

George E. Totten, Ph.D., FASM

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TECHNICAL SKILLS:

- Internationally recognized expert on quenching of steel and aluminum.
- Internationally recognized expert on fire resistant hydraulic fluids, including lubrication.
- Synthesis of organofunctional monomers and polymers.

PROFESSIONAL EXPERIENCE:

1970 – 2001 - **Union Carbide Corporation**

2001 – 2001 - **The Dow Chemical Company**

2001 – 2001- Adjunct Professor – **Polytechnic University of New York (New York, NY)**

2001 – Present – President of **G.E. Totten & Associates, LLC**

2004 – Present – Research Professor – **Portland State University (Portland, OR)**

2005 – 2006 - Visiting Scholar – **Texas A&M University (College Station, TX)**

2006 – Present – Visiting Professor - Department of Engineering, Materials, Aeronautics and Automobile Technology, School of Engineering at São Carlos, (**University of São Paulo, São Carlos, Brazil**)

2006 – Present – Associate - **Associação Instituto Internacional de Pesquisa**, (São Carlos, SP, Brazil)

2006 – Adjunct Professor - **Texas A&M University (College Station, TX)**

My research has encompassed nearly all of the business areas of the former Union Carbide. A partial list of technical areas where I have conducted research includes:

- Designed and synthesized surfactants for polyurethane foams applications
- Synthesized silane coupling agents for filled rubber applications
- Developed new polymers for various applications including surfactants, flocculation agents, asphalt dispersants, and antifoams
- Studied end-group functionalization of poly (alkylene oxide) copolymers to enhance thermal/oxidative stability for use as heat transfer fluids
- Developed methods of anchoring mildewcides in water-based paints
- Developed permanent hydrophilic treatments for various textiles
- Developed new lubricant compositions for polyester fiber, fiberfill, and fabrics
- Conducted structure performance studies on polymers, both anhydrous and aqueous solutions for use as metal quenchants
- Conducted polymer and antioxidant structure-performance studies to model thermal / oxidative stability in heat transfer fluid formulations
- Developed new corrosion inhibitor systems for aqueous polymer solutions used as metal quenchants and water-glycol hydraulic fluids
- Studied additive structure performance effects on the lubrication properties of hydraulic fluids

Most of my recent work has been in: metal quenchants, heat treatment and surface engineering (25 years), hydraulic fluid technology (20 years) and basic research of lubrication (30 years).

From 1978-1989 I was a part-time Ph.D. candidate at **New York University**. From about 1980-1985, I had a half-time leave of absence from Union Carbide to complete my Ph.D. degree. The title of my research dissertation was: "Substituted Neopentyl Systems *via* Silyl Ketene Acetal Chemistry and Acetolysis of Alkyl-Substituted Neopentyl Derivatives". Degree was awarded in September, 1989.

EDUCATION:

- Ph.D., New York University, Physical Organic Chemistry (1989)
- M.S., Fairleigh Dickinson University, Organic Chemistry (1978)
- B.S., Fairleigh Dickinson University, Chemistry (1974)
- AAS, Broome Technical Community College, Chemical Technology (1970)

MEMBERSHIPS:

- ASM International (ASM),
- Brazilian Association of Metallurgy and Materials (ABM)
- American Chemical Society (ACS)
- Society of Automotive Engineers (SAE),
- Society of Tribologists and Lubrication Engineers (STLE),
- American Society for Testing and Materials (ASTM)

AWARDS AND RECOGNITION:

- ACS Outstanding Chemistry Student Award – 1970
- Union Carbide Corporate Fellow Outstanding Technologist Award – 1994
- Elected Fellow of ASM International (FASM) - 1997
- ASTM Excellence in Symposium and Publication Management – 1997
- ASTM Committee D-2 Award of Appreciation - 1998
- Elected as Honorary Member of the Russian Metallurgists Association – 1998
- ASTM Committee D-2 Award of Excellence – 2000
- SAE McFarland Award - 2000
- Elected Fellow of SAE International – 2002
- ASTM Committee D-2 Scroll of Achievement Award – 2004
- BCC (Broome Community College) Alumni Achievement Award – 2004
- Jiangsu University (Zhenjiang, China) Visiting Faculty Lecturer – 2004
- Elected Fellow of IFHTSE (International Federation for Heat Treatment and Surface Engineering) – 2005
- ASTM Award of Merit (and became a Fellow of ASTM) – 2006
- Honorary Member of the Shanghai Heat Treatment of Metals Society – 2006
- Founding Fellow AMME (World Academy of Materials Manufacturing Engineering) - 2006
- Bodeen Award – Heat Treating Society of ASM International – 2007
- George E. Totten Symposium on Quenching – Heat Treating Society of ASM International – 2007
- ASTM Dudley Award – 2008
- IFHTSE Medal - 2011

