

# Concept of virtual printing

## Design parameters

Development of new products is complex due to the large amount of parameters effecting the final result.



### 1. Machine

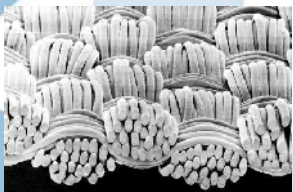
- All the parameters effecting the position and volume of the ink drop

### 2. Droplet of ink

- Density
- Viscosity
- Temperature
- Contact angle (combination with substrate)
- Effective substance
- Etc.

### 3. Substrate (fabric)

- Fibre
- Yarn
- Weave



# Concept of virtual printing

The key to developing a new product

## Goal:

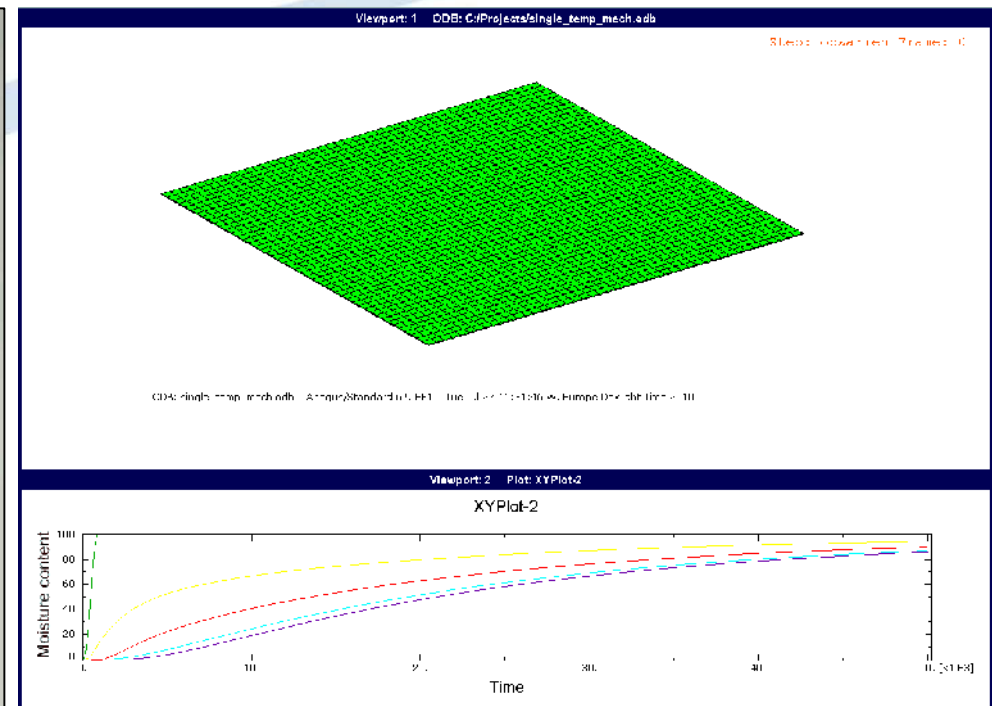
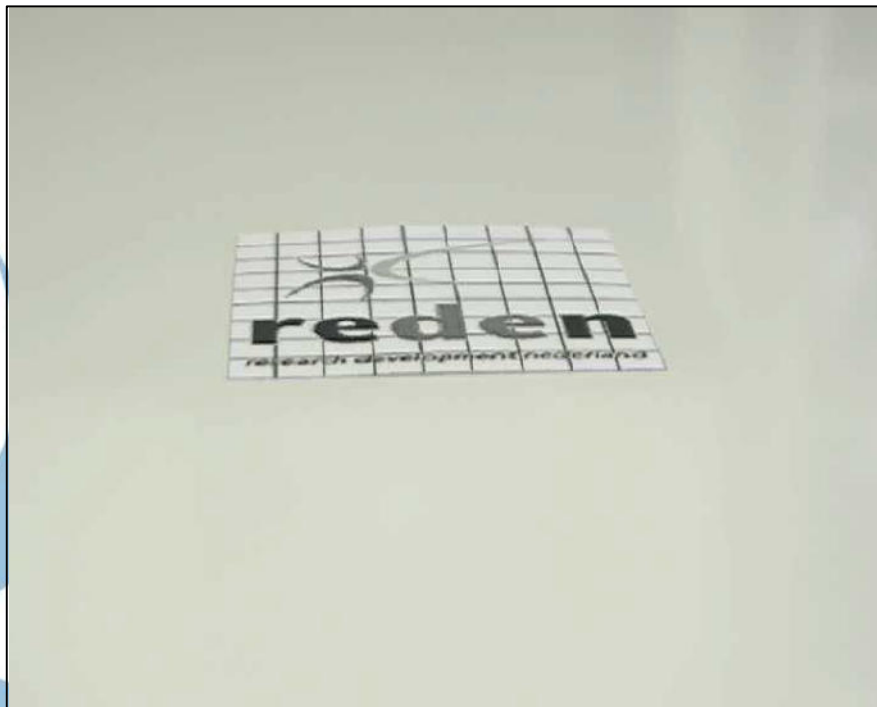
Find the relation between the design parameters and the desired textile properties

