

Introduction to Ten Cate Digital Textiles by Factory of the Future Concept

Main activities of TenCate in digital textiles

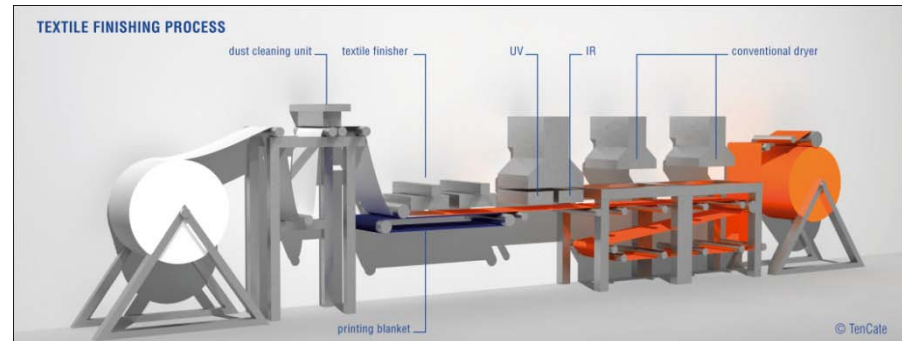
Towards the factory of the future

- Executing the **Factory of the Future** by creating digital solutions for the future of textile processing and products derived from the technology base:
 - TenCate as **launching customer**
 - **Proven solutions** will be sold on the market worldwide
- Two **digital textiles solutions** are being marketed at the moment:
 1. Sales of **reactive and disperse textile inks** for DOD inkjet printing systems
 2. **Sales, supply and service** of Xennia Osiris inkjet printing systems and belonging inks for this system

Factory of the Future

From technical textiles towards smart textiles

- Working on realizing advanced production technologies for cost leadership and functional innovations, considering the important conditions for mass customization and on-demand delivery
- To support the vision of TenCate in market oriented value chain management and honoring the present two most important global trends: safety & sustainability



Factory of the Future

From technical textiles towards smart textiles

Programs that will run in the Factory of the Future:

- **Digital finishing and digital dyeing**, replacing the present conventional analog production processes
- **New functionalities** for new applications, adding new characteristics to products for growth in existing markets and the establishment of new markets
- From technical textiles **towards smart textiles** (towards ambient intelligent materials)
- The combination of these programs can lead to **integrated, multilayered smart textile systems**, produced in preferably **one process batch on continuous production lines**

Factory of the Future

From technical textiles towards smart textiles

- Factory of the Future concepts underpinned by **wide ranging IP portfolio**
 - Digital finishing
 - Digital dyeing
- **Proof on concept generation since 2004**
 - Digitex EU project
- Identification of launching technologies and customers to be defined
- Real solutions for production lines
- Reliable and sustainable technologies

Digital finishing

Benefits

Major benefits of inkjet digital finishing:

- Multi functionality
 - Single sided applications are possible
 - Two sides of the substrate can have different functions
- Patterning – place function where you want it
- Functionality applied efficiently to textile surface only
- Highly consistent coat weight
- Environmental and energy savings

- Not influenced by underlying substrate variations
- Not influenced by bath concentration or dosing variations

Digital dyeing

Benefits

Approach

- Methods developed to use “difficult” aggressive dyes (VAT dyes)
- Not usually used in “printing” but give higher end-user performance, such as fastnesses

Benefits

- Environmentally friendly, efficient use of natural resources
- Very high fixation, with low discharge of unfixed dye
- Low water and energy usage compared to traditional dye baths
- Consistency of product quality
 - Consistent quantity of dye is laid down
 - Does not rely on pick-up of dye from dye bath
- Different colours possible on each side of the substrate

Functional materials

Outdoor fabrics

Hydrophobic

- Comfort of cotton material on the skin side
- Water and dirt repellent on the outside



Dirt repellent / (active) self-cleaning

- More efficient coating when applied with inkjet
- Single-sided application is important



Antimicrobial / anti-fungal / anti-mosquito

- Selective deposition, efficient usage
- Slow release technology
- Materials used cannot be in skin contact
- Single-sided application vital



Functional materials (2)

Protective fabrics

Flame retardant

- Highly coherent coating very important
- Single side coating allows lighter weight

UV blocking (anti-sunburn)

- Coating needs to be away from skin

IR blocking

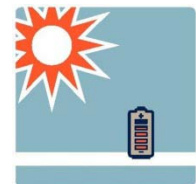
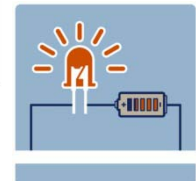
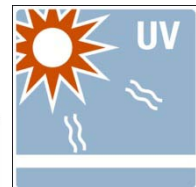
- Insulating fabrics – tents, clothing

Electrically conductive

- Antennae incorporated into clothing, tents
- Communication with electronic devices

Solar energy harvesting

- Tents, awnings, etc
- Low cost manufacturing essential

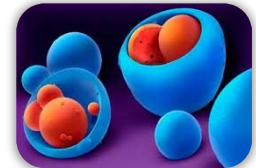


Smart textiles

Slow release technology

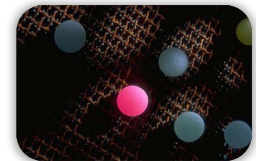
Approach

- Novel scaffold structure holds molecules for release
- Release rate can be controlled by an external stimulus
 - E.g.: temperature
- Rechargeable by reapplying molecules to be released



