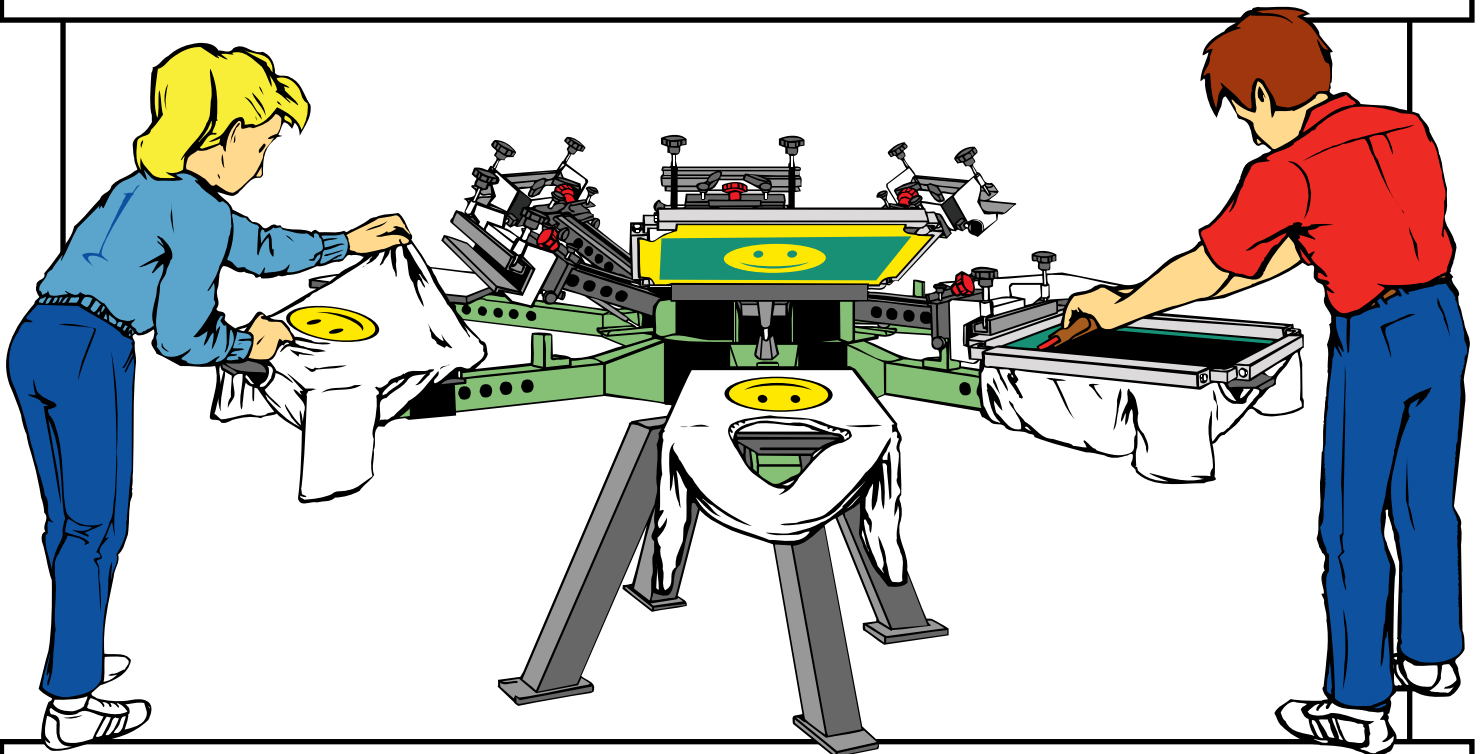




SCREEN PRINTING EQUIPMENT

INTRODUCTION TO SCREEN PRINTING

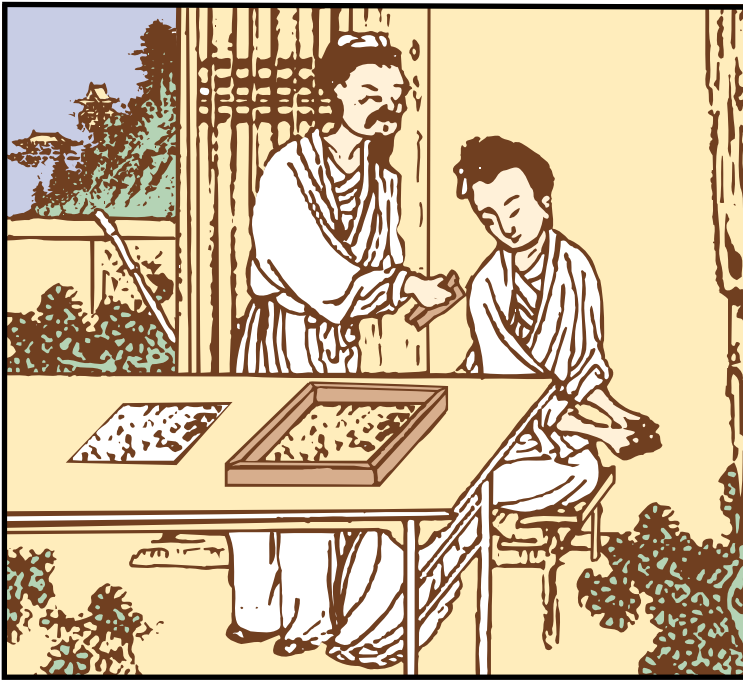
Welcome to our introduction to screen printing. We hope to answer at least some of your questions, but if you need more information, call 1-800-482-7839 or visit our website at www.VASTEX.com.



Screens - Exposure - Production - Cleaning



Written by: Douglas Grigar - Illustrated by: Mike Kelly and Douglas Grigar
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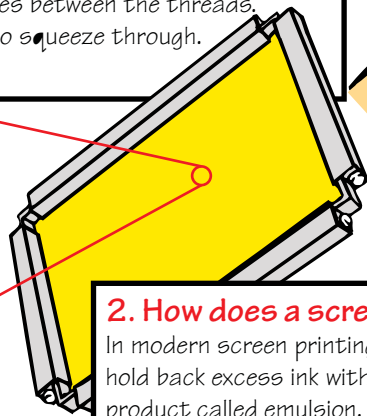
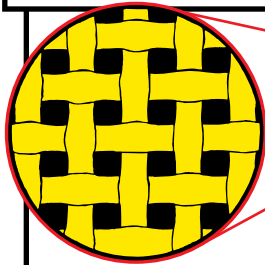
Screen printing? Whatever happened to silk?

The evolution of screen printing began thousands of years ago when printers around the world began using cut stencils made from natural materials and paper for printing. The Japanese and the Chinese developed wooden frames to support the stencil which was glued onto a woven fabric mesh. This mesh, originally made from human hair, eventually was woven from silk, hence the name "silk screen printing". The resulting mass production of ink-decoration on paper, clothing, books, and many other surfaces became an important part of Asian culture.

In the late 1800s, artists and printers in France and Germany advanced the process, and it was given an English patent in 1907. In the late 1930s, artists coined the term "serigraphy" (derived from the Latin word *seri* [silk] and the Greek word *graphein* [to write]) to describe this medium distinguishing it from commercial screen printing. Today, screen printing uses manmade threads of steel, nylon, and polyester - silk is no longer used.

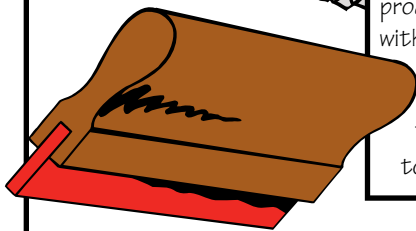
1. OK professor, how does it work?

