



**PASSION
FOR DENIM**

Creating colors and effects
to boost your inspiration





/ How do we **bring** creativity, sustainability and performance, for **denim** **beyond denim?**

CREATING SUSTAINABLE SOLUTIONS

At Archroma, we continuously challenge the status quo in the deep belief that we can make our industry sustainable.

Archroma is committed to developing innovative products and processes that are safer for the consumer and for the environment. We strongly believe, based on our extensive experience in textile processing, that sustainability can generate innovation, performance and can even lead to cost reductions for our customers. For this reason, our clear ambition is to offer our customers the best possible product solution package for them in each textile segments.

Innovation is a core competence of Archroma, which ensures that our products and services meet future demands, foster future technologies and contribute to a more sustainable textile industry.

As a global leader in color and specialty chemicals, together with our trusted heritage, our new product solution packages and innovations, we aim to be a reliable partner for textile mills as well as major retailers and brands for the whole textile chain – **from the first idea to the final garment.**

Brand owners and retailers around the world are taking action to evaluate the environmental impact of textile treatment, dyeing and finishing processes in response to consumer concerns. We can help textile manufacturers with this, our exclusive **ONE WAY Process Simulator** can be used to mimic and compare products and processes, and thus calculate the ecological and economical profile of the final end-product.

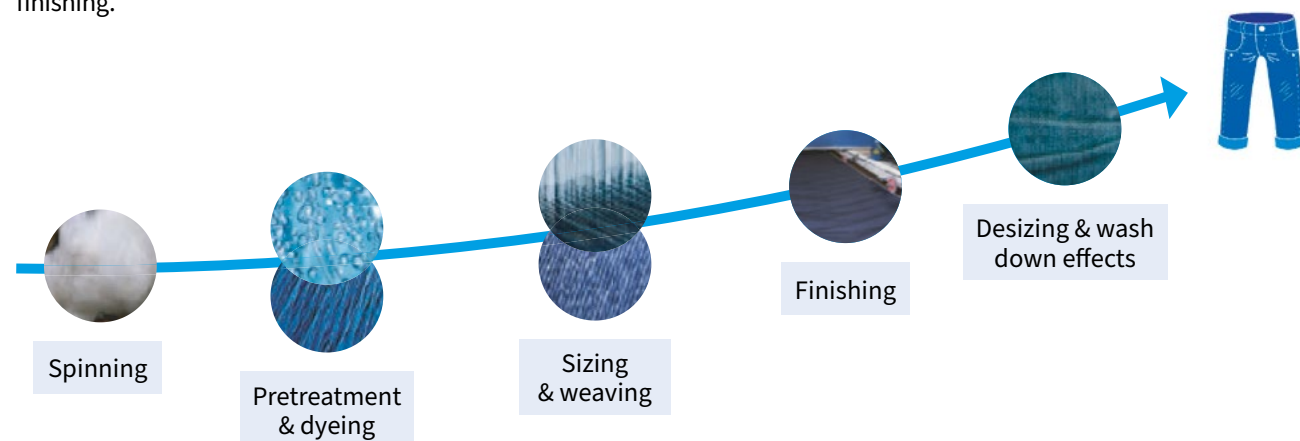
/ ABOUT US

Archroma is a **global color and specialty chemicals** company committed to innovation, world-class quality standards, high service levels, cost-efficiency and sustainability.

From fiber to finish, Archroma's Brand and Performance Textile Specialties plays a key role throughout the entire textile supply chain, with special package solutions for spinning, pretreatment, dyeing, sizing, coating and finishing.

Denim is so special. Maybe no other piece of our closet has the power to tell the world how we feel or who we are.

At Archroma, we share your passion for denim, and we bring our expertise, innovation power and our commitment to sustainability into developing cutting-edge dyeing technologies and products to support your creativity.



At Archroma, we continuously challenge the status quo in the deep belief that we can make our industry sustainable.

The majority of Archroma's products are endorsed by some of the most important eco-standards.

• bluesign® • Oeko-Tex® • GOTS • ZDHC • REACH • EU Ecolabel • C2C • RSL • MRSL

Archroma's ONE WAY Process Simulator allows customers to assess the cost, performance and environmental profile of the evaluated products and processes.

GLOBAL DENIM SERVICES

Benefit from Archroma's denim expertise and networks for:

- Mill and brand marketing partnership collaboration;
- Innovative solutions for improved performance and sustainable production;
- New trends in the denim market;
- Collaboration network with market leaders in machinery manufacturers, denim producers, laundry specialists, universities, textile industries, training centers and brands.

