

D E V E N PVT. LTD.
SUPERCriticalALS *Presents*

For The First Time In The World:

Waterless Dyeing of ALL Textiles with Conventional Dyes

SUPRA **UNO**TM

ONE TECH TO COLOR ALL

(USA Patent no. US 11015289 B2, Indian Patent no. 298213)

Pioneering in Supercritical Fluid Technology Development since 1998...

FASHION INDUSTRY'S

ENVIRONMENTAL IMPACT REDUCTION CHALLENGE

The textile industry, especially its dyeing & finishing operations, are one of the largest consumers of water in the world. Further, it also involves the use of a huge quantity of hazardous auxiliary chemicals which end up in wastewater, polluting the soil, water resources, making an irreversible damage to both the environment and human health.

With the increasing demand for compliances in the fashion industry, there is an urgent need for replacing the conventional water-based dyeing & finishing techniques by a sustainable solution that truly minimises the environmental impact. This solution must reduce the use of hazardous chemicals along with minimizing the water & energy usage while being versatile, efficient and cost-effective.

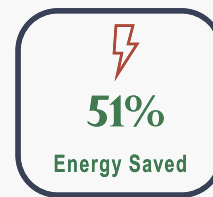
A COMPLETE, VERSATILE AND VIABLE SUSTAINABLE SOLUTION

SUPRAUNO™

ONE TECH TO COLOR ALL

SUPRAUNO™ developed by Deven Supercriticals is an internationally patented, unique dyeing and finishing technology using Supercritical Carbon Dioxide (CO₂), which for the first time in the world, allows the waterless use of conventional dyes and their traditional tri-chrome recipes for the sustainable dyeing of various man-made and natural textile types, truly revolutionizing the textile dyeing & finishing operations.

SUPRAUNO™ in comparison with Conventional Dyeing for Polyester-Cotton Blends



ADVANTAGES



USES NO WATER

NO WATER USED &

~90% LESSER AUXILIARY CHEMICALS

SUPRAUNO™ uses 'Supercritical CO₂' as the medium for dyeing instead of water used in conventional dyeing processes.

SUPRAUNO™ also uses substantially lesser hazardous chemicals, thus, minimizing their release into the water resources preserving the environment and health, thus, achieving sustainability in textile manufacturing.



DYES MULTIPLE TEXTILE TYPES

VERSATILE

Our patented SUPRAUNO™ technology has for the first time in the world, enabled the use of Supercritical CO₂ for sustainable dyeing of not only Polyester but also for various other 'man-made and natural textiles' such as Nylon, Acrylic, Viscose, Cotton, Linen, Wool etc. and their blends.



USES CONVENTIONAL DYES

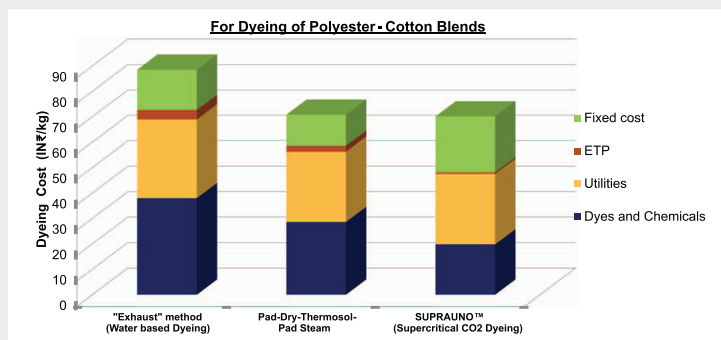
NO SPECIAL DYES

SUPRAUNO™ allows the use of conventional dyes and their tri-chrome recipes for the waterless dyeing process. This improves the viability as 'no special dyes' are required as in the prior-art processes. Also, the expertise of the Dye Masters can be continued to be used like in the earlier conventional dyeing process.

