

# FABRICATION OF PERSONALISED LIPSTICK APPLICATOR USING 3D PRINTING TECHNOLOGY

**Milica STEVIC<sup>1</sup>**, Peter HILL<sup>1</sup>, Slobodanka TAMBURIC<sup>1</sup>

<sup>1</sup>*Department of Cosmetic Science, University of the Arts London, London College of Fashion, United Kingdom*

Developments in 3D printing technology foreshadow the end of standardisation and the beginning of personalised products capable of meeting individual customer's preferences. 3D printing is a term that describes a manufacturing process whereby a 3D digital image of an object to be fabricated is provided to an instrument called a 3D printer. The 3D printer fabricates this object by either depositing layers of a heated material (Fused Deposition Modelling Technology) or crosslinking layers of the material using UV laser (Stereolithography Technology). A 3D scanner enables the capture of the 3D digital image of the object to be fabricated.

The currently-used, conventional, bullet-shaped lipstick, is standardised for its shape and colours, and is applied only using a mirror. The more convenient way of performing this could be using a personalised applicator specifically contoured to the user's lips thus allowing the product to be applied accurately without the use of mirror. The aim of this project was to develop a methodology for manufacturing such an innovative personalised lipstick applicator.

In order to collect digital data of an individual's lips profile, a scan of the individual was performed using a non-invasive, commercially available, hand-held 3D scanner - Sense (3D Systems, USA). Following optimisation and modelling of the collected digital data using 3D computer graphics software, Autodesk 3ds Max (Autodesk, US), a digital image of the lips was obtained. From that image, a three-part ready-to-print digital model of the applicator was designed and exported as stereolithography files (.stl) into the 3D printer software, Makerbot Desktop Beta v. 3.9.1. A standard fused-deposition modelling 3D printer, Makerbot Replicator 2X (Makerbot Inc, USA), was used to print the applicator parts: base, mould and cap. The material used for printing was Acrylonitrile-Butadiene-Styrene (ABS) filament (Makerbot Inc, USA).

The printing setting parameters were as follows: single mode of printing, high resolution printing quality with raft and supports option deactivated, single layer height 0.10 mm, infill 50%, number of shells 2, platform temperature 100 °C, printing speed 150 mm/s, printing temperature 230 °C. A standard lipstick formulation was prepared, poured into the mould, the inverted base was fitted on the top and the product allowed to cool. Following solidification, the applicator was inverted, the mould removed, and the lipstick with a surface perfectly matching the originally scanned topography and shape of the scanned lips was produced. The novel lip product is applied by pressing the sculpted surface to the lips, which deposits a uniform coating of the lipstick to the user's lips removing the need for a mirror. When not in use, the 3D fabricated cap is fitted on the base, providing protection to the lipstick and adding to its aesthetics.

In conclusion, we have successfully created a methodology for fabricating a novel, personalised lipstick applicator.