/ SPINNING

Spinning is the process of making fibrous material into yarn or thread.

At the beginning of the textile chain, Archroma's spin finishes provide outstanding processing performance for all kinds of filaments and fibers.

Influence of a type of yarn on dyeing

Generally, open-end yarns have a good absorption capacity in short periods of bath-material contact in dye vats. Ring spun also has a good absorption capacity, although lower than that of open-end yarn. If the ring spun is additionally combed (with greater orientation of fibers in the same direction), absorption capacity is even lower, although yarn quality is the best.

Influence of the type of yarn on the finish effects

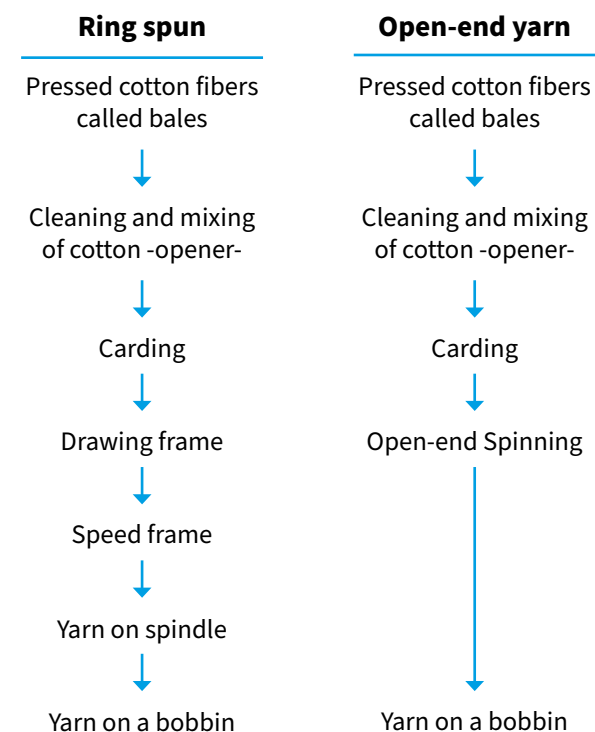
The use of yarn that display certain irregularities or slubs is related to the current tendency to produce final garments with worn-out or 'old' appearance. Attempts are also made to manufacture jeans using methods that were used in the past, when the operation of weaving was selvedge and the irregularities were produced accidentally or by chance.

Archroma's spinning agents

- Spin finish **Afilan®**
- Softeners, lubricants and antistatic agents **Leomin®**

PRODUCTION PHASES OF THE TWO MOST IMPORTANT TYPES OF THREAD

DIAGRAM 1



/ PRETREATMENT & DYEING

The **Archroma Denim portfolio** offers a scope of possibilities in effects and colors, from the traditional to the most innovative solutions; while maintaining high standards of quality and sustainability.

An old saying states that “well prepared is half dyed”. Pretreatment is indeed a key step in textile production. The diversity of fibers and quality variations are major

challenges in consistently obtaining a perfectly prepared fabric, ready for the next processing steps.

Archroma is a recognized leader in integrated solutions for dyeing. Archroma offers the best-in-class specific package of auxiliaries for dyeing. Our portfolio is comprised of products designed to address the specific dyeing requirements of all types of effects.

Archroma's dyestuffs

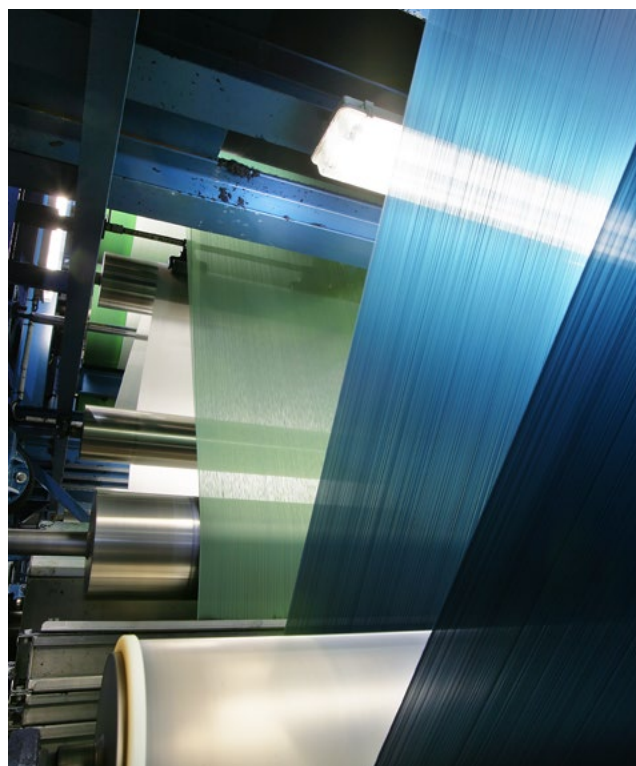
- Pre-reduced indigo solution
Denisol® Indigo 30 liq
Denisol® Pure Indigo 30 liq
- Pre-reduced sulfur dyes
Diresul® RDT Blue Specialties liq
Diresul® RDT Black & Grey liq
Diresul® RDT Colors liq

Archroma's chemical auxiliaries

- Mercerizing
Mercerol® QWXL liq
- Wetting
Primasol® NF-N liq
Leonil® EHC liq c
- Dispersing agents
Ekaline® F liq
Setamol® WS p
- Sequestering agents
Dekol® SN 100 liq
Dekol® 2005 liq c
- Reducing agents
Reducing agent DE liq
Reducing agent D p
Rongalit® DNM p
Reducing HP liq
- Peroxide oxidation booster
Direfix® GPF liq
- Cationic fixing agents
Optifix® E-50 liq
- Lubricant (Rebeaming)
Humectol® Denicomb Ro liq

Archroma has made remarked contributions to the denim industry with cutting-edge dyeing technologies and products that bring together creativity, performance and sustainability.

We re-engineered denim processing by making it faster, simpler and kinder to the environment with its multi-award winning **ADVANCED DENIM** dyeing technology, a sulfur blue specialties dyes concept allowing significant water and resource savings in yarn dyeing, which can be evaluated by the **ONE WAY Process Simulator**.



Bringing indigo back to its roots

Denisol® Indigo 30 liq is a pre-reduced indigo solution at 30% concentration, easy to use, allowing high reproducibility and deep shades while reducing impact on wastewater compared to indigo grains.

Denisol® Indigo 30 liq is globally available with two manufacturing plants located in Asia (Pakistan) and America (Mexico).

Denisol® Indigo 30 liq is compliant with major official eco-standards and requirements from retailers, brands and fashion leading companies and helps to produce fabrics suitable for current eco-labeling:



*Denisol® Indigo 30 liq has received the Cradle to Cradle Products Innovation Institute's Gold Level Material Health Certificate.

Advantages of Denisol® Indigo 30 liq compared to Indigo Powder:

Chemicals consumption

Stock vat preparation is not needed, so less sodium hydrosulfite and sodium hydroxide are used.

Sustainability

Reduced impact on wastewater treatment plant (COD, BOD, sulfates/sulphites, total dissolved solids – TDS).

Easy handling

Automated dosing allows a simpler handling process.

Technical benefits

- Increase in productivity, less indigo required to achieve the same depth;
- Better shade consistency and reproducibility, higher color yield achievable;
- Rubbing fastness improving on dark tones

/ UP TO 60%
LESS SODIUM
HYDROSULFITE

/ UP TO 50%
LESS SODIUM
HYDROXIDE

/ UP TO 10%
LESS INDIGO

THE BEST-IN-CLASS AUXILIARIES

Archroma offers the best-in-class specific package of **auxiliaries for indigo dyeing**.

Using Archroma product package, customers can improve the consistency and the workability of the dyeing process, which will result in a high quality level.

OUTSTANDING UNIFORM DYEING APPEARANCE

Primasol® NF-N liq:

Universal, anionic low foaming padding auxiliary for continuous and semi continuous dyeing processes; wetting and de-aerating agent for dyeing cellulosic fibers and their blends. It increases the liquor pick up, improves the penetration and produces a uniform dyeing appearance.

INCREASING LEVELNESS OF THE DYEING

Setamol® WS p:

Universal, anionic dispersing agent for dyes and protective colloid. It stabilizes the dye dispersion.

LESS STAINING ON INDIGO DYEING MACHINERY

Dekol® SN 100 liq:

Anionic chelating agent and protective colloid with dispersing properties. It is stable over a wide pH and temperature range without losing efficiency. It has a strong complexing action on hardness forming salts and supports less staining formation on the machine during the dyeing process.



New Denisol® Pure Indigo 30 liq

Break new ground with aniline-free* indigo for denim. Archroma’s new aniline-free* indigo dye, **Denisol® Pure Indigo 30 liq**, reduces risk when producing the traditional, iconic indigo blue that consumers associate with denim and jeans.



