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COLLEGE OF ENGINEERING

**Research
Activities
Annual Report
1987-1988**



**Circular No. 63
Engineering Experiment Station**

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PREFACE

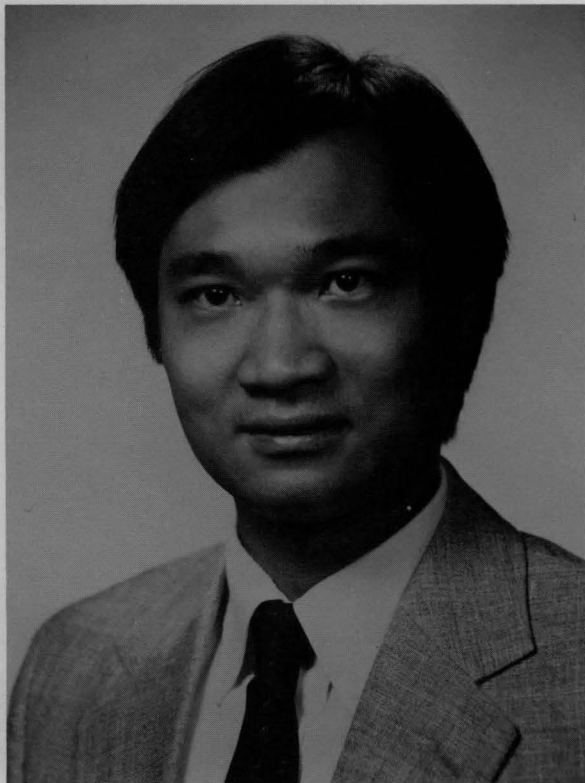
A vigorous program of engineering research is essential for the vitality of the teaching program of our College of Engineering. Good teaching and good research are mutually supportive. Faculty working on the leading edge of technology are those who are best equipped to prepare students for the challenges they will face after graduation. More than half of the College's faculty is able to devote part of its time to investigations outside normal classroom teaching responsibilities. The result is a more diverse and highly qualified group of teaching and research engineers in the various engineering disciplines, and higher quality educational programs at both the undergraduate and graduate levels. Instructional laboratories for students benefit from the research program since research equipment is also used for teaching. Oregon State University has long been known as a quality institution. Continuing research involvement by a strong nucleus of active research engineers is vital to maintenance and enhancement of this reputation.

This report summarizes important data concerning our research and graduate programs. It serves as a vehicle to answer frequently asked questions from industry, government agencies, private businesses, and prospective students. In the report you will find information about our record in research funding and our current research interests, along with a listing of our research faculty and their 1987-88 publications. We have also provided current data on graduate programs and enrollments, and certain financial assistance for graduate students. Additional information concerning academic programs and degrees may be found in the Oregon State University Graduate Catalog or obtained from the individual academic departments. We welcome inquiries, addressed to me or to another appropriate individual.



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NAVAL RESEARCH YOUNG INVESTIGATOR



Solomon C.S. Yim

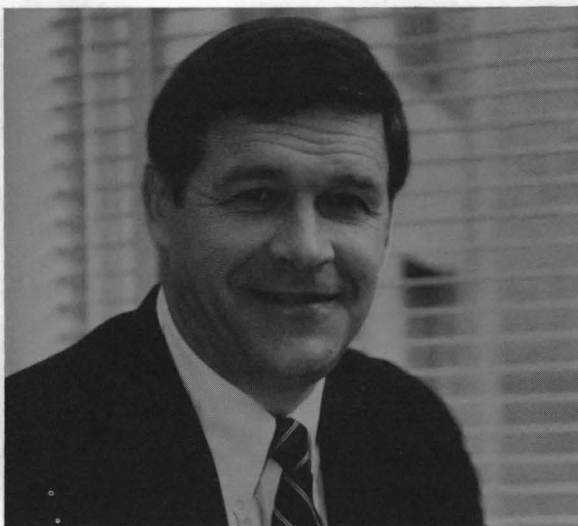
In April 1988, Dr. Solomon C.S. Yim of the Civil Engineering Department was selected by the Office of Naval Research to receive an ONR Young Investigator Award. The award provides \$50,000 per year for three years for research and professional development work, plus an additional two-to-one matching of up to \$80,000 each year if further research funds can be obtained from other naval research laboratories. These national awards were established to help retain outstanding university faculty and to help launch their research careers in areas related to Navy interests.

Dr. Yim graduated from Rice University with a B.S. degree in Civil Engineering in 1976. He then attended the University of California at Berkeley where he completed three graduate degrees: an M.S. and a Ph.D. in Structural Engineering and Structural Mechanics, and an M.A. in Applied Mathematics. His graduate research work in engineering included the analysis of dynamic response of structures to deterministic and random excitations. His research in mathematics dealt with the development of numerical methods to analyze nonlinear wave propagation.

Prior to joining OSU in the fall of 1987, Dr. Yim served as a lecturer/postdoctoral researcher at Berkeley from 1982 to 1984 and worked as a research engineer at Exxon Production Research Company from 1984 to 1987. His industrial experience entailed the development of advanced analysis and design software and experimental techniques for nonlinear compliant structural systems and components. Dr. Yim's main research interest is in nonlinear vibrations and probabilistic mechanics. His current research topics encompass the development and application of analytical and numerical techniques to analyze regular, stochastic, and chaotic responses of nonlinear structural and mechanical systems. His teaching duty includes graduate courses in dynamics and random vibrations as well as undergraduate courses in structural engineering.

ENGINEERING RESEARCH: AN OVERVIEW

The research administrative structure for engineering at Oregon State University is illustrated in Figure 1. Key elements of the programs are concentrated in the academic departments, including six departments in the College of Engineering, and the engineering departments in the College of Agricultural Sciences and the College of Forestry. Faculty within each department constitute the research staff, and each of these faculty members has instruction-related duties. Graduate students in the departments assist with the research work. The Engineering Experiment Station has no technical research staff, but provides administrative support service and a central administrative focus. Several institutes and centers are associated with the academic departments or other elements of the University. These have strong ties with engineering, but operate independently from the affiliated departments.



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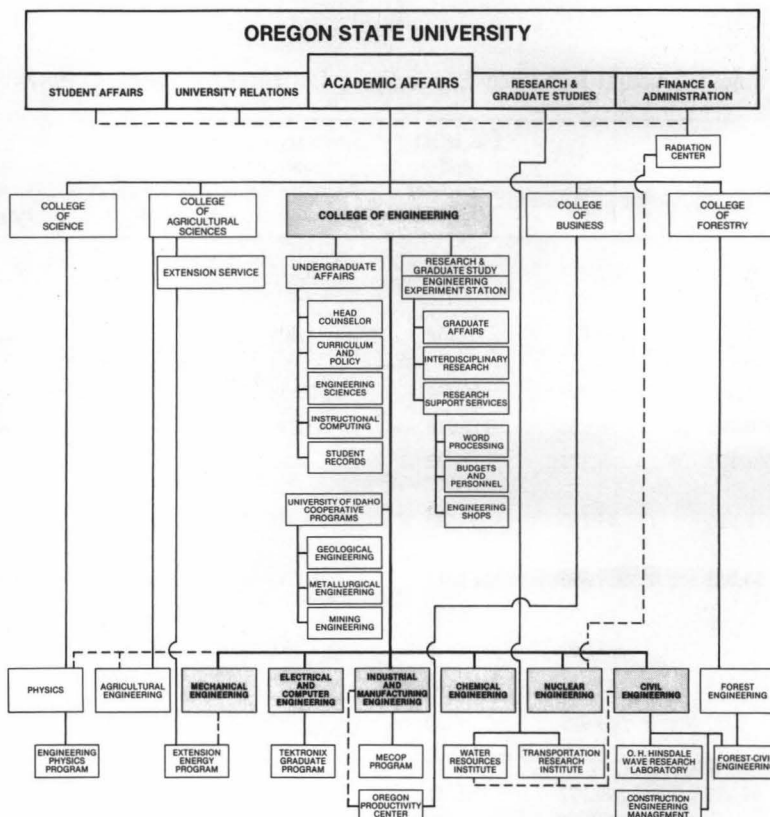


Figure 1. Engineering Research Administration.

