HIPEC

the MODERN method of covering and finishing

F12A 'Cruiser' by Max Lassacher, Montgomery, NY. NO RIBSTITCHING

$16.00 + postage

Falconar Avia Inc. 7739 - 81 Avenue, Edmonton, AB, Canada, T6C 0V4 Technical: 780-479-3515
Tel: 780-465-2024 Email: sales@falconaravia.com Fax: 780-465-2029

HIPEC PLANES

Maranda AMF S14D
George Volk
Schomberg. ON

Piper PA-22
Merv McKay

Hatz CB-1
Ron Bartley
Ashland, OR

Murphy Renegade
Baton Rouge, LA

Motor glider
Brad Hill, WA

Challenger II
Mike Keating
Kitimat, BC

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HIPEC

SUMMARY OF INSTRUCTIONS

060616

For techniques and detailed procedure, see the book "The Modern Method of Covering and Finishing".

OPEN FRAME STRUCTURES

1 Shop, tools, clothing and supports (bench, trestles, etc.) must be clean of dust, oil, grease, etc.
2 Mount structure to be covered on supports.
3 Wood structures may have 1 or more coats of H1C or equivalent 2 part epoxy or polyurethane sealer. Aluminum structures MUST be aluminum etch cleaned with HAC or equivalent, rinse off, apply Alodine or equivalent and rinse.
4 If surfaces requiring fabric to secure to structure are shiny, scuff sand.
5 Remove all dust.
6 Cover supports with masking paper or equivalent clean covering.
7 Cut fabric panels to extend just outside surface to be covered.
8 Put on protective hand cream or solvent resistant gloves.
9 Apply with glue brush or squeeze bottle, HAG around perimeter, ½" (15 mm) wide and put fabric in place with fingers while HAG is still wet. Work around complete perimeter furthermost outer edge. Allow to dry.
10 Tauten fabric in 2 or 3 passes with calibrated iron. For flat and concave surfaces or where there may be hollows to be glued to substrate surface, iron temperature should be at 120 – 130 deg. F. On convex surfaces first pass is usually at 250 – 275 deg. F. Tauten fabric gradually with wide sweeps of iron at first, then thoroughly with additional passes. Last tautening is done at 350 – 375 deg. F.
11 Go around edges with HAG to ensure all fuzzies are laid down.
12 Thoroughly tack rag clean entire surface to be free of dust.
13 On concave or flat surfaces, put weights on clean paper or plastic in middle of each bay to ensure fabric contact onto ribs. Apply 1 coat of HSB over rib locations with glue brush. Let dry. Remove weights and complete tautening to final temperature.
14 Apply first coat of HSB with foam brush or special foam roller. Drain grommets and inspection rings may be added with this or next coat.
15 When first coat is "Sticky Dry", roller or spray second coat of HSB.
16 When second coat is Sticky Dry, roller or spray 1 cross coat of HTC color. If yellow is the color, it must have a base coat of white.
17 If previous coat becomes totally dry, then it must be thoroughly scuff sanded and tack rag cleaned prior to application of next coat.

WARNING: When spraying HIPEC, persons in shop must wear proper mask or external air vented suit. If a person starts coughing he must immediately leave the shop and breath fresh air. For stubborn cases, person should go to a doctor, clinic or hospital.

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Edmonton, Alberta, CANADA T6C 0V4

Shipping Tel (780) 465-2024
Fax (780) 465-2029

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AIRCRAFT COVERING SUPPLIES - Liquids

Orders to US and International destinations, use this price list.

rev 8/Jan/2006

Product	Color		Lbl	Code	US Dollars 500ml (pint)	1L (quart)	4L (gallon)
HIPEC ATTACH GLOO (quick set perimeter glue)	Gold-green		T	HAG	$45	$57	$189
HIPEC Sun Barrier (silver-gray; sealer, primer, base, adhesive)	Silver-gray		B	HSB	$38	$48	$164
HIPEC Primer Sealer (surfacer)	Green	Component A	A	HPS-A	$34	$46	$165
(Both A & B MUST be mixed together at a 1:1 ratio just prior to spraying)		Component B	B	HPS-B	$31	$41	$137
HIPEC 1 Clear (a superior moisture cure polyurethane sealer for interior woodwork, composites, etc.)			B	H1C	$30	$40	$135
HIPEC Top Coat		Component A - Tier 1	A	HTC-A	$41	$55	$182
(Both A & B MUST be mixed together at a 1:1		Component B	B	HTC-B	$45	$60	$199
ratio just prior to spraying - pot life approx. 4hrs @ 20degC / 70degF)		Fluorescent	A	HTC-AF	$82	$110	$364
*component B SPECIAL for brush applications - 2prts A to 1prt B)		Component B*	B	HTC-BS	$88	$121	$399
HIPEC Metal Primer	Green	Component A	A	HMP-A	$31	$41	$137
(for steel & aluminum) GREEN in color; mix 1:1		Component B	B	HMP-B	$31	$41	$137
HIPEC Hard Coat		Component A - Tier 1	A	HHC-A	$41	$55	$182
(for steel & aluminum); mix 1:1		Component B	B	HHC-B	$45	$60	$199
HIPEC Thinners	for HHC, HMP & others	Regular	T	HT-R	$14	$19	$65
(Recommended order is 10% - mix as required)	for HSB, HPS & HTC	Slow	T	HT-S	$19	$26	$89
HIPEC 4 2 1 (hi-build sanding primer for hard surfaces -mix 1 part HTC-B with 4 parts H421-A)	Yellow	Component A	A	H421-A		$42	$143

Component B of HIPEC Primer Sealer is VERY DIFFERENT from Component B of HIPEC Top Coat - DO NOT SUBSTITUTE
HIPEC products cover approximately **75 square feet per L (Qt) per coat**
HIPEC Sun Barrier covers approximately **100 square feet per L (Qt) per coat**

HIPEC TOP COAT Colors & Pricing
HTC-A & HHC-A

Tier 1 = Price for Component A is per list
Pure White, Midnight Black, Sport Yellow, Marlin Blue, Alberta Blue, Dark Aqua Metallic, Clear Insignia Blue, McAllister Green, Corbins Beige, Bright Blue Metallic.

Tier 2 = Tier 1 price x 1.1
Energy Yellow, Bright Lime, Caramel Brown, Chocolate Brown, Sparkling Silver Metallic.

Tier 3 = Tier 1 price x 1.4
Sun Gold Metallic, Apollo Blue, Lunar Blue, Light Lemon Yellow.

Tier 4 = Tier 1 price x 1.7
Sunset Orange, Aerobatic Orange, Fireside Red, Pure Red, Racing Red, Banff Green.

Tier 5 = Tier 1 price x 2
Tangerine, Deep Pearl Red, Racing Red Metallic. Fluorescent

Notes:
Yellows require a light base coat of HTC or HHC White
Other colors can be supplied - name color, chart number & paint company or send us a chip.

HIPEC Top Coat Fluorescent colors: Yellow, Lime Green, Dark Green, Orange, Pink, Red, Blue. T1 price x2
HIPEC Top Coat Semi-gloss colors: Next tier up.

Other Liquids		Code	500ml (pint)	1L (quart)	4L (gallon)
Acetone or MEK (methyl ethyl ketone)	T	ACT/MEK	---	$17	$50
Lacquer Thinners (clean up)	T	HLT	---	$11	$29
Paint Stripper (water wash off)		PSW	$13	$24	$81
HIPEC Aluminum Cleaner (etching agent - dilute 3:1)		HAC	$13	$26	$86
Alodine 1200S (dry - mix with water - 4 ozs. per gallon/4L)		112g / 4oz	$18	224g / 8oz	$36
Micro Balloons Filler (make paste with HPS, HMP, H1C, etc.)		MBF	---	$9	$26
HIPEC Super Catalyst (one drop per gun-full - speeds process)		HSC	100ml	bottle =>	$19
HIPEC Crater Eliminator (1/2 to 1 oz. / gun full - avoids fisheye by silicone contaminant)		HCE	100ml	bottle =>	$26

Adhesives & Resins	Code		1.5L (kit)	3L (kit)
Epoxy Resin, hi-performance (for laminating fiberglas and Kevlar)	IF 93HA4	---	Call	Call
			1L (kit)	2L (kit)
Epoxy Wood Glue	IF G1	---	$40	$68

Note: All products on this page except MBF and IF G1 are Hazmat.
Samples available in 50 ml bottles - HAG, HSB, HPS-A, HPS-B, HIC, HTC-A color, HTC-B, HT-S, etc. - $9/bottle + packing & shipping

HIPEC - The Modern Method of Covering and Finishing

by Chris B. Falconar, Dipl AE Eng, AME Cat "B", CET, EAA 2083 Councillor 266

 21 st Edition

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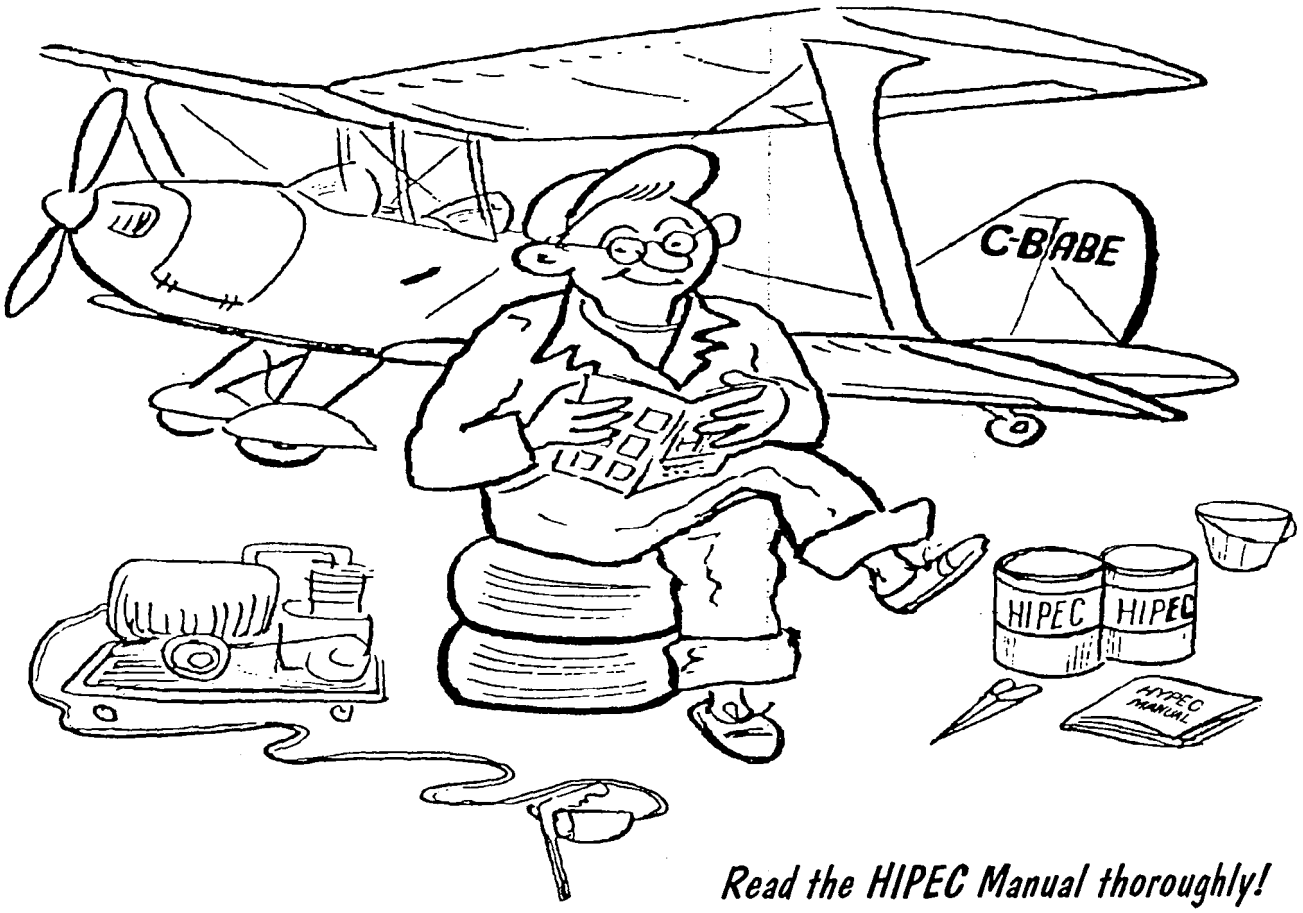
INTRODUCTION

This manual and the instructions herein, have been developed through many years of research, testing and field experience. Although the manual is long, it is not because the application of HIPEC is difficult. Rather, HIPEC is a new and modern process that most people have no experience with, therefore we would prefer that users have as much information as possible before they begin. The art of painting aircraft requires both skill and care. Although no amount of reading can replace practical experience, an amateur painter who thoroughly reads the manual, follows the instructions and makes test panels, can produce outstanding results (often much better than experienced painters who disregard the manual and its instructions). Ensure that you have read and understand the safe handling and use of HIPEC and always follow the safety precautions.



Read the HIPEC Manual thoroughly!

HISTORY

In the early days of aviation, many types of covering materials were used; brown paper coated with fish glue solution, silk cloth coated with clear varnish and fine cotton or linen coated with pigmented varnish. Clear cellulose nitrate dope was first used about 1910. This early covering rapidly deteriorated outdoors, especially in the sun. Early in WW I, it was noticed that pigmented camouflage varnish and paint over the clear dope greatly increased the lifespan of the covering and eventually the dope itself was pigmented to take advantage of this discovery.

Wars typically inspire great advances in technology and by 1916, fabric finishes were reasonably strong and dependable. Wings were ribstitched and surface tapes applied with clear dope. Instead of pinking the edges, they were frayed by removing several strands of thread. Eventually, aluminum powder was introduced into clear dope and was observed to protect the fabric from the sun's destructive ultraviolet rays. However aircraft stored outside still did not have a long life expectancy.

By WW II, Cellulose Acetate Butyrate (CAB) dope was discovered and it proved to be more durable and less flammable than the Cellulose nitrate dope. Although the clear CAB dope could be easily be used on cotton, it did not adhere readily to linen, which still required the first coats to be of nitrate dope. This doping usually had to be done in a paintshop with the temperature and humidity carefully controlled. Excessive heat and humidity caused "blushing" of the finish. Cleanliness was vital to avoid pinholes, wet spots, fish-eye and other finish ailments.

Numerous other dope products were soon developed to enhance the finishing procedure, fungicidal dope, aluminum pigmented dope, non-bleeding dope, colored dope, anti-blush thinners, as well as matching enamels and lacquers for metalwork. Obtaining an attractive doped finish required from ten to as many as twenty coats; each sanded or rubbed before the next was applied. In service, these doped coverings were easily damaged and they became dull and brittle with prolonged exposure to the sun, often developing cracks or ringworm in as little as two to four years. An additional problem occurred when water found its way into or under the fabric and rotted the cotton or linen.

In the 1950's came Ceconite and other heat shrinkable polyester fabrics claiming to be of lifetime quality. Falconar Aircraft Ltd. (FAL) introduced Lincoln A578 polyester fabric with a dope system starting with a primer coat of nitrate dope followed by finishing coats of Butyrate dope. In 1963, FAL had this process D.O.T. approved (along with the application manual still in use today). The D.O.T. soon granted blanket approval for all aircraft up to 12,500 lbs. And then for the DC3, DC4, Canso and Bristol Freighter. The adhesion of this early dope system was not outstanding and was just barely acceptable to both industry and the D.O.T.

With the introduction of flexible polyurethane finishes in the early 1960's, came an interest in applying it to aircraft coverings. In cooperation with Plastiglo Industries Ltd., FAL embarked on a development and testing program. A flexible polyurethane (to be called "Plastithane") was found to adhere to polyester fabric so well that it was impossible to peel off. During the testing program, several other interesting facts emerged. First, it was found that Plastithane stuck the fabric to the wooden structures with such tenacity that wood fibers were torn away when attempting to remove coated fabric. There was no other flexible adhesive available which could duplicate this feat.

Soon a number of tests established minimum and maximum values which concluded that this adhesion to the ribs rendered rib-stitching and surface tapes redundant for most aircraft with light and medium wing loading. This could result in a substantial saving in material costs and labor as well as a smooth surface over the wings. Secondly, testing showed that surface tapes over the ribs did nothing to improve the fabric attachment strength and were difficult to apply because Plastithane lacked the "sticky" consistency of standard dopes. Thirdly, Plastithane had remarkable flow-out qualities, permitting a brushed application which showed no brush marks. Only two coats produced and attractive, glossy finish. Later in 1963, a Hall Cherokee II sailplane was covered with Lincoln A578 and colored Plastithane. The results were so outstanding that all homebuilt kits produced by FAL, henceforth specified the Plastithane Coating System.

In 1966, an unrelated liability suit forced Plastiglo out of business and FAL was able to acquire the stock of color component. At this time, the product was renamed HIPEC (High Performance Polyurethane Coating). By now, the first aircraft painted were a few years old and were observed to show dulling and darkening of the finish exposed to the sun, while the undersides were as bright as new. Polishing quickly restored the gloss of these top surfaces but the color had permanently darkened. The flexibility was still very good, with no ringworm or cracks. Adhesion of the fabric to the ribs was still as strong as when first applied.

About this time an attempt was made to have the HIPEC Coating System approved by the D.O.T. for use on type approved aircraft. The reply was "no way"; the system departed too much from AC 43.13-1 and would not meet any conventional specifications. It was deemed acceptable to apply HIPEC over base coats of dope (whose adhesion was questionable, at best) but it would not be permitted to be used alone. This was truly an ironic decision since HIPEC's greatest benefit was its superior adhesion! Many aircraft were covered this way with the result that HIPEC preserved the flexibility of the dope much longer than the normal expected finish and fabric lifespan.

In 1969, a new polyurethane was developed which possessed almost indefinite gloss and color retention, even after withstanding years of exposure to the sun. FAL called this product HIPEC 2 and it made its first debut on the FAL produced, 2/3 scale, all wood, P51-D Mustang replica first flown that year.

During the 1970's, the system used a two component Primer Surfacer and the HIPEC 2 for a color coat. Adhesion of the HIPEC Primer Surfacer to the ribs was somewhat less than that of the original HIPEC so HIPEC 1 was used for the base coat. During this period, hundreds of tests were done, checking flexibility of the product and the adhesion of the fabric to ribs of various materials, using various glues and HIPEC formulations. Testing procedures included storing samples in a special "cold-box" at -72 °F. These coated samples , although noticeably stiffer, still did not crack during bending tests. Another frequently impressive demonstration at the time, involved hammering a HIPEC coated piece of wood. The wood would be dented and crushed but the HIPEC skin followed the indentation without a break. In a fish tank on display, several pieces of HIPEC coated wood and plywood immersed in water showed no deterioration despite months of submersion. Samples left over from exposure tests since 1967 are still flexible and uncracked today.

During the early 1980's HIPEC found increased usage in the rapidly growing kitplane market. It also began to be used for coating tents, awnings, semi-permanent buildings and ultralight aircraft. Many flexible materials such as sailcloth, Tedlar, Mylar and others requiring superior resistance to the sun, wind and temperature extremes, benefitted form the use of HIPEC. Lab test continued to be conducted in an ongoing program to improve application technique and formulations. HIPEC 2 became HIPEC Top Coat and incorporated and ultraviolet inhibitor which greatly extended gloss retention of the finish. Flexible metallic finishes became available in all colors. For warplane buffs, flat camouflage colors could also be supplied on request.

Efforts continued to have HIPEC approved by the D.O.T. and tests were continuously being performed. In 1987, the burst testing was performed and yielded amazing results. A sample of 1.6 ounce polyester fabric with one brushed coat and one spray mist coat of HIPEC Sun Barrier (no color coats) burst at 180 PSI. When samples of Lincoln A578 and Ceconite 101 with HIPEC Sun Barrier and HIPEC Top Coat were tested, they burst at 375 PSI to over 400 PSI.

As a comparison, burst tests were also performed on similar samples with several coats of butyrate dope. For most samples, the dope blew off or lifted on several samples at pressures from 1 to 11 PSI. On two samples, the dope blew off at 168 and 159 PSI.

Flammability tests, per FAR 23 Appendix F, showed HIPEC coated specimens taking 3 times longer to burn, compared to a CAB doped specimen.

A very impressive test using a "Sunbox" imposed temperature of 140 °F, intense Ultraviolet Light, and pressure of 120 pounds/square foot. A series of many specimens were tested, and proved consistant, and positive adhesion to structures of steel tube, aluminum tube, wood, aluminium bent flange ribs, and aluminum channel ribs. Tests maintained conditions for 96 hours (4 days). Tests showed that HIPEC Sun Barrier would retain fabric to various structures in spite of these severe conditions.

Other "Sunbox" tests maintained 150 °F and intense Ultra Violet, 24 hours per day for 6 months simulating 5 years in semi-tropical conditions.

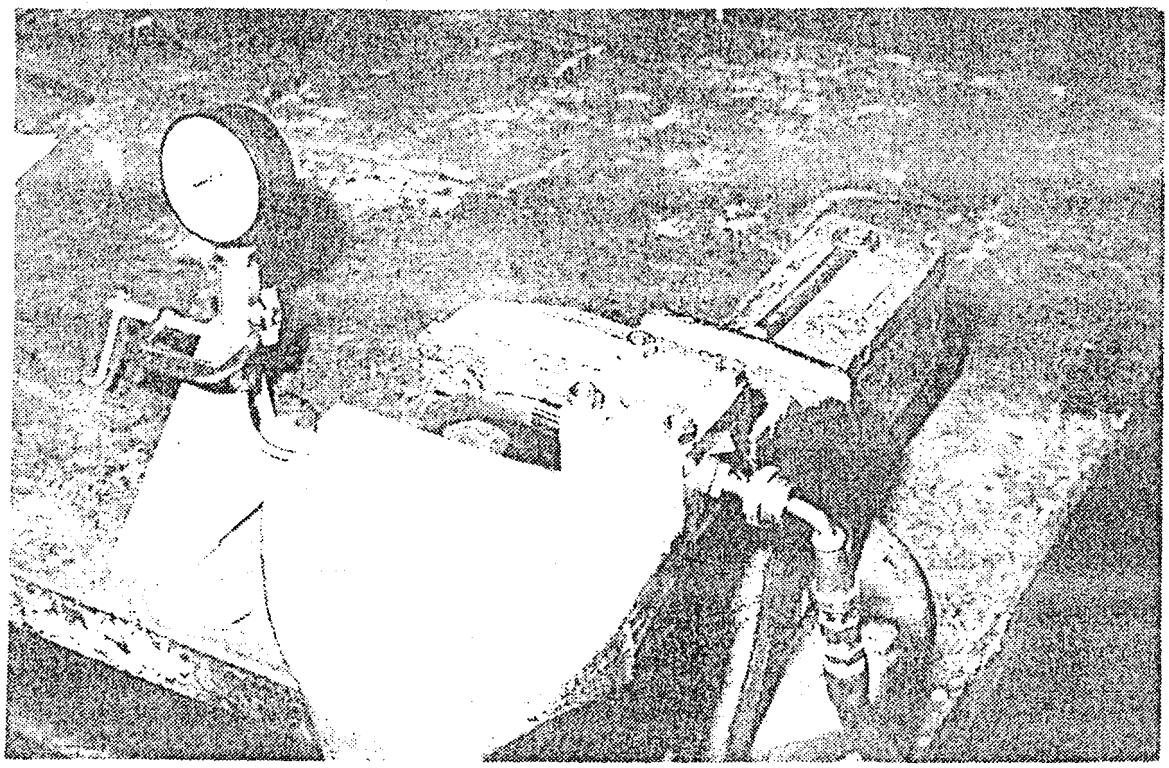
Chemical immersion tests showed specimens unchanged after 2 years immersion in; water, seawater, varsol and glycol.

Slight curling of specimens was noticed after similar immersion in US mogas, acetone, MEK and methyl hydrate. Specimens in 50% solutions of ag. sprays; Sabre and 2-4-D showed only slight softening. Six month and one month tests immersing HIPEC specimens in a whole variety of fuels and other liquids showed minimal effect.

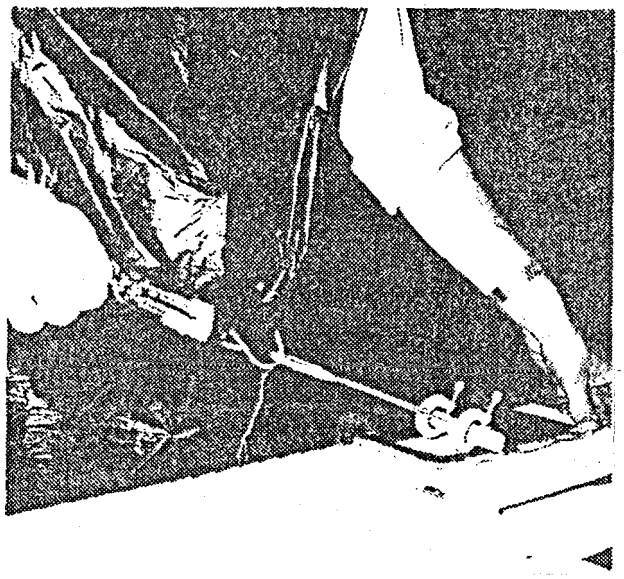
Acknowledgements:

We wish to thank the following persons for their assistance and contribution to this book and to the HIPEC program.

Leon Sebek, Professional Engineer, for his review and edition of many sections.
Garnet Thomas, for the cartoons.



Burst tests consistently averaged 375 to 400 PSI applied to 3.5 ounce/square yard polyester fabric specimen with; one coat HIPEC Sun Barrier (brushed), one coat HSB (sprayed) and one coat of HIPEC Top Coat (sprayed). Standard dope finish on 3.5 ounce fabric blew off specimen at 1 to 160 PSI.



Pull-away test @ 45° on a 1" wide strip broke off rib at 30 pounds average.

PRODUCT DESCRIPTIONS

HIPEC Attach GLOO (HAG) . . . *A metallic greenish brown, single component, flexible adhesive formulated for optimum hand smoothing, yet sticky and quick drying. It has a brushable consistency and a shelf life of one year if unopened (longer in cold storage).*
HAG & shop temp must be at least 15 C(60 F)

HIPEC Sun Barrier (HSB) . . . . *An aluminum colored, single component, moisture cure, flexible polyurethane primer/sealer/adhesive and finish. For use on fabric, wood, plastic, composites and metal. It is very tough, yet flexible over a wide range of temperatures. Remarkably tenacious, it will adhere even to marginally prepared surfaces. Consistency is such that it has a shelf life of one year if unopened. (Longer in cold storage)*

HIPEC 1 Clear (HIC) . . . . . . *A clear, single component, rigid urethane primer/sealer for wood or other rigid materials. This product is not flexible and sets with a very hard, waterproof/chemical-resistant surface. Recommended for use inside structures only (yellows in sunlight). It has a shelf life of one year if unopened (longer in cold storage).*

HIPEC Primer Sealer . . . . . (HPS-A) (HPS-B) *A light medium green, two component, epoxy-urethane Flexible primer/surfacer for fabric and similar surfaces. Frequently used as surfacing coat between HSB & HTC to permit sanding and masking for two or more colors. Can be used with or without "Micro Balloons" as a sanding filler. HPS is also for use where HSB is not suitable or required. (such as on fiberglass, metal or surfaces which must be radio wave transparent).*

NOTE: For HAG, HSB, HPS-A, HMP-A, HTC-A, HHC-A, and H421 -- SHAKE OR MIX VERY WELL JUST PRIOR TO USE.

HIPEC Metal Primer (HMP) . . . ***A two component, green epoxy-urethane primer especially for prepared aluminum or steel surfaces such as aluminum trailers, boats, and all aluminum skinned aircraft.***

HIPEC Top Coat (HTC) . . . . . A flexible, high quality, two component polyurethane with stabilized isocyanate incorporating special Ultra Violet inhibitor. Available in high gloss clear, colors and metallics. Low gloss & fluorescent colors available on special order.

HIPEC Hard Coat (HHC) . . . . . A low cost, high quality, two component polyurethane with stabilized isocyanate incorporating special Ultra Violet inhibitor. Available in high gloss clear, colors and metallics. Low gloss available on special order. For metal and rigid substrates.

HIPEC Thinners (HT-R) . . . . . Thinners, Regular - a special blend for thinning HHC, HMP, H421, H1C, etc.

HIPEC Thinners (HT-S) . . . . . Thinners, Slow - A special blend for thinning HSB, HPS & HTC.

HIPEC 4 2 1 ***Primer***(H421) A hi-build sanding primer for rigid surfaces such as cowls,composites, plywood skins, etc.

TABLE 1 - ADDITIONAL INFORMATION ON TWO COMPONENT PRODUCTS

	HPS & HMP	HTC & HHC
MIXING RATIO	One part A to One part B	For spraying: One part A to One part B For brushing: Two parts A to One part Special B
Thinning	Use HIPEC Thinners as required.	Use HIPEC Thinners as required.
Application Viscosity	15 to 18 seconds (#4 Ford Cup)	16 to 19 seconds (#4 Ford cup)
Pot Life - Mixed	8 to 12 hours	4 to 8 hours (21 °C or 70 °F)
Drying Time (70 °F & 50%R.H.) *See graph	15 to 30 minutes to recoat; 8 to 15 hours to tape	15 to 45 minutes to recoat; 8 to 24 hours to tape *In cool or dry weather, "Super Cat " may be used.
Maximum time until next coat	48 hours	12 to 24 hours
Recommended Thickness	1.5 to 2.0 mils wet; 0.8 to 1.0 mils dry	4 to 5 mils (2 consecutive FILM coats) wet; 2 to 2.5 mils dry
Weight (mixed & ready to spray)	2.3 lbs/liter or 9.0 lbs/gallon	2.7 lbs/liter; or 10.2 lbs/gallon
Weight of Solids	1.2 lbs/liter or 4.1 lbs/gallon	1.2-2.0 lbs/liter; or 4.8-7.5 lbs/gallon

TERMINOLOGY

1. CROSS SPRAYED .... On the first pass, the gun is moved in horizontal or front to rear sweeps. On the second pass, gun is moved in vertical or lateral sweeps (spray patterns are perpendicular to each other).

2. CURE ..... Dry or set.

3. CURTAIN ..... Similar to a run but whole area descends instead of a narrow stream.

4. 1 mil ..... .001" or 1 thousandth of an inch.

5. ORANGE PEEL ..... Pebbled surface resembling the skin of an orange. Caused due to insufficient thinning of paint prior to spraying.

6. PINHOLE ..... A tiny hole in painted surface extending to surface ofsubstrate.

7. REJUVENATE ..... The process of applying plasticizer thinner formulation to old doped surfaces in order to restore flexibility.

8. RUN ..... Too much wet paint applied to a sloped or vertical surface which has been pulled down in a stream by gravity.

9. SOLVENT POP ..... Small bubbles appearing in the top surface of a painted object.

10. STICKY ..... Same as "TACKY"

11. STICKY-DRY . . . Surface feels rubbery when finger is passed over it but HIPEC does not stick to finger. Slightly drier than "TACK-FREE".

12. TACKY . . . . . Freshly painted surface is partly dry and firm but will transfer paint when touched.

13. TACK-FREE . . . . Surface is just at the point where object in <u>light</u> contact will not pick up paint.

14. TAPE-FREE . . . . Painted surface has reached the point where masking tape can be applied and removed without leaving any marks on the surface.

15. EDGE TO EDGE . Edge of colors meet without overlap. Area for second color is masked, then first color sprayed. Masking is removed, color coat allowed to dry tape-free.

16. LAPPED EDGE . . First color is sprayed over area larger than its final area and allowed to dry tape-free. Then first color is masked. The fuzzy edge of the first color is scuff sanded. Then second color is sprayed on.

