

DIGITAL CAMOUFLAGE PRINTING

**TACTICAL ACCURACY & FUNCTIONAL
DURABILITY - DIGITAL SOLUTIONS FOR
DEFENSE GRADE TEXTILES.**



MACHINERY MANUFACTURER

From development to lifecycle support - custom machines, advanced software, and dedicated service for your success.

ONLINE VERSION



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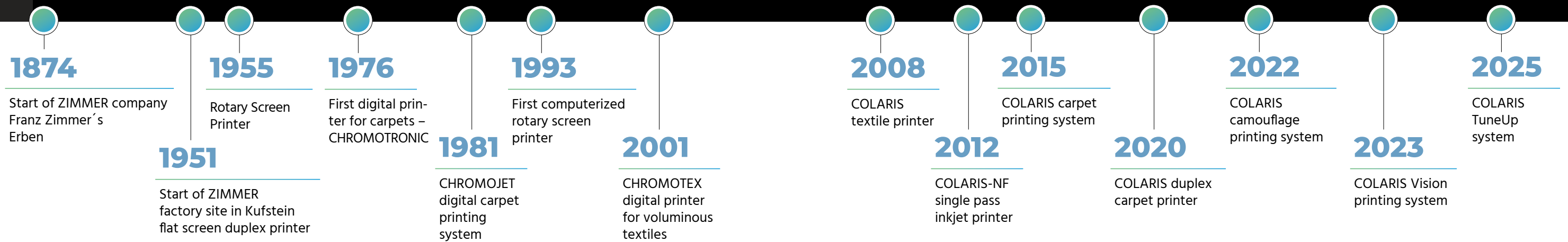
**WE CREATE.
YOU PRINT.
TOGETHER,
WE EXCEL.**

**TAILOR-MADE SOLUTIONS
FOR YOUR UNIQUE NEEDS**

Our machines and systems are as unique as your requirements. We're here to customize them to fit your vision perfectly. To bring your project to life, we need some key details. Tell us more about your end products and specific needs, and we'll get back to you with a solution that's just right for your success!

TELL US MORE





INNOVATIVE PRINTING SOLUTIONS TAYLORED TO YOUR NEEDS

From process development to lifecycle support – custom made digital printing systems, advanced software and dedicated services for your success.

ABOUT US



WE ARE #teamzimmer

150+

Years in Business

5.100+

Machines Globally

2.690+

Happy Customers

FROM VISION TO REALITY: PRECISION AT EVERY STEP



1/ CUSTOMER FIRST

Your Needs, Our Challenge –
Innovative Solutions for You



2/ PROCESS DEVELOPMENT

Efficiency Through Process Development –
Tailored Solutions in close cooperation with You



3/ ENGINEERING & DESIGN

From Process to Perfection –
Engineering with Industrial Excellence



4/ MANUFACTURING

Decades of Engineering Excellence – Your System,
Crafted with Cutting-Edge Technology



5/ ASSEMBLY & COMMISSIONING

Built Twice for Perfection – Tested in Our Facility,
Commissioned at Yours



6/ TRAINING

Training for Success – At ZIMMER Technology
Center & On-Site



7/ MAINTENANCE & SUPPORT

Reliable Support, Anytime, Anywhere –
Expert Service On-Site & Online

....we keep supporting you

UNBREAKABLE PERFORMANCE PRECISION YOU CAN RELAY ON!

PRINT SMARTER. PRINT STRONGER.

Our industrial printheads feature an integrated ink recirculation system for maximum efficiency. They are engineered for the toughest industrial environments. The real game-changer? They are repairable! Extend lifespan, reduce downtime.

Boost productivity like never before.

TAILOR-MADE PRINTING SOLUTIONS – BECAUSE YOUR NEEDS COME FIRST!

A ZIMMER printing system is as unique as your business – designed to meet your exact needs with precision, flexibility, and innovation.

Your vision. Your machine. Your success.

FLAWLESS PRECISION – MAXIMUM PRODUCTIVITY!

COLARIS TuneUp system is the key to fully automated trajectory adjustment and banding compensation. Bring your print quality to the next level while significantly boosting productivity. Experience unmatched accuracy, seamless operation, and superior results – every time.

Print smarter. Perform better.

MAXIMUM COLOR. MINIMAL RESOURCES.

Your printing efficiency is our challenge! Water and energy consumption are key factors in sustainable production. Our COLARIS SupraFix fixation and drying system delivers superior color yield, enhanced brilliancy, and deeper penetration – all while using a fraction of the energy compared to conventional multi-stage fixation systems.

Brilliant results. Sustainable efficiency.

COLARIS ENGINEERED FOR YOUR SUCCESS

SMARTER PRINTS. STRONGER IMPACT.

COLARIS digital printing systems are built around your production needs. Designed for reliability, precision, and efficiency, every system is configured to give you a clear edge over the competition.

KEY FEATURES AT A GLANCE:

- FUJIFILM Dimatix Starfire printheads – modular and repairable for lower long-term costs
- ReadyJet™ technology – combined with inline degassing and advanced ink circulation for maximum uptime and minimized print defects
- Automatic carriage cleaning system – keeps printheads and carriage consistently clean
- Dynamic linear belt monitoring and correction – ensures stable, accurate motion
- Crash protection – safeguards the print carriage and critical components
- Auto printhead calibration – for perfect reproduction of recurring designs
- Easy maintenance access – fast service on heads, electronics, and key components
- Tele-Maintenance – the fast way to get back into production in case of support needs
- Optional banding compensation & calibration – for top-tier print uniformity
- COLARIS Vision System – detects fabric structures or preprinted patterns to ensure perfect registration

**Your requirements
define the machine**



COLARIS
delivers the performance.

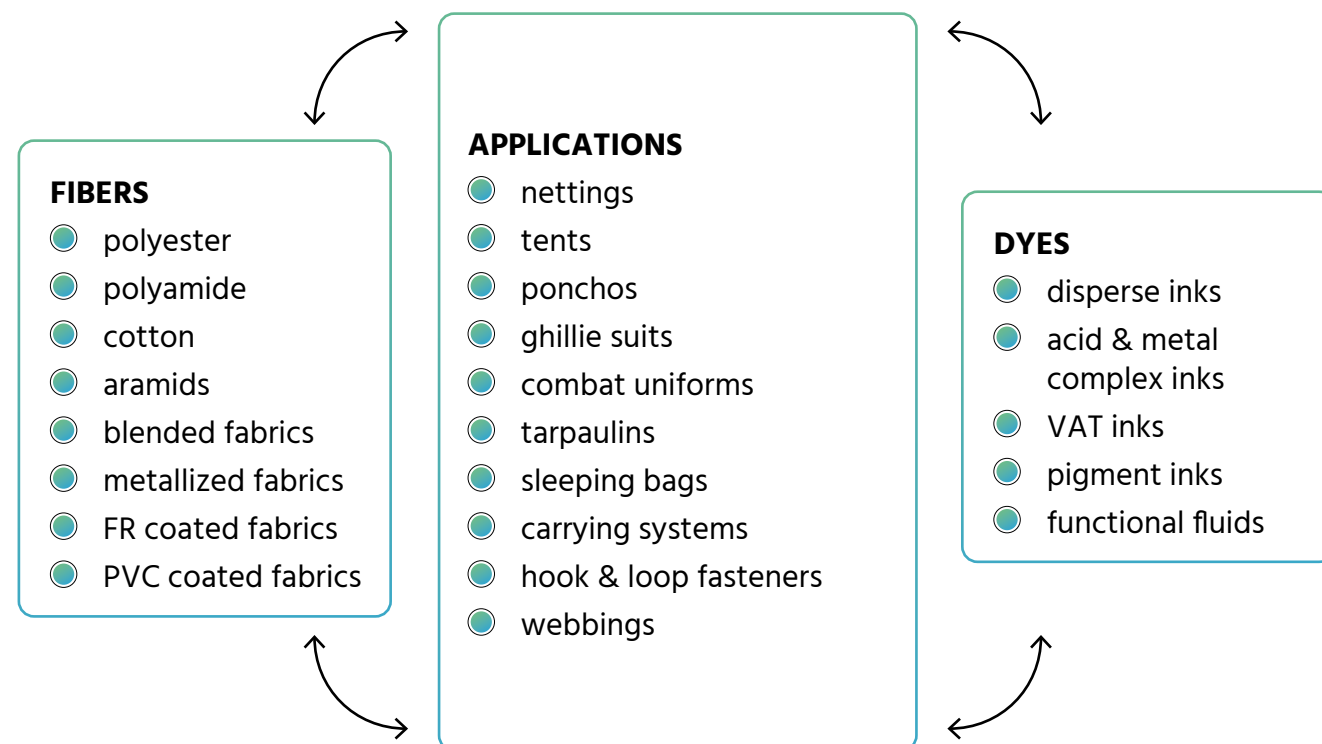


ADVANTAGES OF DIGITAL CAMOUFLAGE PRINTING

10 Key Advantages

- Randomized patterns for optimal concealment against AI-based surveillance systems
- Designs created for any operational environment
- Rapid design adaptation for special requirements and immediate production readiness
- Consistent color accuracy across all batches, including controlled IRR (infrared reflectance) characteristics
- High-resolution detail enabling advanced multi-layer camouflage structures
- Seamless integration of customer-specific pattern libraries and camouflage databases
- Reduced material waste thanks to precise, on-demand digital production
- Precise reproducibility meeting military-grade quality standards
- Scalable production from prototypes to full industrial volumes without retooling
- Ability to print on a wide range of technical and defense-grade textiles

FIBERS, CLASSES OF DYES AND TYPICAL APPLICATIONS



PROTECTIVE REQUIREMENTS



VISUAL CAMOUFLAGE

Being invisible in daylight and matching the shades of environment is standard.

MULTI-SPECTRAL CAMOUFLAGE – UV, NIR, TIR

Being invisible in different electromagnetic spectrum of typical sensor detection systems is a must.

HVA (HIGH VALUE ASSET) PROTECTION – NETTINGS, COVERS, TARPAULINS

Modern warfare is a matter of budget; and if cheap gear (such as drones) destroy HVAs, then camouflage becomes of very (cost) efficient protection method.

