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Wearable Metal Origami?

Abstract for PhD

“Wearable Metal Origami” is a research leading to a collection of wearable objects, made from metallised folding textile.

The research engages with current concerns in industrialised society, where new materials and innovative products are in demand. The material I have developed is influenced by historical and contemporary jewellery and clothing as well as by deployable structures; folding patterns are based on folding patterns in nature and on the knowledge of origami mathematicians; production processes include traditional printing and jewellery techniques. Bridging all these disciplines, the outcome is a novel material that could be used in various design fields but is particularly relevant to jewellery for its striking visual character, its flexible movement which easily adjusts to the human body, and the possibility to use precious metals.

I based my research in the department of Goldsmithing, Silversmithing, Metalwork and Jewellery because this department had helped me develop the initial material during my MA course, so I knew it could provide me with the necessary equipment and support in designing wearable pieces. My project was finally conducted within a departmental team research project (Deployable Adaptive Structures) in which my colleagues investigated the broader application of metallised or otherwise tessellated folded textile in such fields as interior architecture, sunscreens and water sculptures, and ways of actuating the material either virtually or by mechanical means.

“Wearable Metal Origami?” is based on MA project work, where I had used one folding pattern and found one production method. I strongly believed that this material would be ideal for the creation of jewellery and larger wearable objects if I could expand the range of flexibly moving patterns, improve the production process of the material and develop appropriate design processes. My research set out to fulfil these requirements and prove the value of the material in the context of metalwork and jewellery and the applied arts.

To expand the range of folding patterns I collected and analysed existing tessellating origami patterns. With this knowledge I created my own variations. All patterns were evaluated on their suitability for “Wearable Metal Origami” and a basic classification was made, based on their folding properties. A small selection of patterns was then tested to get an understanding of the influence of plate thickness, hinge width and hinge flexibility by making card-textile and plywood-textile models.

I developed and tested new processes for the production of the metallised folding textile. These included preparatory processes (before electroforming), electroforming and various ways of treating the material after electroforming. Each process was evaluated on its practicality.

To develop appropriate design processes for wearable objects of metallised folded textile I ran four case studies, each with its own design brief. I set the briefs in such a way that they addressed different parts of the body and different qualities of the material, such as changing shape and flexibility. For each application an origami pattern was chosen and adjusted through a process of trial and error until it had the correct proportions and movement.