



## **Performance Tests- Nordic Swan criteria**

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Presentation by Ann Stare

# Swerea IVF is part of the Swerea group

## Swerea IVF

Industrial product development, process and materials development within textiles, polymers, ceramics and metals.

## Swerea KIMAB

Materials applications, materials and process development, corrosion.

## Swerea MEFOS

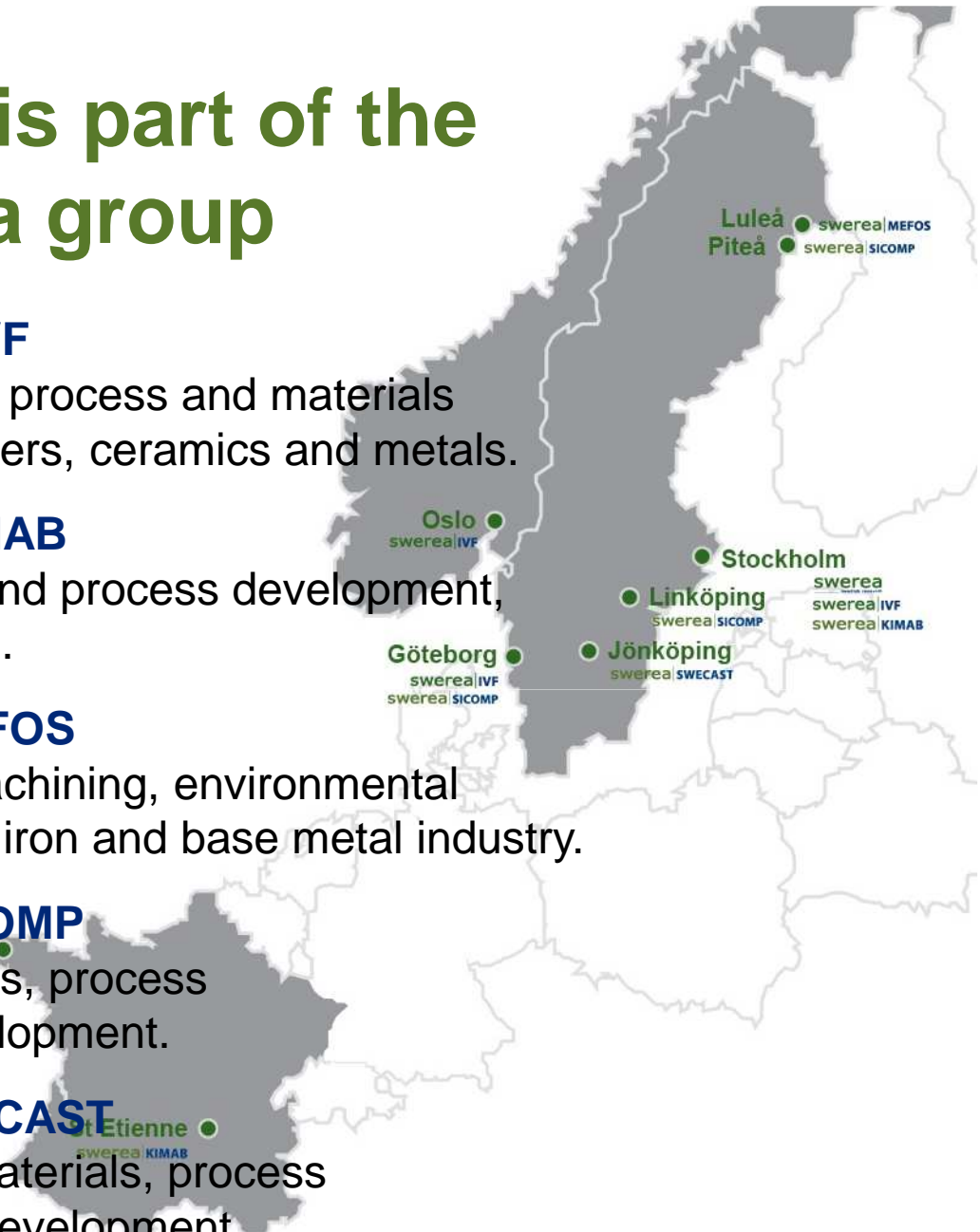
Process metallurgy, heating, machining, environmental engineering and energy efficiency for iron and base metal industry.

## Swerea SICOMP

Composite materials, process and product development.

## Swerea SWECAST

Cast metals – product, materials, process and environmental development.