Screen printing starts with just that: a screen - mesh fabric stretched tightly across a rigid frame. **What is mesh?** Mesh is a special fabric manufactured to have thousands of wide spaces between the threads. This spacing allows ink to **squeeze** through.



2. How does a screen make a print?

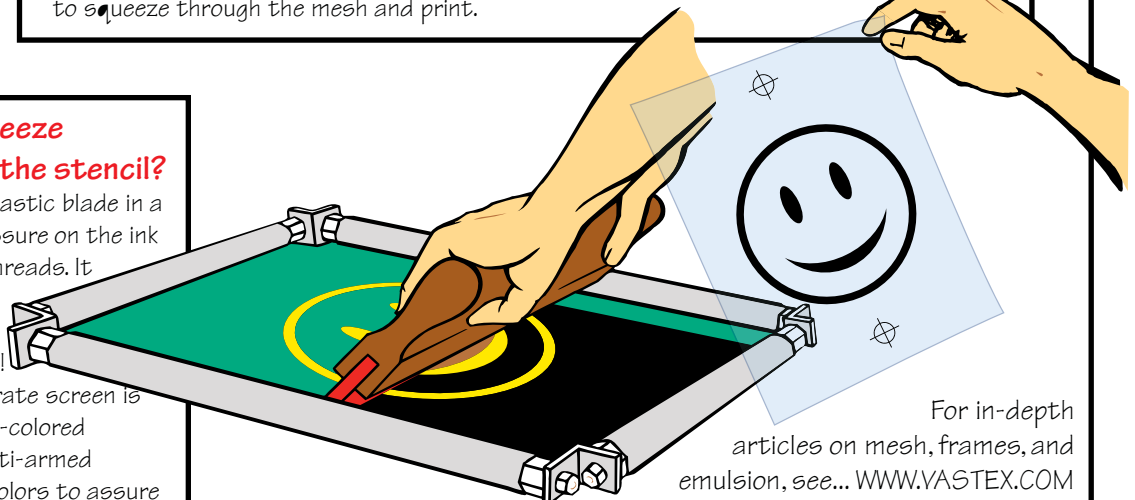
In modern screen printing, a stencil is made to hold back excess ink with a light-reacting product called emulsion. The mesh is covered with emulsion and dried. Then a clear film with dark art is placed on the screen and a light is cast on it (exposure). The areas under the dark art stay soft, and the other areas "harden." The soft parts are washed out, leaving open holes in the mesh, enabling the ink to **squeeze** through the mesh and print.



3. How does the ink squeeze through the mesh past the stencil?

Enter the **squeegee** a flexible plastic blade in a handle. The **squeegee** puts pressure on the ink and sends it past the fabric threads. It leaves a thin layer of ink on the product and "shears off" the excess. That's all there is to it!

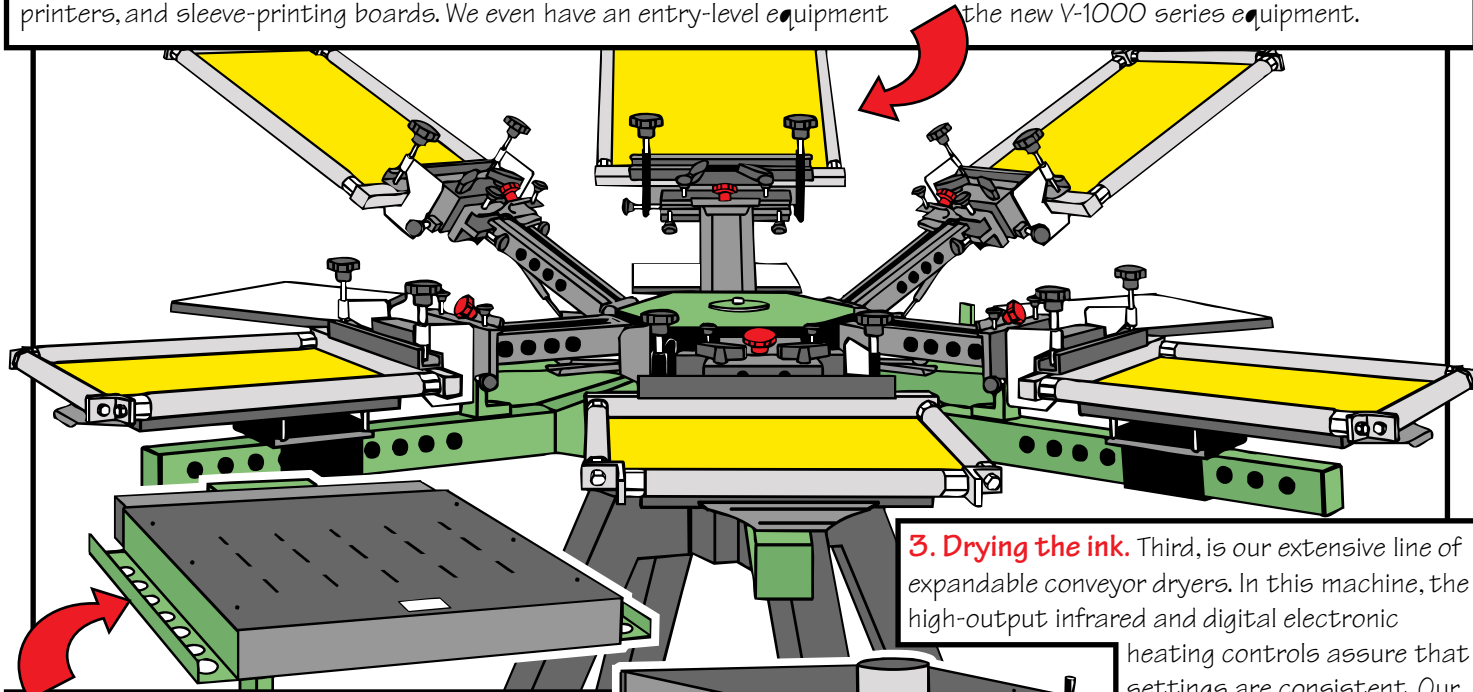
To print multiple colors, a separate screen is needed for each color. For multi-colored products, such as T-shirts, multi-armed printers are used to hold the colors to assure an exact line-up.



For in-depth articles on mesh, frames, and emulsion, see... WWW.YASTEX.COM

1. Since we're talking about printing T-shirts, let us introduce you to our T-shirt printing equipment.

First, our V-2000 HD multi-color T-shirt press. Simply put, this monster-like machine will hold multiple garments and print more than one color, while perfectly holding colors "in line." (Remember: Each color needs its own screen!) The V-2000 HD is available as a one-color "table top" model or with capabilities for up to a 10-shirt, 10-color-arm press. All of our V-2000 presses are expandable (to grow as your shop grows), and will hold our high-speed professional numbering systems, cap printers, and sleeve-printing boards. We even have an entry-level equipment the new V-1000 series equipment.

