

AGENCIJA ZA  
PROMOTIVNE  
POSREDOVANJE  
CABRO

# IV GRAN PREMI INTERNACIONAL 26 d'abril 1936



PARC DEMONTJUIC



**Above:** Water-based ink often comes with a low operations cost. **Right:** Here is a simulated process discharge with a light wash. (All images courtesy Tony Pepitone)



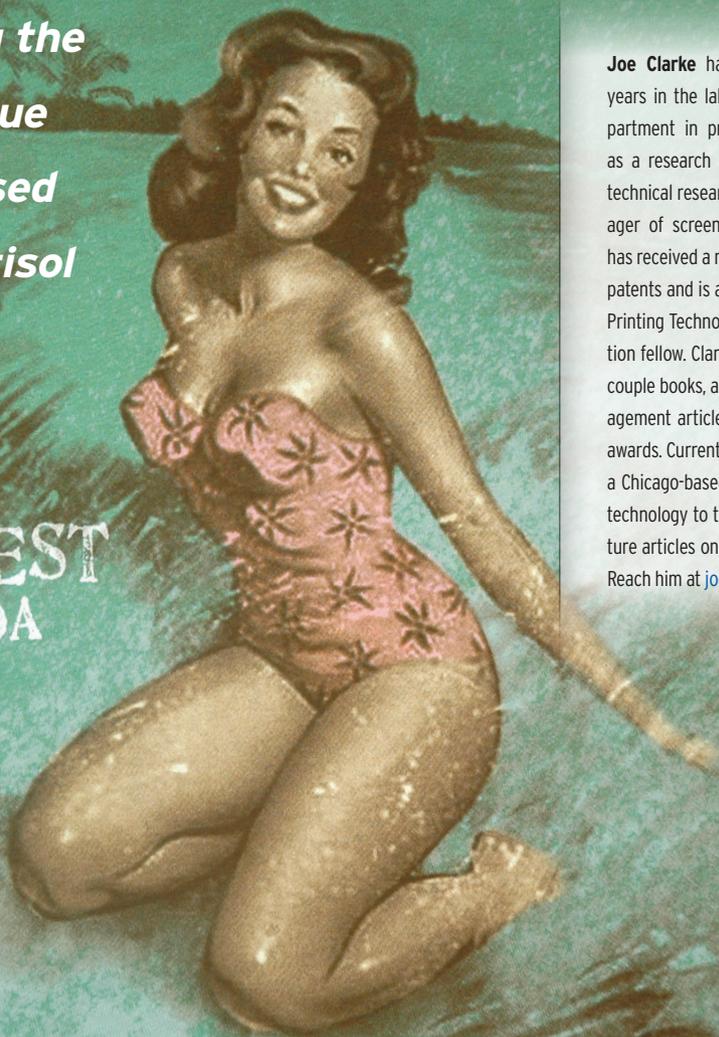
# Weighing Water- Based Ink

BY  
JOE  
CLARKE

**I**n the ensuing battle for press-time profits, plastisol ink has given sway to its aqueous adversary: water-based ink. Notwithstanding, what has seeped out of this colorful conflict is a bit of local testosterone—decorators who have mastered water-based printing in the U.S. show off their biceps first and then their aqueous image. Truth be told, the rest of the world is chuckling at our bravado. The U.S. is the most plastisol-dependent country in the imprinted sportswear business while water-based inks are the prosaic standard in other areas of the world.

