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3D Printed waste textiles : sustainable material innovation and a potential resurrection of the forgotten 'shoddy' industry

Sustainability, biodegradability and circularity are important issues in the textile and fashion industry, with very few tangible solutions that have the potential to make an impact. The research team's project, which utilises waste from the Scottish textile industry and, in combination with PLA bioplastic, has made a 3D printable filament that has the ability to be mass produced in the future. The process of 3D printing, the materials used and 3D printed objects are increasing and, many believe that digital rapid prototyping has the ability to revolutionise how we manufacture and consume. In this way, the waste textiles used in this project can be utilised in bulk and are not down-cycled, particularly if the filaments and 3D printed objects are branded and identified with the same narrative as the textile brands that they originated from.

Utilising waste wool, in particular, into a democratically available product is not a new concept. The 'shoddy' industry in Britain and America in the 19th and early twentieth century and then in Prato in Italy, exploited waste wool to create a 'new' textile. In Britain and America, this textile was always known to be inferior and 'inauthentic'. Harris Tweed as a brand was developed in a particular way that actively shunned the use of shoddy fibres. In Prato in Northern Italy, shoddy was produced and sold quite covertly until recently when it has started to be actively sold as a sustainable material.

The development of 3D printable material utilising specific Scottish textile waste, in many ways, mirrors the processes of shoddy production. However, this process and output has the ability, in the current climate, not only to expound its sustainable credentials, impart the story of the authenticity, provenance and heritage of Scottish textiles but also to develop both of these aspects in a way that reflects the revolutionary changes that digital craft and material science offer. In an odd reversal, the processes, materials and perception of shoddy is reversed in this project, where the use of waste and clarity on the provenance of the original sources adds to the brand image, perceived 'luxuriousness' and authenticity of the 3D printed materials and potential products.

While the process of shoddy did not immediately inspire this project, many of the processes and concepts are unexpectedly similar and some of the early machinery involved in its production could have been used. With laboratory conditions, the scrap materials were not dangerous for the Research Assistant to work with. 'Waste' materials were mixed with biodegradable 'virgin' PLA pellets (although potentially this could have worked with recycled PLA).

This paper will give a historical contextualisation of this project, look at the meaning of authenticity, provenance and luxury in this instance and outline the relationship between this information and what happened in the labs and with the industrial partners. The paper will conclude with a discussion on how this 3D printable material related to ideas on the heritage of Scottish textiles and perceptions of it.