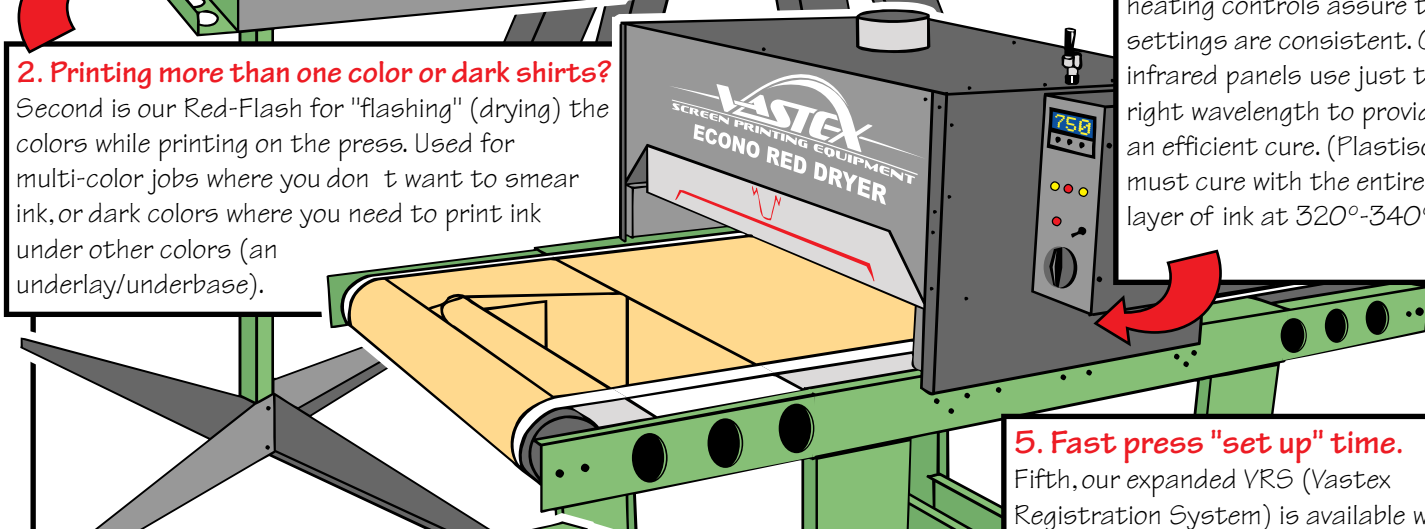


2. Printing more than one color or dark shirts?

Second is our Red-Flash for "flashing" (drying) the colors while printing on the press. Used for multi-color jobs where you don't want to smear ink, or dark colors where you need to print ink under other colors (an underlay/underbase).

3. Drying the ink.

Third, is our extensive line of expandable conveyor dryers. In this machine, the high-output infrared and digital electronic heating controls assure that settings are consistent. Our infrared panels use just the right wavelength to provide an efficient cure. (Plastisol must cure with the entire layer of ink at 320°-340°.)

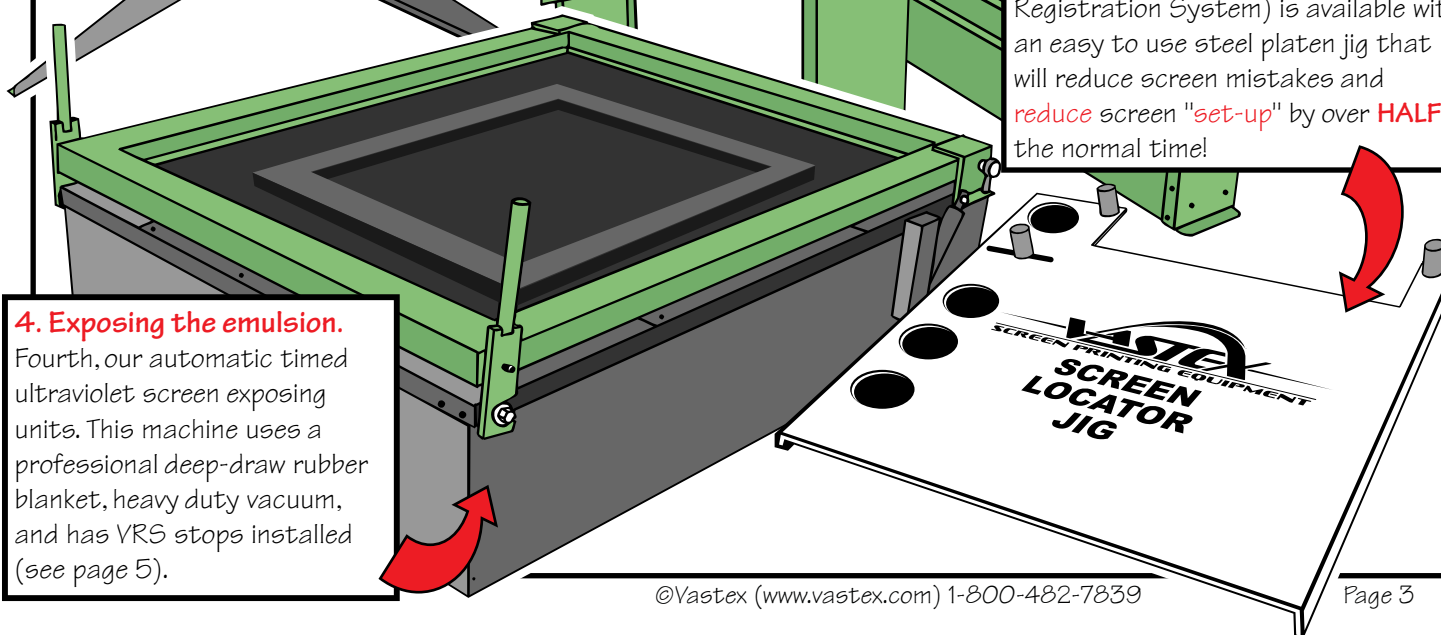


5. Fast press "set up" time.

Fifth, our expanded VRS (Vastex Registration System) is available with an easy to use steel platen jig that will reduce screen mistakes and reduce screen "set-up" by over **HALF** the normal time!

4. Exposing the emulsion.

Fourth, our automatic timed ultraviolet screen exposing units. This machine uses a professional deep-draw rubber blanket, heavy duty vacuum, and has VRS stops installed (see page 5).



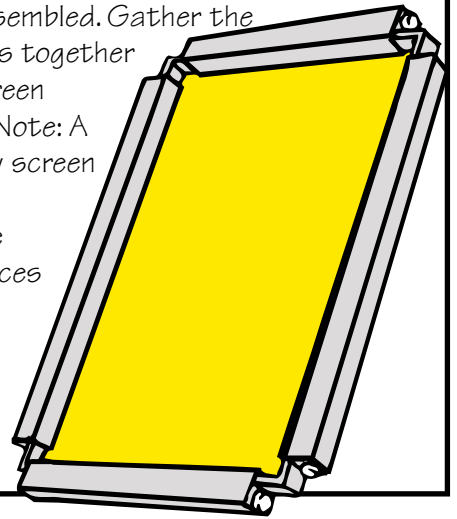


So, all that neat stuff shows up on the truck. Now what? Even though this equipment assembly is easier than programming a DVD player.

READ THE DIRECTIONS!

When unpacking, be careful not to break anything with a crowbar or a hammer. Have your electric service, sinks or booths for water washout, and drying cabinets ready. Call us if you are unsure about what you need (1-800-482-7839). **We can even provide on-site training** and have detailed supply information available. **We host Douglas Grigar's screen printing three day class: the highest rated, most respected and recommended class in the entire industry from 2001.**

1. How it all works. Start at the point when the press, exposure unit, flash, and dryer are in place and assembled. Gather the screen frames together and begin screen preparation. Note: A higher quality screen (such as a retensionable frame) produces the best results.*



*For an in-depth article on frames, suggested supplies, and other technical information, see www.VASTEX.com.

2. Clean (degrease) the screens. Even though they're new, the screens will still need a thorough cleaning. Lather up using a degreaser and a soft, clean brush. Rinse with clean water.



3. Place your screens into the drying cabinet to dry.



Contamination is prevented by using our drying cabinets

4. Fill a coating "trough" with the liquid emulsion. You are now ready to put the emulsion on the screens. This step is called "coating."

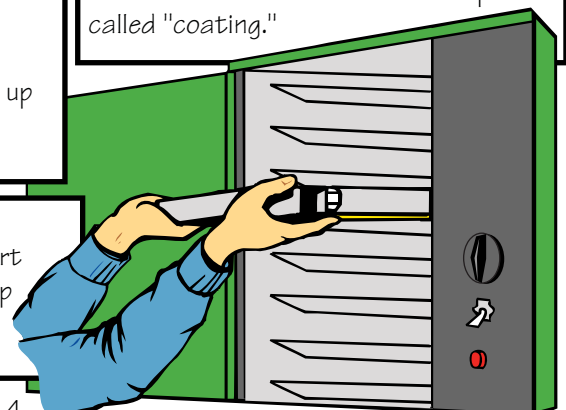
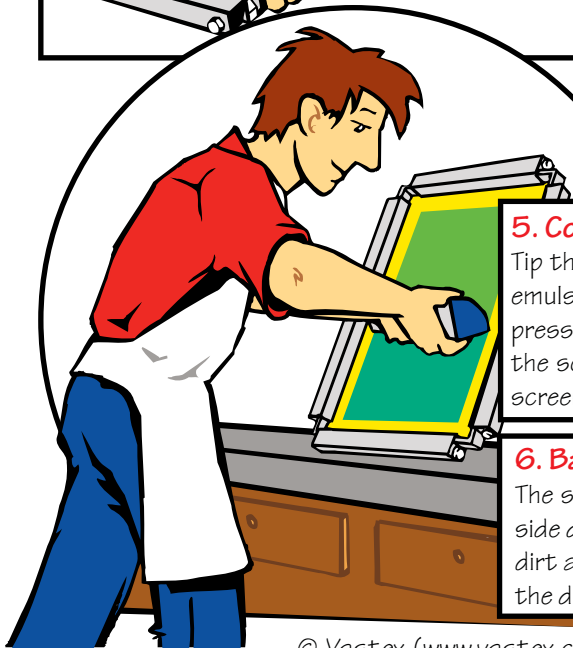


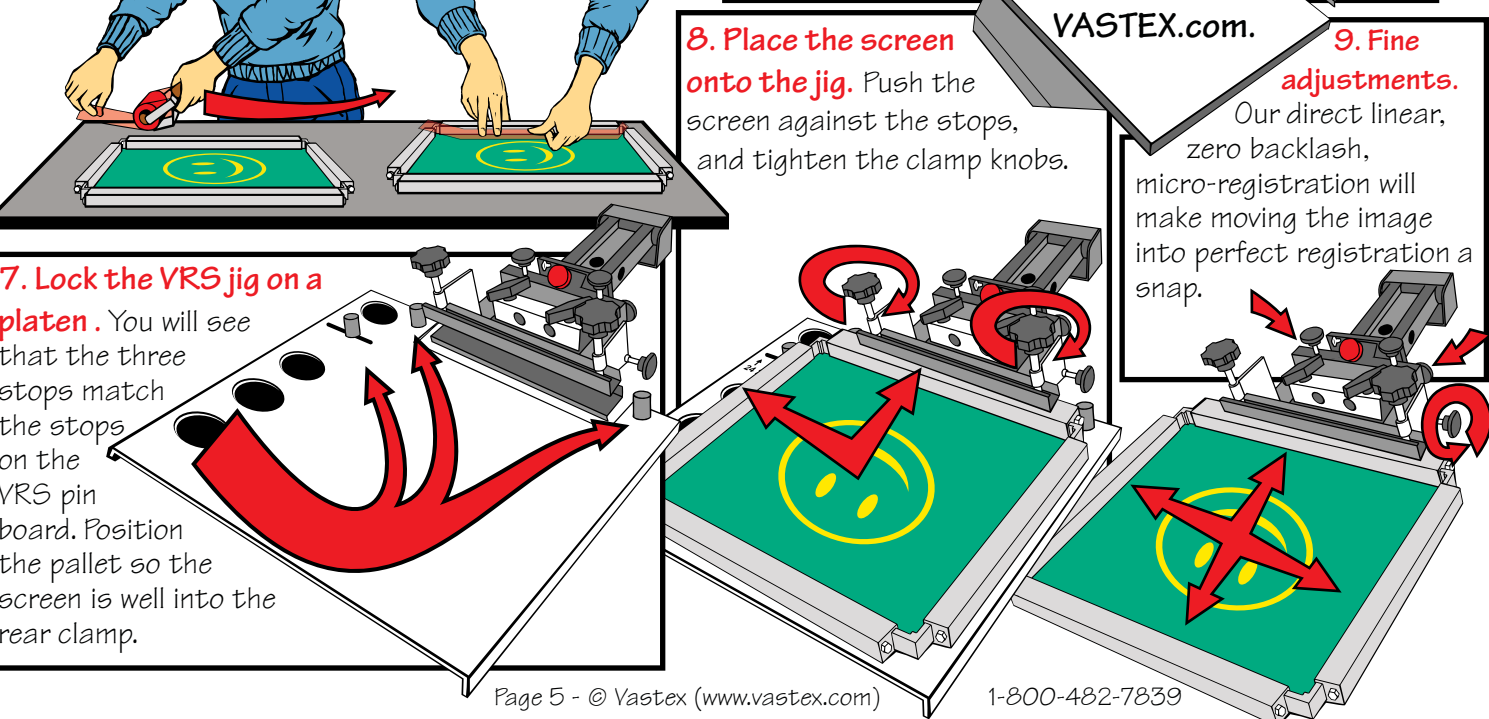
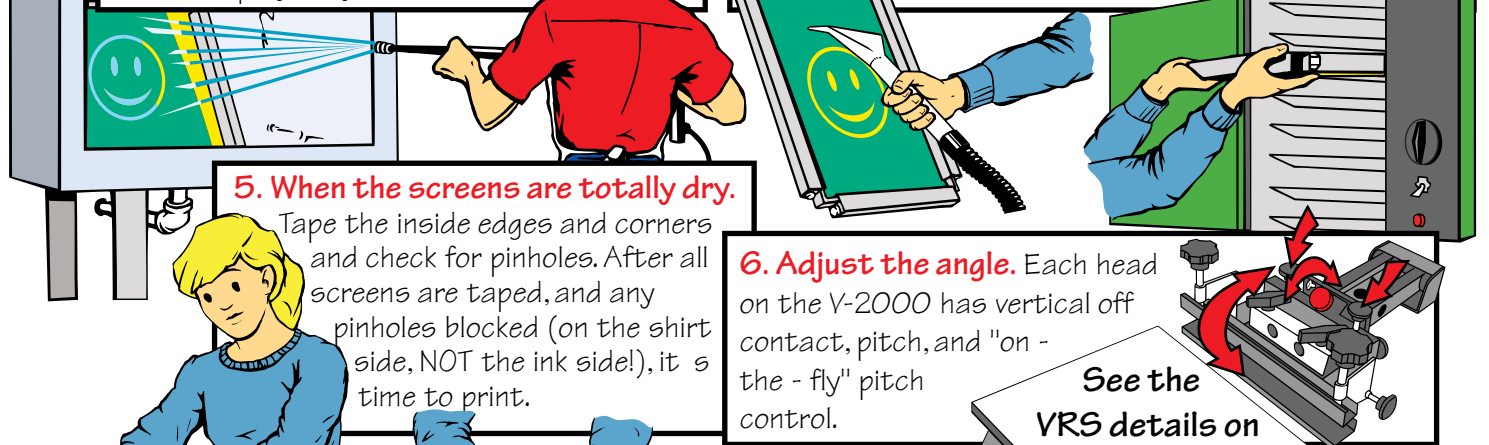
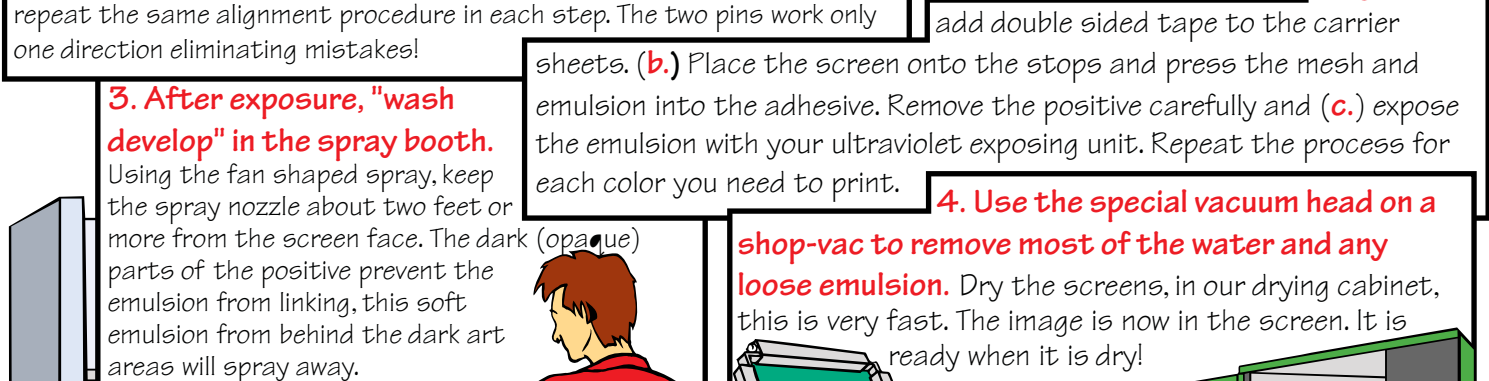
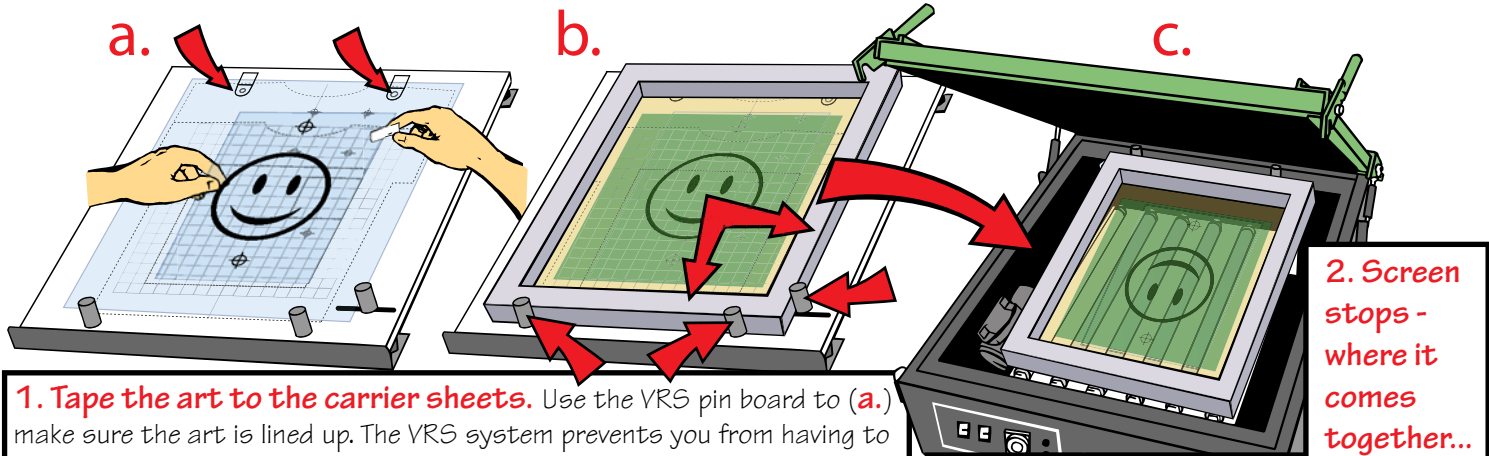
5. Coat the screens with emulsion.