Research Expenditures

Table 1 provides a breakdown of actual research expenditures by department, within the College of Engineering, and by Agricultural Engineering. Totals of separate expenditures by certain other units include

Forest Engineering \$922,286

Water Resources Research Institute \$116,049

Extension Energy \$1,034,148

Details for these expenditures are provided in the DEPARTMENTAL RESEARCH AND GRADUATE STUDY and RESEARCH CENTERS AND INSTITUTES sections of this report. Expenditures by the Transportation Research Institute and the Radiation Center are reported with the departmental data in Table 1. The total of engineering research and extension energy expenditures for the year was \$7,055,142.

Table 1. Actual Research Expenditure Distribution, Dollars, 1987-88.

Expenditure Category	Agricultural Eng.	Chemical Eng.	Civil Eng.	Electrical and Computer Eng.	Industrial and Manufacturing Eng.	Mechanical Eng.	Nuclear Eng.	Engineering Experiment Station	Total
Personnel	128,012	41,576	929,882	317,966	86,277	359,902	80,224	27,794	1,971,633
Payroll									
Assessments	25,172	1,208	190,294	46,269	15,206	63,000	8,239	4,363	353,751
Supplies & Services	21,402	13,302	248,069	36,234	2,638	37,436	47,242	14,903	421,226
Equipment	10,655	7,790	68,022	117,014	43,698	77,527	6,445	208,815	539,966
Computer	0	177	8,377	22	0	2,727	47	257	11,607
Graduate Tuition	6,458	8,516	47,155	30,623	9,962	15,555	13,036	1,266	132,571
OSU Indirect Costs	19,325	14,023	319,396	127,613	37,371	87,284	28,489	806	634,307
Consultants	0	5,452	16,127	18,206	0	5,416	0	400	45,601
Subcontractors	0	0	158,869	0	0	38,804	0	0	197,673
Travel	8,478	4,045	53,656	18,709	5,510	16,328	0	2,673	109,399
Miscellaneous	0	0	559,925	0	0	0	0	5,000	564,925
TOTAL	219,502	96,089	2,599,772	712,656	200,662	703,979	183,722	266,277	4,982,659

Research Funding Trends

Engineering research at Oregon State University is supported by grants and contracts obtained on a competitive basis from government agencies and business. No regularly budgeted State of Oregon funds are available for direct research support. Figure 2 summarizes research funding trends over the years since 1972 and shows that new grants and contracts this past year are up slightly over last year and considerably above funding levels over the last several years. The State of Oregon appropriation for instructional programs in the College for 1987-88 was \$8.0 million. The new research budget of \$7.4 million, therefore, represents a very significant contribution to the overall effort of the College of Engineering. The Federal Government is the leading source of research support.

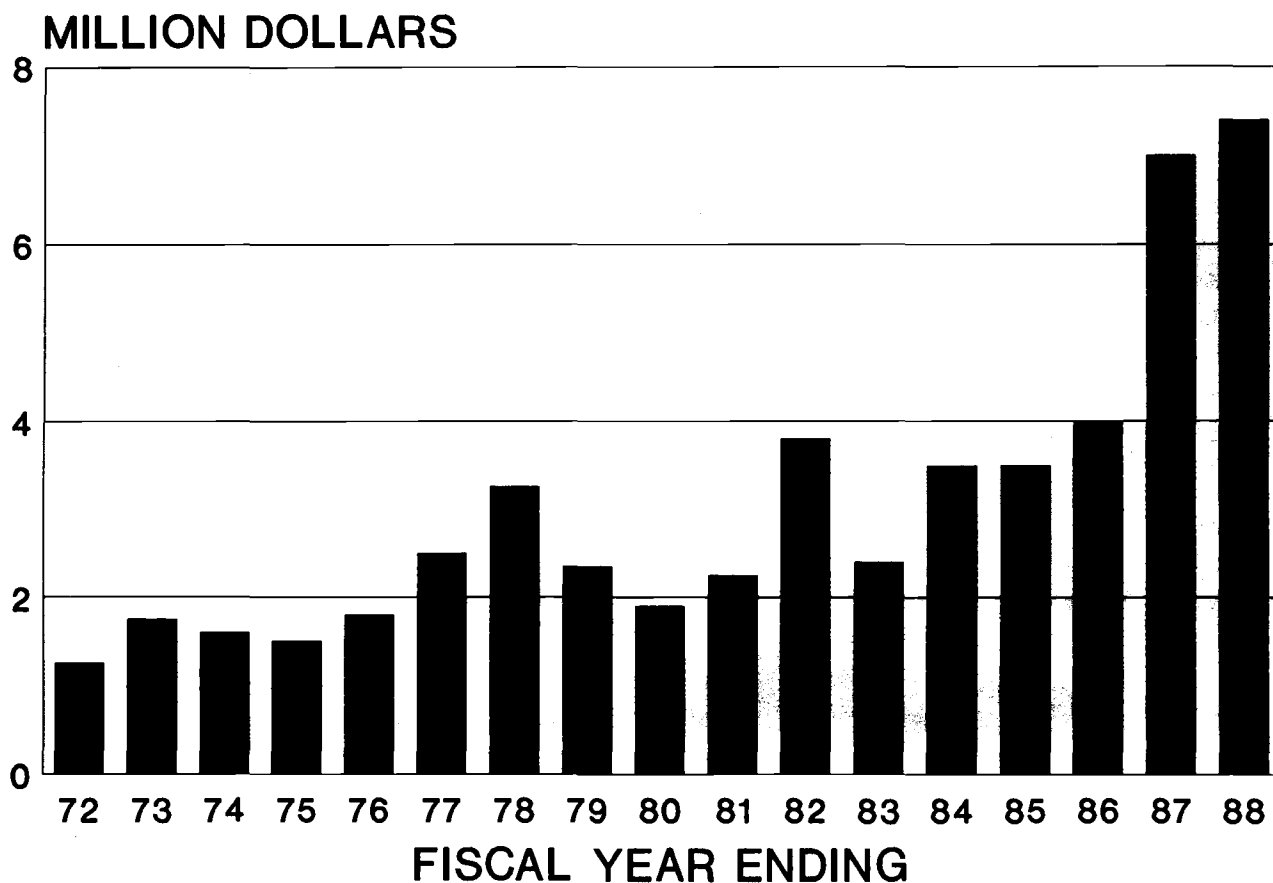


Figure 2. New Research Funding - OSU College of Engineering.

DEPARTMENTAL RESEARCH AND GRADUATE STUDY

Table 2 shows the number of professorial faculty and academic degree production in each department having ABET-accredited undergraduate engineering programs at Oregon State University. New research grant funding received in 1987-88 is also shown. Half of the faculty were at least partially supported by research grants during the year, 96 graduate students held research appointments, and another 137 held teaching assistantships or fellowships which supported their graduate study. Of the total 412 students enrolled in graduate programs, two-thirds received financial support for their work.