OUR SOLUTION - DIGITAL MILITARY CAMOUFLAGE

RANDOMIZED PATTERN GENERATION – TERRAIN SPECIFIC PATTERNS

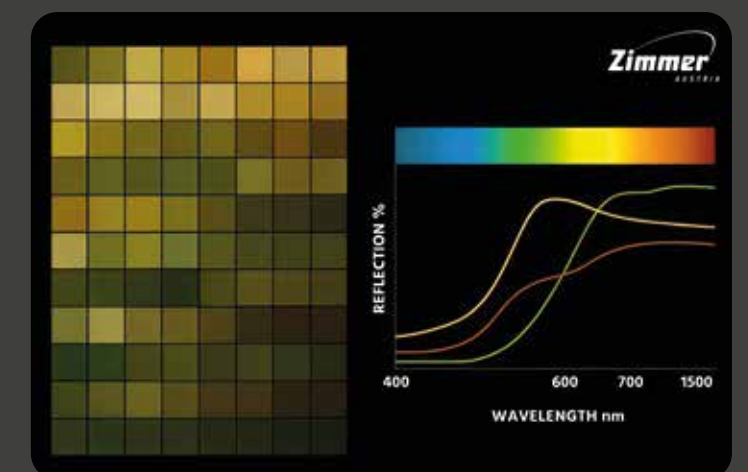
Digital printing combined with arial imaging data from drones/satellites allow customized and randomized pattern on demand.

SIGNATURE DATABASE

For quick matching of spectral behavior of different kind of environment (vegetation, urban etc.) it is mandatory to have a signature database, that represents the required chemistry recipe (textile + coating + ink) for specific camouflage requirements.

HAWK EYE

Is ZIMMER's answer for color matching and signature database management.



MASTERING THE UNIQUE REQUIREMENTS OF CAMOUFLAGE PRINTING

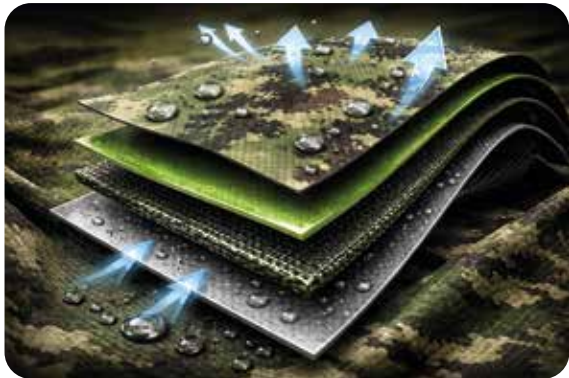
1. TECHNICAL TEXTILES - ENGINEERED FOR PERFORMANCE.

Unlike conventional fabrics, they deliver specific functional properties such as strength, durability, and protection, designed for demanding industrial applications.



2. CAMOUFLAGE PRINTING – TEXTILE PRINTS FOR REDUCED VISIBILITY.

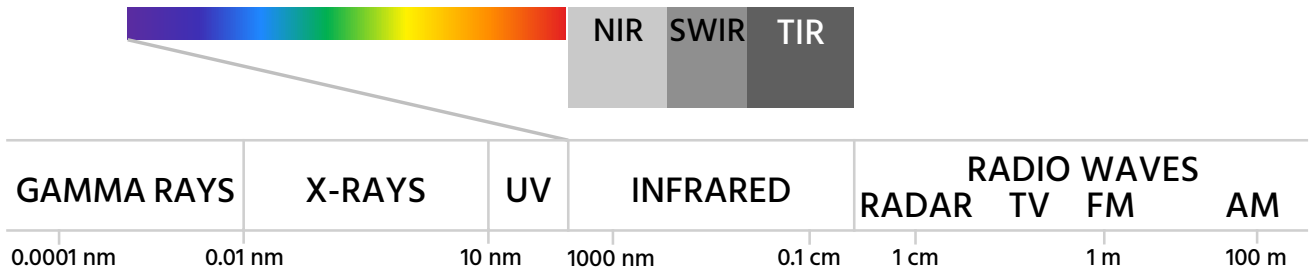
It creates patterns that blend seamlessly into natural or urban environments, providing reliable concealment for military, hunting, and outdoor applications.