**Denisol® Pure Indigo 30 liq has received the Cradle to Cradle Products Innovation Institute’s Gold Level Material Health Certificate.

> Spotlight on **PURE INDIGO ICON**, formerly known as Archroma ‘Pure Indigo Flow’ an aniline-free* indigo system that produces authentic denim without compromising our planet



*Below limits of detection according to industry standard test methods

During production, some of the aniline stays locked into the indigo pigment and is difficult to wash off the fabric. The remainder of the aniline impurity, approximately 300 metric tons/year worldwide, is discharged during dyeing. This can be an issue as aniline is toxic to aquatic life. In addition, exposure levels to factory workers can be high.

The toxic chemical is therefore starting to feature on the restricted substance lists (RSL) of some major clothing brands and retailers.

For designers and brand owners who long for authentic indigo inspiration, the new Denisol® Pure Indigo 30 liq now also makes it possible to produce indigo-dyed denim without highlevels aniline impurities.

From fiber to finish, Archroma offers a scope of possibilities for effects and colors, from the authentic roots of indigo to the most innovative and eco-advanced solutions.

Archroma is a recognized leader in integrated solutions, offering best-in-class auxiliaries for bespoke process packages.

Blue Specialties

Archroma offers innovative dyeing products specialties, which combine quality with sustainability.

Diresul® RDT blue specialties liq are a selection of Archroma’s blue dyestuffs that combine quality with sustainability and enhances the blue jeans’s look. They add a vast range of new shades and wash-down effects while allowing high flexibility on application systems, great versatility on final effects and good performance. They are compliant with the major official eco-standards and requirements from retailers, brands and fashion leading companies and help produce fabrics suitable for current eco-labeling.



**Denisol® Pure Indigo 30 liq has received the Cradle to Cradle Products Innovation Institute’s Gold Level Material Health Certificate.

Archroma’s Diresul® RDT blue specialties are based on **Diresul® RDT Indicolors liq**, **Diresul® RDT Smartdenim blue liq**, **Diresul® RDT performance blues liq** and, as part of its growing portfolio, a new collection of vibrant, bluish dyes called **Diresul®RDT Ocean blues liq**.

SPECIALLY SUITABLE FOR:

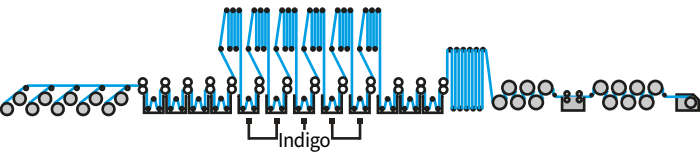
- Warp denim dyeing, using conventional processes and Archroma’s ADVANCED DENIM technology.
- Woven dyeing, using pad-steam and the water saving Pad-Ox system, especially designed for distressed look.
- Garment dyeing, recommended in the use of nitrogen atmosphere for eco-advanced application system.

*Below limits of detection according to industry standard test methods

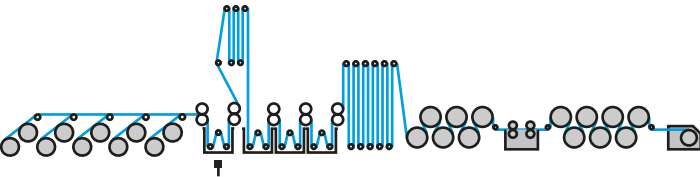
Advanced Denim Technology
Revolutionizing denim manufacture: we’ve made it faster, simpler and kinder to the environment

Archroma’s ADVANCED DENIM technology brings the benefits of innovative denim dyeing with the responsible use of the Earth’s resources.

Conventional denim



Advanced Denim Denim-OX process



Diresul® Smartdenim blue liq
Reducing agent D p
Leonil® EHC liq c
Dekol® 2005 liq c

Direfix® GPF liq
Optifix® E-50 liq

> Spotlight on **INDIGO REFLECTION**, a coloration system that behaves like indigo but with a more sustainable and efficient process



/ SIZING & WEAVING

Advanced bottoming

Diresul® RDT selection for minimal staining indigo bath:

- Diresul® Yellow RDT-E liq
- Diresul® Olive RDT-B liq 150
- Diresul® Olive Yellow RDT-Y liq
- Diresul® Brown RDT-GS liq 150
- Diresul® Brown RDT-R liq
- Diresul® Indinavy RDT-B liq 150
- Diresul® Blue RDT-2G liq 150

