

**THEODORE M. (TED) CLARKE
ASSOCIATE CONSULTANT
CORPORATE OFFICE**

Mr. Clarke has 35 years of experience in metallurgical engineering, especially as applied to the understanding of basic manufacturing processes. His broad background includes extensive study of gears, bearings, and similar heat treated components, including damage mechanisms. He has also developed expertise in fracture characterization, photomacrography, and high resolution digital imaging.

He spent his entire career with International Harvester Corporation and its successor organizations. His research was initially in the fatigue behavior of continuous cast steel and cast aluminum. Later research involved fatigue behavior of new gear steels and associated heat treatments, brittle fracture behavior of structural steel, strain based axial fatigue behavior of cast and wrought ferrous metals, and the mechanism for pit initiation on boundary lubricated case hardened gears. The latter work was conducted in a National Science Foundation sponsored program involving Northwestern University and International Harvester.

Most recently, Mr. Clarke led the development of reliable laser welding for transmission components. He holds four patents in his areas of expertise.

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Areas of Specialization

Failure analysis and prevention

Fracture mechanisms, especially fatigue and brittle fracture

Tribology and pitting mechanisms

Materials selection, specification, characterization, and verification

Manufacturing processes, process and product research and development, and quality control.

Off highway and heavy equipment

Photomacrography and high-resolution digital imaging.

Professional Affiliations/Honors

State Microscopical Society of Illinois

Education

M.S., Materials Science
Northwestern University, 1968.

B.S., Science Engineering
Northwestern University, 1965.

Positions Held

CNH Global

Senior Technical Specialist, 1999-2000

Case Corporation

Senior Technical Specialist, Technology Center, 1994 - 1999
Project Engineer, Technology Center, 1985 - 1994

International Harvester Corporation

Project Development Engineer, 1982 – 1985
Research Scientist, 1979 – 1982
Principal Research Metallurgist, 1973 – 1979
Materials Research Metallurgist I, 1967 – 1973
Research Metallurgist, Research Center, 1965 – 1967

Patents

"Vehicle Hitch Link," Daniel K. Schlegel, Michael D. Morton, Theodore M. Clarke, U.S. Patent No. 6,352,123, Issued March 5, 2002.

"Improved Bearing Assembly Permitting Tri-Axial Movement," Jimmy R. Kreftmeyer, Theodore M. Clarke, Timothy Olson, U. S. Patent No. 5,678,930, Issued Oct. 21, 1997.

"Method of Welding," Theodore M. Clarke, Barry Slee, U. S. Patent No. 5,211,327, Issued May 18, 1993.

"Earth-Working Implement," Theodore M. Clarke, Gordon H. Walter, U. S. Patent No. 4,098,622, Issued Jul. 4, 1978.

Publications

Sponzilli, J. T., Remus, G. E., Clarke, T. M., Sawdo, E. J., "Steel Quality Requirements for Heavy Duty Off-Highway Gearing," SAE 2000-01-2566.

Clarke, T. M., "Water Immersion Caps for Pond Water Microscopy," *The Microscope*, **2000**, **48**, 87-91.

Clarke, T. M., "Building an Affordable Universal Student Microscope," *The Microscope*, **2000**, **48**, 19-39.

Clarke, T. M., "Digital Imaging in the Materials Engineering Laboratory," *The Microscope*, **1998**, **46**, 85 – 100.

Clarke, T. M., "Upgrading the Bausch & Lomb Research I Metallograph," *The Microscope*, **1997**, **45**, 47 – 52.

Clarke, T. M., "Brightfield Illumination of Complete Metallographic Specimens," *The Microscope*, **1996**, **44**, 59 – 80.

Clarke, T. M., "Light Microscopy Criteria for Electronic Imaging," *The Microscope*, **1995**, **43-3**, 121 – 124.

Clarke, T. M., "Image Field Size Limitation for Scanning Light Photomacrography," *The Microscope*, **1993**, **41**, 21 – 30.

Clarke, T. M., "Vertical Incident Illumination for Photomacrography," *The Microscope*, **1988**, **36**, 11-34.

Clarke, T. M., "Photography of Fractured Parts and Fracture Surfaces," *Metals Handbook*, Ninth Edition, Volume 12, *Fractography*, ASM International, 1987.

Clarke, T. M., "Method for Calculating Relative Apertures for Optimizing Diffraction-Limited Depth of Field in Photomacrography," *The Microscope*, **1984**, **32**, 219 – 258.

Clarke, T. M., Miller, G. R., Keer, L. M., Cheng, H. S., "The Role of Near Surface Inclusions in the Pitting of Gears," ASLE Preprint No. 84-AM-3A-1, **1984**.

Clarke, T. M., Walter, G. H., "Toughness Considerations of Structural Steel for Roll Over Protective Structures," SAE Paper 790828, **1979**.

Clarke, T. M., Johnson, D. L., Fine, M. E., "Effect of Oxygen Partial Pressure on Precipitation in Titanium – Doped aluminum Oxide," *Journal of the American Ceramic Society*, Vol. 53, No. 7, Jul. 1970.

Johnson, D. L., Clarke, T. M., "Grain Boundary and Volume Diffusion in the Sintering of Silver," *Acta Metallurgica*, Vol. 12, No. 10, 1964, 1173 – 1179.

Teaching and Technical Presentations

"Principles of Digital Imaging," McCrone Research Institute, 2000

"Optical Image Resolution and Digital Imaging," Stereology Course Lecture, Northwestern University, 1999

"Principles of Photomacrography," ASM Electronic Materials Seminar for Chicago Chapter, 1995.