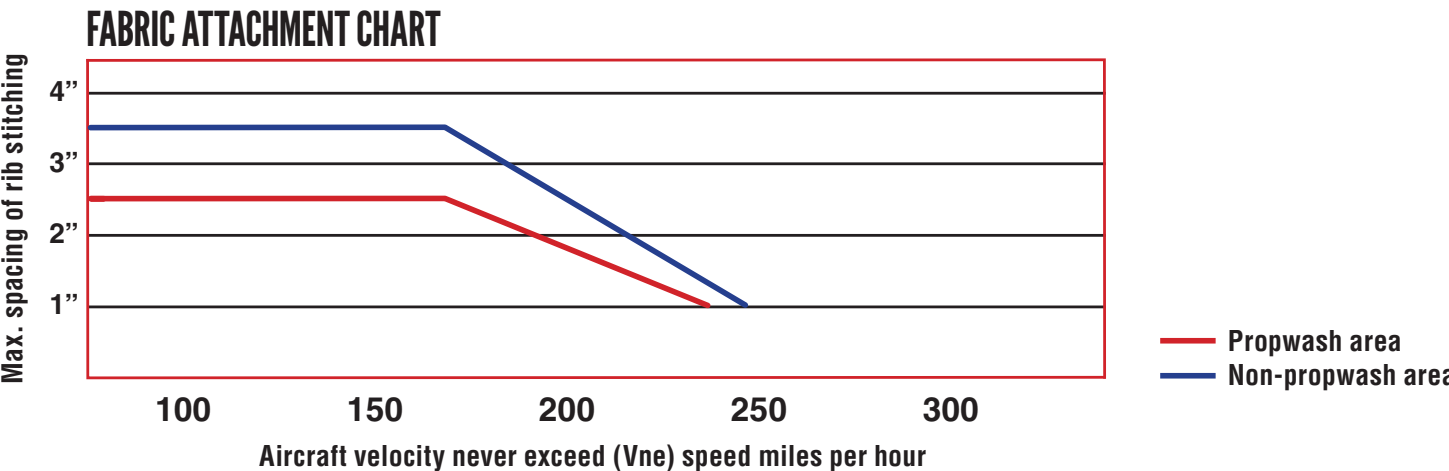
Sticky-back (reinforcing) tape is used to provide additional strength to the fabric. It helps prevent tearing that rib stitching rivets, screws, or clips may cause when being secured.

Apply the tape **before** rib stitching. It’s very important to match the width of the tape with the width of the rib cap. A tape width that is smaller than the rib cap may result in the fabric tearing, and if it’s wider than the fabric, it may bunch up. You should have recorded the width of the rib cap when you removed the old fabric.

You must use Superflite reinforcing tape in order to meet the requirements of the Superflite STC. Below is a list of the widths available:

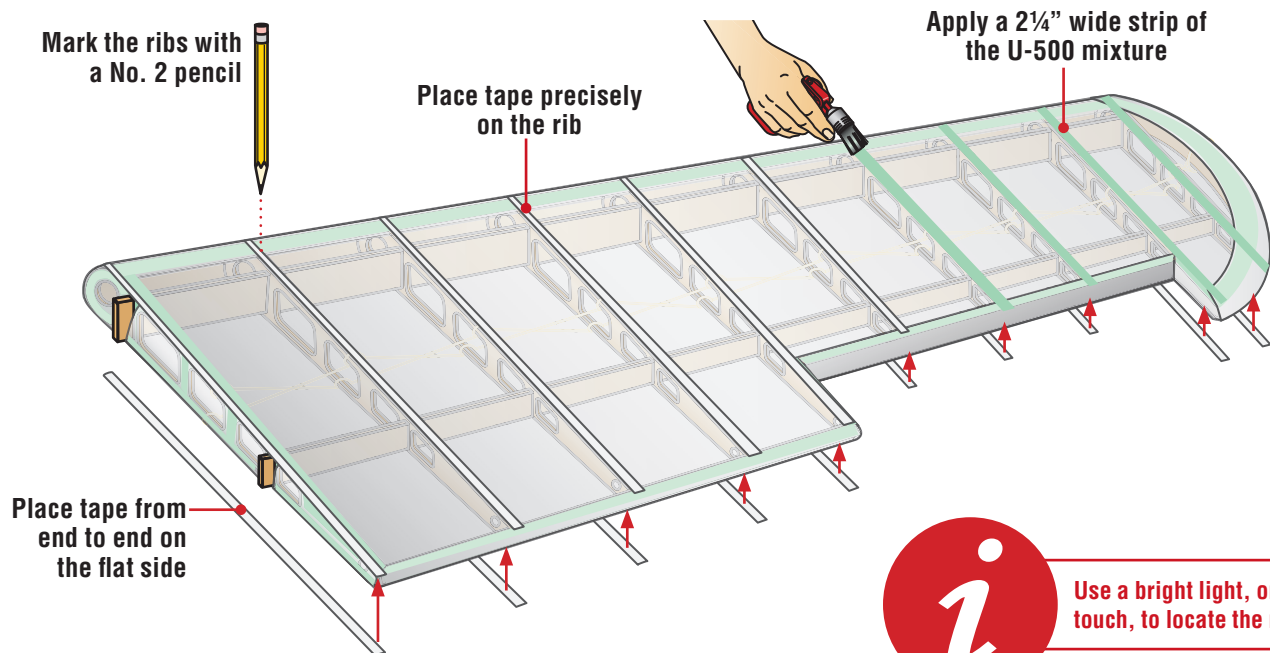
SUPERFLITE REINFORCING TAPE

Width	Part Number
1/4"	SF-REINF-1/4
3/8"	SF-REINF-3/8
1/2"	SF-REINF-1/2
3/4"	SF-REINF-3/4
1"	SF-REINF-1



To apply the reinforcing tape:

- 1 Begin with the bottom of the wing (flat side). Mark the rib locations with a No. 2 pencil.
- 2 Measure the span across the wing and cut strips of tape. Do **NOT** wrap the tape all the way around – you only want it between the leading and the trailing edges.
- 3 Carefully place the tape directly over the ribs. This will help keep the lacing parallel.
- 4 On a typical installation, apply a 2¼" wide strip of glue to the fabric on the rib and over the taped area. This will help prevent the fabric from tearing when puncturing holes for the rib stitching. It will also be your glue base for the surface tapes.
Note: The width of the glue strip depends on the airplane and its size.
- 5 Repeat Steps 3 and 4 for each strip of tape on the top of the wing.

Figure 5.37 | Attach Sticky-Back Reinforcing Tape

i

Use a bright light, or a light touch, to locate the ribs.

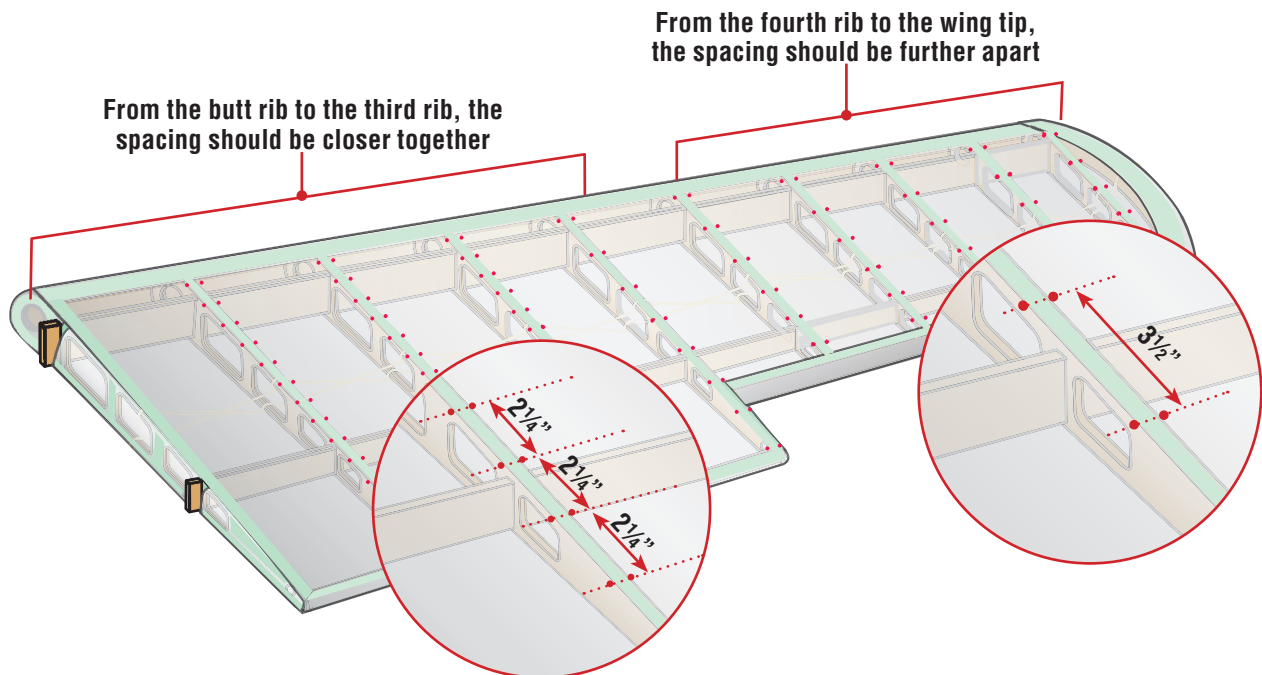
Rib Stitch Spacing

As we discussed at the beginning of this section, there are a number of ways you can determine the spacing of the rib stitches. After you have determined the spacing, lay out and mark the spots for the individual rib stitches on the fabric. There's more than one approach, but this is the easiest method:

1 Start on the butt rib where the leading-edge faring ends (on the top surface of the wing). Determine the Vne (velocity never exceed) for your aircraft. Once you know your plane's airspeed, refer to the rib stitch spacing chart on page 68.

2 For example, let's choose a Vne of 100 miles per hour. Referring to the chart on page 68, find the spacing for both the propwash area and the non-propwash area. In this situation, the rib stitch spacing in the propwash area (butt rib to the third rib on the wings of most average-sized aircraft) will need to be $2\frac{1}{4}$ " apart. In the non-propwash area (Fourth rib to the wing tip on the wings of most average-sized aircraft), the stitches will be $3\frac{1}{2}$ " apart.

Figure 5.38 | Rib Stitch Spacing

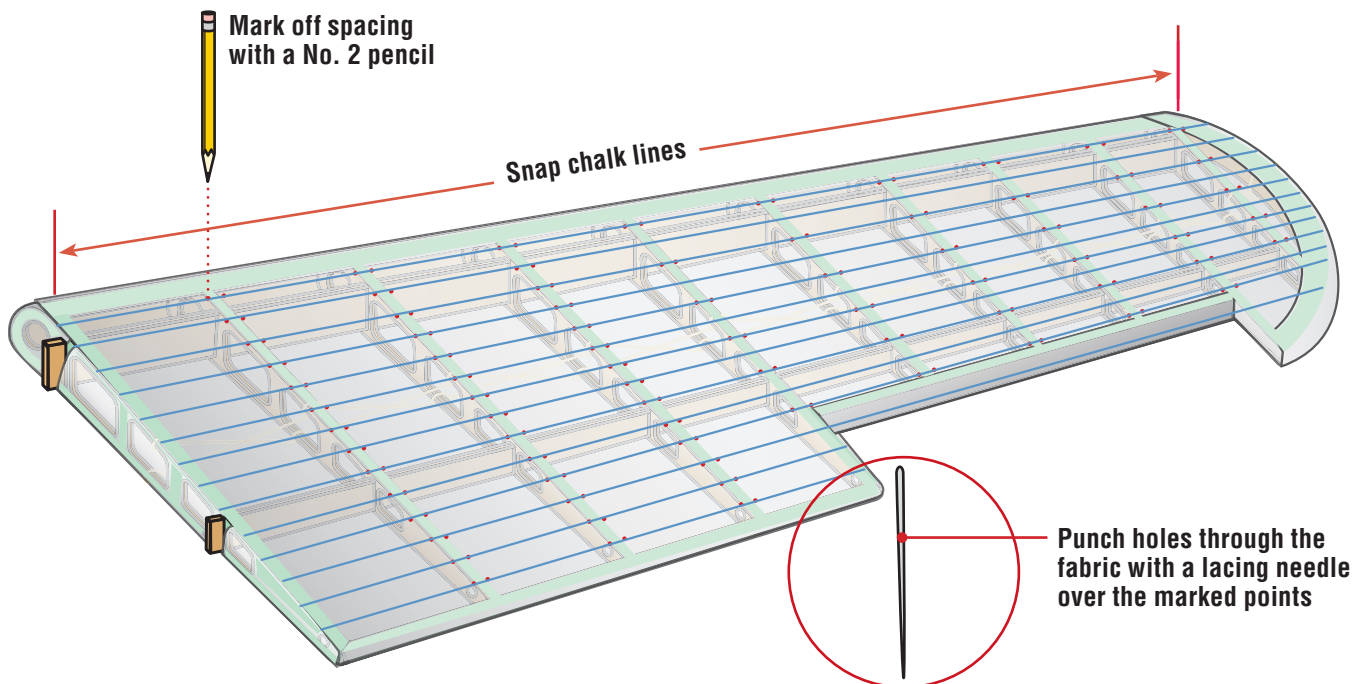


- 3 Using a measuring tape and a straight edge (paint stirring sticks work really well), measure spacing in 2½" and 3½" increments. You may want to use two separate sticks, or straight edges. As you measure, mark the points with a No. 2 pencil. Do this for the entire length (leading edge to trailing edge) of each rib.
- 4 Pre-punch holes through the fabric on the marked points with a stitching needle. This will help when it comes time to lace the ribs together.
- 5 From the outside edge of the butt rib to the wing tip, line up the points with a chalk line. Snap all of the lines in the propwash areas all the way across the wing. In the non-propwash areas, just rib stitch on every other line.
- 6 After marking the spacing on the top surface, you will need to transfer it to the bottom surface. To do this, repeat Steps 4 and 5 on the bottom side of the wing.



Avoid wing spars, and other internal obstacles, when positioning rib stitch locations.

Figure 5.39 | Mark Rib Stitching Holes



Rib Stitch Knots

Now that the task of laying out and making knot holes is complete, it's time to begin the process of knotting and stitching. It's best to use a bent tip needle, as it will make threading the cord to the next hole easier. Needle lengths vary from 2½" to 20". The size of the rib stitching needle depends on the size of the wings and the control surfaces you're sewing. To avoid the frustration of cord tangles, use only 6–8 feet of cord at a time.



If you don't have a bent tip needle, simply bend the tip of your straight needle with pliers, or on the edge of a work bench.

Begin at either end of the wing by first using a seine knot (see Figure 5.41). After tying this knot, thread the needle to the next set of pre-punched holes. From that point on, you will be making hidden knots (see Figure 5.42). They're called hidden knots because, after making them, you will gently push them through the fabric so the knot is hidden.

You will need:

- Rib stitching needle (lengths vary for different aircraft)
- Rib lacing cord

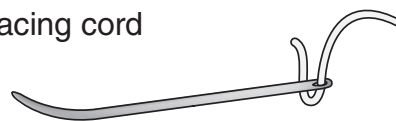
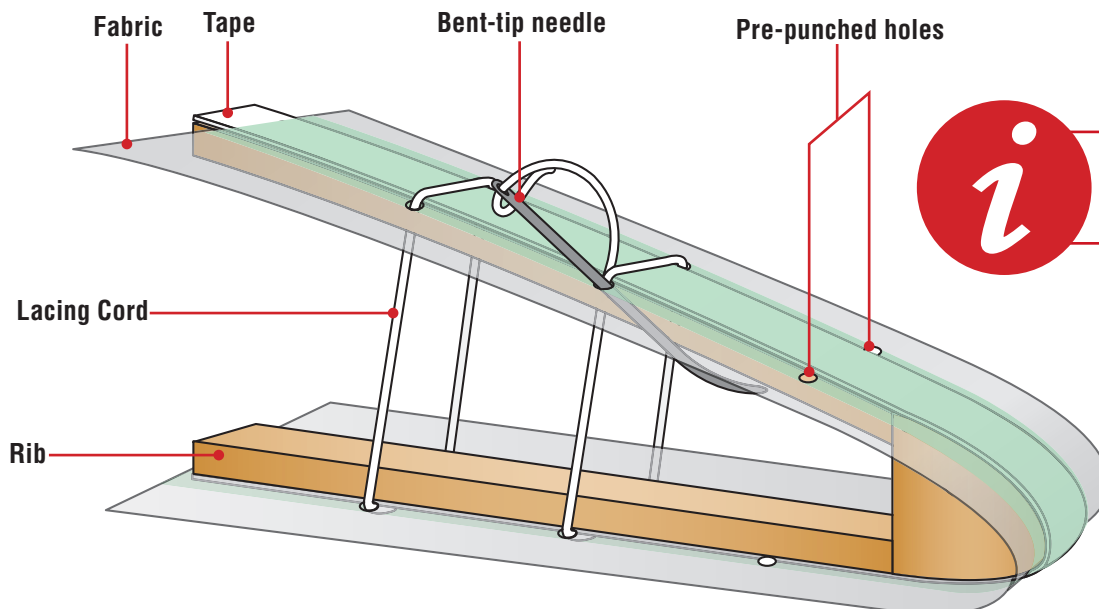


Figure 5.40 | Rib Lacing Cut-away



Shine a flood light onto the fabric to help see the pre-punched needle holes and your threading.

