SURFACE INDENTATION TEST (SIT) FOR FRICTION PREDICTION IN MIXED LUBRICATION OF COATED SHEETS

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INTRODUCTION

In order to investigate the possibility to predict the frictional response of coated steel sheet materials, a combination of the Surface Indentation Test (SIT) and Bending-Under-Tension (BUT) friction test was used. Topographical data from the SIT test was here combined with the friction data from the BUT test to verify the usability of SIT topographies for prediction of frictional behaviour.

The study included 5 different types of Electro Zinc coated surface-textures, of which four (S1, S2, S3 and ffez) were electron beam-textured (EBT), and one was electro-chromium deposition (ECD). The surface texture was measured in the SIT with an interference microscope close to the centre of the indentation mark.

The BUT testing resulting in frictional data was performed in mixed lubrication under equal conditions for all materials used. In order to describe the frictional behaviour, a topography index was calculated from the surfaces 3D features – the WC (Wihlborg-Crafoord) index [1].

It is essential to select a discrete level for the evaluation of the parameters characterising the features of the contacting sheet surface texture in the WC index. One possibility is to determine the actual contact depth using the normal probability plot [1,2]. Another way is to use the amplitude distribution curve comparing sheet surfaces before- and after contact (see fig.1). Both methods are discussed in this paper, giving useful insight in the practical determination of the height-level of contact.

RESULTS

- The result correlates well with previously published results for less severe lubrication conditions as well as studies performed on coated and uncoated steel sheets [2].
- The importance of method used for the determination of a true contact area is highlighted.
- The need for further studies to develop the SIT test method and methods to simulate the contact area, outgoing from the virgin sheet surface is, exemplified and discussed.

REFERENCES