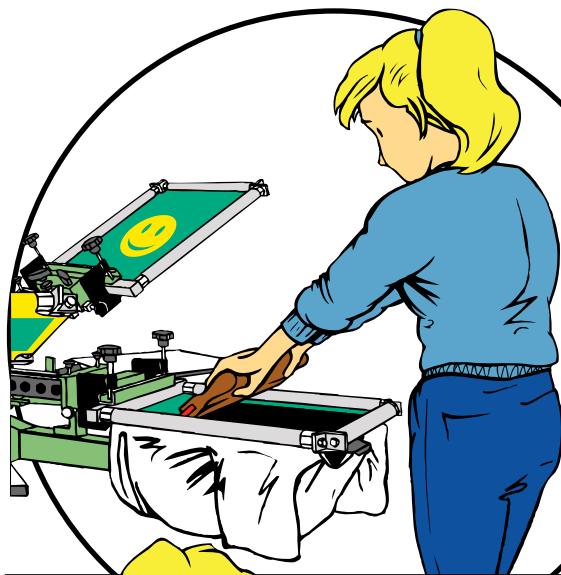
Tip the coating trough, when the emulsion flows to the mesh, apply pressure, and draw the coater slowly up the screen. Coat both sides of the screen (shirt then squeegee side).

6. Back into the drying cabinet.

The screen goes into the cabinet shirt side down. The drying cabinet will keep dirt and dust from accumulating on the drying screen.



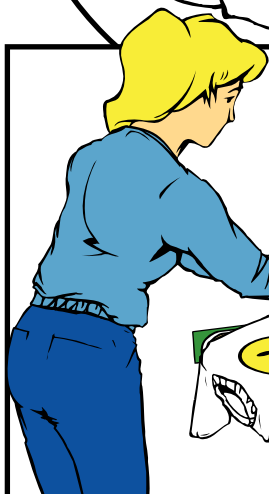
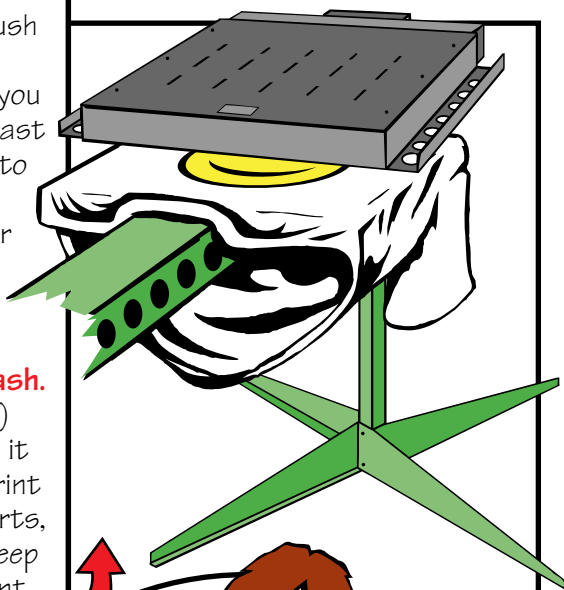