COMPARISON OF SUPRAUNO™ WITH OTHER SUPERCRITICAL CO₂ PROCESSES

	Features	Deven Supercriticals Patented (SUPRAUNO™) SC CO ₂ Technology	Conventional SC CO ₂ Processes
A	Which types of Textiles can be Dyed?		
	Polyester	✓	✓
	Cotton, Linen, Flax etc.	✓	✗
	Viscose and Modified Cellulose	✓	✗
	Polyester - Cotton or Viscose Blends	✓	✗
	Nylon, Acrylic, Wool etc.	✓	✗
B	Suitability of Conventional / Traditional Dyes	✓	✗
C	Dyes suitable for the process		
	Disperse Dye	✓	✓
	Reactive Dye	✓	✗
	Direct Dye	✓	✗
	Acid Dye	✓	✗
	Basic (Cationic) Dye	✓	✗
D	Achieving Desired Shade by using in-house Trichrome Recipe?	✓	✗
E	Solubility of Dyes in SC CO ₂	HIGH	LOW
F	Dye Utilization / Dyeing Efficiency	HIGH	MODERATE
G	Finishing possible along with Dyeing step?	✓	✗
H	Batch Time (T)	ABOUT HALF (t/2)	LONG (T)
I	Commercial Level Scale-up	EASY	DIFFICULT
J	Final Shade Buildup	BASED ON RECIPE	CHANGES WITH BATCH TIME
K	Batch to Batch Consistency	EASY	DIFFICULT

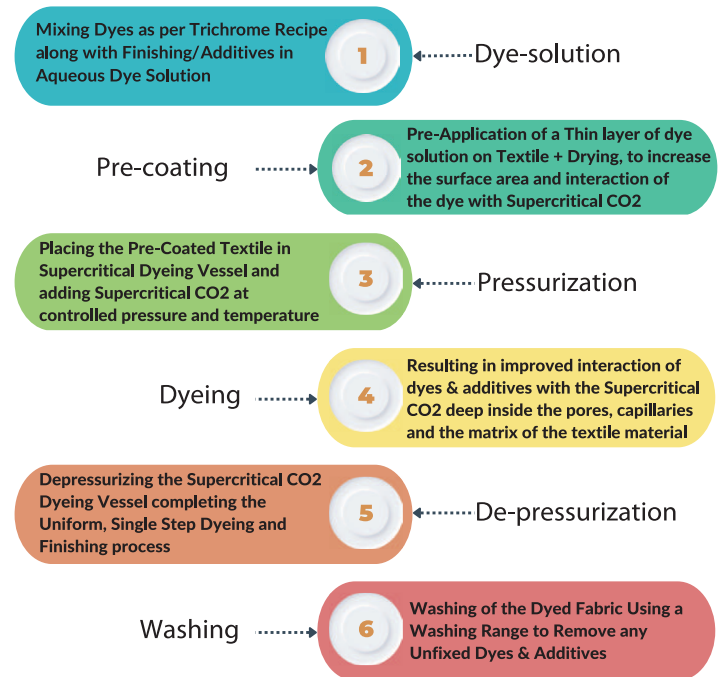
ECONOMIC VIABILITY



Our patented, sustainable technology, SUPRAUNO™, is economically viable to be implemented in the industry with dyeing costs being comparable to conventional water-based dyeing. Our technology avoids two-bath dyeing for Polyester-Cotton blends and uses much lesser quantity of auxiliary chemicals, uses no salt for cotton and no reduction clearing for polyester, thus substantially reducing the pollution, water and energy load.

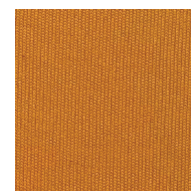
Thus, SUPRAUNO™ has a great potential to truly accomplish Environment friendly, Green objectives of the Textile Industries around the world for utilizing Sustainable process in place of conventional processes.