Figure 5.41 | Seine Knot

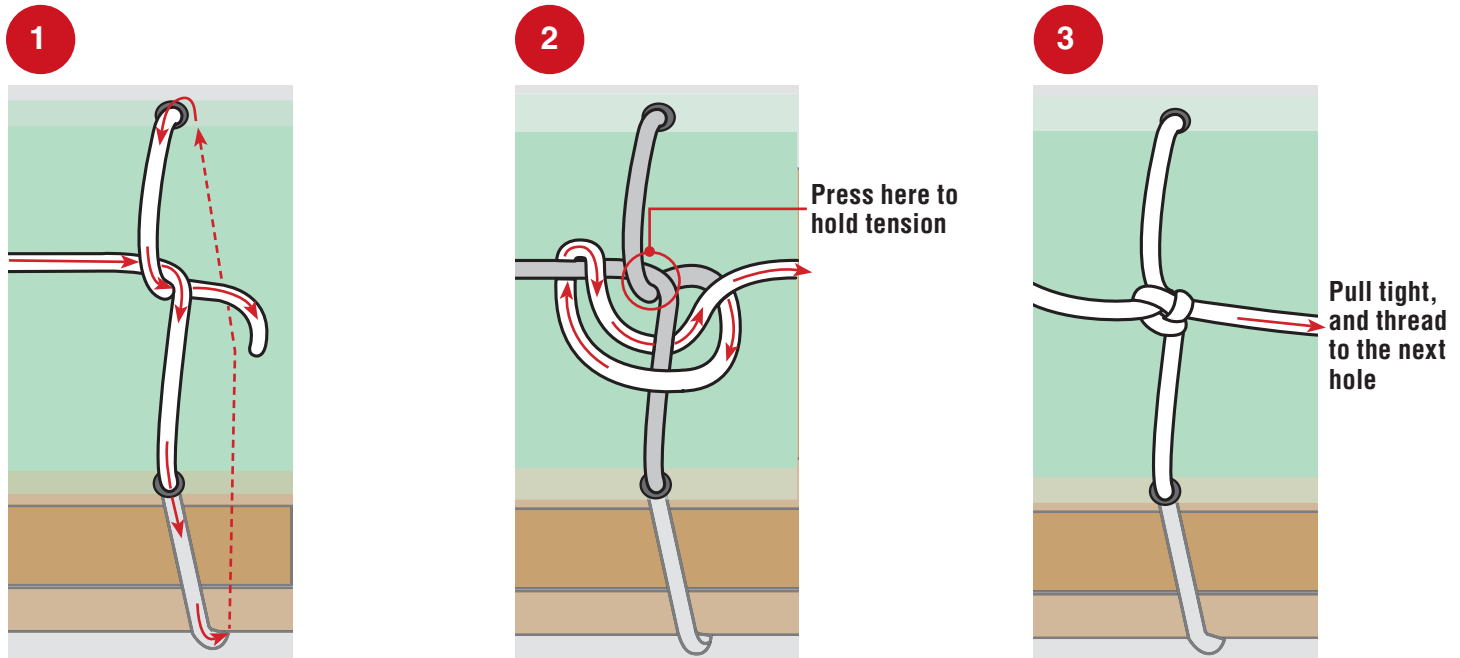
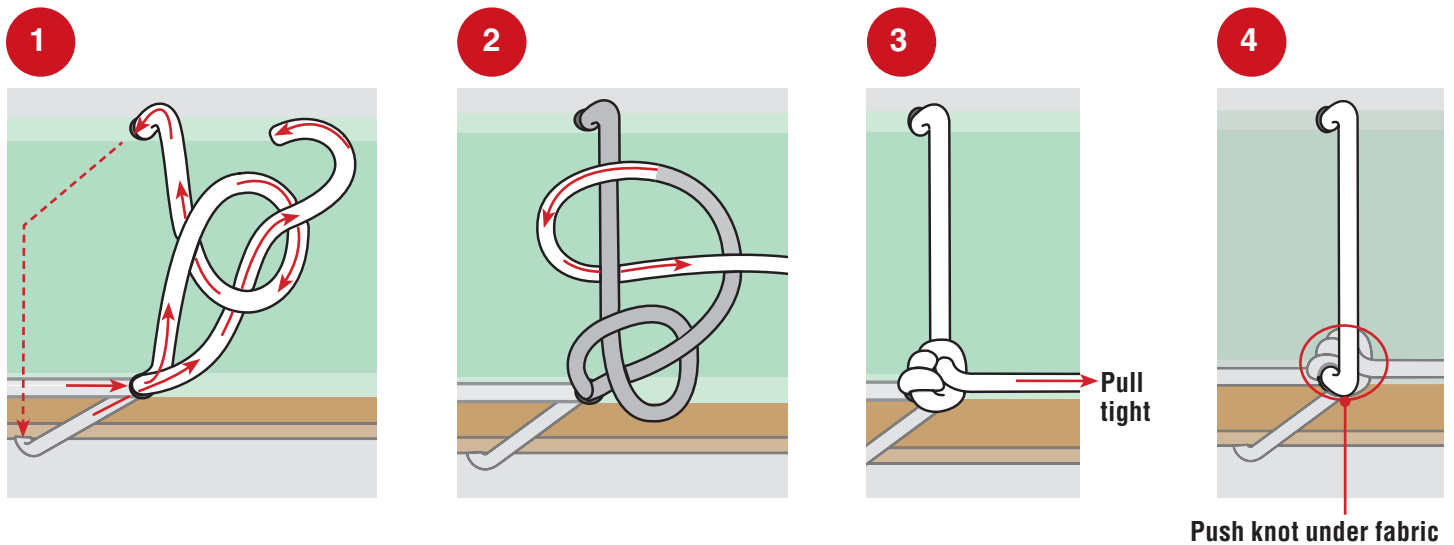


Figure 5.42 | Hidden Knot



DRAIN GROMMETS & INSPECTION RINGS

Now is the time to install drain grommets and inspection rings. Grommets are needed so that trapped water can be drained effectively. Inspection rings will allow you easy access to the inside of the wing, when needed. Each inspection ring comes with a removable aluminum inspection plate. **Note:** Also check AD Notes and Service Bulletins for any additional drain grommets and inspection rings that may be required.

You should refer to the original fabric that was removed, an approved maintenance manual, or AC 43.13 for placement of grommets and rings.

Generally, drain holes should be located on bottom surfaces of different parts of the airplane, and at the lowest possible points adjacent to the trailing edge. Inspection rings are usually located where you can access bell cranks, drag/anti-drag wires, or any other components that may require inspection or annual service. Think about any possible need you may have to access an area inside the plane, and put an inspection ring there. It's better to have more inspection holes than too few. Doing it now will save you headaches later.

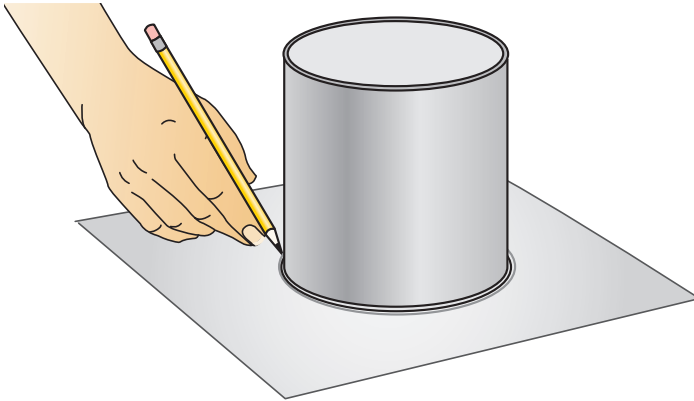
DRAIN GROMMETS & INSPECTION RING SPECIFICATIONS

Part	Part Number	Part O.D.	Fabric Diameter
Standard Drain Grommet	L274	3/4"	2-1/4"
Seaplane Drain Grommet*	L271	1-1/8"	2-5/8"
Inspection Ring	483-15	4-5/8"	6-1/8"
Domed Inspection Plate	SF-225		
Recessed Inspection Plate	SF-325		

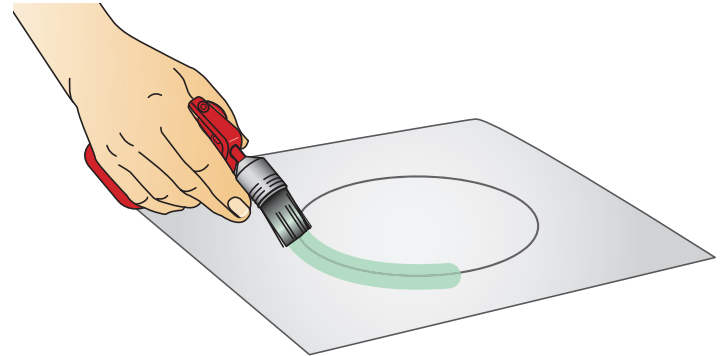
*Seaplane drain grommets can be used on any plane where large amounts of moisture accumulation is a concern — like with a float plane.

To attach a drain grommet or inspection ring:

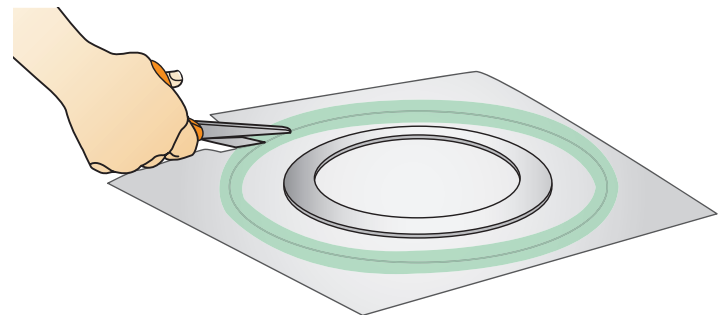
- 1 Using a No. 2 pencil, draw an outline on a piece of unwrinkled fabric. A coffee can works especially well for circular shapes.

Figure 5.43 | Draw and Outline

- 2 Brush a strip of U-500 adhesive on the outline. This will prevent the fabric from unraveling.

Figure 5.44 | Coat Line with Adhesive

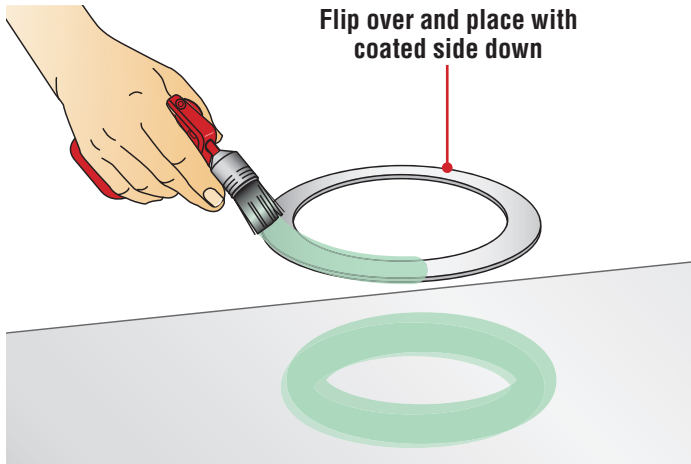
- 3 Using pinking shears, cut along the line. See the chart on page 74 to determine the amount of fabric that will be needed to cover the parts in Step 5.

Figure 5.45 | Cut the Fabric

Using smooth, unwrinkled fabric will help when applying the fabric over the part.

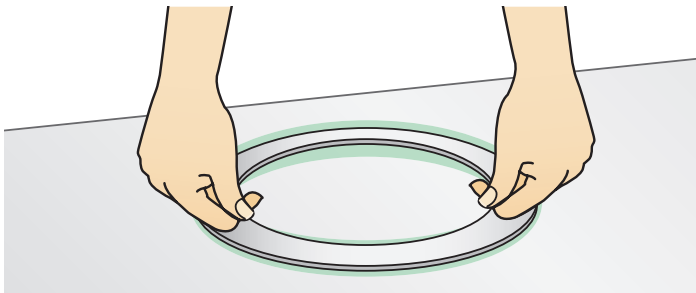
- 4** Coat the bottom of the part, and the area of the fabric where it will be located, with U-500 adhesive.

Figure 5.46 | Coat Part with Adhesive



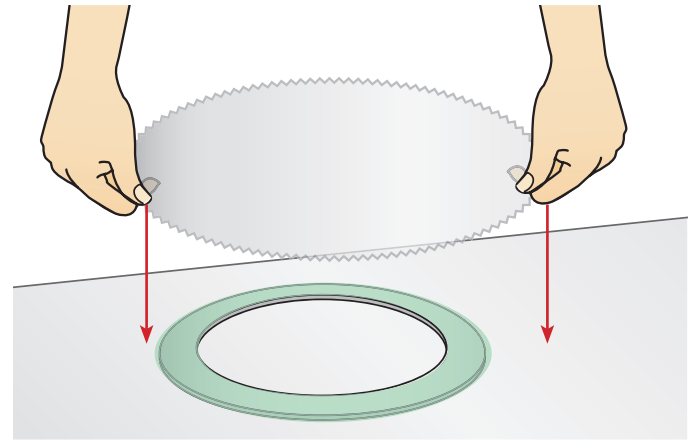
- 5** Hold the part down to work out any entrapped air and wipe away excess adhesive. Be sure that there's equal adhesion all around the part.

Figure 5.47 | Remove Trapped Air



- 6** Coat the top surface of the part with U-500 adhesive and place the piece of fabric you cut in Step 3 over the part. Check that the part and fabric are centered.

Figure 5.48 | Place Fabric Over Part



Note: You will open the drain and inspection holes after applying the final coat of the paint.

FINISHING TAPE & PATCHES

The purpose of finishing tape is to provide abrasion resistance and protection along ribs, trailing edges, and leading edges. Finishing tapes are made from our medium weight (SF102) and lightweight (SF104) fabrics. There are several different styles of surface tape available – straight edge, pinked edge, bias cut, and pre-shrunk. All are available in both fabric weights. Use manufacturer's specifications, or your own personal preference, to determine which tapes to use.

Areas to cover with finishing tape:

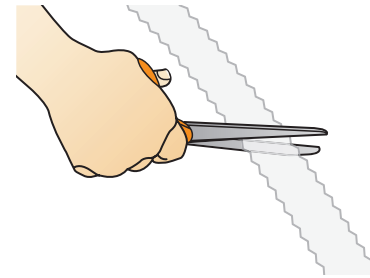
- Fuselage stringers
- Longerons
- Ribs and false ribs
- Sewn seams
- Cemented seams
- Glued joints
- Edges formed from fabric
- Areas needing extra reinforcement
- Any areas specified by the original manufacturer

The order in which you apply your tape is important. First, apply tape to any spots that are oddly shaped or need reinforcing. Next, apply the tape to ribs. Lastly, apply the tape to leading edges.

1

To apply finishing tape to straight areas:

You can use either the pinked or straight edge tape – the choice is yours. You may even want to consider pre-shrunk tape. Determine the length of finishing tape needed. You can cut enough to cover the entire area, or you can cut smaller pieces and butt them together at the leading edge.