This section includes a departmental listing of new research grants and contracts, and statements of current research objectives and interests. We have included research data for Forest Engineering because of its close affiliation with our research programs.

Table 2. Faculty, Degrees Granted, and New Research Dollars, 1987-88.

Degree Program	Faculty	Degrees Granted, 1987-88			New Research \$
		Undergraduate	Master's	Doctorate	
Agricultural Engineering*	13	6	2	0	\$ 388,744
Chemical Engineering	8	28	5	2	237,622
Civil Engineering	29	115	34	7	3,588,516
Electrical & Computer Engineering	31	81	35	8	805,749
Industrial and Manufacturing Engineering	14	48	1	0	382,752
Mechanical Engineering	22	80	22	5	1,636,155
Nuclear Engineering	9	15	3	0	303,883
TOTAL	126	373	102	22	\$7,343,421

*Agricultural Engineering is a department of the College of Agriculture, and offers ABET accredited undergraduate engineering degrees.

Agricultural Engineering

Current Research

Irrigation--development of operational guidelines and procedures for optimal management and operation of sprinkler systems and utilization of irrigation water.

Harvesting Machinery--design and development of specialized harvesting equipment for uneven ripening seed crops requiring multiple periodic harvests.

Post Harvest Fruit and Vegetable Preservation and Storage--development of an energy analysis and storage environment computer model for designing containers and managing in-transit movement of fresh produce to Pacific Rim markets.

Post Harvest Conditioning of Seed Crops--development of new approaches and equipment for threshing, cleaning, grading, and storage of small seed crops.

Agricultural Waste Management--movement and control of bacteria emanating from animal waste is being studied in order to develop management techniques for livestock facilities and rangeland operations to prevent surface water contamination.

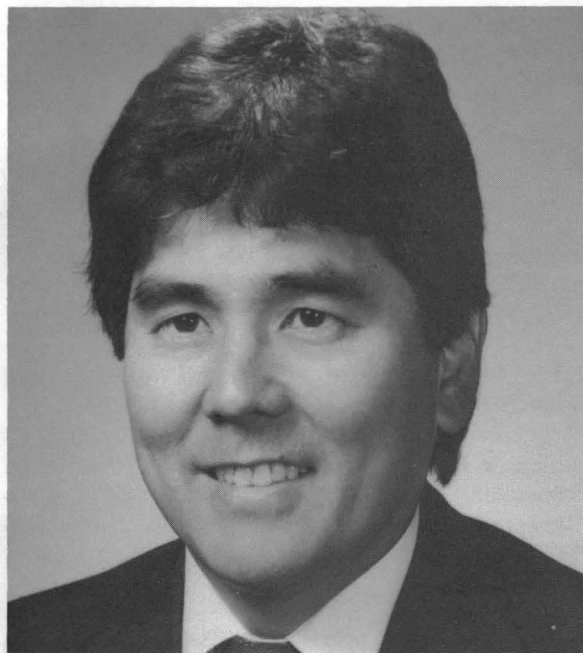
Energy Management and Alternative Energy Sources--farm structure modifications to reduce operating energy requirements and development of alternative energy sources from agricultural biomass and waste products.

Graduate Faculty

Brooks, Royal Harvard 1967 Prof International Agriculture. BS Utah State 1952; MCE Colorado State 1960, PhD 1965.

Cavaletto, Richard Alan 1985 Asst Prof, Extn Agricultural Engineer. BSAE Cal Poly 1981; MS California-Davis 1983, PhD 1986.

Cuenca, Richard H. 1978 Assoc Prof. BS California State Polytechnic 1971; MS California State-Sacramento 1975; PhD California-Davis 1978.



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Fish Engineering--designs developed to improve refrigeration of steel fishing vessels and to process and store restructured fish products.

Analyzing Groundwater Quality--numerical methods are being developed for analyzing and documenting pesticide concentrations in groundwater.

Davis, John Rowland 1971 Prof. BS Minnesota 1949, MS 1951; PhD Michigan State 1959.

English, Marshall Joseph 1978 Assoc Prof. BS San Jose State 1965; MS California 1974, PhD 1978.

Hansen, Herbert Eugene 1974 Assoc Prof. BS Iowa State 1952, MS 1970, PhD 1971.

Hansen, Hugh Justin 1974 Prof., Extn Agricultural Engineer. BS North Dakota State 1951; MS Cornell 1952.

Hashimoto, Andrew G. 1986 Prof and Head. BS Purdue Univ 1966, MS 1968; PhD Cornell Univ 1972.

Hellickson, Martin Leon 1975 Assoc Prof. BS North Dakota State 1968; MS South Dakota State 1972; PhD Minnesota 1975.

Istok, Jonathan David 1986 Asst Prof. BS Ohio State 1978; MS Oregon State 1981, PhD 1986.

Kolbe, Edward Robert 1974 Assoc Prof. BME Rensselaer Polytechnic Institute 1964; MSE Case Western Reserve 1966; PhD New Hampshire 1975.

Miner, John Ronald 1972 Prof. BS Kansas 1959; MSE Michigan 1960; PhD Kansas State 1967.

Moore, James A. 1979 Extn Agricultural Engineer, Prof. BS California Polytechnic 1962; MS Arizona 1964; PhD Minnesota 1975.

Tice, Ezra M. 1988 Asst Prof. BS Pennsylvania State Univ 1973, MS 1983; PhD Auburn Univ 1988.

Trimmer, Walter Lee 1983 Extn Irrigation Specialist, Asst Prof. BS Colorado State 1974, MS 1975, PhD 1984.

New Research Grants and Contracts: 1987-88

Principal Investigator	Project Title	Agency	Amount
Cavaletto, R.A.	Wear Characteristics of Agricultural Spray Nozzles	Ag Engrg Res Found	2,500
Cuenca, R.H.	Determination of Crop Water Requirements in the Ebro Valley (Supplement)	USDA	10,375
Cuenca, R.H.	Application of U.S.-French Data Bases to Evaluate Crop Water Requirement Estimating Methods and Effects of Climate	USDA-OICD	55,800
Hellickson, M.L.	Mass Transfer from Fresh Pears in Controlled Atmosphere Storage Conditions	Ag Engrg Res Found	5,000
Istok, J.D.	Geostatistical Analysis of Pesticide Contamination (WRRI-004)	USDI	11,189
Istok, J.D.	Geostatistical Analysis of Rock Matrix Hydrogeological Data from Yucca Mountain	USDI	245,977
Istok, J.D.	Groundwater Contamination by Pesticides and Nitrates in the Ontario Area	Ag Engrg Res Found	5,000
Perry, G.M. Adams, R.M. Istok, J.D.	Managing Groundwater Pollution from Agriculture Related Sources	USDI	47,903
Kolbe, E.	Fish Cooling Characteristics in Small Boat Refrigerated Seawater Tanks	Ag Engrg Res Found	5,000

Faculty Publications: 1987-88

Cavaletto, Richard A.

"Evaluation of Aerial Pesticide Application in the Pacific Northwest," (with Tom Karsky), ASAE-PNR 87-109, Lethbridge, Alberta, September 1987.

"Wear Characteristics of Flat Fan Nozzles," (with M.J. Novak), American Society of Agricultural Engineers, Paper No. 88-1015, 1988.

"Guarding Against Machine Hazards," American Society of Agricultural Engineers, Paper No. 88-1637, 1988.

"Evaluation of New and Old Spray Equipment," *Proceedings of the Oregon Horticultural Society*, 1988.

Agricultural Safety, Bi-monthly newsletter to all Oregon Extension Agents, 1988.

Cuenca, Richard H.