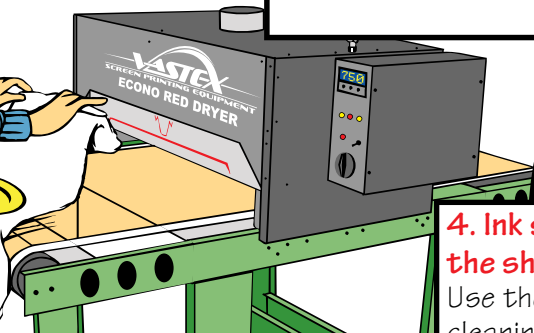
1. Print your colors. Push the squeegee across the screen. This step enables you to push the ink into and past the mesh and shear it onto the shirt. Lift the screen and move to the next color in line.

2. Flash with the Red-Flash.

The flash will tack dry (gel) the top of the ink so that it will not smear when you print the next color. On dark shirts, a printed undercolor will keep the print bright and prevent shirt color from showing.



3. Place the printed shirt on the dryer belt. The conveyor dryer will pass the shirt under the infrared heat for a consistent amount of time. Plastisol ink will cure (dry) when the total thickness reaches 320°- 340°. The dryer controls the speed (time) and heat.



4. Ink spots on the shirts?

Use the spot cleaning gun to blow out spots. Be careful, and wear protective gear.

READ YOUR SAFETY INFO!

Scorches can also be removed at this time with other chemicals.

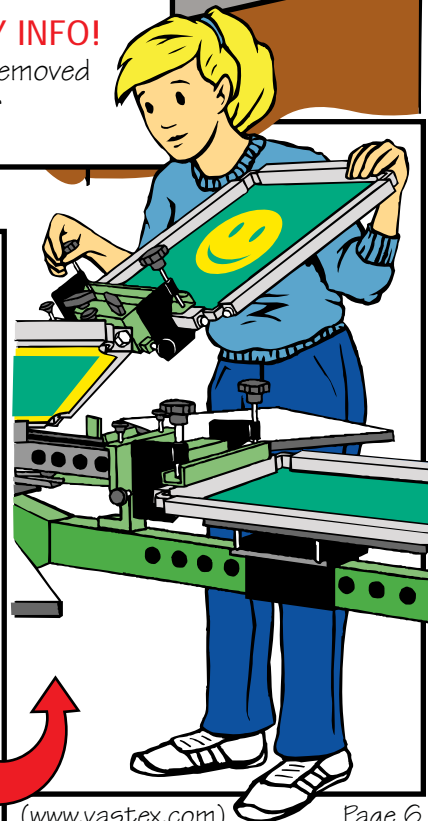


5. Fold and box up the shirts. They're ready for your customer.

First, inspect both sides carefully for problems and print quality.

6. Time to "break down" the press and start cleaning.

Scrape off the unused ink and return it to the buckets. Carefully remove the screens from the press and take all tools and screens to the wash area.

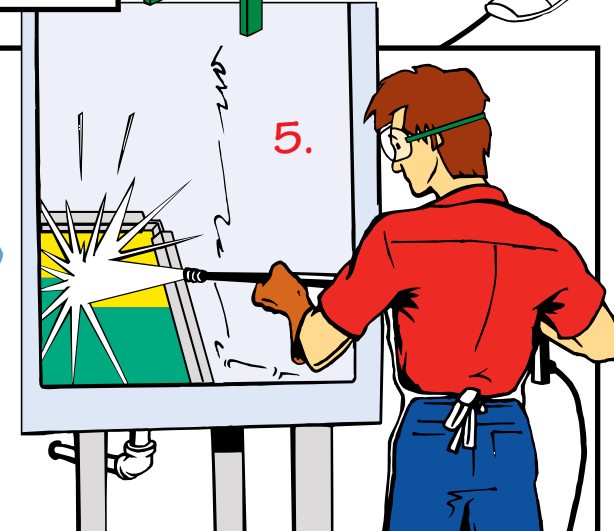
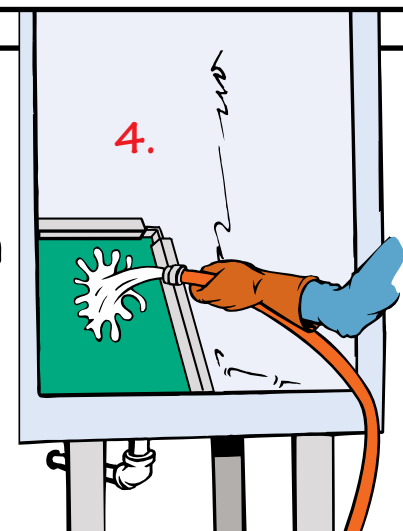
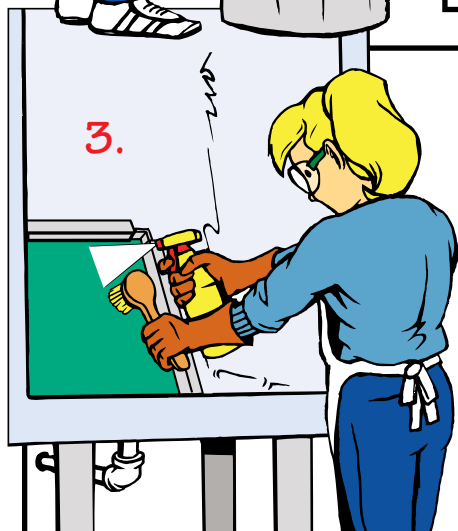




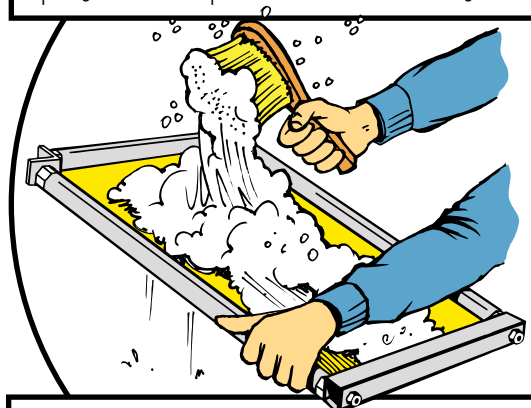
1. Pull off the tape. After scraping off as much ink as you can with a scoop or card, pull off the tape. The tape prevents the ink from leaking, but removing it can be very messy!



2. Wash the ink off the screen in the wash sink. Use an ink degradant, spray, then scrub and rinse off all ink in the wash sink. (Another option would be to rent chemicals and a recirculator from an outside source.)