SUPERFLITE FINISHING TAPES

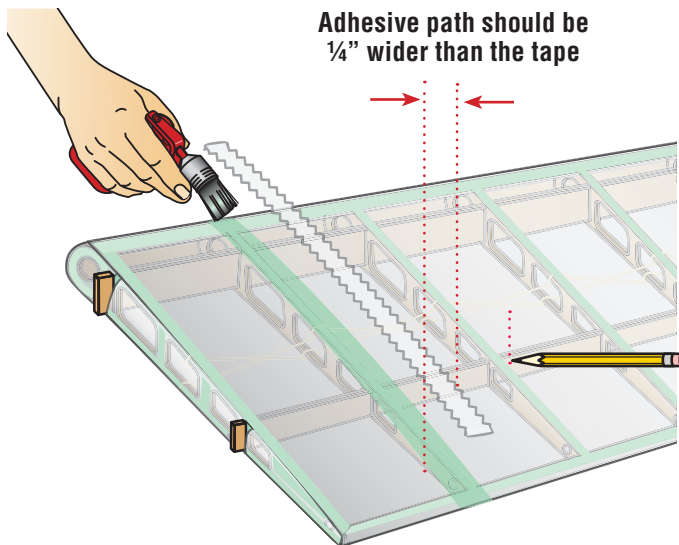
Tape Style	Benefits
Pinked edge	41% more adhesion
Straight edge	Easier to sand
Lightweight	Less defined tape line
Bias cut	Used on curves and corners
Pre-shrunk	Great for use on ribs, longerons, and dark-colored airplanes



If your topcoat is a dark color, use a pre-shrunk surface tape to avoid edge separations in the hot sun.

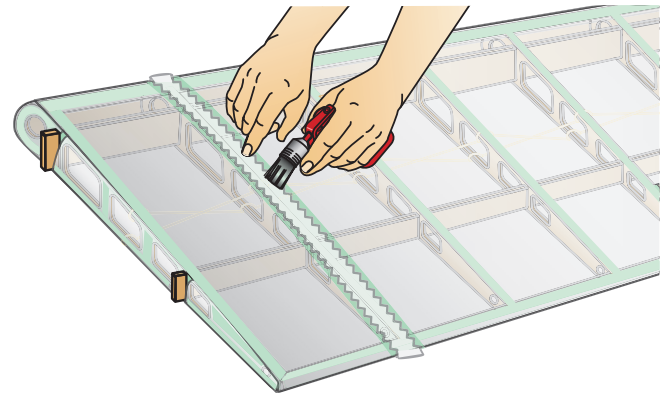
- 2 Using a No. 2 pencil and a straight edge, mark just outside the width of your surface tape. This keeps glue application neat and to a minimum.
- 3 Brush thinned U-500 adhesive (2 parts Acetone to 1 part U-500) over the area. Brush a path that is about $\frac{1}{4}$ " wider than the finishing tape you are applying. Brush on a second coat as soon as the first is dry, leaving a neat and even green stripe over the area to be taped.

Figure 5.49 | Apply Adhesive



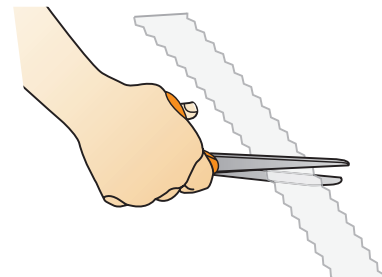
- 4 Align the tape over the newly brushed area. Hold down the tape with one finger, and apply the U-500 adhesive (2 parts Acetone to 1 part U-500) over the tape, working the adhesive into the weave of the fabric. The edges of the tape must be completely adhered, especially the edges.

Figure 5.50 | Adhere Tape



For curved surfaces, consider using bias tape. It will lay down easily without the need to apply heat.

- To apply finishing tape to curved areas:**
 - 1 Measure the length of surface tape you will need. Add an extra 12" of tape and cut the tape.

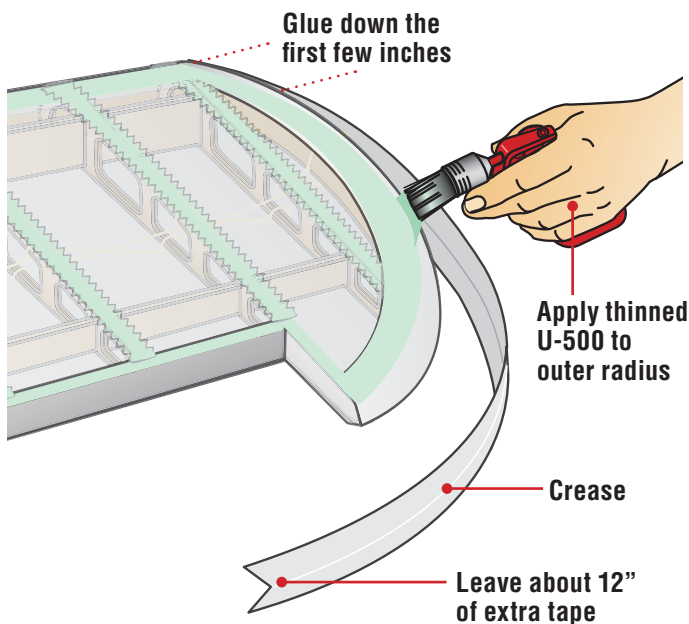


- 2** Fold the tape in half, length-wise, creating a center-line crease. The crease will provide a visual guide around your radius, giving you equal amounts of fabric on each side.

Fold to
make crease 

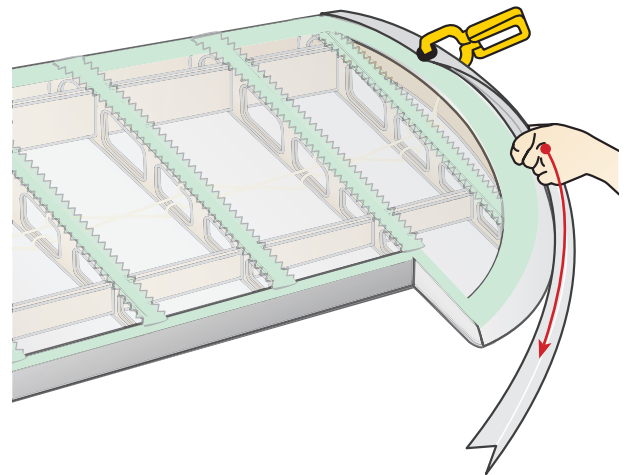
- 3** First, glue the tape to an end that is flat where you have a couple of inches with which to work. Next, using thinned U-500 (2 parts Acetone to 1 part U-500), apply two coats around the outer radius of the curved surface and let dry completely.

Figure 5.51 | Apply Adhesive



- 4** Grasp the tape firmly, making sure it doesn't wrinkle. Pull the tape tightly over the radius of the curve, using the crease to keep it centered. Clamp the area you have just stretched. Then apply the thinned U-500 adhesive (2 parts Acetone to 1 part U-500) over this area. Continue the process of pulling the tape tightly, clamping, and gluing until you get close to the end.

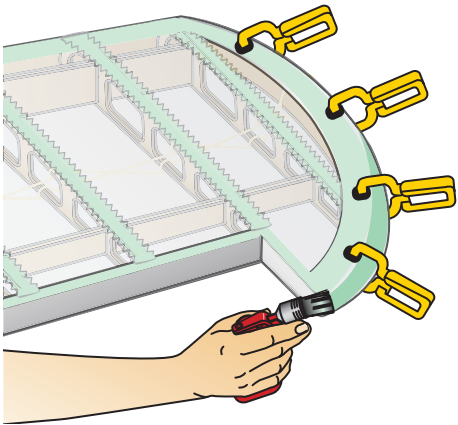
Figure 5.52 | Pull Tape Firmly



The harder you pull on the finishing tape the better it lays down.

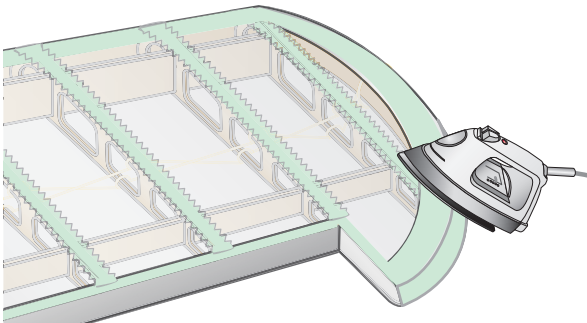
- 5 Once you have reached the end, using the extra fabric, grasp firmly and pull hard towards the end and clamp. Glue the edges of this area where it will lay flat. Be sure the fabric-to-radius area has good adhesion.

Figure 5.53 | Clamp and Glue



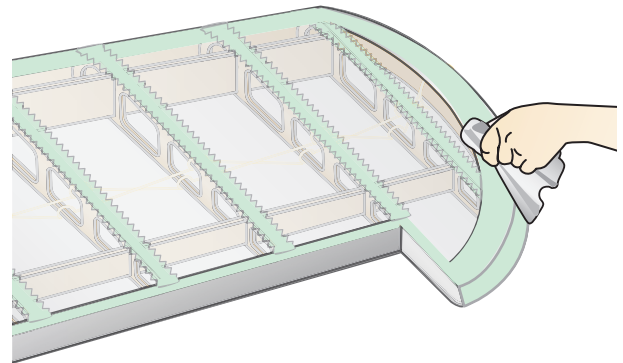
- 6 Don't be concerned about a tape edge that does not lay flat. Once the adhesive is dry, shrink the tape with an iron at 250°F, flattening the tape down to the base fabric.

Figure 5.54 | Shrink Tape with Iron



- 7 Brush the thinned U-500 adhesive under the tape and base fabric, encapsulating both the finishing tape and base fabric. Wipe away any excess adhesive, or drips, with a lint-free cloth dabbed in Acetone. Make sure you have good adhesion on all the edges.

Figure 5.55 | Wipe Away Excess Adhesive

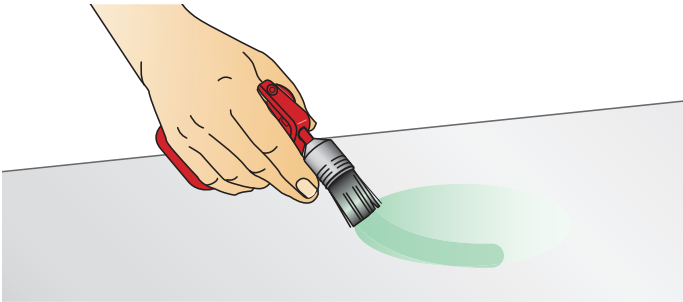


Reinforcing Patches

It's important to cover all protrusions and exposed drain grommets with an overlay patch. This process works much the same way as installing an inspection ring.

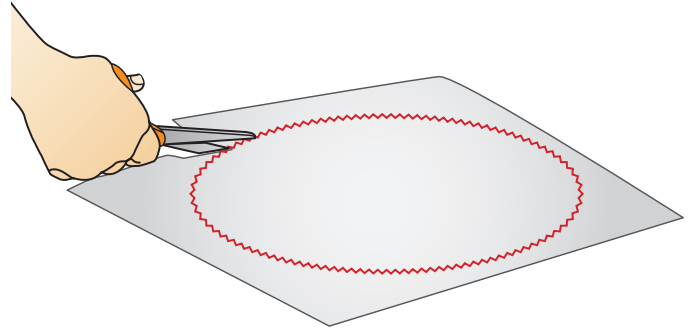
- 1 Apply a thinned coat of U-500 adhesive (2 parts Acetone to 1 part U-500) to the area that needs covering. This helps in the adhesion process, and will prevent unraveling.

Figure 5.56 | Apply Thin Coat of Adhesive



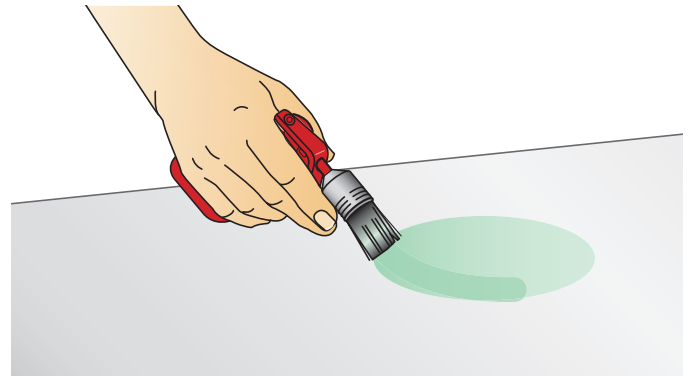
- 2 Cut enough unwrinkled fabric from your scraps to cover the area you're patching.

Figure 5.57 | Cut Fabric from Scraps



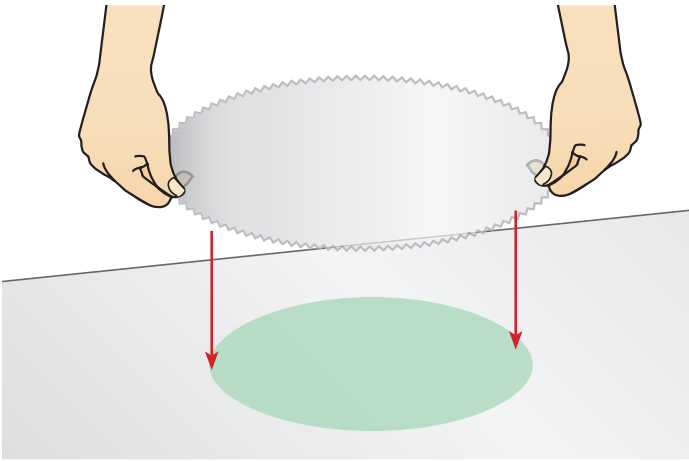
- 3 Brush another coat of the U-500 adhesive (2 parts Acetone to 1 part U-500) over the spot. Let this dry for a few minutes.

Figure 5.58 | Apply Second Coat of Adhesive



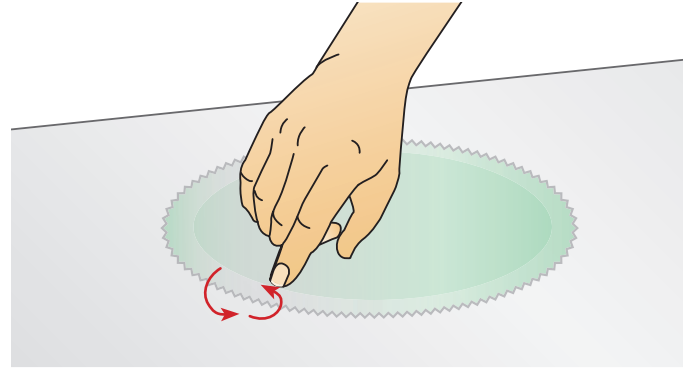
- 4 Place the fabric patch over the area, and brush the top of it with the thinned U-500 adhesive (2 parts Acetone to 1 part U-500).

Figure 5.59 | Apply Fabric



- 5 Rub the fabric and U-500 gently to imbed the fabric into the adhesive.

Figure 5.60 | Imbed Fabric into Adhesive



Always wipe off excess glue adjacent to the tape or patch using a lint-free cloth soaked in Acetone.

SUMMARY

Before taking off to the next chapter you should have complete knowledge of how to:

- Cover the frame with fabric using the best method for your project.
- Tauten or heat shrink the fabric.
- Apply reinforcing tape.
- Secure the fabric to the frame by lacing and knotting cord through the fabric and ribs.
- Install inspection windows and drain grommets.
- Apply finishing tape and patch edges with finishing fabric.

PRIMING & PAINTING

PRE-FLIGHT CHECKLIST

	Overview	84
	Fabric Cleaning & Inspection	85-86
	Mixing the Fabric Primer	87-89
	Applying the Fabric Primer	90-95
	Applying the Superflex Topcoat.....	96-99
	Applying the Trim Colors	100-104
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OVERVIEW

It's time to add some life to your aircraft, color! Color is what defines your plane's personality, and yours. So think it through and make it you.

In this chapter, we will discuss, and demonstrate, all the steps you need to take for priming and painting your aircraft.

By the time you land you will have:

- Prepared the fabric for the priming phase
- Mixed the primer
- Primed your aircraft
- Mixed the paint
- Painted your aircraft
- Painted trim colors

FABRIC CLEANING & INSPECTION

The final touches of covering the frame are very important. If not done properly, you will have problems in the priming and painting phase. Therefore, before going any further, take these final steps:

- Inspect for any blemishes such as wrinkles, bumps, and bubbles. Use your fingertip to check for rough or wrinkled edges. You can repair any of these by using an iron and a bit of Acetone.
- With the Iron set at 250°F, iron the **OUTER EDGES ONLY** of the finishing tape and patches. This will smooth down any upturned edges on pinked material.
- Brush a coat of U-500 (thinned to a watery consistency with Acetone) onto the fabric in all areas where the fabric is in direct contact with solid structure, such as leading edges, turtledecks, and fuel-tank bays. This will seal the fabric to the structure, and prevent “wicking” of the primer, which might otherwise require three or four extra applications to properly fill the weave.



Cleaning the Fabric

At this point, it's important that the fabric is completely clean. There are two acceptable ways of washing your fabric: the Superwash method and the detergent method.

Why wash the fabric?