"Analysis of Evapotranspiration as a Regionalized Variable," (with K.Y. Amegge), in *Advances in Irrigation*, Vol. 4, Hillel (editor), Academic Press, Orlando, FL, pp. 181-220, 1987.

"Simple Method of Obtaining Su-Brooks Retention Parameters," (with R.J. Lenhard), American Society of Civil Engineers, *Journal of Irrigation and Drainage Engineering*, Vol. 114, No. 2, pp. 363-370, 1988.

"Comparison of Ground-Based Evapotranspiration Measurement Systems in the HAPEX-MOBILHY Regional Experiment," (with W.E. Nichols, O.A. Carrijo, and J. Noilhan), (abstract) Symposium on Large Scale Field Experiments, *EOS Transactions*, American Geophysical Union, Vol. 69, No. 16, p. 351, 1988.

Hansen, Hugh J.

Electric Energy in Agriculture Handbook, Chapter 1, Elsevier Science Publishers, 1988.

Hashimoto, Andrew G.

"Modeling Anaerobic Batch Fermentation of Glucose to Produce Methane," (with Y.R. Chen and T.H. Chen), ASAE Paper 87-6033, ASAE, St. Joseph, MI, 1987.

Hashimoto, Andrew G. (continued)

"Effect of Moculum/Substrate Ratio on Methane Yield and Production Rate from Straw," ASAE Paper 88-6038, ASAE, St. Joseph, MI, 1988.

"Thermophilic and Mesophilic Methane Production from Anaerobic Degradation of the Cyanobacterium *Spirulina Maxima*," *Resources, Conservation and Recycling*, 1(1):19-26, 1988.

Hellickson, Martin L.

"Simulated and Tested Performance of a Rockbed Heat Sink for Cooling Summer Ventilation Air," (with C.F. Chen), *Transactions of the ASAE*, 30:1(207-214), 1987.

"Challenges for Research Changes in the Structures and Environment Division of ASAE," Oregon State University Agric. Exp. Stn. Tech. Paper No. 8396. ASAE Tech. Paper No. 87-4557, December 1987.

"Postharvest Research in the Pacific Northwest," in *Postharvest Pomology Newsletter*, Vol. 6, No. 1 (E. Kupferman and H. Waelti, ed.), 16 pp., March 1988.

"Computer Simulation of Transient Refrigeration Load in a Cold Storage for Apples and Pears," (with N. Adre), ASAE Tech. Paper No. 88-6010, June 1988.

"Bioenvironmental Engineering - Responding to Advanced Environmental Control Needs," (with L.L. Christianson and L.D. Albright), 1988 ASAE Annual Conference Proceedings, June 1988.

Istok, Jonathan D.

"Groundwater Vulnerability to Contamination: A Literature Review," (with A.H. Rea), *Proceedings*, American Society of Civil Engineers, Irrigation and Drainage Division Special Conference, Portland, OR, August 1987.

"Subsurface Drainage Effects on Sheet and Rill Erosion in Northwest Oregon," (with G.E. Formanek and E. Ross), *Proceedings*, American Society of Civil Engineers, Irrigation and Drainage Division Special Conference, Portland, OR, August 1987.

Istok, Jonathan D. (continued)

"Geostatistics Applied to Groundwater Contamination. I: Methodology," (with R.M. Cooper), American Society of Civil Engineers, *Journal of Environmental Engineering*, Vol. 114, No. 2, pp. 270-286, 1988.

"Geostatistics Applied to Groundwater Contamination. II: Application," (with R.M. Cooper), American Society of Civil Engineers, *Journal of Environmental Engineering*, Vol. 114, No. 2, pp. 287-299, 1988.

"Global Estimations of Groundwater Contaminants," *Journal of Environmental Engineering*, Vol. 114, No. 4, pp. 915-928, 1988.

Kolbe, Edward R.

"Measurement and Prediction of Freezing Times of Vacuum Canned Pacific Shrimp," (with D.Q. Wang), *International Journal of Refrigeration*, 10(1):18-21, 1987.

"Submersible Structures for Shellfish Culture," (with G.W. Robertson, M.J. Cashin, and J. Merritt), *Agricultural Engineering Journal*, 6:111-126, 1987.

"Onboard Refrigeration Options," a five part series, *Alaska Fisherman's Journal*.

1. "Icing," 11(6):50-51, June 1988.
2. "Refrigerated Seawater," 11(7):54-56, July 1988.
3. "Chilled Seawater," 11(8):50-51, August 1988.
4. "Partial Freezing," 11(9):44-45, September 1988.
5. "Freezing and Frozen Storage," 11(10):56-58, October 1988.

McGuire, Joseph

"Initial Interfacial Events which Occur During Fouling of Heat Exchangers by Milk," (with K.R. Swartzel), Paper No. 108, IFT Annual Meeting, Las Vegas, NV, 1987.

"The Role of Solid Surface Tension in Macromolecular Adsorption from Milk," (with K.R. Swartzel), Paper No. 26d, AIChE Summer National Meeting, Minneapolis, MN, 1987.

"On the Use of Water in the Measurement of Solid Surface Tension," (with K.R. Swartzel), *Surface and Interface Analysis*, 10:430-433, 1987.

McGuire, Joseph (continued)

"A Predictive Model for Food Particle Interactions with Contact Surfaces," Paper No. 80, IFT Annual Meeting, New Orleans, LA, 1988.

"Surface Characterization of Materials Targeted for Food Contact," (with S.A. Kirtley), AIChE Summer National Meeting, Denver, CO, 1988.

Miner, J. Ronald

Come Sit with Me Again, The Pilgrim Press, New York, 1987.

"Evaluating Coliform Concentrations in Runoff from Various Animal Waste Management Systems," (with J.A. Moore, J. Smyth, and S. Baker), Special Report 817, Agricultural Experiment Station, Oregon State University, Corvallis, OR, 80 pp, January 1988.

"Water Quality Impacts of Alternate Rangeland Management Systems," (with J.A. Moore and J.C. Buckhouse), Final Report to CSRS, USDA, 85-CSRS2-2718, 212 pp., 1988.

Moore, James A.

"Designing Dairy Free Stalls," (with M. J. Gamroth), PNW Extension Publication 31, September 1987.

"Evaluating Coliform Concentrations in Runoff from Various Animal Waste Management Systems," (with J. Smyth, S. Baker, and J.R. Miner), Special Report 817, Agricultural Experiment Station, Oregon State University, Corvallis, OR, 1988.

"Modeling Surface Transport of Microorganisms," *Proceedings*, EPA Biotechnology Risk Assessment Workshop, Breckenridge, CO, January 11-15, 1988.

"New Ideas for Designing an Anaerobic Digester," *Proceedings*, Third International Conference on Environment and Housing of Livestock, Pig Research Institute, Taiwan, April 21-22, 1988.

"Efficiency of Various Solid Separators," *Proceedings*, Third International Conference on Environmental and Housing for Livestock, Pig Research Institute, Taiwan, April 21-22, 1988.

Moore, James A. (continued)

"Water Quality Impacts of Alternate Rangeland Management Systems," (with J.C. Buckhouse and J.R. Miner), Final Report to CSRS, USDA, 85-CSRS2-2718, 212 pp., 1988.

Tice, Ezra M.

"Load Distributions on the Soil-Coulter Interface," (with R.L. Schafer and C.E. Johnson), ASAE Paper No. 87-1578, 1987.

"Soil Displacement by Rolling Coulters," (with R.L. Schafer and C.E. Johnson), Poster presentation at 11th Conference of International Soil Tillage Research Organization, Edinburgh, Scotland, 1988.

Trimmer, Walter L.