PRESIDENT/CHAIRMAN:

- Chairman of ASM Quenching and Cooling Committee – 1988-2001
- Co-chairman of ASM/HTS Technical Programming Committee – 1994-2002
- Chairman of SAE FCIM Board – 2001- 2004
- President of International Federation for Heat Treating and Surface Engineering (IFHTSE) – (2002-2004)
- Chairman of ASTM International’s Committee on Publications (COP) – 2003-2006

EDITORIAL BOARD MEMBERSHIP

- Inżynieria Powierzchni (Surface Engineering – Inst. of Precision Mechanics - Poland)
- Jinshu Rechuli (Heat Treatment of Metals – CMES - China)
- Rechuli (Heat Treatment of Metals – Shanghai Society for Heat Treatment)
- Industrial Heat Engineering (Inst. of Eng. Thermophysics, National Academy of Sciences of Ukraine – Ukraine)
- **Associate Editor** – Journal of ASTM International (ASTM International)
- Int. Journal of Materials & Product Technology (Inderscience)
- Int. Journal of Microstructure and Materials Properties (Inderscience)
- WSEAS Transactions on Heat and Mass Transfer
- Research Letters in Materials Science
- **Deputy Editor-In-Chief** – Journal of Achievements in Materials and Manufacturing Engineering (JAMME)
- Strojni.ki vestnik – Journal of Mechanical Engineering (Slovenia) – International Advisory Board
- International Heat Treatment and Surface Engineering – International Advisory Board
- **Co-Editor** (with Prof. Rick Neu of Georgia Tech) – ASTM Journal of Materials and Characterization

PUBLICATIONS:

Coauthored or edited over 30 books and Conference Proceedings including: Conf. Proceed. Quenching and Distortion Control, 2. Handbook of Quenchants and Quenching Technology, 3. Heat Treating: Equipment and Processes - 1994 Conf. Proc. 4. Fire Resistance of Industrial Fluids, 5. Tribology of Hydraulic Pump Testing , 6. 2nd International Conference on Quenching and Control of Distortion, 7. Steel Heat Treatment Handbook, 8. Handbook of Hydraulic Fluid Technology, 9. Conf. Proceed .3rd International Conference on Quenching and Control of Distortion, 10. Handbook of Aluminum: Physical Metallurgy and Processes, 11. Handbook of Residual Stress, Distortion and Cracking of Steel, 12. ASTM Fuels and Lubes Manual.

In addition to a Ph.D. thesis and books, publications also include: 16 patents, approximately 600 journal and technical papers, magazine and trade journal articles, book chapters, and conference papers. These papers are mostly in the area of poly (ethylene glycol) as phase transfer catalysts, various aspects of heat treating, quenching and surface engineering technology, hydraulic fluids and lubrication technology. **A complete listing of all publications is attached.**

