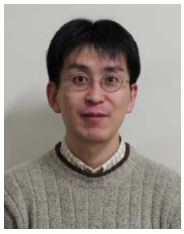
National Institute of Technology, Tsuruoka College
Department of Creative Engineering,Course of Mechanical Engineering

Strength evaluation and displacement measurement of machine elements



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Keywords	Gear, Fatigue Strength, Strain Measurement, Digital Image Correlation Method
Technical Support Skills	・Stress analysis and strength evaluation for machine elements ・Fatigue strength simulation of steel ・Displacement and strain measurement by digital image correlation method

Research Contents — Fatigue strength simulation / Strain measurement by the DIC

・Fatigue strength and reliability evaluation of machine elements especially in carburized gears

It is important to evaluate fatigue strength with dispersion precisely for strength design of machine elements. Defects in the material will cause the failure of high strength steels. I am carrying on the research of strength simulation method based on the defects. This method is able to estimate the dispersion of strength.

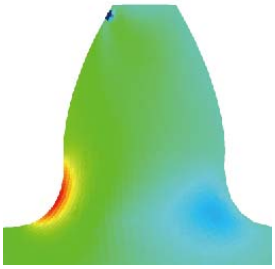

Fig.1 Stress analysis of gear tooth

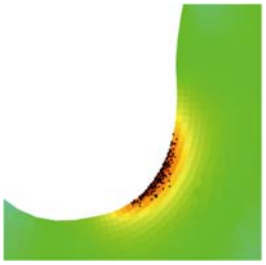

Fig.2 Black dots indicate the initiation points fatigue failure

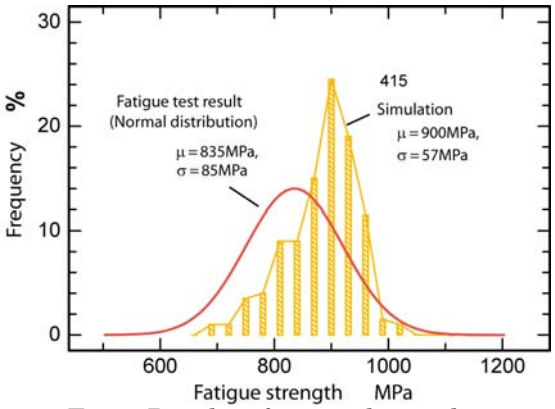

Fig.3 Results of strength simulation

・Displacement and strain measurement by the Digital Image Correlation method

We quantify the displacement of objects by comparing the luminosity of digital photos. The accuracy of the method has been achieved in order of 0.1 pixel, however, we try to develop the program and measuring setting for reducing the cpu time and enhance the accuracy.

Fig.4 A specimen painted the random pattern for the DIC method

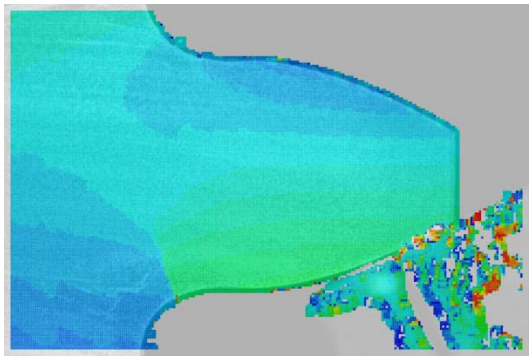

Fig.5 Displacement of a tooth with a crack measure by the DIC

Available Facilities and Equipment

Precision Universal Tester (Shimadzu AG250-kNG)	
Servo controlled Fatigue Tester (Shimadzu)	
Application program for DIC (Own developed)	