# Department Textiles and Plastics

- Five groups:

- ✓ **Fiber development**

- Melt spinning

- Temperature regulating fibers
      - Conductive fibers
      - Piezoelectric fibers

- Electro spinning of nanofibers

- Technical textiles (filters, sound abs., etc.)
      - Biomedical applications (wound care, TE)

- Solution spinning

- ✓ **Functional textiles**

- Plasma treatment

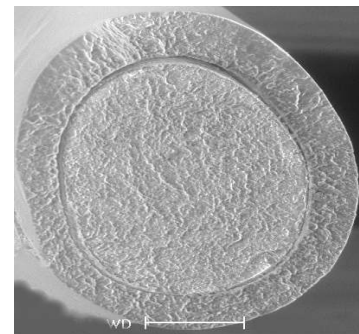
- Comfort testing

- ✓ **Chemical Analysis**

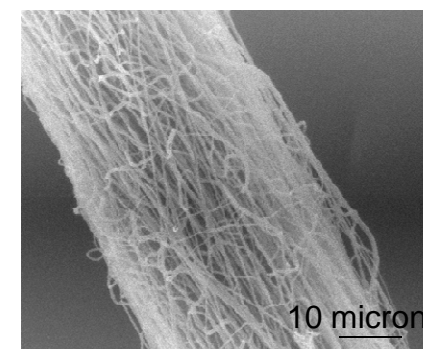
- GC-MS, FTIR, ICP

- ✓ **Polymeric Materials**

- ✓ **Testing and Certification**



Patent: WO 2009 031946  
Inventor: Hagström et al.



Biomacromolecules,  
Thorvaldsson et al, 2008

# Testing & Certification

Member of  
**eurolab**



One of northern Europe's most well equipped laboratories!

- ✓ Approx 1000 commissions/year
- ✓ Accredited laboratory
- ✓ Testing, consultation, education and certification
- ✓ A large number of test methods
  - standardised method (ISO, EN, National, Corporate standards)
  - modified methods
  - in house methods
- ✓ Oeko-Tex certification
- ✓ Active participation in international and national standardisation  
Textiles, Protective clothing and Shoes & leather

SS-EN ISO/IEC 17025:2005

**Reference lab**  
**IKEA**



# Testing & Certification

## Competence:

- Textile chemistry and textile mechanics
- Material knowledge
- Testing:
  - mechanical, physical properties
  - down, feather and wadding
  - colour fastness, colour measurement
  - flammability
  - ageing (impact of)  
(light, temperature, moist, UV etc)
  - performance test of laundry detergents
  - fibre identification and quantification
- Courses: open and corporate designed  
Textile material, Fibre knowledge,  
Textile testing, Washing chemistry

## Our services:

- Testing
- Counselling & consultation
- Courses
- Construction of fabric
- Product development and choice of material
- Performance Requirement specifications
- Testing for CE labelling  
High Visibility clothing
- Testing and classification according to various performance requirements  
i.e. surgical drapes etc., furniture fabrics, terry fabrics
- Oeko-Tex certification  
Oeko-Tex standard 100  
Oeko-Tex standard 1000 (STeP)
- Quality certification

# Performance tests-primary effects HD detergent



- Cleaning performance
- Standardized soil/stains for evaluation
- Extra soil load
- Standardized cotton ballast (4.5 kg)
- Standard detergent for comparison
- Standard washing machine or defined commercial washing machine
- Water hardness:  $(5.5 \pm 0.5)$  °dH
- In-water temperature:  $(15 \pm 2)$  °C
- Wash temperature: 30 °C (colour wash) 40 °C (white wash)
- 5 wash cycles



# Performance test – cleaning performance

- 4 soil strips in each wash cycle
- 5 stains for colour wash
- 7 stains for white wash



# Performance test – cleaning performance

- Evaluation by reflectance measurements with a spectrophotometer
- Y-value, “brightness”
- Unsoiled white cotton fabric Y ~ 80-90
- Test detergent compared to standard detergent (and water when commercial washing machine is used)
- Calculation of Limit values

$DY = Y_r - Y_t$	< 10.0 one soil permitted to be < 20.0
$DM_{type} = M_{type,r} - M_{type,t}$	< 10.0
Average DM	< 5.0



