#6 Edge and Surface Finishing

This brief gives advice for:

- **Procedures**
- **Equipment and Materials Suppliers**

Procedures

Be sure to follow the manufacturer's safety recommendations for equipment and materials used with ACRYLITE FF acrylic sheet.

Type of Finish

Finish	Method
High Luster	Polishing
Satin	Sanding Method
Matte	Scraping (Edges only)
Medium High Luster	Flame Polishing (Edges only)
Matte to Medium Luster	Edge Finishing Machines

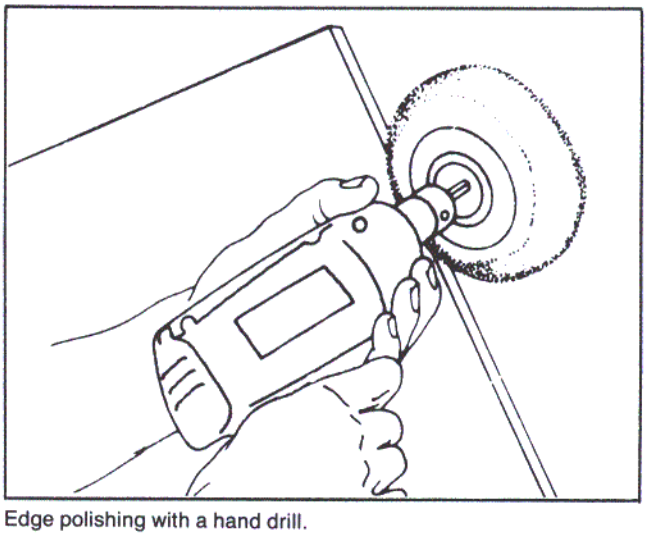
Preparation

The amount of finishing required to produce a smooth, transparent edge is dependent on the quality of the machined edge. A sharp and properly designed cutting tool will reduce the amount of the finishing work needed. Finishing work is also reduced when a spray coolant is used with the cutting tool to prevent excessive heat build-up.

Polishing Edges

Polishing creates the best finished edge but requires the most preparation. A well machined (milled) edge can be polished without prior sanding. However, a saw-cut must be either sanded, run through a jointer, shaper, router or edge finishing machine, or be hand-scraped before it can be polished. Edge polishing is best done on a stationary polishing head. Use 8" to 14" (200-300 mm) diameter bleached muslin wheels designed with bias strips which give the buffing wheel a pleated appearance. This design runs cooler than a stitched buffing wheel design and will do a faster job.

Edge finish quality depends on the selection of the polishing compounds. The use of a medium cutting compound will give a fairly good finish in one operation. For a high luster finish, it is best to first use a fast cutting compound to remove all sanding marks, and then a high luster compound for the final buffing operation.



Edge polishing with a hand drill.

Be careful to avoid excessive heat buildup when buffing edges. Too much heat can induce stress into the sheet and eventually cause crazing. To reduce to a minimum the amount of stress, anneal the part, if possible, after all fabrication steps are complete (including polishing). See Tech Brief #12 on Annealing for the proper procedures.

Polishing Surfaces

If the scratches or machining marks are not too deep, the surface can be polished without prior sanding. Wheels used for surface polishing can be from 6" to 12" (150-300 mm) in diameter, built up to a width of 1½" to 2" (38-51 mm). They are made of soft, bleached muslin for the initial polishing operation and of soft flannel for the final finishing.

For the first buffing operation use a medium-coarse polishing compound or a fine compound depending on the depth of the scratches.

When polishing the surface of the sheet, the piece must be kept in motion at all times. Do not use excessive pressure, as softening from over-heating can result.

Sanding Edges

Wet sanding is desired for finishing acrylics. Normally, 180 to 320 grit "wet-or-dry" paper is used along with plenty of water. If done by hand, use a sanding block to keep the edges even. Only light pressure should be applied when grinding with power sanders to minimize frictional heat which can cause gumming from over-heating of the acrylic. Follow "Polishing Surfaces" procedure for a higher finish.

Sanding Surfaces

A scratched surface should not be sanded unless the imperfections are too deep to be removed by polishing alone. If sanding is required, it is recommended that wet sanding be used. The application of water makes it possible to produce a smoother finish, because a fine-grit sandpaper can be used. Without water, this same fine-grit paper would fill up and over-heat the acrylic.