"Sprinkler Evaporation Loss Equation," *J. of Irrigation and Drainage Division*, American Society of Civil Engineering, (113:4) 616-620, 1987.

"Conserving Water in Agriculture: Stretching Irrigation Water Supplies," Pacific Northwest Regional Extension Publication PNW 323, 1987.

"1986 Offset/Swingline Demonstration Project Report," (with H.J. Hansen), Oregon State University Agricultural Engineering Department Report submitted to USDOE Bonneville Power Administration in completion of Agreement No. DE-PR79-86BP31218, 29 pp., March 1987.

Trimmer, Walter L. (continued)

"A Moving Sprinkler Test Cart," Paper No. PNR-87-205, American Society of Agricultural Engineers, PNW Meeting, Lethbridge, Alberta, Canada, 10 pp, September 23-25, 1987.

"Calibration of Irrigation Flow Meters," Oregon State University Agricultural Engineering Department Report submitted to USDOE Bonneville Power Administration in completion of Order No. AI79-86BP71980, 43 pp., September 1987.

"Irrigation Efficiency of Center Pivot Sprinklers," Paper No. 87-2594, American Society of Agricultural Engineers Winter Meeting, Chicago, IL, December 17, 1987.

"Ultrasonic Flow Meters Testing," (with A. Taylor), ASCE Irrigation and Drainage Division, Specialty Conference, Lincoln, NE, pp. 643-650, July 1988.

"Partial Irrigation and its Application in Pakistan," Washington State University Report to University of Idaho Irrigation Systems Management Research Project, 56 pp., September 1988.

"Understanding Irrigation Water Rights in Oregon," Oregon State University Extension Publication EC 1274, October 1988.

Chemical Engineering

The Department of Chemical Engineering research programs reflect not only the traditional chemical engineering fields but also new technologies important to Northwest industries. Significant contributions have been made in chemical reactor engineering, heat transfer, mass transfer, fluidization, and thermodynamics. With the addition of new faculty members, research activities have expanded into areas of computer-aided design and control of chemical processes, biomass conversion, toxic waste treatment, and evaluation of pulp and paper processes.

Current Research

Heat Transfer--Scaling characteristics in cooling tower waters; fouling of heat transfer surfaces during evaporation of spent pulping liquor scale deposition under boiling conditions; transient heat transfer treatment to preserve wooden poles.

Chemical Reactor Engineering--Production of furfural from hemicellulose hydrolyzate and production of ethylene glycol from cellulose.

Process Control--Distributed control of chemical processes; design and robustness of multivariable controllers; control of staged fluidized beds; adaptive control of polymer reactors.

Computer-Aided Design--Modeling and design of complex separation processes; integrated fuel/chemical plant for complete utilization of biomass.

Thermodynamics--Solubility in supercritical fluids; temperature dependence of ionic activity coefficients in aqueous solutions; modeling chemical equilibrium in aqueous ionic solutions, thermodynamics of polyelectrolyte solutions.



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Mass Transfer--Absorption with simultaneous chemical reaction; use of ozone in wastewater treatment; neutralization of acidic gases (H_2S and H_2Se).

Coal Cleanup--Microbial desulfurization and demineralization of high-sulfur coals; kinetics of pyrite solubilization; bioaccumulation of metals from aqueous solutions.

Gas Conversion--Conversion of synthesis gas to methanol and methyl formate via the BNL liquid-catalyzed process.

Toxic Wastes--The use of activated carbon in the absorption of toxic metals from wastewater; routine treatment of unreacted toxic gases used in the production of photovoltaic cells; bioleaching of toxic metals from geothermal sludge.

Graduate Faculty

Frederick, William James Jr. 1983 Assoc Prof. BS Maine 1967, MS 1969, PhD 1973.

Levenspiel, Octave 1968 Prof. BS California-Berkeley 1947; MS Oregon State 1949, PhD 1952.

Levien, Keith Lester 1985 Asst Prof. BS Iowa State 1970; BS Wisconsin 1975; PhD Wisconsin 1985.

Mrazek, Robert Vernon 1960 Interim Department Head and Prof. BS Purdue 1957; PhD Rensselaer Polytechnic Institute 1960.

Sproull, Robert D. 1986 Asst Prof. BS Purdue 1973, MS 1974, PhD 1986.

New Research Grants and Contracts: 1987-88

Principal Investigator	Project Title	Agency	Amount
Frederick, W.J.	Non-Process Element Behavior in Chemical Pulp Mills	Pulp-Paper Industries	46,000
Frederick, W.J.	Control of Pirssonite Scaling in Green Liquor Processing	Weyerhaeuser	7,500
Frederick, W.J.	Preparation of Paper Industry Handbook	Am. Paper. Inst.	19,500
Knudsen, J.G.	Heat Transfer - Fouling	HTRI	4,183
Levenspiel, O.	A Critical Experiment in Fluidized Bed Heat Transfer	NSF	54,311
Levenspiel, O.	The Development of a Magnetic Filter for Fine Slurry Solids	NSF	74,128
Levien, K.L.	3M Untenured Faculty Grant	3M	15,000
Sproull, R.D.	Union Oil Company Untenured Faculty Grant	Union Oil	7,000
Wicks, C.E./ Mrazek, R.V.	Shell Graduate Grant in the Department of Chemical Engineering for 1987-88 Academic Year	Shell	10,000

Faculty Publications: 1987-88

Beaudry, Edward G.

"Trickle-Bed Reactors: Liquid Diffusional Effects in a Gas-Limited Reaction," (with M.P. Duda-ković, and P.L. Mills), *AIChE Journal*, Vol. 33, No. 9, pp. 1435-1447, September 1987.

Frederick, William J.

"Black Liquor Properties," TAPPI Kraft Recovery Operations Seminar, Orlando, FL, January 12-16, 1987; also January 10-15, 1988.

Frederick, William J. (continued)

"The Effect of Multivalent Metal Ions on the Solubility of Aluminosilicates in Alkaline Pulping Liquors," (with R.C. Streisel), AIChE Summer National Meeting, Minneapolis, MN, August 16-19, 1987.

"Functional Group Analysis of Kraft Black Liquor Organics by ¹³C-NMR," (with K.P. Wilson and M.L. Laver), IChE Summer National Meeting, Minneapolis, MN, August 16-19, 1987.

Frederick, William J. (continued)

"The Use of CREN as a Relaxation Agent for C-13 NMR Analyses of Kraft Black Liquor Organics," (with K.P. Wilson and M.L. Laver), *Oregon Acad. Sci. Ann. Mtg.*, February 6, 1988.

"Modeling Electrolyte Behavior in Pulp and Paper Processes," (with B. Kelly, H.C. Kim, M.J. McIntyre, and J.P. Danko), *AIChE For. Prod. Symp. Ser.*, Vol. 2 (1988).

"The Solubility of Aluminosilicates in Alkaline Pulp Lignin Liquors," (with R.C. Streisel and H.A. Gasteiger), *AIChE For. Prod. Div. Symp. Ser.*, Vol. 2 (1988).

"Solute Rejection in the Ultrafiltration of Polydisperse Organics from Natural Products," (with K.P. Wilson, M.L. Laver, and S.A. Sinquefeld), *Chem. Eng. Comm.* (1988).

"Evaluation of Pitzer Ion Interaction Parameters of Aqueous Electrolytes at 25 C. 1. Single Salt Parameters," (with H.T. Kim), *J. Chem. and Eng. Data*, Vol. 33, No. 2, p. 177 (1988).