CONFERENCES ORGANIZED AND CHAIRED OR CO-CHAIED

1. "1st International Conference on Quenching and the Control of Distortion", ASM International, Lincolnshire, IL, 1992. (Co-chaired with Dr. C.E. Bates)
2. "Poly (Ethylene Glycols) As Phase Transfer Catalysts" - American Chemical Society Division of Polymeric Materials: Science and Engineering - ACS National Meeting, Boston, MA, 1993
3. "First International Conference on Equipment and Processes", ASM International, Schaumburg, IL, 1994 (Co-chaired with Dr. R.A. Wallis)
4. "International Conference on Fire Resistance Testing of Industrial Lubricants", ASTM, D-2 Meeting in Indianapolis, IN, June 1995 (Co-chaired with Ing. J. Reichel - DMT Germany)
5. "Tribology of Hydraulic Pump Testing", ASTM, D-2 Meeting in Houston, TX, December 1995 (Co-chaired with G.H. Kling (Caterpillar) and D.M. Smolenski (GM Research))
6. "Hydraulic Fluids Symposium", IFPE '96 (Hosted by NFPA, Chicago, IL, April 1996 (Co-chaired with G.H. Kling (Caterpillar) and H.M. Melief (Rexroth Corp.))
7. "Hydraulic Fluid Technology", SAE Toptec Conference, Pittsburgh, PA, September 1996 (Co-chaired with G.H. Kling (Caterpillar) and H.M. Melief (Rexroth Corp))
8. "2nd International Conference on Quenching and the Control of Distortion", ASM International, Cleveland, OH, 1996 (Co-chaired with Dr. M.A.H. Howes (IITRI) and Dr. S. Sjostrom (ABB Stal))
9. "Hydraulic Fluid Technology", SAE Toptec Conference", Schaumburg, IL, August 19-20, 1998 (Co-chaired with G.H. Kling (Caterpillar) and H.M. Melief (Rexroth Corp))
10. "3rd International Conference on Quenching and Control of Distortion", Prague, Czech Republic, March, 1999 (Co-Chaired with Prof. B. Liscic and Prof. H.M. Tensi)
11. "International Symposium on Hydraulic Failure Analysis: Fluids", Components, and System Effects, Reno, NV, December 5-6, 1999 (Co-Chaired with Prof. D. Feldmann and D. Wills)
12. "Symposium on Bench Testing of the Lubrication and Wear Properties of Industrial Fluids Used in Machinery Applications", Seattle, WA, June 24-27, 2000. (Co-chaired with L.D. Wedeven, J.R. Dickey and M. Anderson.).
13. "Hydraulic Fluids Symposium", IFPE 2000 (Hosted by NFPA, Chicago, IL, April 2000 (Co-chaired with G.H. Kling (Caterpillar) and H.M. Melief (Rexroth Corp.))
14. "20th Conference of the Heat Treating Society", St. Louis, MO, October 2000, (Co-Chaired with K. Funatani (Nihon Parkerizing Co. Ltd.)).
15. The 13th International Federation for Heat Treatment and Surface Engineering Congress", October 7-10, 2002, Columbus, OH. (Co-chaired with Dr. Robert Tucker (The Tucker Group, LLC))

16. "4th International Conference on Quenching & Control of Distortion", Beijing, China – November, 2003 (Co-chaired with Prof. Pan Jiansheng (Shanghai Jiaotong University))
17. "4th International Conference on Thermal Process Modeling and Computer Simulation", Shanghai, China – May 31-June 2, 2010 (Co-chairing with Prof. Weimin Zhang)

G.E. TOTTEN - PUBLICATIONS

1. Williams, T.C. and Totten, G.E., "Polysulfide Silicon Compounds", *USP* 4,113,696, Sept. 12, 1978.
2. Williams, T.C. and Totten, G.E., "Polymer Composite Articles Containing Episulfide Substituted Organosilicon Coupling Agents", *USP* 4,140,830, Feb. 20, 1979.
3. Williams, T.C. and Totten, G.E., "Amino Substituted Mercapto Organosilicon Compounds", *USP* 4,147,712, April 3, 1979.
4. Williams, T.C. and Totten, G.E., "Polymer Composite Articles Containing Polysulfide Silicon Coupling Agents", *USP* 4,151,157, Apr. 24, 1979.
5. Williams, T.C. and Totten, G.E., "Polymer Composite Articles Containing Amino Substituted Mercapto Organo Silicon Coupling Agents", *USP* 4,156,677, May 29, 1979.
6. Williams, T.C. and Totten, G.E., "Polymer Composite Articles Containing Polysulfide Silicon Coupling Agents", *USP* 4,210,459, Jul. 1, 1980.
7. Williams, T.C. and Totten, G.E., "Polymer Composite Articles Containing Amino Substituted Mercapto Organo Silicon Coupling Agents", *USP* 4,218,513, Aug. 19, 1980.
8. Goddard, E.D., Matteson, G.H. and Totten G.E., "Counterion Effects In A Cationic Monolayer", *J. Coll. Interface Sci.*, **1982**, 85, p 19-27.
9. Totten, G.E. and Williams, T.C., "Liquid Crystal Silanes", *USP* 4,316,041, Feb. 16, 1982.
10. Totten, G.E., Wesson, J.P., Williams, T.C. and Eager, R.G., "Mildewcidal Silane Compounds", *USP* 4,339,581, Jul. 13, 1982.
11. Wenke, G., Jacobsen, E.N., Totten, G.E., Karydas, A.C. and Rhodes, Y.E., "Silyl Ketene Acetal Chemistry: Steric Limitations In Lewis Acid-Promoted Addition Of Ketones", *Synth. Comm.*, **1983**, 13, p 449-458.
12. Totten, G.E. and Pines A.N., "Alkoxy Functional Silicones", *Eur. Pat.* 123,935, Jul. 11, 1984.
13. Totten, G.E. and Sabia, A.J., "Process For Imparting Hydrophilicity To Fabric", *USP* 4,463,036, July 31, 1984.
14. Totten, G.E. and Williams, T.C., "Liquid Crystal Silanes", *USP* 4,496,482, Jan. 29, 1985.
15. Totten, G.E., Wenke, G. and Rhodes, Y.E., "Dimerization Of Silyl Ketene Acetal: Effect Of Lewis Acid Selection On Product Yield And Structure", *Synth. Comm.*, **1985**, 15, p 291-300.

16. Jacobsen, E.N., Totten, G.E., Wenke, G., Karydas, A.C., and Rhodes, Y.E., "Steric Effects On The Titanium Tetrachloride Promoted Dimerization Of Silyl Ketene Acetals", *Synth. Comm.*, **1985**, 15, p 301-306.
17. Totten, G.E. and Pines, A.N., "Alkoxy Functional Silicones", *USP* 4,579,964, Apr.1, 1986.
18. Harding, R.H. and Totten, G.E., "Method of Indirect Liquid-Phase Heat Transfer", *USP* 4,617,984, Oct. 21, 1986.
19. Harding, R.H. and Totten, G.E., "Method of Indirect Liquid-Phase Heat Transfer", *USP* 4,624,299, Nov. 25, 1986.
20. Totten, G.E., Goddard, E.D., Matteson, G.H. and Wanchisen, M.L., "Counterion Effects On The Aqueous Solution Viscosity Of Cationic Surfactants", *J. Am. Oil Chem. Soc.*, **1986**, 63, p. 1586-1589.
21. Totten, G.E., Dakins, M.E., Ananthapadmanabhan, K.P. and Heins, R.W., "Cooling Rate Curve Area: A New Measure Of Quenchant Performance", *Heat Treat.*, **1987**, December, p 18-20.
22. Totten, G.E. and Clinton, N.A., "Poly(ethylene glycol) Derivatives as Phase Transfer Catalysts and Solvents for Organic Reactions", *Rev. Macromol. Chem. Phys.*, **1988**, C28(2), p 293-337.
23. Dakins, M.E., Totten, G.E. and Heins, R.W., "Cooling Curve Shape Analysis Can Help Evaluate Quenchants", *Heat Treat.*, **1988**, December, p 38-39.
24. Totten, G.E., Dakins, M.E. and Heins, R.W., "Cooling Curve Analysis Of Synthetic Quenchants - A Historical Perspective", *J. Heat. Treat.*, **1988**, 6, p 87-95.
25. Bates, C.E. and Totten, G.E., "Procedure for Quenching Media Selection to Maximize Tensile Properties and Minimize Distortion in Aluminum - Alloy Parts", *Heat Treat. of Metals*, **1988**, 4, p. 89-98.
26. Totten, G.E., Bates, C.E. and Jarvis, L.M., "Quench Factor Analysis: Polymers vs. Hot Water", *Heat Treat.*, **1989**, May, p. 38-40.
27. Totten, G.E. and Johnson, G.C., "Random Polyether Foam Control Agents", *USP* 4,836,951, June 6, 1989.
28. Jarvis, L.M., Blackwood, R.R., and Totten, G.E., "Thermal Separation of Polymer Quenchants for More Efficient Heat Treatments", *Ind. Heat.*, **1989**, November, p 23-24.
29. Totten, G.E., Dakins, M.E. and Jarvis, L.M., "How H-Factors Can Be Used To Characterize Polymers", *Heat Treat.*, **1989**, December, p 28-29.
30. Dakins, M.E., Bates, C.E., and Totten, G.E., "Calculation of Grossman Hardenability Factor from Quenchant Cooling Curves", *Metallurgia*, **1989**, 56, p S7-S9.
31. Totten, G.E., "Substituted Neopentyl Systems via Silyl Ketene Acetal Chemistry and Acetolysis of Alkyl-Substituted Neopentyl Derivatives", Ph.D. Dissertation, New York University, 1989.
32. Bates, C.E. and Totten, G.E., "Procedure for Quenching Media Selection to Maximize Tensile Properties and Minimize Distortion in Aluminum - Alloy Parts", *Nauchno-Prikladnoi Zhurnal (J. Appl. Science)*, **1989**, 11, p 86-100.
33. Totten, G.E., "Polymer Quenchants: The Basics", *Adv. Mat. & Proc.*, **1990**, Vol. 137, No. 3, p 51-53.

34. Alvadia, L.A., Totten, G.E. and Orszak, K.B., " Strategies for the Replacement of Oil Quenchants with Aqueous Polymers", *45 Congresso Anual - Associacao Brasileira de Metalls*, **1990**, 3, p 389-406.
35. Totten, G.E., Wenke, G., Kawamura, H. and Rhodes, Y.E., "Synthesis of 2-Isopropylideneadamantane via a Novel Silylketene Acetal Fragmentation", Presented at the 199th National Meeting of the American Chemical Society, Boston, MA, April 1990; Paper ORGN 396.
36. Bates, C.E. and Totten, G.E., "Quantifying Quench-Oil Cooling Characteristics", *Adv. Mat. & Proc.*, **1991**, 3, p 25-28.
37. Totten, G.E., Blackwood, R.R. and Jarvis, L.M., "Analyzing Polymer Quenchants During Use", *Heat Treat.*, **1991**, March, p. 16-18.
38. Bates, C.E., Totten, G.E. and Orszak, K.B., "Quench Severity Effects on the Properties of Selected Steel Alloys", Quenching and Carburizing - 3RD International Seminar of IFHT, Melbourne, Australia, 1991; p 46-65.
39. Mues, E., Orszak, K.B., and Totten, G.E., "Selection and Use of Polymer Quenchants", Paper Presented at the Second Tribological Meeting", Organized by the Centro Argentino de Tribologia - Comite Tecnico de la Camara Argentina de Lubricantes, August 15,1991.
40. Bates, C.E., Totten, G.E., and Brennan, R.L., "Quenching of Steel", *ASM Handbook - Volume 4: Heat Treating*, ASM International 1991, p. 67-120.
41. Totten, G.E., Orszak, K.B., Jarvis, L.M., and Blackwood, R.R., "How to Effectively Use Polymer Quenchants", *Ind. Heat.*, **1991**, October, p 37-41.
42. Totten, G.E., C.E. Bates and L.M. Jarvis, "Type I Quenchants for Aluminum Heat Treating", *Heat Treat.*, **1991**, December, p 16-19.
43. Totten, G.E., "Novel Thickened Water-Glycol Hydraulic Fluids For Use At High Pressures", Proceedings of the International Fluid Power Applications Conference - Emperical Design and Applications, Chicago, IL, March 24-26, 1992; p. 419 - 428.
44. Dakins, M.E., Bates, C.E. and Totten, G.E., "Estimating Quench Severity with Cooling Curves", *Heat Treat.*, **1992**, April, p 24-26.
45. Bates, C.E. and Totten, G.E., "Quench Severity Effects on the As-Quenched Hardness of Selected Alloy Steels", *Heat Treatment of Metals*, **1992**, 2, p 45-48.
46. Bates, C.E. and Totten, G.E., "Method for Predicting Quench Severity Effects on the Properties of Aluminum and Steel Alloys: I", *Ind. Heat.* , **1992**, August, p 19-23.
47. Totten, G.E., Orszak, K.B., Jarvis, L.M., and Blackwood, R.R., "Selection and Use of Polymer Quenchants", *Heat Treatment of Metals (China)*, **1992**, 7, p 53-58.
48. Totten, G.E., "Thickened Water-Glycol Hydraulic Fluids for Use at High Pressures", *SAE Technical Paper Series*, Paper No. 921738, (1992).
49. Conf. Proceed. Quenching and Distortion Control, Totten, G.E., Ed.; ASM International, Materials Park, OH, 1992.
50. Bates, C.E. and Totten, G.E., "Application of Quench Factor Analysis to Predict Hardness Under Laboratory and Production Conditions", In Conf. Proceed. Quenching and Distortion Control, Totten, G.E., Ed.; ASM International, Materials Park, OH, 1992; p 33-39.

51. Lally, K.S., Kearny, M.W. and Totten, G.E., "Quench Tank Agitation", In Conf. Proceed. Quenching and Distortion Control, Totten, G.E., Ed.; ASM International, Materials Park, OH, 1992; p 95-105.
52. Han, S-W, Yun, S.G. and Totten, G.E., "Continuously Variable Agitation in Quench System Design", In Conf. Proceed. Quenching and Distortion Control, Totten, G.E., Ed.; ASM International, Materials OH, 1992; p 119-126.
53. Totten, G.E. and Lally, K.S., "Proper Agitation Dictates Quench Success - Part I", *Heat Treat.*, **1992**, September, p 12-17.
54. Bates, C.E. and Totten, G.E., "Method for Predicting Quench Severity Effects on the Properties of Aluminum and Steel Alloys: II", *Ind. Heat.*, **1992**, October, p 29-31.
55. Lally, K.S. and Totten, G.E., "Proper Agitation Dictates Quench Success - Part 2", *Heat. Treat.*, **1992**, October, p 28-31.
56. Totten, G.E., "Hydraulic Fluids Take The Heat", *Machine Design*, **1992**, October 22, p 153-156.
57. C.E. Bates and G.E. Totten, "Kwantificering van Koelkarakteristieken van Afschrikolien", *Roestvast Staal*, **1992**, 8, p21-27.
58. K.S. Lally, M.W. Kearney and G.E. Totten, "Quench Tank Agitation for Optimizing Heat Treatments", *Ind. Heat.*, **1993**, March, p 49-54.
59. G.E. Totten, N.A. Clinton and P.L. Matlock, "Polyethylene Glycols as Phase-Transfer Catalysts - A Review", Proceedings of The American Chemical Society Division of Polymeric Materials: Science and Engineering, **1993**, 69, p 480-481.
60. G.E. Totten, "Thickened Water-Glycol Hydraulic Fluids For Use At High Pressures", New Achievements in Fluid Power Engineering: Proceedings of the Third International Conference on Fluid Power Transmission and Control ('93 ICFP), L. Yongxiang, G. Yiyuan and W. Rongliang, Ed; Int. Academic Publishers, 1993; p 3-9.
61. G.E. Totten, T. Narumi, and L.M. Jarvis, "Chemistry of Quenching", Environmental and Energy Efficient Heat Treatment Technologies: Proceedings of the 4th International Seminar of International Federation for Heat Treatment and Surface Engineering, S. Zhoujun and W. Yingsi, Ed., Int. Academic Publishers, Sept. 15-17, 1993, Beijing China; p 259-268.
62. K.S. Lally, D. Wan and G.E. Totten, "Quench Tank Agitation", Environmental and Energy Efficient Heat Treatment Technologies: Proceedings of the 4th International Seminar of International Federation for Heat Treatment and Surface Engineering, S. Zhoujun and W. Yingsi, Ed., Int. Academic Publishers, Sept. 15-17, 1993, Beijing China; p 282-292.
63. S.G. Yun, S-W. Han and G.E. Totten, "Continuously Variable Agitation in Quench System Design", Environmental and Energy Efficient Heat Treatment Technologies: Proceedings of the 4th International Seminar of International Federation for Heat Treatment and Surface Engineering, S. Zhoujun and W.Yingsi, Ed., Int. Academic Publishers, Sept. 15-17, 1993, Beijing China; p 282-292.
64. R.D. Howard and G.E. Totten, "Expansion of Application Potential of Polymer Quenchants Using Membrane Separation", Environmental and Energy Efficient Heat Treatment Technologies: Proceedings of the 4th International Seminar of International Federation for Heat Treatment and Surface Engineering, S. Zhoujun and W. Yingsi, Ed., Int. Academic Publishers, Sept. 15-17, 1993, Beijing China; p 298-306.