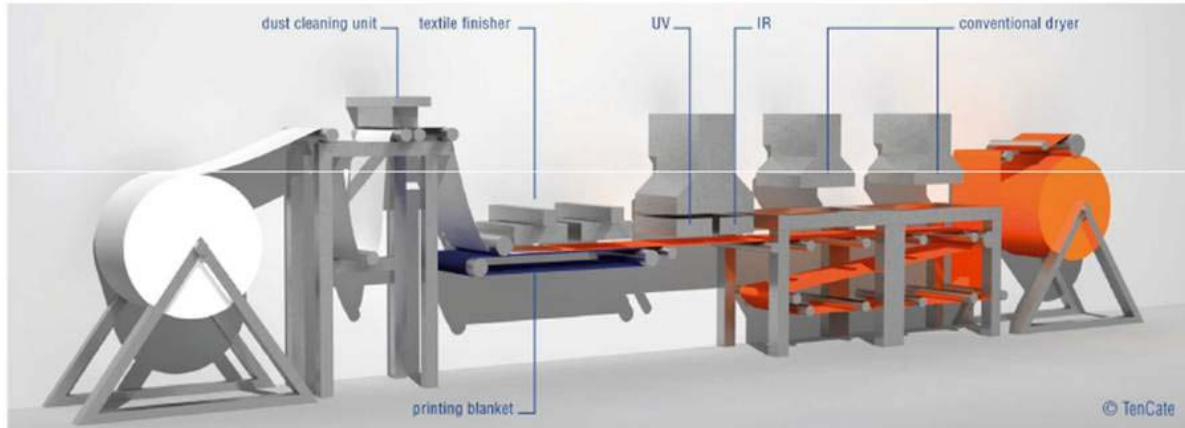
Application example

- Insect repellent / anti-mosquito
 - Toxic materials, undesirable for skin contact
 - Single sided coating, material held away from skin contact

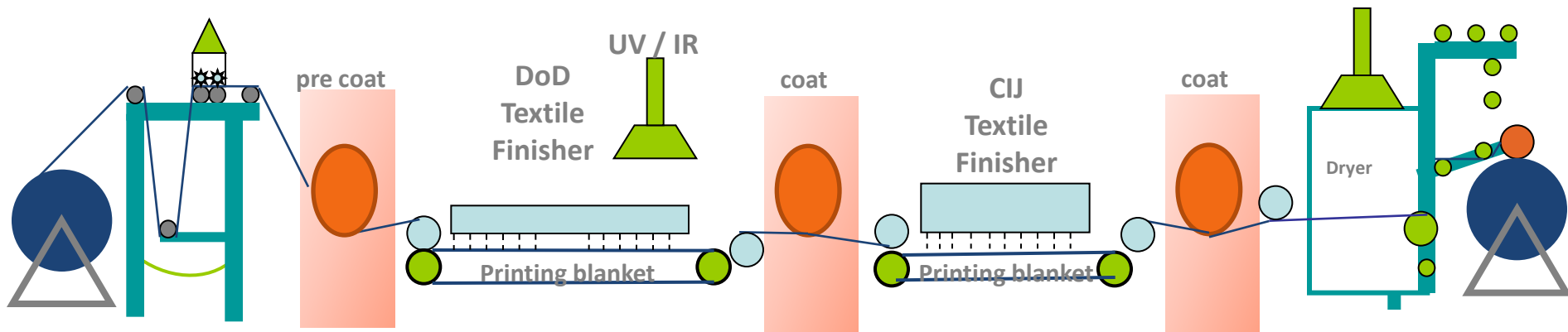


Future digital finishing processes

An example



- Modular set up with a series of selective fine and broad patterning combined with pre and post coating

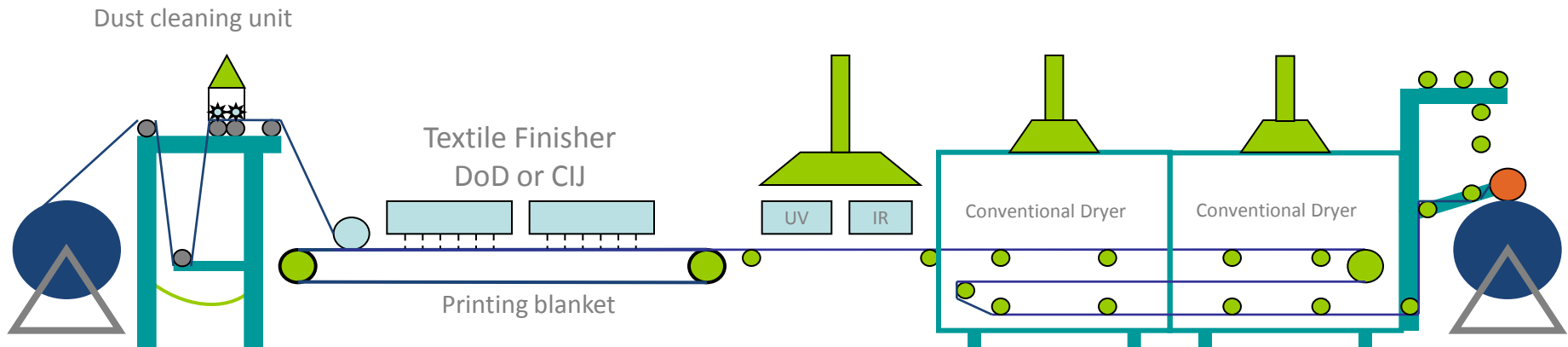


Existing digital inkjet textile finishing

An example

Digital inkjet textile finishing process system can be used:

1. Stand alone
2. Integrated in existing finishing lines



Factory of the future

Innovation driven

- From:



- Towards:

