UTILISATION OF LASER CONFOCAL MICROSCOPE OLYMPUS LEXT FOR THE ANALYSIS OF THE FRACTURE AREA OF FINE GRAIN STEELS

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KEY WORDS: fracture area, confocal laser scanning microscope, LEXT

The appearance of fracture areas contains information about the character of damage and thus also about material behavior during its destruction. Detailed observation of fraction areas can only be carried out using microscopes with high depth of focus. Recently the Olympus Company has introduced a confocal laser microscope LEXT OLS 3000, which allows observation of fracture areas without any special preparations and without the need of vacuum utilization. This microscope can be applied not only for the structure analysis but also for the evaluation of less broken fraction areas in order to obtain quick information about their appearance. The device offers a broad magnification range from 120 to 14 400x and the exact 3D reconstruction of the surface relief. The confocal laser microscope LEXT scans the surfaces with a laser beam with the wavelength of 408 nm thus allowing submicron visualization of material and component surfaces with the resolution of down to 0.12 μm.
This paper illustrates the possibilities of fracture area observation on specimens subjected to tensile as well as Charpy impact tests and also describes the application of the confocal laser microscope for observation of various kinds of fracture. Within the presented analysis, less broken fraction areas of ductile as well as brittle appearance were observed using a standard objective without extended focal distance. The upper and the lower scanning boundary together with a suitable brightness and contrast need to be set prior to scanning. The observations show that good images can be obtain more easily in the case of brittle fracture compared to ductile fractures with hole morphology, which introduce higher demands on the microscope's depth of focus (Fig. 1). For a better illustration of the failure mechanism a 3D visualization of the fraction area is available (Fig. 2).

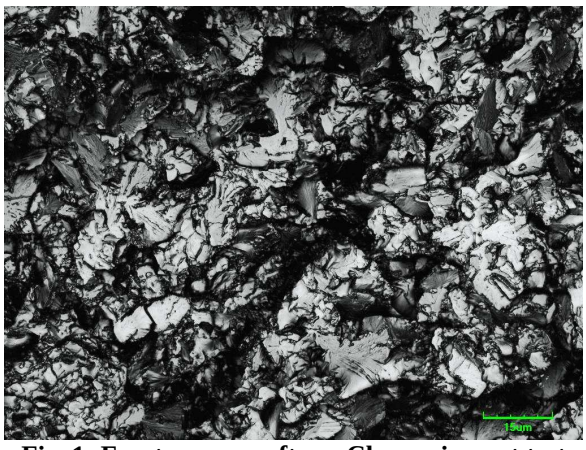

Fig. 1: Fracture area after a Charpy impact test

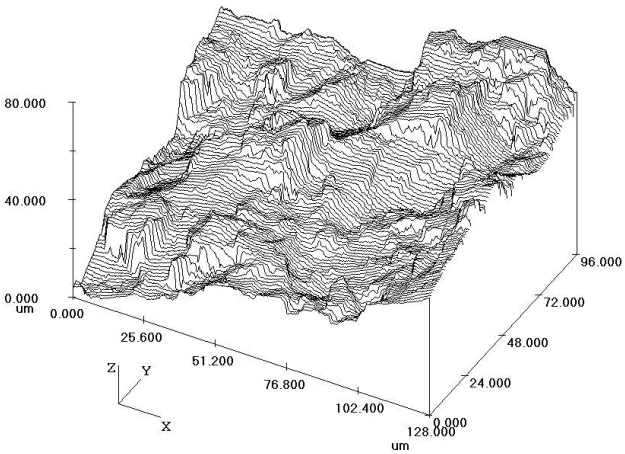

Fig. 2: 3D wireframe visualization of fracture area

Acknowledgements : This paper includes results created within the project 1M06032 Research Centre of Forming Technology.