Cleaning the fabric gets rid of any dirt, dust, or grease that might contaminate the primer and paint. Not cleaning the fabric could create fisheye, pin holing, orange peeling, or some other unsightly blemish in the finish.



WICKING – The absorption of liquid into material by capillary action.

Materials needed for Superwash method:

- Superwash
- Clean and lint-free terry cloth towels
- Cleaning gloves (optional)

Figure 6.1 | Superwash Method Materials



A wipe-down with an alcohol-based cleaner, such as Superwash, is probably the easiest and fastest method of cleaning the fabric. Using a lint-free (already washed) terry cloth rag, soak it in Superwash and wipe it over the fabric, concentrating on any spots with excessive dirt or grease. The fabric should dry almost instantly. Alcohol-based liquids evaporate very quick.

Materials needed for detergent method:

- Non-sudsing detergent, like Pine-Sol®
- Bucket of clean water
- Clean and lint-free terry cloth towels

Figure 6.2 | Detergent Method Materials



Mix a fairly diluted amount of non-sudsing detergent. You don't need the cleaning solution to be too potent – a ratio of two parts water to one part cleaning agent should do the trick. Wipe the fabric down with the detergent, concentrating on any areas with excessive dirt or grease. With a clean bucket of water and a clean towel (not the one used with the detergent), rinse the cleaning agent off the fabric. The fabric will take longer to dry – water doesn't evaporate as quickly as alcohol.

Important! It is critical that all soap residue is removed from the fabric to ensure primer adhesion, and the fabric must be dry before continuing on to the primary steps

MIXING THE FABRIC PRIMER

After cleaning and preparing the fabric, you're ready to mix your primer. It's best to only mix as much as you might use in an hour's time. If you mix much more than that, the primer will harden before you can get it sprayed onto the fabric. Before you start mixing, you will need to wear the appropriate protective gear. Even though you're not spraying the primer yet, you will want to wear your fresh air mask, just to be safe.

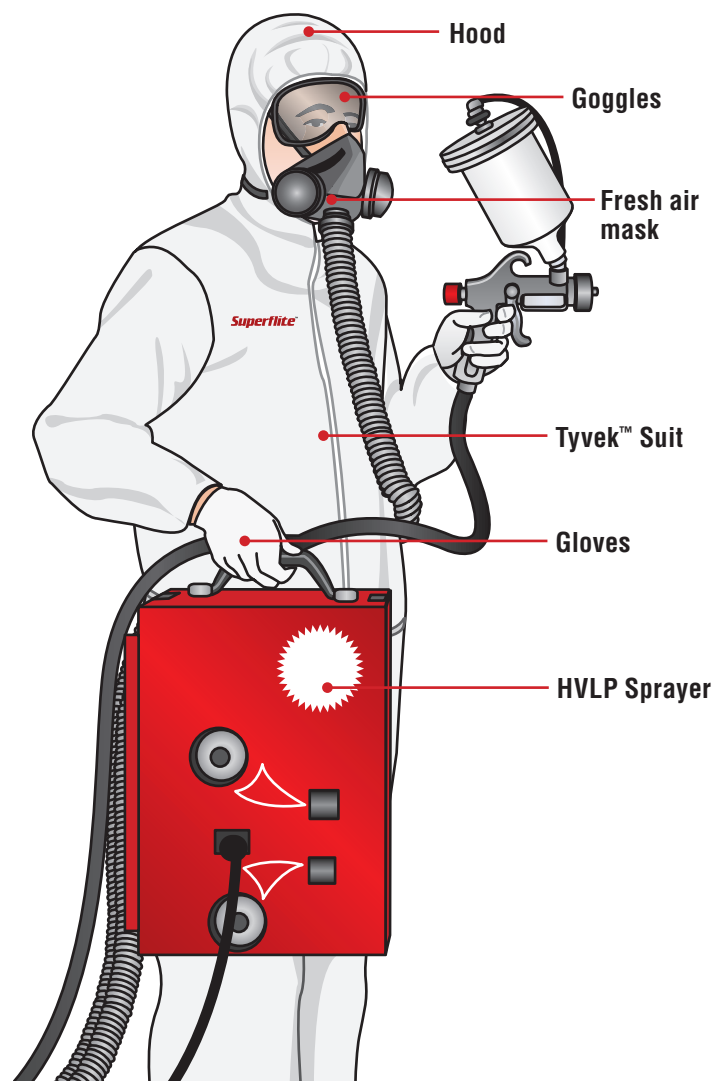
Gather the following materials:

- Paint/primer stirring sticks
- Mesh strainer
- Viscosity cup
- SF7500 Primer base
- SF7600 Primer catalyst
- SF7800-Series reducer

Wear the following protective gear:

- Goggles/hood/full fresh air mask
- Tyvek® paint suit
- Latex or rubber gloves
- Fresh air breathing unit

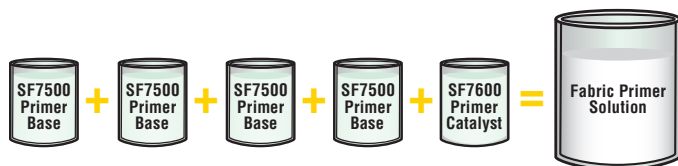
Figure 6.3 | Protective Gear & Spray Equipment



Important! Before mixing the components to make your fabric primer, the SF7500 primer base needs to be properly shaken, or stirred. Using a stirring stick, thoroughly mix the SF7500. Be sure to scrape the bottom of the can to loosen any pigment that might have settled. If your SF7500 has been sitting for longer than a couple of weeks, you might even consider setting the can on a paint shaker for five minutes. This ensures a properly mixed primer base.

Mixing the Fabric Primer

- 1 To obtain the solution for the fabric primer, mix 4 parts SF7500 Primer Base with 1 part SF7600 Primer Catalyst.



Many hardware or paint suppliers will shake your paint for a minimal fee and sometimes free. Low budget paint shakers are available for as little as \$100.

- 2 Strain the fabric primer through a mesh strainer.

Figure 6.4 | Strain Fabric Primer



- 3 For the first penetration coat add reducer for 17 seconds through a No. 2 Zahn viscosity cup.
- 4 For the heavier coat add reducer for 23 seconds through a No. 2 Zahn viscosity cup. For the reducer, use anything in the 7800-Series follow the reducer chart below for the appropriate temperatures. If you don't have a No. 2 Zahn viscosity cup, a Ford cup will suffice. See conversion chart on page 35.

REDUCER TEMPERATURES

Reducer	Temperature
SF7860	60–70° F
SF7870	70–80° F
SF7885	75–85° F
SF7895	85° F +

It's essential that you **DO NOT** mix more primer than you can use in 1½ hours. That is the pot life of the primer – it will only be sprayable for 1½ hours at 70°F. After that, the catalyst will harden the primer, making it impossible to spray. Mixing more than you can use will only be a waste.

! WARNING



Wear a fresh air breathing mask when mixing the primer. When the isocyanates from the catalyst become airborne, they are harmful to your lungs.

Spray Equipment

When spraying the fabric primer, the best type of spray gun to use is a high volume, low pressure (HVLP) turbine spray gun. There are several different types of units available that contain the gun, the air compressor, and the fresh air breathing mask all in one unit. While the HVLP gun is the best choice for the fabric primer, an air compressor gun will work as well.

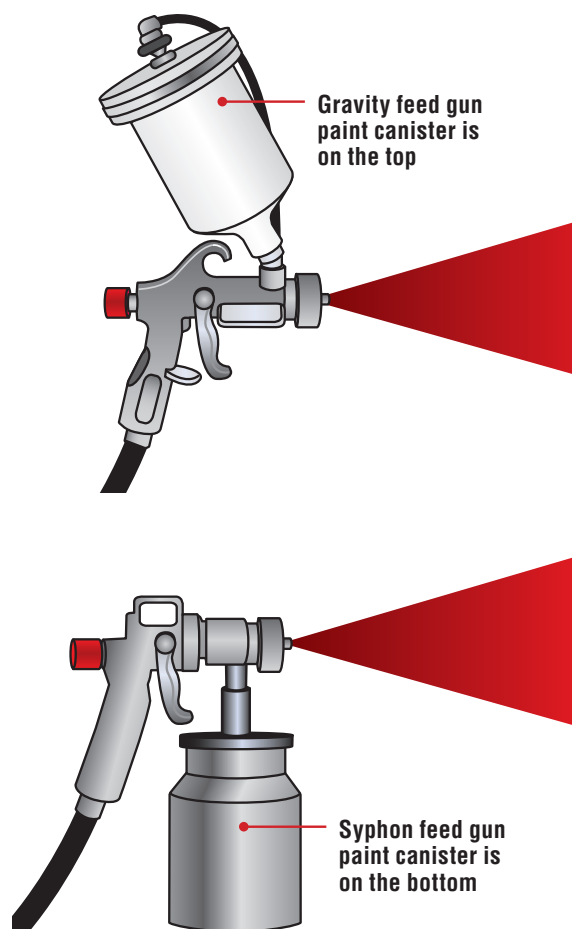
Spray Booth

All spraying of primer, or paint, should be done in a spray booth. See Chapter 3, page 18, for detailed information on spray booths.

FLUID TIP SPRAY GUN SETTINGS

Spray Gun Type	Setting	Air Pressure
Gravity Feed	1.0–1.4 mm	10–20 psi
Pressure HVLP Feed	1.0–1.4 mm	10–20 psi
Conventional Unit	1.3–1.7 mm	45–60 psi

Figure 6.5 | Spray Guns



APPLYING THE FABRIC PRIMER

Time is of the essence in this next phase. Once your primer is mixed, you have just a little over an hour to apply it before it catalyzes.

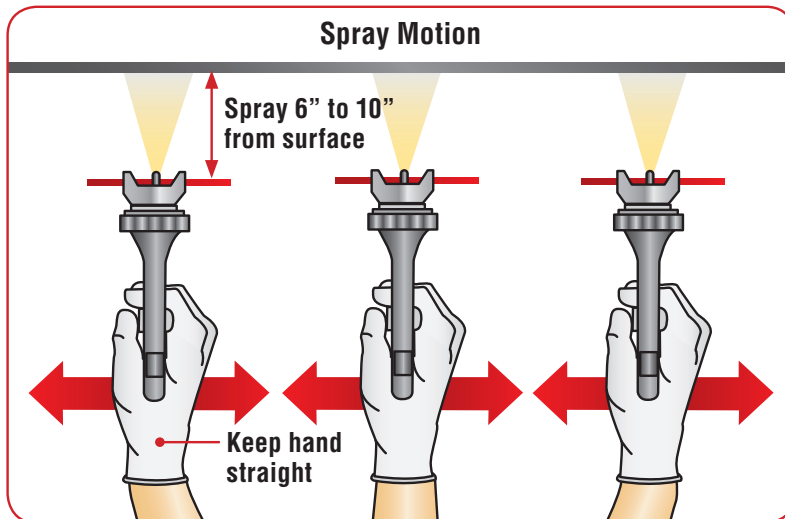
1 Applying the First Coat of Primer

For optimum weave penetration and cosmetic appearance, the surface to be sprayed should be placed in a horizontal position. Mix enough thinned primer (See viscosity chart on page 35) to spray on one pass (1/2 of a cross coat). Spray the first pass, and let it dry for a minimum of 45 minutes to an hour. The longer the dry

time, the better. **Note:** This first pass will be cosmetically unattractive, but do not be concerned. The primer is doing its job of penetrating the weave for paint adhesion.

2 After this first pass is dry, a second pass will need to be sprayed. Use the same viscosity as the first pass. Remember to spray the second pass in the opposite direction of the first. For example, if you sprayed north-to-south on your first pass, spray east-to-west on your second pass. This will complete the first full cross coat.

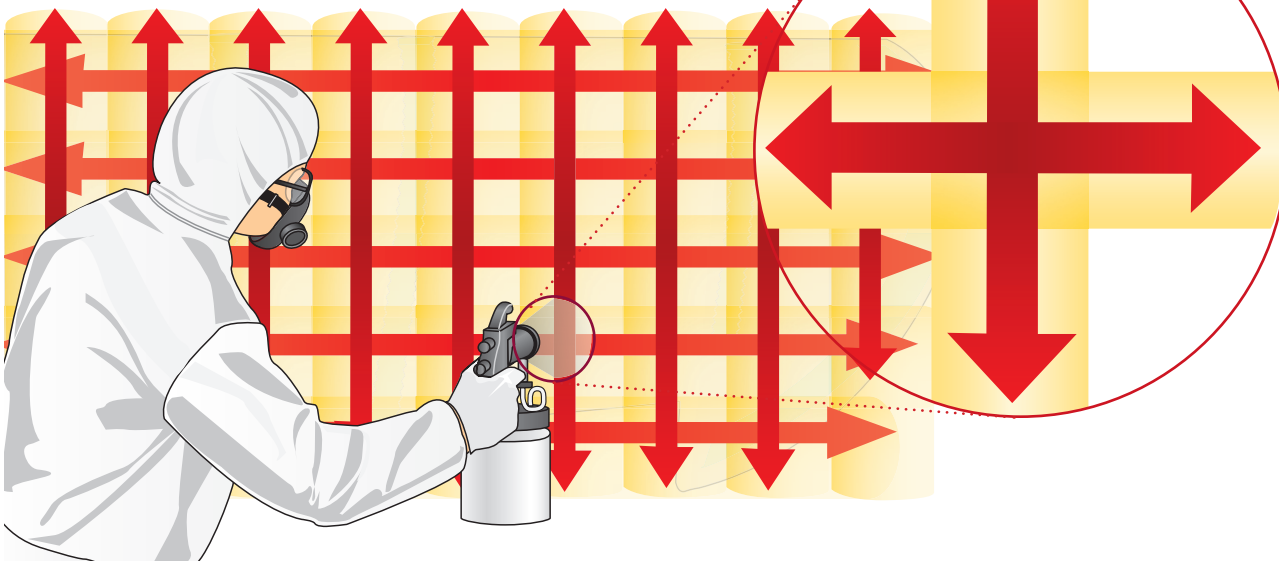
Figure 6.6 | Spray Motion



Only mix as much as you can spray in an hour. If you should have to stop before you've sprayed the entire mixture, and you don't want to waste any, it can be stored in the freezer for up to one day. It will still be sprayable. Cold catalyzed product has a tendency to run. So, make sure to bring it to room temperature before spraying.

Figure 6.7 | Spray East to West

CROSS COAT – Is a spray painting term. To cross coat, first spray from left to right, or east to west, over the entire surface. Allow the first pass to “tack up.” The first pass is then followed by a vertical, or north to south, pass. Both passes together make one cross coat.

Figure 6.8 | Spray North to South

Sanding the Primer

Sanding is an important step in the Superflite System 7 application process.

As far as the cosmetics of your finish are concerned, sanding is essential. Proper sanding, especially on finished materials, takes talent, attention to detail, and patience. Sanding done poorly will make your finished job look bad.

Wet sanding on a Cub-sized aircraft generally will take about a day. It's not a difficult job, but it is labor intensive.

Materials needed for sanding the primer:

- 320–400 Grit sandpaper
- Mild dish washing soap
- Large bucket (5 gallon works well)
- Lukewarm water

Figure 6.9 | Primer Sanding Materials



To Sand the Primer

- 1 Fill your bucket with water and mild dish washing soap. You won't need a lot of soap – about 1 oz. of soap to every 2 gallons of water.

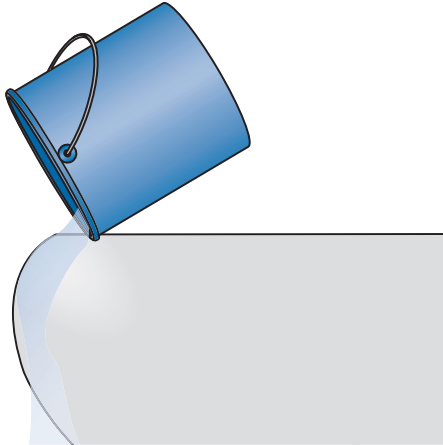
Figure 6.10 | Fill Bucket with Soap and Water



Using soap and water keeps the sanding dust and residue to a minimum, and will help your sandpaper last longer.

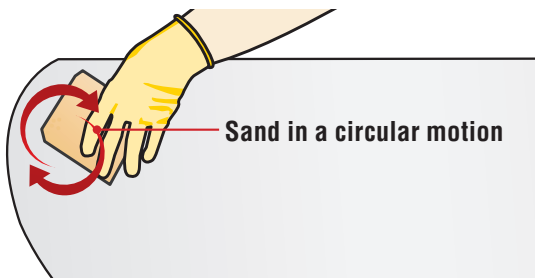
- 2 Choose a piece of your aircraft – you may want to start with the smaller pieces first – and pour a little of the soapy water on the surface.