"Evaluation of Pitzer Ion Interaction Parameters of Aqueous Electrolytes at 25 C. 2. Ternary Mixing Parameters," (with H.T. Kim), *J. Chem. and Eng. Data*, Vol. 33, No. 3 (1988).

Levenspiel, Octave

"Heat Transfer from Fluidized Beds to Immersed Fine Wires," (with R. Turton and M. Colakyan), *Powder Technology*, 53, 195 (1987).

Levien, Keith L.

"Internal Model Control of Coupled Distillation Columns," (with M. Morari), *AIChE Journal*, 27, 83 (1987).

"RTCP: A Software Package for Experiments in Process Control Research," (with C. Chapat and M. Morari), *Comput. Chem. Engng*, 11, 3, 227 (1987).

"Micro-Computing on a Microbudget?" 1987 ASEE Summer School for Chemical Engineering Faculty, Poster Session, Southeastern Massachusetts University.

Mrazek, Robert V.

"High-Temperature Relative Enthalpies and Related Thermodynamic Properties of Cuprous Iodide (CuI)," (with M.T. Ferrante and R.R. Brown), *U.S. Bureau of Mines Report of Investigation*, No. 9074, 1987.

Sproull, Robert D.

"Economic and Engineering Considerations," (Panel with P. Dugan, F. Kargi, B. Zakheim, D. Walia, J. Batchelor, and C. Siebenthal), EPRI "Biological Processing of Coal" Workshop, Monterey, CA, February 17-19, 1987.

"Metals Detoxification of Wastewater by Bioaccumulation," (with E.T. Premuzic, M.S. Lin, and L.E. Kukacka), Pacific NW Metals and Minerals Conf., Portland, OR, April 26-28, 1987.

"Enhancement of Coal Quality by Microbial Demineralization and Demetalization," (with A.J. Francis, C.R. Krishna, and C.J. Dodge), *Proceedings, Biological Treatment of Coals Workshop*, pp. 83-94 (1987).

Civil Engineering

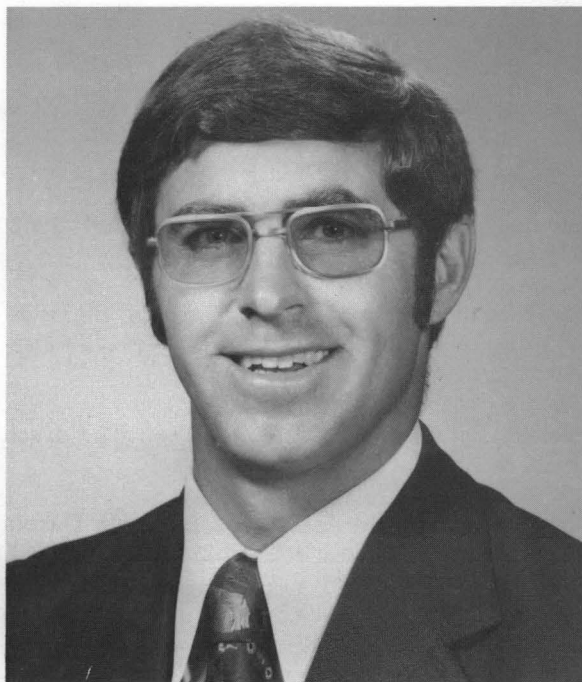
Current Research

The Civil Engineering Department faculty is significantly involved in a wide range of basic and applied research activities. A recently awarded \$8.6 million grant from the Office of Naval Research to the Oregon Engineering Program is being used to develop the most modern and comprehensive large-scale laboratory facilities in the United States. These facilities will be used to expand wave research investigations into coastal processes, wave dynamics, forces on marine structures, and many other marine-related areas of focus.

Water resources faculty are involved in sediment transport studies, as well as mathematical modeling of groundwater transport phenomena. The groundwater studies relate to the prediction of transport of radioactive substances that could enter the groundwater from nuclear waste containment facilities.

Environmental engineering faculty are active in the handling, disposal, and fate of hazardous substances in the environment. Other studies involve novel wastewater treatment methods, acid rain, and the susceptibility of water supply facilities to contamination by hazardous substances.

Transportation engineering faculty are studying the effect of high tire pressure on asphalt pavements, overlay design of highway pavements,



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and the application of weigh-in-motion data on highway engineering.

Structural engineering faculty are undertaking a study of tension structures, such as cables and membranes, exposed to the marine environment, a study on the use of wire mesh as reinforcing steel in concrete and a variety of studies dealing with dynamic loads on structures.

Graduate Faculty

Bell, Christopher A. 1981 Assoc Prof. BSc U of Nottingham 1972, PhD 1978.

Bell, J. Richard 1962 Prof. BSCE Purdue 1952; MSCE 1956, PhD 1963.

Bella, David Andrew 1967 Prof. BS Virginia Military Institute 1961; MS New York U 1964, PhD 1967.

Burgess, Frederick Joseph 1953 Dean of College of Engineering, Prof. BS Oregon State 1950; MS Harvard 1955.

Hicks, R. Gary 1975 Prof, Director of Transportation Research Institute. BS California-Berkeley 1963, MS 1965, PhD 1970.

Hudspeth, Robert Turner 1974 Prof. BS U.S. Naval Academy 1963; MSCE Washington 1966; PhD Florida 1974.

Klingeman, Peter Clayton 1966, Prof, Director of Water Resources Research Institute. BS Northwestern 1957, MS 1959; PhD California-Berkeley 1965.

Laursen, Harold Ivan 1963 Prof. BS Oregon State 1958, MS 1960; PhD California-Berkeley 1964.

Layton, Robert Davis 1972 Assoc Prof. BSCE Colorado State 1959; MSCE Kansas State 1965; PhD California-Berkeley 1970.

Leonard, John William 1979 Prof. BS Tufts 1962; MS Illinois 1963, PhD 1966.

McDougal, William G. 1981 Assoc Prof. BS Humboldt State 1976; MCE Delaware 1977; PhD Oregon State 1981.

Nelson, Peter Oliver 1975 Assoc Prof. BS Cornell 1968, MS 1972, PhD 1975.

Peterson, John 1964 Assoc Prof. BS South Dakota State 1951; MS Illinois 1959; PhD Wisconsin 1964.

Phelps, Robert Elton 1968 Assoc Prof. BS Alaska 1957; MS Stanford 1958.

Pritchett, Harold Duane 1957 Prof. BS Oregon State 1957, MS 1961; DE Stanford 1965.

Rogge, David F. 1982 Asst Prof. BS Nebraska 1970, MS 1971; PhD Texas 1981.

Schaumburg, Frank David 1967 Prof, Head of Department. BSCE Arizona State 1961; MSCE Purdue 1964, PhD 1966.

Schroeder, Warren Lee 1967 Prof, Assoc Dean of Engineering. BSCE Washington State 1962, MSCE 1963; PhD Colorado 1967.

Schultz, Robert James 1962 Prof. BSCE Worcester Polytechnic Institute 1955, MSCE 1960; Professional Engineer, Massachusetts 1959, Oregon 1963, Professional Land Surveyor Oregon 1974.

Sollitt, Charles Kevin 1972 Assoc Prof. BSCE Washington 1966, MSCE 1968; PhD MIT 1972.

Vinson, Ted Stephen 1976 Prof. BS California-Berkeley 1966, MS 1967, PhD 1970.

Williamson, Kenneth Jay 1973 Prof. BS Oregon State 1968, MS 1970; PhD Stanford 1973.

Woods, Sandra L. 1984 Asst Prof. BS Michigan State 1976; MS Washington 1980, PhD 1984.

