

Investigation of Microwave Sensor Application on Conventional Shot Peening Media Dosage Unit

**Yu Song Meng¹, Ahluwalia Kunal², Marcus Ang Guo Wei², Muhammad Azrul Shukri², Alex Goh²,
Chongwei Lee³, and Keng Huat Tan³**

¹National Metrology Centre, A*STAR, 1 Science Park Drive, Singapore 118221

²Advanced Remanufacturing and Technology Centre, A*STAR, 3 Cleantech Loop, Singapore 637143

³Abrasive Engineering Pte Ltd, 5 Tuas South Street 1, Singapore 638059

Abstract:

In conventional shot peening process, flow rate of the media (Ferrous or Non-Ferrous) plays a critical role in the residual stress profile. Media dosage units were developed in the market for such purpose to regulate the media flow rate. From the literature review, most media dosage units use a contactable sensor to detect the mass flow rate. One of the problems faced in the industry is that the prolonged contact of media and sensors would inevitably result in the wear and tear of the sensing head. Secondly, most media dosage units available in market can only detect either ferrous or non-ferrous media independently. In order to eliminate such factors and provide a cost-effective solution, this paper aims to study the applicability of microwave sensor in shot peening process, a non-contactable type sensor that would be suitable to detect both ferrous and non-ferrous media.

Our investigation shows that non-homogeneous media flow rate in shot peening process is a challenge for obtaining a stable signal output using microwave sensor. With a newly proposed fixture, media flow rate was controlled in a homogenous approach and the microwave sensor is able to detect the signal steadily, which demonstrated clearly that microwave sensors have very high potential for shot peening media dosage unit application. Finally, experimental results shows that our prototype system with microwave sensor is capable of capturing mass flow rate values for ferrous and non-ferrous shot peening media with a good accuracy.