

Tool Wear of Gear Shaving Cutter (Evaluation of Nose Radius from SEM Images)

Ichiro MORIWAKI,

Associate Professor

Kyoto Institute of Technology

Matsugasaki, Sakyo-ku, 606-8585 Kyoto, JAPAN

Phone: +81 75 724 7360 **Fax:** +81 75 724 7300

e-mail: ichi@mech.kit.ac.jp

Kazuya SUGIMURA,

Engineer

Ishida Co., Ltd.

e-mail: sugimura@sf.ishida.co.jp

and **Shinpei NAKADA,**

Graduate Student

Kyoto Institute of Technology

Matsugasaki, Sakyo-ku, 606-8585 Kyoto, JAPAN

Phone: +81 75 724 7375 **Fax:** +81 75 724 7300

e-mail: sin@pml.mech.kit.ac.jp

ABSTRACT

Gear shaving is one of the most important processes of gears for automobiles. However, the design method for shaving cutters has not yet been established. One of the most difficult problems in the design of shaving cutters is determination of tooth modification. The tooth modification should be determined in consideration of a target tooth form of work gear and tool life. For longer tool life, change in shaved tooth form with the deterioration of cutting performance of a shaving cutter must be revealed. For this purpose, a shaving cutter with a removable tooth has been developed. This special cutter has a removable tooth which enables an aspect of a cutting edge to be observed easily with a scanning electron micro scope (SEM). Meanwhile, shaved tooth forms are affected by nose radii of cutting edges. This means that the nose radii determine the cutting performance of a shaving cutter. Therefore, the evaluation of a nose radius from a SEM image is required for the determination of the cutting performance. The present paper describes a method for the evaluation in which a SEM image is handled manually. Furthermore, using a developed computer simulation program for gear shaving, which can consider the change in cutting performance of a shaving cutter, finished tooth forms of shaved gears were calculated, and compared with the measured ones. As a result, it was confirmed that the proposed method for the nose radius evaluation could be useful, and the developed program could simulate the change in shaved tooth forms with deterioration of cutter performance.