New Research Grants and Contracts: 1987-88

Principal Investigator	Project Title	Agency	Amount
Bell, C.A.	Field Testing of Automatic Vehicle Identification Equipment (Supplement)	OSDT	12,398
Bell, C.A.	Field Testing of Automatic Vehicle Identification Equipment: Phase II - Evaluation of Specified System	OSDT	55,830
Bell, C.A.	Asphalt Mix Design and Applications to Pavement Design, Combining UK and US Experience (with S.F. Brown, Nottingham Univ.)	SERC	17,500
Hicks, R.G.	Effectiveness of Antistripping Additives in Asphalt Pavements	OSDT	31,997
Hicks, R.G.	Development of an Improved Overlay Design Method	Alaska	7,675
Hicks, R.G. Rogge, D.F.	Evaluation of Polymer Modified Asphalt in Hot Mix Pavements	ODOT	50,000
Hudspeth, R.T.	Rubble Mound Structures	NOAA Sea Grant	50,000

Hudspeth, R.T.	Wave Groupiness	State Dept.	38,000
Hudspeth, R.T. Leonard, J.W. McDougal, W.G. Sollitt, C.K.	Fundamental Dynamics of Ocean Structures and Nearshore Circulation (Supplement)	ONR	2,500,000
Klingeman, P.C.	Cooperative State Water Resources Research Institute Program Funds (FY 1988)	USDI-USGS	105,130
Layton, R.D.	Highway Engineering and Safety: Short Courses and Technical Assistance	OTSC	103,606
McDougal, W.G. Burcharth, H.F.	U.S.-Denmark Cooperative Research: Static Stresses in Concrete Armor Units Used for Breakwaters	NSF	5,700
Nelson, P.O. Baham, J.	Laboratory Study of In-Situ Reclamation Process for Metals-Contaminated Soils (WRRI-002)	USDI-GS	17,974
Schroeder, W.L.	Influence of Installation Depth on Holding Capacity of Rock Anchors in Southeast Alaska	USDA-FS	34,000
Schaumburg, F.D. Baumgartner, D.J.	IPA Assignment of Donald J. Baumgartner as an Associate Professor at the Hatfield Marine Science Center	EPA	69,976
Schaumburg, F.D. Hudspeth, R.T.	IPA for Robert T. Hudspeth	Navy	7,400
Schaumburg, F.D. Woods, S.L.	Presidential Young Investigator Award: Hazardous Waste Management and Control	NSF	62,500
Schultz, R.J.	"Road Manual" Update 1988	AOC (Assoc. of Oregon Counties)	18,045
Washburn, J.L.	The Cumulative Effects of Multiple Diving Equipment on a Diver's Safety	Dreyfus	5,000
Williamson, K.J.	Heterotrophic Oxidation, Nitrification, Denitrification and Anaerobic Fermentation Process for Wastewater Treatment	NSF	63,903
Williamson, K.J.	Use of Support Aerated-Biofilm Reactor for the Biodegradation of Toxic-Organic Compounds (Supplement)	EPA	150,000
Woods, S.L.	New Bedford Harbor Anaerobic Polychlorinated Biphenyl Biodegradation Study	NMF	64,382
Woods, S.L.	GE Presidential Young Investigator Award	GE	30,000
Woods, S.L.	GE Presidential Young Investigator Award	GE	30,000
Woods, S.L.	Matching Funds for Presidential Young Investigator Award	Nutter, McClennan & Fish	7,500
Yim, S.C.	Chaotic and Random Dynamic Response of Ocean Structures (PYI Award)	ONR-PYI	50,000

Faculty Publications: 1987-88

Bell, C.A.

"Selected Results from the First Three Years of the Oregon Automatic Vehicle Monitoring Demonstration Project," (with M. Krukar), *Transportation Research Record 1123*, Transportation Research Board, pp. 99-111, January 1987.

"Development of Laboratory Oxidative Aging Procedures for Asphalt Cements and Asphalt Mixtures," (with O-K. Kim, J.E. Wilson, and G. Boyle), *Transportation Research Record 115*, Transportation Research Board, pp. 101, April 1987.

"Experiences in Implementing the Corbett-Swarbrick Procedure for Separation of Asphalt into Four Generic Fractions (with G. Thenoux, J.E. Wilson, D. Eakin, and M. Schroeder), *Transportation Research Board*, January 1988, 20 pp.

"Evaluation of Asphalt Physical and Fractional Properties and Their Interrelationships," (with G. Thenoux and J.E. Wilson), *Transportation Research Board*, January 1988, 35 pp.

"Measurement and Analysis of Truck Tire Pressures in Oregon," (with O-K. Kim), *Transportation Research Board*, January 1988, 31 pp.

"Study on Mix Design Criteria for Controlling the Effect of Increased Tire Pressure on Asphalt Pavement," (with O-K. Kim, J.E. Wilson, and G. Boyle), *Transportation Research Board*, January 1988, 43 pp.

"Evaluation of Asphalt Properties and Their Relationship to Pavement Performance," Parts 1 and 2, (with G. Thenoux, J.E. Wilson, D. Eakin, M. Schroeder, J. Kliwer, and B. Kramer), FHWA-OR-RD-88-02, May 1988, 103 pp.

"Effect of Permit and Illegal Overloads on Pavements (with R.L. Terrell), Synthesis of Highway Practice 131, NCHRP, September 1987.

Procedures for Controlling the Effect of Increased Tire Pressure on Asphalt Concrete Pavement Damage," (with O-K. Kim and J.E. Wilson), FHWA-OR-RD-88-01, May 1987, 157 pp.

"Field Testing of Automatic Vehicle Identification Equipment. Final Report," (with L. Henion, G. Thenoux, and J.L. Washburn), for Oregon Dept. of Transportation, December 1987, 177 pp.

Bell, C.A. (continued)

"Evaluation of the Coordination of Weigh-in-Motion Data," Volumes 1, 2, and 3, (with Y. Abwahab, S. Davis, and G. Burgess), for Federal Highway Administration, January 1988, 24 pp.

Bella, David A.

"Ballistic Missile Defense and the Possibility of Catastrophic Mistakes," *Technology and Society*, IEEE, Vol. 6, No. 1, March, 1987, pp. 4-9.

"Engineering and the Erosion of Trust," *Journal of Professional Issues in Engineering*, ASCE, Vol. 113, No. 2, April 1987, pp. 117-129.

"Taking Context Seriously," (with J. King), *Liberal Education*, Vol. 73, No. 3, May/June 1987, pp. 7-13.

"Nuclear Deterrence: An Alternative Model," *Technology and Society*, IEEE, Vol. 6, No. 2, June 1987, pp. 18-23.

Discussion of "Sewage-Related Wastes and Oceans: A Problem," by Richard C. Kolf, *Journal of Professional Issues in Engineering*, ASCE, Vol. 113, No. 3, July 1987, pp. 296-297.

"Fault Tolerant Ballistic Missile Defense," Conference Proceedings, *Direction and Implications of Advanced Computing*, Seattle, WA, July 12, 1987.

"Organizations and the Systematic Distortion of Information," *Journal of Professional Issues in Engineering*, Vol. 113, No. 4, October 1987, pp. 360-370.

"Technocracy and Trust: Nuclear Waste Controversy," (with C.D. Mosher and S.N. Calvo), *Journal of Professional Issues in Engineering*, Vol. 114, No. 1, January 1988, pp. 27-39.

"Establishing Trust: Nuclear Waste Disposal," (with C.D. Mosher and S.N. Calvo), *Journal of Professional Issues in Engineering*, Vol. 114, No. 1, January 1988, pp. 40-50.

Hicks, R.G.