## How?

Modelling and simulation (virtual printing) in combination with validation experiments

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The key to developing a new product

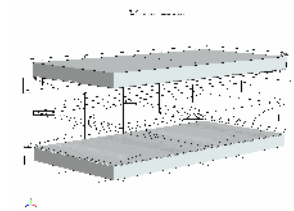
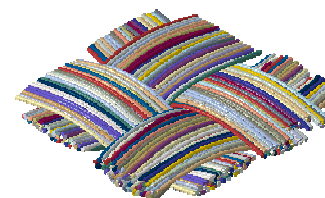
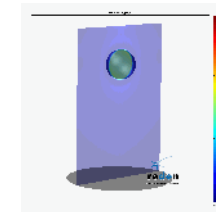
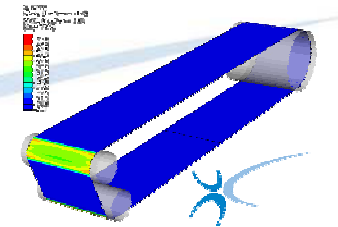


# Concept of virtual printing

## Modular system

### Creating knowledge in a modular way

- Transport belt
- Ink transport system
- Printer head
- Flight of the droplet
- Interaction of the ink with the substrate



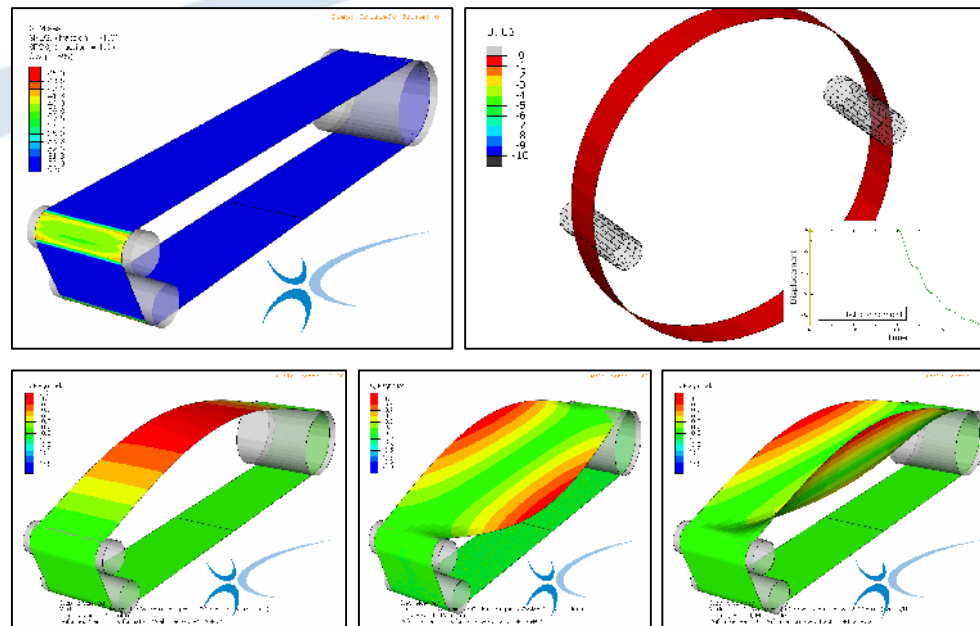
# Transport belt Model

## Goal:

Gain insight in the stability of a belt on a system of support and tensioning rolls

## Parameters:

- Stiffness of fabric
- Tension in fabric
- Convex roll
- Misalignment of rolls
- Friction coefficient
- ....



