Total Solution for textiles

Everything you need for digital textile printing
Experience the Total Solution

Total Solution is the complete integrated system for industrial digital printing on textiles with Monna Lisa series, created in synergy by three companies, each with their expertise: For.Tex for inks and pre- and post-treatment, Epson for printing technology, F.lli Robustelli for engineering and mechanical assistance. All components belong to the same process to guarantee the best printing results and the utmost customer satisfaction. This is our uniqueness, this is our value: to make the Total Solution available in industrial digital textile printing.
Printing process with Monna Lisa series

Industrial digital printing on textiles belongs to a wider process including different steps, from creative concept to fabric pre-treatment to finishing. Below scheme features the whole printing flow with Monna Lisa series.
Monna Lisa has become the brand identifying the range of textile industrial digital printers, now a reference standard for high quality printing in application fields such as haute couture fashion, accessories, home fabrics, sportswear. Characterized by the flexibility and productivity typical of the digital technology, it’s the right choice for an increasingly dynamic market, which requires quick responses to its diverse demands.

Since the launch of Monna Lisa in 2003, the range has increased with the introduction of new models with enhanced features, and it’s still evolving.

Monna Lisa evolution: development and innovation

Our story

- 2003: Launch of the second generation Monna Lisa machine with new M type printing heads designed to double productivity.
- 2007: Monna Lisa is launched at Villa Erba, Como.
- 2009: Award Ecolitech for the low environmental impact (less than 40% of water and less than 75% of power consumption, compared to traditional systems).
2012
Introduction of Monna Lisa Evo featuring Epson PrecisionCore printing heads for enhanced quality and productivity.

2012
Launch of Monna Lisa Evo with 32 new generation T type printing heads that increase production, velocity and printing precision.

2012
Green Label for the environment-friendly approach and remarkable energy saving features.

2014
Launch of Monna Lisa Evo 2 with ultra performing new type T2 printing heads.

2014
Launch of Monna Lisa Evo with 32 new generation T type printing heads that increase production, velocity and printing precision.

2016
Introduction of Monna Lisa Evo Tre featuring Epson PrecisionCore printing heads for enhanced quality and productivity.
The Monna Lisa Evo Tre increases flexibility and reliability

Monna Lisa Evo Tre is a further step in the remarkable evolution of printing technologies in the textile sector. One of the most important qualities of the new Monna Lisa is its flexibility. It provides users with a single printer to meet a variety of different production needs: it can print on any type of fabric and reproduce with the highest quality the most essential as well as the most complex designs with perfect speed and repeatability.

Monna Lisa Evo Tre means a full range of printers available in several configurations, differentiated by number of printing heads or by printing height, for example, to suit any specific need.

**Powered by PrecisionCore**

Driving the Monna Lisa Evo Tre is a new printhead array featuring Epson’s advanced PrecisionCore technology. With 128 PrecisionCore MicroTFP print chips configured in 32 4-chip printheads, the array provides 12,800 nozzles* for each colour for outstanding productivity. While being highly durable, it is also designed for easy maintenance to minimize downtime.

*For 8-colour configuration
Textile digital printing is gentle to the environment

There is a consensus that inkjet printing is the future of textile printing. Advantages such as lower production costs and the possibility to customise short runs are undeniable. But there’s more. The Total Solution system offers printing companies and other operators from the textile production chain considerable benefits in terms of environmental impact, complying with the laws, regulations, certifications and restrictive specifications produced by customers and brands in the fashion industry.

Let’s find out the reasons behind the low carbon footprint of textile digital printing. First of all the Epson inkjet technology driving the Monna Lisa series is a no heat technology. When an electrical voltage is applied to it, the piezo crystal inside the printing head flexes, generating the motion that pumps the ink in every nozzle. There’s no warm up time, which immediately results in lower energy consumptions.

Secondly, the streamlined textile printing process means reduction both in the volume of wastewater sent for purification and in the consumption of energy for heating process water in comparison with the traditional flow, with an overall saving of 27%. Moreover, a conventional rotary system has a carbon footprint of 139.56 kg of CO$_2$eq while a digital system produces 85.66 kg of CO$_2$eq.*

*Data obtained by simulating the consumption of materials needed to print 1,000 metres of fabric using conventional and digital technologies based on values provided by a printer run with both types of equipment.
Less maintenance, less waste

Also the maintenance model used by F.lli Robustelli for the Monna Lisa series allows to keep more than 80% of the machine in service at each five-year maintenance, so that customers can save costs and reduce waste as well.

And finally, all types of Genesta inks have been granted the ECO PASSPORT certification by OEKO-TEX®, assurance that they meet the strict human-ecological standards for chemicals. At Textile Solution Center we are constantly making Research & Development activities to make chemicals for pre- and post-treatment more and more gentle to the environment and human health.

Total Solution: a guarantee of eco-friendliness, a necessary feature to make digital printing the first choice for high quality production in textiles.
Fabric pre-treatment with PREGEN®

The fabrics meant for printing, both traditional and digital, must be carefully prepared, i.e. they must be clean of any impurity that might compromise printing. They have to be hydrophilic, flat, straightened and stabilized in dimensions.

In addition to all these requirements, in order to be ready for digital printing, the fabric must be addictivated with all those products that:

- allow the fixation of the dye contained in the ink to the textile substrate
- optimize the intensity and brilliance of the prints
- control the spreading of the ink on the fabric, so improving the printing definition
- support the ink absorption on the fabric, so making drying easier
- support the penetration of the dye contained in the ink

In general, fabric preparation is essential for all the digital printing processes, except for pigment printing. It is optional for digital printing with pigment inks but it’s useful in order to obtain deep and brilliant shades.

It may be applied using various application systems, such as padding, all over printing or spraying, but thanks to its ease of use and the possibility to have a perfect dimensional control of the fabric, the most used method is by padding.

After the application of the PREGEN® preparation for digital printing, the fabric must be dried.

In case of preparation meant for printing on silk, wool, polyamide or other cellulosic fibers, the drying temperature should not exceed 105°C and drying shall be made in such a way to have a residual humidity on the material of approx. 50% of the nominal rate of recovery.

Residual humidity values lower than that mean waste of energy and may lead to a thermal degradation of some preparation components, with consequent loss of colour yield.

In the case of polyester fibers, there is no temperature restriction, but a too quick drying could negatively affect the printing definition.