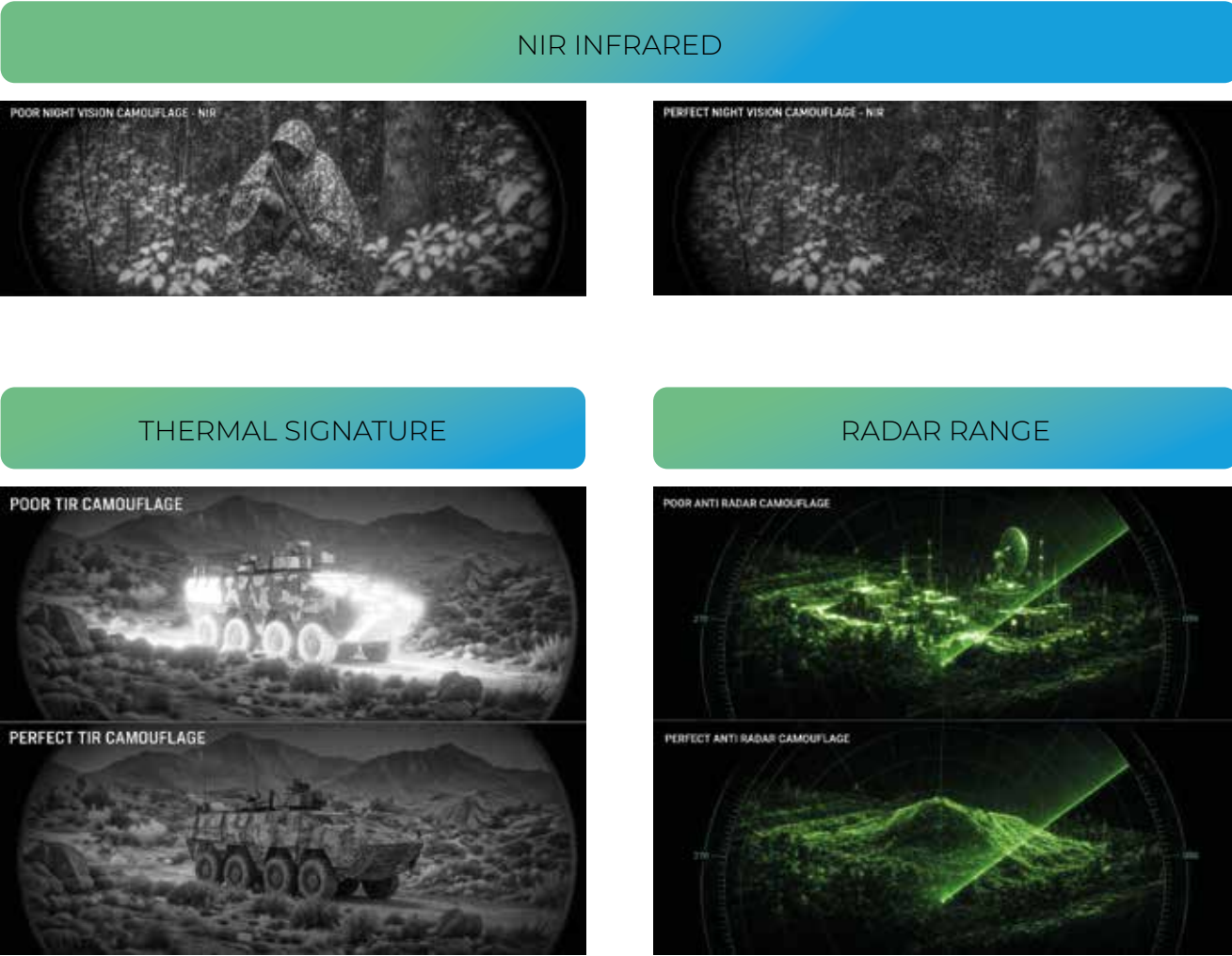
3. MILITARY CAMOUFLAGE – ENGINEERED FOR HIGH-LEVEL CONCEALMENT.

It delivers controlled camouflage performance in the visual, the NIR, and SWIR wavelength, essential for protection against night-vision and infrared detection in a market consuming a huge amount of technical textiles every year.

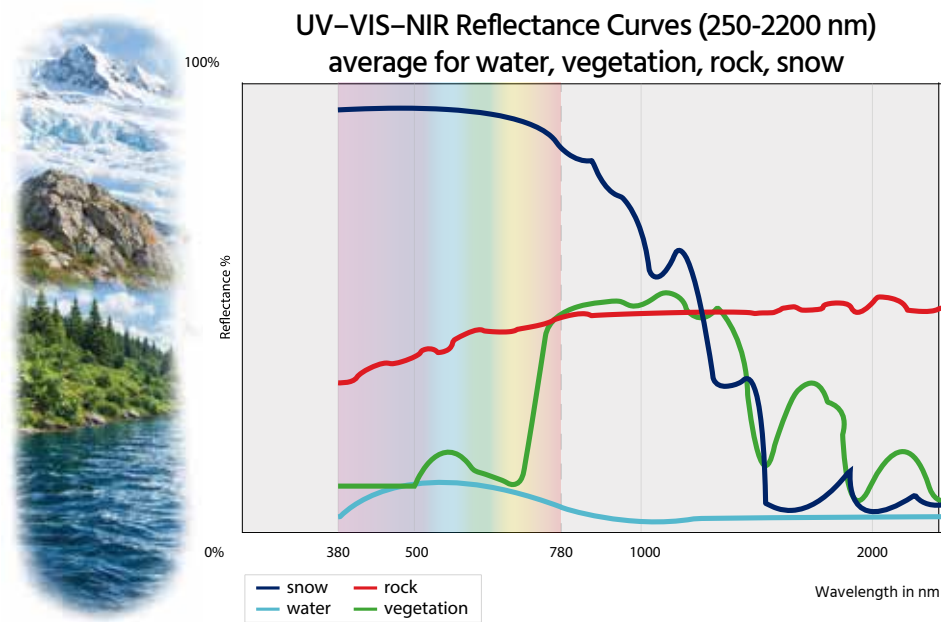
4. WAVELENGTH CLASSIFICATION



5. CAMOUFLAGE EFFECT WITH THE USE OF VARIOUS SENSOR TECHNOLOGIES

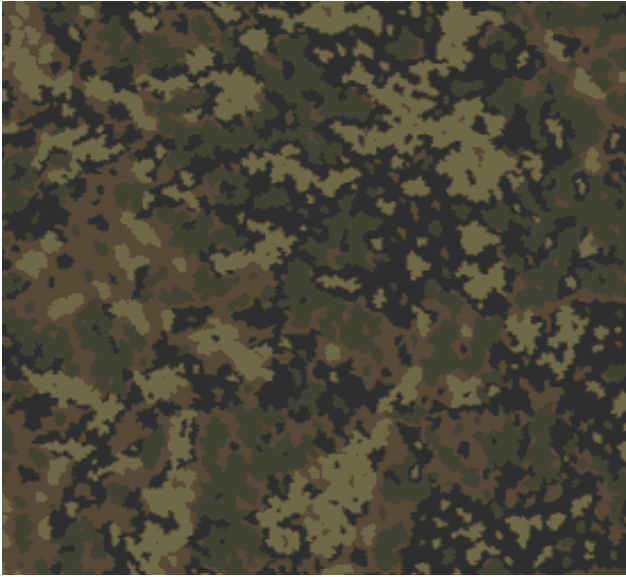


6. SPECTRAL SIGNATURE OF DIFFERENT MATERIALS



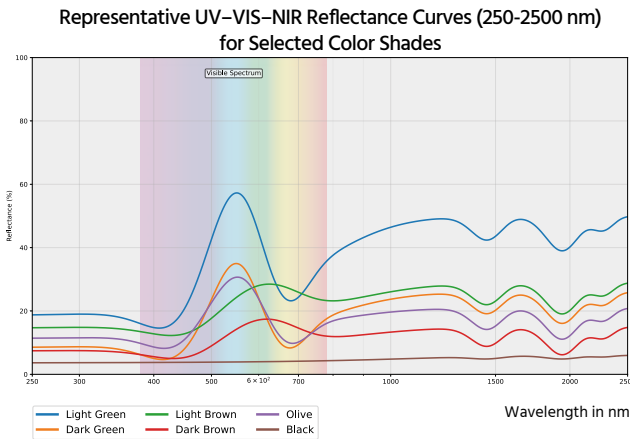
7. SPECIFICATIONS OF COLORS AND IRR VALUES

Color name	light green		dark green		brown		black	
Palette index	0		2		3		4	
	Cov. %	Lab tol.	Cov. %	Lab tol.	Cov. %	Lab tol.	Cov. %	Lab tol.
	18,20%	+/-	28,90%	+/-	23,10%	+/-	29,80%	+/-
L	45,00	1,6	28,00	1,50	32,00	1,20	19,00	0,90
a (+red/-green)	-3,50	0,8	-4,00	0,70	6,00	0,80	0,20	0,40
b (+yellow/-blue)	20,00	1,5	8,00	0,80	13,00	1,10	0,00	0,40
R (D165/10°)	113		65		91		46	
G	107		68		71		46	
B	72		53		55		46	
nm	min	max	min	max	min	max	min	max
450	5%	10%	3%	8%	4%	8%	3%	8%
550	12%	22%	5%	12%	4%	10%	3%	8%
630	10%	18%	4%	8%	8%	15%	3%	8%
650	3%	20%	3%	8%	8%	17%	3%	8%
680	3%	28%	2%	9%	8%	17%	3%	8%
700	8%	40%	8%	14%	10%	22%	3%	8%
750	50%	76%	28%	45%	10%	25%	5%	10%
850	60%	76%	35%	55%	14%	28%	6%	15%
1000	65%	76%	39%	52%	16%	30%	8%	18%
1250	60%	73%	36%	55%	20%	32%	9%	21%