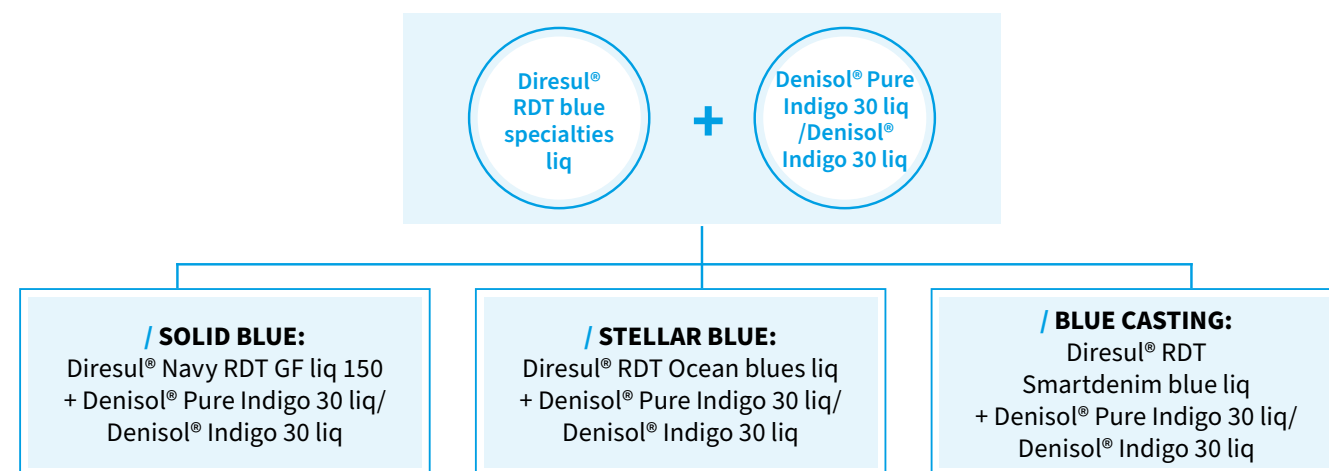
Selection of colors fast to chemical wash-downs:

- Diresul® Yellow RDT-E liq
- Diresul® Brill Green RDT-H liq
- Diresul® Red RDT-BG liq
- Diresul® Blue RDT-3R 80 liq
- Diresul® Navy RDT- GF 150 liq
- Diresul® Fast Black RDT liq

Bottoming-Ox process for:

- Minimal staining of indigo dyebath
- Water saving
- Ring dyeing fixation (for Wash-down look)

EXCLUSIVE Topping/Bottoming



> **Spotlight on PURE UNDERTONES**, a sulfur bottoming system that brings a new layer of color creativity to your aniline-free* indigo denim



The sizing process is necessary to achieve highest weaving efficiency.

The aim of this process is to provide the yarn with a protective coating in order to:

- Protect the yarn from friction;
- Increase resistance to traction;
- Prevent the warp threads from entangling or sticking to each other;
- Increase the tensile strength to avoid breakages in the loom;
- Reduce fiber dusting (formation of fiber clusters);
- Facilitate the use of a single yarn.

Neither classical weaving nor modern high speed weaving can be carried out without sizing agents. These adhere to the individual fibers in the yarn to each other and form a protective film on the fiber surface, which enables the yarn to survive the extreme mechanical stress during weaving without damage.

Archroma supplies sizing package solutions that meet all requirements of modern weaving technology. This includes more ecological and economical products for all types of looms and size recovery technologies.

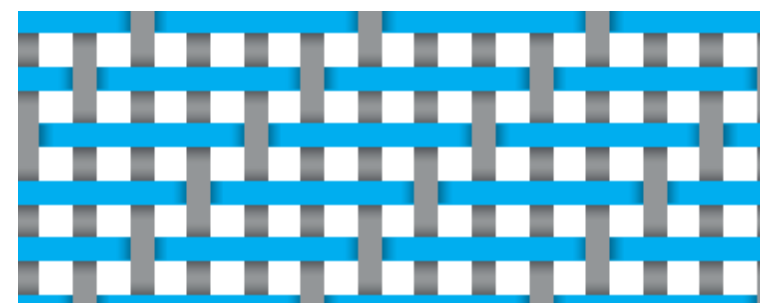
Archroma's sizing agents selection

- Carboxymethylcellulose
Arkofil® CMC 20 gr
Arkofil® CMC 300 gr
- Polyvinyl Alcohol & copolymers
Arkofil® PFM gr
Arkofil® G1 gr
- Sizing wax
Trefix® MSW fla
Trefix® P liq
- Starch & compounds
Arkofil® S60 p
Arkofil® UCF-4 gr
- Polyacrylates
Arkofil® CE liq
Arkofil® CO p/liq
- Others (Pad/Sizing-Ox)
Arkofil® DEN -FIX IN

DENIM STRUCTURE

The structure is the particular way in which the warp and the weft ends cross and interlace each other. Denim fabrics are distinguished by a colored warp yarn and raw or uncolored weft.