# Performance test- expression of results

Reference (r)							
wash cycle	rödvin	te	ägg	stärkelse	sebum bomull	sebum PES	kakao
1	74,6	55,9	81,2	59,6	65,3	64,7	63,8
2	74,8	56,9	80,5	57,5	65,4	66,4	63,7
3	74,7	56,2	80,3	58,2	66,2	66,5	61,6
4	74,3	56,2	81,1	57,7	65,2	65,4	62,0
5	74,6	55,9	81,3	57,6	66,0	65,1	64,8
Mean value (Y <sub>r</sub> )	<b>74,6</b>	<b>56,2</b>	<b>80,9</b>	<b>58,1</b>	<b>65,6</b>	<b>65,6</b>	<b>63,2</b>
Mean value (M <sub>type</sub> )	<b>65,4</b>		<b>80,9</b>	<b>58,1</b>	<b>64,8</b>		

wash cycle	rödvin	te	ägg	stärkelse	sebum bomull	sebum PES	kakao
1	65,8	50,1	73,7	65,4	59,3	51,7	52,2
2	66,1	50,8	76,5	67,5	59,8	51,9	55,7
3	65,9	49,8	74,9	68,7	60,0	51,9	55,5
4	65,8	49,1	75,0	68,5	60,1	52,7	56,4
5	66,1	50,4	74,9	68,4	59,5	53,1	57,0
Mean value (Y <sub>t</sub> )	<b>65,9</b>	<b>50,0</b>	<b>75,0</b>	<b>67,7</b>	<b>59,7</b>	<b>52,3</b>	<b>55,4</b>
Mean value (M <sub>type</sub> )	<b>58,0</b>		<b>75,0</b>	<b>67,7</b>	<b>55,8</b>		
$\Delta Y = Y_r - Y_t$	<b>8,7</b>	<b>6,2</b>	<b>5,9</b>	<b>-9,6</b>	<b>5,9</b>	<b>13,4</b>	<b>7,8</b>
$\Delta M_{type} = M_{type,r} - M_{type,t}$	<b>7,4</b>		<b>5,9</b>	<b>-9,6</b>	<b>9,0</b>		
Average $\Delta M$	<b>3,2</b>						

<20

# Performance tests-secondary effects HD detergent

- 10 wash cycles
- Standard control cotton fabric
- Incrustation (ash content)
- Greying (white wash only)
- Chemical degradation (white wash only), Fluidity