65. L.D. Wedeven and G.E. Totten, "Performance Map Characterization of Lubricating Oils - Characterization of Gear Lubricants Formulated from Different Base Oils", *SAE Technical Paper Series*, Paper Number 932437, (1993).
66. G.E. Totten and G.M. Webster, "Review of Testing Methods for Hydraulic Fluid Flammability", *SAE Technical Paper Series*, Paper Number, 932436, (1993).
67. K.S. Lally and G.E. Totten, "Quench Tank Agitator", *Jinshu Rechuli (Heat Treatment of Metals -Beijing)*, **1993**, 11, p 24-29.
68. G.E. Totten, T. Narumi and L.M. Jarvis, "Quenchant Chemistry Holds the Key to Improved Shop Operations", *Heat. Treat.*, **1993**, December, p 16-19.
69. S.G. Yun, S-W. Han, and G.E. Totten, "Continuously Variable Agitation in Quench System Design", *Ind. Heat.*, **1994**, January, p 35-38.
70. G.E. Totten, C.E. Bates and N.A. Clinton, Handbook of Quenchants and Quenching Technology, ASM International, Materials Park, OH, 1993.
71. G.E. Totten and G.M. Webster, "High Performance Thickened Water-Glycol Hydraulic Fluids", Proceedings of the 46th National Conference on Fluid *Power*, March 23-24, 1994, p 185-194.
72. Heat Treating: Equipment and Processes - 1994 Conference Proceedings, G.E. Totten and R.A. Wallis, Ed., ASM International, Materials Park, OH, Schaumburg, IL; April 1994.
73. H.M. Tensi, A. Stich and G.E. Totten, "Fundamentals About Quenching By Submerging", In Heat Treating: Equipment and Processes - 1994 Conference Proceedings, G.E. Totten and R.A. Wallis Ed., ASM International, Materials Park, OH, 1994, p 243-251.
74. B. Liscic and G.E. Totten, "Controllable Delayed Quenching", In Heat Treating: Equipment and Processes - 1994 Conference Proceedings, G.E. Totten and R.A. Wallis, Ed., ASM International, Materials Park, OH, 1994, p 251-262.
75. S.W. Han, S.H. Kang, G.E. Totten and G.M. Webster, "Principles and Applications of the Immersion Time Quenching System in Batch and Continuous Processes", In Heat Treating: Equipment and Processes - 1994 Conference Proceedings, G.E. Totten and R.A. Wallis, Ed., ASM International, Materials Park, OH, 1994, p 337-345.
76. G.E. Totten and G.M. Webster, "Hydraulic Fluid Flammability Testing", *Off-Highway Engineering*, **1994**, April, p 11-15.
77. G.E. Totten, L.M. Jarvis and J. Guadarrama, "Poly(Alkylene Glycol) Quenchants for Aluminum Heat Treating", In Conf. Proceed. Vol. 1 - 3rd International Conference on Aluminum Processing, May 26 -29, 1994, Cancun, Mexico, p 271-285.
78. G.E. Totten and E. Mues, "Thickened Water-Glycol Fluids for Use at High Pressures", Paper Presented at the Third Tribological Meeting", Organized by the Centro Argentino de Tribologia - Comite Tecnico de la Camara Argentina de Lubricantes, August 8-12, 1994.
79. L.D. Wedeven and G.E. Totten, "Performance Map Characterization of Lubricating Oils: Characterization of Gear Lubricants Formulated from Different Base Oils", Paper Presented at the Third Tribological Meeting", Organized by the Centro Argentino de Tribologia - Comite Tecnico de la Camara Argentina de Lubricantes, August 8-12, 1994.

80. G.E. Totten and G.M. Webster, "Review of Testing Methods for Hydraulic Fluid Flammability", Paper Presented at the Third Tribological Meeting", Organized by the Centro Argentino de Tribologia - Comite Tecnico de la Camara Argentina de Lubricantes, August 8-12, 1994.
81. G.E. Totten, R.J. Bishop, R.L. McDaniels, D.P. Braniff and D.J. Irvine, "Effect of Low Molecular Weight Carboxylic Acids on Hydraulic Pump Wear", *SAE Technical Paper Series*, Paper Number 941751,(1994).
82. L.D. Wedeven, G.E. Totten and R.J. Bishop, "Performance Map Characterization of Hydraulic Fluids", *SAE Technical Paper Series*, Paper Number 941752,(1994).
83. G.E. Totten, G.M. Webster and C. Ulisses, "Chemistry of Quenching", 49 Congresso Anual - Novos Tipos de Aco e suas Aplicacoes; Tratamento Termico, Associacao Brasileira de Metals, **1994**, 8, p 241- 254.
84. R.D. Howard and G.E. Totten, "Membrane Separation of Polymer Quenchants", 49 Congresso Anual Novos Tipos de Aco e suas Aplicacoes; Tratamento Termico, Associacao Brasileira de Metals, **1994**, 8, p. 255-266.
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