

TEXTILE + DESIGN LAB

Case Study Number: 04/2016

Project Title: A Conductive Knit Structure Investigation

Research Team: Hollee Fisher, Caroline Stephen, Yasir Al-Hilali

Contact: Hollee Fisher - hollee.fisher@live.com Caroline Stephen - caroline.stephen@gmail.com

Yasir Al Hilali – yasirhilali@gmail.com

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Project Description:

This was a collaborative research and development project during which an investigation was undertaken into the development and construction of conductive knitted textile structures by three AUT postgraduate students. The parameters for the knitted samples were set by the conductive yarn used and the size of the conductive patch in terms of courses and wales within a base knit fabric. The variable of each sample was the knitted structure used for constructing the conductive area. Stitch structures were explored which consisted of combinations of purl, tucks and double knits.

The conductive samples underwent testing to investigate the resistive capability of different stitch structures and their repeatability. These samples were compiled and presented in a reference book along with the resultant test data.

Background:

The project utilised the combined skills of two Master of Creative Technologies students with Textile Design backgrounds, and a Master of Engineering student with an interest in smart textile development. Through investigating different potentials of conductive fabrics, this project explored the use of knitting as a mode of making in the design and development of textile-based sensors. The project was undertaken through the Textile and Design Lab (TDL) using its Shima Seiki flatbed knitting machines.

Process:

Conductive fabric samples were knitted on the lab's Shima Seiki SIG 123SV intarsia machine. The intarsia technique used to develop the sensors allowed conductive yarns to be knitted only where the sensor was to be integrated. Textile sensors were able to be isolated within the surrounding base fabric via the intarsia technique. Isolating these knitted sensors optimised placement possibilities for integrating the sensors anywhere within the fabric structure. The fabrics were subjected to two separate testing procedures: a tensile force was applied to the fabric samples and the changes in electrical resistance were measured whilst load was being applied. Similarly, changes in electrical resistance were measured whilst downward pressure was being applied to the conductive panels. A camera with a super macro lens was paired with the testing equipment in order to analyse the fabrics after testing.

Project Outcomes:

The researchers noted that the advantages of working with the TDL to create the reference folder was the access to the Shima Seiki intarsia machine and the guidance of Senior Technician, Gordon Fraser. The reference folder is a valuable and useful resource, compiling samples of conductive knitted structures. This folder is being retained at the Textile and Design Lab as a reference for those wishing to develop knitted sensory textile applications.

Publications:

<https://colab.aut.ac.nz/projects/smart-tack-textile-based-system-monitoring-equine-physiology/>

<https://colab.aut.ac.nz/projects/digital-dynamics-interactive-design-process-generating-knitted-textiles/>

Images:



