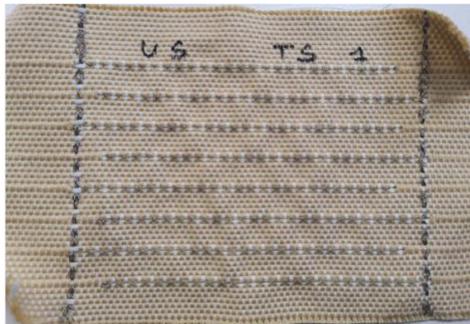


Abstract

- Experimental abrasion analysis of textile capacitive sensors based on Martindale test.
- Two different conductive yarns were used to compare the abrasion impact respect to conventional yarns.
- Results show that the integration of conductive yarn don't reduce the fabric lifetime and the sensor behaviour remains unalterable during the lifetime.



Materials

- Woven fabric substrate:
 - Warp -> 100% cotton spun yarn
 - Weft -> 35/65% polyester/cotton spun yarn
- Conductive yarns:
 - Shieldex 117/17 2-ply polyamide filament cover with silver
 - Bekaert 60/40% polyester/stainless steel spun yarn



Methodology

- The sensor was embroidered in a Dornier LWV8/J 71 weaving machine moved by a Jacquard Stäubli LX1600B.
- The Martindale abrasion test is performed following the EN ISO 12947-2:2016.
 - The weight selected for the test is defined for upholstery fabrics (795±7g)
 - Samples prepared on circular shape and mounted on the test holders



Results

- After 20,000 cycles some wear out effects are observed, the conductive yarns do not lose their electrical continuity.
- When 40,000 cycles are finished the samples present an important wear out. The electrical continuity is lost.
- The continuity is lost due to a decrease on the electrical conductivity. Conductivity has decreased differently on each yarn due to their manufacture process

➤ 20.000 cycles



➤ 40.000 cycles



	Bekaert		Shieldex	
Resistance (Ω/cm)	Initial	35k cycles	Initial	35k cycles
	16	<120	0.7	<200

Conclusion

- The integration of conductive yarns reduce the pilling effect on the fabric during use.
- The abrasion resistance improves on conductive samples.
- The decrease of conductivity after 40,000 cycles are provoked by the lost of conductive fibres in Bekaert yarns and wear out of the conductive coating on Shieldex yarn.
- The results denote that integration of conductive yarns do not affect negatively on the fabric properties and guarantees the sensor functionality during the fabric lifetime.

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