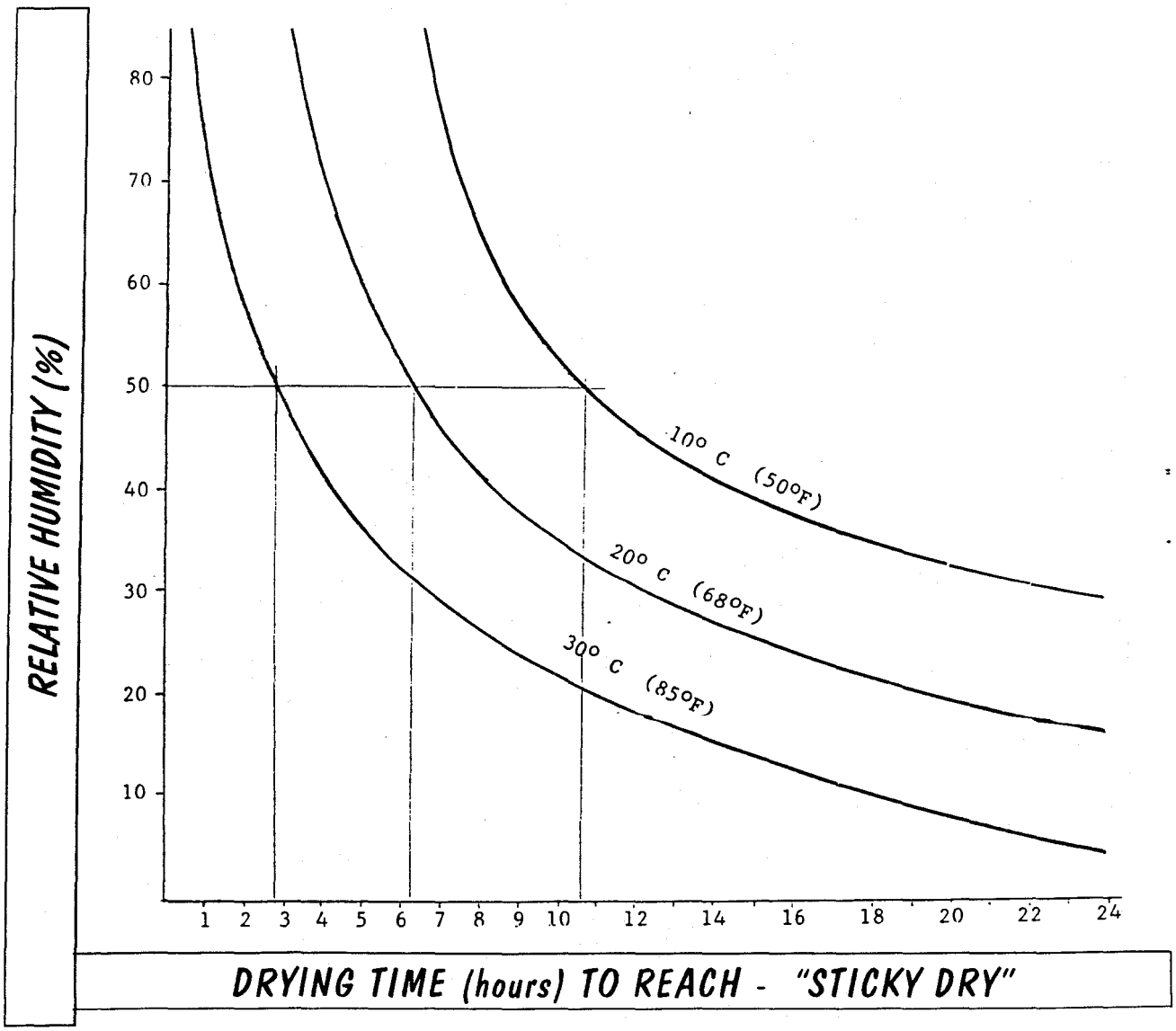
DRYING TIME

Time to reach STICKY DRY condition is approximately per following graph.
Drying is dependent on several features of the workshop air.

1. *Temperature*
2. *Humidity*
3. *Ventilation - evacuation rate of overspray and solvent laden air.*

In cool, dry conditions, draw air from ceiling area of separate room. Pass through wet blanket type filters or waterfall.

STICKY DRY becomes TACK FREE about the same time it has taken to reach STICKY DRY.



IT IS VITALLY IMPORTANT THAT THE TERM

STICKY-DRY

BE POSITIVELY UNDERSTOOD

SURFACE FEELS RUBBERY

BUT

NO HIPEC TRANSFERS TO FINGERS

STORAGE;

SHELF LIFE AT ROOM TEMP. OF 70°F. (20°C) IS 1 YEAR FOR FULL CLOSED CONTAINERS OF HAG, HSB, HIC & ALL OTHER B COMPONENTS. PARTIALLY FULL CONTAINERS SHELF LIFE IS USUALLY CONSIDERABLY LESS. SHELF LIFE CAN BE ALMOST INDEFINITE IF STORED AT -25°C (-10°F) OR LOWER. BRING TO SHOP TEMP. BEFORE USING. SHELF LIFE OF A COMPONENTS AND THINNERS IS INDEFINITE IN SEALED CONTAINERS.

MATERIAL SAFETY DATA

PRODUCTS:	HIPEC Sun Barrier, HIPEC 1 Clear, HIPEC Primer Sealer HIPEC Top Coat, Hipec Metal Primer and Hipec Hard Coat.
SOLUBILITY IN WATER:	Insoluble (reacts)
PERCENTAGE VOLATILE:	35%-55% (by volume) depending on color
FLASH POINT:	Tag open $20^{o}F$ - $50^{o}F$
EXTINGUISHING MEDIA:	CO^2, Dry Chemical or Foam
HEALTH HAZARDS:	Moderate eye irritant, possible skin irritation from thinners, irritation and/or narcosis can result from inhalation of thinners or spray mists.
EMERGENCY & FIRST AID:	Skin contact - thoroughly rinse with mild soap and water. Eye Contact - Flush with water for 10 min. and immediately consult eye physician. Inhalation - Leave area immediately and get plenty of fresh air. If symptoms of coughing or choking persist, go immediately to hospital (an airway may be needed).
REACTIVITY:	Do not allow products to come into contact with water, alcohols, amines or other compounds which react with isocyanates.
SPILLS OR LEAKS:	Absorb with oil absorbing compound and flush with water.
WASTE DISPOSAL:	Waste may be incinerated under conditions which meet Federal, Provincial and local enviromental regulations.
PROTECTION:	Use mechanical ventilation and cartridge type respirator with M.S.A. Cat #CR-84306 G.M.A. chemical cartridges and particulate filters. If ventilation is poor, wear a fresh air mask. Wear protective clothing and gloves and use goggles or shield to protect against liquid splash.
SHIPPING DATA:	Class 3.2 PIN 1263 Group III

Attention !

A PROPER PAINT SHOP IS ESSENTIAL

To obtain good results, the application of HIPEC must be done in a clean, dust free, bug free, paint shop with adequate ventilation. When spraying, personnel in the shop must wear suitable mask or paint suit with fresh air supply.

If the foregoing requirements cannot be met, then the prepared components and parts should be taken to an auto or industrial paint shop suitably manned and equipped for applying polyurethane paint.

Install fabric onto components per appropriate instructions. To keep components clean during storage or transit, cover with plastic garbage bags or polyethylene sheet. Tape with masking or packing tape as required. Transport components to paint shop. Be sure they are properly padded and secured.

Paint shops should have trestles, tables or supports onto which components are laid. Otherwise these will have to be made.

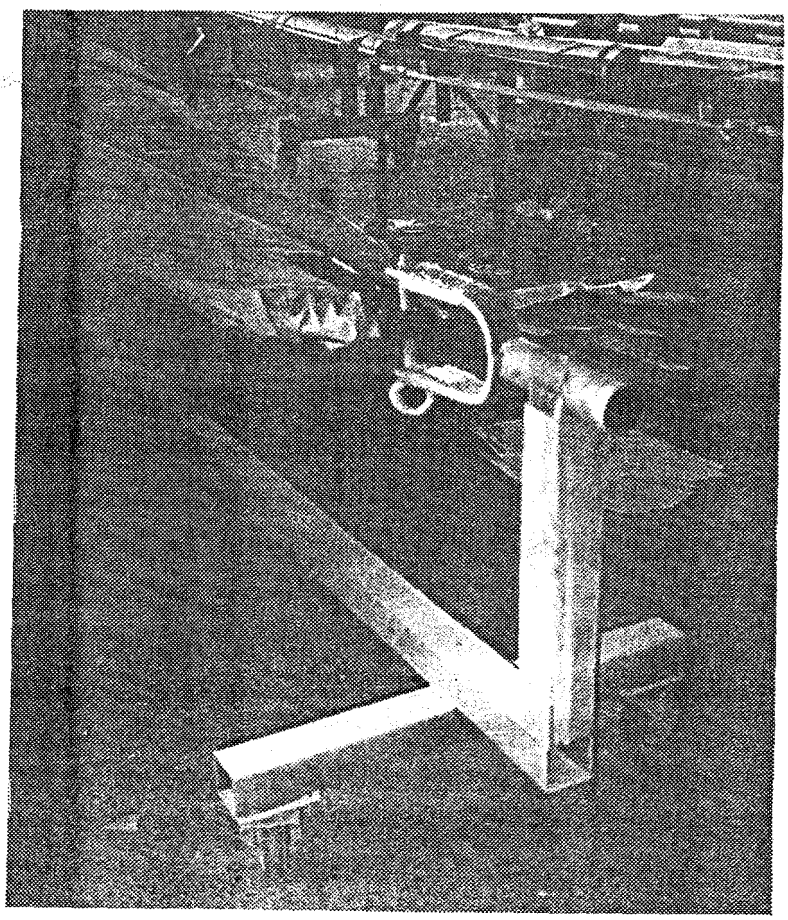
Most paint shops will allow you to brush or roller the first coat of Hipec Sun Barrier and install inspection rings, etc. Then the painter will follow with the spray coats.

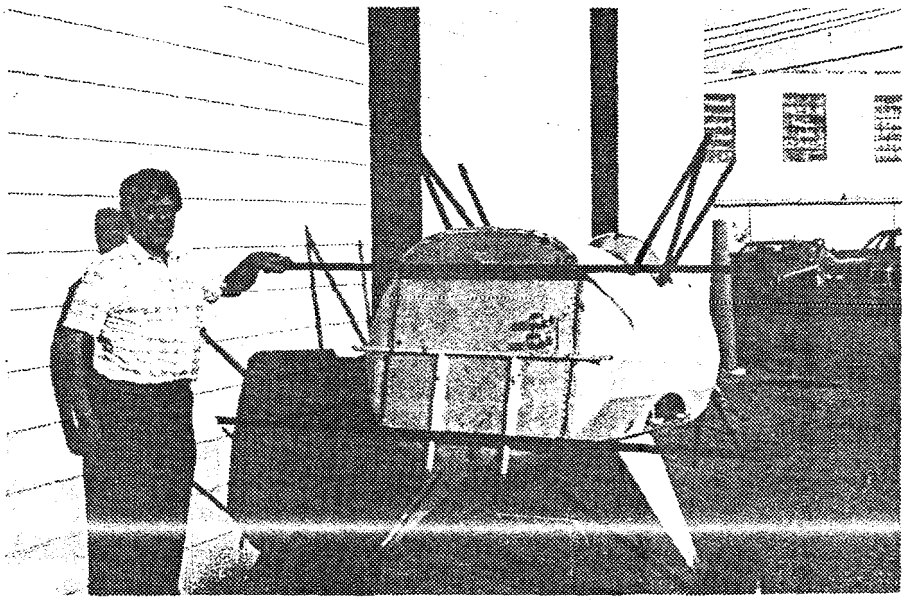
Make sure a test panel has been done first so that if any problems appear they can be solved before doing the aircraft components.
A tail component or aileron can serve as a test panel.

Those painters who specialize in dope spraying tend to apply HIPEC too thick and too many coats. Car painters usually have no problem with HIPEC. They are familiar with spraying thin coats of 2-component urethanes.

Be sure painter reads the summary of instructions. These instructions have been developed after years of experience to give a quick, step-by-step sequence of successful coating procedure.

Mobile wing jig attaches to wingtip and permits rotating wing to any convenient position.





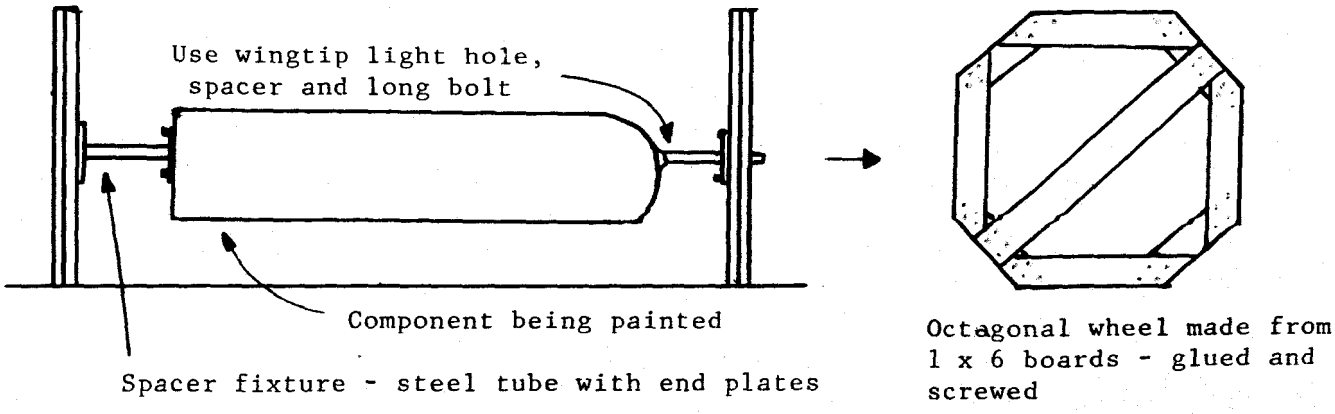
Two angle irons mounted at engine mount holes permit this fuselage to be set with sides up or down so that top and bottom can be easily painted. A tail stand is at rear.

PAINT SHOP

The paint shop should be as dust and bug free as possible. If practical, hose down entire interior of shop, ceiling, walls, beams, etc. In conditions where air is polluted with dust, bugs, pollen, etc. suitable filters should be installed on air circulation system. In cold or dry climates, suitable shop heaters with water pans or humidifiers should be installed. The shop should be adequately ventilated or utilize exhaust fans. (2)

Staple or tape clean **masking paper** over benches, trestles, floors and items to be protected from overspray (plastic garbage bags may be used). Newspapers and kraft paper provide only limited protection when brushing HIPEC; it quickly soaks through thin layers of paper and sticks them to whatever surface is underneath!

Arrange for good lighting and if necessary have mobile lights on hand so object being painted has no shadows. Components which are mounted on trestles or benches must be painted one side at a time. However by using appropriate end supports, components can be rotated, allowing the entire component to be painted in one session. (3) (1)



(1.) Vertical preferred for fabric components.
(2.) Shop ventilation is best located near floor.
(3.) Lighting should be at floor level as well as above.

Note: - When spraying HIPEC, as with any polyurethane containing isocyanate as an ingredient, always wear a proper fitting mask suitable for polyurethane vapor filtering or fitted with an external air supply. A military type aviation oxygen mask may be hooked to a long hose with the air supply coming from a small vacuum cleaner, as long as the vacuum cleaner is located outside the paint shop area and away from the fumes. Professional paint sprayers rigs are available, consisting of a belt with receptacles, filter and regulator (Woods model #003348T05L); regulated air pressure goes to mask and line pressure from remote regulator goes to the gun.

Warning: - Immediately after spraying, guns and brushes must be cleaned before HIPEC sets, otherwise it will have to be scraped off or chemically removed. Professional painters use a paint gun washer but occasional painters can run cleaning thinners through the gun several times. For washing brushes and guns use: Acetone, Methyl Ethyl Ketone, Laquer Thinners, Butyrate Thinners, Nitrate Thinners or similar mineral solvents for the first two rinses. For the final wash, use turpentine or turpentine substitute to remove residual film and leave equipment clean.

Protect your hands: - HIPEC 1 Clear, Sun Barrier, Primer Sealer and Top Coat will stick tenaciously to skin just like everything else! Apply a good hand protector such as HIPEC Hand Protector or PR88, otherwise wear gloves.

SUGGESTED PAINT SHOP SUPPLIES

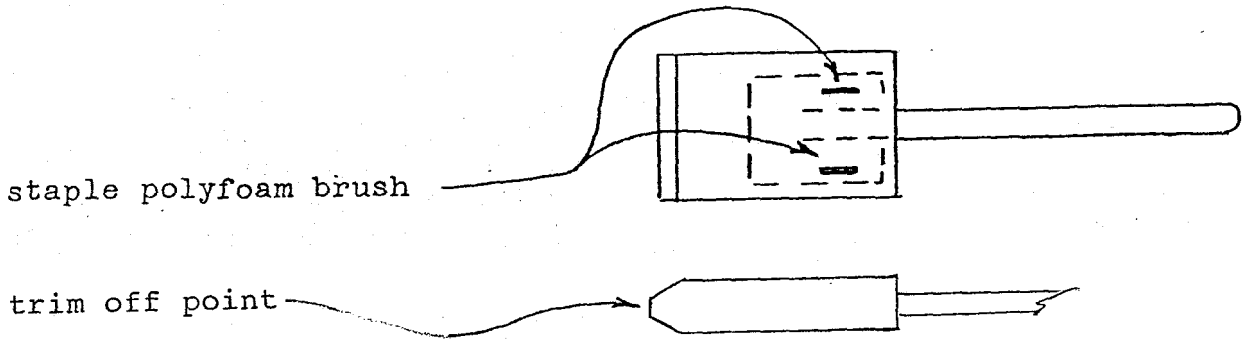
(for covering an average aircraft)

10 yards	masking paper
10	Plastic garbage bags
12	Foam brushes (3'' size)
5	Glue Brushes
10 rolls	Masking tape (18mm or 3/4'')
4 rolls	3M Fineline masking tape
10	Paper throw-away paint filters
1	air respirator or fresh air paint suit system
1	pr. scissors
2	foam rollers & 6 replacement rollers.

4	tack rags
1	dust brush (must be thoroughly detergent washed)
4 sets	Air filters for polyurethane (isocyanate) spraying
5	Scotchbrite pads (or equivalent)
5 sheets	#180 wet or dry sandpaper or combination of grades to suit
2 gal. (8 litres)	Acetone for cleanup and gun wash (or MEK)
1	razor-knife
Wire	for hanging components if necessary
	clean cotton rags

We recommend the polyfoam brushes because they do not shed bristles or leave brush marks. Clean them by squeezing inside a plastic bag. When they get soggy and limp, they should be discarded.

Staple brushes as shown. Trim off edge with scissors.
They are only good for about 1/2 hour of HIPEC application.



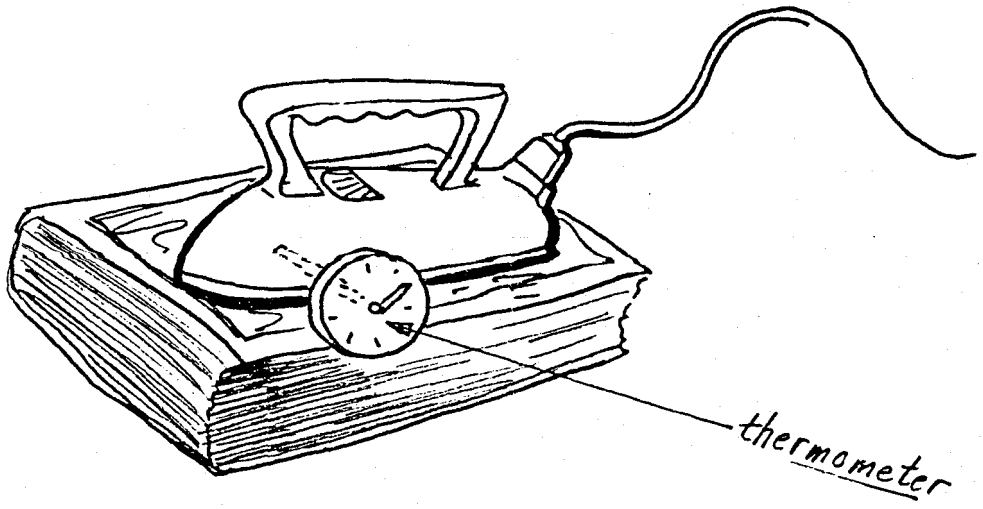
CALIBRATING THE IRON

1. Cut to shape and apply a sticky-back white label to the existing dial face on the iron.

2. Acquire a portable oven thermometer and place on a phone book, stack of magazines or other low heat conducting base.

3. Plug in iron and place thermometer on sole plate.

4. Some irons will roam 20° at a setting due to the heating element turning on and off. While ironing fabric, the element will be "on" most of the time so calibrate the iron for the highest reading in the fluctuation. Starting at 100°C (200°F), mark a radial line and the temperature on the dial face. Continue marking these settings in steps of 30°C (50°F) all the way up to 220°C (450°F). With a yellow highlighter pen, shade a cautionary zone on the label from 190°C (375°F) to 220°C (450°F). With a red felt pen, shade the area above 220°C (450°F).



CHOOSING THE FABRIC

For any particular aircraft, check designer's recommended weight and strength of fabric. Use 1.6 oz/sq. yd. fabric only on aircraft whose wing loading is less than 8 lbs. /sq. ft., and never-exceed-speed is 135 mph or less. Use this fabric when light weight is paramount.

Generally, 2.7oz/sq yd fabric (C 102/ FF 75) is used on most average aircraft. Ultra lights usually prefer 1.7oz fabric (FF 55). For heavy duty service such as ex military aircraft, bushplanes, ag planes, etc. usually use 3.5oz fabric (C 103/ FF110). Areas prone to gravel damage often use 3.5oz fabric.

When selecting the weight of fabric to be used, note that 1.6 oz fabric is much more prone to ground handling damage than the 2.7 or 3.5 oz. On a 500 sq. ft. covering area aircraft, the extra weight of 2.7 oz. fabric compared to 1.6 oz. fabric is:

1.1 oz. per sq. yd. or 56 sq. yds. x 1.1 ÷ 16 = 3.85 lbs.

If 1L (or US Quart) for first coat covers about 75 sq. ft., then weight of HIPEC® Sun Barrier (or most HIPEC® Top Coat Colors), weight is .016 lbs./sq. ft./coat. Two coats weigh .016 x 2 = .032 lbs./sq. ft. One Liter HSB or HTC leaves 1.2 lbs. of cured finish (per 75 sq. ft./ coat). One Liter of White HIPEC® TOP COAT has heavy pigment and leaves 2 lbs. of cured finish. One coat of white weighs 2.6 lbs./100 sq. ft.

WEIGHT OF FABRIC & FINISH COMPARISONS			
Polyester fabric weight / sq. yd.	1.6 oz.	2.7 oz.	3.5 oz.
Weight of bare fabric per 100 sq. ft.	1.1 lbs.	1.9 lbs.	2.5 lbs.
Weight of fabric & 1 brushed coat HIPEC® Sun Barrier	2.7 lbs.	3.5 lbs.	4.1 lbs.
Weight of fabric & 1 brushed coat HIPEC® Sun Barrier & 1 sprayed coat HIPEC® Top Coat per 100 sq. ft. white	5.3 lbs.	6.1 lbs.	6.7 lbs.
Weight of fabric & 1 brushed coat HIPEC® Sun Barrier & 1 sprayed coat HIPEC® Top Coat per 100 sq. ft. OTHER THAN WHITE	4.3 lbs.	4.9 lbs.	5.5 lbs.
Weight of fabric & 1 brushed coat HIPEC® Sun Barrier & 1 sprayed coat HIPEC Primer Sealer OR HIPEC® Sun Barrier (as primer) & 1 sprayed coat HIPEC® Top Coat WHITE per 100 sq. ft.	6.9 lbs.	7.7 lbs.	8.3 lbs.
Weight of fabric & 1 brushed coat HIPEC® Sun Barrier & 1 sprayed coat HIPEC Primer Sealer OR HIPEC® Sun Barrier (as primer) & 1 sprayed coat HIPEC® Top Coat OTHER THAN WHITE per 100 sq. ft.	5.9 lbs.	6.7 lbs.	7.3 lbs.


OK. BABE...
WANNA BE A LIGHTWEIGHT.. A MIDDLEWEIGHT.... OR A HEAVYWEIGHT?

CHOOSING A COLOR SCHEME

If an aircraft is stored in the shade, a hangar or trailer, HIPEC Sun Barrier (aluminum colored) and some trim colors may be all you want. The Sun Barrier may darken and dull slightly with age, especially if it receives prolonged exposure to the sun, but this can be delayed with a light coat of clear HIPEC Top Coat which will greatly enhance the gloss and prevent darkening. A contrasting and attractive trim over the Sun Barrier is yellow pinstriping.

By far the better finish for prolonged exposure to the sun, is a single cross sprayed coat of colored Top Coat over the Sun Barrier. It is often a good idea to choose colors for good visibility that contrast with the terrain frequently travelled over. Whites and blues are good when flying over green and brown farmland, grassland, bush or mountains. Yellow, orange and dark colors are good when frequently flying over snow cover. A metallic finish greatly enhances visibility regardless of what terrain the aircraft is flying over. On the other hand, owners of military aircraft or replicas thereof usually prefer the flat colors for camouflage.

If the aircraft is often parked in cold winter temperatures down to -20°C (-5°F) the sun will help dissipate snow and ice from dark colored wings far more readily than light colored ones. However in hot sun and warm temperatures, excessive heat buildup can occur in dark colored aircraft and for this reason many composite aircraft and sailplanes are required (by the designer or manufacturer) to be white.

Choose a color scheme to your liking. Spend time and "doodle" several choices on sketches or photocopies of your plane. Study color schemes of the latest factory-built aircraft. Usually color schemes fall into one of the following categories (listed in increasing cost and difficulty):

i One major color for all components and one or two trim colors

ii Two major colors (each confined to whole components) and one trim color

iii Two or more colors per component, each covering a substantial area. With this kind of finish, a spray coat of HIPEC Primer Surfacer is required over HIPEC SUN BARRIER to act as a primer for the HIPEC Top Coat. Now the more complex color scheme requires more labor, more primer, masking tape and more paint shop time.

iv As in (iii), but includes complex pin striping, shading, etc.

Note that HIPEC coats most surfaces such as aluminum, steel, plastic, and fabric that are free of wax. No need to select matching enamels and special primers.

When applying multiple colors as in (iii) and (iv)., masking for colors "edge to edge" improves adhesion, saves weight and retains flexibility.

COVERING OPEN FRAME STRUCTURES

CHOOSING THE FABRIC TO STRUCTURE METHOD OF ATTACHMENT

The fabric covering on an open frame structure such as a wing or tail component must carry substantial air loads. The fabric must be coated with a strong airproof finish. This coated fabric must be secured to the structure to resist the loads to which it is subjected.

Methods of attachment fall into four groups.

METHOD A - attached by adhesive brushed through fabric.
B - attached by adhesive applied to structure.
C - attached by rib stitching with lacing cord.
D - attached by rivets, screws, clips, rods or wires.

For saving cost of tapes, thread and paint and saving substantial labor, Method A is very attractive for light wing loading aircraft. HIPEC SUN BARRIER has the properties of flowing easily through the polyester cloth and having a high film strength,giving a very strong flexible bond over a wide temperature range. See outside of back cover where the author is standing in a panel with center rib. A 150 lb/sq.ft. load is applied when one foot is applied to the one sq. ft. of one side. We have had 200 and 300 lb. gentlemen stand in the panel. We frequently demonstrate this at air shows, sometimes actually jumping in the panel.

Method B - HIPEC ATTACH GLOO has high strength over a wide temperature range. It is fast drying so must be applied quickly. Flexible epoxy and other flexible hi strength glues with good temperature range can be depended on for even stronger bonds than HSB. There is a serious disadvantage with wet glue on ribs. First, it takes considerable time to apply the glue. By the time the last

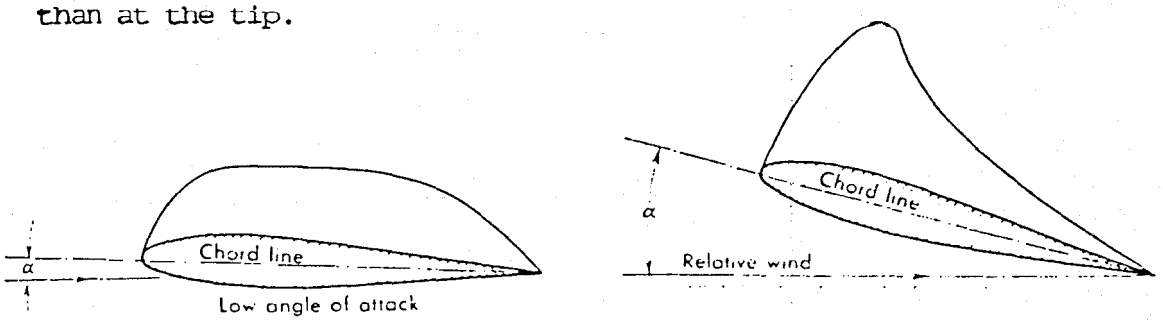
glue has been applied, the first application is often dry. You need several fast working glue people. Then the cloth can only be applied by the blanket method. A number of people are required to handle the fabric "blanket" and very carefully position it. In practical terms, this method is only suitable for very small frames. It has been found that Method A is far easier with consistantly good results.
So Method B is not practical. Use method A.

Methods A & B have a great advantage aerodynamically. There are no ugly rib cords crossing the airflow.

For most factory built aircraft, rib lacing (Method C), or attachment to ribs by mechanical fasteners (Method D) is required by specification. Designers of aerobatic and high wing loading aircraft usually specify Method C or D.

HIPEC Sun Barrier brushed through the fabric, will secure the fabric to a properly prepared structure (ribs, tubing, flat or curved surfaces) with a pull-away strength of 20 to 30 lbs/in.

Consider for example, the panel of a wing measuring 12" x 23", bounded by 2 ribs as well as the leading and trailing edges. If the bond was a constant 20 lbs/in. and the panel was evenly loaded along the perimeter (96"), it could support 1920 lbs. (640 lbs/ft^2). Since the wing loading of a fabric covered aircraft is usually under 12 lbs/ft^2, the panel could support 53 times this amount. Unfortunately this only holds true for the theoretical even loading. In reality wing loading is not evenly distributed; wing lift distribution plots show a much greater lift load over the wing spar than at the leading or trailing edges. Similarly, lift loads are usually greater near the wing root than at the tip.



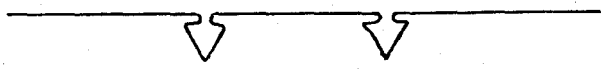
Pressure distribution as altered by angle of attack.

Generally, the maximum lift at any point on top of the wing (at the most critical speed and heaviest load), would not exceed 3 times the average. This maximum is multiplied by the gust factor and again by a factor of safety. If a total safety factor of 9 g's is used then 3 (times the average) x 12 (lbs/ft^2 average) x 9 (safety factor) = 324 lbs/ft^2, which is still far below the panel bond strength of 640 lbs/ft^2. Using this same wing loading of 12 lbs/ft^2, a safety factor of 17 g's could be used without exceeding the panel bond limit. This is why we advocate gluing the fabric to the structure instead of the laborious rib-stitching procedure.

METHOD D

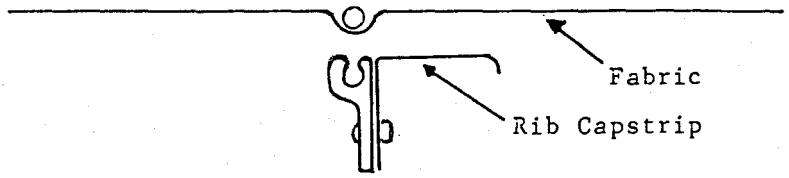
To secure fabric to top of wing (instead of rib stitching), Aeronca, Champion and Ercoupe utilized sheet metal screws through thin plastic or metal washers, screwed into the ribs. As time passed, corrosion between screws and aluminum ribs eventually led to the failure of the attachment, but usually the fabric required changing by this time anyway. Approvals now exist for using wide flange aluminum pop rivets instead of steel screws.

The Martin fabric clip found popularity in Piper Cubs and other aircraft.



The continuous wire clip is installed through reinforcing tape and fabric into accurately positioned holes in rib capstrips.

The Curtiss Helldiver of WW II used an aluminum extrusion along side of the rib, into which a wire was pounded to hold the fabric in place.



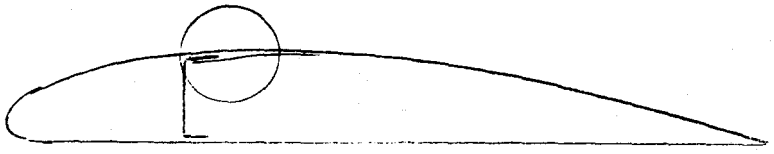
No doubt numerous other innovative ways exist to hold fabric to the structure, however all the above involve considerable labour and expense compared to Methods A or B and create inevitable surface lumps.

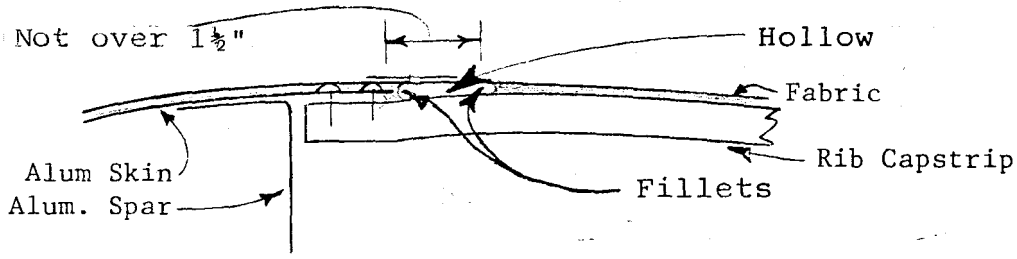
SUMMARY

Properly done, any fabric aircraft should be able to use the Hipec Method A fabric to structure securing with the coverer's confidence considering all the testing that has been done.

There are many skeptics around. They usually have an aircraft already rib stitched or taped and do not want to see anyone use an easier, lower cost or better looking system. Others were trained in the "old school" and have a closed mind to progress.

Even if there are short gaps of attachment, HSB will make a pair of fillets accross the rib, one in front and one behind the gap. So attachment strength is maintained.



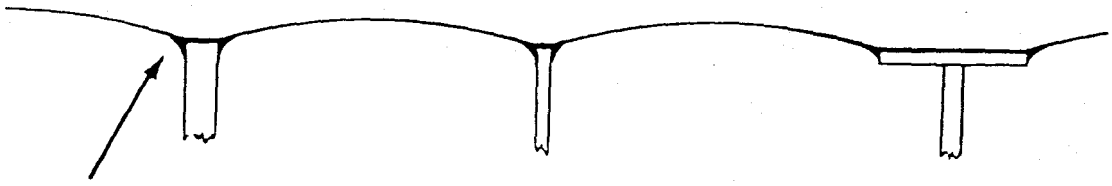


Check with your aircraft inspector and be sure he will approve the fabric to structure attachment by HSB.Some inspectors who may be unfamiliar with the system will need to update themselves. Ask them to call Falconar Avia Inc if they need additional information.

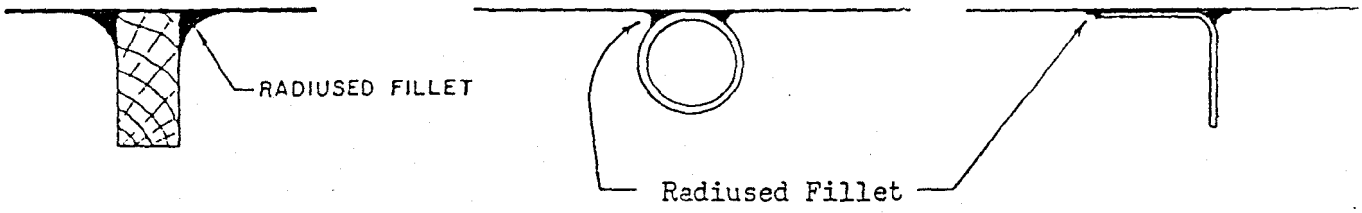
Fabric Attachment to Ribs with **HIPEC SUN BARRIER**

How wide must the capstrip be? — Doesn't matter!

Fabric breaks away from rib at same load value no matter what rib width is.



Fillet retains fabric



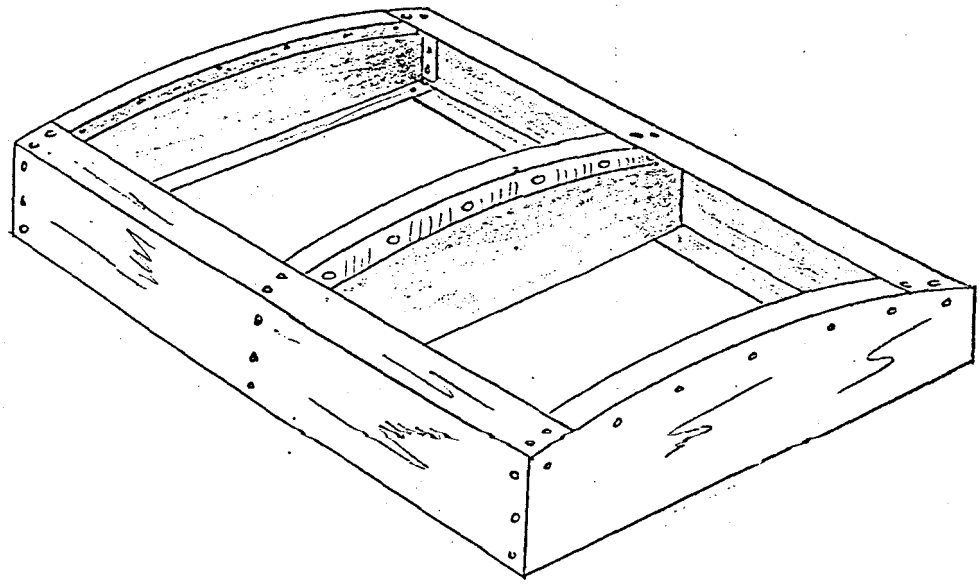
WARNING ATTENTION ACHTUNG

901012A

BEFORE COVERING AIRCRAFT YOU MUST MAKE A TEST PANEL OR

cover a small component such as rudder or elevator. If it is not perfect (and at times it is not) tear it off and make another try. Do this several times until you have mastered the TECHNIQUE.

If covering a homebuilt and using HIPEC SUN BARRIER to attach fabric to structure, you MUST make a frame with rib(s) in it typical of the structure to be covered. If possible, make several frames. Cover them. Coat them with HIPEC per instructions. Let each set a few days. Then test one. Be sure you can achieve the strength results required.



PREPARING THE STRUCTURE

First inspect and repair the complete assembly or structure to be covered. Lubricate and service mechanisms and systems as necessary but avoid getting lubricants on surfaces to which fabric is to be attached. The parts of the structure to which fabric will be in contact must be clean and free of grease, oil dirt and silicone compounds. Clean if necessary, with solvents such as varsol, tolulol, acetone, methyl ethyl ketone or wash with detergent and rinse.

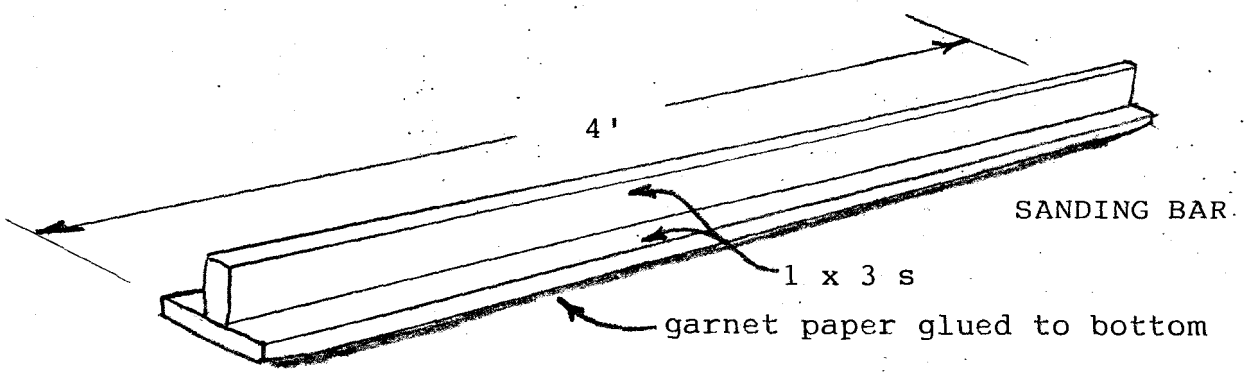
Wooden Structures - Sand woodwork to remove glaze, bumps and sharp edges (use 120 - 240 grit garnet paper for best results) then blow, vacuum or wipe away all dust. Tops of ribs must be sanded to provide a proper surface for attachment.

Lumps or bumps should be sanded out using a sanding bar or block. It is best to "fill and level" hollows using a filler paste of micro balloons mixed with Sun Barrier or Primer Sealer. Mix a creamy paste and apply in thin layers, allow to dry 12 to 24 hours and then sand with sanding bar or block and garnet paper.

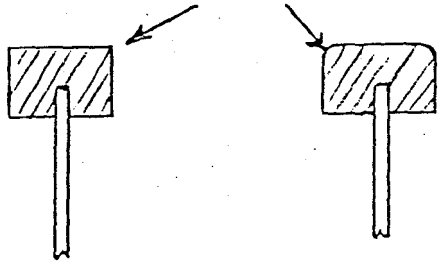
To seal the wooden structure, brush or spray HIPEC 1 Clear, HIPEC Sun Barrier, HIPEC Primer Sealer or HIPEC Top Coat, over the entire structure (recommended method) or just over the parts of the structure which will be in contact with the fabric. The Sun Barrier generally affords the best protection but HIPEC 1 Clear is very popular because it is transparent and shows wood grain and color.

Apply one or more coats, as necessary, until all wood pores are filled or the surface is shiny. To ensure the best intercoat adhesion, be sure coats are applied as soon as the previous coat is "STICKY-DRY", especially over the areas which will require fabric adhesion.

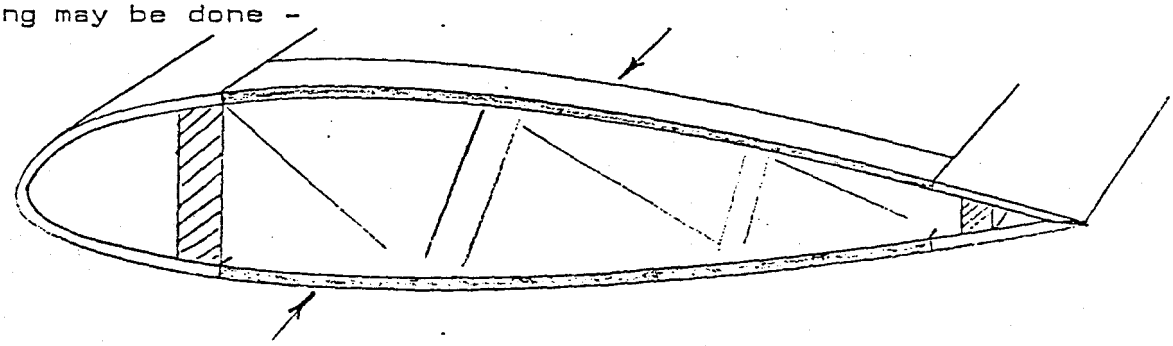
Where fabric is to adhere to structure, most finishers prefer to apply only **one coat**. This leaves a rough surface for good adhesion of HSB brushed through fabric later.



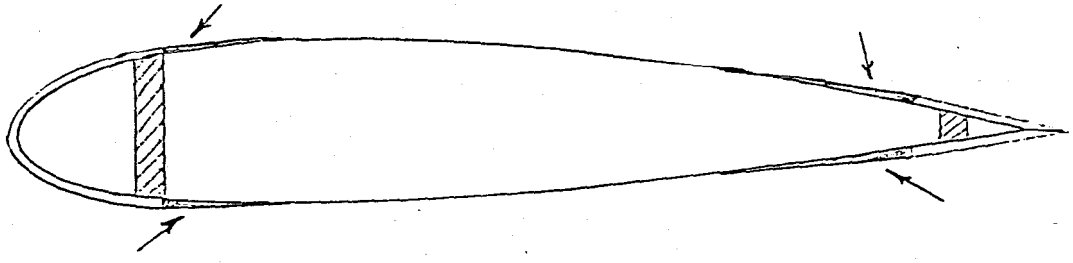
Crossection through typical rib capstrip.
- sand edges to remove sharp corners.



If a deluxe contouring is desired on wings, tail feathers, etc., the following may be done -



Add capstrip, width of rib or wider. Use strip of plywood or wood of the same thickness as leading edge or tailing edge gusset either as short tapered filler or full length.



Wooden structures not coated as mentioned above soak up extra HIPEC when fabric is coated. This necessitates extra coats of Sun Barrier over the fabric in these places and can lead to "Solvent-Pop" problems.

Balsa wood and other very porous materials must be coated several times prior to covering in order to prevent thinners from being absorbed. The thinners evaporating from HIPEC during the drying process permeate into the porous material and as the HIPEC dries a non-porous skin develops. The thinners eventually try to escape through the skin and form small bubbles during the process known as "Solvent Pop". Some finishers seal balsa wood and other porous materials with shellac, resorcinol glue, white glue or epoxy varnish prior to applying HIPEC.

Urethane foam may be sealed with either HIPEC 1 Clear or HIPEC Sun Barrier, however polystyrene foam dissolves rapidly when in contact with HIPEC. To prevent this, apply enough coats of epoxy resin or other water-base coating (shellac, white glue, etc) so a continuous and impervious skin is formed over the polystyrene foam.

Steel Structures - For exposed structures note section titled "Metal Protection". Steel structures to which fabric is to be adhered should be abrasive cleaned with emery cloth or sandpaper. File off sharp points, nibs or weld splash. Prime surface with HIPEC Sun Barrier, HIPEC Primer Sealer or Hipec Metal Primer. Where adhesion not required, zinc chromate or red oxide may suffice (allow to dry 3 days or more prior to HIPEC application). Apply cloth adhesive tape to lumpy or sharp areas where fabric could be cut due to flexing or abrasion (while in service or during finishing).

Aluminum Structures - for exposed structures note section titled "Metal Protection". To remove all traces of dirt, wax, grease or oil, clean with solvent or detergent, then rinse and dry. Apply cloth adhesive tape over rivet heads and other sharp edges and bend protruding edges inward. Parts of structure to which fabric is to be adhered (such as capstrips, trailing edges, leading edge skins, etc.) must be prepared as follows:

i Remove old primer and paint (if required) using abrasive material or wax free paint remover.

ii Clean with solvent (or detergent and rinse).

iii Carry out HIPEC Aluminum Cleaning and Alodine treatments as described in "Metal Protection".

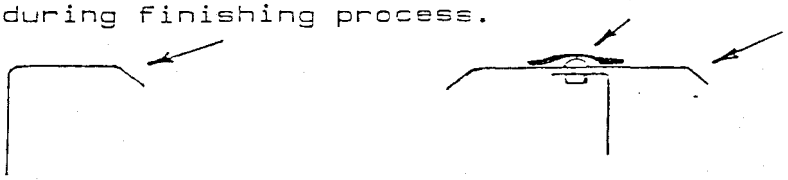
iv Rinse thoroughly and dry.

v Within 15 hours, prime with HIPEC Primer Sealer or HIPEC Sun Barrier. Delaying the priming will allow the aluminum to reoxidize and shed the thin Alodine coating.

Composite, Plastic and Fiberglass Reinforced Surfaces & Structures - Sand to remove glaze, then blow, vacuum or wipe off dust. Remove waxy surface with acetone or other wax remover and prime with HIPEC.

Treatment of Lumps and Hollows on Sheet Metal - Large areas of thin aluminum sheet metal to be covered with fabric often have overlap seams, doublers and protruding rivets. Sharp edges of gussets should be folded inward and lumpy areas can be covered with flannelette or cloth adhesive tape to help smooth the external contour and prevent the fabric from being abraded due to flexing or chafing. Using dabs of HIPEC Attach Glue, apply flannelette to the lumpy areas (or entire edge, if necessary) and if desired, even apply a second layer. For even smoother and better contours, a "fill and level" procedure can be performed prior to application of the finish. This procedure is especially important on large, thin, sheetmetal covered areas such leading edges of wings, wing roots, etc. A filler paste of Micro-Balloons and Sun Barrier or Primer Sealer can be applied in thin layers, allowed to dry 12 to 24 hours and sanded using a sanding bar or block and garnet paper.

Sharp edges of gussets should be folded inwards. Apply cloth adhesive tape to lumpy or sharp areas, over protruding rivet heads, etc. where fabric could be cut due to flexing and chafing in service or during finishing process.



Another way, is to apply a 3/4" (19mm) fiberglass tape to flanged rib secured with a dab of HAG at each end. Then reworking ribs by folding inwards or deburring is unnecessary. When applying HSB later, use stippling action with a stiff brush to ensure complete penetration of HSB.

TREATMENT OF PROTRUSIONS HIGHER THAN 1" or 2"

Strut ends, aileron & flap bearing support arms & the like, protruding from open frame structure need a "shelf" around them. A slot cut into fabric to go over support arm for instance needs to be glued to the shelf to provide a neat appearance & not an ugly loose hole. EG. Flap overhang on the Emeraude is fabric covered. It needs a piece of spruce 6mm X 18mm epoxy glued on each side of each hinge bearing support arm. These are sealed with Hipec 1 Clear or HSB. Fabric panel is slotted by scissors or sharp razor knife and glued to shelf pieces with HAG. Similarly on a Murphy Renegade wing, a shelf of .020" or .016" aluminum can be fitted around strut brackets. Pop or Avdel type 3/32" or 1/8" rivets secure the shelf to adjascent structure. Shelf should be at least 3/4" (18mm) on each side of protrusion. The result is a neat way of finishing a potentially awkward problem.

METAL PROTECTION

How well the metal surface is protected is directly related to how well the surface has been prepared. Marginally prepared surfaces which are coated with the very best primers would not be as well protected as properly prepared surfaces using regular primers.

Steel Parts and Assemblies

FS 24

Except for pre-plated or corrosion proof steel, all steel parts should be adequately protected against rusting. This must be done to each individual part prior to assembly. The method used depends largely on the type of part.

Method A is best for small, non-welded parts and will require the services of sandblasting and plating shops. Parts subject to wear and exposure to water (bolts, links, rods, etc.) should be finished using this method if it is possible only if entrapment of plating solution is not possible (where 2 plates are welded together; solution could seep into the joint and cause eventual corrosion). It is very important that step 3 follow step 2 within 24 hours (during dry conditions), or immediately, if the weather is humid, otherwise the newly sandblasted steel will begin to oxidize and corrode. Do not handle sand blasted surfaces with bare hands (use a clean, dry towel or wear gloves).

1. Wash off all grease, oil and dirt with varsol, tolulol, thinners or other solvent. If mud or other water-soluble impurity is to be removed, wash with detergent and water, then rinse thoroughly with hot water. Dry.
2. Sandblast.
3. Cadmium plate.
4. (optional) Prime with Strontium Chromate, HIPEC® Primer Sealer (HPS), HIPEC® Sun Barrier (HSB), zinc chromate, red oxide or HIPEC® Metal Primer (HMP).
5. (optional) Apply paint which is compatible with the primer (a 72 hour waiting period may be required with some primers).

Method B is best for welded assemblies (brackets, engine mounts, undercarriage parts, steel tube frames, etc.) Step 2b should be avoided if entrapment of the solution is possible.

1. a) Wash off grease, oil and dirt with varsol, tolulol, thinners, solvent or detergent and water, then dry.
2. a) Sandblast, or;
   b) Dunk in a 30% solution of hydrochloric acid or a commercial preparation such as Metal Prep 78 for 5 minutes, then rinse in hot water and dry, or;
   c) Clean with emery cloth then wash with thinners, solvent or detergent and water. Rinse and dry.
   d) It has been found that leaving sandblasted steel for several days affords better adhesion for the primer.
3. Prime with HIPEC® Primer Sealer(HPS), HIPEC® Sun Barrier (HSB), zinc chromate, red oxide, or HIPEC® Metal Primer (HMP).
4. Apply paint or finish desired (must be compatible with primer; a waiting perioc may be required.)

Method C is used when chrome plating is desired.

1. Polish using buffing wheel and buffing compound.
2. Have part cleaned, copper plated and then chrome plated.
3. As soon as the plating process is completed, the part should be baked for 4 hours at 350ºF to eject occluded hydrogen; otherwise corrosion, embrittlement or peeling and blistering could occur later.

Method D is generally used for protected areas, engines, inside steel tube structures, etc. This is not for parts which will be in contact with or contaminate the fabric prior to painting. Coat the part with grease, oil, waterproof or inhibiting oil (such as LPS 2 or 3) or other protective material. Boiled linseed oil is often used inside steel tube structures.

Aluminum and Aluminum Alloys (Dural) FS 29

Aluminum and its alloys are usually fairly resistant to corrosion except when exposed to a corrosive atmosphere (such as near the ocean), or if the aircraft is infested by birds or mice.

However some alloys are only moderately corrosion resistant so they are usually aluminum coated ("clad" or "Alclad") or etched and primed (as Dural often is). Further protection is available by painting with enamel, lacquer or polyurethane products. On occasion, anodizing or aluminizing is performed but this is usually only in high production facilities. For optimum protection where anodizing is unavailable, Alodine or similar treatments are recommended. Alodine must be used if a HIPEC® Product is going to be applied.

Alodine Treatment for Aluminum - Acid resistant (rubber, glass, plastic or stainless steel) containers should be used. Operators should be equipped with rubber gloves, apron and goggles to avoid contact with solutions. For spray applications, plastic or stainless steel paint cups and nozzles should be used and a respirator must be worn. This process can most effectively be performed when the temperature is between 20ºC and 30ºC (70ºF - 85ºF).

1. Dilute 1 part HIPEC® Aluminum Cleaner with 3 parts water. Apply to an area of about 10-20 sq ft at a time, using a soft brush, rag or mop.

2. When working with the solution, always keep the surface wet; the aluminum cleaner must never dry on the surface. Starting at the bottom and working upwards, scrub with a Scotchbrite pad (especially along seams and around rivets), allowing solution to remain on the surface for 5 to 15 minutes.

3. Rinse thoroughly with clean water and brush or mop. Water should drain off without any signs of water-break. Seams and crevices should blown out with clean compressed air. Continue this process until the entire surface is cleaned. When finished, reduce fire hazard by washing rags, mops or sponges with water before discarding.

4. Prepare the Alodine solution by dissolving 100 grams (4 oz,) of Alodine 1200S in 4 liters (1 gallon) of water. Apply Alodine solution in the same manner as the aluminum cleaner (except no scrubbing is require). After a thorough rinsing, the prepared surface should have a light iridescent gold or tan color.

5. As soon as possible after Alodine rinsing has dried, prime structure with HIPEC® Sun Barrier, HIPEC® Primer Sealer, HIPEC® Metal Primer or equivalent.

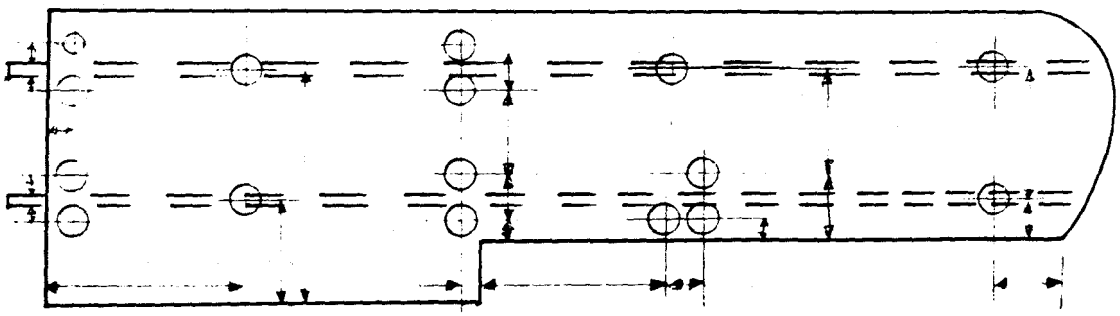
THE 3 STAGE PROCESS

STAGE 1 - PREPARING THE SURFACE

Are you ready? You are now at the stage where the structure is ready for covering.

1. Check that the manufacturer or designer of the aircraft has provided positioning information for inspection holes. If not, make a diagram of each component such as for bottom of wings, and show positions of inspection holes, reinforcements and grommets. Measure positions from trailing edge and wing root, etc.

DIAGRAM FOR INSPECTION COVERS, REINFORCEMENTS AND GROMMETS



Strut locations and wing root require two inspection holes. Note that Canadian D.O.T. AD 63-3* applicable to all aircraft having wood in the major structure, require detailed inspection of woodwork. Plan inspection holes so both sides of all spars can be viewed with a light and mirror (suggested spanwise spacing is every meter (yard). Do not place inspection holes on lifting surface such as top of wing or over cabin.

* Superceded by TP 4914, N-AME-AO 13/85

2. Check that all sanding, pre-coating, Alodine and structural preparation has been completed.

3. Wherever the fabric will contact the structure, the structure must be sealed or coated with HIPEC or equivalent compatible primer, sealer or finish. This includes metal, wood and fiberglass surfaces, flannelette, cloth adhesive tape and fillers. In addition, there must not be any pinholes or blind cavities which might trap vapors emitted during the curing process. If the fabric will cover a cell or otherwise enclose an empty space, vent holes should be made to permit the escape of trapped vapors.

4. Check that all systems have been installed and are functioning correctly (fuel system, controls, wiring, fittings, sleeves, etc.).

5. Check for any slack wires and cables, pull tight and tape so they do not fall outside the contour of the structure.

6. Check that there are no blobs of grease or dripping fluids from any system.

7. Ensure that bench tops, saw horses, supports, jigs, etc. are ready, covered with polythene and are clean.

Inspection - Now is the time for Final Inspection Before Cover. This inspection will verify acceptance of workmanship, completeness of installations and systems, function of systems and installation of locking devices. Depending on the circumstances of fabrication and certification requirements, one or more of the following persons should be summoned to conduct the inspection:

1. Factory Inspector
2. E.A.A. Counsellor for aircraft construction or rebuild
3. MD - RA Inspector for Amateur Built Aircraft (Canada)
4. F.A.A. Inspector for Amateur Built, Experimental Catagory (USA)
5. A.M.E. Catagory M for Type Approved Aircraft (Canada)
6. A&E or A&I for Type Certificated Aircraft (USA)
7. Other government Inspector, as required

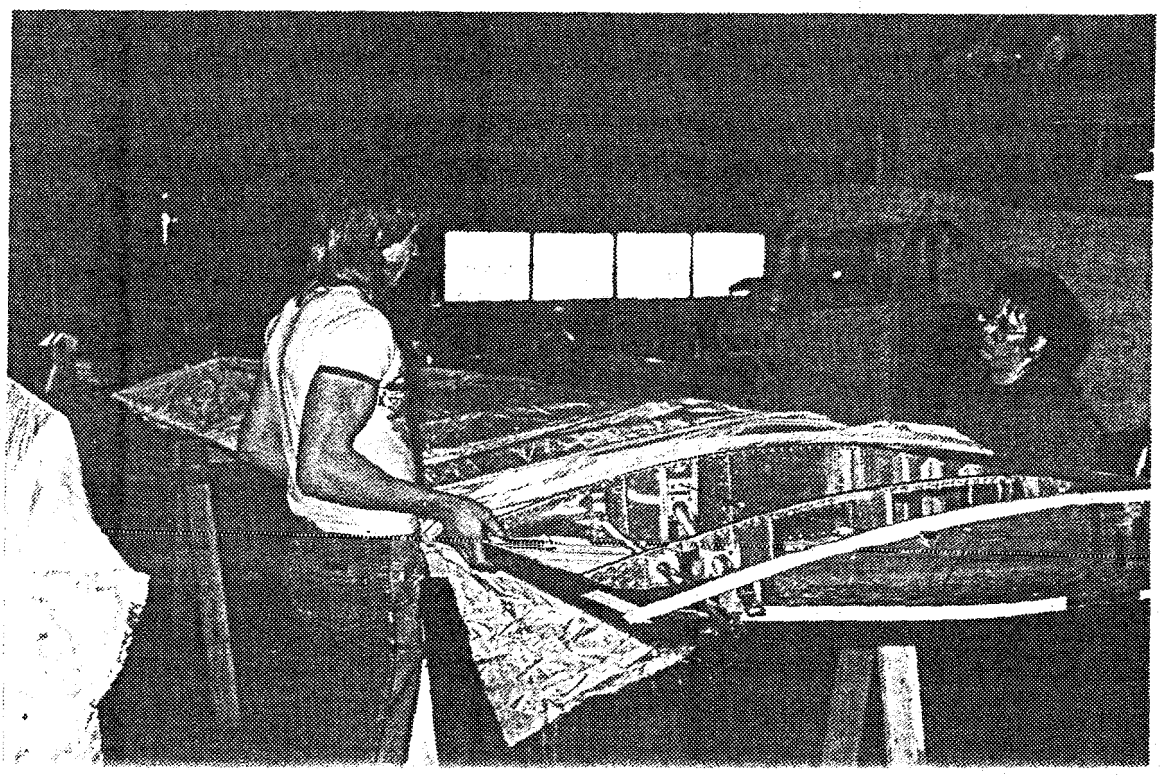
Note: Take this opportunity to take some photos of your project.

Up to this point, the covering procedure has been relatively common to all four attachment methods of fabric to lifting surfaces. The four methods were introduced in Chapter titled "Choosing the fabric to structure method of attachment". To clarify the steps and sequence, refer to the summary of the method chosen. Before pulling on cover or proceeding with blanket method for covering lifting surfaces requiring structural attachment, check the following:

Method A: top of ribs and attachment structure must be rough or scuff sanded with appropriate grade of abrasive paper if made of wood. If metal, prepare accordingly.

Method B: as for A but in addition a coating of Hipec Attach Gloo, heat melt glue or catalysable adhesive applied to top of rib capstrips and other lifting structure.

Method C:
Method D: no special treatment except porous surfaces must be sealed.



COVERING BY SEWN ENVELOPE

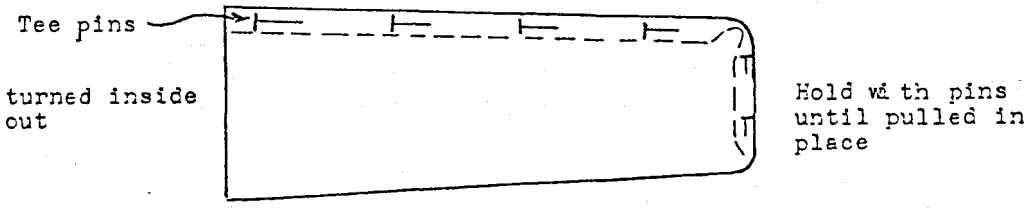
This is fairly easy to accomplish and results in a neat looking, secure attachment. It can only be done on structures shaped or tapered so that the envelope can be pulled on and off the structure. The final open end is either hand sewn or glued to the structure.

1. Fitting and Sewing: Fit fabric in place and pin around the perimeter to be sewn (use saftey pins, T pins or straight pins). Up to 5% slack is allowed after sewing (this will be taken up when shrinking the fabric. Next, draw a dark line around the edge, on both sides, then remove the fabric. Now remove the pins, fold the fabric back the other way, match the lines and re-pin (the fabric should now be inside out). These pins should point in the opposite direction of sewing to facilitate easy removal. Finally, using aircraft sewing thread of at least 5 lbs strength, sew around edges outside pencil line to allow for 2 - 5% slack. Usually the percentage slack is not critical, However, too much slack spanwise will result in a scalloping between the ribs known as "Hungry Horse" effect.

   Note: If symetrical or identical left and right components are being covered (as is often the case), skip the process of removing the pins and turning the fabric inside out. Simply sew around the lines and use that envelope for the opposite side (i.e. cover, pin and mark fabric on the right wing, then sew it and use it on the left wing).

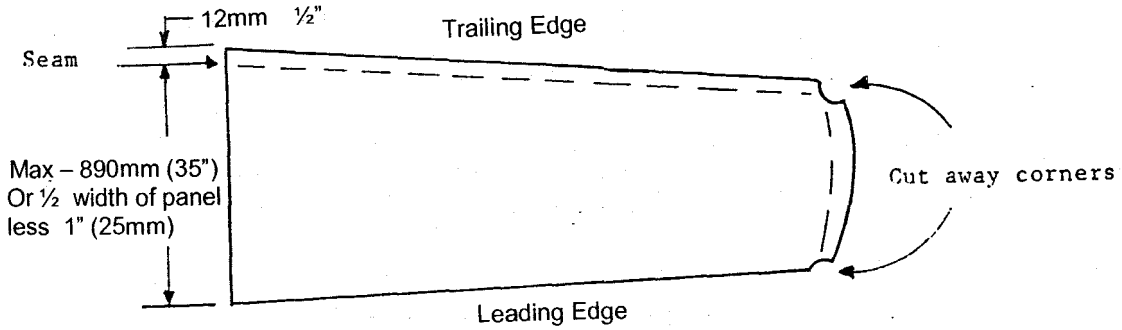
Turn envelope correct side out and prepare to pin the loose edges together (now inside). There are two methods for aligning loose edges,

a) The first involves folding both edges together so they reside on the bottom of the structure.

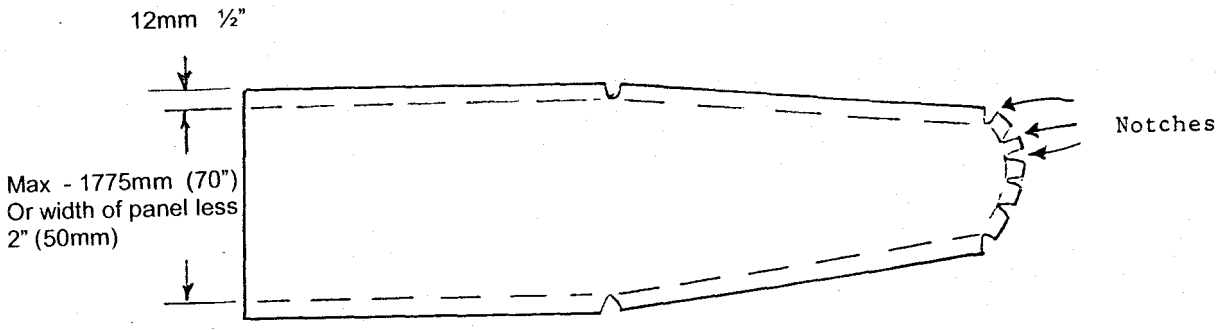


adjust seams straight before pulling out pins

Once you have determined which way to pin the edges, do so and pull the envelope onto the structure. Remove the pins and apply a 12mm (1/2") bead of Attach Glue on the wing root or whatever the open end of the envelope will be attached to (also see instructions under covering by blanket method). Open end may be hand sewn using 14 lb. polyester hand sewing thread (or equivalent) and a baseball stitch. Make sure to pull envelope spanwise to prevent the "Hungry Horse" effect.

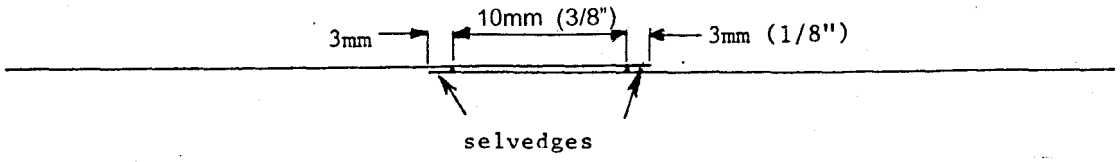


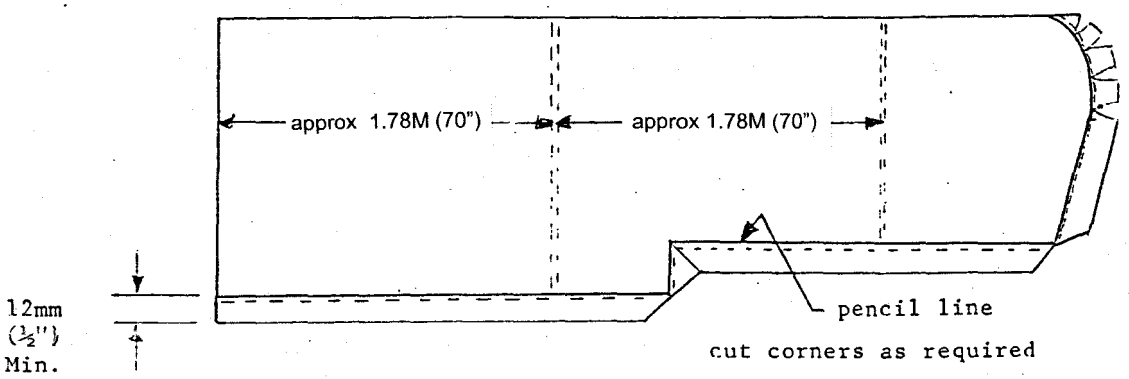
1 piece laid spanwise, folded around leading edge and sewn at tip and trailing edge.



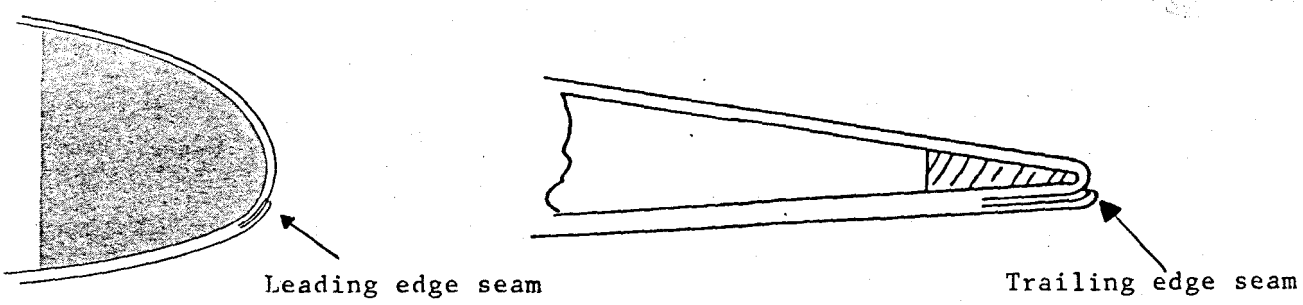
2 pieces of fabric laid spanwise on wing and sewn all around.

Where panels must be joined to get enough length, make a double plain seam as illustrated below.

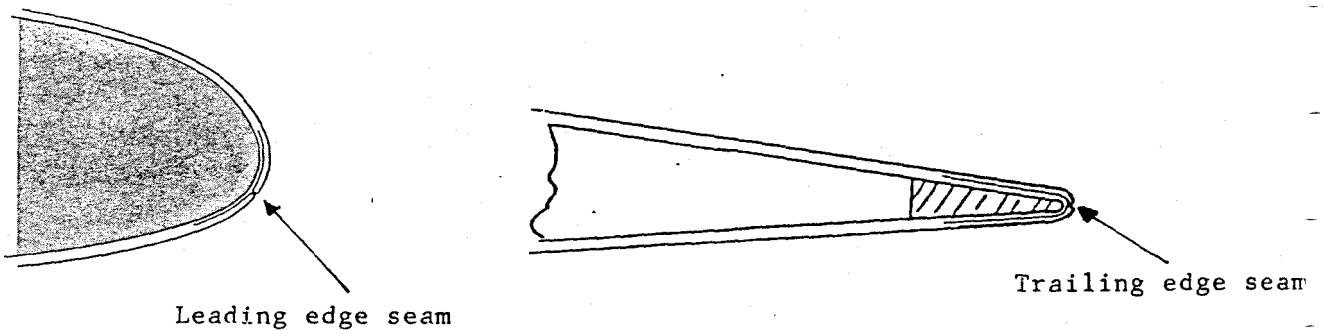




Several panels laid chordwise and sewn with double plain seams, folded around the leading edge and sewn at the top and trailing edge.

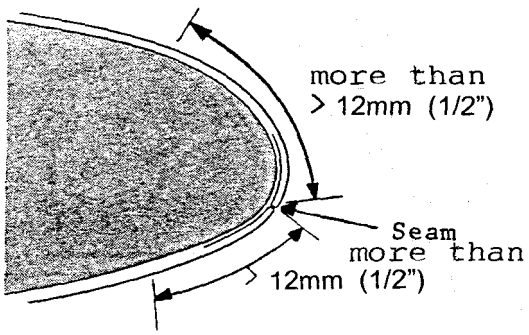


b) The second involves folding each edge an opposite direction from the seam.

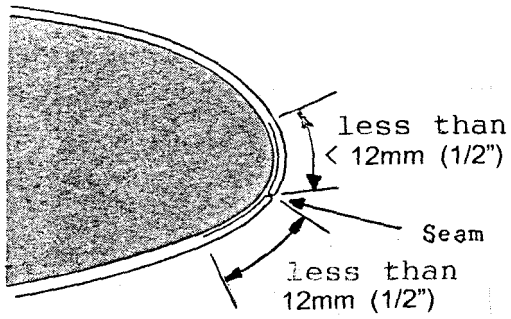


If you are using the Method A or B attachment and don't want to tape the seam, the loose edges must extend at least ½" (12mm) past the seam and the surface of the structure must have been prepared as a fabric attachment surface (make sure that you plan all this out before you cut your fabric). If the loose edges extend less than the required amount past the seam, surface taping will be required.

No surface taping required



Surface taping required



COVERING BY BLANKET

COVERING BY BLANKET METHOD - This method is often used on wings with very little taper or wherever there would be difficulty installing an envelope. Preferred by those without sewing machine or skills.

For wood or composite structure:

1. Use a sandpaper pad to scuff the portions of the structure which were previously sealed with HIPEC and which will be in contact with the fabric. Thoroughly clean away all dust and residue. Not required if surface is already rough.

2. Cut panels of fabric to suit the areas to be covered. Always try to wrap the fabric around a straight edge of the component if there is one. Large components such as wing panels, may be wider than the width of the fabric rolls, in which case sew fabric panels together as shown under "Covering by Sewn Envelope".

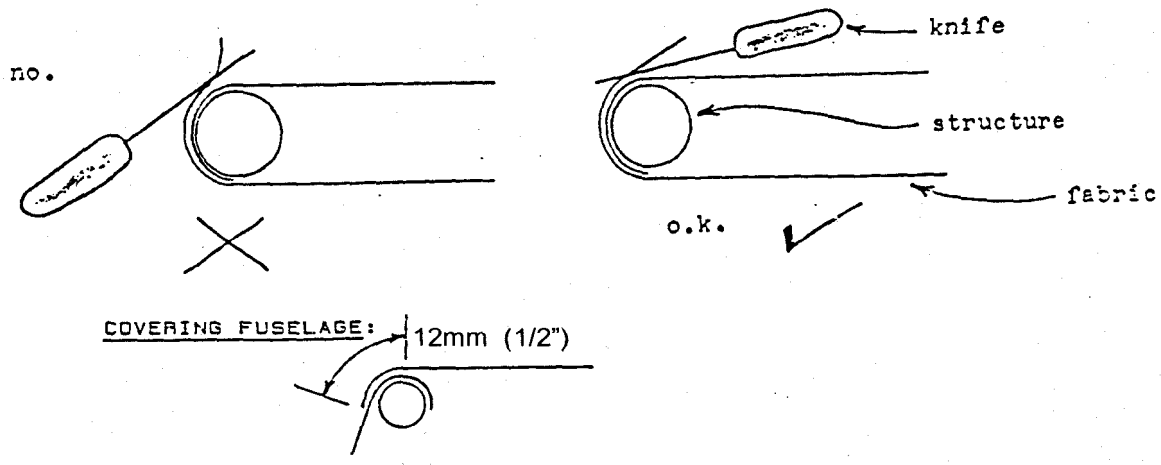
3. Apply a 12 mm ($\frac{1}{2}$") wide by .5mm (.02") thick bead of HIPEC Attach Gloo around the perimeter of the structure as shown in the cross-sections. (this example is for a wing but the same principles apply to any structure).
Best way is to apply HAG with glue brush and while it is still wet, apply fabric pressing firmly with fingers.

4. Starting with bottom side, apply a fabric panel to an edge. If the glue is dry, apply more glue or soften the old with thinners. When the glue is ready, attach the fabric and keep wrinkles out of the covering.

5. Additionally (or optionally), apply thinners by brush or cloth to soften the glue and ensure it will soak into the fabric cover.

TIP:
For light structures, fabric laid 45 degrees to the spar will add torsional strengh.

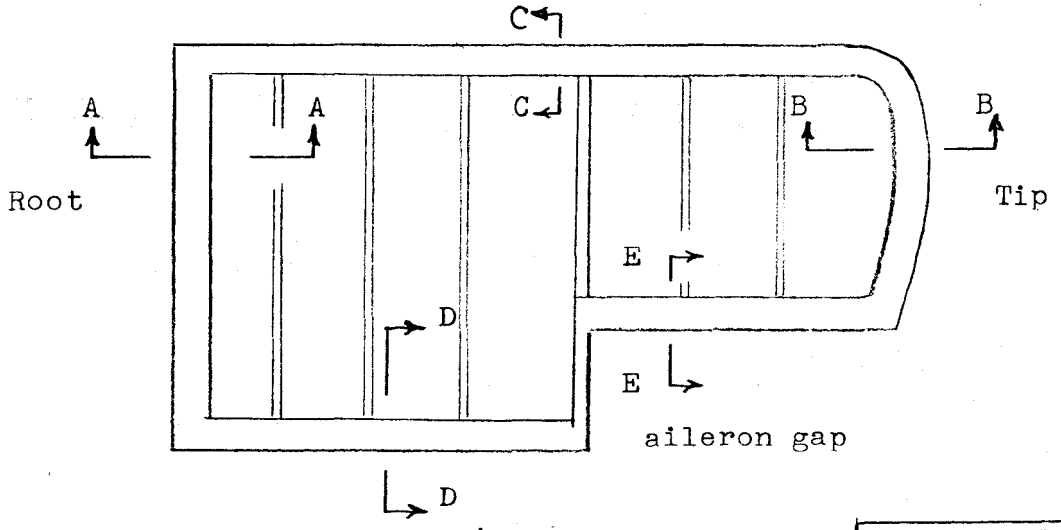
6. When trimming off excess fabric along glued seams, trim from "inside" of the overlap as shown below.



Note: Pass iron over all areas where HAG is used. Temperature setting should be at 100°C or 210°F. This will melt HAG into fabric and ensure a good bond.

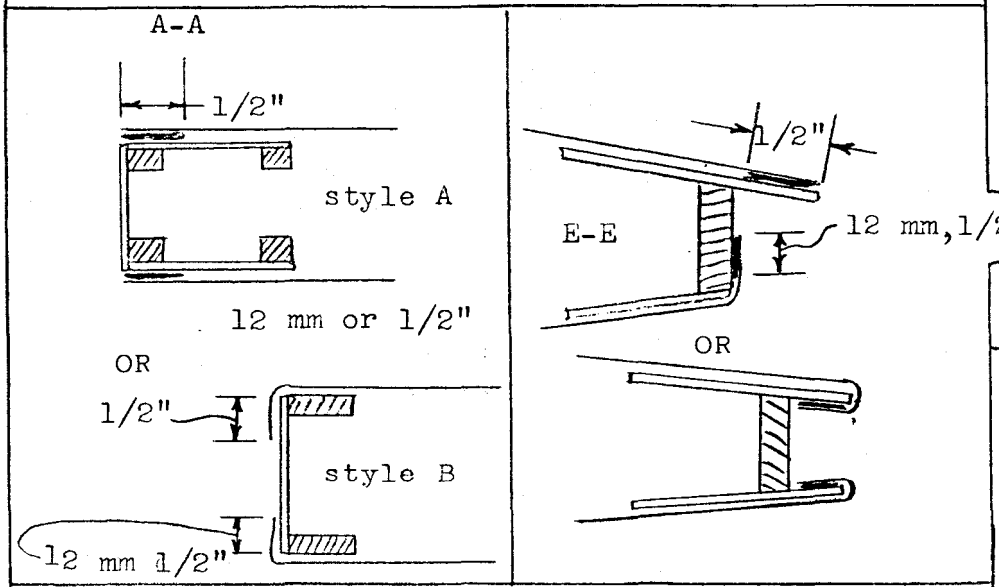
Applying fabric to wood structure with HIPEC ATTACH GLOO

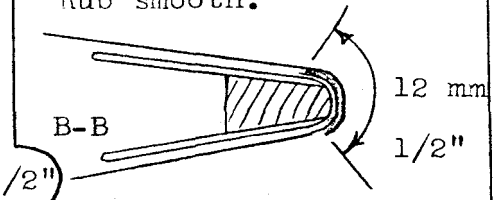
Apply HAG in areas shown 3/8" to 3/4" (10 mm to 20 mm) wide all around perimeter on sections shown as 12 mm or 1/2".

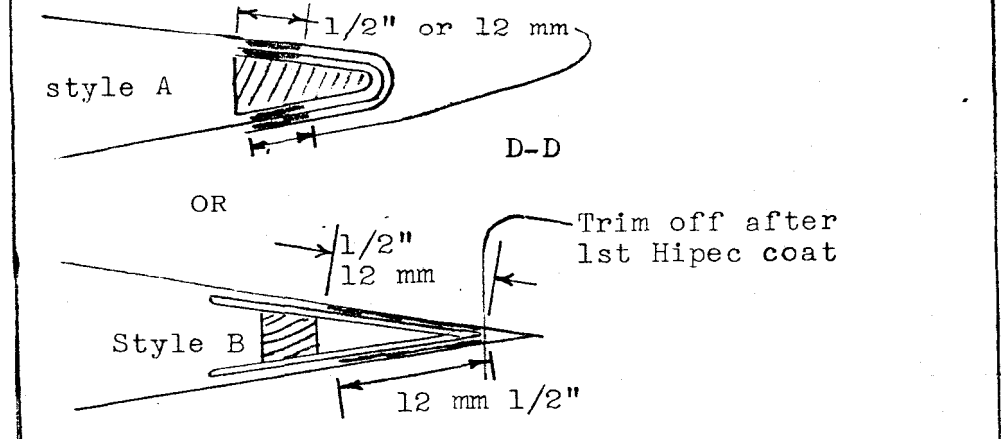


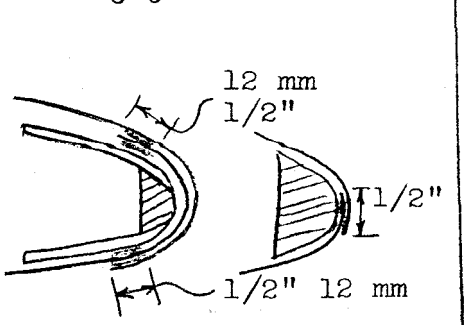
Cover bottom surface first.

Apply thinners if required thru fabric to soften cement. Rub smooth.









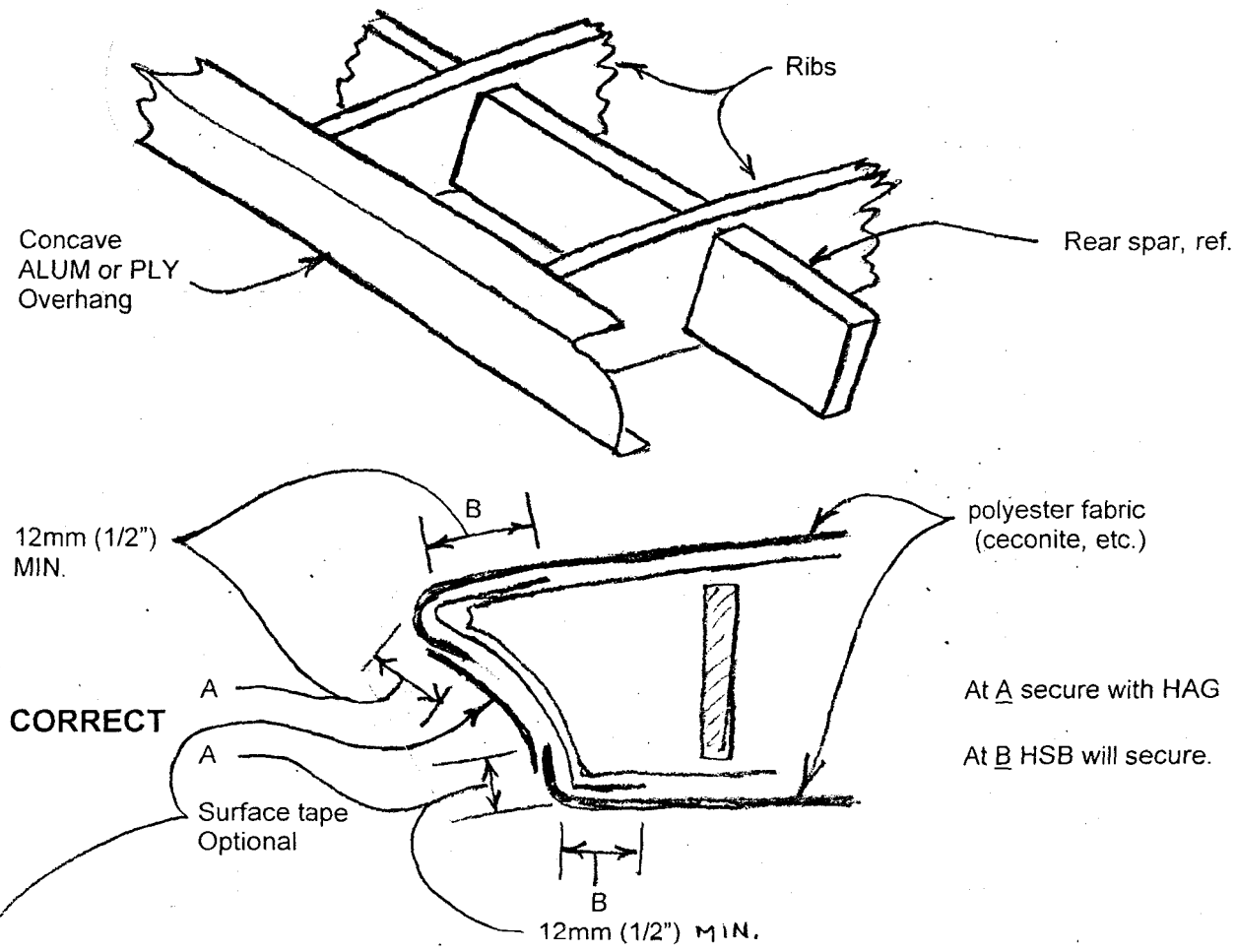
Falconar Avia Inc 7739 – 81 Avenue, Edmonton, Alberta, Canada, T6C OV4 Technical: (780)479-3515
Tel: (780) 465-2024 Fax: (780) 465-2029

World Wide Web Internet – *http://www.falconaravia.com*

010201A

Securing Fabric to wing, etc. at flap or aileron overhang

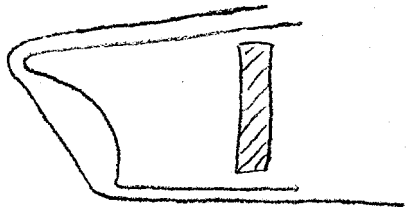
1. Overhang structure (aluminum, plywood, etc.) must be prepared per Hipec manual.
2. Secure fabric at A with HAG. Do not put HAG at B which is where HSB will attach fabric.



If necessary to cover lightening holes, etc, apply tape with HAG if tape is polyester or HSB if fabric tape is fiberglass.

Do **not** try to span fabric from T.E. top to T.E. bottom.

WRONG



FUNDAMENTAL LAWS

FOR A GOOD PAINT JOB

THE SHOP MUST BE CLEAN

THE EQUIPMENT MUST BE CLEAN

THE AIR MUST BE FILTERED

THE PAINT MUST BE THOROUGHLY MIXED

THE CLOTHING MUST BE VACUUMED

THE FABRIC MUST BE TACK RAGGED

SHRINKING THE FABRIC

Once the fabric is properly attached around the perimeter and the Hipec Attach Glue has thoroughly dried, the fabric is ready for shrinking. Pass iron over HAG areas to ensure it has melted into fabric.

1. Check bottom of iron and clean if required.

2. Resist the urge to cut openings in the fabric for strut fittings and similar projections less than 1" or 2" in height, they will be cut out later after the Sun Barrier has set.

3. With the steam iron set on "dry", tauten the fabric in two passes; the first at low heat (120°C or 250°F) and the second at medium heat* Note how easily the wrinkles can be removed, even at the edges where the fabric is glued. When shrinking the fabric, do the leading edge first then align the seams so they are straight, then shrink the fabric on the trailing edge and align its seam. Next shrink the fabric between the ribs and finally the fabric directly over the ribs. Use patience when shrinking the fabric, don't try to do it all in one pass. Excessive overtightening can only be relieved by releasing the fabric and starting over.

*350°F (180°C)

NOTES: It will take longer to shrink the fabric over structures which absorb heat (especially aluminum). Do not try to speed things up by turning up the heat on the iron.

Do not use a hair dryer.

MARKING POSITIONS FOR ATTACHMENT ON LIFTING SURFACES FOR METHODS C & D

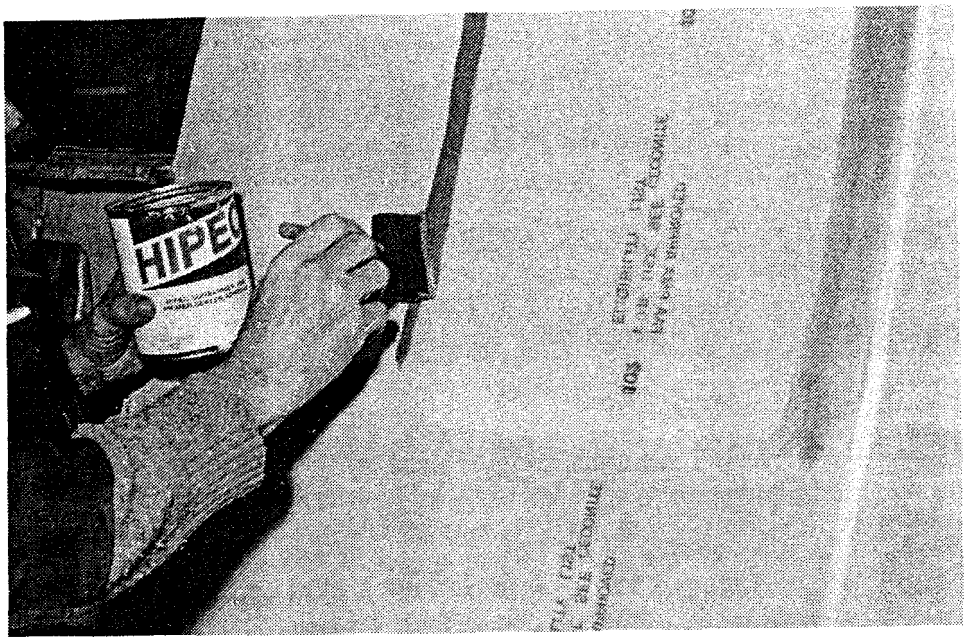
METHOD C

This process requires a rib stitching procedure. The reinforcing tape used should be of width equal to or slightly less than that of the capstrips. Wider tape may be used only if great care is taken during the stitching so as to avoid causing any "humps". Any approved reinforcing tape may be used; cotton, linen, dacron, fiberglass, polyester, herringbone or adhesive backed. Avoid non-approved and nylon tapes which may be too stretchy. Follow the aircraft manufacturer's or designer's instructions, CAM-18, AC-43.13-1B chapter 3 or similar recognized procedure for rib stitching (rib lacing). After shrinking, locate rib stitching holes by measuring and marking their position with pencil according to manufacturer's specifications or per Manual AC43.13.1B. Note that rib stitching spacing in slipstream is much closer than outboard of slipstream. With rib stitching needle, poke a hole in fabric at each place where cord is to go.

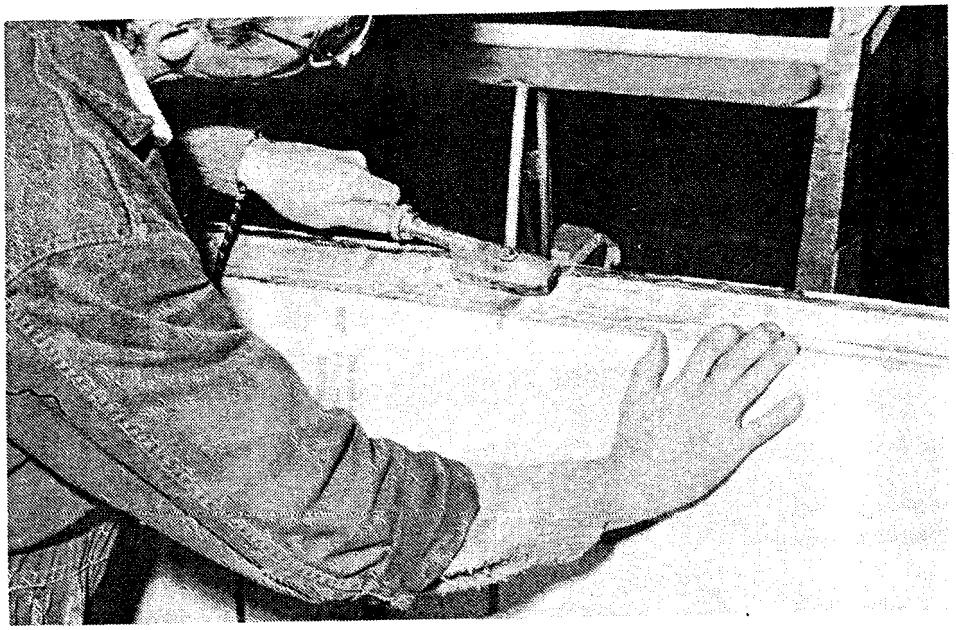
METHOD D

Poke holes where rivets, clips or screws are installed later. At this time fabric is slightly transluscent and positions can be better seen.

Securing fabric with HAG



Brushing HSB through fabric over rib.



Heat setting HAG with small iron.

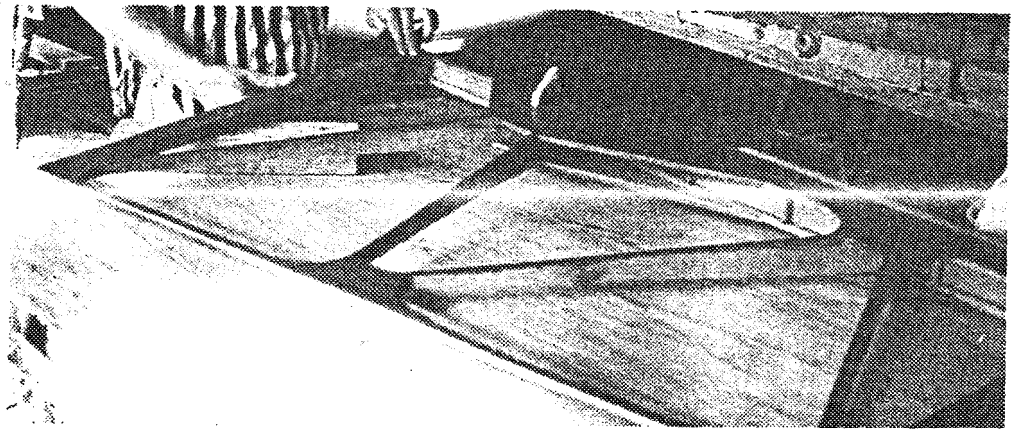
STAGE 2 - APPLYING HIPEC SUN BARRIER

Prepare for Application - The workshop must be clean and free of dust. Pour water all over the floor to keep dust down and humidity up. Ensure adequate ventilation or wear proper respirator. Note the section titled "Paint Shop". No Smoking!

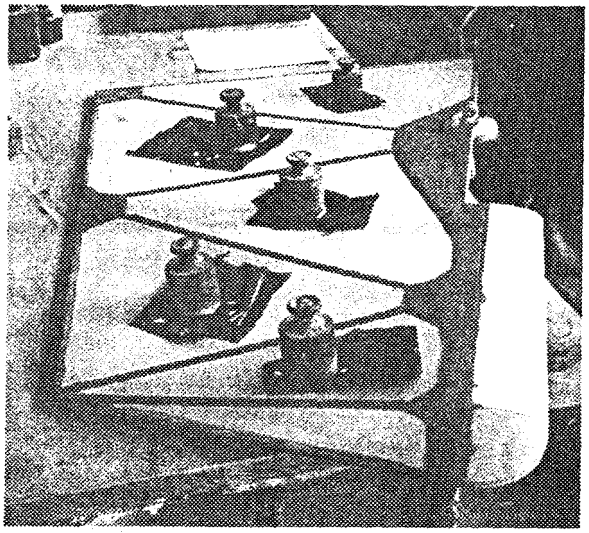
> Important: If you have not used HIPEC before, make a small test panel to simulate the structure you are covering. Check that the drying time and final quality are easily obtained.

Planning Ahead: - Once you start STAGE 2 it is best to carry on and complete both STAGE 2 and STAGE 3 all in a one or two day span. Waiting too long between coats will result in a thorough sanding being required before the next coat can be applied. Plan to coat small components first. If components lay on a bench or saw horses, only one side can be coated at a time. If components are mounted at each end so they may be rotated, both sides may be coated in one operation. **Thoroughly tack rag all fabric surfaces** immediately prior to coating the fabric, in order to remove all dust. If possible, locate the vacuum outside the paint shop area or ensure that the vacuum has a good, clean exhaust filter. Thoroughly clean vacuum nozzle with solvent or thinners to ensure there are no traces of wax or silicone.

Coating: - Shake HIPEC Sun Barrier container well before using. Do not open and stir; HSB is a moisture cure product. Stirring introduces air and moisture, greatly shortening the lifespan of the container's contents. When ready to proceed, open can of HSB and filter an appropriate quantity into a clean container through a new paint filter.

