



CHALLENGING CONVENTIONS IN THE DENIM INDUSTRY

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As a global leader in sustainable specialty chemicals for the textile industry, Archroma is dedicated to pioneering eco-advanced solutions. Our mission is to challenge conventions and redefine industry standards to contribute to a more sustainable future.

Our portfolio of solutions embody efficiency, enhanced user experiences, and stringent regulatory compliance, all while conserving resources, including water and energy, and using fewer chemicals. Through planet conscious tools such as our ONE WAY Impact Calculator, we empower mills and brands to track water-related data and optimize their processes. We also support our customers in their efforts to comply with evolving regulations, eco-certifications, and brand requirements with Safe Edge,

an online platform that allows instant compliance-checking of a given product, as well as specialist testing laboratories dedicated to product stewardship.

Archroma has been at the forefront of innovation and sustainability for decades. Our journey in sulfur dyes has been nothing short of transformative. From the introduction of the low-sulfide DIRESUL® RDT range back in the 1980s to the more recent launch of our plant-based EarthColors® dyes and upcycled FiberColors® dyes, we have redefined what's possible in denim.

Over this time, we have seen a marked shift towards the use of safer ingredients, with growing public awareness of sustainability

alongside regulatory change and more brand recognition of clean manufacturing as a key differentiator. Even so, mills and brands continue to face sustainability challenges on several fronts. How can they optimize water consumption and greenhouse gas (GHG) emissions, enhance chemical management, and embrace circularity while maintaining product quality and production efficiency?

Optimizing Water Consumption and GHG Emissions

Denim production is notoriously water-intensive and responsible for wastewater pollution in global production locations that are already under water stress. It also generates substantial GHG emissions throughout the supply chain, from carbon-intensive materials to manufacturing,

coloration and washing, and consumer use and disposal.

We recently expanded our DIRESUL® RDT range to include DIRESUL® EVOLUTION BLACK LIQ. Based on cutting-edge synthesis technology developed by Archroma, it delivers an overall impact reduction to 57% compared to standard Sulfur Black 1 liquid.[# Ecotarrae lifecycle analysis using the PeCiPe 2016 impact calculation methodology to measure impact on human health, resources, and ecosystems]#

Unlike traditional synthesis processes, it does not produce any ammonia, sodium salts waste, or liquid effluents. What's more, water consumption and GNG emissions in the synthesis process is significantly reduced. The new DIRESUL® dyestuff, when adopted with the full Archroma coloration system, delivers a new black color with on-tone wash-down effect and cleaner effluent at the mill.

Innovations also originate from the development of new processes and chemistries aimed at creating more sustainable textile articles. Our Denim-OX technology relies on our low-sulfur DIRESUL® dyes, like the vibrant DIRESUL® RDT Ocean Blues collection, to deliver a vast range of casts and wash-down effects with lower environmental impact—saving water and energy, reducing wastewater and CO2 emissions, and speeding up production time.

Enhancing Chemical Management

Denim brands are placing greater emphasis on sustainable practices to satisfy consumers, allow the adoption of new eco-labels, and adhere to increasingly stringent environmental regulations. This is driving them to eliminate hazardous chemicals



choose more ecological upcycled colors. Introduced in 2017, EarthColors® is a range of biosynthetic dyes synthesized from natural waste products from the agriculture and herbal industries; leaving the edible part still available for food consumption. Compared to conventional synthetic dyes, which use petroleum-based raw materials, this technology helps to reduce water footprint and climate impact and protect our natural resources.*[*Below limits of detection according to industry standard test methods ** Based on internal LCA comparative screening]* Upcycling natural waste in this way also has no negative impact on any other steps of dye manufacturing, such as water and energy consumption or waste generation. EarthColors® is transformed into a new dyestuff using up to 100% of raw materials from natural waste, helping us close the loop.

and reduce pollution, further elevating the significance of effective chemical management. Technical innovation by industry leaders like Archroma has made it possible for mills to maintain the performance of their textiles and their production efficiency whilst utilizing the safer, cleaner chemistry that brands and consumers' desire. This keeps unwanted chemicals, such as aniline, an ingredient long considered essential to the production of iconic blue jeans, out of the supply chain and ensures they cannot pollute waterways and harm aquatic life.

Archroma disrupted the denim industry in 2018 with the introduction of an aniline-free* indigo alternative: DENISOL® PURE INDIGO. With the world's major clothing brands and retailers increasingly looking to eliminate aniline from their supply chains, many leading mills are now switching to aniline-free DENISOL® PURE.

Embracing Circularity

The denim industry's heavy reliance on fossil fuels, legacy production processes, and global supply chain complexity continue to hamper efforts to move towards greater circularity. Breakthroughs from Archroma are changing the equation and giving brands a way to

Launched in 2023, FiberColors® is an innovative range of dyes based on a revolutionary technology that turns pre- and post-consumer textile waste into its own beautiful colors. It is synthesized with a minimum of 50% textile-waste raw material. FiberColors® uses cotton, polyamide, and their blends (with more than 95% purity) to substitute a major part of the petroleum-based raw material that is usually used to make dyestuff. This approach allows for either virgin and/or recycled waste to be used, keeping waste from landfills. The waste raw materials can be any color and does not need to be sorted by color. The FiberColors® range comprises of five dyes, covering a palette of brown, olive, bordeaux, blue and grey shades. It enables the creation of diverse collections, from t-shirts and chinos, to sweatshirts, hoodies, polo shirts, and home textiles—supporting the circular economy.



* Ecotarrae lifecycle analysis using the PeCiPe 2016 impact calculation methodology to measure impact on human health, resources, and ecosystems

* Below limits of detection according to industry standard test methods

** Based on internal LCA comparative screening

Throughout this journey, we have remained committed to innovation, sustainability, and resource efficiency. Archroma has advanced our solutions as well as redefined the industry's approach to more sustainable coloration in the denim industry. We remain dedicated to pushing the boundaries of what's possible, striving for a textile industry that is eco-conscious and yet can also fulfil consumer trends of today and tomorrow. **BoF**

About the author

Navneet Krishnan is Brand Marketing Manager – Asia at Archroma.

He is actively involved in collaborating with textile brands and customers to introduce sustainable innovations from colour to execution.

