FINE PITCH PRINTING ON A NON-WOVEN FABRIC FOR HIGH FREQUENCY APPLICATIONS

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1 Introduction

Interest in wireless body area networks (WBAN) operating in the millimetre-wave regime (60 GHz) is increasing due to concerns over the security of data transfer. Obtaining fine pitch in this frequency regime is essential, as the design dimensions scale inversely with wavelength. In the area of wearable electronics, printing onto fabrics is challenging, due to the porosity of the material. Some researchers have considered screen printing for realising interconnects onto fabrics. In this paper, inkjet printing is investigated for fine pitch printing on a non-woven fabric targeted for high frequency applications.

2 Results and Discussion

Surface modification using a jettable UV-curable insulator was performed on the non-woven fabric, prior to printing with a silver ink. In addition, corona treatment was applied to minimise the de-wetting of the silver ink on the insulator surface. The corona treatment parameters were optimised using a design of experiment (DoE) approach, where the degree of ink wettability was observed to improve with an increase with the voltage level and number of passes applied.

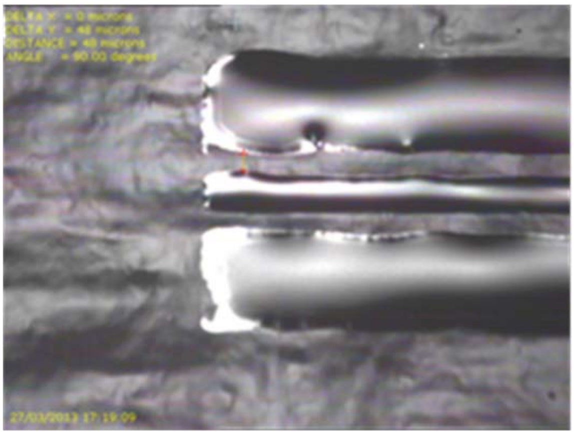

Fig. 1: *Minimum pitch obtained.*

The optimised corona treatment parameters were found to be 18 kV, 30W with 8 passes. Based on these parameters, line gaps of 50 µm were achieved, as shown in Fig. 1. This was obtained after compensating for the targeted dimensions, due to the ink spread. In this case a 100 µm gap was set to obtain the 50 µm gap. The corresponding trace width was observed to increase by 40 µm to 100 µm.

3 Conclusions

In this work, fine pitch dimensions were obtained on a non-woven fabric using inkjet printing. This involved coating the non-woven fabric with a jettable UV-curable insulator, followed by corona treatment, for which the parameters were optimised. A minimum gap of 50 µm was achieved after compensating for the ink spread. Future work would involve investigating the curing conditions after printing to obtain conductive traces.