In the following page a table lists the main types of PREGEN® according to their characteristics.
<table>
<thead>
<tr>
<th>PREGEN®</th>
<th>FIBER / INK</th>
<th>COLOR YIELD</th>
<th>PENETRATION</th>
<th>DEFINITION</th>
<th>NOTES</th>
</tr>
</thead>
<tbody>
<tr>
<td>A 1005</td>
<td>Silk, polyamide with GENESTA® AC</td>
<td>Good</td>
<td>Acceptable</td>
<td>Very good</td>
<td></td>
</tr>
<tr>
<td>A 450</td>
<td>Silk, polyamide with GENESTA® AC</td>
<td>Good</td>
<td>Fair</td>
<td>Good</td>
<td>Suitable for fabrics that absorb a lot of ink</td>
</tr>
<tr>
<td>AT-6</td>
<td>Silk, polyamide with GENESTA® AC</td>
<td>Good</td>
<td>Fair</td>
<td>Very good</td>
<td></td>
</tr>
<tr>
<td>TRC</td>
<td>Polyamide with GENESTA® AC</td>
<td>Fair</td>
<td>Good</td>
<td>Good</td>
<td>Mainly suitable for elastic jersey</td>
</tr>
<tr>
<td>A WOOL</td>
<td>Wool with GENESTA® AC</td>
<td>Very good on chlorinated wool</td>
<td>Fair</td>
<td>Very good</td>
<td></td>
</tr>
<tr>
<td>RCA</td>
<td>Cellulose, silk with GENESTA® RE-N</td>
<td>Very good</td>
<td>Acceptable</td>
<td>Very good</td>
<td>Alkali must be added (Carbonate or Bicarbonate)</td>
</tr>
<tr>
<td>RCA-B</td>
<td>Cotton, silk with GENESTA® RE-N</td>
<td>Very good</td>
<td>Acceptable</td>
<td>Very good</td>
<td>Ready-to-use version containing bicarbonate</td>
</tr>
<tr>
<td>RCA-OB</td>
<td>Viscose with GENESTA® RE-N</td>
<td>Very good</td>
<td>Acceptable</td>
<td>Very good</td>
<td>Ready-to-use version containing bicarbonate</td>
</tr>
<tr>
<td>RCA-F</td>
<td>Cellulose, silk with GENESTA® RE-N</td>
<td>Very good</td>
<td>Acceptable</td>
<td>Very good</td>
<td>Ready-to-use version containing a blend of alkali</td>
</tr>
<tr>
<td>RCA-C</td>
<td>Cellulose with GENESTA® RE-N</td>
<td>Very good</td>
<td>Acceptable</td>
<td>Very good</td>
<td>Ready-to-use version containing carbonate</td>
</tr>
<tr>
<td>DS 6040</td>
<td>Polyester with GENESTA® DS</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
<td></td>
</tr>
<tr>
<td>DDS</td>
<td>Polyester with ULTRACHROME® DS</td>
<td>Good</td>
<td>Good</td>
<td>Good</td>
<td>Direct printing procedure with sublimatic inks</td>
</tr>
<tr>
<td>PG</td>
<td>All with GENESTA® PG</td>
<td>Very good</td>
<td>Acceptable</td>
<td>Very good</td>
<td></td>
</tr>
<tr>
<td>PCC</td>
<td>All with GENESTA® PG</td>
<td>Very good</td>
<td>Acceptable</td>
<td>Very good</td>
<td></td>
</tr>
<tr>
<td>TH</td>
<td>Polyester with GENESTA® DS-E</td>
<td>Very good</td>
<td>Acceptable</td>
<td>Good</td>
<td>Concentrated product to be diluted with water</td>
</tr>
<tr>
<td>TH</td>
<td>Cellulose and silk with GENESTA® RE-N</td>
<td>Very good</td>
<td>Acceptable</td>
<td>Good</td>
<td>Base to be mixed with alkali, urea and OXIDOL PA</td>
</tr>
<tr>
<td>RTW</td>
<td>Wool with GENESTA® RE-N</td>
<td>Very good on chlorinated wool</td>
<td>Fair</td>
<td>Good</td>
<td></td>
</tr>
<tr>
<td>SUBLI</td>
<td>All with ULTRACHROME® DS</td>
<td>Good</td>
<td>Poor</td>
<td>Good</td>
<td>Paper sublimation</td>
</tr>
</tbody>
</table>
Printing with Genesta inks

The Genesta® inks have been developed by Epson in collaboration with For.Tex specifically for the Monna Lisa series, to allow precision, reliability and durability in fabric prints. Genesta inks - acid, reactive, disperse, pigment or sublimation-disperse - make it possible to obtain the highest quality on any type of fabric. The exclusive ink management system of the Monna Lisa has been created to prevent waste. The suction system is designed to permit the use of degassed vacuum bags.

A thorough activity of Research & Development is ongoing to expand the range of inks or colours, and to improve the printing quality.

Acid inks
GENESTA® AC

It is possible to print with GENESTA® AC inks on a properly prepared fabric using the Monna Lisa printer.

Drying is easy and the dried fabrics can be stored before steaming, to be done with saturated steam at 102°C for 30 minutes (40 minutes for wool).

In order to eliminate the unfixed ink and the preparation, specific washing treatments are performed according to the type of the printed fabric.