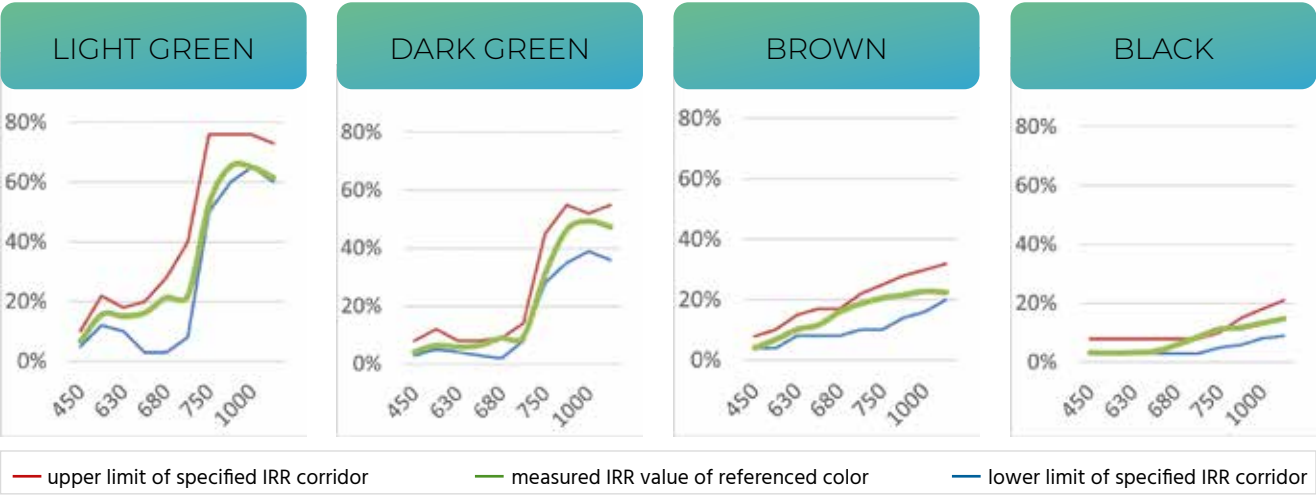
8. ADAPTIVE CAMOUFLAGE FOR THE MODERN BATTLEFIELD

Modern sensors don't just see visible colors - they detect signatures across UV, NIR and even TIR spectra. As drone surveillance, advanced optics and AI rapidly evolve, camouflage must advance with equal speed. Our digital camouflage technology delivers terrain matched concealment across a wide range of substrates — an efficient, low cost solution to protect both personnel and high value assets. With our SIGNATURE DATABASE and HAWK EYE analysis tools, we generate mission ready camouflage palettes precisely tuned to environmental conditions and military specifications.



DIGITAL CAMOUFLAGE PRINTING TECHNOLOGY
BEYOND PRINTING. TOTAL SIGNATURE CONTROL.

Digital camouflage printing is a fully integrated technology suite. Spectral measurement data is processed through advanced digital systems and translated into precise, mission ready color values. A tailored blend of different fabrics specialized dyes and functional fluids ensures exact performance across visible UV, NIR and TIR ranges - meeting the strict signature requirements of modern armed forces. **Accuracy. Repeatability. Operational Advantage.**



9. DIFFERENCE BETWEEN “GOOD” AND “BAD” IRR SIGNATURES



PRINT SEEN AT DAYLIGHT



PRINT WITH BAD IRR-SIGNATUR



PRINT WITH GOOD IRR-SIGNATURE

10. PRECISION COLOR FOR SUPERIOR CAMOUFLAGE

Engineered for military camouflage, our advanced ink technology delivers deep, accurate colors and optimized IR signatures—every time. Specialized software aligns inks with precise IRR requirements, ensuring patterns perform flawlessly in the field. High-performance dyes and fixation processes guarantee outstanding lightfastness, while automated calibration keeps every print sharp, stable, and consistent. And because our platform supports multiple ink systems in one workflow, you get maximum flexibility for any mission-critical textile.

Reliable. Repeatable. Ready for deployment.



11. DIGITAL PRINTING IS A POWERFUL COMPLEMENT TO TRADITIONAL SCREEN PRINTING.

Specialized forces increasingly require unique camouflage patterns to adapt flexibly to diverse operational environments. With advanced surveillance technologies — especially drones—randomized and non repeat patterns become essential, as they are significantly harder to detect, even with AI supported image recognition.

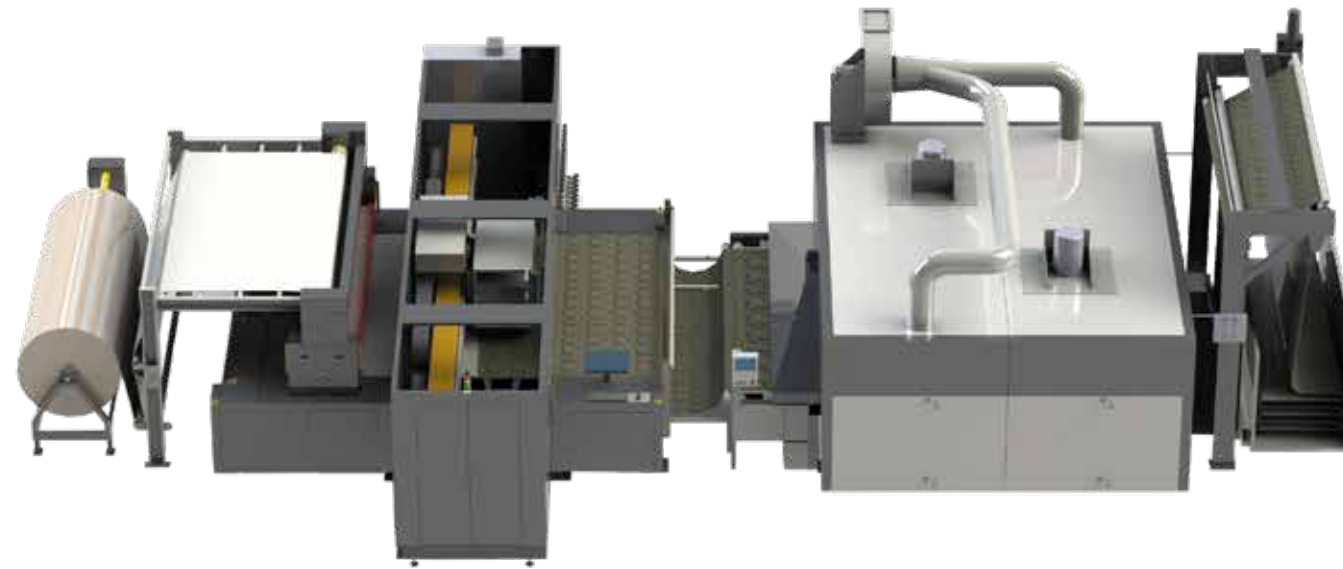
Digital design and printing offer the flexibility needed to generate such complex structures, including the integration of macro and micro elements within a single pattern. In addition, digital production enables rapid market response with minimal inventory, providing a clear economic advantage.

