

DTG Ink Consumption & ROI Standard Operating Procedure

DIRECT-TO-GARMENT STANDARD COSTING & BUDGETING GUIDE

Document No.	SOP-DTG-COST-001	Version	V1.0
Target Audience	DTG Printing Factories, OEM Garment Manufacturers, Sales & Technical Support Teams		
Objective	Standardize ink volume calculation, precisely control unit production cost, optimize consumable usage, and maximize bulk profit margin.		

1. PURPOSE

To standardize ink consumption calculation, per-garment ink costing, and bulk order budgeting during Direct-to-Garment (DTG) production. This SOP empowers printing facilities to accurately manage production overhead, optimize consumable efficiency, and enhance gross profit margins on volume orders.

2. CORE CALCULATION LOGIC & STANDARD FORMULAS

2.1 Base Cost Calculation Formula

TOTAL INK COST PER GARMENT

$$\text{Total Ink Cost (\$)} = (\text{Color Ink Volume [ml]} \times \text{Color Ink Unit Price [/ml]}) + (\text{White Ink Volume [ml]} \times \text{White Ink Unit Price [/ml]})$$

Color Ink Unit Price/ml: $\text{Bottle Price (\$)} \div 1,000 \text{ ml}$
(e.g., $\$80 \div 1,000 \text{ ml} = \$0.08 / \text{ml}$)

White Ink Unit Price/ml: $\text{Bottle Price (\$)} \div 1,000 \text{ ml}$
(e.g., $\$65 \div 1,000 \text{ ml} = \$0.065 / \text{ml}$)

2.2 Ink Volume Estimation Metrics

Based on standard **1200 DPI** print resolution and actual artwork area (**Width × Height** in sq. inches):

Garment Category	Ink Type	Standard Estimation Formula (in ml)
Light / White Fabrics (No White Underbase)	Color Ink Volume (ml)	$\text{Artwork Area (sq.inch)} \times 0.005 \times (\text{Color Coverage \%} \div 40\%)$
	White Ink Volume (ml)	0 ml
Dark / Black Fabrics (Requires White Underbase)	Color Ink Volume (ml)	$\text{Artwork Area (sq.inch)} \times 0.006 \times (\text{Color Coverage \%} \div 40\%)$
	White Ink Volume (ml)	$\text{Artwork Area (sq.inch)} \times 0.028 \times (\text{White Coverage \%} \div 80\%)$

3. STEP-BY-STEP OPERATING PROCEDURE



Step 1: Determine Fabric Color & Material Properties

- Condition 1:** For 100% cotton or high-cotton blend light/white garments, classify as **Light Garment** (No white ink required).

- **Condition 2:** For black, dark, or colored garments, classify as **Dark Garment** (Requires white ink underbase).

Step 2: Measure Artwork Dimensions & Estimate Coverage

- Open graphics software (e.g., Photoshop) or RIP software to measure actual artwork size:
Example: 10 inches (Width) × 12 inches (Height) = 120 sq. inches
- Evaluate image density and coverage percentage:
 - **Medium Density Artwork:** Color ink coverage ~40%, Dark garment white ink coverage ~80%.
 - **Full-bleed / High Density Artwork:** Color ink coverage ~70%–80%, White ink coverage ~100%.

Step 3: Confirm Ink Unit Purchase Price

- Check current DTG pigment ink specifications and convert to price per ml (USD/ml or local currency).

Step 4: Execute Formula & Calculate Bulk Budget

- Input parameters into Section 2 formulas to calculate single-garment ink cost and overall bulk order budget.

4. PRACTICAL CALCULATION EXAMPLE

Test Parameters: Dark T-shirt (Standard A4 Artwork: 10" × 12" = 120 sq.inch), Color Ink = \$0.08/ml, White Ink = \$0.065/ml.

Cost Component	Consumption Formula	Volume (ml)	Unit Price (\$/ml)	Unit Cost (\$)
Color Ink (CMYK)	<i>120 sq.inch × 0.006</i>	0.72 ml	\$0.080	\$0.0576
White Underbase Ink	<i>120 sq.inch × 0.028</i>	3.36 ml	\$0.065	\$0.2184
Total Ink Cost per Garment				\$0.276 / pc (Approx. \$0.28 / pc)
1,000 Pcs Bulk Order Ink Budget				\$276.00

5. COST OPTIMIZATION & SAVINGS STRATEGIES

1. Utilize High-Opacity White Ink Technology

Employ high-opacity pigment white ink to achieve rich opacity on dark fabrics in a single pass. This can reduce white ink consumption by **15% – 20%** compared to standard inks.

2. Optimize RIP Software Ink Limits

Calibrate custom ICC profiles for specific fabric types to prevent over-inking. This preserves vibrant color saturation while eliminating up to **10%** of unnecessary color ink wastage.

3. Standardize White Ink Maintenance to Reduce Purge Losses

Strictly enforce automated circulation and gentle agitation SOPs for white ink. Preventing pigment settling and printhead clogging minimizes the need for forced deep head cleans, saving substantial ink overhead.