*Determining the  
cost and value  
of water-based  
versus plastisol*

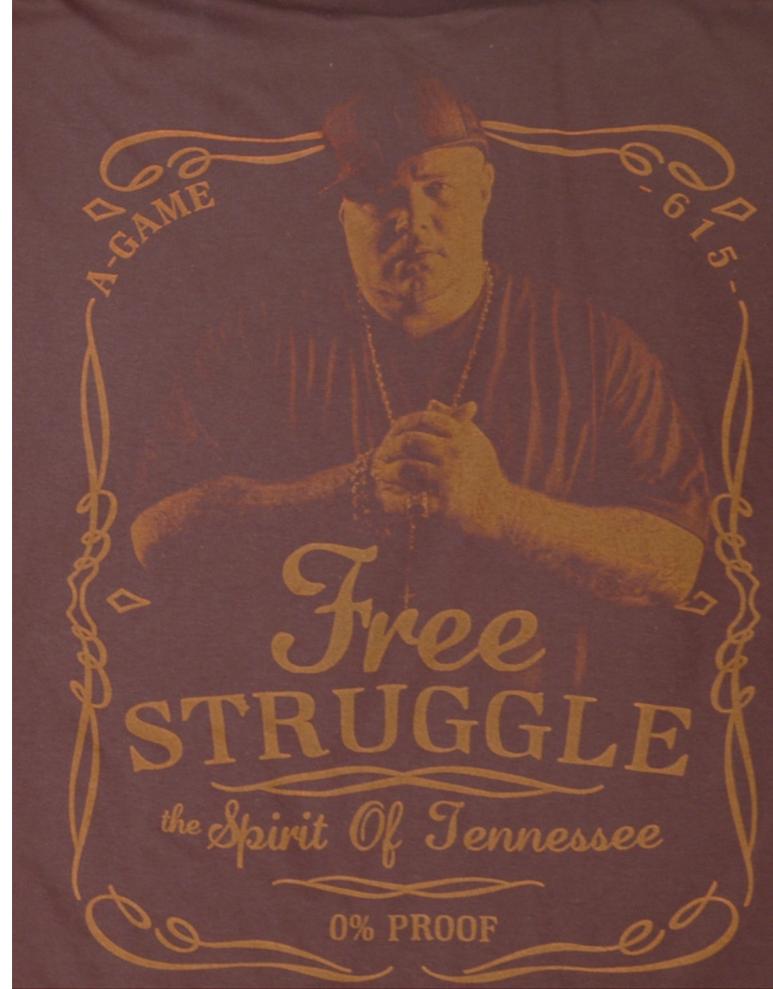
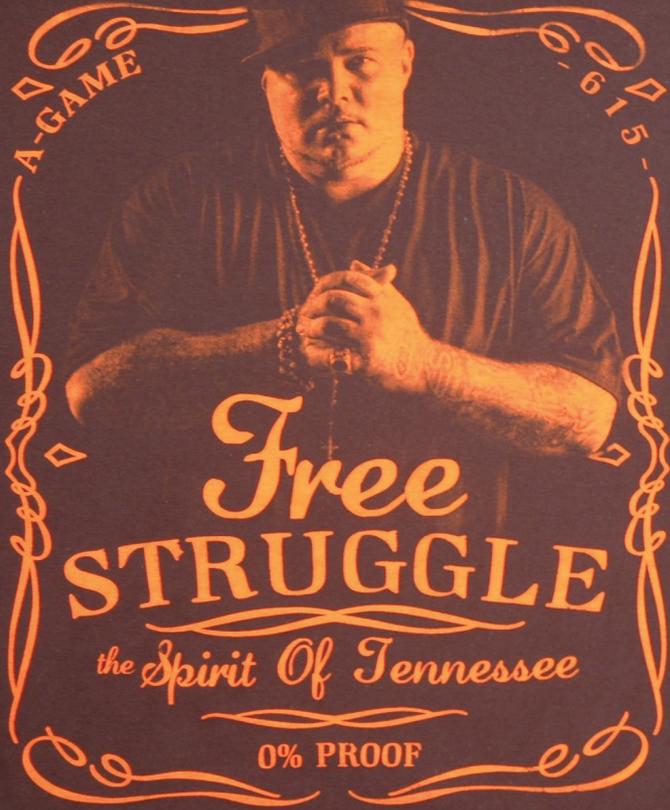
KEY WEST  
FLORIDA



**Joe Clarke** has spent the past 45 years in the lab and engineering department in prepress and on press as a research and development and technical researcher as well as a manager of screen print production. He has received a number of print-related patents and is a member of The Academy of Screen and Digital Printing Technologies and a Specialty Graphic Imaging Association fellow. Clarke has presented hundreds of papers, written a couple books, and published more than 600 technical and management articles for which he has earned numerous industry awards. Currently, he is president of Clarke Product Renovation, a Chicago-based corporation that brings product and process technology to the screen printing industry. He contributes feature articles on textile screen printing exclusively to *Printwear*. Reach him at [joec Clarke@cprknowsjack.com](mailto:joec Clarke@cprknowsjack.com).



WATER-BASED **INK**



**Above:** Before and after cure of a one screen halftone using improved fluorescent ink. **Below:** This print used a one screen halftone discharge white, exhibiting a wide range of tone. The image on left is on a blended fabric previously deemed not suitable for the discharge process.