12. PROS AND CONS OF DIGITAL CAMOUFLAGE PRINTING VS. SCREEN PRINTING

- No need for screens
- Unlimited pattern repeats
- Faster color and pattern development
- Relatively slower production speed (up to approximately 7 m/min for 1.6 m wide fabric)
- Not all dyes can be produced as inks for digital printing

13. WHY THE FUTURE BELONGS TO DIGITAL CAMOUFLAGE PRINTING

- Inkjet has a much lower negative environmental impact in comparison to screen printing (color matching; color preparation; dye leftovers; system washing, ...)
- Unlimited repeats and number of colors; no minimum quantity; fast sampling
- Less know-how in comparison to traditional printing is needed
- In future everything will be digital



PRINT LINE FOR CAMOUFLAGE PRINTING

SMART SIMPLICITY FOR CAMOUFLAGE EXCELLENCE

Multi-ink-class digital printing delivers precise colors and controlled IR performance in one streamlined process. Compatible with cotton, blends, and technical fabrics, it ensures fast production, low resource use, and mission-ready camouflage with uncompromising accuracy.

TECHNICAL DATA

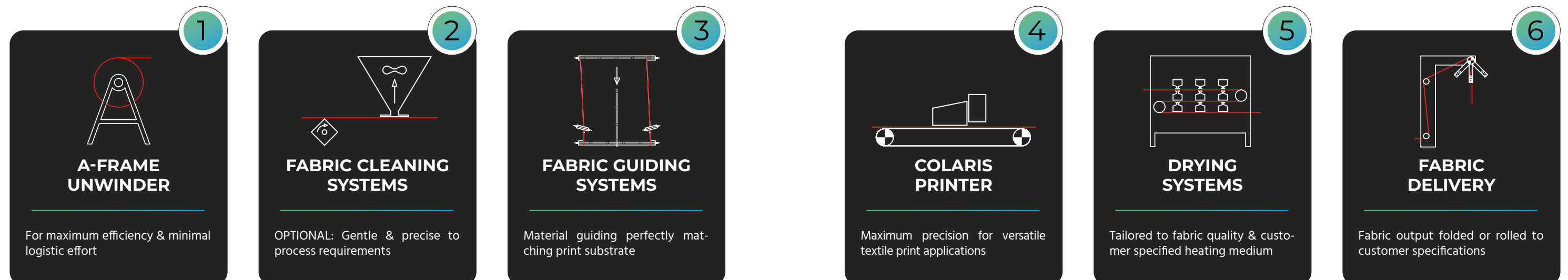
working widths: 1800 | 2700 | 3400 mm

print substrates: woven, nonwoven, knitted fabrics

max no. of colors:
12 colors or a combination of inks & functional fluids

number of printheads: up to 6 per color group, or 12 per color, max. 72 possible

production capacity: scalable up to 860 m²/h



THE HEART OF PRINTING – THE PRINthead

STARFIRE™ SG1024 – PRECISION & PERFORMANCE FOR INDUSTRIAL PRINTING

ZIMMER AUSTRIA offers four models of the high-performance StarFire™ SG1024 printhead from FUJIFILM Dimatix, designed for durability and efficiency in textile and carpet printing.

KEY BENEFITS:

- Industrial Reliability – Built for long-term use
- Coated Metal Nozzle Plate – Abrasion-resistant
- High Firing Frequency – Maximized productivity
- 6 mm Print Distance – High drop velocity
- VersaDrop™ Technology – Binary & grayscale modes
- ReadyJet™ System – Continuous ink re-circulation prevents clogging
- Flexible Options – Four models with different drop sizes

StarFire™ SG1024
Precision. Performance.
Reliability.



SHS SUPRAFIX-V

SUSTAINABLE – FLEXIBLE – COMPACT

Discover our special curing technology by using a combination of steam and heat – our answer to the energy discussion in the textile industry.

Comparison of curing methods:

	Calendar (oil-heated)	Hot Air Dryer (gas-heated)	SupraFix-V (electric-heated)
Installed power	80-120 kW	200-300 kW	30 kW
Operational power consumption	50-90 kWh	100-150 kWh	12-15 kWh
Heat-up time	Up to 90 min.	Up to 60 min.	Upt to 30 min.
Efficiency	20-50 %	30-55 %	85-90 %

SPECIALLY DESIGNED FOR CURING FLAT TEXTILES, OFFERING SEVERAL ADVANTAGES:

- Minimum energy consumption due to very economical drying process
- Maximum penetration by using steam
- Great fastness properties due to increased ink distribution within the fiber
- Minimized heat loss and exhaust air
- No glycol dripping on fabric
- Minimum space requirements
- Lower water consumption
- Suitable for all ink classes (Pigment, Disperse, etc.)

SHS SupraFix-V.
Performance meets Responsibility.



SPECIAL OPTIONAL FEATURES



COLARIS TUNEUP

SMART CALIBRATION FOR FLAWLESS INKJET PRINTING

Inkjet printing often suffers from visible defects caused by uneven droplet release, aging printheads, and density mismatches - especially on flat surfaces and color gradients. TuneUp by ZIMMER AUSTRIA solves these challenges for COLARIS printers with a powerful combination of hardware and software, delivering consistent, high-quality results across all ink classes.

BEFORE



AFTER



WHY TUNEUP?