Figure 6.11 | Pour Water on Aircraft Part



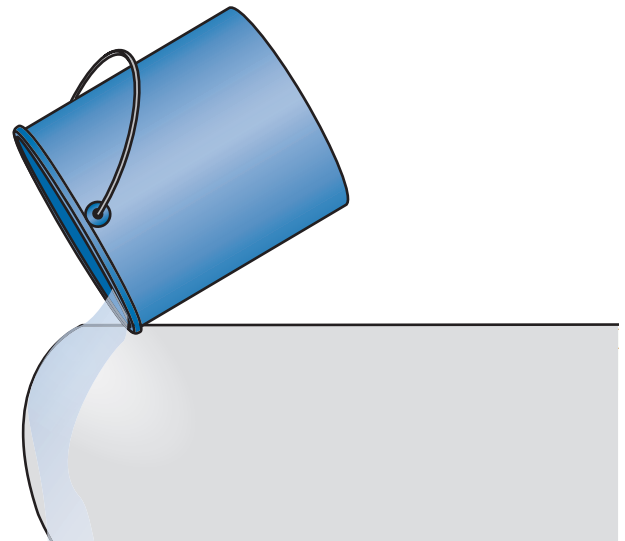
- 3 Using sandpaper no lower in grit than 320, begin slowly sanding in a circular motion. Don't get too vigorous. If you over-sand and expose fabric, or sand through the fabric, patching will be necessary. Sand with a light touch, and be especially careful when sanding over structure, like a rib. In these spots, you will probably want to use a finer grit.

Figure 6.12 | Sand Aircraft Part



- 4 After sanding, use a bucket of clean water, or a garden hose, to rinse off the sanding residue. Allow it to air dry before moving on to the topcoat.

Figure 6.13 | Rinse Sand Off



Important! Do NOT wait any longer than 2 days after spraying your fabric primer to begin sanding. If you wait any longer than 2 days, it will be extremely hard to sand.

Applying the Second Primer Coat

Once the surface is smooth from sanding, and it's clean and dry, you're ready to begin applying the second cross coat of primer.

- 1 Keep the surface you are spraying horizontal. Mix the primer to a viscosity of 23 seconds through a No. 2 Zahn cup. See the viscosity chart on page 35 before mixing. The ratio will be: 4 parts SF7500 Primer Base to 1 part SF7600 Primer Catalyst.

- 2 Apply the first pass of the second cross coat. Allow this pass to tack up before moving on to the next pass.

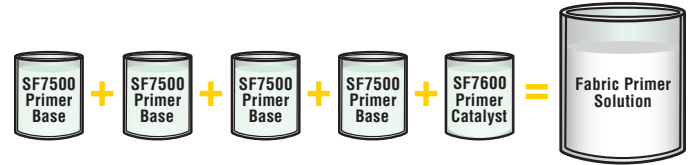
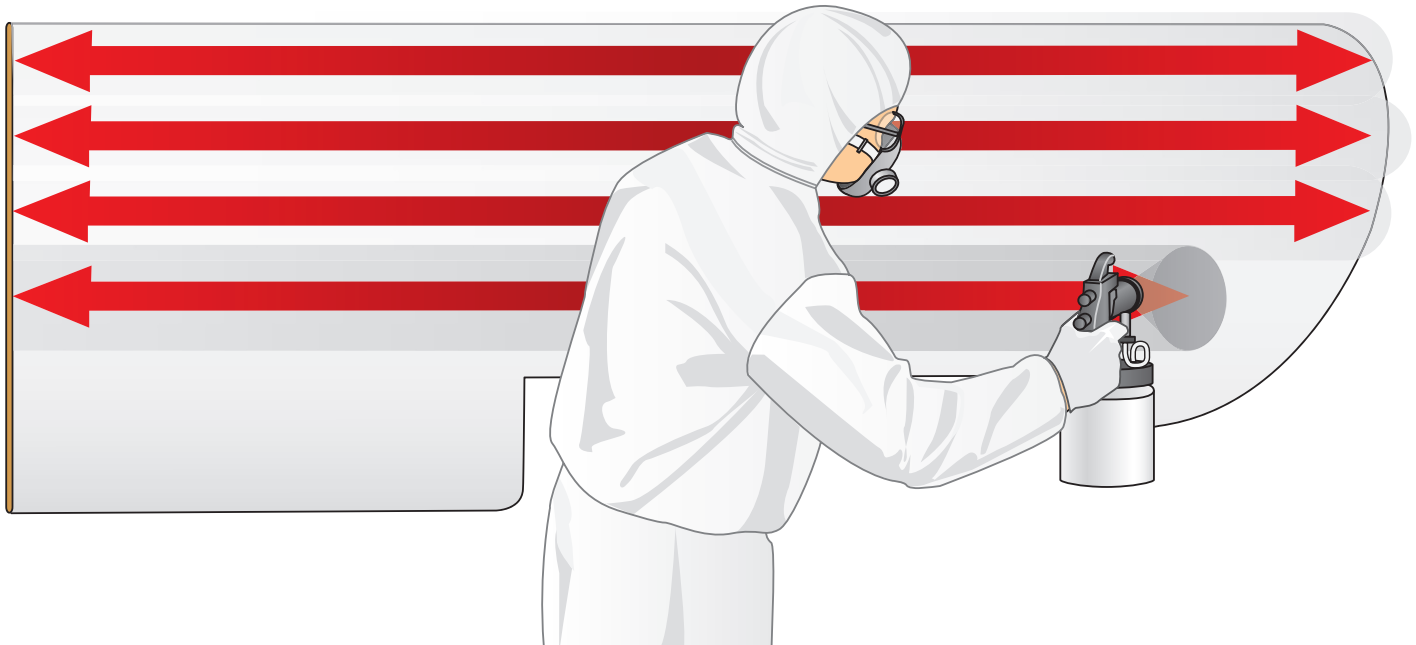


Figure 6.14 | Apply First Pass of Second Coat



- 3 When the first pass of the second cross coat is tacky, spray the second pass. This pass will have the same viscosity as the first. Spray this final pass in the opposite direction of the one prior.
- 4 Allow the second cross coat to sit overnight. If necessary, wet sand it the next day. Clean with water before moving on to the topcoat.

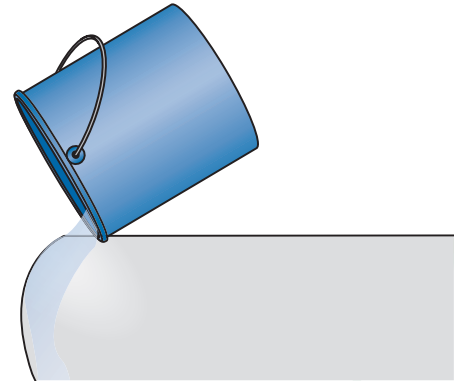
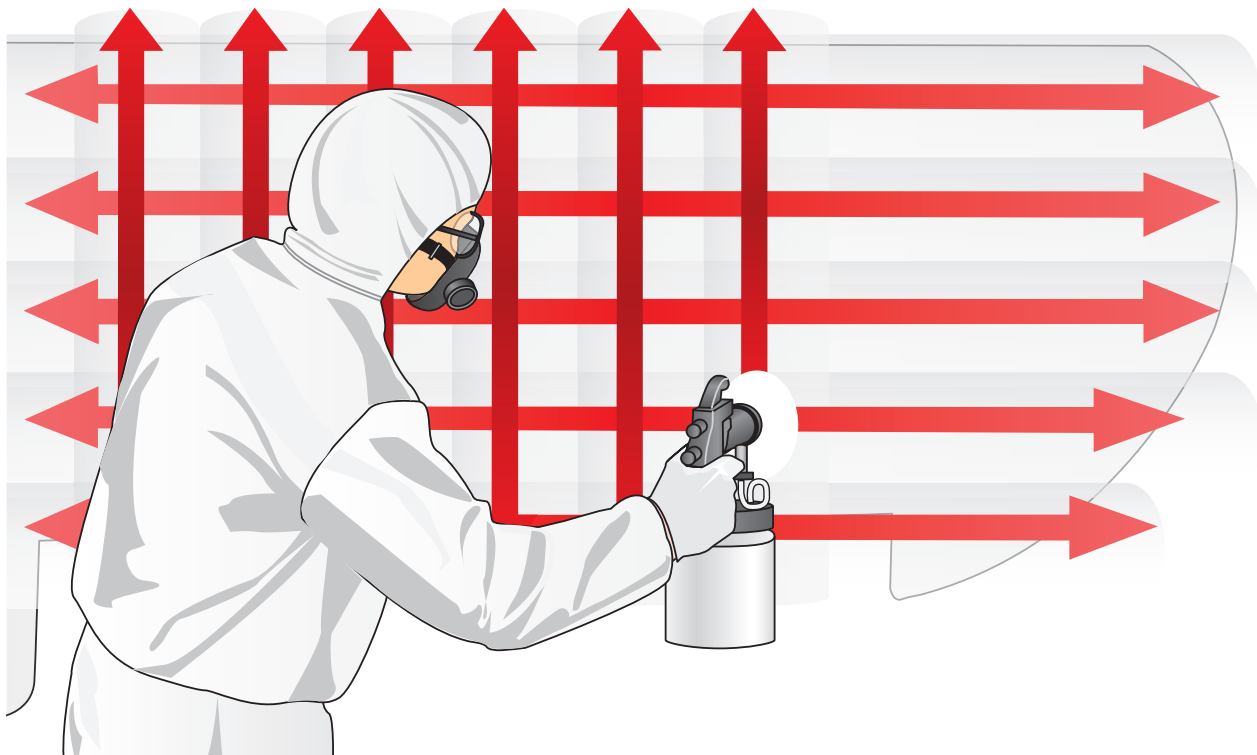


Figure 6.15 | Apply Second Pass of Second Coat



APPLYING THE SUPERFLEX TOPCOAT

You have your paint booth assembled; your parts have been primed, sanded, and cleaned. Now it's time to mix and catalyze your paint color.

To Mix the Superflex Topcoat:

- 1 Mix 3 parts paint with 1 part of SF7950 catalyst.



- 2 Reduce this mixture to your preference. Remember, it's always better to over-thin than to under-thin. Too much reducer will not compromise the integrity of your paint. In fact, it may reduce the possibility of orange peeling. Use any of the 7800-Series reducers with the Superflex topcoat.
- 3 Strain the paint through a mesh strainer. After mixing the paint, you will only have a pot life of about 1½ hours. Be sure to only mix as much as you can use in that time.

Set Your Spray Gun

If you're using an HVLP compression driven gun, it needs to be set at 20–25 psi at the nozzle. If using a standard gun, it needs to be set at 40–60 psi at the gun, **NOT** at the nozzle.

To Apply the Superflex Topcoat

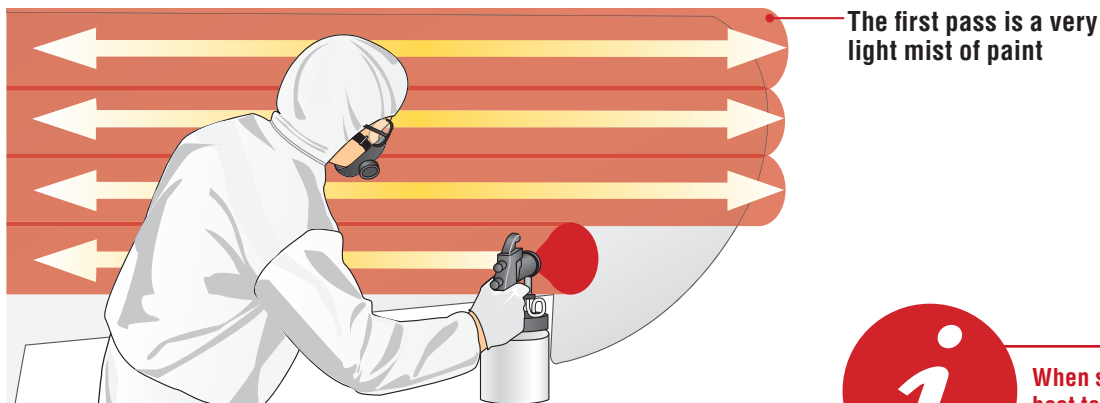
When spraying the paint, you can hang your pieces and spray vertically, or you can use saw horses and spray horizontally. There is no right or wrong way of doing this – it's really your preference. A beginner painter may want to spray horizontally to eliminate the possibility of runs.



If you find that you have mixed more than you can use in the allotted pot life time, you can put your catalyzed paint in the freezer, and it will remain “good for use” for another 1–2 days. Note: Cold catalyzed product has a tendency to run. So, be sure to bring to room temperature before spraying.

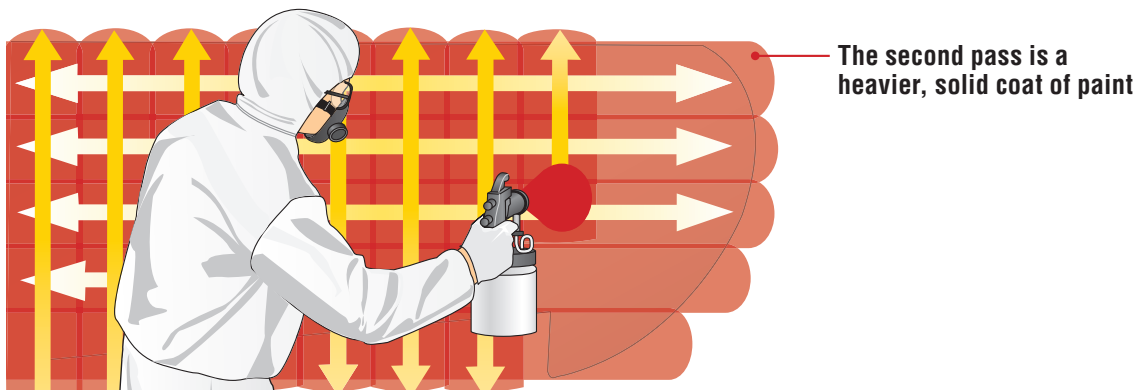
- 1 Spray the first pass of paint. It's going to be just a very light "tack pass" that's very much like misting the paint. The direction does not matter. You can start out east-to-west or north-to-south. You need to remember which direction you start out using. This will be important as you prepare to spray your next pass. Wait 15–30 minutes before proceeding to the next pass.
- 2 Spray the second pass. This pass needs to be heavier than the first. It's going to be a nice, full coat of paint, and it needs to be sprayed in the opposite direction of your first pass. For instance, if you sprayed north-to-south with your first pass, this second pass needs to be east-to-west. This will complete your first cross coat.

Figure 6.16 | Spraying the First Pass



When spraying your topcoat, it's best to do it one pass at a time.

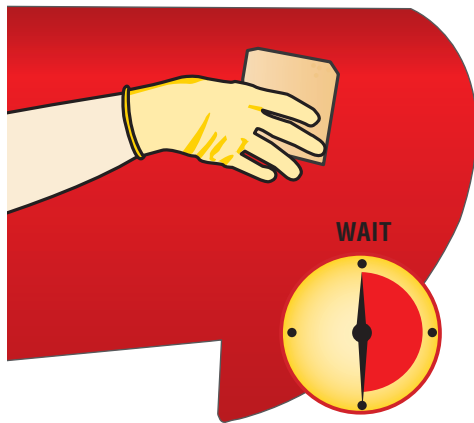
Figure 6.17 | Spraying the Second Pass



We've come to the point in your topcoat spraying where it's time for optional sanding. For a "show-quality finish", let your first cross coat sit overnight. The next day you'll want to do a light wet sanding with 400–600 grit sandpaper. **NOTE:** This step is **OPTIONAL**. It's not required. It does, however, create a smoother and shinier finish.

If you choose **not** to wet sand between cross coats, you only have to allow your second pass (Step 2) to tack up before moving on to your final cross coat. The tack up drying time usually takes 15–30 minutes.

Figure 6.18 | Optional Wet Sanding



Buffing

On spot repairs, or patching, buffing can be used to blend overspray edges. **NOTE:** This only works on solid topcoats – **NOT** metallics. After your second coat of Superflex topcoat has dried, wet sand the overspray area with a 1500 grit sandpaper. If the area is small enough, at this point, you can hand buff with an automotive

polish. If the area is larger, use a machine buffer with a wool pad and some automotive polish. Buffing the overspray will take care of the "halo" around your patched area.

