

STANLEY R. TROUT, Ph.D., P.E.

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SPONTANEOUS MATERIALS, Fishers, IN [2001 to date]

Owner

A consultancy specializing in solving client's problems with magnetic materials and the rare earths. A resource for technical training and writing.



ALMA COLLEGE, Alma, MI [2006 to 2007]

Visiting Assistant Professor of Physics

MAGNETICS MAGAZINE, Greenwood Village, CO [2005 to date]

Contributing Editor

Writer of the Spontaneous Thoughts column

ELLIS UNIVERSITY, Chicago, IL [2005 to 2009]

On-line Physics Instructor

MARIAN COLLEGE, Indianapolis, IN [2002 to date]

Adjunct Lecturer in Physics

MAGNEQUENCH INTERNATIONAL, INC., Anderson, IN [1997 to 2001]

Applications Engineer

- Worked with customers to resolve material selection, design, coating, adhesive and magnetic testing issues. Created a database of information and resources that allowed most questions to be answered in less than an hour.
- Initiated company web site
- Updated technical literature, application bulletins and data sheets.
- Chairman of the Technical Committee of the International Magnetics Association. Helped to rewrite Standard for Permanent Magnets Materials, MMPA-0100-00.

MOLYCORP, INC., A UNOCAL COMPANY, White Plains, NY & Fairfield, NJ [1988 to 1997] (now Molycorp Minerals, LLC)

Metallurgist-Technical Sales and Development

- Responsible for sales and promoting new applications of the lanthanides, rare earths.
- Managed over 130 accounts in North America, with roughly 30 very active customers. Annual sales ranged from \$15 to \$20 million.
- Resolved product specification, quality, scheduling, pricing and contract issues.
- Application areas covered: permanent magnets, glass polishing compounds, petroleum and environmental catalysts, thermal barrier coatings, nickel metal hydride batteries, advanced ceramics, ferroalloys.
- Designed first company web site.

PROFESSIONAL ENGINEER REVIEW COURSE, Northport, NY [1992 to 1997]

Instructor

Review of chemistry, materials science and thermodynamics for the state Fundamentals of Engineering (FE) examination. www.percinc.com

PRIVATE TUTOR, [1991 to date]

High school physics, chemistry and mathematics.

HITACHI MAGNETICS CORP., Edmore, MI [1984 to 1988] (closed July 2005)

Senior Development Engineer

- Developed new Nd-Fe-B magnet alloys with improved thermal stability.
- Liaison to Hitachi research group in Kumagaya, Japan.
- Established vacuum induction melting, both as a research tool and as a viable production process.
- Invented hydrogen decrepitation, the standard process to pulverize Nd-Fe-B alloys .
- Developed internal magnetic materials training course and a seminar to promote the use of Nd-Fe-B magnets with major customers.

CRUCIBLE MAGNETICS, Elizabethtown, KY [1982 to 1984] (Became

Vacuumschmelze and closed in December 2003)

Manager of Rare Earth Technology

- Responsible for SmCo magnet production, quality control, applications.
- Assisted in technology transfer from TDK Corporation, Japan.
- Modernized an ancient array of magnetic test equipment. Examples: automated density measurement, Helmholtz coils with digital solid state fluxmeters.
- Introduced the use of computers in applications, design and production. Created software to estimate magnetic fields and forces for simple geometries.
- Started up the first VFS vacuum sintering furnace, in record time.

RECOMA, INC., Fairfield, NJ [1979 to 1982] (Became Precision Magnetics)

Manager of Materials Development, Design Engineering and Quality Control

A small start-up company to produce and market SmCo₅ magnets in North America, using technology developed by Brown Boveri (now Asea Brown Boveri) in Switzerland.

- Turned around failed quality program, winning approval from Northrup.
- Interfaced with customers on design and application issues, as well as source inspectors, auditors and quality managers.

EDUCATION**UNIVERSITY OF PENNSYLVANIA, Philadelphia, PA [1974 to 1979]**

Research Fellowship in Metallurgy and Materials Science

Ph.D.: Magnetocrystalline Anisotropy, Magnetostriction and Saturation Magnetization of SmCo₅ Single Crystals

M.S. High Field Magnetic Measurements on Sintered SmCo₅ Permanent Magnets

Techniques used: torque magnetometer, vibrating sample magnetometer, strain gages, high field Bitter magnets.

Teaching Assistant for undergraduate courses. Advisor: C. D. Graham, Jr.

LAFAYETTE COLLEGE, Easton, PA [1969 to 1973]

B.S. Physics with Honors, nine semesters of Mathematics. Set up high pressure viscometer. Teaching Assistant.