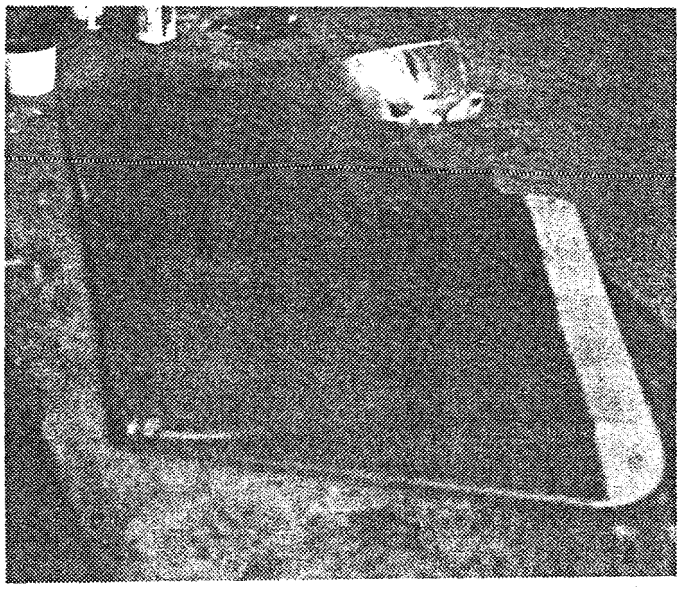


Scuff sanding attach areas



Weights applied to hold fabric in contact with ribs while HSB is brushed on at the ribs

Removing wrinkles over HSB



First coat is brushed on

If HSB does not have a spout lid, apply a pouring lip per diagram on page 67.
Any residual HSB in can lip trough must be removed with rag or toilet paper prior to reinstalling lid. Otherwise lid will be glued to can permanenly. A piece of medium thickness polythene between lid and can helps make lid easily removeable.

1. Brush a narrow coat 10MM (3/8") wide on fabric over edges of structure where "wicking" can occur. Edges of structure include edges of gussets, skins, trailing edge, etc. HSB likes to run through fabric around such structures.

   Note: - Fabric must make good contact with the entire length of the ribs. If a concave surface is being covered, apply weights between the ribs to ensure positive contact. When one well brushed coat along the ribs has set, weights may be removed. See Chapter 15 "Covering Concave Components".

2. As soon as the attach coat over the ribs has set "Sticky-Dry" to "Tack-Free", brush or roller a coat over entire surface of the component. This coat shouldn't just be brushed onto the fabric but rather, into the fabric for a good bond. Take care to apply an even coat; don't spread too thick and cause runs, or too thin and cause bare spots or pinholes. Runs should be brushed out immediately and pinholes should be brushed out and a little more Sun Barrier brushed on. Thin with up to 100% with Hipec Slow Thinners (HT-S).

   Thinning may occasionally be required for good "flow-out". When brushing, viscosity should be about 20 seconds to 25 seconds. (#4 Ford cup)

3. When HSB brushed coat in 2 is "sticky dry", spray or roller one complete cross coat. Never brush this coat – brush marks will show.

WARNING

Always wear a properly fitting mask with new filters appropriate for polyurethane spraying or **paint suit** with remote air supply. Do not remove mask in paint shop as long as overspray exists. Do not let others into the shop, post notices on door that polyurethane spraying is in progress.

Check that sufficient SUN BARRIER was applied. With a bright lamp over the upper surface, make sure no light or pinpoints of light are visible when looking up from the bottom surface. This method of checking makes it important that the top surface of the component be coated first. When coating the fuselage, keep a small lamp inside the fuselage so as to easily spot pinholes.

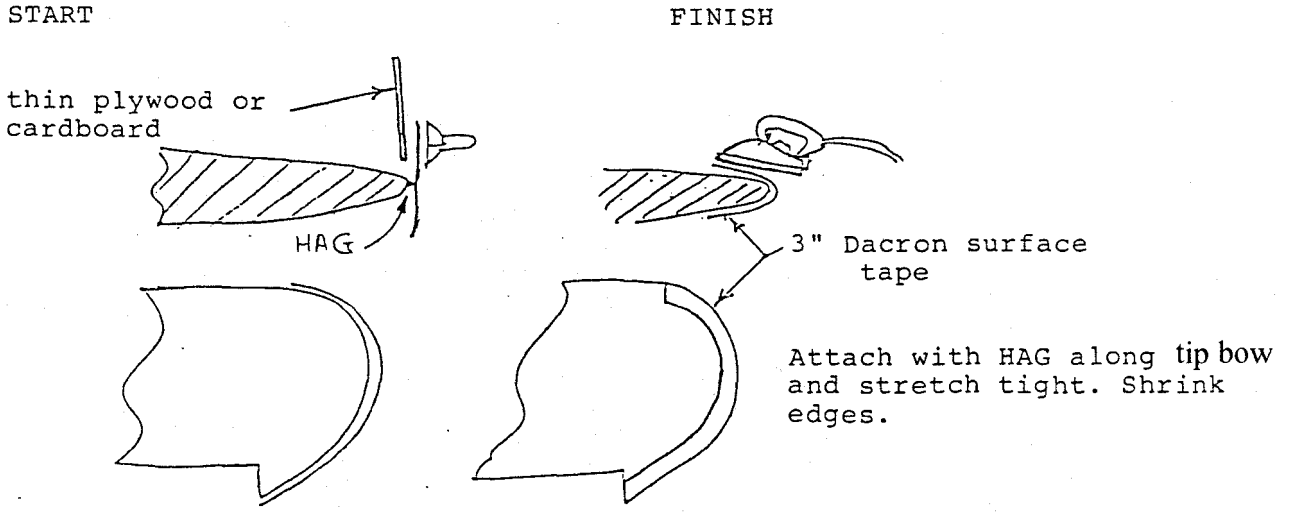
4. If component is only to have **one color**, proceed to Stage 3. For multi color finish, while brushed coat is "sticky-dry" (feels rubbery but will not transfer HSB to fingers passed over the coating), spray one light medium coat of HIPEC PRIMER SURFACER. This coat is allowed to fully dry "tape free". Then the dried HPS may be sanded to desired smoothness. Remove dust with tack cloths or wash. If you have contamination spot on the fabric or structure which causes pinholing Spray additional very thin coats of HPS. Thinning to 100% is required. Use Hipec Slow Thinners (HT-S).

Note: After each coat, clean brushes or spray equipment with thinners.

5. Generally, surface taping is not required and is undesireable. A little careful work in smoothing seams with ATTACH GLOO usually renders taping unnecessary and testing has proven that tapes are not required.

However, if METHOD C or D is used, or if an ugly seam requires covering use **fiberglass** tape wide enough to cover plus at least 12mm (½") on each side if practical.

6. We like to recommend to avoid using polyester (Dacron) surface tapes. They require considerable labor in laying down and eliminating bubbles and often leave raised edges. Exception is around curved trailing edges. Secure with HAG, thinned as required. Shrink edges with an iron.



7. Enclosed surfaces such as wings, tail pieces, etc., should have at least one drain hole for venting fumes. Larger components should have more.

8. Apply DRAIN GROMMETS and INSPECTION RINGS with first or second coat of Hipec Sun Barrier or with Hipec Primer Sealer coat. Soak grommets and rings for 30 seconds (not longer) in HSB, MEK, HT-S or acetone.

9. Once the HSB or HPS has set from "STICKY DRY" to "TACK FREE", cut around projections such as strut fittings, etc. Minor slack or wrinkles can be ironed out at this time, with the iron set at 175°C (350°F).

10. If you have let any HIPEC surface set too long before applying the next coat, scuff* surface with #180 to 400 wet-or-dry paper, then remove all dust and residue before applying the next coat. On light fabrics such as 1.6 oz., take every precaution to avoid having to sand.

*Wet sanding with detergent and water solution is easiest.

APPLYING RIB CORD AND TAPES FOR METHODS C & D

Once fabric is on and tautened, it must be "tack ragged" to remove all traces of dust. Mark positions of rib stitching or rivets, clips, etc. by poking a rib stitch needle through at each position. From "Stage 2", complete steps "Prepare for Application", "Planning Ahead" and "Coating". Brush or roller one coat of Hipec Sun Barrier over entire surface. Let dry.

When HSB is dry, scuff sand and tack rag. For Method C, lay reinforcing tapes over each rib to be rib stitched. A dab of HAG is applied at each end of each tape to secure it in position. Then rib stitch per manual AC43.13-1B or aircraft specification. Use a dab of HAG to lay down ends of rib cord and at any lumps or hollows. With a bristle brush using a stippling action, soak reinforcing tape with HSB or HPS. This is still required on top when using adhesive backed reinforcing tape. For Method D, apply tape, washers, rivets, clips, screws, etc. as per aircraft covering specification.

Fit and cut surface tapes. Most finishers use 2" (50mm) wide fiberglass surface tapes over ribs and 3" or 4"(75mm or 100mm) tapes at trailing edge and tips. Dabs of HAG are applied at rib stitching and lumps. Fiberglass tapes are preferred as they are easier to apply and coat. Polyester tapes need to be applied with HAG, usually slightly thinned. HAG does not soak very well, so brush HAG under tape as tape is laid. On curved tips and edges, polyester tapes must be used because they can be edge shrunk. When HAG is thoroughly dry, brush on one coat of HSB or HPS onto tapes. Apply HSB or HPS not more than ¼" (6mm) beyond edge of tape to avoid brush marks. Apply chordwise tapes first, then spanwise and tip tapes. When HSB or HPS is dry, scuff sand, being careful not to sand into polyester tapes. Tack rag.

Now spray or roller second coat of HSB or HPS over entire component surface. With this coat apply drain grommets and inspection rings. Do NOT apply reinforcement fabric over inspection rings. Testing and experience has proven this is not necessary and invites trouble and extra labor.

STAGE 3 - APPLYING HIPEC TOP COAT

Except when coating over dry Hipec Primer Sealer or HSB, STAGE 3 must follow STAGE 2 as soon as the last coat of Sun Barrier is "Sticky-Dry" or at least before it has reached the "Tape-Free" stage. This is usually less than 24 hours at room temperature. Applying the Top Coat too early (while the Sun Barrier is still emitting solvent vapors) will cause "Solvent-Pop". Waiting past the "Tape-Free" stage will necessitate that the Sun Barrier be scuff-sanded and cleaned for proper adhesion unless HPS has been applied.

If you notice pinholes, bubbles or similar cavities in the Sun Barrier before you begin STAGE 3, apply one or more coats as required of HPS, well thinned (up to 100 %). If surface is very bad, fill any cavities with a paste of Sun Barrier (or Primer Sealer which will dry quicker) and Micro balloons. When this is "Sticky-Dry", apply the Top Coat (or wait until dry, sand smooth and then apply the Top Coat) or additional coats of Hipec Primer Surfacer, HPS. or HSB.

Note that both components A & B of the HIPEC Top Coat must be mixed together (1 part A to 1 part B) just prior to applying. Before opening Component A, shake well. Mix only the amount that you can use in 1 hour, then rinse the spray gun and mix another batch.

Before starting, ensure there is good ventilation and you are wearing a respirator with the correct, clean filters (note section titled "Paint Shop").

Mix a small amount of Top Coat and spray a test panel to check application and drying time. In cool, dry conditions or when you need to accelerate the curing of Top Coat, add 1 (and only 1) drop of HIPEC Super Catalyst to each liter (quart) of Top Coat and mix well. Adding more than this amount of Super Catalyst will cause the finish to become brittle rather than flexible. If the Top Coat is curing too fast, as during hot, humid weather conditions of 25°C - 45°C (80°F -100°F), then HIPEC Slow Thinners should be used for thinning.

When spraying HIPEC, spray the edges of the component first, then the middle. The first coat should be a mist coat and when it is tacky, follow with a cross-sprayed light to medium coat. Occasionally, when spraying metallics, a third mist coat may be necessary to achieve a uniform metallic effect. When spraying metallics, the final metallic coat is followed by a light coat of clear HIPEC Top Coat.

If the undersides of wings, tail and fuselage have not been coated with Sun Barrier, this bare fabric will usually require that the first coat of HTC brushed or rollered on (to minimize pinholes and maximize adhesion).

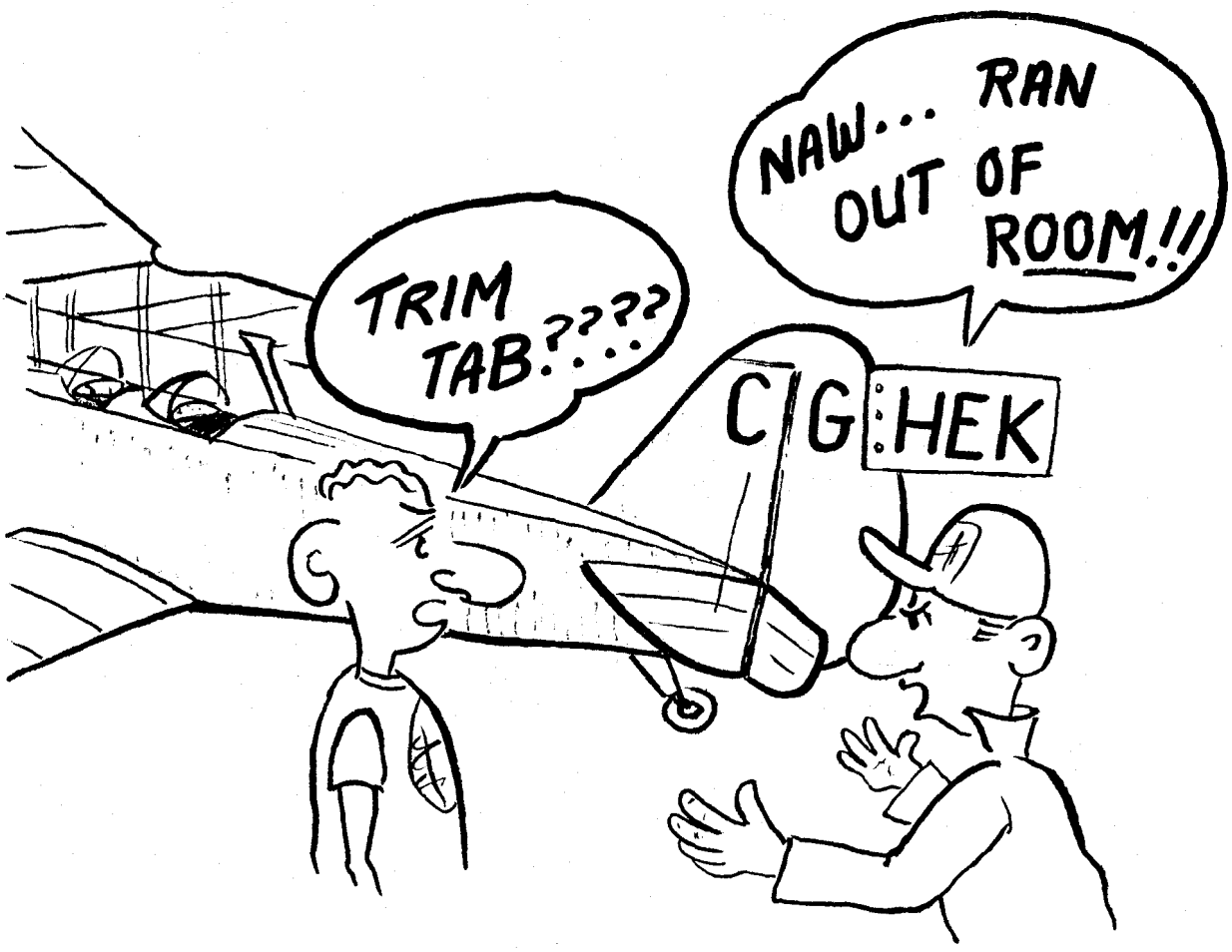
When applying two or more colors, two methods can be used - **lapped or edge to edge**. The lapped method is faster. Simply spray on first color. Let dry Tape Free. Mask for second color using 3M "Fineline" masking tape or equivalent and masking paper for masking. To mask a long straight line requires some skill and care. Secure one end of tape to surface, pull roll, clear of surface, full length of line. Careful "eyeballing" is now required. An assistant with good eyeballing skill is usually essential. Gradually and with enough tension to keep straight, bring tape to surface. Secure roll end. Ensure tape is straight. Lift off and realign as necessary. Once in place, **gently pat** tape to surface. Make a second pass patting more firmly. Finally, a third pass is made with fingers and back of finger nails to ensure no **"bridging"**. Continue masking using poly sheet or good masking paper. Scuff sand areas to be sprayed. Spray second color. **Remove masking carefully as soon as possible after spraying.**

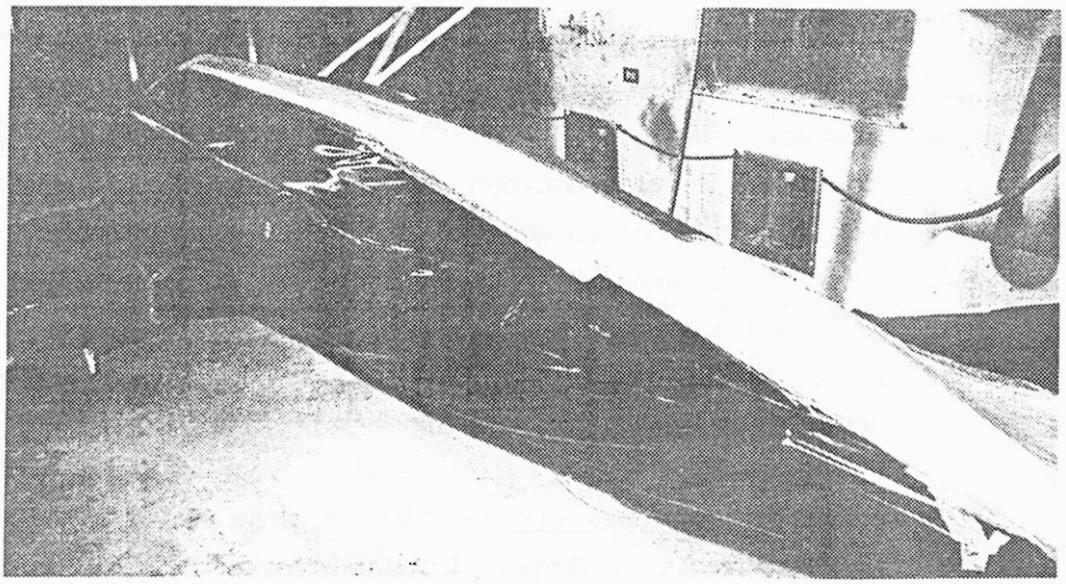
Edge to edge method takes a little more time but ensures a better bond and lighter weight. Before applying first color coat, mask where second color is to be applied. As soon as first color is on, remove masking. Let dry tape free. Mask first color and then spray on second color. Remove masking carefully as soon as practical after spraying. This ensures no edge lifting and ragged edge between colors. Color lines slightly flow, resulting in nice smooth edge.

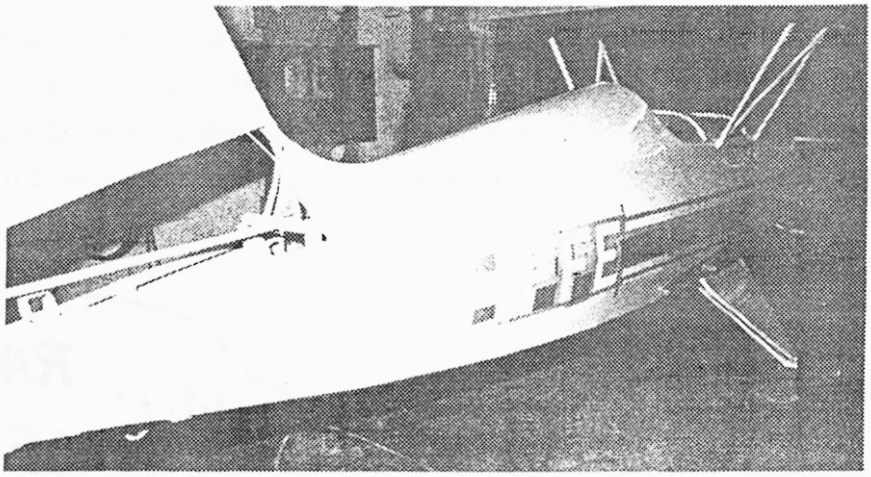
Notes to remember,

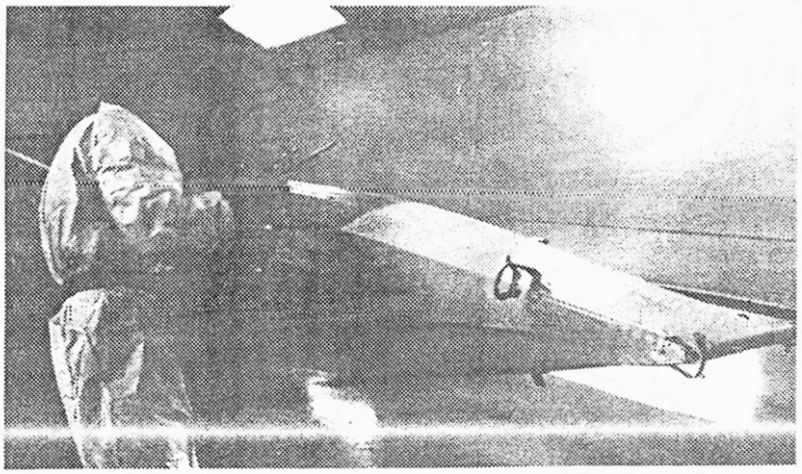
1. In case of a delay between coats, a thorough scuff sanding is required in order to achieve good inter-coat adhesion.
2. Heavy coats are <u>not</u> better; they may run, take longer to apply and are less flexible.
3. Do not expose freshly painted surfaces to strong sunlight or rain for at least 24 hours after painting.

<u>Trim, Lettering, Artwork, etc.</u> - These may be brushed on using a mixture of 2 parts Top Coat Component A to 1 part Top Coat Component B "Special". Any extra color or brushwork must be done as soon as the Top Coat is "Sticky-Dry" to "Tape-Free" (approx 2 to 24 hours), otherwise scuff sanding will be required. If some other brand of paint is to be used for the lettering, check compatibility first. Unless HIPEC has dried for at least a week, alkyd enamel painted over top will not dry. Decals should not be applied until coating has cured at least 7 to 14 days.









COVERING CONCAVE COMPONENTS

Where attachment to ribs on lower surface of wings and other structures where fabric is not in contact with structure and attachment is required, proceed as per following steps:

1. Structure must be coated or primed with HIC, HSB, HPS, HMP or similar epoxy, polyurethane or similar primer or sealer. Alodined aluminum is an excellent surface.
2. Scuff sand surface to be in contact.
3. Apply fabric and secure around perimeter with HAG or similar adhesive per procedure. Tension spanwise and leave slack chordwise to prevent "hungry horse" effect.
4. Shrink lightly 120 to 130 degrees F
5. With component adequately supported on clean surface, apply sufficient weights between each rib or member, using small sheets of polyethelene to protect fabric, so that fabric is in contact with structure. Alternatively use shaped boards, clamped.
6. Tack rag wipe.
7. x
8. Shake HSB for at least 2 minutes.
9. Apply HSB by brush along fabric over each rib capstrip or member so that HSB soaks through to attach fabric. Let dry.
10. Remove weights.
11. Do final heat shrink. Do not overtauten.
12. Continue HIPEC finishing system per method chosen.

APPLYING HIPEC TOPCOAT YELLOW - SPECIAL PROCEDURE REQUIRED

Hipec yellows have low hiding. To avoid applying heavy yellow coats which add unnecessary weight and possible runs, use the following techinque:

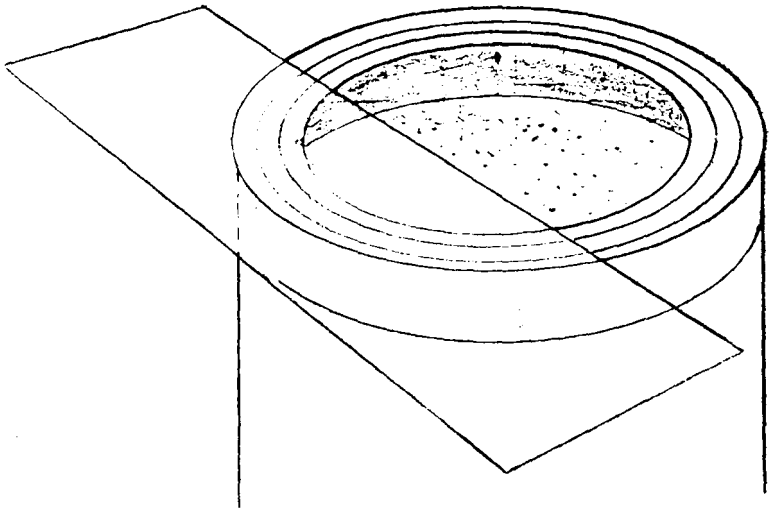
1. Spray one light coat of white, just enough to hide base color OF HSB OR HPS.
2. When "Sticky dry" spray one medium coat of yellow.

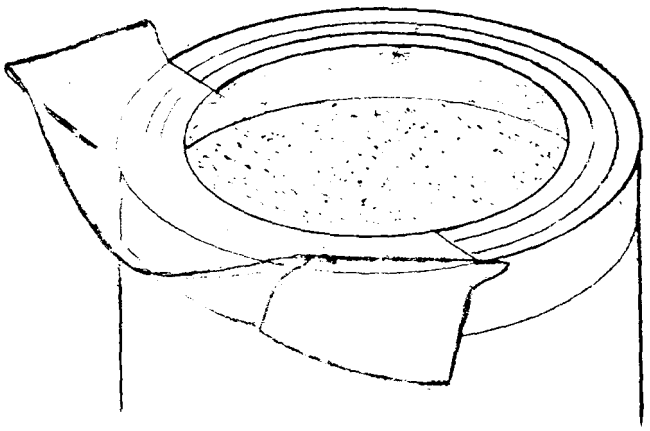
HINTS

HOW TO POUR FROM CAN WITHOUT GETTING LIQUID IN RIM GROOVE

Make a pouring lip with packing tape:

1. Clean rim groove with toilet paper or soft tissue paper.
2. Apply tape.
3. Fold ends and stick to side of can to form lip.
4. Cut excess tape from inside of rim with razor-knife.





Q = question or problem
A = answer or reason
F = fix or repair recommended

PROBLEM SOLVING

1. Q: Why did pinholes show up after the Sun Barrier (or Top Coat) was applied?

   A: a) Wooden structure was not sealed and it absorbed the Sun Barrier and during drying it emitted thinners - solv. pop.

   b) Inadequate Sun Barrier applied.

   c) Contaminated fabric: i contaminate from vacuum nozzle
   ii oily or dirty finger marks

   d) Top Coat was applied before Sun Barrier was sufficiently dry.

   e) Insuffient thinning or wrong thinners.

   FIX: a) If Sun Barrier is still fresh, spread more in pinholes.

   b) Apply a filler paste of Micro Balloons and Sun Barrier or Primer Sealer to fill pinholes.

   c) Re-spray with HPS thinned 100%. with Hipec Slow Thinners (HTS). May need several very thin coats.

2. Q: Why did ''fisheye" occur in the finish during application?

   A: a) Oil, wax, water, silicone, glycol or other contaminate on surface during application.

   b) Contaminate in compressor or airline to spraygun.

   c) Workshop may have had silicone spray or wax in the past.

   FIX: a) Let surface dry, scuff sand, clean off residue, thoroughly clean fisheye areas with acetone, add some HIPEC Crater Eliminater to the TOP Coat and re-spray.

   b) Ensure oil separator or filter is installed & cleaned.

3. Q: Why is the Sun Barrier taking so long to dry?

   A: a) Shop temperature and/or humidity is too low.

   b) Poor ventilation or cold draft on job.

   c) Wrong thinners.

   d) Thick HSB in can - old or overheated in storage.

   FIX: a) Increase temperature and/or humidity

   b) Improve ventilation but keep drafts off job.

   c) Use only Hipec thinners, HT-S.

4. Q: Why is the HIPEC Top Coat taking so long to dry?
A: Same as for question 3.

FIX: a) Increase temperature/humidity/ventilation.
b) Before applying Top Coat, add 1 drop of HIPEC Super Catalyst to each litre (quart) of Top Coat and mix in well.

5. Q: Why are there zits (or stringy lumps) in the finish?
A: a) Shop air not dust and bug free.
b) Dusty or dirty clothing or hands
c) HIPEC was not filtered into a clean container through a new, clean paint filter.

FIX: a) Scuff sand with wet-or-dry pads, being very careful not to abrade into fibers of the fabric, especially near humps, rivets, bumps, edges, etc.
b) Sand with 220 grit or finer wet or dry sandpaper, being very careful not to sand into fibers of the fabric.
c) After abrading, wash and tack away all residue and re-spray.

6. Q: Why do rough spots appear over bumps, edges, etc?
A: Fabric was sanded through, causing little fibers to stick up.

FIX: a) If HIPEC is still setting, try smoothing area to lay fibers down and when ready, recoat.
b) Try sanding very lightly and re-apply HIPEC. Repeat until area is adequately smooth.
c) If condition is severe and strength is important, damaged area must be patched or taped as per repair or taping instructions.

7. Q: Why does the fabric appear bare over the ribs and structure?

A: The first coat of HIPEC was absorbed into the structure because it was not properly sealed. See Stage 2, para. 1.

FIX: Apply more Sun Barrier along affected areas - several coats may be required. HPS often preferred.

8. Q: Why have little bubbles appeared in the layer of Top Coat?

A: a) Top Coat was applied too soon over the Sun Barrier, causing "Solvent Pop".

b) Top Coat was applied in hot, humid weather causing a surface skin to form too quickly, inducing "Solvent Pop".

c) Sudden drop in temperature just after Top Coat was applied.

d) Wrong thinners.

FIX: When dry, carefully sand off bubbles, clean thoroughly and spray on HIPEC Primer Sealer, sand again, clean thoroughly and repeat until smooth, then apply Top Coat again. HPS should be well thinned with Hipec Slow Thinners (HTS) - up to 100%.

9. Q: When using the "Process C" attachment method, can Sun Barrier be applied to the tautened fabric before rib stitching?

A: Yes, this is the preferred way.

10. Q: What can be used to fill tapes and tape edges?

A: For polyester tapes, use HIPEC ATTACH GLOO, thinned as required. For fiberglass tapes, use HSB or HPS.

11. Q: Can a cut in the fabric be patched with a glued on, precoated outer patch?

A: Yes, just follow the procedure for inner patching.- see "Repairs".

12. Q: If the woodwork is coated with a synthetic varnish, can the Process A or B attachment methods be used?

A: Yes, just scuff sand the tops of the ribs and wherever else the fabric must adhere.

13. Q: If the woodwork is coated with a marine spar varnish, can the Process A or B attachment methods be used?

A: Yes, but the spar varnish must first be sanded off wherever the fabric will contact the structure. Then one or more coats of HIPEC 1 Clear or Sun Barrier must be applied and scuff sanded when dry. Any of the structure which does not have the spar varnish sanded off and which might be in contact with HIPEC, should be coated with a dope-proof paint.

14. Q: Can HIPEC be applied over sails treated with Armorall, Scotchgard etc?

A: Not if you want it to stick. Try removing treatments with solvents.

15. Q: If I don't want HIPEC to stick to the ribs of my ultralight, what can I do?

A: Wax the ribs before application but be careful not to get any wax on any surface to be coated with HIPEC.

16. Q: Can Dacron tapes be applied over HIPEC PRIMER SURFACER with Stits Polytak or Stits Polybrush?

A: Yes. Polytak tests give the full pullaway strength of 7 lbs on a 2" wide tape. Also, another good Polyester surface tape adhesive is HIPEC ATTACH GLOO THINNED TO SUIT.

Note: Spray a coat of HPS over Polytak before spraying on HTC.

Points to remember:

i Adequate humidity is very important for HIPEC to dry quickly. - 50 to 80% is recommended.

ii Any contaminant on or in the fabric will cause the fabric to reject the HIPEC and cause "pinholes". We suggest washing or spray-washing the fabric to remove contaminants with 100% Methanol or Methyl Hydrate. Dirty fabric only.

iii If HIPEC is allowed to dry thoroughly (24 hrs. at 70°F and 50% R.H.) it must be scuff-sanded and cleaned before applying the next coat.

vi On fabric over sheet metal, plywood, etc., thin HSB with Slow Thinners to avoid pinholes.

v Leave Hipec set at least ONE WEEK before applying DECALS or ADHESIVE BACKED STRIPES.