The weaving process is achieved by using looms, which are mechanical devices that maintain the warp tension in order to facilitate the interweaving of the weft. There are different shapes and mechanical looms according to the type of fabric produced. In the case of denim fabric, the type of looms used are called plane looms.



FINISHING

From denim performance to the jeans look

Finishing of denim fabrics has been largely developed over the past years. Apart from the conventional treatments that assure quality standards, there are also special finishing treatments which improve the

performance of the fabric and the final effect on the garment.

The finishing treatments of the denim garments are based on current fashion trends and desired effects.

Archroma's color effects solutions

COATING

- High quality pigment printing preparation
Printofix® T p
Printofix® Blue T-WD p (Indigo look)
- Binders, thickeners and auxiliaries
(including Zero Formaldehyde Add-on solutions)
Appretan® N, E (ultra low FA)
Appretan® NF, Lurapret® N (FA-free)

OVERDYEING

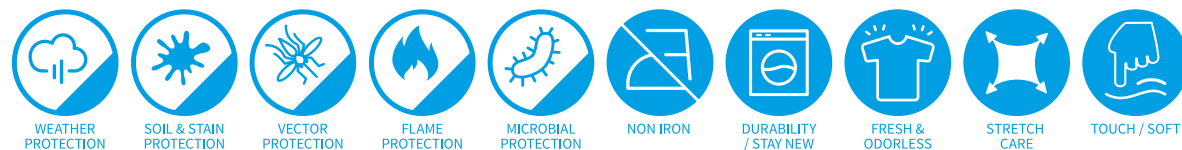
- Pre-reduced sulfur dyes & DAX
Diresul® RDT liq
- Reactive dyes & DAX
Drimaren® Ultimate HD
Drimaren® HF
- Direct dyes
Indosol®

Archroma's thermo-control & protection solutions to help make your garment more resistant to extreme weather conditions; from heatwaves to rain pours.

Archroma's care effects solutions bring softness and comfort to your garment whilst looking good at all times.

Archroma's polymers allow tailor-made solutions for customer specific requirements; from soft to hard, from elastic to rigid, from hydrophilic to hydrophobic and impermeable to breathable.

Discover more information in our 'Functional Finishing' brochure.



Archroma's performance and care effects solutions

- Thermocontrol
Hydroperm®
coldblack®
- Care effects
(including softeners that help to prevent
yellowing caused by ozone during fabric storage)
Arkofix® **Siligen®**
Ceralube® **Fixapret®**
Ceraperm® **Cepreton®**
Solusoft® **Leomin®**
- Protection
Smartrepel® Hydro **NanoSphere®**
Nuva® N **Pekoflam®**
Sanitized®
- Water-based solvent-free polymers for elastic,
soft and flexible surfaces
Appretan® **Texapret®**
Lurapret®
- Crocking fastness improver
Optifix® RUB New liq

DESIZING & WASH DOWN EFFECTS

The cornerstone of fashion effects

SPECIAL GARMENT FINISHING

During the last few years new mechanical (dry) as well as chemical (wet) effects for garments have been developed. By combining both a series of unique and individual looks in each pair of jeans, a vintage denim effect can be obtained.

DRY PROCESSING

- Grinding
- Tagging & clipping
- Damages & breaks
- 3D effects with resin applications
- Patch and repair
- Laser effects
- Ozone effect

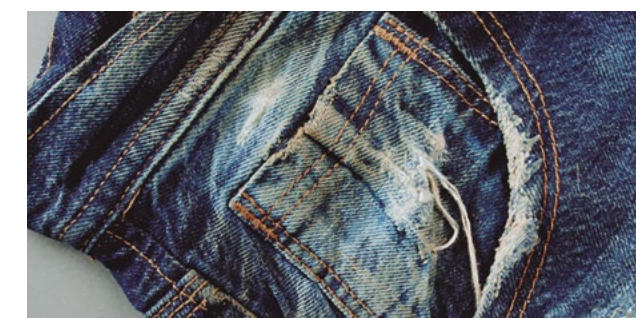
WET PROCESSING

- Desizing
- Stone wash
- Enzyme washing & biowashing
- Bleached effect
- Acid wash effect
- Spray & pulverizing effect
- Tie effects
- Tinting on garment