- 3 Spray the third pass. Once again, this will be a heavier paint coverage, just like the second pass. Spray this pass in the opposite direction you just completed. Wait for 15–30 minutes.
- 4 Spray the fourth and final pass; this too will be using a heavier paint coverage. Spray in the opposite direction you just sprayed to complete your second cross coat. You are now finished with the painting stage.

If you have a problem with runs when spraying the topcoat, it's fixable. Allow the topcoat to dry to the touch. Using a fine grit sandpaper (start with 600 grit), sand the area that has the run. After sanding down the run, you'll need to do some touch up painting in that area. To get this new coat of paint to blend with the paint already on the part, you'll need to use a blending agent. The blending agent does just as the name suggests – it blends the two layers of paint together and eliminates the "halo effect" you often see when touching up urethane paints.



When spraying your topcoat, patience is key! Now is NOT the time to get in a rush to finish your project. Take your time spraying the topcoat. Also, the slow drying, or hot temp reducer, can be used as a blending agent.

Figure 6.19 | Spraying the Third Pass

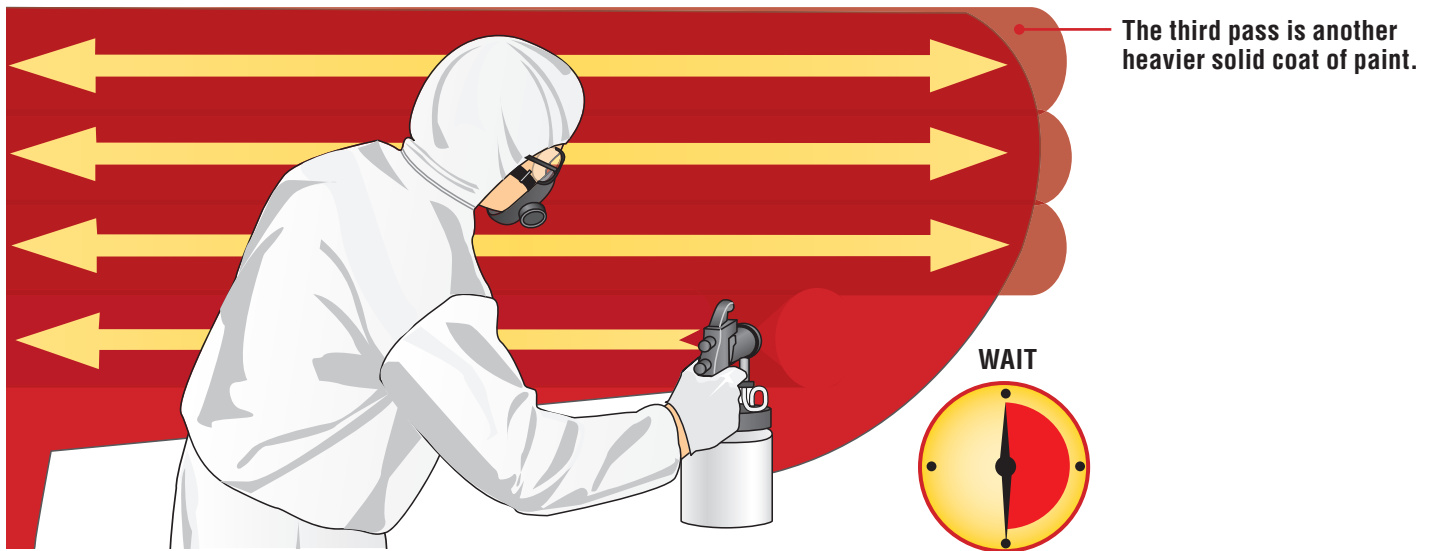


Figure 6.20 | Spraying the Fourth Pass



APPLYING THE TRIM COLORS

If you're applying trim, stripes, or stencils, it's necessary to wait 24 hours before you begin that process. Temperature and humidity can be a factor in this waiting period. It's best to test a small area with painters tape before taping off the whole plane. If the paint starts to lift, wait a little longer than 24 hours, and try again. Once your topcoat is dry, you're ready for taping and painting your trim colors.

Materials needed for applying accent colors:

- Fine line striping tape (usually it's bright blue or neon green) – this can be found in most automotive paint stores and body shops.
- Good quality masking paper.* Do NOT use newspaper. Ink and lint from the paper can ruin your new finish.
- Scotch-Brite™ Pad*

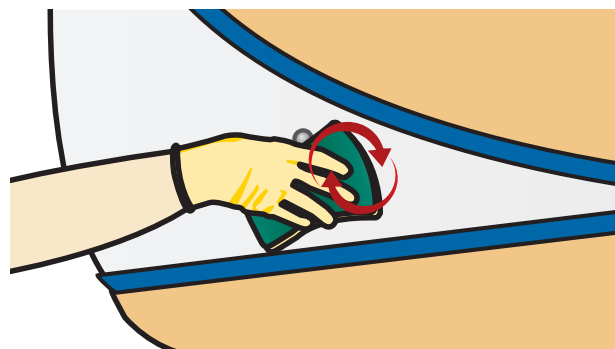
*The masking paper and Scotch-Brite™ pad are available through Superflite. Call or visit our website to purchase.

Note: Be sure to consult the Code of Federal Regulations (CFR) for the current specifications on registration numbers (N-numbers), and other designations/notations, such as those for experimental aircraft.

To Apply Trim Colors:

- 1 Tape the masking paper to the area you are painting with the fine line striping tape. Mask off the area where you will **NOT** be painting stripes or trim. Be sure you have a good seal between the tape and the finish. If you don't, the paint will seep through the tape, and ruin the paint underneath.
- 2 Once you have the masking tape and paper in place, you'll need to lightly scuff the striping/trim areas with a Scotch-Brite™. This will allow the paint to adhere to the finish already on the plane.

Figure 6.21 | Scuff Paint Areas



- 3 Apply the first coat of trim color using the same steps as outlined on pages 97–99. Spray one light “tack pass”. Wait 15–30 minutes.

Figure 6.22 | Mask Off Non-Paint Areas

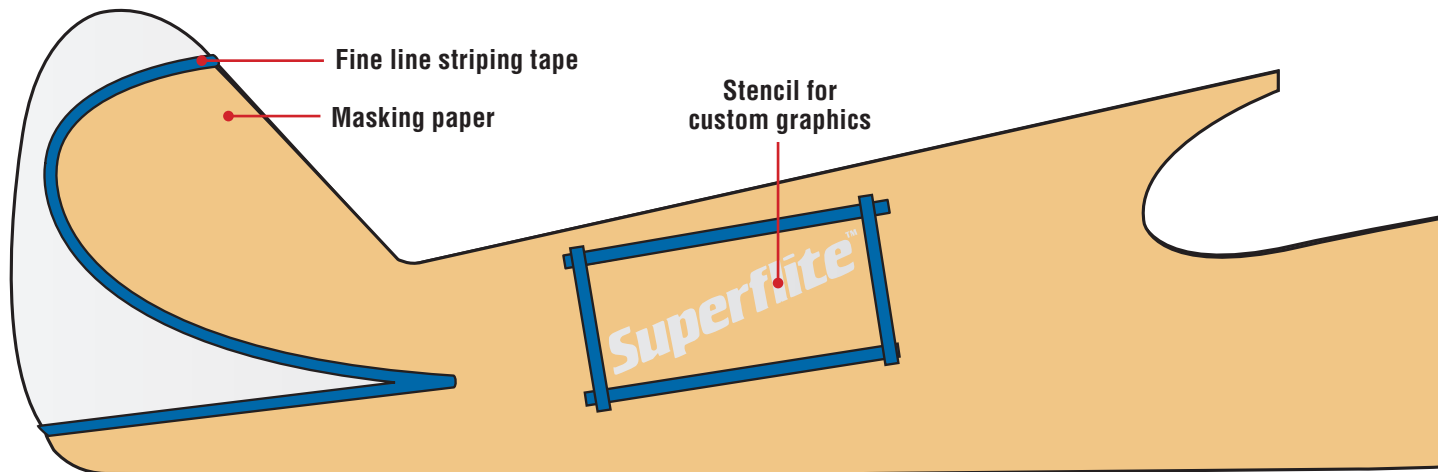
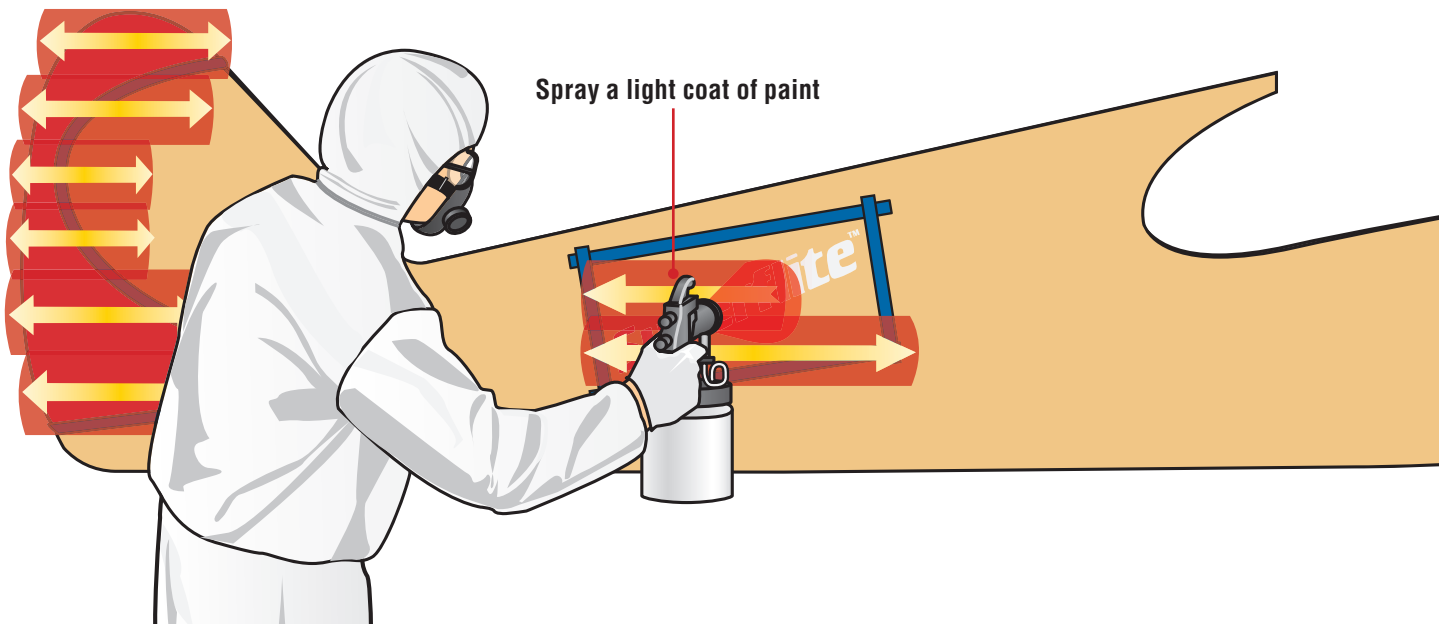


Figure 6.23 | Mask Off Non-Paint Areas



- 4 Apply three more full passes. This will give you two cross coats. Wait 24 hours or until the striping/trim is dry.
- 5 **CAREFULLY** remove the tape and masking paper by slowly peeling it back at an angle.

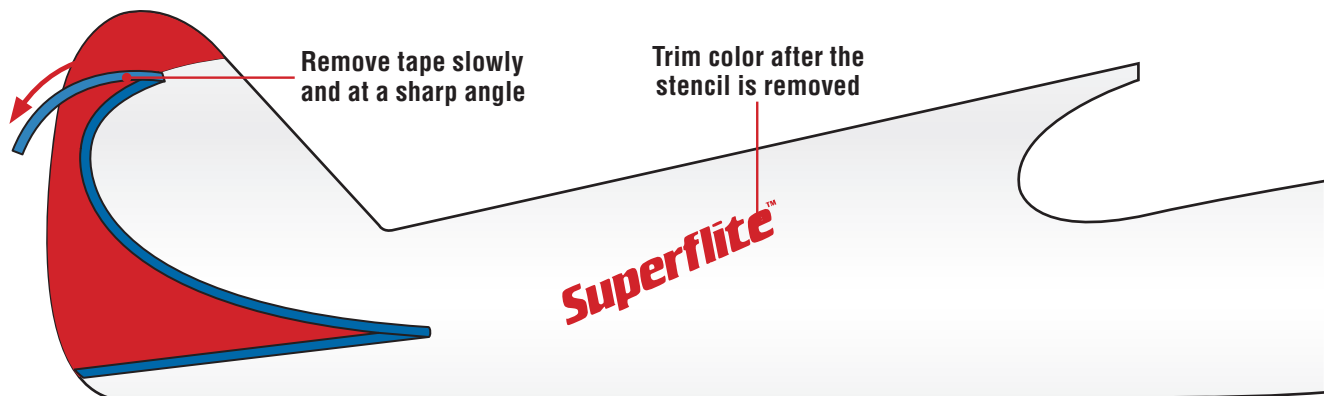


You can apply your own custom designs, such as logos and other graphic elements, through specific companies that make stencils and vinyl decals.

Figure 6.24 | Spray Two Complete Cross Coats



Figure 6.25 | Remove Masking Paper & Tape



To Apply Trim Colors:

- 1** Only one trim color at a time can be applied. Therefore, you will need to wait 24 hours before spraying the next color.
- 2** Cover the areas you just sprayed with masking paper, leaving the second trim color open for spraying.
- 3** Repeat Steps 2–5 for the second trim color.

Figure 6.26 | Apply Masking Tape & Paper for Second Trim Color

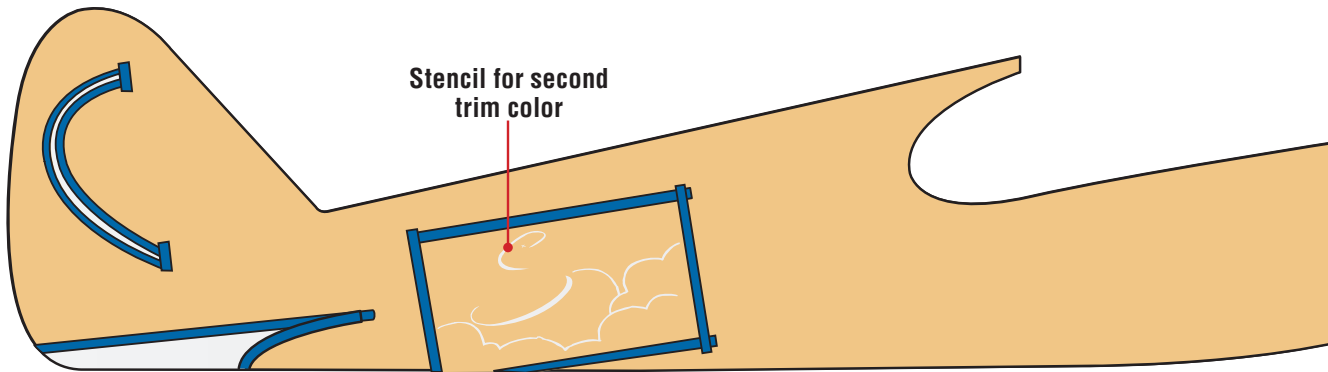
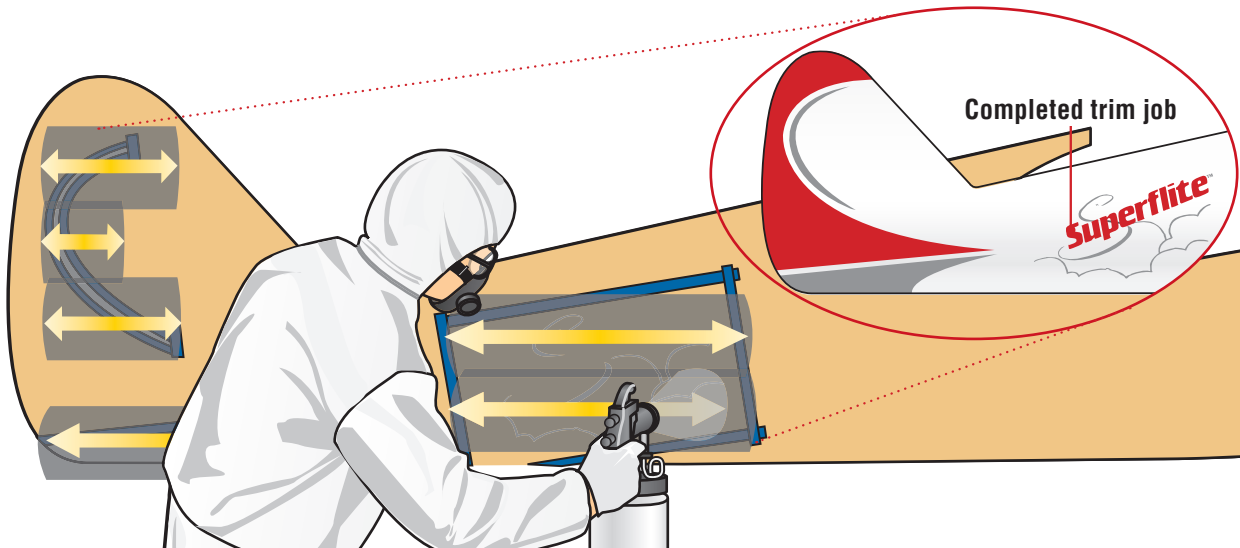


Figure 6.27 | Spray Two Complete Cross Coats for the Second Trim Color



SUMMARY

Before taking off, you should have complete knowledge of how to:

- Clean and inspect the fabric.
- Mix the primer solution.
- Prime all aircraft parts that need painting.
- Apply two cross coats of Superflex Topcoat on all primed parts.
- Apply fine line tape and masking paper for painting trim colors.
- Paint as many as two trim colors.
- Clean your newly finished aircraft.



Visit **www.superflite.com**, or scan this QR code with your smartphone or tablet, for a complete listing of your aircraft covering needs!



CONGRATULATIONS!

You've just covered an airplane.

Use soap and water to clean your new finish. Once it has cured, you can use any of the popular cleaners or detail sprays. To polish the paint, use an automotive urethane polish. Do NOT wax the finish before 30 days. The paint needs to be able to breathe in order to cure properly.

IMPORTANT! Your plane will be flyable within 4–7 days. However, your finish will not be fully cured for 30 days. This means you'll need to be careful with fuel. Fuel may stain your new finish if it hasn't cured for a full 30 days.



GLOSSARY OF TERMS

A

AC43.13: Advisory Circular 43.13. The handbook of Acceptable Methods, Techniques, and Practices for Aircraft Inspection and Repair Reference tool for aircraft maintenance. Available for download on the FAA website.

Acetone: This is used to thin the Superflite U-500 adhesive.

Alodine: A chemical used to oxidize the surface of new aluminum. It acts as an acid etcher, giving the primer and paint a better surface to adhere to. Alodine should **ALWAYS** be applied to new aluminum before priming.

Anti-Chafe Tape (Reinforcement Tape): Used to cover any sharp metal edges or rivets on the airframe that might rub through the fabric. The Anti-Chafe Tape covers those metal pieces and prevents holes being worn into the fabric.

A&P: Airframe and Power Plant mechanic.

B

Bias cut: A type of finishing tape. Bias cut tapes are cut diagonally across the weave of the fabric, allowing them to easily lay down around curved surfaces.

C

Calibration: The process of adjusting the output or indication on a measurement instrument (like a thermometer) to agree with the value of the applied standard, within a specified accuracy.

Catalyst: Any substance that changes the speed of a chemical reaction and does not appear in the final product and undergoes no permanent changes.

Cross coat: Painting terminology. Two passes (north-to-south and east-to-west) make up one full cross coat.

D

DAR: FAA Designated Airworthiness Representative.

F

FAA: Federal Aviation Administration. The governing body for commercial and general aviation.

Finishing Tape (Surface Tapes): These tapes are applied around edges and over the ribs after the fabric has been tautened and stitched to the frame.

Ford Cup: A type of viscosity cup. This No. 4 Ford Cup can often be used in place of the No. 2 Zahn Cup.

Forms:

337 Form: Field approval form. Must be completed by the A&P/IA or DAR authority upon the completion of the recovering project.

8130-3 Form: Standard airworthiness certificate.

G

Gravity Feed Gun: Also known as a top-loading gun. The can is attached to the top of the spray gun.

H

Hidden Knot: See Seine Knot

HVLP Sprayer: High Volume Low Pressure Sprayer. This type of spraying unit is used when applying the Superflite Primer and Topcoat.

M

Media blasting: A dry abrasive blasting process that uses high pressure air and a variety of media (sand, plastic, etc.) to remove old paint, primer, or rust from a surface.

Mesh Strainer: Used for straining primer and paint mixtures.

P

Pre-Shrunk: A type of finishing tape. Less than 5% shrinkage remains in the pre-shrunk tapes.

Propwash: Prop blast area of an aircraft.

R

Reducer: Used as a thinner for the Superflite epoxy and fabric primers and topcoat.

Reinforcement Tape (Anti-Chafe Tape): The reinforcement tape is applied to the rib before rib stitching.

Respirator System (Fresh Air Breathing System): This must be worn when spraying the Superflite fabric primer and paint. It provides fresh air and protects the lungs from the isocyanates released by the catalysts for the primer and paint.

Rib Brace Tape: A twill tape laced between the ribs of a wing. This tape is designed to keep the ribs straight as you cover your wings.

Rib Lacing Cord: A waxed cord used to stitch the fabric to the wings, control surfaces, and sometimes the fuselage of the airplane.

S

Seine knot: The standard knot used when rib stitching.

Supplemental Type Certificate (STC): This is provided for all certificated aircraft that use an FAA-certified fabric covering system.

Syphon Feed Gun: In a syphon feed gun, the can is attached to the bottom of the spray gun.

T

Tack Up: In reference to primer and paint dry-time. When a coat “tacks up” it is slightly dry but still sticky to touch.

Tauten: To become taut or tauter; to tighten or firm. In fabric covering, when fabric is tautened, it is tightened, or shrunk, with heat (like an iron).

V

Viscosity: A measure of the resistance of a fluid to deform under shear stress. It is commonly perceived as “thickness”, or resistance to pouring.

Velocity Never Exceed (Vne): The Vne of an aircraft is the V speed which refers to the velocity that should never be exceeded. Vne is specified as a red line on many airspeed indicators.

W

Wet sanding: Sanding with a fine grit sandpaper and water.

Wicking: Absorption of liquid into a material by capillary action. Also know as fiber tow infiltration.

Z

Zahn Cup: A No. 2 Zahn Cup is used to measure the viscosity of the Superflite primer and paint. A No. 4 Ford Cup can also be used.

REPAIRS

It's inevitable. You drop a screwdriver and poke a hole in an elevator. You snag the wingtip on a barbed wire fence. Your gorgeous, newly recovered, newly refinished airplane is damaged. Don't fret. It's completely fixable, and no one will ever notice the repair. Small damaged areas are easily repaired without removing the finish coat.

Materials Needed for Repairs:

- Straight razor or scissors
- Scotch-Brite™ pad or heavy grit sandpaper
- Unwrinkled scrap fabric
- Iron
- U-500
- Acetone
- Blending agent/Hot Temperature Reducer
- Spray equipment
- Lint free cloths

To Apply Trim Colors:

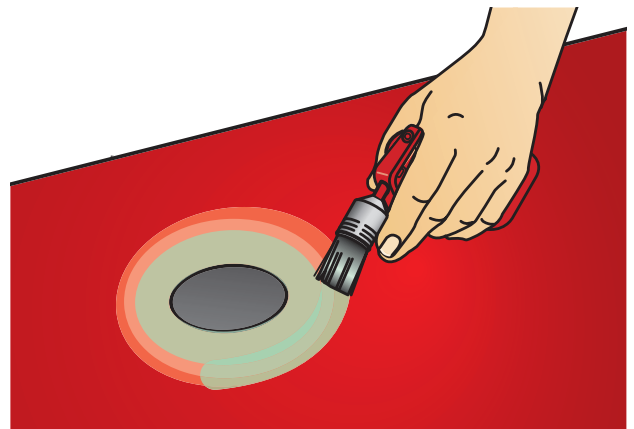
- 1 Trim the ragged edges with scissors or a straight edge razor, making a neat circle or rectangle.



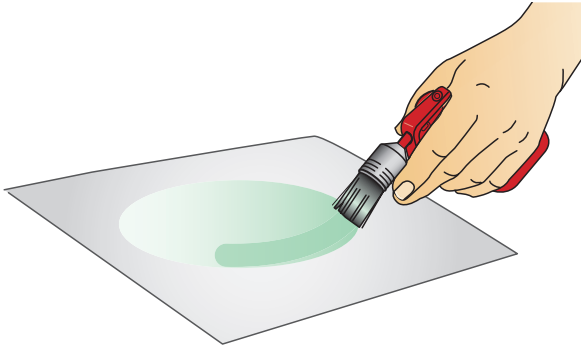
- 2 Scuff the area no more than two inches surrounding the hole using a Scotch-Brite™ pad or a heavier grit sandpaper.



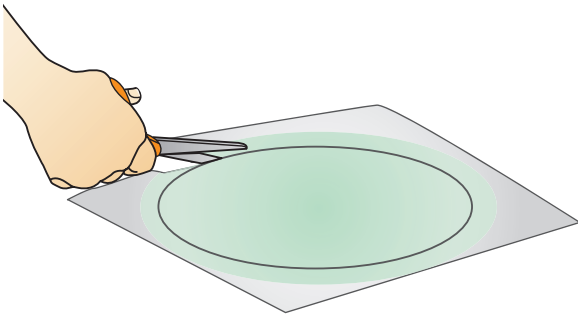
- 3 Apply a thinned coat of U-500 (2 parts Acetone to 1 part glue) over the sanded area and allow it to dry.



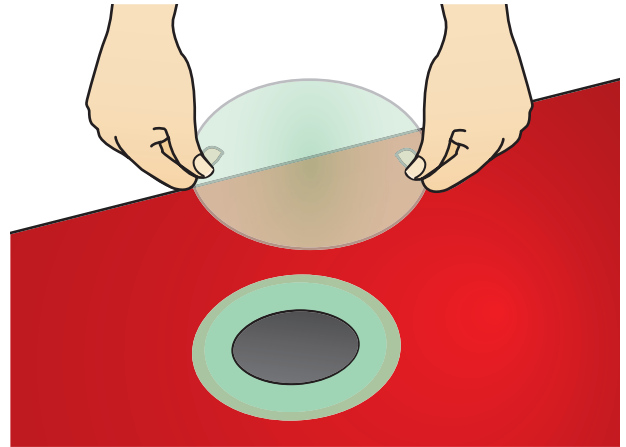
- 4 Prepare your patch by brushing a thinner coat of U-500 (3 parts Acetone to 1 part glue) onto a scrap piece of fabric.



- 5 Your patch can now be cut from the fabric without concern for raveled edges or loose threads.



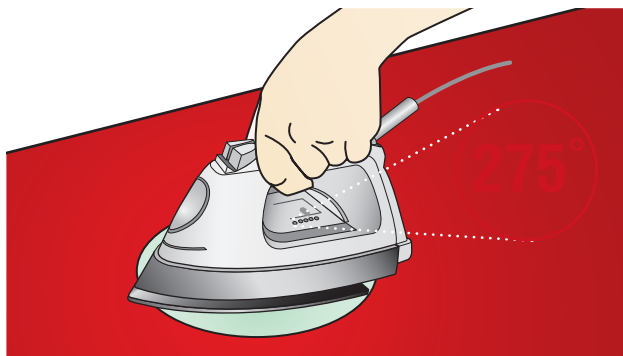
- 6 Place the patch over the area to be repaired.



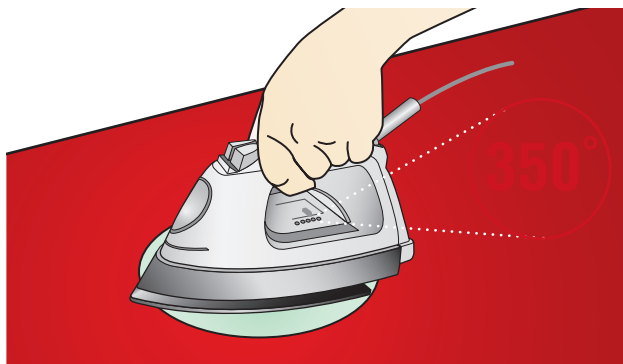
- 7 Brush a thinner coat of U-500 (3 parts Acetone to 1 part glue) into the fabric, rubbing lightly to soften the U-500 and work it into the patch.



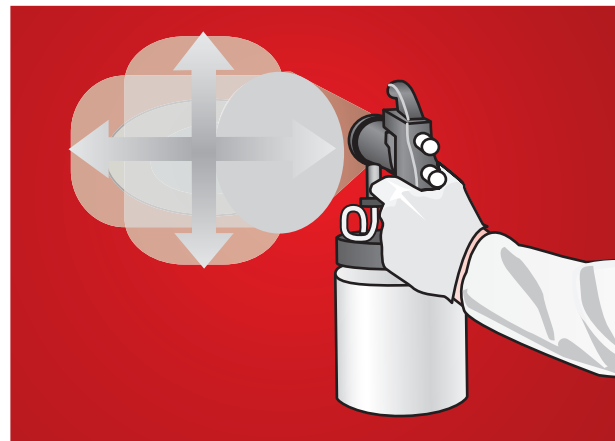
- 8 You will now need to tauten the patch by ironing, just like you did with the initial covering. Set your iron to 275°F, and concentrate the heat on the middle of the patch. Be careful, the heat will soften the cement, which may cause the patch to slip.



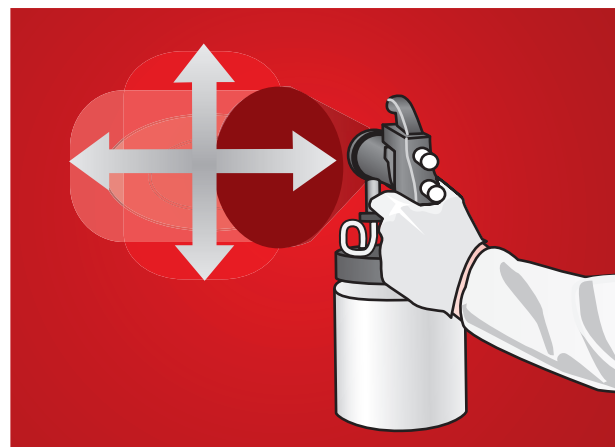
Now increase the heat to 350°F and iron over the center of the patch at that temperature.



- 9 Apply the primer to the patch as discussed in Chapter 6 pages 90–95.

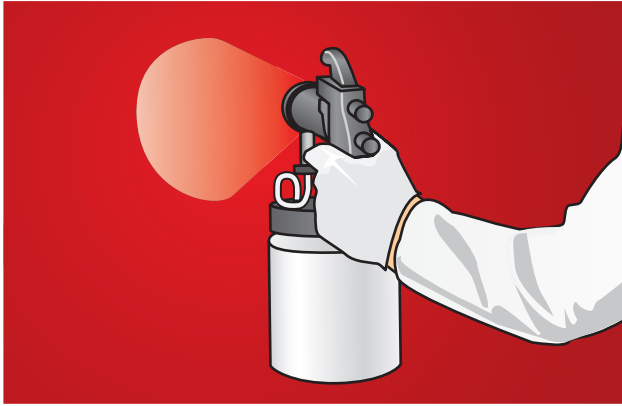


- 10 Apply the Superflex topcoats over the primed area as discussed in Chapter 6 pages 96–99.

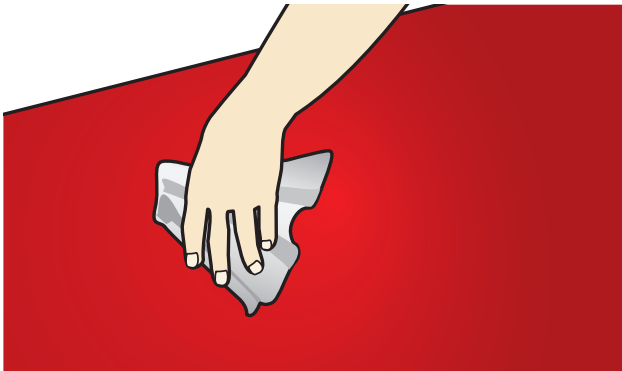


To eliminate the “halo” effect that might occur when patching the urethane topcoat, use the hot temperature reducer to feather cut the edges.

- 11** After spraying your final coat of paint, immediately spray a coat of the Hot Temp Reducer on the outer edges of the paint patch. Allow it to dry.



- 12** Once dry, the foggy residue (overspray) can be wiped away with a lint-free cloth.



To repair larger areas:

- If the damaged area requires a patch larger than 16 inches in any direction, an entire replacement panel should be installed using the same repair steps discussed in this section.
- If this is a wing panel, the new fabric must overlap the rib on either side and be laced or rib stitched through both layers of fabric, leaving the original rib stitching in place.