SUMMARY OF INSTRUCTIONS & QUANTITIES TO ORDER

COATING HEAT SHRUNK POLYESTER FABRIC APPLIED TO OPEN FRAME STRUCTURE

This section endeavors to assign usual quantites of HIPEC and related products to complete the particular coating system chosen.

To avoid pinholes, wicking and other possible problems, experience has shown that the best preventative is to seal or prime the surfaces on which the fabric is to be applied, no matter if structure is wood, metal or composite.

Estimate quantity of primer or sealer required by calculating area to be coated and using Table 1.

WOOD - OPEN FRAME STRUCTURE

It is common practice to coat entire woodwork **inside and outside.** Complicated structures, such as gussetted wood ribs, should each be allotted an area equal to its chord x maximum depth (airfoil max. thickness). Typical area calculation is as follows for wood airplanes such as the AMF-S14 "Maranda".

32	wing ribs	.5' x 5' x 2 sides	=	160
2	wing leading edges	1' x 15' (top & bottom)	=	30
2	wing leading edges inside	1' x 15'	=	30
2	wing tailing edges (top & bottom)	.2' x 15' x 2	=	12
2	wing gusset areas, top & bottom	.2 x 15' x 2	=	12
4	wing spars, front & back	.5' x 15' x 2	=	60
4	fuselage sides, top & bottom, inside & outside ply, bulkheads, gussets and stringers (estimate like a large rib - LxW)	4' x 16'	=	256
16	tail ribs	.25' x 3'	=	12
6	tail spars	.25 x 5' x 2 sides	=	15
12	tail l.e.,t.e. skin & gusset areas inside & outside and misc.		=	12
				600 sq.ft.

Select quantities of HIPEC **Interior CLEAR (HIC)** or HIPEC **SUN BARRIER (HSB)** from Table 1 for 600 sq.ft.

METAL - OPEN FRAME STRUCTURE

Steel tube structure to which fabric is to be securely attached must be sandblasted, chemically cleaned or cleaned with emery cloth. To obtain quantities of **HIPEC METAL PRIMER (HMP)** required, calculate area of structure to be coated as for Wood Structure and estimate quantity from Table 1.

COMPOSITE AND FIBERGLASS - OPEN FRAME STRUCTURE

Remove all wax and mold release material by sanding or with solvent or water wash. Calculate square footage to be in contact with fabric and use Table 1 for quantities required. Note that HIPEC **eats polystyrene foam BUT NOT urethane foam.** Seal Polystyrene coated furfaces with **"white glue",** latex primer, epoxy sealer or similar. **HIPEC fumes will not injure polystyrene foam.**

PRODUCT DEFINITIONS

CODE	COMPONENTS	PRODUCT NAME	PRODUCT PURPOSE AND USAGE
HAG	1	HIPEC ATTACH GLOO	Quick dry flexible contact glue for perimeter initial attachment.
HSB	1	HIPEC SUN BARRIER	Grey, flexible, base coat, primer, sealer, slow dry adhesive, UV blocker, high film strength.
HPS	A&B - equal mix	HIPEC PRIMER SURFACER	Flexible sealer, primer. Sandable, provides for very smooth surface.
HMP	A&B - equal mix	HIPEC METAL PRIMER	High film strength, epoxy - polyurethane metal primer.
HTC	A&B - equal mix	HIPEC TOP COAT	Flexible polyurethane - Clear, plain or metallic - high gloss color. Semi gloss on special order.
HHC	A&B - equal mix	HIPEC HARD COAT	Similar to HTC except non-flexible, tough, durable polyurethane finish for metals, composite and other firm surfaces.
HIC	1	HIPEC INTERIOR CLEAR	Sealer for wood and composite inside surfaces. Flexible on special order.
HT *	1	HIPEC THINNERS	Thinners for all HIPEC products.
* SPECIAL B. Comp. "SPECIAL B" Mix ratio - 2 parts A to 1 part "Special B".			Available for BRUSHING. Excellent for small jobs, canoes, hardware, etc.

STICKY-DRY = feels rubbery when passing fingers over surface but will not transfer product to fingers - usually 2 to 10 hours after application and DEPENDING ON TEMPERATURE, HUMIDITY AND VENTILATION.

NOTE: Component B of HIPEC PRIMER SURFACER (HPS) is very different to Component B of HIPEC METAL PRIMER (HMP) and also very different to Component B of HIPEC TOP COAT COLOR.

* Important to use Hipec Slow Thinners (HTS) in HSB to avoid pinholes.

DRY PRODUCTS — See list for typical requirements.

To determine amount of fabric required, measure wing area, flaps and ailerons area, as well as tail area. Determine fuselage requirements by making scale (usually 1/10) patterns of sides, top and bottom, cut out of paper. Make a scale width strip of paper representing the fabric which is usually 72" wide. Arrange the pattern on the strip for best economy and measure strip required. Add to wing and tail area top and bottom. Area in sq. ft. can be changed into lineal yards, as follows:

$$\text{Lineal yards} = \frac{36}{72} \times \frac{\text{area in square feet}}{9} = .056 \times \text{area in sq. ft.}$$

To determine liquids required, calculate area to be coated in sq. ft.

$$\text{A in sq. ft.} = \frac{72}{36} \times \frac{\text{lineal yards} \times 9}{} = 18 \times \text{lineal yards.}$$

ATTACHING FABRIC

Cut fabric panels to size of component to be covered. Use HIPEC Attach Gloo (HAG) to secure the perimeter of the fabric panel. A 1/2" (12mm) wide bead of HAG is all that is usually required. The HIPEC SUN BARRIER will adhere the remainder. Use HAG, thinned, as necessary, to smooth and fill all fuzzy edges. Refer to Table 2 for usual requirements.

TABLE 2

Area in sq.ft.	50	100	150	200	250	300	350	400	450	500	550	600	650	700	
ATTACH 500ml	1	1	1	1											PT
GLOO (HAG) L			·		1	1	1	1	1	2	2	2	2	2	QT

PAINTING STRUCTURE - TABLE 1

910424

AREA - SQ. FT.		50	100	150	200	250	300	350	400	450	500	550	600	650	700	SIZE	AREA TO BE COATED
HIC OR HSB	L	1	2	3		1	2	3		1	2	3		1	2	QT	Single component, moisture cure, clear polyurethane for interior coating on wood or fiberglass
	4L				1	1	1	1	2	2	2	2	3	3	3	GAL	
HMP-A	500ml	1	1			1	1			1	1			1	1	PT	A superior bond epoxy - polyurethane primer for Alodined aluminum or steel. Medium green in color.
	L			1	1	1	1	2	2	2	2	3	3	3	3	QT	
	4L																
HMP-B	500ml	1	1			1	1			1	1			1	1	PT	Must be mixed EQUALLY with HMP-A.
	L			1	1	1	1	2	2	2	2	3	3	3	3	QT	
	4L															GAL	
HPS-A	500ml	1			1			1			1					PT	A flexible polyurethane primer, sealer and surfacer. Medium light green color. Sandable.
	L		1	1	1	2	2	2	3	3	3					QT	
	4L											1	1			GAL	
HPS-B	500ml	1			1			1			1			1		PT	Mix with component A just prior to applying.
	L		1	1	1	2	2	2	3	3	3				1	QT	
	4L											1	1	1	1	GAL	

TABLE 4

AREA - SQ. FT.		50	100	150	200	250	300	350	400	450	500	550	600	650	700	SIZE	AREA TO BE COATED
HSB *	L	1	2	2	3			1	2	2	3			1	2	QT.	Base coat adheres
(Base coat)	4L					1	1	1	1	1	1	2	2	2	2	GAL.	fabric to structure.
HTC-A	500ml	1			1			1			1			1		PT.	Flexible polyurethane top coat - Clear, color or metallic high gloss. Semi gloss on special order. 2 component - equal mix proportions.
(mix equally	L		1	1	1	2	2	2	3	3	3				1	QT.	
with Comp. B)	4L											1	1	1	1	GAL.	
HTC-B	500ml				1			1			1			1		PT.	
(mix equally	L					2	2	2	3	3	3				1	Qt.	
with Comp. A)	4L											1	1	1	1	GAL.	
HT *	500ml	1	1	1					1	1	1			1		PT.	Only HIPEC thinners may be used for HIPEC paint.
HIPEC THINNER	L				1	1	1	1	1	1	1	2	2	2	3	QT.	

* Best thinners for HSB on fabric over sheet structure is Slow Thinners (HTS)

TABLE 5

AREA - SQ FT.		50	100	150	200	250	300	350	400	450	500	550	600	650	700	SIZE	AREA TO BE COATED
HSB *	L	1	2	3		1	2	3		1	2	3		1	2	QT.	Grey, flexible, base coat, primer, sealer, slow dry adhesive.
(Base coat)	4L				1	1	1	1	2	2	2	2	3	3	3	GAL.	
HTC-A	500ml	1			1			1			1					PT.	See Table 4
(mix equally	L		1	1	1	2	2	2	3	3	3			1	1	QT.	
with Comp.B.)	4L											1	1	1	1	GAL.	
HTC-B	500ml	1			1			1			1					PT.	See Table 4
(mix equally	L		1	1	1	2	2	2	3	3	3			1	1	QT.	
with Comp.A.)	4L											1	1	1	1	GAL.	
HPS-A	500ml	1	1			1	1			1	1			1	1	PT.	Flexible sealer, primer. Sandable. Provides very smooth surface.
(mix equally	L			1	1	1	1	2	2	2	2	3	3	3	3	QT.	
with Comp.B.)	4L															GAL.	
HPS-B	500ml	1	1			1	1			1	1			1	1	PT.	Mix equally with Comp. A, above.
(mix equally	L			1	1	1	1	2	2	2	2	3	3	3	3	QT.	
with Comp.A)	4L																

COATING FIBERGLASS CLOTH REINFORCED WOOD
or other
POROUS SURFACES

1. Fill and sand surface to desired smoothness using **HIPEC® COMPATIBLE FILLERS SUCH AS** **HIPEC® Primer Sealer** / **HIPEC®** Micro Balloons. mix into a paste
2. Brush one coat of **HIPEC® Sun Barrier, HIPEC® 1 Clear, HIPEC® Primer Sealer**. Let become "sticky dry" or dry.
3. Apply a layer of fiberglass cloth to surface.
   Smooth with hands or dust brush to eliminate wrinkles. Tack rag clean.
4. Brush one coat of **HIPEC® Sun Barrier** or **HIPEC® Primer Sealer**
   Let become "sticky dry".
   * Thin sufficiently to avoid pinholes - **HIPEC® Slow Thinners (HTS)**
5. Spray one or more coats of **HIPEC® Sun Barrier** or **HIPEC® Primer Sealer**. Scuff sand between coats or spray on next coat when previous coat has become "sticky dry". If component being coated is to have only one color, as soon as last **HIPEC® Sun Barrier** is "sticky dry", spray one cross coat of **HIPEC® Top Coat * Color.** If color is metallic, follow with one spray coat of **HIPEC® Top Coat Clear** .
6. Mask area for second color and spray one cross coat **HIPEC® Top Coat Color.* Remove masking immediately after spraying.** Let dry **"tape free".**
7. Mask first **HIPEC® Top Coat Color** and spray next **HIPEC® Top Coat Color** *

COATING ALUMINUM

1. Solvent wash to remove wax, grease and oil.
2. Detergent wash to remove mud and dirt.
3. **HIPEC® Aluminum Cleaner** wash and rinse.
4. **HIPEC® Alodine** wash, rinse and dry. Within 15 hours, proceed with priming in Step 5 .
5. One spray coat **HIPEC® Metal Primer, HIPEC® Primer Sealer,** or **HIPEC® Sun Barrier**. When this coat is "sticky dry", apply one sprayed cross coat of * **HIPEC® Top Coat Color** before **HTC** in #6. If primer is **HIPEC® Sun Barrier**, a better bond with **HTC** is achieved if a light sprayed coat of **HMP** or **HPS** is applied as soon as **HSB** is **"sticky dry"**.
6. One spayed coat of **HIPEC® Top Coat Color** or Hipec Hard Coat (HHC).

MATERIALS Coverage

HIPEC® Aluminum Cleaner	**1 quart (1Liter) undiluted per 400 sq ft**
HIPEC® Alodine	**1/4 lb per 500 sq ft**
HIPEC® Sun Barrier	**1 quart (1Liter) per 65-90 sq ft**
HIPEC® Primer Sealer	**1 quart (1Liter) per 65-90 sq ft**
HIPEC® Metal Primer	**1 quart (1Liter) per 75-100 sq ft**
HIPEC® Top Coat Color *	**1 quart (1Liter) per 75-100 sq ft**
HIPEC® Slow Thinners (HTS)	**usually up to 5% dilution for HPS**

HSB can be thinned up to 100% for pinhole filling.

HIPEC ® SUMMARY OF INSTRUCTIONS 930706 B

FOR FABRIC ON OPEN FRAME STRUCTURES
ULTRALIGHT 1 ½ COAT SYSTEM

1. Procure or design and construct suitable component support trestles and/or hangers or simply lay on clean bench if coating only one side at a time.

2. Complete systems installation including controls, electrical and other systems.
   Be sure wires and cables are secured or tight so that they will not stick to covering.

3. Prepare structure
   a. Wood - should have one or more coats of:
      HIPEC® 1 Clear (H1C) or **HIPEC® Sun Barrier (HSB)**, etc. **Do not use spar varnish.**
      If more coats are applied so that surface is shiny, scuff sand surface to allow **HSB** to GRIP.
   b. Steel - sandblasted or emery cloth clean. Prime with **HIPEC® - HPS, HMP, HSB,** or **H1C.** Scuff sand attachment surface.
   c. Aluminum - Wipe off dust, oil or grease. Apply **HIPEC® Aluminum Etch** (cleaner) & **Alodine.** Rinse between applications with warm water in warm shop.
   d. Composite epoxy or vinyl ester - scuff sand & wipe off harmful foreign matter.
   e. Composite - polyester - **thoroughly sand** to remove all wax and apply a sealer.

4. See that pre-cover inspection is **done** and **inspection sheet is signed.**

5. Mask windows, antennas and other areas (which are not to be painted) with paint-proof paper.

6. Ensure clean shop, trestles, tools and clothing. If necessary increase humidity and temperature. Ideal temperature is 25 C (75 F) and 75% Relative Humidity. (Wet down floor with water)

7. Apply fabric by bag, blanket or combination method using **HIPEC® Attach GLOO (HAG).**

8. Tauten fabric with electric iron in two or more passes;
   FIRST PASS at 275 F and **FINAL PASS** at 350 F.
   On flat or concave surfaces do steps 13 & 14 before final pass.

9. Tack rag wipe to remove all traces of dust.

10. X

11. Shake **HIPEC® Sun Barrier (HSB)** before opening for the first time.

12. To ensure a totally nib free finish, filter **HIPEC® Sun Barrier (HSB).**

13. On flat or concave surfaces, apply weights between ribs to ensure fabric contact with capstrip. Put weights on a piece of clean paper or polyethylene in case bottom of weight is dirty.

14. Brush one narrow coat of HSB on fabric positioned over structure where wicking may occur. Wicking occurs along any edge in contact with fabric. The narrow coat should only be 10 to 15 mm (3/8" to 5/8") wide. Typical structure is over rib capstrips, stringers, trailing edges. edge of leading edge skin, edges of gussets, etc. Apply gromets and inspection rings with HSB as required.

15. When Hipec Sun Barrier in step 14 is "sticky-dry", brush or roller 1 coat of HSB over entire top and vertical fabric surfaces, including areas in Step 14.

16. Mix equal quantities of Components A & B of Hipec Top Coat colour in a suitable quantity for not more than one hour of spraying and thinned to suit.

WARNING - Proper mask with NEW filters is required when spraying and while spray mist is in shop. Fan Ventilation Required

17. On all top & vertical surfaces coated in step 15, Spray one light mist coat. Allow to "tack up" 10 to 15 minutes, then apply medium wet cross sprayed coat.

18. As soon as convenient, brush or roller 1 coat of HTC on all bottom surfaces including over HSB in step 14.

19. Make drain holes with hot rod.

-Job's Done-

* It is best to use standard suction cup spray gun at 40 psi.(eg. DeVilbiss, Binks, etc.).

If using HVLP gun, follow manufacturers instruction for auto body finishing.

Note: 1. To ensure that no pinholes develop, especially in steps 15 & 16, be sure HSB & HPS are thinned to consistancy with Hipec Slow Thinners (HTS) even in low temperatures.

2. If using polyester (Dacron) surface tapes, secure with Hipec Attach Gloo thinned about 5%.

HIPEC ® SUMMARY OF INSTRUCTIONS 930708 B

FOR FABRIC ON OPEN FRAME STRUCTURES
STANDARD 2 & 3 COAT SYSTEMS

1. Procure or design and construct suitable component support trestles and/or hangers or simply lay on clean bench if coating only one side at a time.

2. Complete systems installation including controls, electrical and other systems.
Be sure wires and cables are secured or tight so that they will not stick to covering.

3. Prepare structure
   a. Wood - should have one or more coats of:
   HIPEC® 1 Clear (H1C) or **HIPEC® Sun Barrier (HSB)**, etc. **Do not use spar varnish.**
   If more coats are applied so that surface is shiny, scuff sand surface to allow **HSB** to GRIP.
   b. Steel - sandblasted or emery cloth clean. Prime with **HIPEC® - HPS, HMP, HSB,** or **H1C.** Scuff sand attachment surface.
   c. Aluminum - Wipe off dust, oil or grease. Apply **HIPEC® Aluminum Etch** (cleaner) & **Alodine**. Rinse between applications with warm water in warm shop.
   d. Composite epoxy or vinyl ester - scuff sand & wipe off harmful foreign matter.
   e. Composite - polyester - thoroughly sand to remove all wax and apply a sealer.

4. See that pre-cover inspection is done and inspection sheet is signed.

5. Mask windows, antennas and other areas (which are not to be painted) with paint-proof paper.

6. Ensure clean shop, trestles, tools and clothing. If necessary increase humidity and temperature. Ideal temperature is 25 C (75 F) and 75% Relative Humidity.

7. Apply fabric by bag, blanket or combination method using **HIPEC® Attach GLOO (HAG)**.

8. Tauten fabric with electric iron in two or more passes;
FIRST PASS at 275 F and **FINAL PASS** at 350 F.
On flat or concave surfaces do steps 13 & 14 before final pass.

9. Tack rag all of surface

10. X

11. Shake **HIPEC® Sun Barrier (HSB)** before opening for the first time.

12. To ensure a totally nib free finish, filter **HIPEC® Sun Barrier (HSB)**.

13. On flat or concave surfaces, apply weights between ribs to ensure fabric contact with capstrip. Put weights on a piece of clean paper or polyethylene in case bottom of weight is dirty.

14. Brush one narrow coat of **HIPEC® Sun Barrier (HSB)** on fabric positioned over structure where wicking may occur. Wicking occurs along any edge in contact with fabric. The narrow coat should only be 10 to 15 mm (3/8" to 5/8") wide. Typical structure is over rib capstrips, stringers, trailing edges, edge of leading edge skin, edges of gussets, etc.

15. When **HIPEC® Sun Barrier (HSB)** in Step 14 is "sticky dry", **brush or roller 1 coat of HIPEC® Sun Barrier (HSB)**.over all fabric surfaces, including areas in Step 14. Note 2. Apply inspection rings and drain grommets with this coat.

NOTE: If brushed coat of **HIPEC® Sun Barrier (HSB)**.is found to be not sufficient to block out all light, apply a light medium spray coat of **HIPEC® Sun Barrier (HSB)**, when brushed coat is "sticky dry". Do not brush this coat. Brush marks will show that are very difficult to sand out.

16. Mix equal quantities of Components A and B of **HIPEC® Top Coat (HTC)** Color in a suitable quantity for not more than one hour of spraying. Thin to suit, usually not more than 5%. Preferred position of wing is trailing edge down ▼ and leading edge up ▲ .

WARNING - Proper mask with **NEW** filters is required when spraying and while spray mist is in shop. Fan Ventilation Required

17. When **HIPEC® Sun Barrier (HSB)** in Step 15 has become "sticky dry", (usually within 15 hours) spray one light mist coat of **HIPEC® Top Coat (HTC)**. Allow to "tack up" 10 to 15 minutes, then apply medium wet cross sprayed coat. Best results are achieved when only <u>just enough</u> **HIPEC®** is used to cover a particular area.

18. Make drain holes with a hot rod or solder gun.

- Job's Done -

Note:

1. To ensure that no pinholes develop, especially in steps 15 & 16, be sure HSB & HPS are thinned to consistency with **HIPEC® Slow Thinners (HTS)** even in low temperatures.
2. If one coat of **HIPEC® Sun Barrier** brushed does not hide a light held on other side of fabric, spray a second coat when brushed coat is sticky dry. Thin adequately with **HIPEC® Slow Thinners (HTS)**.
3. It is best to use standard suction cup spray gun at 40 psi (eg. DeVilbiss, Binks, etc.)
4. If using **polyester (Dacron fiber)** surface tapes, secure with **HIPEC®** ATTACH GLOO thinned.
5. If using HVLP gun, follow maker's instructions for auto body finishing.

HIPEC ® SUMMARY OF INSTRUCTIONS 930710B

FOR FABRIC ON OPEN FRAME STRUCTURES
DELUXE 3 COAT SYSTEM

1. Procure or design and construct suitable component support trestles and/or hangers or simply lay on clean bench if coating only one side at a time.

2. Complete systems installation including controls, electrical and other systems.
Be sure wires and cables are secured or tight so that they will not stick to covering.

3. Prepare structure
   a. Wood - should have one or more coats of:
   HIPEC® 1 Clear (H1C) or **HIPEC® Sun Barrier (HSB)**, etc. **Do not use spar varnish.**
   If more coats are applied so that surface is shiny, scuff sand surface to allow **HSB** to GRIP.
   b. Steel - sandblasted or emery cloth clean. Prime with **HIPEC® - HPS, HMP, HSB,** or **H1C.** Scuff sand attachment surface.
   c. Aluminum - Wipe off dust, oil or grease. Apply **HIPEC® Aluminum Etch** (cleaner) & **Alodine.** Rinse between applications with warm water in warm shop.
   d. Composite epoxy or vinyl ester - scuff sand & wipe off harmful foreign matter.
   e. Composite - polyester - **thoroughly sand** to remove all wax and apply a sealer.

4. See that pre-cover inspection is done and inspection sheet is signed.

5. Mask windows, antennas and other areas (which are not to be painted) with paint-proof paper.

6. Ensure clean shop, trestles, tools and clothing. If necessary increase humidity and temperature. Ideal temperature is 25 C (75 F) and 75% Relative Humidity.

7. Apply fabric by bag, blanket or combination method using **HIPEC® Attach GLOO (HAG).**

8. Tauten fabric with electric iron in two or more passes;
FIRST PASS at 275 F and **FINAL PASS** at 350 F.
On flat or concave surfaces do Step 13 & 14 before final pass.

9. Tack rag wipe to remove all traces of dust.

10. 

11. Shake **HIPEC® Sun Barrier (HSB)** before opening for the first time.

12. To ensure a totally nib free finish, filter **HIPEC® Sun Barrier (HSB).**

13. Brush one narrow coat of HSB on fabric positioned over structure where wicking may occur. Wicking occurs along any edge in contact with fabric. The narrow coat should only be 10 to 15 mm (3/8" to 5/8") wide. Typical structure is over rib capstrips, stringers, trailing edges, edge of leading edge skin, edges of gussets, etc.

14. When Hipec Sun Barrier in step 13 is "sticky-dry", brush or roller 1 coat of HSB over entire fabric surfaces, including areas in Step 13. Preferred position of wing is trailing edge down and leading edge up. Apply inspection rings and drain grommets with this coat.

WARNING - Proper mask with NEW filters is required when spraying and while spray mist is in shop. Fan Ventilation Required

15. After HSB in step 14 is "sticky dry", spray one coat of Hipec Primer Surfacer (HPS) over all surfaces. Let dry. HPS must be mixed 50% Component A with 50% Component B. Thin to suit, usually not over 5%.

16. Scuff sand entire surface. Take care not to sand over projections such as those made by rivet heads or gusset edges.

17. Remove all dust by washing and/or tack ragging.

18. When more than one color is to be applied, mask for first color with thin masking tape, masking paper or paint proof paper.

19. Mix equal quantities of Components A & B of Hipec Top Coat color in a suitable quantity for not more than one hour of spraying and thinned to suit.

20. Spray one light mist coat. Allow to "tack up" 10 to 15 minutes, then apply medium wet cross sprayed coat.

21. Optionally, for higher gloss when top coat is metallic, as soon as it is "sticky-dry", spray one coat of Hipec top Coat Clear. Mix Components A & B as with HTC color coats.

22. Remove masking as soon as spraying is complete.

23. Allow first color to dry "tack free". Mask and apply additional colors as per Steps 19 to 22.

24. Make drain holes with hot rod.

-Job's Done-

Note: 1. To ensure that no pinholes develop, especially in steps 15 & 16, be sure HSB & HPS are thinned to consistancy with Hipec Slow Thinners (HTS) even in low temperatures.

HIPEC ®

SUMMARY OF INSTRUCTIONS

FOR FABRIC ON OPEN FRAME STRUCTURES

FABRIC SECURED BY ---- RIBSTITCHING - RIVETS - SCREWS, ETC.

1. Procure or design and construct suitable component support trestles and/or hangers or simply lay on clean bench if coating only one side at a time.
2. Complete systems installation including controls, electrical and other systems.
   Be sure wires and cables are secured or tight so that they will not stick to covering.
3. Prepare structure
   a. Wood - should have one or more coats of:
   HIPEC® 1 Clear (H1C) or **HIPEC®** Sun Barrier (**HSB**), etc.
   Do not use spar varnish.

   b. Steel - sandblasted or emery cloth clean. Prime with **HIPEC®** - **HPS**, **HMP**, **HSB**, or **H1C**.
   Zinc Chromate may be used.
   c. Aluminum - Wipe off dust, oil or grease.
   d. Composite epoxy or vinyl ester - scuff sand & wipe off harmful foreign matter.
   e. Composite - polyester - thoroughly sand to remove all wax and apply a sealer.
4. See that pre-cover inspection is done and inspection sheet is signed.
5. Mask windows, antennas and other areas (which are not to be painted) with paint-proof paper.
6. Ensure clean shop, trestles, tools and clothing. If necessary increase humidity and temperature.
   Ideal temperature is 25 C (75 F) and 75% Relative Humidity.
7. Apply fabric by bag, blanket or combination method using **HIPEC® Attach GLOO** (**HAG**).
8. Tauten fabric with electric iron in two or more passes;
   FIRST PASS at 275°F and **FINAL PASS** at 350°F.
9. Mark position of ribstitching (with a pencil). Poke ribstitch needle through to easily identify positions later.
10. Tack rag all of surface
11. X
12. Shake **HIPEC® Sun Barrier** (HSB) before opening for the first time.
13. Preferred position of wing is: trailing edge down ▼ leading edge up ▲
14. To ensure a totally nib free finish - FILTER **HIPEC Sun Barrier** (HSB).
15. Brush or roller one coat of Hipec Sun Barrier over all surfaces.
16. After **HSB** in Step 15 is "sticky-dry" (usually within 15 hours) SPRAY ONE COAT of **HIPEC® Primer Sealer**.

HIPEC® Primer Sealer must be MIXED - 50% HPS Component "A" WITH - 50% HPS Component "B".
Thin to suit, usually not over 5%. Lastly, allow painted surface to become **"sticky dry"**

On surfaces not requiring ribstitching, (fuselage, u/c legs, etc.), proceed with steps 23 to 33 as applicable. For surfaces requiring attachment to structure - let dry. On surfaces not requiring attachment to structure and only one color per component, you may proceed per steps 28, 29 and 30. It is best to use standard suction cup spray gun at 40 psi. (e.g. - DeVilbiss, Binks, etc.).

If HVLP gun is used, be sure to follow manufacturer's instructions

HPS Component B is different formula than HTC Component B - DO NOT SUBSTITUTE

NOTE: Use of an oil filter in airline to spray gun is essential.

Warning - Proper mask with NEW filters is required when spraying and while spray mist is in shop. Fan Ventilation Required.

17. Scuff Sand surfaces at least to which tapes are to be applied

    (See manual definition of scuff sanding).

18. On lifting surfaces, apply reinforcing tape, then ribstitching or screws, rivets or clips as specified by aircraft manufacturer, designer or other specification.

19. Apply surface tapes with a light coat of **HIPEC® Attach GLOO (HAG)** at tape ends and over ribstitching and other lumps or hollows. Use polyester tapes on curved edges otherwise try to use fiberglass tapes as they are easier to lay & sand.

20. Brush one coat of **HIPEC® Sun Barrier** or **HIPEC® Primer Surfacer (HPS)** into reinforcing tapes.

21. If Polyester (Dacron) surface tapes are preferred for economy reasons, then use

    HIPEC® ATTACH GLOO to secure and fill tapes. Sand between coats as required.

    Be careful not to sand into fibers. They will stand up & be very difficult to lay smooth.

22. Brush several coats of **HIPEC®** HSB or HPS to thoroughly fill tapes. Allow previous coat to become at least "sticky-dry" before applying next coat. If **HPS** becomes "tape free" dry, scuff sanding is required before the next coat.

23. Apply drain grommets and inspection rings with HPS or HSB.

24. Spray one coat **HIPEC® Primer Surfacer (HPS)** over coated tapes. Let dry.

25. **Scuff sand entire surface**. Take care not to sand over projections such as at ribstitching.

26. **Remove all dust** by washing and/or tack ragging.

27. When more than one color is to be applied, mask for first color. **Fineline Masking Tape** gives the best results.

    (Available from **Falconar Avia Inc**. or a **HIPEC® Dealer**)

28. Mix equal quantities of Components "A" & ""B" of **HIPEC® Top Coat Color** in a suitable quantity for not more than one hour of spraying and thinned to suit.

29. Spray one light mist coat. **Allow to "tack up"** 10 to 15 minutes,

    then apply - **medium wet - cross sprayed coat**.

30. Optionally, for higher gloss, when top coat is metallic, as soon as it is "sticky-dry",

    - Spray one coat of **HIPEC® Top Coat Clear**.

      Mix Components "A" & "B" same as with **HTC Color**.

31. Remove masking as soon as spraying is complete.

32. Allow first color to dry "tape free". Mask and apply additional colors

    as per Steps 25, 26, 28, 29, 30 and 31.

33. Make drain holes with hot rod.

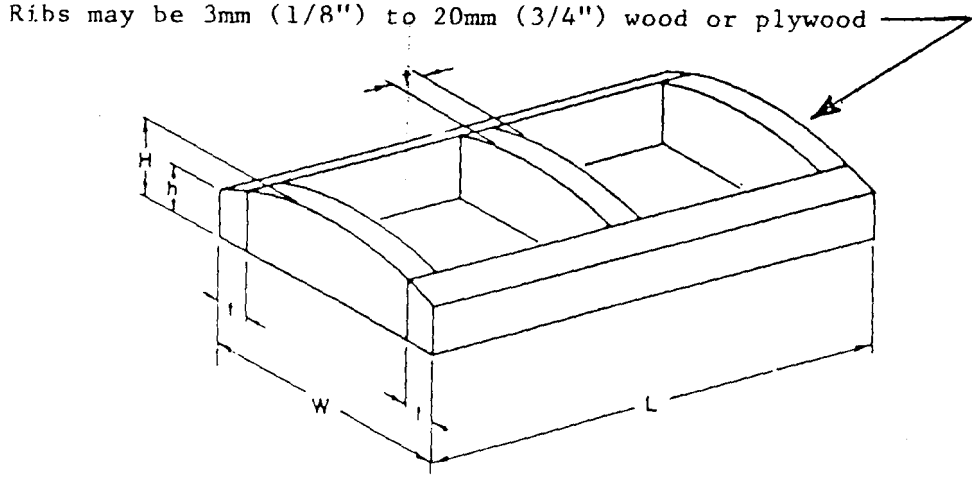
********* Job's Done *********

Take all precautions for clean shop,
filtered ventilation, oil separator & pressure regulator in air line, & new filters in properly fitting mask.
If silicone has ever been used in shop it should be suspected as present.
Silicone presence as small as 5 parts per million will cause "fisheye".
If any silicone is suspected, use HIPEC® Crater Eliminator (HCE).
1oz. /gal. or 30ml/ 4L, in all coats if used in first coat.

MAKING TEST PANELS

If you have never used HIPEC before, it is strongly recommended that you make some test panels. This is especially important when covering aircraft wings where rib stitching and taping are to be eliminated. D.O.T.* or F.A.A. inspectors are often unaware of this covering method and may require proof that whoever works on the covering, can in fact achieve the quality and consistency of bond to provide the strength required.

* or MD-RA in Canada



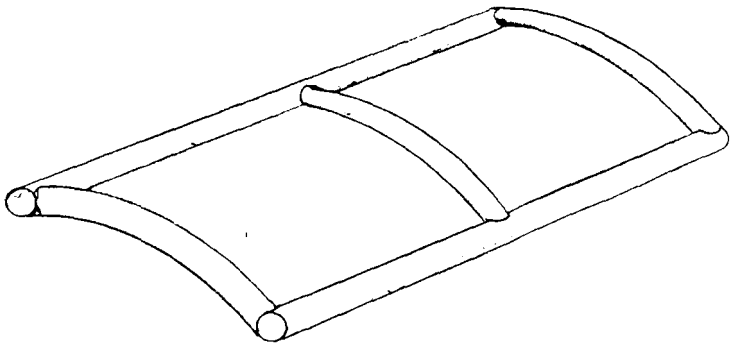
	SMALL TEST FRAME	LARGE TEST FRAME
L	150 mm (6")	300 mm (12")
W	80 mm (3")	300 mm (12")
H	25 mm (1")	60 mm ($2\frac{1}{2}$")
h	15 mm ($\frac{3}{8}$")	25 mm (1")
t	3 - 10 mm ($\frac{1}{8}$") - ($\frac{1}{8}$")	20 mm ($\frac{3}{4}$")

It is suggested that several frames be made.

Test Preparation

Coat the test frame with HIPEC 1 Clear or Sun Barrier to the standard intended for your project. If fabric and HIPEC application are not going to follow the coating of the frame (within 24 hours), frame and ribs will need a scuff-sanding and thorough cleaning before covering.

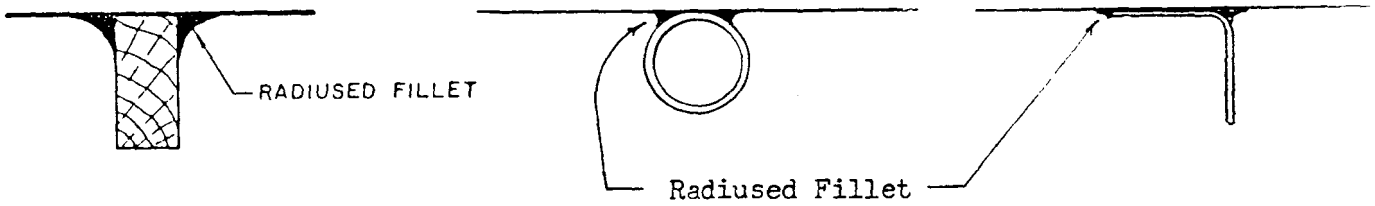
If wing or tail structure is of a material other than wood, make test frames out of that material - i.e. welded steel tube, gusset reinforced aluminum tube, sheet aluminum, etc.



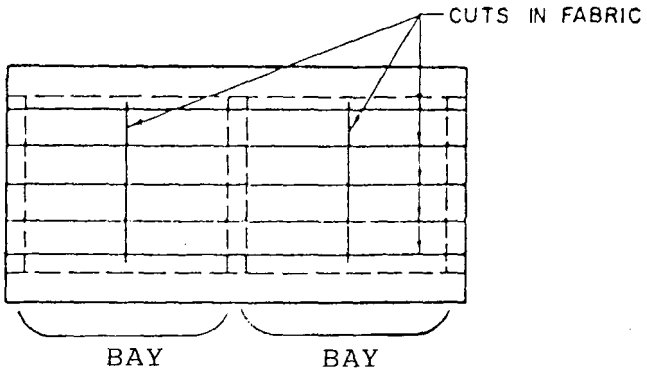
Cover the frames with the polyester cloth and complete the coating according to the appropriate instructions. Repeat the process for more frames, remembering to keep some for demonstration use.

Test Evaluation

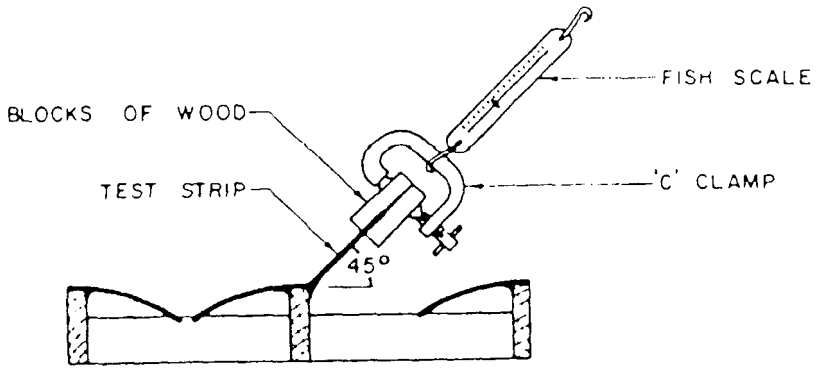
The finished samples should have a shiny, tough finish and be well adhered to the frame. Observe the radiused fillet of HIPEC (which has soaked through the fabric) on the inside, at the ribs and perimeter. This fillet secures the fabric to the ribs - the width of the rib is unimportant.



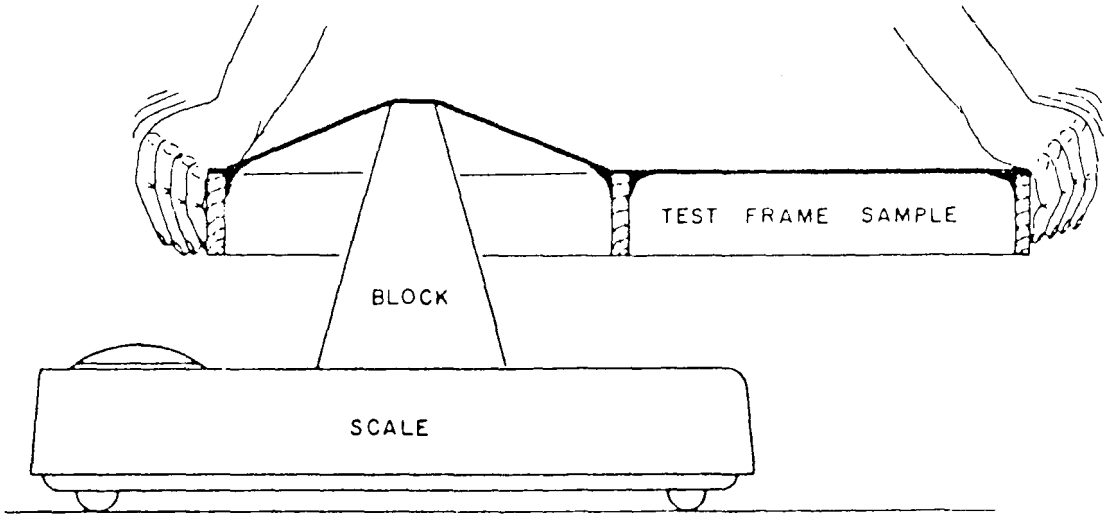
Cut the HIPEC coated fabric into 25mm (1") strips and cut across the center of each bay.



This will leave a number of floppy tabs of finished fabric. These may be attached to a fish scale. Pull until the radiused fillet breaks (at which time the fabric will snap away from the rib). Break-away reading should be at least 10 lbs. average (approximately equivalent to 20 g's) for a 25mm (1") wide strip at 21°C (70°F). Check requirements for particular aircraft.



Another , simpler test is to cut strips in a test panel and use a bathroom scale and a block to push up on the center of the strips. Readings obtained through this testing procedure are usually 10% - 20% higher.



REPAIRS TO HIPEC COATED FABRIC SURFACES

If the damage involves an indentation or stretching of the fabric without a long tear, use an iron to tauten the slack fabric (maximum temperature 160°C or 350 °F). If the hole is less than 85mm (3 1/2") in diameter or length and is located under a wing, stabilizer or fuselage, consider applying an inspection ring and inspection hole cover.

If the hole or tear is accessible from the inside, consider an interior patch made of thin, aircraft grade plywood, HIPEC coated fabric, metal , or a fiberglass panel. Cut the patch so it will extend at least 50mm (2") beyond the damaged area, and shape it to fit the curvature of the surface (if any). Coat the inside of the damaged area with Hipec Attach Gloo and do same to panel. When the patch has dried, the outer surface may be sanded, filled with a paste of Micro Balloons and Sun Barrier or Primer Sealer, sanded smooth, cleaned and refinished. Iron to re-tauten if necessary.

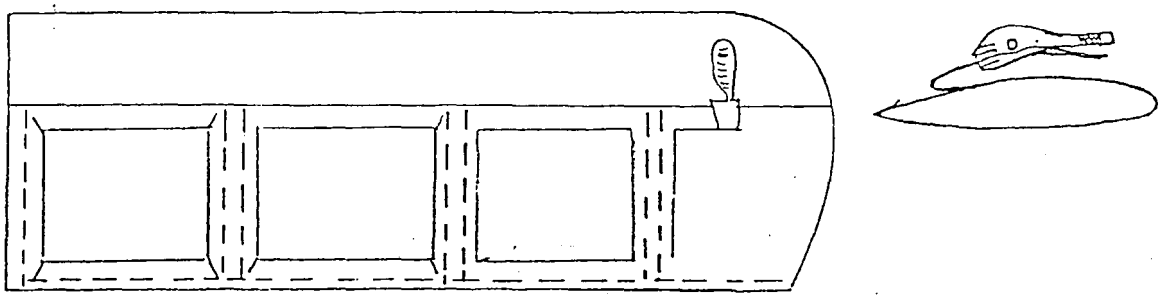
If the damaged area is quite large:

1. Cut out the damaged area to the nearest ribs or members.
2. Cut a patch or panel of the same type of polyester fabric originally used, large enough to cover the damaged area and overlap by at least 50mm (2").
3. Sand and clean 100mm (4") beyond the edge, into the overlap area.
4. Attach the patch or panel using Hipec Attach Gloo along the <u>outer</u> 25mm (1") edge of the patch or panel.
5. With the iron set at 100°C (210°F) pass over the glued area to ensure positive attachment. Rubbing this area with acetone or methyl ethyl ketone will also assist in smoothing the surface at the edge.
6. When the HAG has <u>thoroughly</u> dried, shrink the fabric patch or panel to the same tension as the adjacent fabric (as per the standard shrinking procedure).
7. If patch overlaps ribstitched ribs, add new reinforcing tape and rib stitching.
8. Brush one coat of HIPEC Sun Barrier over entire panel. Area which has been attached with HIPEC Attach Gloo should not be given too much HSB or so much brushing that fabric loosens.
9. When HIPEC Sun Barrier is "Sticky Dry", spray one coat of HSB over entire patch or panel. Alternatively, HPS may be used instead of HSB.
10. When coat in (9) is "Sticky Dry", spray on one matching HTC color coat. Apply it a little heavier over edge area to hide any edge imperfections.

11. If reinforcing and surface tapes are to be applied, after item (9), at Sticky Dry stage, spray one coat of HIPEC PRIMER SURFACER. Let dry.
12. Apply reinforcing tape with dab of HAG at each end.
13. Ribstitch per original.
14. Apply fiberglass surface tape as per original with small amount of HAG to ensure contact over screws, rivets, ribstitching or over-lap.
15. Brush or spray successive coats of HSB or HPS until tape is filled and sanded to desired standard of finish.
16. Spray one coat of HTC color to match the color scheme.

Note: Touch-up sprayer may be used (Preval, etc.).

When large amounts of fabric must be replaced, such as an entire elevator or wing panel, removal of the fabric from light or delicate structures must be done with care. Wood ribs are especially prone to damage where HIPEC has adhered the fabric to them. First cut the fabric from the bays.



Then cut into the corners and across capstrips, taking care not to cut capstrips. Next grab loose ends with plain or "Vise-grip" pliers and carefully peel off the strip of fabric covering the rib. Continue peeling the fabric off in this manner. Finally, block sand the structure with garnet paper and recover as per the normal procedure.

Repair Patches

1. Make one or more panel frames 4"(100 mm) larger on each inside edge than largest area on wing or wherever repair is forseeable.
2. Cover and finish in same manner and finish color as component. Shrinking of fabric should be first pass only at 275 °F maximum.
3. Cut patch to size. Trim hole.
4. Apply HAG or other high spec. flexible adhesive to perimeter of area to be patched and apply patch.
5. Heat set perimeter of patch at 225°F. Let cool.
6. Heat shrink patch at 160°C/350°F with iron.
7. Complete application of HSB, HPS, and HTC per original finish.

REFINISHING OLD DOPED SURFACES

Test the fabric with Maule or Seyboth testing tools. Check with the aircraft service manual or FAA manual AC43.13-1B to ensure that the fabric meets the strength requirements.

Next wash the aircraft thoroughly with detergent and water, scrubbing with a ScotchBrite pad. All oil, grease and wax must be removed using suitable solvents and clean cloths. Randolph E 3158 Wax and Silicone Remover is a suitable product for this.

Remove all metal panels, inspection covers and fairings, except for those which are best left in place for some good reason. Clean these areas the same way the other areas were cleaned.

Mask all metalwork, windows, antennas and plastic with dope-proof masking paper. Use tack cloths to remove all dust.

Now use a micrometer to measure the thickness of the doped fabric or a chip of dope removed from the fabric in order to determine the amount of rejuvenator which will be required.

Dope Thickness	Dope & Fabric Thickness	Rejuvenator Required
.005"	.008"	2 gal/100ft^2
.010"	.013"	3 gal/100ft^2
.020"	.023"	5 gal/100ft^2

If Randolph rejuvenator is used, the recommended mixture is 6 parts rejuvenator to 5 parts CAB (Butyrate) thinners, however some applicators like to use 1 part rejuvenator to 1 part CAB thinners to 1 part retard thinners.

To rejuvenate, spray on one heavy, wet, cross-coat of the mixture (do not brush on, as brush marks are inevitable). The coat should be as heavy as possible without causing runs. For dope coatings which are of medium to heavy

thickness, additional coats of the rejuvenator mixture will be required. This rejuvenating may take several days and the surface may sag at first but it should tauten up later.

Wherever cracks or ringworm exist, wait until the rejuvenator has taken maximum effect, then work out with a stiff brush or fingers and extra rejuvenator.

If the surface has rough spots, weak areas or requires patching, this should be taken care of now. Patching should be performed following the manufacturer's instructions or AC43.13-1B. Build up the finish with clear dope, then aluminum fill dope, to obtain the desired smoothness. If the surface is rough or shows too much of the weave of the fabric, apply one or more coats of aluminum fill dope, sanding between coats, until the desired smoothness is obtained.

When the surface is dry and smooth, with no rough spots, spray a coat of HIPEC Primer Sealer* onto the surface and when that is Sticky-Dry, follow with a coat of HIPEC Top Coat, following the regular application procedures for HIPEC. Note that surface must be <u>thoroughly</u> dry BEFORE Hipec application.

* or HSB

REINFORCED COATING

FOR PLYWOOD OR WOOD SURFACES

Some designers prefer to incorporate a fabric in the coating process to add structural strength or smoothness to the finish. The most favored fabric for this purpose is plain weave fiberglass. It adds strength and can be sanded to a superbly smooth finish. Polyester fabrics, on the other hand, cause little cut fibers to stick up through the finish if sanded through at high spots. This fuzzy finish is then very difficult to eliminate. Furthermore, fiberglass cloth hugs the surface without air pockets, whereas polyester fabrics "bridge" hollows, causing air pockets. When incorporating fiberglass cloth into the finish, proceed as follows,

1. Filling and sanding may be performed on plywood, wood or plastic surfaces to produce a super smooth finish. Polyester fillers such as Bondo, White Lightening, etc. may be used or you can make your own using Micro Balloons and either HIPEC Sun Barrier, Primer Sealer, 1 Clear, polyester resin or epoxy resin. Red oxide should be avoided because of the low film strength, which will reduce the effectiveness of the HIPEC system. After filling and sanding, vacuum and clean away all dust. Tack rag wipe surface.

2. Cut fiberglass cloth panels to suit area. A 1.5 oz. to 3 oz. plain weave cloth is suitable for most applications. For heavier applications such as float bottoms, hulls, etc. it is common to use a fiberglass cloth weighing up to 6 oz. per square yard. (165 grams/M^2.).

3. Apply cloth to surface which has been coated with Sun Barrier or HIPEC 1 Clear. Smooth out fabric with small dust brush or hands to remove all wrinkles. Dust brush must be clean - detergent washed.

4. Starting at the leading edge (if cloth covers both sides) or top (if covering a fuselage) or center (for flat panels), brush on HIPEC Sun Barrier very carefully so as not to induce wrinkles. Work towards the opposite end or towards the outer edges of the panel.

5. When the first coat is "Sticky-Dry", apply additional coat by brush roller or spray (as desired). If dust specks or zits appear, wait until dry and sand with wet or dry paper. If desired, use an orbital sander to speed up the operation. After sanding, wash with water or wipe with tack cloths to remove all dust. Hipec 421 makes an excellent sandable primer.

6. If color or clear finish is desired, spray one or more coats of HIPEC Top Coat as per instructions in STAGE 3 of the 3 STAGE PROCESS.

Note: After second coat of HSB is "STICKY DRY", HPS may be sprayed on in one or more coats. Sanding HPS is much easier than sanding HSB. HPS may be allowed to become dry before next coat is applied but be sure to scuff sand using 220 to 360 grit Wet-or-Dry. Use detergent solution when wet sanding.

When applying HIPEC, always ensure adequate ventilation. When spraying, always wear a respirator with the proper, clean cartridges and filters.

APPLICATION OVER EXISTING COATINGS

HIPEC can be applied over a range of previously coated materials (Dacron, sailcloth, doped fabrics, Tedlar, composite fiberglass, wood, plywood, tents, awnings, fiberglass coverings, aluminum, magnesium or steel). The following is a brief listing of the steps for coating previously coated materials and is not meant to replace the information in the previous sections. Make sure that you have read and understand the information in the previous sections, including the safety precautions.

Prepare the surface: sand, then wash with detergent, rinse and dry. Ensure all wax, oil, grease and silicone is completely removed. Rejuvenate old doped fabric surfaces and repair if necessary.Clean and alodine treat aluminum surfaces. Clean steel with steel cleaner, abrading or sandblasting.

Apply the HIPEC Sun Barrier: Wash floor area and take other dust abating measures. Vacuum brushes and clothing then wipe surface with tack cloth. Shake containers well before opening, then strain off some Sun Barrier. Spray a mist coat and allow it to get "Tacky", then spray a medium cross coat. If fiberglass surface tape is desired over ugly seams, apply with Sun Barrier.

Apply Top Coat: as soon as the last coat of Sun Barrier is "Sticky-Dry". If it has been left past this stage, then abrade the surface with a no. 180 to no. 260 wet or dry sandpaper and clean thoroughly. Just prior to application mix 1 part Component A with 1 part Component B and shake or stir well. Mix only what can be used in one hour. When that is used up, rinse the spray gun and mix another batch. Spray a mist coat first and when tacky, follow with a light to medium cross-sprayed coat. If thinning is required use HT-S for porous surfaces and HT-R for non porous surfaces.

"SLEEK"

COAT YOUR ULTRA LIGHT SAILS WITH

HIPEC TOP COAT CLEAR

If your bird is covered with unprotected Dacron sailcloth and stored in the sun, its strength will usually be drastically deteriorated in as little as 8 months. It will be dangerous to fly in less than 2 years!

HIPEC Top Coat CLEAR has these benefits:

* Flexible and tough
* Protects seams and sewing
* When creased, normally never makes white lines (as do other Clear coats)
* Seals pores and thread holes
* Lowers stall speed
* Increases cruise speed
* Improves climb
* Shortens takeoff and landing
* Easier to wash and keep clean
* Easier to remove frost
* Better aileron control
* Brightens colors

PROCEDURE:

1. If dirty, remove grease, oil, wax, silicone preps or dirt with solvent.
2. Wash with detergent and rinse.
3. Apply by brush, roller or spray - one coat HIPEC Top Coat CLEAR. Additional coats may be applied by roller or spray.

Material required for average ultra light such as Quicksilver, Chinook, Beaver or Challenger:

To coat top and vertical surfaces:

2L (Qts.) HIPEC Top Coat CLEAR, Component A
2L (Qts.) HIPEC Top Coat Component B (equal mix)

To coat all surfaces:

3L (Qts.) HIPEC Top Coat CLEAR Component A
3L (Qts.) HIPEC Top Coat Component B (equal mix)

WARNING - Proper mask with NEW filters is required when spraying and while SPRAY MIST IS IN SHOP.

Do not use a fuzzy or fur roller. Use only a **foam roller** for urethane.

Remember that Clear coating should be periodically tested. Not as good as solid color that can last indefinately.

PAINT REMOVAL FROM METAL

880704

1. Wear rubber gloves, apron and eye & face shield.

2. Mask or remove plastic windows, sealant and other plastic parts.

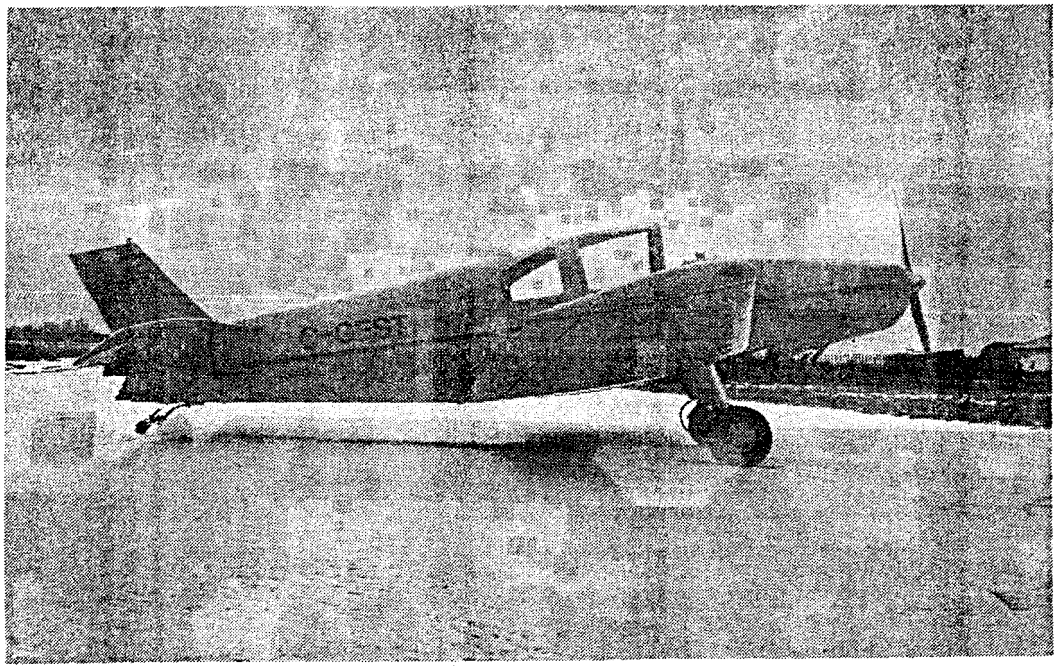
3. Apply paint remover very thick with large brush in warm temperature 15°C (60°F) to 35°C (95°F) but not in direct sunlight.

   WARNING: - fumes are very corrosive. Adequate ventilation is important.

4. After about 5 to 50 minutes, when paint is loose and wrinkled, wash off with water. If possible, use warm water. Residual paint remover is toxic to environment and soil. Observe prudent and legal disposal procedures.

5. Apply successive coats to areas where paint has not lifted in the first paint remover application. Scrub stubborn areas, around rivet heads, etc. with abrasive pads and remover. Rinse away all traces of paint.

F11E with complete Lincoln Cloth (Dacron) and Hipec system including Hipec Sun Barrier fabric to wing ribs attachment. F11E cruises at 120 mph.



APPLYING COLOR COAT(S) AFTER HSB IS COMPLETELY DRY

OR

COATING SEVERAL COLORS ON A COMPONENT

1. Prepare structure per Manual.
2. Apply fabric and/or prepare surface per Step 1 of Manual. Tack cloth wipe.
3. Per Step 2, brush on fabric - one coat of HIPEC SUN BARRIER (HSB) at ribs.
4. When HSB has become "STICKY DRY" (see definition on page 16), brush or roller 1 coat of HSB over entire surface.
5. When "STICKY DRY", spray one coat of HIPEC PRIMER SEALER (HPS). (Sometimes called HIPEC PRIMER SURFACER). Let dry. or HSB
6. Sand. Be super careful not to sand through to fabric at small bumps. Use detergent solution for wet sanding.
7. Clean off dust with tack cloth or wash.
8. Mask as required using 3M or equivalent thin masking tape.
9. Apply TOP COAT COLOR by spray.
10. Remove masking as soon as possible after spraying. Let dry.
11. Apply next masking.
12. Apply next Top Coat Color.
12. Repeat for additional colors.

WARNING It is very easy to sand into fibers of the fabric and make a good finish impossible to obtain. If the fibers are cut, they stand up, making the surface fuzzy and are very difficult to hide. Do not sand near projections or lumps caused by screws or rivet heads. It is extremely easy to sand through the fabric in these places!

For most woodwork where rain and cold weather protection is necessary, a Hipec coating offers an almost indefinite life. It is immune to most dilute chemicals and resists denting by blunt objects. Typical applications are:

1. Aircraft - plywood skinned components such as wings, fuselage, tail, floats and propellers.

2. Boats - masts, decks, cabins.- not recommended for prolonged immersion below waterline.
3. Campers, trailers and trucks - roofs, sides, window frames, deck tops and bottoms.

4. Houses and buildings - walls, roofs, doors, frames, soffits, facia, trim and fences.

The surface to be coated must be free of all oils, grease, wax or silicone. Wash off with varsol, tolulol, acetone, methyl ethyl ketone or similar solvents. Hipec will stick to roofing tar.

When coating a wood surface for exterior protection, simply apply first coat of Hipec Sun Barrier by brush. When this coat becomes **sticky-dry**, follow with one or more sprayed coats of Hipec Sun Barrier or Hipec Primer Surfacer. To hide the grain and provide a thicker, stronger film, add more coats, sanding if required to remove zits. Finish with one sprayed Hipec Top Coat.

For application over old painted surfaces, remove all chips and loose paint, then sand surface prior to application. Try a small test area to check compatibility, adhesion and smoothness. If desired, a wood filler must be used as necessary (make absolutely sure it does not contain an incompatible oil). This is not recommended for applications involving prolonged immersion in seawater.

Intense hot sun exposure heats wood to a temperature that drives out its moisture. When wood cools down & relative humidity increases, the wood absorbs water to bring its moisture content to a value compatable to the R.H. The expulsion of moisture causes strong paint film to bubble & eventually crack & peel. Wood is composed of minute pores & cells containing resin or moist air. With temperature & R.H. changes, wood likes to "breathe". Breathable solid stain is the preferred coating for wood for decks, fences etc. Prior to coating sun exposed wood, it should be as dry as possible.

For aircraft, thin plywood skins & gussets form much of the outer structure. Glue layers in plywood form barriers minimizing the moisture pressure in hot sun.

Aircraft wood structures are usually covered with polyester or fiberglass fabric which is bonded to the wood by Hipec Sun Barrier. Hipec coated aircraft seem to withstand years of outdoor exposure without damage. Colored Hipec Top Coat withstands sun much better than does HTC clear. White is the best color as it reflects heat. Black is the worst. Light fiberglass fabric (2 to 4oz/sq. yd.) permits a thicker and stronger Hipec film. This holds plywood from swelling and breaking the thin film.

HIPEC HARD COAT HHC

RESPONDING TO MARKET INTEREST AND DEMAND, HIPEC IS PROUD TO INTRODUCE A SUPERIOR, HIGHLY WEATHER RESISTANT, 2 COMPONENT POLYURETHANE FINISH FOR METAL, COMPOSITE OR SIMILAR HARD SURFACES. IT POSSESSES HIGH GLOSS RETENTION IN A HIGH TEMPERATURE AS WELL AS IN A HIGH UV ENVIRONMENT. IT RESISTS FUEL STAINING, HARSH CLEANERS, ACETONE, CROP SPRAY AND SEA WATER SPRAY.

HIPEC HARD COAT HAS BEEN DESIGNED FOR SPRAY OR BRUSH* APPLICATION ON PREPARED SURFACES OF ALUMINUM, STEEL AND COMPOSITE. BUILDERS OF COMPOSITE AIRCRAFT OFTEN PREFER HHC OVER THE FLEXIBLE HIPEC COATINGS DUE TO HHC'S ABILITY TO RUPTURE WITH THE COMPOSITE IN EVENT OF A STRUCTURAL FAILURE. IT THUS SHOWS POSITIVELY THE LINE OF FAILURE WHICH MAY OTHERWISE BE HIDDEN BY A FLEXIBLE COATING SUCH AS STANDARD HIPEC SUN BARRIER AND HIPEC TOP COAT.

HIPEC HARD COAT USES HIPEC METAL PRIMER HMP AS ITS BASE COAT. HHC IS FORMULATED TO BE RUN AND CURTAIN RESISTANT. PAINTERS REPORT THAT THEY GREATLY APPRECIATE THIS CHARACTERISTIC.

HHC IS AVAILABLE IN CLEAR, METALLIC AND THE STANDARD HIPEC COLORS. OTHER COLORS CAN BE CUSTOM MIXED INCLUDING SEMI GLOSS.

FOR DELUXE FINISH, AFTER FIRST PRIMER COAT, SPRAY ONE OR MORE COATS OF HIPEC 421 SANDING PRIMER. SAND BETWEEN COATS WITH 180 GRIT PAPER. THIS IS ESPECIALLY USEFUL TO SMOOTH OUT SLIGHTLY BUMPY SURFACE - COWLS, FAIRINGS, SAILPLANE WINGS, ETC. BEFORE TOP COAT, SPRAY ONE FINAL PRIMER COAT.

*BRUSH APPLICATION IS FOR LETTERING AND TRIM USING A SPECIAL "B" COMPONENT.

SECURING FABRIC TO SHARP EDGED METAL RIBS 931016

Flanged sheet metal ribs pose a problem in service as they are prone to shearing the coated fabric when a load is applied along the rib edge. The load pushes down on the fabric surface and the sharp edge of the flange can actually shear it.

Of course the recommended treatment of this type of rib is to deburr and bend the lip down and inwards so that the sharp edge is bent away from fabric contact. This can be a laborious and difficult task especially if the rib is fluted.

A very easy alternative is to leave the sharp edge. Simply etch clean if rib is aluminum, do the Alodine treatment and then apply a 3/4" fibreglass tape over the ribs flange. Secure with dabs of HAG.

Apply the fabric by bag, blanket or combination method and tauten in the normal manner.

First coat of HSB is a narrow strip over each rib area. Brush with a stippling action to ensure that the fibreglass tape gets well saturated. The HSB must thoroughly soak through fabric covering and fibreglass tape to completely cover rib capstrip. Complete finishing per standard procedure.

For extra smooth finish, fill all rib flange flutes with a filler paste of microballoons and HSB, HPS or epoxy.* Sand smooth. Then proceed with application of fabric and Hipec.

* or suitable light-weight auto body filler.

Applying Hipec Fluorescent Colors 931010

Procedure:

1. Complete all steps up to completion of one coat brushed of Hipec Sun Barrier (HSB).

2. When HSB is sticky-dry, spray one thin coat of white. It should be only thick enough to cover the HSB so that a uniform coat of solid white is present.

3. Let dry "tack free", a stage at which almost all solvents have evaporated.

4. Spray on 2 medium wet coats of Hipec Fluorescent color (HFC). Allow to become Sticky-dry between coats. Let last coat dry tack free.

5. Spray on 1 medium wet coat of Hipec Top Coat - Clear (HTC-Clear).

6. Allow 7 days before applying decals, stick on tapes, etc.

Keep out of direct sunlight as much as possible. Store in hangar or use wing and fuselage covers. All current fluorescent colors have a limited life in sunlight. We believe from experience, comparisons and reports that Hipec fluorescents are significantly better than others on the market. Field experience has placed Hipec as the best available today.