Additional Training

- Vector Fields, Opera 3D, finite element software, 2001
- Vector Fields, Opera 2D, 1999
- Ansoft, Maxwell 2D finite element software, 1998
- Managing Technical Professionals, American Management Association (AMA), 1996
- The Legal Aspects of Buying and Selling, AMA, 1996
- Face to Face Communications, Module V, Unocal, 1995
- Time Management, AMA, 1995
- Mastering the Internet, Cowles Business Media, 1995
- Communication and Interpersonal Skills: A Program for Technical Professionals, AMA, 1994
- Fundamentals of Finance and Accounting for Nonfinancial Executives, AMA, 1994
- Strategies for Selling Technical Industrial Products, AMA, 1993
- Value Added Selling, AMA, 1992
- Positive Negotiating Skills, Module VI, Unocal, 1990
- Statistical Process Control, Hitachi Magnetics, 1987
- The Engineer as Manager, Michigan State University, 1986

Publications (most may be found at www.spontaneoumaterials.com/papers.htm)

- “Rare Earth Permanent Magnets: Raw Materials, Magnets and Opportunities,” Plenary Lecture, International Magnetics Conferences (2009).
- “Optimum Corrosion Protection of Nd-Fe-B Magnets,” Magnews (2004) and Magnetics Magazine (2004).
- “Selection and Specification of Permanent Magnet Materials,” with G. Wooten, Electric Manufacturing and Coil Winding Conference (2003).
- “Magnetic Testing of Bonded Magnets,” NATO Advanced Research Workshop on Bonded Magnets, University of Delaware (2002).
- “Rare Earth Magnet Industry in the USA: Current Status and Future Trends,” Seventeenth International Workshop on Rare Earth Magnets and Their Applications, University of Delaware (2002).
- “Material Selection of Permanent Magnets, Considering Thermal Properties Correctly,” Electric Manufacturing and Coil Winding Conference (2001).
- “Understanding Permanent Magnet Materials, An Attempt at Universal Magnetic Literacy,” Electric Manufacturing and Coil Winding Conference (2000).
- “Effective Use of Neodymium Iron Boron Magnets, Case Studies,” with Y. Zhilichev, Electric Manufacturing and Coil Winding Conference (1999).
- “Permanent Magnets Based on the Lanthanides,” The International Symposium on Magnetics, Seoul, Korea, 79 (1990).
- “The Lanthanide Myths,” Eleventh International Workshop on Rare Earth Permanent Magnets, 286 (1990).
- “Use of Helmholtz Coils for Magnetic Measurements,” IEEE Trans. Magnetics **24** 2108 (1988).
- “Magnetizability of Nd-Fe-B type Magnets with Dy Additions,” with M. Tokunaga, M. Endoh, and H. Harada, Journal of Applied Physics **63** 3510 (1988).

- “Effect of Nb Additions on the Irreversible Losses of Nd-Fe-B type Magnets,” with M. Tokunaga and H. Harada, IEEE Transactions on Magnetics, 23 2284 (1987).
- “Squareness Ratio for Various Rare Earth Permanent Magnets,” with D. L. Martin and H. F. Mildrum, Eighth International Workshop on Rare Earth Permanent Magnets, 269 (1985).
- “Improving the Distribution of Magnetic Properties in Rare Earth-Cobalt Magnets by the use of Selective Thermal Stabilization”, IEEE Transactions on Magnetics 19 2047 (1983).
- “Magnetocrystalline Anisotropy, Magnetostriction and Saturation Magnetization of SmCo₅ Single Crystals”, abstract, with C. D. Graham, Jr., Journal of Applied Physics 50 2361 (1979).
- “Magnetic Anisotropy in MnBi Particles Grown by Directional Solidification of the Mn-Bi Eutectic”, with M. R. Notis, Dilip Shah and C. D. Graham, Jr., Journal of Applied Physics 49 2043 (1977).
- “Statistical Analysis of the Orientation of Sintered SmCo₅ Magnets”, with C. D. Graham, Jr., IEEE Transactions on Magnetics 12 1015 (1976).
- “High Field Measurements in Sintered SmCo₅ Permanent Magnets”, with C. D. Graham, Jr., AIP Conference Proceedings 29 608 (1975).

Presentations/Seminars

- Alma College
- ASM International
- Ball State University
- Bodine Electric Motors
- Central Michigan University
- Coil Winding Berlin
- Fort Monmouth
- GM Powertrain
- Gorham/Intertech
- IBM Tucson, AZ and Rochester, MN
- Intermag, Plenary Speaker
- Lafayette College
- Milwaukee Electric Tool
- Philadelphia Permanent Magnet Meeting
- SSI Technologies
- University of Dayton
- University of Kentucky
- University of Pennsylvania
- Virginia Tech

Professional Societies

IEEE, Magnetics Society, senior member
 UK Magnetics Society
 SMMA, The Motor and Motion Association

Miscellaneous Information and Other Interests:

Registered Professional Engineer, Pennsylvania PE-027314-E, since 1978
 Computer Experience: reasonably proficient with Microsoft Office and FrontPage
 Home renovations: plumbing, electrical and masonry
 Amateur Radio Operator, Advanced Class, WB2SHR
 Long distance running, cycling
 Volkswagens