# Droplet flight and impact

## Model

### Goal:

Gain insight in the droplet shape before and during impact

### Parameters:

Viscosity

Density

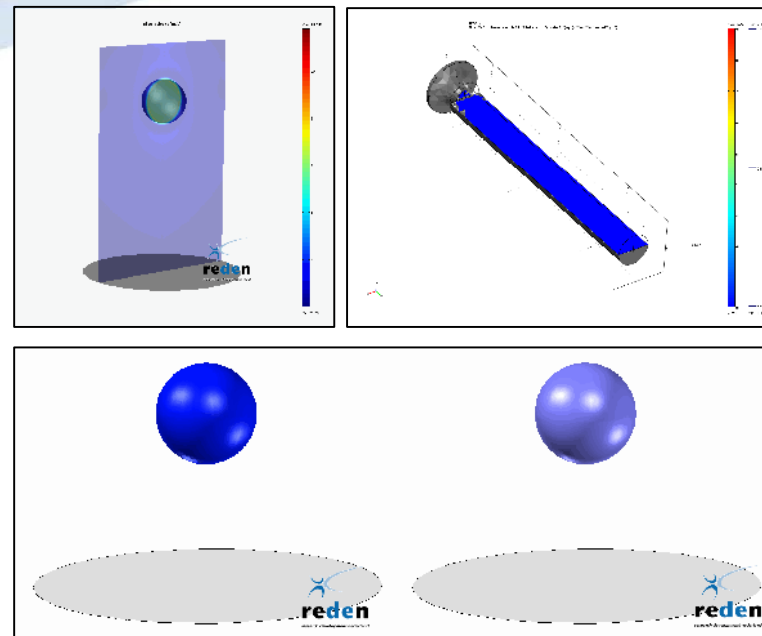
Contact angle

Surface tension

Printer head velocity

Temperature

....



# Interaction between ink and fabric

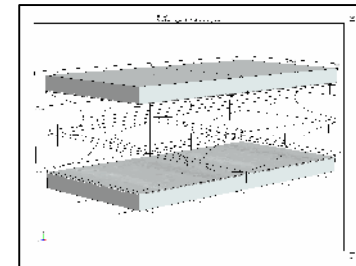
## Model

### Goal:

Gain insight in the wetting behavior and drying of ink drops on a fabric

### Necessary:

Exact geometry of the fabric on a fiber level



### Sub goal:

Predict the geometry (on a fiber level) and mechanical properties of a fabric

# Interaction between ink and fabric

## Model

### Sub goal:

Predict the geometry (on a fiber level) and mechanical properties of a fabric

### Parameters:

#### Fiber

Diameter

Stiffness

Friction coefficient

#### Yarn

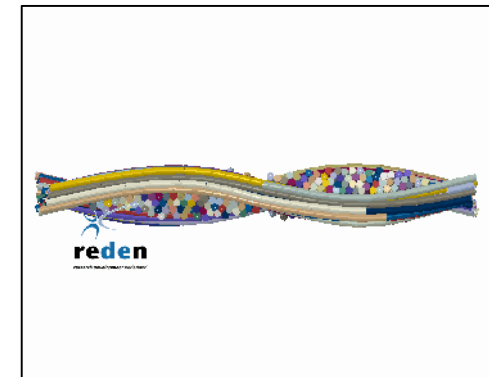
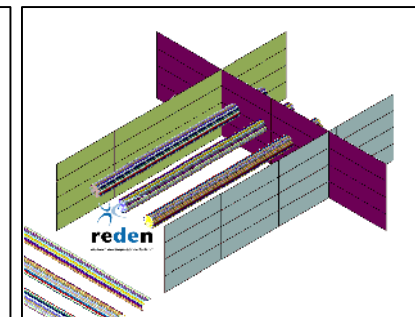
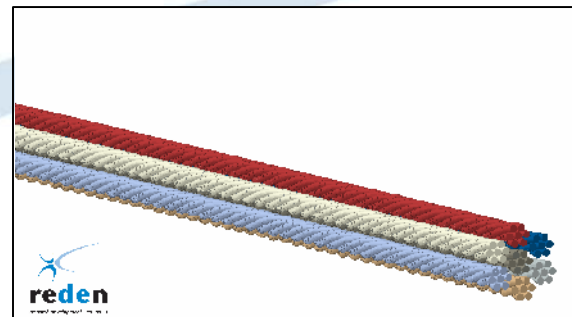
Number of fibres

Amount of twist

#### Weave

Weave type

Pre-stress in weft and warp direction





## Questions?

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