Falconar Avia Inc. 7739 - 81 Avenue, Edmonton, AB, Canada, T6C 0V4Technical: 780-479-3515
Tel: 780-465-2024 Fax: 780-465-2029

HIPEC®
Test Reports
Summary

Flexible Fine Finishing
Covering Products

960527

From 1992-1994, the following tests were carried out regarding the **HIPEC® Covering System** under the supervision of **Mr. Paul Salvian, P.Eng.**

1. **HIPEC® Covering System Push Off Tests:** These tests consisted of applying uniformly distributed heat from ultraviolet heat lamps and distributed pressure to polyester fabric that had been secured to a rib structure with **HIPEC® Sun Barrier**. Please note that the fabric was not rib stitched as in the classical method of covering systems. The heat and pressure were to represent a more than worst case scenario that a fabric covered aircraft structure could expect. The fabric was coated with **HIPEC® Sun Barrier** and **HIPEC® Top Coat**. Test Panels were manufactured using aluminum, wood and steels ribs.
2. **Fabric Deformation Recovery Tests:** During the three previous test programs deformation of the fabric occurred. When the loads and heat to the fabric were removed, the fabric did not recover. Heat was reapplied to the coated fabric to determine if the fabric would recover to its original shape.
3. **Liquid Chemical Immersion Testing of Fabric Coating Systems:** Immersion testing was carried out for the various chemicals that a fabric covered aircraft would encounter.
4. **Tear Test:** Several fabric coating systems were applied to various weights of polyester Dacron fabrics. An initial cut was made in the test specimens and then each of the specimens were subjected to a tearing pull test.
5. **Yarn Pull Tests:** Pull tests were carried out on the fabric yarns used in the above test with the initial coatings applied.
6. **Weathering test:** Samples of the above fabric and coating systems have been undergoing weathering tests for the past two years. The samples are mounted outside and subject to ultra violet radiation, rain, snow and +32°C and -38°C temperatures.

Our findings concerning the above testing are as follows:

1. **HIPEC® Push Off Tests:** As per test reports 92B1 and 92B6 for Aluminum Channel Ribs, 92B8 for Sitka Spruce Wood Ribs and 92B9 for Steel Tube Ribs. These tests were carried out in a hot box that was maintained at 54°C to 62°C while a load was applied that was 3.6 times greater than the maximum design loads expected in a home built aircraft. The loads were applied for more than 30 hours per sample with some being loaded for more than 45 hours. In all test cases the fabric remained attached to the ribs with no release occurring. The fabric did deform, stretching out of the plane of the curvature of the ribs. When the samples were removed from the hot box they

retained the deformed shape. Shape recovery tests were carried out some time afterwards to determine if the fabric would recover its original shape.

2. **Deformation Recovery Test:** As per test 92B5. The test samples in the **HIPEC® Push Off Test** were permanently deformed after completion of the push off test. It was felt that the permanent deformation occurred as a result of the heat being removed from the test samples before the applied load was released. The fabric coating cooled while in a deformed state and therefore retained its deformed shape. A Deformation Recovery Test was defined that would test the ability of the fabric and coating system to regain its pre push off test shape. By applying temperature of 185°F, the fabric regained a maximum of seventy five percent of its original shape.
3. **Chemical Liquid Immersion Tests:** Test coated fabric samples are immersed in various chemicals. The results of the test would suggest that the **HIPEC® Coating System** is comparable to other coating systems used in the aircraft industry.
4. **Tear Tests:** Test samples were coated with the various coating systems commonly used in the aircraft industry. The tests were carried out using various weights of cloth coated with either **HIPEC® Sun Barrier**, **Stits**, **Blue River** or **doped** fabric. The tests would suggest that the uncoated fabric has a greater tear resistance than any of the coating systems. All coated test samples appeared to have comparable tear resistance.
5. **Yarn Pull Tests:** Lincoln Fabric 578/652 yarn samples were coated with **HIPEC® Sun Barrier** & various coating systems to determine if the coating altered the tensile strength of the yarn. Test results suggest that coated yarn strength is not affected by the coating that is applied.
6. **Weathering Tests:** Inspection of the test samples would suggest that the **HIPEC® Coating System** will resist fading and embrittlement. Additional testing over an extended period of time must be carried out before any conclusive statements can be made.

Conclusions:

1. The adhesion characteristics for the **HIPEC® Sun Barrier** appear to be comparable for fabric attached to wood, aluminum or steel ribs.
2. The **HIPEC® Coating System** would appear to be comparable to other coating systems commonly used in the aircraft industry.
3. The **HIPEC® Attach GLOO, HIPEC® Sun Barrier** and **HIPEC® Top Coat** system meets or exceeds FAR23.337 design requirements without applying rib stitching.
4. Rib stitching for aircraft wings would not appear to be required for aircraft wings as the **HIPEC® Coating System** provides more than adequate attachment strength to the ribs.

For further information on the **HIPEC® Covering System** please contact : **Falconar Avia Inc.**
C.B.Falconar's Book - **"HIPEC® The Modern Method of Covering & Finishing"**

COMMENTS

1. The HIPEC® Push Off Tests show that HIPEC® Sun Barrier adheres fabric to ribs of wood, aluminum or steel without release in presence of extreme conditions of temperature, pressure & UV rays.
2. The Deformation Recovery Tests have little significance to light aircraft use since flight in these extremes of temperatures & pressure is unlikely. The main purpose of using the extremes was to prove fabric adhesion to ribs.
3. The Tear Tests showed that no matter what system is used, coated fabric tears more easily than uncoated fabric. Coating on fabric isolates the yarns so that tearing breaks them one at a time. Uncoated fabric allows concentration of several yarns at point of tearing. Thus, tear strength is much higher. Manual AC 43.13-1B does not have a value for tear strength of coated fabric.
4. Chemical Immersion Tests had HIPEC® coated specimens in water, salt water, alcohol, thinners, paint solvent, two types of agricultural spray, auto fuel & numerous other liquids. They were mostly two year immersions. Results showed HIPEC® remarkably inert.
5. HIPEC® does not eat polyester fabric. The "Yarn Pull Tests" showed no strength loss when HIPEC® coated.
6. Accelerated weather testing over one year in our "Sunbox" showed no apparent deterioration. Outdoor samples on a board are examined & tested periodically. No deterioration has been observed.

Inspection Procedure, Aircraft Covering Page 1 of 4 - **PN 931101A**
Fabric Attachment to Structure by **HIPEC® Sun Barrier**
Including over Ribs on Top Surface of Wing

Inspection Frequency:

1. After covering, before flight.
2. After first test flight.
3. After first test flight involving high G maneuvers.
4. After any experience or condition that could possibly cause release or weakening of the fabric to structure bond.
   a. After a hailstorm.
   b. After beating off ice with rope or stick where damage is suspected.
5. After first 25 hours.
6. Annually - 11 to 13 month intervals.

Inspection tools:

1. Flashlight
2. Mirror
3. Measuring tape or scale
4. Suction cup per Dwg. H1669.
5. Fish scale 0 to 50 lbs/ 0 to 20 kg.
6. Report form

Purpose of Inspection:

1. To locate any cuts, tears, porosity, or puncture.
2. To locate any looseness.
3. To locate any release of load bearing fabric.
4. To locate any other problems involving fabric and finish.

Procedure:

1. Visually inspect entire outside of all surfaces top, bottom and edges. Record all discrepancies.
2. Visually inspect all accessible inside surfaces, removing inspection covers as required and record discrepancies.
3. Choose one of the following tests per Aircraft Maintenance Manual requirements or Owners discretion or Inspectors's discretion:
   a. Maximum test - @ 3" spacing everywhere
   b. Class 2 test - @ 6" spacing top surfaces on wings, canard, flaps & @ 6" spacing for both surfaces on tail and ailerons.
   c. Class 3 test - @ critical or suspect positions as determined by visual inspection.
4. a. Using selected test from 3 & procedure described in Appendix A, test fabric attachment to structure per test "map" value developed for the aircraft.
   b. Check off position on "map" as they are done.
   c. Generally, there should be 90% attachment to any structural member. Around rivets, lumpiness, joints for skins, gussets and leading or trailing edges will leave attachment gaps. These are normal and allowed except that any one attachment gap should not exceed 1" (25mm) with no breaks in attachment radius. See Fig 1
   d. Pull test load must not fail when applied according to "**map**".

See Figure 1 next page

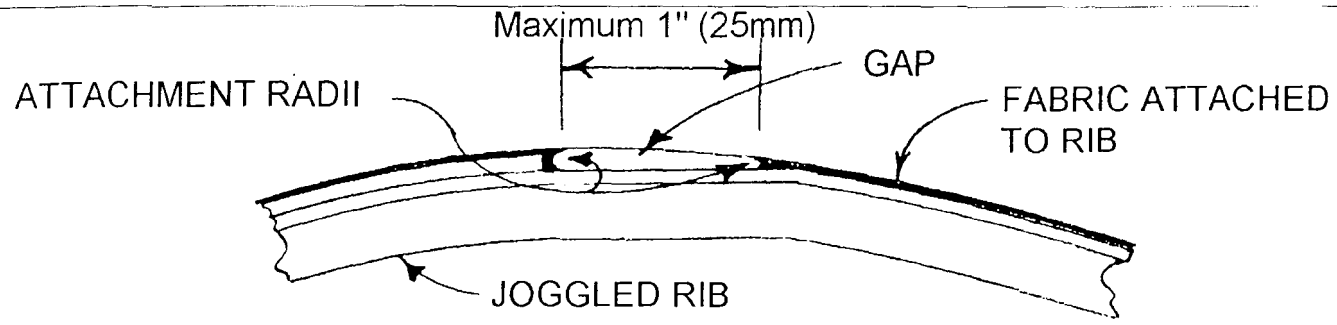


Figure 1

Repairs:

1. Loss of lift surface attachment to structure must be rectified.
   a. Re-secure by injecting adequate **HIPEC® Attach GLOO** (HAG), with hypodermic needle at suitable locations to restore required strength. Re-test when dry 24 hours.
   b. If method in (a) is not adequate, then add in the weak area reinforcing tape, washers, clips, rivets or screws and surface tapes as required by original design or manual AC 43.13-1B. Scuff sand surface. Then apply surface tapes with **HIPEC® Attach GLOO** (HAG) or **HIPEC® Tape Dope** (HTD) and refinish to match per appropriate **HIPEC®** instructions.
2. Repair cuts, tears, dimples, and punctures per Repairs Instructions.

Final: a. **Record inspections and work accomplished.**
b. **Send copy** to **Falconar Avia Inc.**, Attention: **HIPEC® Division**

Appendix A:

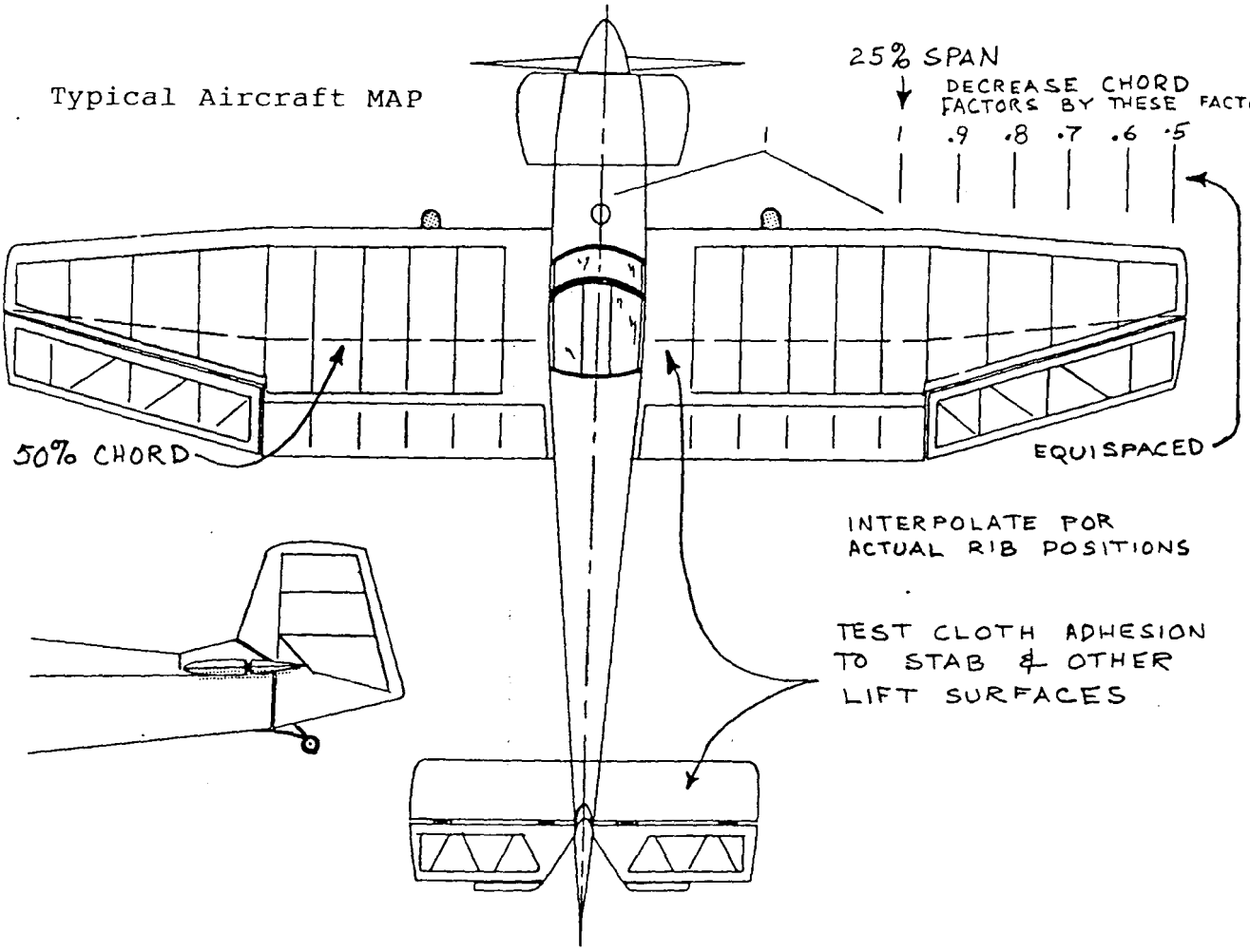
1. Fabric attachment tests. These tests have evolved from general values of chordwise rib loading modified by a general spanwise loading. When winglets, endplates & the like are installed, adjust the span loading by considering the height of the tip appendage as extra wingspan.
2. At the discretion of inspector or owner, test spacing can be lengthened if it is observed that initial test values & appearance of covering indicate that no doubt exists over untested length.
3. Test values & formula are based on typical ultra light & amateur built aircraft & **FAR23** Appendix A.
4. A **"map"** (**marked attachment positions**) must be made for each aircraft type. Designer may provide this or make per guidelines herewith.
5. Obtain a scale top view of the aircraft showing position & identity of all ribs & lift support structure (including tail or canard).
6. Obtain a scale side view of fin & rudder & mark in support structure - ribs etc.
7. If underside is different than topside then obtain bottom view also & mark structure on it.
8. a. Determine average wing loading W/S where:
   W = Gross Weight in lbs or kg
   S = wing area in sq ft or sq meters
   b. Determine rib spacing, R, in feet (ft) or meters (M)
   c. Select applicable **Safety Factor, n**, from aircraft data sheet. Example - from **FAR23**, **n** is: Normal Category 3.8, Utility Category 4.4, Aerobatic Category 6.0.
   d. Determine test pull load F = location factor

T (lbs) = .525 x W/S x n x R x F or **Tm (kg) = .035 x W/S x n x R x F**

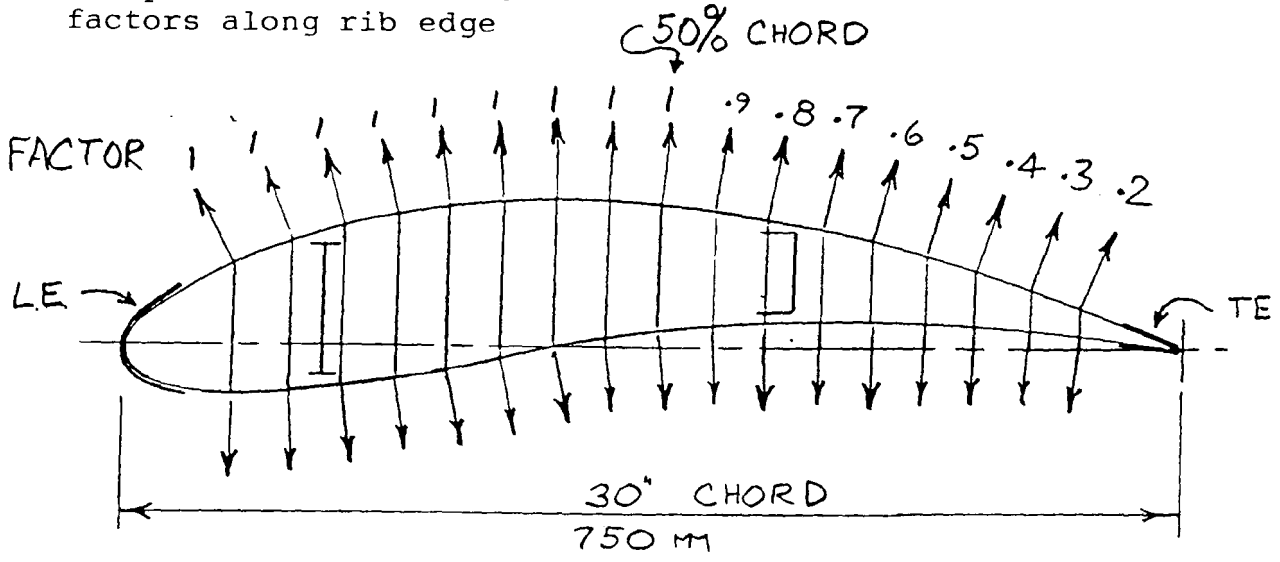
9. Establish values for wing rib per formula in #8 above.
10. Mark inboard wing ribs with these values factored as required.
11. Mark on map values for outboard ribs adjusted for span loading factors.
12. For test pull loads for control surfaces use 75% of maximum wing test values near spar & 25% maximum wing test values near LE & TE. Test both top & bottom surfaces.
13. a. For Normal & Utility Category aircraft (**FAR23**)
    -Test underside of wings to 50% of topside values.
    b. For Aerobatic Category test underside of wings to same values as topside.

Appendix A - Continued next page

Typical Aircraft MAP

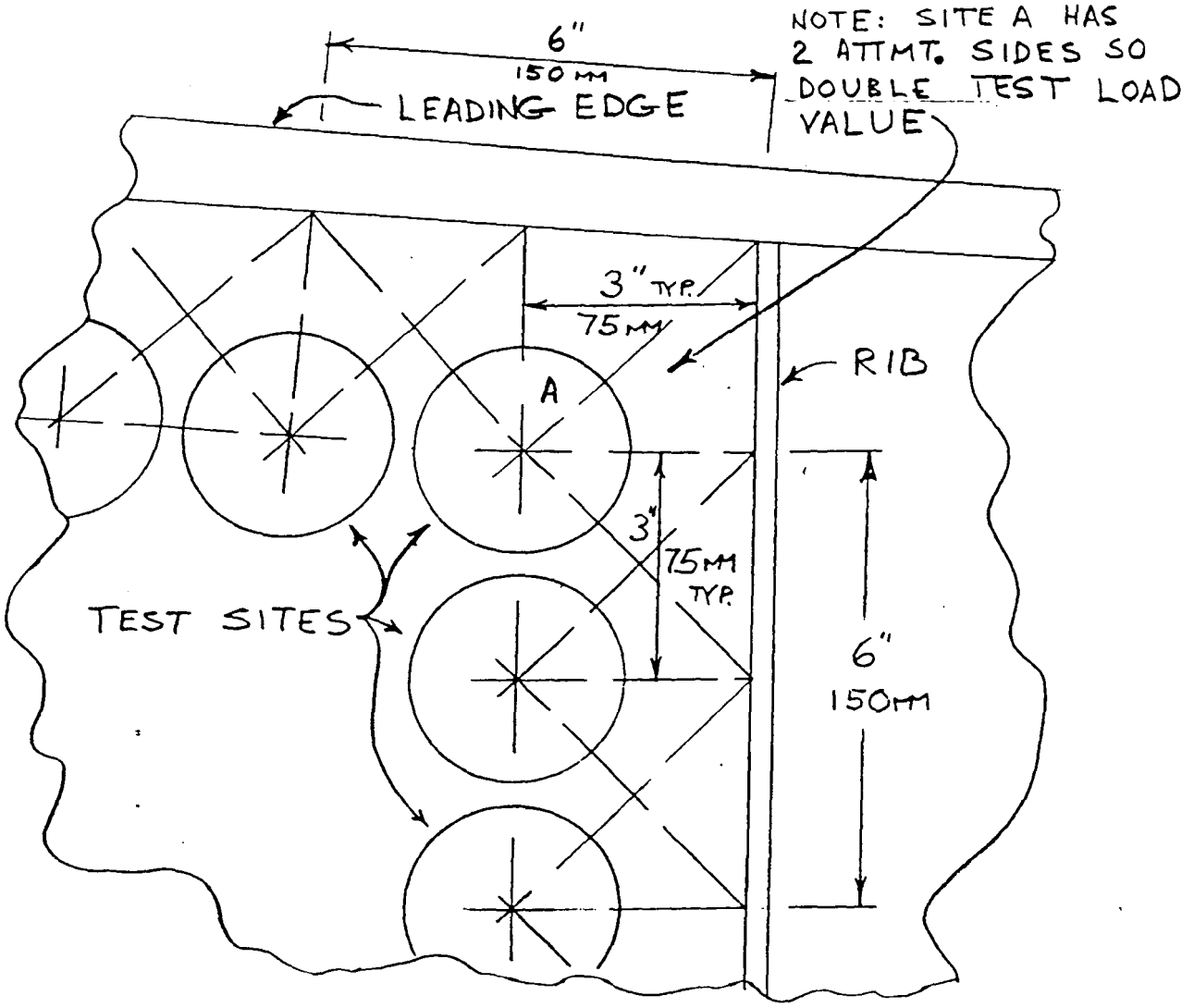


Example of test sites & factors along rib edge



FOR 60" CHORD - 2 x TEST SITES - INTERPOLATE FACTORS

DESIGNED BY:	QUANTITY:	INSTALLATION: INSPECTION PROCEDURE 931101	DRAWING NO. Appendix A
	FINISH:		
DRAWN BY:	DATE: Apr. 15/97	TITLE: TEST SITE LOCATING	ISSUE NO. A / SHEET NO. 1of 2
	SCALE:		



DESIGNED BY:	QUANTITY:	INSTALLATION: INSPECTION PROCEDURE 931101	DRAWING NO. Appendix A
	FINISH:		
DRAWN BY:	DATE: Apr. 15/97	TITLE: TEST SITE LOCATING	ISSUE NO. A / SHEET NO. 2of 2
	SCALE:		

U870327 C

HOW TO ORDER HIPEC

1. Review HIPEC literature and select method of finishing and products required.

2. HIPEC SUN BARRIER

   Calculate total area in square feet to be coated with HSB. Order 1 L. (1 quart) per coat per 100 sq. ft. Add 10 to 25% for "good measure".

3. HIPEC TOP COAT

   Calculate total area to be coated with each color of HIPEC TOP COAT. This area will usually be the same as for HIPEC SUN BARRIER.

   Order 1 quart per 100 sq. ft. per coat. Add 10 to 25% for possible waste. (1 L per 7 M^2)

4. HIPEC PRIMER SURFACER

   Order 1 quart per 75 sq. ft.

5. HIPEC THINNERS

   Although HIPEC is in a consistancy ready to spray, it may be thinned up to 10% with HIPEC THINNERS to suit spraying conditions. Order 10% HIPEC THINNERS.

6. BRUSHABLE HIPEC TOP COAT

   You may want to brush on some lettering. If so, order appropriate quantity of HTC color component "A" and component SPECIAL "B". Note that this mixture is 2 parts A to one part SPECIAL "B". This mix is ONLY for Brushable HTC.

7. In cold dry conditions - order SUPER CAT as required.

Place orders direct to Hipec dealer or:

Falconer Avia Inc.
7739 - 81 Ave.
Edmonton, Alberta, Canada T6C 0V4
Ph: (780) 465-2024 Fax: (780) 465-2029

Warranty and liability is limited to replacement of defective merchandise only. No further liability is undertaken.

sales@falconaravia.com

960514

HIPEC® Finishing Kits are available for Wood as well as **Metal Aircraft**, such as **Zenairs** and **Vans**. **Each Kit is tailored to the specific aircraft** and contains the required amount of **HIPEC®** liquids to coat the fabric and metal parts and the required amount of. fabric to cover the airframe.

Fabric for Ultralights is the new generation high strength **1.6 oz./sq.yd., FF55.** Most homebuilts have **2.7 oz., FF75** fabric while bigger homebuilts such as **Avid Amphibian and S14 Maranda** are supplied with **3.5 oz. Lincoln Cloth or Ceconite 101.** These are heat shrinkable polyester fabrics made from **Dupont Dacron** filament.

The **HIPEC® Sun Barrier** base coat is very unique in that IT IS A VERY POWERFUL ADHESIVE. **HSB WILL ADHERE THE FABRIC TO WOOD, STEEL OR ALUMINUM RIBS** eliminating the need for rib stitching and taping. This saves countless hours of labor, weight and cost. It also results in an aerodynamically smooth surface. This novel feature has been demonstrated at many airshows including **EAA's Arlington, Sun'N Fun & Oshkosh** shows. A 300 lb person can stand in a square foot panel and the fabric attached with **HIPEC® Sun Barrier** will hold the 300 LBS without breaking the fabric or tearing away from the structure.

The First coat on fabric is **HIPEC® Sun Barrier** brushed on.
Second coat is **HIPEC® Top Coat** sprayed on.
If the top coat is Sparkle-Sparkle metallic, a clear coat is sprayed over it.
HIPEC® is flexible and very abrasive resistant. Sanding between coats is rarely required.
HIPEC® SLEEK requires only one coat for UV protection & performance increase on U/L craft.

HIPEC® has been on aircraft since 1963.
Once applied, **HIPEC®** can last 20 years or more in hot sun or Arctic cold.
HIPEC® is inert to most chemicals.
HIPEC® coats BOTH fabric and metal - no need for matching enamels.

NOTICE:

Many of the new ultralight aircraft are being flown with fabric that has no ultraviolet protection whatsoever. This is a dangerous combination that can be lethal when coupled with a pilot who is unaware of the effects of ultraviolet deterioration.

Most of these type of aircraft can be protected with:
HIPEC® Sun Barrier and **HIPEC® Top Coat**
with a cost in weight of only 5 or 6 lbs or less added to the total aircraft weight.

An aircraft exposed to the sun will have massive fabric strength deterioration
if left in the sunlight within 2-3 years or less
IF NOT PROTECTED FROM ULTRAVIOLET LIGHT.
Please use **HIPEC® Sun Barrier or HIPEC® SLEEK** to protect your aircraft **from UV deterioration** and **FLY SAFELY**

Satisfied builder Ken Legault wrote this letter.

Ken Legault
Site 18, Comp 5
RR#1
WHITEHORSE, Yukon Territory
Y1A 4Z6

Tel: 403-668-7292

April 11, 1988

Dear Chris,

Please find enclosed a few pictures of my "Renegade Spirit" which I recently completed and now have test flown. It flies beautifully.

I used your **HIPEC®** paint and actually enjoyed the finishing process.

First I used your **HIPEC® Attach GLOO** then the **HIPEC® Sun Barrier** then **HIPEC®** finishing colors white and red sparkle sparkle. It came out quite nicely, as you can see in the accompanying photos.

Thank you for a good quality product.

Yours sincerely,

Ken Legault

Ken Legault

HIPEC® Manual "the Modern Method"

News release **051203**

HIPEC FINISHING SYSTEM GETS LSTC

The Canadian made Hipec finishing system has been issued a Limited Supplemental Type Certificate for use on an Ercoupe 415D that has a full certificate of airworthiness. The first Ercoupes had cotton fabric and dope covered wings. This one's wings are being completely recovered with Superflite polyester certified fabric and the very flexible Hipec. As soon as job is complete, the system is eligible for a full Supplemental Type Certificate. Additional group types of aircraft can be approved after short application manual is approved.
Hipec has several big advantages over its competition. Only 3 coats are required – 2 coats of Hipec Sun Barrier and one cross coat of Hipec Top Coat Color. Each wing surface was timed and it took two people only 10 minutes to do each side for each coat – a vast saving of labor. Hipec is made in Canada so is much less expensive. Cost of Hipec liquids including color to do the Ercoupe wings will be less than $400. This also includes 1L of Hipec Attach Gloo used to secure fabric panels to aluminum structure and grommets, inspection rings and surface tapes to fabric. There is no need to use a separate matching enamel for metal inspection covers and fairings – the Hipec Sun Barrier as primer and Hipec Top Coat is just fine.
When dry, the Hipec Top Coat is very glossy. It is a special formulation polyurethane available in semi gloss, metallic, fluorescent and pearl. It lasts indefinitely, needing only occasional light polishing on top surfaces. It is not a car finish with flexibilizer. The flexible feature is in the formulation.
To obtain the LSTC, a very severe test program had to be completed. Surface tapes and inspection rings were shown to stay adhered after being in a QUV test chamber for 1000 hours. Not a single failure occurred. To get the LSTC we used the services of Mirko Zgela, DAR, of Centre d'Expertises en Technologies in Boucherville, QC.
The Hipec Finishing System has been used on hundreds of ultra light, amateur built and owner maintenance aircraft since 1964. Its great advantage for these type aircraft has been the ability of the Hipec Sun Barrier to secure fabric to structure without rib stitching or taping. At airshows and demos, the heaviest person in the audience is invited to stand in a test panel. He is often over 300 lbs and fails to push off the fabric which is attached only by the Hipec Sun Barrier. Tests conducted by students of the University of Alberta and partially funded by an Alberta Research Council IRAP program, showed that fabric would stay secured with a pressure of 120 psi in test chamber temperature at 140 deg. C for over 24 hours. This represented the most severe test that an aircraft would be expected to encounter.
Hipec is made in Edmonton, Alberta, center of a huge petrochemical industry. It was designed and is marketed by Falconar Avia Inc., 11343 104 St., Edmonton, AB, T5G 2K7, 780 465 2024, website www.falconaravia.com. Quebec sales rep is Bruno Gauthier, phone/fax 418 690 0849.

FLEXIBLE FINISHES

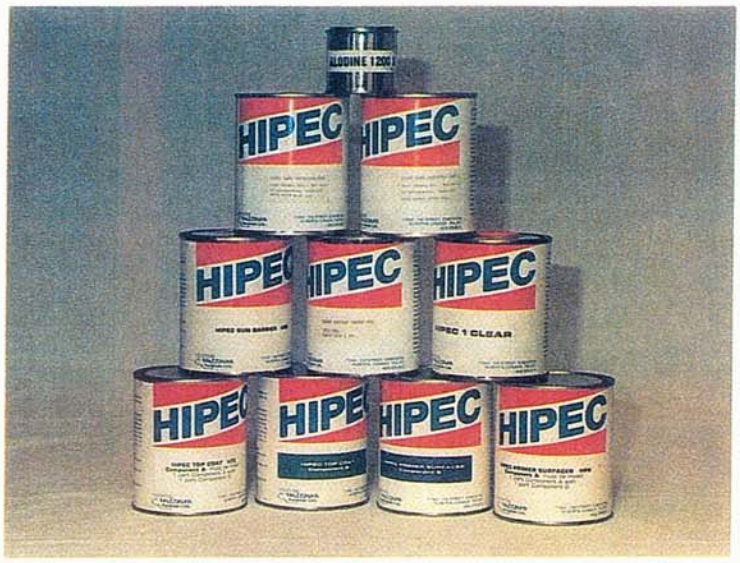
by

FALCONAR AVIA INC.
7739-81AVE
Edmonton, Alberta, Canada
T6C 0V4
www.falconaravia.com
email: Sales@falconaravia.com

STANDARD COLOR CHART FOR HIPEC TOP COAT

Pure White	Light Lemon Yellow	Energy Yellow	Sport Yellow
Midnite Black	Sunset Orange	Aerobatic Orange	Tangerine
Fireside Red	Pure Red	Racing Red	Deep Pearl Red
Marlin Blue	Lunar Blue	Alberta Blue	Apollo Blue
Bright Lime	Banff Green	McAllister Green	Insignia Blue
Corbins Beige	Caramel Brown	Chocolate Brown	Sun Gold Metallic
Bright Blue Metallic	Dark Aqua Metallic	Sparkling Silver Metallic	Racing Red Metallic

Printed reproductions of colors may not be precise, as some shades and metallics in particular, are hard to reproduce.



HIPEC Flexible Finishers

Chris Falconar showing adhesion
to structure capabilities.

Bill Neelin's ACRO 2

ARV Golden Hawk

Ray Nichol's Murphy Renegade
— no ribstitching or surface taping

Bob Maxwell's
– Falconar Jodell F11

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