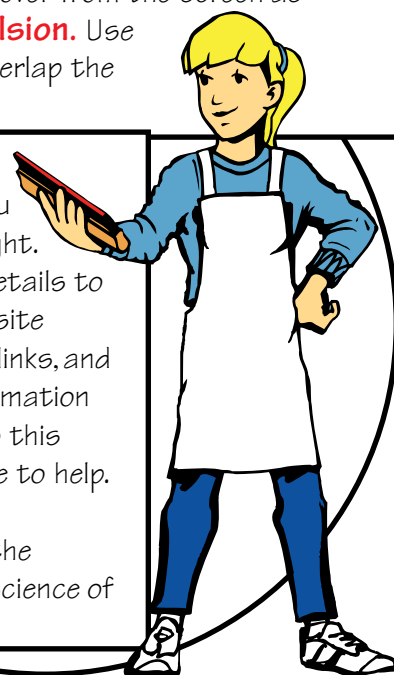
3. Reclaim the screens. Squirt on an emulsion remover, scrub with your brush, and allow it to set for a few minutes. The remover will start to break up the emulsion. Don't let it dry! (If it is allowed to dry, it will never come off.) **4. Rinse off the remover.** Rinse off as much of the loose emulsion and remover from the screen as possible to prevent the chemicals from falling back on you. **5. Blast off the emulsion.** Use the pressure sprayer set on "fan spray" to blast off the remaining old emulsion. Overlap the spray on each pass to remove every last speck of old emulsion from both sides.



6. Now, degrease again. Once again, lather up, rinse, and dry the screens. Now you're all ready for the next job.

Well, that's the end of our

illustrated introduction. We told you it wouldn't be as bad as you first thought. Keep in mind, there are lots of smaller details to each step. Be sure to check out our website www.VASTEX.com for articles, more info, links, and tips. Additionally, there will be more information available as we add detailed chapters to this illustrated manual. Questions? We'd love to help. Call 1-800-482-7839 or e-mail us at info@VASTEX.com. You'll soon discover the rewards (and profits!) in the craft and science of screen printing.



Screen Supplies

What is needed to start printing production.

Each item listed is a representation of the needed supply item, the product listed is what is included in the Vastex supply package. In almost all cases there are alternative products and brands available from your regional screen printing supplier. In some cases there are even items that can be purchased or made from supplies available from your local hardware, home improvement, or department store.

Please download the Vastex "Introduction to Screen printing" comic and follow along with the comic as a guide to where the supplies fit in the entire process. The comic is available for free from www.vastex.com in the education section. Please refer to the articles about frames, emulsion, mesh, and tips for more information (free downloads from www.vastex.com.)

Each item will be labeled with a word tag to help judge how important it is before a purchase is made.

The tags are:

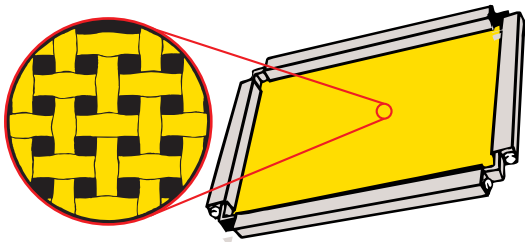
(Must have) - without this item a shop will not be able to proceed to the next step and complete a print.

(Should have) - this item is so useful and saves so much time that it is almost a must have.

(Need) - this item is useful and saves enough money, supplies or time that it is worth every penny, but the process can proceed with out it's use.

(Nice to have) - this item is useful and saves money or time, it is also worth every penny, but many printers do not use it.

1. Screens (Must have) - used to hold the stencil for printing [comic p. 2].



Twelve static aluminum frames 20" x 24" outside diameter frame size with the following mesh:

- 2 ea. 110 Dyed T thread plain weave mesh
- 4 ea. 156 Dyed T thread plain weave mesh

- 2 ea. 195 Dyed T thread plain weave mesh
- 4 ea. 230 Dyed T thread plain weave mesh

Note: For detailed art, process, or small dots add:

- 4 ea. 305 Dyed T thread plain weave (16 screens)

Note: The best choice for textile printing is the retensionable frame, but because the choices are so large with this product (and special tools are needed) please call or e-mail for additional information. 800-482-7839 or info@vastex.com

2. Degreasing chemical (Must have) - used to remove the contamination from the mesh [comic p. 4].

- 1 ea. Gallon screen mesh degreaser concentrate

3. Emulsion (Must have) - a photo reactive chemical used to make the stencil [comic p. 4].

- 1 ea. Gallon of photopolymer or dual cure emulsion

4. Two edged scoop coater (Must have) - used to apply liquid emulsion to the mesh [comic p. 4].

- 1 ea. Double edged 15" - 16" scoop coater



5. Drying cabinet (must have) - used to dry the screens. [comic p. 4,5]

Note: A drying cabinet can be purchased from Vastex or built from local supplies. Please see the article on drying screens on www.vastex.com for ideas.

6. Wash booth (Must have) - for developing, removing, washing, and degreasing [comic p. 5,7].

Note: A wash booth can be purchased from Vastex or constructed from local supplies.

7. Pressure washer (Must have) - for reclaiming and developing screens [comic p. 5,7].

Note: A suitable 1000 psi. pressure washer with fan spray head can be purchased from a local store.

8. Vacuum head (Nice to have) - for removing water and scum from exposed screen [comic p. 5].

1 ea. Screen vacuum head attachment for a shop vac.

9. Tape (Must have) - used for trapping ink in the screens, taping the squeegee blade, and the famous "tape trick" (needs clear tape) [comic p. 5,7].

Note: Two inch plastic clear and tan tape with rubber adhesive can be found in any office supply store. (Scotch 370 or 375 are good choices)

10. Platen protection tape (Nice to have) - for covering platens making clean up faster.

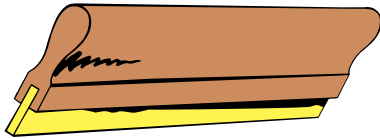
1 ea. Pallet Protection tape 18" x 100 yard roll

11. Squeegees (Must have) - for pushing ink onto the shirts [comic p. 2, 6].

Note: Each press will need at least one squeegee for each color print arm. Shorter squeegees will be needed for small logos

4,6 or 8 ea. 14" Wooden handle squeegee (70 duro.)

4,6 or 8 ea. 7" Wooden handle squeegee (70 duro.)



12. Goop Scoops (Need) - for moving ink.

4,6 or 8 ea. One for each print head

Note: This item can be replaced with metal or plastic paint scrapers. Sharp edges must be rounded.

13. Plastic transfer cards (Nice to have) - For moving ink in the screen.

4,6 or 8 ea. One for each print head

Note: This item can be replaced with old credit, phone, or membership cards.

14. Screen block out (should have)

1 ea. Quart screen emulsion blackout

15. On press wash (Must have) - for cleaning ink

from the mesh or changing colors while printing.

1 ea. Gallon on press wash (photopolymer safe)

16. Platen adhesive (Must have) - used to tack down garment to the platens.

1 ea. Gallon platen adhesive (water based)

17. Spot cleaning gun (Must have) - for removing cured ink spots [comic p. 6].

1 ea. 110v. spot remover gun

18. Spot cleaning fluid (Must have) - used in spot guns [comic p. 6].

1 ea. Gallon spot fluid



19. Screen scrub brush (Must have) - for use while cleaning and degreasing [comic p. 7].

2 ea. Fan bristle brushes with handles

2 ea. Bristle brushes

Note: Brushes can be found at any hardware or home improvement store.



20. Plastisol Inks (Must have) - a PVC ink that does not air dry [comic p. 6].

1 ea. Gallon Plastisol Black

1 ea. Gallon Plastisol White (High Opacity for cotton)

1 ea. Gallon Plastisol White (HO/Low Bleed for 50/50)

1 ea. Gallon Plastisol Red

1 ea. Gallon Plastisol Yellow

1 ea. Gallon Plastisol Royal Blue

1 ea. Gallon Plastisol Navy Blue

1 ea. Gallon Plastisol Green

- 1 ea. Gallon Plastisol Grey
- 1 ea. Gallon soft hand - detack
- 1 ea. Gallon curable reducer

Note: Ink colors are suggestions, any colors available can be chosen as replacements.