For very deep scratches, a 240-grit or 320-grit paper will be coarse enough to start the sanding process. This first step should be followed, after rinsing, by a 400-grit, and then by a 600-grit paper. Be sure to use plenty of water and rinse the sandpaper frequently to keep it from clogging. With power sanders, only light pressure should be applied to reduce friction. Follow "Polishing Surfaces" procedure for a higher finish.

Scraping Edges

Easiest of all finishing techniques is scraping. A scraper can be almost any piece of metal with a sharp, flat edge. Special acrylic scraping tools are available from your ACRYLITE acrylic sheet distributor. Whatever tool you use, it must have a sharp, square edge.

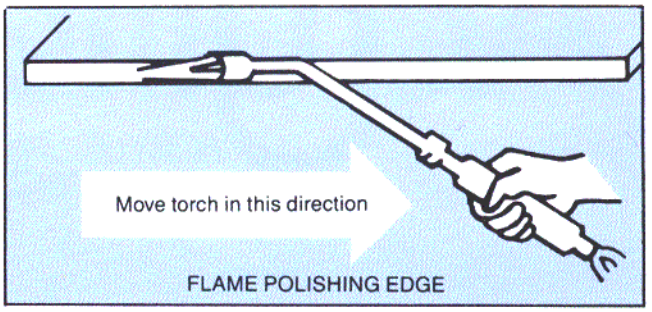
Hand scraping is an alternative to sanding for preparing the edges for polishing. Used in conjunction with flame polishing, high luster edges are achieved, but without the smoothness of sanded and polished edges.

Clamp the work vertically. Start at the rear of the edge with the scraper tilted 45° and draw with uniform speed and pressure to the front. A uniform strip should be removed. Follow an edge polishing procedure for a higher finish.

Flame Polishing Edges

Flame polishing should be done with an oxygen-hydrogen welding torch. The flame should be bluish, nearly invisible, approximately 3" (75 mm) long and narrow. Hold the torch at the angle shown and draw the flame along the edge of the sheet. Practice will help you to estimate the speed and distance. If the first pass does not produce a completely polished edge, *allow the piece to cool,* then try a second pass.

The sudden heating of the sheet when flame polishing induces a high degree of stress into it.



FLAME POLISHING EDGE

After flame polishing, be sure to anneal the part. This will decrease the amount of stress and reduce or prevent the chance of crazing over time. See Tech Brief #12 on Annealing for more information.

Edge Finishing Machines

Commercially available edge finishing machines offer a fast method of obtaining smooth edges without sanding or scraping. Finishes range from smooth edges with slight machining marks to smooth, almost polished edges, depending on the design of the machine and cutting tools used. Machine finished edges are ideal for cementing or flame polishing, but are sharp and require some additional fabrication to make them safe for handling.

Care should be taken to adjust the feed rate to eliminate chipping and melting. Feed rates too fast will result in chipping, while a slow feed rate will result in melting. Edge finishing machines will vary in cutter diameter and rotation speed. In general, machines with larger cutter and rotation speeds will permit faster feed rates without chipping.

Equipment and Materials Suppliers

The suppliers listed below offer materials and equipment tested and approved by CYRO Industries. Authorized ACRYLITE sheet distributors may also offer materials and equipment.

Buffing Equipment

Delta International
4290 E. Raines Rd.
Memphis, TN 38118
1-800-223-7278

Buffing Compounds

Lea Manufacturing Co.
Buff Division
75 Progress Lane
Waterbury, CT 06705
(203) 753-5116

Matchless Metal Polishing Co.
801 E. Linden Avenue
Linden, NJ 07036
(908) 862-7300

Sanding Materials

3M Company
Abrasives Laboratory
3M Center
St. Paul, MN 55144-1000
(612) 733-8460

Edge Finishers, Machine:

Edge Finisher Corporation
49 Richmondville Avenue
P.O. Box 5227
Westport, CT 06880
(203) 227-7027
FAX (203) 227-3187

Burmaq Edge Finishing Machines
American Woodworking Equipment
Distributor Corporation
110 W. Clarkstown Road
New City, NY 10956
(914) 634-7964
FAX (914) 634-7446

Edge Finishers,Tools:

Carter Diamond Tool Corporation
4475 Hamann Parkway
Willoughby, OH 44094
(216) 946-7800
(800) 628-8665
FAX (216) 946-5671

Pre-Flame Cleaner

Crystalclean
Discovery Plastics
P.O. Box 330
Tangent, OR 97389
(503) 926-2900

Post Finishing Cleaners and Polishes

Anstac 2M Cleaner
Chemical Development Corp.
22 Portsmouth Road
Amesbury, MA 01913
(508) 388-2221

210 and 210 Plus Plastic Cleaner
Sumner Laboratories
210 Lincoln Street
Boston, MA 02111
(617) 542-8656

Crystalclean
Discovery Plastics
P.O. Box 330
Tangent, OR 97389
(503) 926-2900

Plexus Plastic Cleaner
Plexus
638 Lindero Canyon Rd. #371
Agoura, CA 91301
(818) 879-1493

Finesse It Polishing System
3M Company
Microfinishing Systems Dept.
3M Center
St. Paul, MN 55144-1000
(612) 737-5467

Trouble Shooting

Problem	Cause	Solution
Dull edge after flame polishing	Missed spots	Allow to cool and reflame
		Change torch-tip size
	Too much heat	Increase rate of pass
		Adjust flame size
Char on edge	Dirt or contamination	Wipe with lint-free, dry cloth prior to flaming
	Wrong fuel	Use oxygen/hydrogen mixture
Edge blisters	Too much heat	See above
	Wet sheet (high moisture content)	Pre-dry sheet
Crazing after flame polishing	Incompatible cleaner used before or after flaming	Use approved cleaner

Additional Technical Information and Assistance

Technical Literature Available
For more detailed information, see your local Authorized ACRYLITE Sheet Distributor or contact CYRO Industries. Literature is available for these and other topics:

Physical Properties —
#1121 — "Physical Properties of ACRYLITE FF Acrylic Sheet"

Fabrication Tech Briefs —
These cover individual operations of fabrication such as cutting, drilling, thermoforming, etc. Be sure to ask for the latest listing of available Tech Briefs from your ACRYLITE sheet distributor or CYRO Industries.

Application Tech Briefs —
These cover required fabrication operations for specific applications like glazing, signs, etc.

Technical Service
For complete technical assistance contact CYRO Industries, Technical Service:

CYRO Industries
25 Executive Blvd.
Orange, CT 06477
(203) 795-6081

In Canada:
CYRO Canada Inc.
6285 Northam Drive
Suite 100
Mississauga,
Ontario L4V 1X5
(905) 677-1388
(800) 268-4743

Offices

For the name of your local Authorized Distributor
call toll-free 1-800-223-2976 or contact the nearest CYRO office:

Degussa, CYRO Industries, 379 Interpace Parkway, PO Box 677, Parsippany,
NJ 07054 800-631-5384 www.cyro.com www.degussa.com

Fire Precautions

ACRYLITE FF acrylic sheet is a combustible thermoplastic. Precautions should be taken to protect this material from flames and high heat sources. ACRYLITE FF acrylic sheet usually burns rapidly to completion if not extinguished. The products of combustion, if sufficient air is present, are carbon dioxide and water. However, in many fires sufficient air will not be available and toxic carbon monoxide will be formed, as it will when other common combustible materials are burned. We urge good judgement in the use of this versatile material and recommend that building codes be followed carefully to assure it is used properly.

Compatibility

Like other plastic materials, ACRYLITE FF sheet is subject to crazing, cracking, or discoloration if brought into contact with incompatible materials. These materials may include cleaners, polishes, adhesives, sealants, gasketing or packaging materials, cutting emulsions, etc. See the Tech Briefs in this series, particularly #1, Handling and Maintenance, for more information or contact your ACRYLITE Sheet Distributor or the CYRO Technical Center for information on a specific product.

Important Notice: The information and statements herein are believed to be reliable but are not to be construed as a warranty or representation for which we assume legal responsibility. Users should undertake sufficient verification and testing to determine the suitability for their own particular purpose of any information or products referred to herein. NO WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE IS MADE. Nothing herein is to be taken as permission, inducement or recommendation to practice any patented invention without a license.

Degussa, CYRO Industries, 379 Interpace Parkway, PO Box 677, Parsippany, NJ 07054 800-631-5384 www.cyro.com www.degussa.com

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