- **Nozzle-Level Calibration**
Automatically balances density across all nozzles for a smooth, uniform print image.
- **Fast & Efficient**
Full calibration—including test prints—takes approx. 15 minutes, even with up to 96 printheads.
- **Simple Software Interface**
Designed for ease of use, enabling quick adaptation to new materials or print requirements.
- **Extended Printhead Life**
Partial compensation of failed nozzles maintains quality and reduces maintenance costs.
- **Digital Printhead Alignment**
Re-aligns printheads in minutes after replacements — minimal manual effort needed.

Print smarter. Save time. Deliver perfection.
With COLARIS TuneUp.

TECHNOLOGY CENTER - SPACE FOR INNOVATION

EXPERIENCE INNOVATION, DESIGN SOLUTIONS.

High-tech meets practice in our Technology Center: this is where we develop pioneering processes, test new applications and support our customers with expertise, experience and state-of-the-art equipment.

DEVELOPMENT & PRACTICAL TESTS

New technologies are developed at the heart of our innovation work - realistically tested on textiles, carpets and technical materials. Our systems: CHROMOJET, COLARIS and modern coating and laboratory technology.

APPLICATION TECHNOLOGY & CUSTOMER PROXIMITY

Whether product samples, process optimization or new materials - we test customer solutions directly on original substrates. In this way, we create reliable, reproducible results for use in production.

TRAINING & TECHNOLOGY TRANSFER

From operator training to product development: our technology center is a hub for knowledge, training and practical service - right at the pulse of our technology.

PRINTHEAD RECONDITION CENTER

EXTEND PRINTHEAD LIFESPAN – REDUCE COSTS

Printheads are a major cost factor, often failing due to ink deposits or mechanical damage — not aging. Unlike conventional printheads, FUJIFILM Dimatix StarFire™ can be cleaned and restored! High-Tech Cleaning & Repair

KEY BENEFITS:

- Advanced Cleanroom Technology – Precision tools & process-controlled stations
- Custom Cleaning & Repair – Tailored treatments for contamination & damage
- Performance Grading – Quality-rated from A to C for optimal usability

ZIMMER AUSTRIA's expert re-conditioning.

Extend printhead life, reduce waste, and optimize performance.



AFTER SALES SERVICE

WE ARE THERE FOR YOU - EVEN AFTER THE PURCHASE.
Our service does not end with the delivery of the machine – on the contrary: we accompany you throughout the entire lifecycle. Whether maintenance, spare parts, updates, or support – our specialists are there for you, worldwide and reliably.



TECHNICAL SUPPORT

Experienced service technicians support you with faults, maintenance and commissioning - remotely or directly on site. Fast, solution-oriented and always at eye level.



SPARE PARTS & COMPONENTS

Original parts ensure the quality of your machine. We deliver reliably - tailored to your model and your production requirements.



SOFTWARE & UPDATES

The latest updates ensure greater efficiency and new functions. Our systems can be updated - and our team will inform you about new features in good time.

MORE DETAILS



Delivery

Your system is delivered ready for operation - tested, documented and ready for immediate use.

Maintenance

Regular checks ensure performance and service life - we support you with foresight.

Updates

Firmware and software always up to date - for efficient and future-proof work.

Training

Our experts get your team up to speed - practical, easy to understand and tailored to your processes.

Spare parts

Original parts, delivered quickly - for maximum operational reliability and optimum performance.

Support

Whether remote maintenance or personal support - our service team is there for you, worldwide and directly accessible.



+43 (5372) 64893-220
colaris_servicecenter@zimmer-austria.com



+43 (5372) 64893-220
servicecenter@zimmer-austria.com



+43 (5372) 64893-220
rotation_servicecenter@zimmer-austria.com

FULL IN-HOUSE MANUFACTURING EXCELLENCE



FROM STEEL TO SYSTEM

ZIMMER AUSTRIA operates state-of-the-art production facilities covering the entire range of machinery and plant engineering – from welded structures and precision machining to final assembly of components and control cabinets.



HIGH- PRECISION MACHINING

Driven by the needs of textile printing technology, high-end multi-axis milling has become one of our core strengths. With machine dimensions unmatched in the region, we are a trusted partner for large-format component manufacturing.



CONTRACT MANUFACTU- RING

To ensure optimal utilization of our production capacity, we offer high-quality contract manufacturing for various industrial partners – especially in large-scale and precision parts.



QUALITY AND ASSEMBLY

Every component is subject to strict quality control and pre-assembly, guaranteeing maximum reliability in our machines and in projects for third-party clients.



CONTROL CABINET ENGINEERING

We build electrical systems that comply not only with EU standards but also with the specific regulations of our customers' target countries.



PRE-TESTED FOR GLOBAL USE

All systems are assembled and tested in-house before shipping – ensuring smooth final installation and rapid commissioning on site.

FIND THE PERFECT TECHNOLOGY FOR YOUR BUSINESS

Digital Textile Printing

Digital Carpet Printing

Carpet Back-Coating

Digital Technical Textile Printing

Digital Military Printing

Special Solutions

OEM Manufacturing



GET IN TOUCH

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ZIMMER AUSTRIA
DIGITAL PRINTING SYSTEMS



Eibergstrasse 2-8
6330 Kufstein | AUSTRIA



+43 (5372) 64893-0
info@zimmer-austria.com

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