21. Plastisol ink degrader (Must have) - used to remove ink residue [comic p. 7].

- 1 ea. Gallon ink (plastisol) degrading Ink wash

22. Emulsion reclaiming (Must have) - Used to remove used emulsion from the mesh [comic p. 7].

- 1 ea. Gallon of emulsion remover in a concentrate form.

23. Haze and stain remover (should have) - used to remove stains (haze) from mesh [comic p. 7].

- 1 ea. Gallon of two part haze remover and activator.

24. Squeeze spray bottles (should have) - used to apply chemicals to screens [comic p. 7].

- 5 ea. hand held squeeze spray bottles.

Note: Spray bottles help you cover more area and use less chemicals, they are available in local stores.

25. Heat temperature reader (Must have) - used to gauge dryer temperatures

- 1 ea. Wire return thermal probe -or-
- 1 ea. Reflective temperature gun with laser pointer

26. Ink cure testing chemical kit (Should have) - used to test plastisol cure.

- 1 ea. Vastex cure testing kit

Note: This kit can be assembled from local supplies.

27. Exposure calculator (Must have) - used to find the correct exposure time

- 1 ea. Multi-step neutral sectioned exposure calculator

28. Printing test squares (Nice to have) - used to print a display, check for mistakes or reference.

- 100 ea. Test Squares in white

- 100 ea. Test Squares in black

Note: A local thrift resale store will have old t-shirts for purchase that can replace this item.

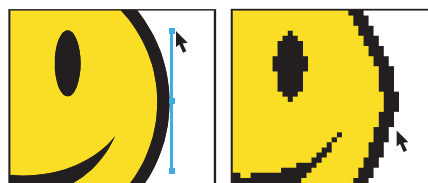
29. Computer and scanner (Must have) - used to scan and modify art for final design.

Note: Computers and scanners are available from many local stores. Your minimum requirements will be dictated by your software choices. Please call or e-mail Vastex for suggestions.

30. Graphic Software (Must have) - used to produce art and separations for printing.

- 1 ea. Software package Adobe Illustrator
- 1 ea. Software package Adobe Streamline
- 1 ea. Software package Adobe Photoshop

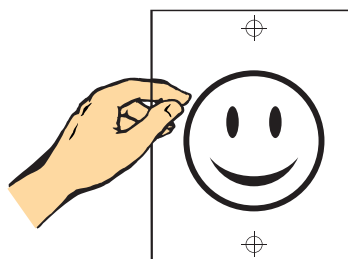
Note: Graphic programs are available at your local computer store or from internet mail order sources.



31. Printer (Must have) - used to make positives to burn art onto the emulsion [comic p. 5].

- 1 ea. Ink jet printer with RIP package

Note: The ink jet printers must have a software rip package to print separations.



32. Art tools (need) - used when needed.

Metal Artist t-square and yard stick, and ruler, Craft knife and blades, ultra fine tip permanent markers.

Note: Art tools are available from local stores.

Hosted on www.vastex.com



Training Classes



Complete, Professional Training Classes at Our Place or Yours!



Master Screen Printer, Douglas Grigar, is the instructor of screen printing classes hosted by Vastex.



Hands on experience includes actual printing by all students.



Students observe as a fellow classmate coats his first screen.



Students inspecting the results of an exposure test.

3 Day Class at Vastex Factory:

Our intensive training program can help eliminate the months of traditional start up problems, allowing you to save thousands of dollars in supplies and time as well as to avoid the typical lengthy learning period. This hands on three day class (or five days at your location) is effective, down to the basics technical training, offering advanced information on the screen printing process.

This is not a course on "Vastex equipment" but a course dedicated to teaching the fundamentals of screen printing. Vastex hosts this class which is instructed by independent master screen printer, Douglas Grigar.

- **Up Close and Personal**
- **Hands On Experience**
- **Prepress Through Reclaiming**

Course Includes Complete Training in:

- Screen coating
- Screen frame choices
- Mesh selection
- Exposure control and emulsion choices
- Registration and multicolor printing
- Identifying and solving problems
- Special inks and procedures
- Curing and flashing
- Screen cleaning and reclaiming

• 3 Day class for **\$500/student**

Classes at Your Place:

No equipment purchase is necessary, however, classes can be purchased with complete shops. Onsite classes are customized for your needs which can include:

- Installation of new equipment
- Staff training
- Advanced techniques
- Production efficiency improvement.

• **\$895/Day** +expenses, Domestic (3 day min)

• **\$1,000/Day** +expenses, International (5 day min)

Whatever your screen printing training needs are, Vastex wants to help you reach your goals!

Visit **VASTEX.COM**

For a current schedule or to sign up.

or call **1-800-482-7839**



Training

Instruction is based on common procedure (and can be modified as needed).

This is intensive hands on training on the HOW and the WHY,
to help you understand more clearly the various printing processes.

3 DAY CLASS at Vastex Fast paced three day class hosted at Vastex in Allentown, PA. (Cost \$500)	
Day 1 Mesh information & choices, Retensioning & stretching, Frame choices & maintenance, Coating screens & the application of film products, Emulsion choice, Coating procedure, Coating control, Drying stencils, Exposure control, Step Test & calculator use, Exposure units, Troubleshooting, Screen storage	
Day 2 Preparing screens, Preparing positives, Producing positives, Reviewing positives, Screen placement, Press Setup, Product loading, Inks & squeegee, Exposing screen, Developing screen, Drying screen, Screen preparation, Print preparation, Reviewing Order, Print Operations, Print take down, Screen cleaning	
Day 3 Flooding & printing, Flashing, Ink use, Special printing, Dryer & pulling, Troubleshooting, Ink removal, Reclaim screens, Degreasing screens, Drying screens, Tips, Emergency procedures, Troubleshooting, Exposure box, Chemicals, Purchasing, Training, Proof & package positives	

5 DAY ONSITE TRAINING at your location Customized five day onsite training for your shop with complete equipment installation & total technical instruction in a casual one on one presentation. (Cost \$3,750)				
Day 1 Shop setup <ul style="list-style-type: none"> • Computer • Printer • Assemble frames • Coat screens • Press assembly • VRS • Exposure unit 	Day 2 Prepress <ul style="list-style-type: none"> • Mesh choice • Positives • Exposure testing • Wash out • Preparation • Press setup • Preparing orders 	Day 3 Production <ul style="list-style-type: none"> • Flood and print • Flashing • Off contact • Print order • Squeegee • Ink cure • Troubleshooting 	Day 4 Postpress <ul style="list-style-type: none"> • Press breakdown • Screen cleaning • Reclaim screens • Chemical use • Screen care • Screen drying • Emergency tips 	Day 5 Art <ul style="list-style-type: none"> • Art programs • Scanner use • Positives issues • Freelance art • Clip art • Art limitations • Shirt placement

Onsite training client requirements:

Washout booth & drying cabinet that is plumbed and vented.

Electrical connections for flashes and dryers in place along with good lighting.

Plastisol inks, emulsion, scoop coater, and film for positives on hand.

Macintosh or PC with a copy of Illustrator, Streamline, Photoshop and a working scanner.

(Photoshop is not needed for basic art.)

(Once training is scheduled "pre-support" can be provided & supply needs overviewed.)

**For a current schedule or to sign up, visit VASTEX.COM
or call 1-800-482-7839 to discuss your training needs.**