Damages/breaks



Grinding effects in pockets



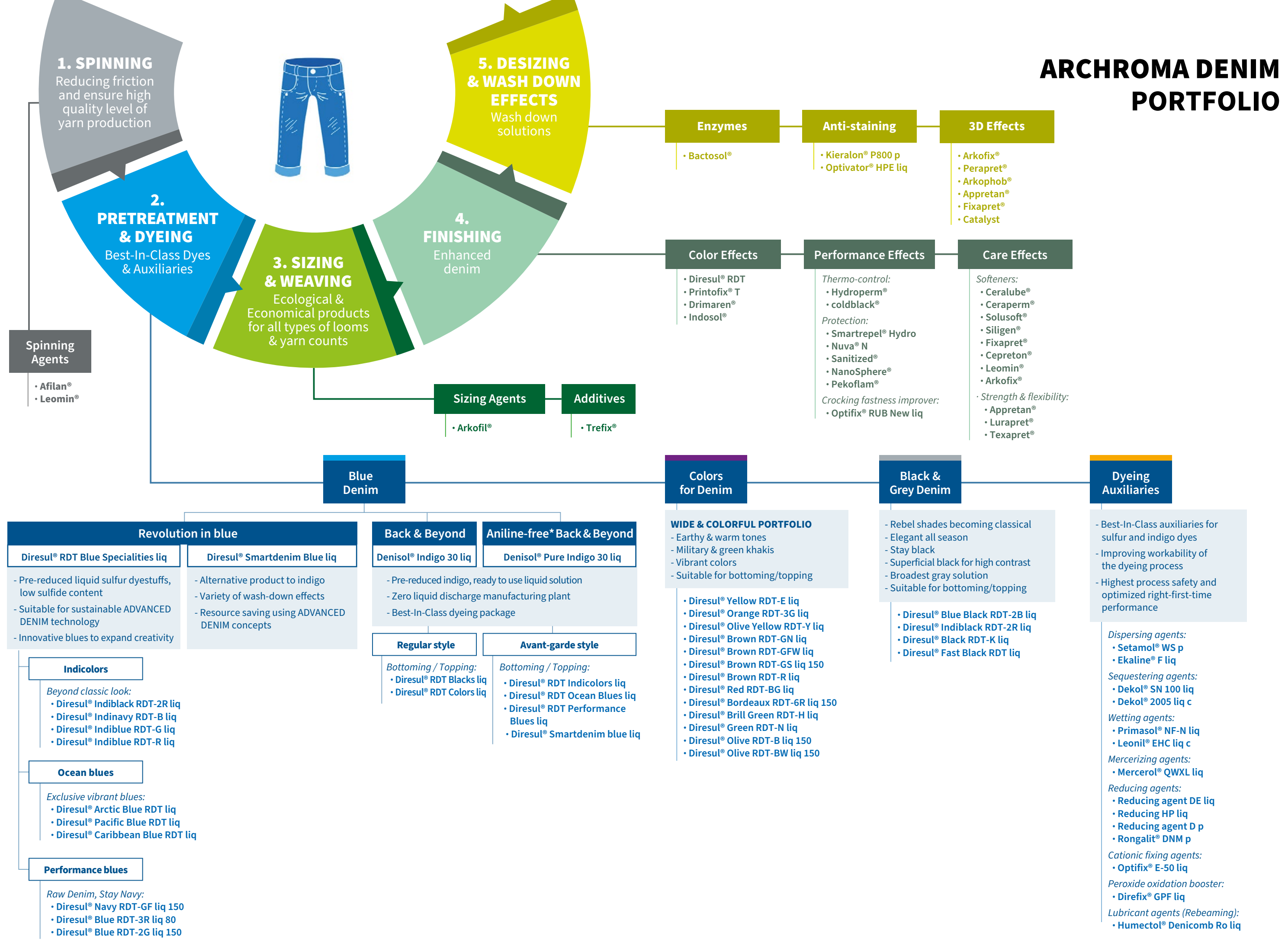
Denim, of course, is in constant evolution and new developments and regulations will surely influence the future of the industry. Archroma aims to be the best partner in this journey.