Incrustation	< 0.6 %
Greying	< 2.8 DY
Chemical degradation	< 1.0 Rhés

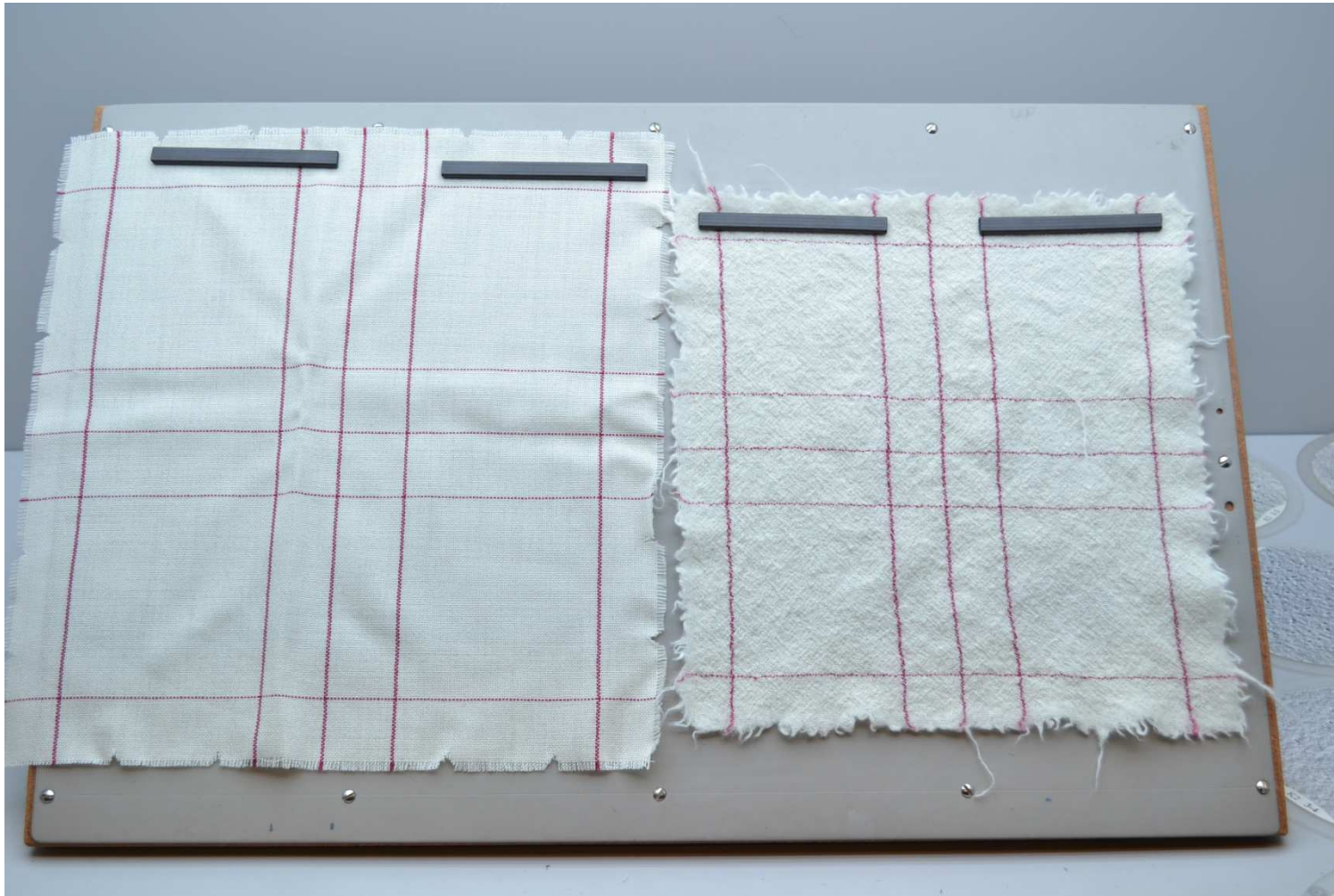
# Performance tests

## LD detergent (delicate textiles)

- Cleaning performance
- Water hardness (5.5-15.5) °dH
- Wool shrinkage (dimensional change) after 5 wash cycles  
Comparison between test detergent and water at 30 °C (wool programme)
- Colour fastness after 20 wash cycles  
Comparison between test detergent and water at 40 °C (wool programme)

Cleaning performance, DY	< -5 one soil permitted to be 0.0
Dimensional change	± 2%
Colour fastness	≥ water

# Dimensional change of wool fabric

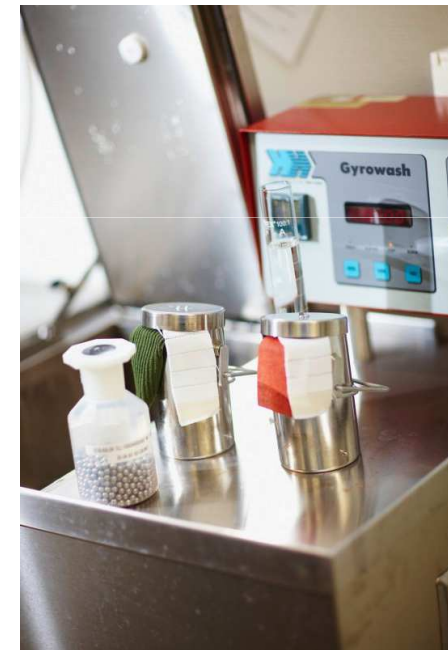


# Performance tests

- Stain removers with subsequent washing
- Stain removers without subsequent washing
- Alternative dry cleaning (The cleaners must demonstrate that cleaning performance is satisfactory for the applicable textile types and soiling. The results of laboratory or service tests must be documented.)
- Laundry detergents for professional use

# EU ecolabel (the flower)

- HD detergent
- CS detergent
- LD detergent
- Commercial washing machine
- Water hardness 14 °dH
- 14 different stains x 2 in each wash cycle
- 6 wash cycles for cleaning performance (stain removal)
- 15 wash cycles for greying (degree of whiteness) (only when colour care is claimed)
- 15 wash cycles for colour maintenance
- Dye transfer inhibition test (only when colour care is claimed)



# Development of functional tests

- More stains since the start. Blood excluded.
- Fixed number of wash cycles (used to be 3 or 5)
- Fixed water hardness (used to be 5.5 °dH or 14.0 °d H)
- Fixed main wash time (used to be 15 min or 30 min)
- Only reference detergent for comparison when using reference washing machine (used to be both water+reference detergent)
- Standard deviation and measurement uncertainty excluded in calculations (used to be calculated as min cleaning efficiency and max cleaning efficiency)

## Future development ?

- Possibility to test white wash at lower temperature
- Harmonisation with EU Ecolabel
- More stains?
- Calculation with measurement uncertainty included again?

**Thank you for listening**