GENESTA AC inks are available in the following types:

- Yellow AC-F
- Orange AC-F
- Magenta AC
- Red AC
- Rubine AC
- Blue AC
- Cobalt AC
- Cyan AC
- Grey AC-N
- Black AC-N
- Across

Reactive inks
GENESTA® RE-N

It is possible to print with GENESTA® RE-N inks on a properly prepared fabric using the Monna Lisa printer.

Drying is easy and the dried fabrics can be stored before steaming, to be done within 24 hours after printing with saturated steam at 102°C for 12-15 minutes in case of cellulosic fibers, 20 minutes in case of silk and 30 minutes in case of wool.

Special care must be given to the quality of the steam, which must be free of any nitrogenous compounds that are often used as additives for boilers or that are residuals of previous steaming of fabrics printed with acid inks.

In order to eliminate the unfixed ink and the preparation, specific washing treatments are performed according to the type of the printed fabric.

GENESTA RE-N inks are available in the following types:

- Yellow RE-N
- Orange RE-N
- Magenta RE-N
- Crimson RE-N
- Red RE-N
- Blue RE-N
- Grey RE-N
- Black RE-N
- Cyan RE-N
- Across
**Disperse inks GENESTA® SBL**

GENESTA® SBL disperse inks are specific for printing on paper with the Monna Lisa printer, and the subsequent transfer on to polyester fabrics by sublimation.

The printed paper will have to be transferred onto the fabric by using a calender.

The transfer conditions (temperature/time) depend on the type of used paper and on the polyester fabric on to which the transfer is being done. A reductive cleaning of the fabric after transfer is an optional, to improve wet fastness.

GENESTA SBL inks are available in the following types:
- Yellow SBL
- Magenta SBL
- Cyan SBL
- Black SBL

**Pigment inks GENESTA® PG-2**

Pigment inks GENESTA® PG allow to print on any kind of fabric with Monna Lisa printer. The best results, especially for colour yield and brilliancy, can be obtained by printing on fabrics pre-treated with PREGEN® PG or PCC.

Drying after printing must be calibrated in order to start the cross-linkage of the resin and consequently the temperature on the fabric must be at 150°C for at least 1 minute. In fact, the GENESTA® PG-2 inks contain a small amount of binder which is necessary to give the pigment resistance to wetting but not to washing with detergents.

In order to guarantee the fastness of the colour, it's necessary to post-treat the fabric with special products. After applying the post-treatment, the resin must be baked again at 160°C for 2 minutes.

GENESTA PG-2 inks are available in the following types:
- Yellow PG-2
- Orange PG-2
- Magenta PG-2
- Red PG-2
- Cyan PG-2
- Green PG-2
- Grey PG-2
- Black PG-2

**Disperse inks GENESTA® DS**

It is possible to print with GENESTA® DS inks on a properly prepared fabric using the Monna Lisa printer.

Drying is a bit more difficult than the other inks because polyester has low absorption capability. So, we suggest using a paper sheet to avoid back staining.

The dried fabrics can be stored before fixation, that can be done as follows:
- using heated steam at 170°C for 10 minutes (suggested method)
- using air at 180°C for 2 minutes

In order to eliminate the unfixed ink and the preparation, specific washing treatments are performed.

GENESTA DS inks are available in the following types:
- Yellow DS-E
- Orange DS-E
- Magenta DS-E
- Red DS-E
- Blue DS-E
- Cyan DS-E
- Grey DS-F
- Black DS-F
Adhesives for blanket ATRAFIX

In order to assure a correct digital printing, it is necessary that the blanket of the printer has the right sticking degree. The blanket of the printer Monna Lisa requires to be covered with a permanent adhesive and, for this purpose, the ATRAFIX ML series was created. We are talking about solvent-based acrylic co-polymers that may be spread over the blanket by using the supplied squeegee.

For example, the blanket preparation may be done by spreading a bottom layer of ATRAFIX ML/T and, over it, a layer of ATRAFIX ML/S or ATRAFIX ML/K. The first one creates a soft and very sticky film (more suitable for cellulosic fibres) while the second one creates a harder and very stick film (more suitable for silk and synthetic fibres).