Archroma's desizing & wash down solutions

- Desizing enzymes
Bactosol® PHC liq hc
Bactosol® HPA liq
 - Wash down enzymes
Bactosol® CA liq c
Bactosol® CNX liq c
 - Anti-back staining agent
Kieralon® P800 p
Optivator HPE liq
 - Garment dyeing
Diresul® RDT liq
Drimaren®
Indosol®
Printofix® T
 - 3D effects (bleachable resins, FA-free*, low curing)
Arkofix® NZF New liq
Arkofix® NZK liq (self catalyzed)
Arkofix® NZW liq
Arkofix® NF liq
Catalyst FF
Catalyst NKD
 - 3D effects (non bleachable resins)
Fixapret® NEC Plus
 - 3D improvers (FA-free*)
Perapret® PU New (grey cast**) **Arkophob®DAN New** (wash fast improver)
Appretan® FFX 6270 (grey cast**) **Appretan® TT** (blue cast**) **Appretan® MB extra** (blue cast**)
- *formaldehyde-free
**after chlorine bleach

/check our latest updates at
www.denim.archroma.com

...and know more about our
SYSTEMS SOLUTIONS for denim



/ THE ARCHROMA WAY TO A SUSTAINABLE WORLD

Safe, efficient, enhanced.

As a global leader in color and specialty chemicals, we are committed to develop innovative systems and services to provide you with custom solutions that are:

Safe – It's our nature to protect. Safe to use, safe to release and safe to wear.

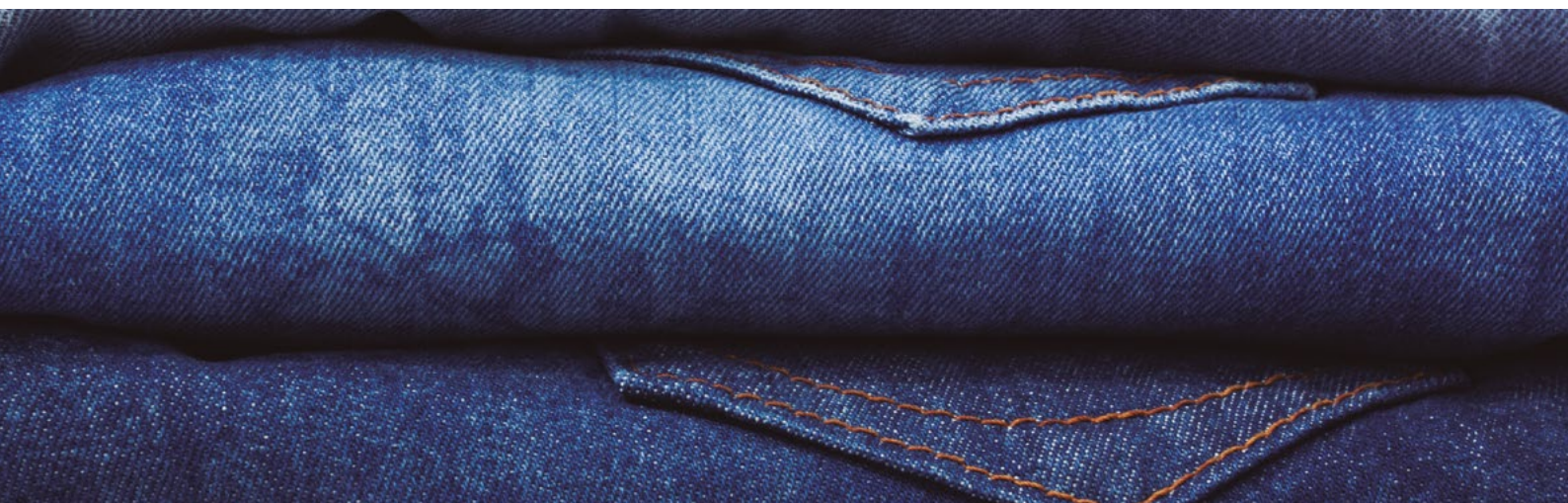
Efficient – It's our nature to rethink sustainable manufacturing. Innovating application processes that minimize resources and maximize productivity.

Enhanced – It's our nature to add another level of value. Effects, functionality and aesthetics to give additional value, for a life enhanced.



Ask your Archroma representative for additional information on our system solutions

*Below limits of detection according to industry standard test methods.
Not intentionally added



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ARCHROMA DENIM COMPETENCE CENTER

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