### CAUSE OF DEPENDENCY

While water-based inks in the U.S. are marketed as being more environmentally-friendly, one of the main reasons many printers all over the world use water-based inks is because of low operational costs, a real bonus for a labor-intensive manufacturing, e.g., garment decoration. These operators often choose water-based ink for cost savings. Here's a cursory review to compare the cost and value of plastisol and water-based inks.

**1. Dollar savings:** There are a few options with water-based systems, which include ready-to-print, clear colorants blended on-site through a homogenizer, emulsified aqueous coatings, and semi-opaque and opaque aqueous alternatives. The following example allows for the evaluation of the value of any and all types.

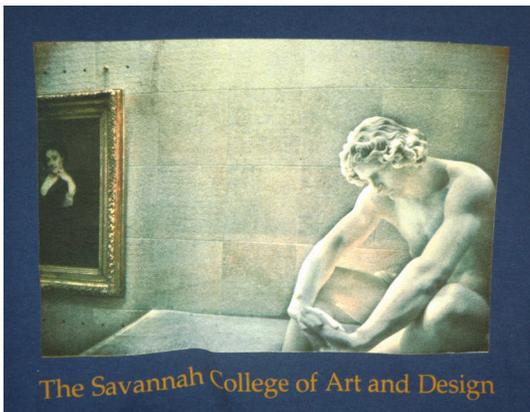
If a ready-to-print aqueous system isn't printed at close to the same speed as plastisol, water-based inks are likely more costly. Consider a square foot of plastisol at \$48 per gallon on 280/35 mesh that costs 3 cents per print. In the U.S., the press used to print 500 pieces is worth more than \$150 per hour. Let's say a decorator prints 500 shirts per hour. The ink cost at 3 cents would be \$15 total or a cost per print of 33 cents.

If the hypothetical water-based ink costs \$8 per gallon or 5 cents per print, this cost to print 500 shirts equates to \$2.50 total or a per-order savings of \$12.50. However, to maintain the same total cost of 33 cents per shirt, water-based ink has to print at a rate of 462 shirts per hour to break even with the cost of plastisol. This means a decorator can only incur 8 percent more downtime, even at \$8 to \$48. If aqueous causes more than 8 percent downtime, the plastisol costs less than the water-based ink.

When the labor cost is as low as it is in most other countries, water-based inks are affordable—our costs are considerably higher in the U.S., and our example favors water-based ink. It's best to do the math and see for yourself.



**Top:** Inks and coatings that contain water are more likely to develop fungus. Luckily, today's additives help to elevate pH to help minimize growth. **Above:** To determine the true cost of production, take the time to do the math.



**Top:** This boutique-style water-based print uses a colored slurry wash for an all-over effect. **Above:** Pictured is a true four-color process discharge using in-house-formulated, single-pigmented colors.

Traditional water-based ink is transparent and generally low tack because of its selection of resin, plasticizer, and solvents.

**2. Operational issues:** It's easy to convert from water-based ink to plastisol, but it's typically more painful to go in the other direction. Even under extreme conditions, the flow properties of plastisol don't change. The process is predictable and consistent.

Traditional water-based ink is transparent and generally low tack because of its selection of resin, plasticizer, and solvents. This is an advantage. It requires less force to print, generally produces at top print-stroke speed, and is unlikely to build up if the ink is fresh.

Inks and coatings that contain water tend to develop fungus. Long ago, ammonia was used as an anti-fungal, but to-

day's additives elevate the pH level, which may interfere with chemical wetting and trapping. Pungent odor and phase separation indicate that an ink emulsion broke down. Keeping the mesh thin, the blade sharp, and the stroke speed high mitigates wetting issues with fresh ink.

The final operational note regards stencil life and preparation. Stencil chemistry should remain reclaimable and highly resistant to water. Permanent screens are not viable for most. An alternative is to prepare for longer runs by having redundant backup screens ready to go to press in case of premature stencil breakdown.

**3. Ecology and hygenics:** Inks contain fossil fuels, and some have a higher level of

volatility than others. Keep ink off your skin and out of your eyes and have adequate exhaust and air flow to remove all volatiles and irritants. Dispose waste as recommended by the manufacturer and local authorities.

Before making a hard conclusion about the safety or true value of any compound, research the product. Just like plastisol, two-part silicone and urethane, solvent-based sublimation, and even alkyd enamels, water-based ink has rules and regulations. Tackling water-based inks without preparation or research is likely a short-lived fool's errand. Treat the rules and the handling of each appropriately, so the products can serve us as intended. 