Note: If you're not sure how to approach your repair, it is always safe to refer to AC 43.13. Any repairs made in accordance with that advisory circular are always legal.

TROUBLESHOOTING

Problem

Cause

Blistering

Blisters appear as swelling on the surface of the paint and vary in both size and density. Coarse blisters, larger than 1.5mm in diameter, generally occur in patches, although they may also be found in isolation. Fine blisters, typically around 0.5mm in diameter, occur in meandering lines or in the shape of a finger print. Blister in the color coats are generally more prominent than those occurring between the paint and substrate (primer).

Moisture or contaminants trapped under the surface. This may result from:

- Inadequate surface cleaning, residual moisture, or contaminants such as oil, industrial pollutants, or grease from the finger tips.
- Incompatible materials or the use of non recommended thinners.
- Too thin paint coats leading to increased permeability.
- Water permeating both newly applied and aged films. Exposure to rain or high humidity before the finish is fully hardened increases the risk of blisters caused by permeation.

Blushing

A milky white haze or mist formed on the surface of the paint film (this doesn't happen often with urethane).

Moisture condensing on and being trapped in the wet film. This may be due to:

- Spraying during the cold, wet or humid weather.
- Use of too fast or poor quality thinner.
- Compressed air pressure onto the film to speed up solvent release.
- Draughty paint shop, or inadequate heating and/or air movement.

Chipped Paint

Damaged and broken paint film, varying in depth and extent, depending on the cause.

This may be due to:

Impact damage, typically caused by stones or rocks, or scratching by sharp objects.

Prevention	Solution
• Protect the unpainted surfaces when in storage, and clean surfaces thoroughly before spraying. • Use only top quality recommended and approved materials. • Follow the correct spraying processes. • Avoid exposure to moisture and extreme temperature changes until the finish is fully hardened.	Establish the depth and cause of the blister by pricking out with a pin and examining under a low power magnifying glass. Where the blisters occur between paint layers, the affected area may be sanded down to a sound surface and repainted. In more severe cases, or where the blisters occur between the primer and fabric (or metal), strip down to the fabric (or metal) and repaint.
• If possible, avoid spraying air drying paint during rainy or exceptionally cold or humid weather. If this is unavoidable, a non-bloom thinner should be used. • Use the correct grade of thinner. • Reduce compressed air pressure to minimize the cooling effect. • Allow solvent release to take place naturally. • Ensure that the paint shop is adequately heated, properly ventilated and free from draughts.	Slight blushing may be removed by the use of polishing compound after the paint film has hardened, or by spraying the affected area with one of the 7800-Series reducers. In more severe cases, sand the surface, and repaint using the correct grade of thinner. If these remedies fail to correct the fault, raise the temperature of the paint shop by a minimum of five degrees, avoid all direct draughts, flatten the area by sanding, and repaint the affected area. Note: Blushing rarely happens with two-part urethane primers and paints. This is generally a problem that affects air dry products.
Damage caused on the ground may be unavoidable, but care should be taken to protect airplanes in storage, in the paint shop.	Sand the affected area, feather the edges of the chips, and restore the level with primer and repaint. Be careful NOT to sand down to fabric! Go no further than the primer coats.

Problem**Cause****Fish Eye**

Small crater-like holes or indentations in the paint surface, varying in size from pinholes up to 1 cm in diameter. Usually the larger craters occur individually, while the smaller ones are often found in small densely packed clusters. Small impurities are often visible in the center of the crater.

Variations in the surface tension of the paint.**The most common reasons for this are:**

- Silicone in the environment or on the surface of the substrate; even minute traces are sufficient to cause fish eye.
- Contamination by other sources, such as grease, dried soap, detergent, spray dust, wax, or oil from the spray gun.
- Incompatible elements in the primer.
- Saturation by fumes in the spray booth.

Orange Peel

Pebbled uneven surface of the paint film, similar in appearance to orange skin.

Failure of the paint droplets to join together on the surface. This may be due to:

- Poor spraying technique, spray gun too far from the surface, incorrect compressed air pressure, incorrect nozzle adjustment.
- Excessively thick or thin film.
- Paint incorrectly mixed, wrong viscosity, poor quality, or incorrect thinner.
- Insufficient drying time between coats, cold air fanning to speed drying.
- Incorrect ambient or surface temperature.

Prevention	Solution
• Thoroughly clean any silicone polishes from the surface to be painted and avoid using silicone polishes in the vicinity of the paint shop. Prepare the surface using the procedure below. • Thoroughly clean the surface with wax and grease remover. Do not allow cleaning solvents to dry on the surface but remove with a clean dry cloth, using the cloth only once. An alcohol-based cleaner also works well. Clean the surfaces prior to sanding and always ensure that all sanding dust is removed. Prepare bare metal surfaces with metal conditioner. Repeat the solvent alcohol cleaning operation before spraying the topcoat. Make sure that the spray gun and compressed air equipment is properly maintained. • Always used the recommended materials. • Ensure that the spraying area is properly ventilated.	Remove the paint completely from the affected area and repaint, following the recommended preparation procedure.
• Use the correct spraying technique and ensure that equipment is correctly adjusted. • Apply the paint in thin even coats. • Ensure that the paint is correctly mixed, and use only the recommended thinner. • Allow sufficient drying time between coats. • Spray within the recommended temperature range and ensure proper ventilation.	Rub out the orange peel with an automotive polish. In severe cases it may be necessary to flatten the area with sanding and repaint the surface.

Problem	Cause
Pinholing Small cavities, generally less than 1 mm in diameter, occurring over stopper, filler, or some other substrate.	Absorption of the paint into holes in the substrate. This is due to: • Air inclusions in the primer. • Inadequate preparation and sealing of the substrate. • Poor mixing and application of the primer/filler. • Improper saturation of the first pass of fabric primer.
Runs Well defined local thickening of the paint film in the form of a wavy line or shallow, rounded ridges, normally confined to sharply sloping or vertical surfaces.	Slumping of the paint due to: • Excess thickness of application, air pressure too low, fan width too narrow, spray gun too close to the surface, or moving too slowly. • Use of incorrect thinner. • Incorrect viscosity of the paint. • Air and surface temperature too low. • Contamination of the underlying surface.
Slow Drying The paint film requires an excessive drying period or fails to harden thoroughly.	Slow evaporation of solvent from the paint. This may be due to: • Excessive thickness of the paint film. • Poor atmospheric conditions during spraying or drying. • Insufficient drying time between coats. • Incorrect thinner and/or catalyst. • Incorrect product mixing ratios.

Prevention	Solution
• Heat to above spraying temperature prior to preparation in order to burst the inclusions. Do not heat above 176°F to avoid distortion of the surface. • Inspect the filled areas carefully. Stop any pinholes, spot primer, and sand until smooth before priming the complete surface. • Use only the recommended materials. • Mix the primer correctly and apply in thin smooth layers. Allow it to harden before applying further layers and before rubbing down.	Sand the affected areas, stop any pinholes, and spot prime. Sand the surface smooth and repaint.
• Use the correct spraying technique and spray gun settings. • Use only the recommended thinner. • Ensure that the paint is mixed to the correct viscosity. • Always spray within the recommended temperatures. • Ensure that the surface is clean.	Allow the paint to harden thoroughly, rub down the excess paint, and polish. In severe cases, it may be necessary to run down and repaint the surface. Note: Due to separation of the metal flakes, metallic paints will normally require repainting.
• Apply paint in thin films. • Ensure adequate warmth and ventilation. • Allow sufficient drying time between coats. • Use the correct amount of recommended thinner.	Move the plane to a warm, well ventilated area. Low heat may be applied to improve drying, but care must be exercise to avoid wrinkling.

Problem	Cause
Solvent Popping Open topped blisters up to 1 mm in diameter on the surface of the most recently applied paint film.	Air or solvent vapor trapped by fast drying paint and forming a bubble. This may be due to: • Too fast thinner. • Excessive film thickness or insufficient drying time between coats. • Compressed air pressure too low. • Drying temperature too high, heat sources too close to the film, too hot, or applied too soon.

Prevention	Solution
• Ensure that the surface is clean before spraying. • Use only the recommended thinner. • Apply paint in thin wet films. Allow sufficient drying time between coats. • Use the correct compressed air pressure. • Allow sufficient flash off time before using any kind of climate controlled drying, such as an oven. Ensure that the correct drying temperature is not exceeded. Do not allow the heat source to be placed too close to the surface.	Sand to a smooth surface and repaint.

PRE-SHRUNK TAPES

LIGHTWEIGHT PRE-SHRUNK SURFACE TAPES

Item Number	Size	Description
SF104-1P-HS	1 In x 50 Yds	Pinked Edge Pre-Shrunk Tape
SF104-15P-HS	1.5 In x 50 Yds	Pinked Edge Pre-Shrunk Tape
SF104-2P-HS	2 In x 50 Yds	Pinked Edge Pre-Shrunk Tape
SF104-3P-HS	3 In x 50 Yds	Pinked Edge Pre-Shrunk Tape
SF104-4P-HS	4 In x 50 Yds	Pinked Edge Pre-Shrunk Tape
SF104-6P-HS	6 In x 50 Yds	Pinked Edge Pre-Shrunk Tape
SF104-1S-HS	1 In x 50 Yds	Straight Edge Pre-Shrunk Tape
SF104-15S-HS	1.5 In x 50 Yds	Straight Edge Pre-Shrunk Tape
SF104-2S-HS	2 In x 50 Yds	Straight Edge Pre-Shrunk Tape
SF104-3S-HS	3 In x 50 Yds	Straight Edge Pre-Shrunk Tape
SF104-4S-HS	4 In x 50 Yds	Straight Edge Pre-Shrunk Tape
SF104-6S-HS	6 In x 50 Yds	Straight Edge Pre-Shrunk Tape

MEDIUM WEIGHT PRE-SHRUNK SURFACE TAPES

Item Number	Size	Description
SF102-1P-HS	1 In x 50 Yds	Pinked Edge Pre-Shrunk Tape
SF102-15P-HS	1.5 In x 50 Yds	Pinked Edge Pre-Shrunk Tape
SF102-2P-HS	2 In x 50 Yds	Pinked Edge Pre-Shrunk Tape
SF102-3P-HS	3 In x 50 Yds	Pinked Edge Pre-Shrunk Tape
SF102-4P-HS	4 In x 50 Yds	Pinked Edge Pre-Shrunk Tape
SF102-6P-HS	6 In x 50 Yds	Pinked Edge Pre-Shrunk Tape
SF102-1S-HS	1 In x 50 Yds	Straight Edge Pre-Shrunk Tape
SF102-15S-HS	1.5 In x 50 Yds	Straight Edge Pre-Shrunk Tap
SF102-2S-HS	2 In x 50 Yds	Straight Edge Pre-Shrunk Tape
SF102-3S-HS	3 In x 50 Yds	Straight Edge Pre-Shrunk Tape
SF102-4S-HS	4 In x 50 Yds	Straight Edge Pre-Shrunk Tape
SF104-6S-HS	6 In x 50 Yds	Straight Edge Pre-Shrunk Tape

LIGHTWEIGHT TAPES

LIGHTWEIGHT BIAS SURFACE TAPES

Item Number	Size	Description
SF104-2SB	2 In x 25 Yds	Straight Bias Tape
SF104-3SB	3 In x 25 Yds	Straight Bias Tape
SF104-4SB	4 In x 25 Yds	Straight Bias Tape
SF104-2PB	2 In x 25 Yds	Pinked Bias Tape
SF104-3PB	3 In x 25 Yds	Pinked Bias Tape
SF104-4PB	4 In x 25 Yds	Pinked Bias Tape

LIGHTWEIGHT SURFACE TAPES

Item Number	Size	Description
SF104-1S	1 In x 50 Yds	Straight Edge Tape
SF104-15S	1.5 In x 50 Yds	Straight Edge Tape
SF104-2S	2 In x 50 Yds	Straight Edge Tape
SF104-3S	3 In x 50 Yds	Straight Edge Tape
SF104-4S	4 In x 50 Yds	Straight Edge Tape
SF104-6S	6 In x 50 Yds	Straight Edge Tape
SF104-1P	1 In x 50 Yds	Pinked Edge Tape
SF104-15P	1.5 In x 50 Yds	Pinked Edge Tape
SF104-2P	2 In x 50 Yds	Pinked Edge Tape
SF104-3P	3 In x 50 Yds	Pinked Edge Tape
SF104-4P	4 In x 50 Yds	Pinked Edge Tape
SF104-6P	6 In x 50 Yds	Pinked Edge Tape

MEDIUM WEIGHT TAPES

MEDIUM WEIGHT BIAS SURFACE TAPES

Item Number	Size	Description
SF102-2SB	2 In x 25 Yds	Straight Bias Tape
SF102-3SB	3 In x 25 Yds	Straight Bias Tape
SF102-4SB	4 In x 25 Yds	Straight Bias Tape
SF102-2PB	2 In x 25 Yds	Pinked Bias Tape
SF102-3PB	3 In x 25 Yds	Pinked Bias Tape
SF102-4PB	4 In x 25 Yds	Pinked Bias Tape

MEDIUM WEIGHT SURFACE TAPES

Item Number	Size	Description
SF102-1S	1 In x 50 Yds	Straight Edge Tape
SF102-15S	1.5 In x 50 Yds	Straight Edge Tape
SF102-2S	2 In x 50 Yds	Straight Edge Tape
SF102-3S	3 In x 50 Yds	Straight Edge Tape
SF102-4S	4 In x 50 Yds	Straight Edge Tape
SF102-6S	6 In x 50 Yds	Straight Edge Tape
SF102-1P	1 In x 50 Yds	Pinked Edge Tape
SF102-15P	1.5 In x 50 Yds	Pinked Edge Tape
SF102-2P	2 In x 50 Yds	Pinked Edge Tape
SF102-3P	3 In x 50 Yds	Pinked Edge Tape
SF102-4P	4 In x 50 Yds	Pinked Edge Tape
SF102-6P	6 In x 50 Yds	Pinked Edge Tape

MIXING RATIOS

EPOXY METAL PRIMER 1:1

Quantity	Item	Mix	Pot Life
1 Quart	SF80-04 Base	1 Quart of SF80 to 1 Quart of SF820	7 Hour Pot Life 30 Min. Between Coats Cure at 65° F
1 Quart	SF820-04 Catalyst	Use 7800-Series Reducer	
1 Gallon	SF80-01 Base	1 Gallon of SF80 to 1 Gallon of SF820	
1 Gallon	SF820-04 Catalyst	Use 7800-Series Reducer	

EPOXY WOOD VARNISH 1:1:1/2

Quantity	Item	Mix	Pot Life
1 Quart	SF90-04 Varnish	1 Quart of SF90 to 1 Quart of SF920	7 Hour Pot Life 30 Min. Between Coats Cure at 65° F
1 Quart	SF920-04 Catalyst	to 1 Quart of 7800-Series Reducer	
1 Quart	7800-Series Reducer		
1 Gallon	SF90-01 Varnish	1 Gallon of SF90 to 1 Gallon of SF920	
1 Gallon	SF920-04 Catalyst	to 1 Gallon of 7800-Series Reducer	
1 Gallon	7800-Series Reducer		

FABRIC PRIMER 4 : 1

Quantity	Item	Mix	Pot Life
1 Quart 1/2 Pint	SF7500-04 Base SF7600-08 Catalyst	1 Quart of SF7500 to 1/2 Pint of SF7600 Use 7800-Series Reducer	1 Hour Pot Life 30 Min. until dry to touch Wet sand with 320 Grit after 24 Hours
1 Gallon 2 Pints	SF7500-01 Base SF7600-08 Catalyst	1 Gallon of SF7500 to 2 Pints of SF7600 Use 7800-Series Reducer	

TOPCOAT 3 : 1

Quantity	Item	Mix	Pot Life
1 Quart 1/2 Pint	Superflex-04 Topcoat SF7950-08 Catalyst	1 Quart of Superflex to 1/2 Pint of SF7950 Use 7800-Series Reducer	1 Hour Pot Life Wait 24 Hours before taping 30 Day Cure Time
1 Gallon 2 Pints	Superflex-01 Topcoat SF7950-08 Catalyst	1 Gallon of Superflex to 2 Pints of SF7950 Use 7800-Series Reducer	

CONVERSION RATES

LIQUID CONVERSIONS

Equals		
1 Pint	=	16 Ounces
1 Quart	=	32 Ounces
1 Gallon	=	128 Ounces
2 Pints	=	1 Quart
8 Pints	=	1 Gallon
4 Quarts	=	1 Gallon

VISCOSITY RATES

Zahn Rate	Ford Rate
17 Seconds	10.88 Seconds
23 Seconds	14.72 Seconds

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