It is possible to mix the two adhesives in order to obtain an intermediate characteristic which could be more suitable for the different production requirements.

We suggest a periodical washing of the blanket using RESINA MC which allows to remove the dirt so refreshing the initial adhesiveness.

Washing the blanket using only water, by turning on the rotating brushes placed in the lower side of the blanket, is not effective.

When the adhesive must be totally replaced, the old layer must be completely removed by using ADHESOLV (environmental-friendly and not flammable solvent).
# THERMOPLASTIC ADHESIVE

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>VISCOSITY</th>
<th>SOLID CONTENT</th>
<th>TACK</th>
<th>ADHESION</th>
<th>FILM HARDNESS</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATRAFIX ML/T</td>
<td>1000 cps</td>
<td>21%</td>
<td>&gt;30°C</td>
<td>Very good</td>
<td>Hard</td>
</tr>
</tbody>
</table>

# PERMANENT ADHESIVES

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>VISCOSITY</th>
<th>SOLID CONTENT</th>
<th>TACK</th>
<th>ADHESION</th>
<th>FILM HARDNESS</th>
</tr>
</thead>
<tbody>
<tr>
<td>ATRAFIX ML/S</td>
<td>1450 cps</td>
<td>21%</td>
<td>High</td>
<td>Good</td>
<td>Soft</td>
</tr>
<tr>
<td>ATRAFIX ML/K</td>
<td>1000 cps</td>
<td>22%</td>
<td>Very high</td>
<td>Very good</td>
<td>Hard</td>
</tr>
</tbody>
</table>

# LEVELLING RESIN

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>VISCOSITY</th>
<th>SOLID CONTENT</th>
<th>TACK</th>
<th>ADHESION</th>
<th>FILM HARDNESS</th>
</tr>
</thead>
<tbody>
<tr>
<td>RESIN MC</td>
<td>600 cps</td>
<td>22%</td>
<td>No</td>
<td>Very good</td>
<td>Very hard</td>
</tr>
</tbody>
</table>

# DETERGENT AND REFRESHING AGENT

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>SPECIFIC WEIGHT</th>
<th>CONCENTRATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>REMOVER NLP</td>
<td>0.99 g/cm³</td>
<td>78%</td>
</tr>
</tbody>
</table>

# STRIPPING AGENT FOR THE REMOVAL OF RESINS AND ADHESIVE FILMS

<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>SPECIFIC WEIGHT</th>
<th>CONCENTRATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADHESOLV</td>
<td>0.90 g/cm³</td>
<td>100%</td>
</tr>
</tbody>
</table>
Post-treatment

Traditional finishing

In order to obtain the desired hand-touch, all the commonly used finishing products may be applied on digital printed fabrics according to the specific fiber.

We suggest using quality products like:

- **FORSIL MCS**
  softening silicon microemulsion

- **FORSIL HYR**
  hydrophilic and cross-linking silicon micro-emulsion

- **MONSOFT IO**
  non-yellowing concentrated cationic softener

- **SINFOR APD**
  polyurethane resin for a full hand effect and good crease recovery

- **FORPUR 48**
  very soft polyurethane resin

- **RESIVIN NN**
  thermoplastic resin for full and hard hand effect

- **RESIVIN AT**
  cross-linkable resin for full and hard hand effect

- **BINDER MRY**
  acrylic resin for full and soft hand effect

- **FORDEEP SOF**
  darkening silicon softener

- **FORFLEX PE**
  polyethylene wax for full hand effect and improved sewability

- **FORFLEX ULF**
  anti-crease glyoxalic resin for full hand effect

- **FORPOLY**
  hydrophilising agent with soil release properties for polyester

After printing with the GENESTA® inks, the fabrics may be subjected to a water/oil repellent treatment using the product FORGUARD 3001 or only to a water-repellent treatment using fluorine-free products like FORGUARD NF.
Innovative finishing

In addition to the traditional finishings, new “wellness” finishings are available.

They allow to apply substances onto the fabrics making possible the interaction with the final user and the surrounding environment and, so, bringing special benefits:

– AROMA AQUALITE
  release of perfumed fragrances (lavender, rose, lemon, sandal, etc)
– TENDRE ALO
  aloe and chitosan
– SUPERFRESH
  anti-smoke / anti-smell
– PRETHERMO
  thermoregulator at 25°C or 31°C
– FORAGE EL
  release of elagic acid (anti-inflammatory)
– FORAGE GL
  release of linoleic acid (moisturizing)
Our mission

Industrial textile printing is an expression of high craftsmanship that requires continuous support and attention, as well as tailored, precise, timely and effective solutions.

An important goal of our Total Solution is to pursue continuous improvement, on the one hand helping customers to solve critical issues, and on the other, exploring the technical-expressive potential of digital printing on fabric, so as to stay one step ahead in the quest for innovation.

We liaise directly and continuously with printing companies so as to understand their needs and develop customised solutions based on their own customers’ requirements.
WE LISTEN TO OUR CUSTOMERS AND HELP THEM SOLVE THEIR ISSUES

Our ongoing interaction with customers allows us to understand and handle any issues concerning the finished product - the printed fabric, whether produced by means of digital or traditional technology. Such issues may include wet, light and other fastness, smudging and colour rendering.

Light fastness
Perspiration fastness

Chemical laboratory

The For.Tex Chemical Laboratory is equipped with the tools and equipment required to perform objective fabric tests and to provide printing workshops with an incontrovertible and reliable response to any disputes concerning appearance, fastness and toughness. Technicians specialised in traditional and textile chemistry thoroughly analyse every chemical-textile issue that may arise during printing or during pre- and post-treatment. Chemical engineers, instead, research innovative solutions with regard to ink features and printing effects.

Rubbing fastness
Water fastness
Industrial Digital Printing Research Center

In 2014, For.Tex opened Textile Solution Center, one of the first facilities to concretely apply our Total Solution, specialised in research, assistance, training and promotion.

Through this center, it is possible to follow the entire digital printing production process on an industrial scale, bringing to life any creative idea and developing customised solutions to any issue - in short, a one-stop shop in which to explore, understand, choose and experiment.

The Textile Solution Center covers the entire process, from pre- to post-printing, offering a complete overview of the workflow, pinpointing the steps that may jeopardise the final result, and identifying solutions. There is no space for conjecture - every step is reproduced and checked, so as to offer the customer a clear-cut solution. This unique service allows for considerable customisation, both at the process verification phase and in developing customer-specific pre-treatment products.

In addition to its assistance and research work, the Textile Solution Center also trains the designers and stylists of tomorrow, as well as potential Monna Lisa customers, with a view to providing a thorough understanding of textile printing and of the potential offered by digital printing. Moreover, the center actively promotes the digital culture, mainly through the Textile Solution Center Advisory Board, which organises events, conferences and courses and publishes themed publications, such as the series of books entitled “Beyond the silk road”.

[Images of the Textile Solution Center]
WE OBSERVE THE MARKET AND DEVELOP INNOVATION

With us at their side, printing workshops are never alone in facing evolving customer requests. We offer cutting-edge solutions to new fashion trends, developing the original print effects required by style offices and the finishes launched at fashion shows. Our immediate, targeted advice makes all the difference in a fast-paced market driven by fast fashion and increasing competitiveness.

With constant innovation in mind, two new innovation hubs were opened in 2016.

**INNOVATION Research Lab**

Based in For.Tex with the aim of researching and developing new inks for industrial digital printing, it is equipped with state-of-the-art technologies and is staffed with a team of highly-skilled researchers.

**PRINTING Research Center**

Located in F.lli Robustelli’s head office, it will aid product development of inkjet core devices, ensuring the continued development of the highest quality textile printers for Epson.