

GRAPHENE IN TEXTILES: RESHAPING FABRIC, PERFORMANCE & SUSTAINABILITY



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WHY NOW? THE FABRIC INDUSTRY IS AT A TURNING POINT

- THE WORLD DEMANDS **SUSTAINABILITY**.
 - BRANDS DEMAND **PERFORMANCE**.
 - MANUFACTURERS DEMAND **COST EFFICIENCY**.
- ! CURRENT MATERIALS CAN'T SOLVE ALL THREE — BUT **GRAPHENE CAN**.
- ✓ WE'VE DEVELOPED **READY-TO-INTEGRATE GRAPHENE LIQUIDS** FOR EVERY STAGE OF TEXTILE MANUFACTURING — NO CHANGE IN YOUR PROCESS, JUST CHANGE IN PERFORMANCE.



THREAD-LEVEL INTEGRATION — SMART FABRIC STARTS HERE

- *WHERE STRUCTURE MEETS SCIENCE.*
- GRAPHENE IS EMBEDDED DURING **YARN SPINNING**.
- BOOSTS TENSILE STRENGTH BY UP TO **30%**.
- REGULATES HEAT — COOLER IN SUMMER, WARMER IN WINTER.
- ADDS **ANTIBACTERIAL AND ANTISTATIC** PROPERTIES.

OUTCOME: *FABRICS THAT LAST LONGER, PERFORM BETTER —
WITH NO ADDED WEIGHT OR STIFFNESS.*



- *YOUR BLACK DYE, OUR GRAPHENE — A NEW ERA OF COLOR BEGINS.*
- GRAPHENE ADDED TO BASE DYE SOLUTIONS.
- REDUCES SALT REQUIREMENT BY UP TO **40%** — EASIER WASTEWATER RECYCLING.
- ENHANCES COLOR CONTRAST AND DEPTH.
- IMPROVES **WASH FASTNESS** — MORE VIBRANT FABRICS FOR LONGER.

OUTCOME: *BETTER FABRIC + CLEANER WATER + ZERO WORKFLOW CHANGE.*

DYEING REIMAGINED —
STRONGER COLOR, CLEANER
PROCESS



POST-STITCH PRINTING — DURABLE, FUNCTIONAL FASHION



- GRAPHENE COATINGS AND INKS FOR FINISHED GARMENTS.
- ENHANCED **PRINT DURABILITY** (EVEN ON ACRYLIC).
- SUPPORTS **CONDUCTIVE INK DESIGNS** FOR SMART APPAREL.
- MAINTAINS BRIGHTNESS EVEN AFTER 30+ INDUSTRIAL WASHES.
- CREATES **MULTI-FUNCTIONAL WEAR**: UV PROTECTION, ANTI-STATIC, SMART SENSORS.

OUTCOME: ADD VALUE AT THE FINAL STAGE —
WITHOUT EXTRA STEPS.



● STRATEGIC INSIGHTS & VALUE ANALYSIS
**COST STRUCTURE, ENVIRONMENTAL FOOTPRINT,
AND REGULATORY POSITIONING**



PART 1: TANGIBLE ROI – FROM PRODUCTION COST TO SUSTAINABILITY ADVANTAGE

Parameter	Traditional Process	Graphene-Enhanced	Cost Impact
Dye Salt Usage	50–80 g/L in black reactive dyeing	Reduced by up to 60%	₹15–20 savings per kg fabric
Oven Drying Energy	130–150°C for acrylic prints	Reduced by 20–30°C	~₹4–6/kg fabric (gas/electric)
Water Purification Cost	Complex TDS/salt load post-dyeing	30–50% easier water recyclability	₹50–80 saved per 1000L effluent
Chemical Additives	Separate anti-bacterial, UV & finishers	Replaced by graphene multifunctionality	Up to ₹10–12 saved per kg fabric
Fabric Shrinkage Rejection	~3–5% in low-quality blends	Controlled with graphene infusion	Lower returns, ~₹6/kg indirect saving





PART 2: STRATEGIC ADVANTAGE: REPLACING COSTLY GREEN CHEMICALS

Function	Typical Green Chemical	Graphene Effect	Impact
Anti-bacterial finish	Ag or Zn nano-sols (₹30–50/g)	Natural graphene layer	Replaces rare metals
UV protection	UV inhibitors (₹200–500/kg)	Graphene blocks UV-A/B	No added formulation
Moisture wicking agents	Silane/PEG based (₹80–120/kg)	Improved surface topology	Built-in property
Anti-static & durability	Polyurethane top coats	Graphene improves conductivity & strength	No extra finish needed





SUMMARY SAVINGS SNAPSHOT (PER 1 TON OF FINISHED FABRIC)

Traditional	Graphene-Integrated
₹20,000+ on salt, additives, and heat cost	₹8,000–₹10,000 savings (net)
₹3,000–₹5,000 on wastewater chemical handling	Simplified STP; long-term ROI
₹2,500–₹4,000 in finishers & topcoat savings	Graphene replaces multiple chemicals
Net Cost Reduction:	₹12,000–₹18,000 per ton

Bonus: Quality = Market Position

- Graphene-treated cotton blends allow **higher cotton % over polyester** while improving **durability and feel**.
- Garments gain **premium export potential** with higher wash durability, comfort, and compliance with **Oeko-Tex / ZDHC**.



High-Impact Applications Across Textile Segments

"From the factory floor to the fashion ramp – Graphene is not just functional, it's transformational."

• 1. TECHNICAL TEXTILES

Use Case	Benefit
Protective clothing	Fire resistance, anti-static, durability
Filtration fabrics	Anti-bacterial, high-tensile support layers
Industrial workwear	Abrasion resistance, thermal comfort

2. Sportswear & Athleisure

Feature	Graphene Advantage
Sweat-wicking	Surface morphologies help moisture migration
Odor resistance	Antimicrobial graphene = freshness
Temperature control	Heat-dissipating & insulating behavior
Durability	20–30% higher wash life (tested: >50 cycles)

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- **3. FASHION / LIFESTYLE APPAREL**

- Enhanced color vibrancy with deeper black dyes
- Lightweight yet stronger knits and woven materials
- Softer cotton-rich blends with better drape and recovery
- Ideal for **premium, export-ready collections**

4. Smart & Strategic Textiles

Sector	Role
Wearable Electronics	Conductive graphene paths embedded in fabric
Camouflage/Defense	Stealth-friendly coatings, low IR signature
Sensors/Textile IoT	Temperature, movement, or pressure sensing

POSITIONING FOR GROWTH

- INDIA'S TECHNICAL TEXTILE MARKET IS EXPECTED TO REACH ₹2 LAKH CRORE BY 2026. BRANDS ARE UNDER PRESSURE FOR GREEN TRANSITION AND PERFORMANCE INNOVATION. GRAPHENE IS THE ONLY MATERIAL THAT DELIVERS BOTH — WITHOUT REDESIGNING THE PROCESS.

WHY PARTNER WITH RI GROUP?

“WE’RE NOT HERE TO SELL A CHEMICAL. WE’RE HERE TO HELP YOU LEAD THE TEXTILE REVOLUTION.”

What We Offer

Tailored graphene formulations

Pilot trial support

Multi-grade graphene

Mass-production ready

How You Benefit

No change to your machinery or brand ink/dye

Test and scale confidently

Pre-validated for cotton, polyester, blends

>5 tons/month available on order

 **CONNECT FOR PILOT DEMOS,
COMPATIBILITY MAPPING, OR
COLLABORATION** 

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