STEPS INVOLVED IN SUPRAUNO™

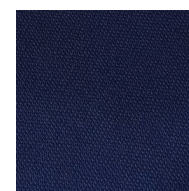


TEXTILES DYED USING SUPRAUNO™

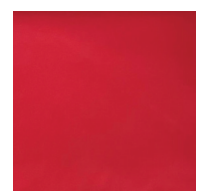
Types of Polyester Textiles Dyed with SUPRAUNO™



Micro Denier Polyester

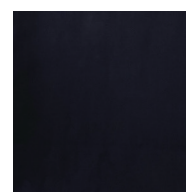


SORONA® Polyester



Recycled Polyester

Other Textiles Dyed



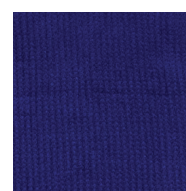
Nylon



Polyester-Cotton Blend



Cotton



Acrylic

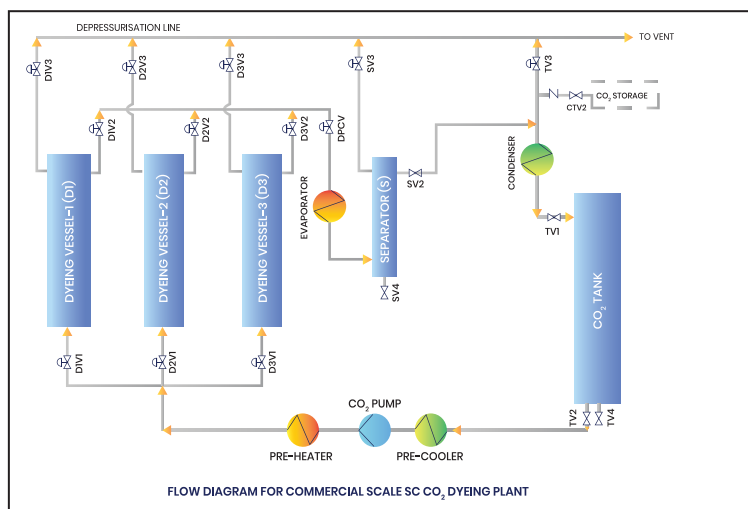


Zipper Tape



PET Yarn

SUPRAUNO™ SC CO₂ PROCESS



Supercritical (SC) Carbon Dioxide (CO₂) based dyeing and finishing plant would have dyeing vessels, separator, CO₂ hold-up tank, heat exchangers etc., state of the art Programmable Logic Controller (PLC) and Human Machine Interface (HMI) terminal with a safety interlock logic software for safe operation and reproducible results.

The dyeing process works in a closed loop with constant circulation of CO₂ in the system. It is a semi-batch operation with a typical batch time of ~ 1.5 to 2 hours.

The dye pre-coated textile material to be dyed is held in the dyeing vessel with the help of perforated textile holder for easy handling and uniform contact between Supercritical CO₂ and the textile material. The Dyeing vessel is equipped with specially designed quick acting closure for easy and fast opening of the pressure vessel. The CO₂ leaving the separator is fed back to the CO₂ hold-up tank for recirculation.

PATENTS GRANTED

- "Process for Dyeing of Textile Materials using Supercritical Fluid" (Indian Patent no. 298213, USA Patent no. US 11015289 B2)
- "A Control Valve having a Hollow Piston for Controlling Flow of Fluid" (USA Patent no. US 10883612 B2, European Patent no. EP 3440387 B1, Indian Patent no. 425453)
- "System for Continuous Feeding and Discharging of Solid Material to & from a Vessel Operating under High Pressure" (USA Patent no. US 10328406 B2, European Patent no. EP 3242741 B1)



Dr. A.P.J. Abdul Kalam (former President of India) giving Award to Dr. Swapneshu Baser for contributions in development of SCF Technology

AWARDS AND RECOGNITIONS

- Selected for South Asia INNOVATION PROGRAMME of 'Fashion for Good': a global platform for innovation, based in Amsterdam to make all Fashion 'Good', April 2021
- 'Young Engineer Award' from the Indian National Academy of Engineering (INAE), for year 2000
- Economic Times (ET) MSME Excellence Icons Award, under the category of 'Most Innovative MSME of the Year 2020' instituted by Times of India (TOI) group and DCCIA
- 'Excellence in Entrepreneurship in Research and Innovation' Award from Entrepreneurs' International, 2021
- 'Dr. P.K. Patwardhan Award' for Technology Development & Transfer for year 2001
- Recipient of the 'NOCIL Award for Excellence in Design / Development of Process Plant / Equipment', from the Indian Institute of Chemical Engineers (IICChE), for year 1997

CONTACT US

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