"Determination of Pavement Layer Structural Properties for Aggregate Surfaced Roads," (with T. Rwebangira and M. Truebe), *Transportation Research Record 1106*, Vol. I, Transportation Research Board, pp. 215-220, 1987.

Hicks, R.G. (continued)

"Alternate Surfacing for Forest Roads - An Overview," (with M. Takallou, R.D. Layton, and J. Lund), *Transportation Research Record 1106, Vol. II*, Transportation Research Board, pp. 6-9, 1987.

"Evaluation of Alternate Surfacing for Forest Roads," (with M. Takallou and R.D. Layton), *Transportation Research Record 1106, Vol. II*, Transportation Research Board, pp. 10-22, 1987.

"Development of Improved Design and Construction Procedures for Cold In-Place Recycled Pavements," (with T. Oguara and D. Allen), Volumes I and II, *FHWA/OR 87-06*, Federal Highway Administration, February 1987.

"Evaluation of Rubber-Modified Asphalt Pavement Performance - Mt. St. Helen's Project," (with J. Lundy and E. Richardson), *Proceedings, Association of Asphalt Paving Technologists*, February 1987, pp. 573-598.

"Evaluation of Properties of the OMNI Shimless Full-Depth Rubber Railroad Grade Crossing Surface - Phase II," (with W.L. Allen and A. Brickman), Volumes I, II, III, Final Report to Riedel International, March 1987.

"Emulsified Asphalts in Highway Applications, *Proceedings, International Seminar on Transportation Engineering for Developing Countries*, Singapore, April 1987, pp. 125-134.

"Evaluation of Oregon Department of Transportation's Cold In-Place Recycling Program," (with R. Nelson, D. Allen, and M. Hanson, *Proceedings, Asphalt Emulsion Manufacturers Association*, April 1987.

"Survey of Transportation Journals - Final Report," (with E.W. Hauser, E.K. Morlok, and J.L. Schafer), Council of University Transportation Centers, May 1987, 45 pps.

"Use of Rubber-Modified Asphalt Pavements in Cold Regions," (with H.B. Takallou and D.C. Esch), *Proceedings, Working on Paving for Cold Regions*, July 1987, pp. 544-574.

"Theme Lecture on Pavement Evaluation and Performance," (with C. Freeme), *Proceedings, Sixth International Conf. on Structural Design of Asphalt Pavements*, July 1987.

Hicks, R.G. (continued)

"Development of an Improved Overlay Design Procedure for the State of Alaska," (with M. Yapp and B. Conner), accepted for presentation at the 1988 Annual Meeting of Transportation Research Board, August 1987.

"Development of Improved Mix and Construction Guidelines for Rubber Modified Asphalt Pavements," (with H. Takallou), accepted for presentation at the 1988 Annual Meeting of Transportation Research Board, August 1987.

"Evaluation of Cold In-Place Recycling - 1986 Projects," (with T. Scholz and D. Allen), *TRR 87-29*, Oregon State University, August 1987.

"Notes on Backcalculation Procedures," (with N. Coetzee and B. Conner), for Alaska DOT&PF, *TRR 87-23*, Oregon State University, August 1987.

"Development of an Improved Overlay Design Procedure for the State of Alaska - Volumes I and II," (with M. Yapp and B. Conner), Final Reports to Alaska DOT&PF, *TRR Reports 87-15 and 16*, August 1987.

"Determination of Subgrade Soil Strength from Deflection Data," (with T. Rwebangira), *Proceedings, 9th African Regional Conference of ISSMFE*, Lagos, Nigeria, September 1987.

"Project Design Considerations for Cold In-Place Recycling," (with R. Terrel and E. Richardson), *Proceedings on Pavement Recycling with Asphalt Emulsions*, Asphalt Emulsion Manufacturers Association, November 1987.

"AASHTO Guide for Design of Pavement Structures," (with F. Finn, F. McCullough, and S. Seeds), report to American Association of State Highway & Transportation Officials, November 1987.

"Construction of Rubber-Modified Asphalt Pavements," (with J. McQuillen), *Journal of Construction Engineering and Management*, ASCE, December 1987, pp. 537-553.

"Development of an Improved Overlay Design Procedure for Oregon - Volumes I and II," (with H. Zhou, R. Noble, and C. Eichhorn), Final Reports to Oregon DOT, *TRR Reports 87-33 and 34*, December 1987.

Hicks, R. Gary (continued)

"State-of-the-Art on Rutting in Asphalt Concrete," prepared for Third International Road Federation Meeting, Riyadh, Saudi Arabia, January 1988.

"Performance Update of Open Graded Emulsified Asphalt Pavements in the Pacific Northwest," (with K. Valdez and D. Decker), prepared for 15th Annual Meeting of Asphalt Emulsion Manufacturers Association, February 1988.

Hudspeth, Robert T.

"Sea Wave Groups," Annual Report submitted to Secretariat: U.S.-Spain Joint Committee for Scientific and Technological Cooperation, February 1987.

"Fundamental Dynamics of Ocean Structures," Annual Report submitted to Office of Naval Research for OSU-University Research Initiative (OSU-URI), February 1987.

"Flow Equations in Terms of Piezometer Levels for Nonisothermal Fluid in Low-Permeability Porous Medium," (with A.H. Lu, B. Sagar, and R.B. Guenther), *Water Resources Research*, Vol. 23, No. 6, (Paper 6W4595), June 1987, pp. 1097-1102.

"Buoy/Mooring System Analysis," (with J.H. Nath and J.W. Leonard), Report submitted to Naval Civil Engineering Laboratory, Port Hueneme, CA, August 1987.

"Sea States Defined by Wave Height/Period Functions (with J. Medina), *Proceedings IAHR Seminar on Wave Analysis and Generation in Laboratory Basins*, XXII IAHR Congress, Lausanne, Switzerland, September 1987, pp. 249-259.

"Nonlinear Estimation of Return Flow in Wave Basins," (with W. Sulisz and T-I Kim), *Proceedings IAHR Seminar on Wave Analysis and Generation in Laboratory Basins*, XXII IAHR Congress, Lausanne, Switzerland, September 1987, pp. 423-434.

"Grupos de Olas y Diseño de Obras Maritimas," (with J. Medina), Ch. 5, *Proceedings of Curso de Ingenieria de Costas*, Universidad Politecnica de Valencia, SPUPV-87.3-01, Valencia, Spain, September 1987, pp. 5.1-5.14 (in Spanish).

Hudspeth, Robert T. (continued)

"Earthquake Response of Circular Cylindrical Structures in Water," (with Y. Tanaka), *Earthquake Engineering and Structural Dynamics*, Vol. 16, January 1988, pp. 99-119.

"Wave Phase Effects on Force Coefficients," (with J.H. Nath and P. Khare), *ASCE, Journal of Waterway, Port, Coastal and Ocean Engineering Division*, Vol. 114, No. 1, (ASCE Proc. Paper 22095), January 1988, pp. 34-49.

"Mass Transport in Wave Flumes," (with W. Sulisz), Abstract presented *Proceedings Third International Workshop on Water Waves and Floating Bodies*, Swope Center, Woods Hole, MA, April 10-13, 1988.

Layton, Robert D.

"Safety of Flashing Signal Operation," *Missouri Traffic Conference*, Columbia, MO, April 1987.

"Van Pooling for Oregon State University," (with M. Takallou), *ITE District 6 Annual Conference*, July 1987.

"Technical Assistance for Local Highway Safety Improvements in Oregon," (with K.C. Humphrey and H. Takallou), *ITE District 6 Annual Conference*, July 1987.

"Evaluation of Alternate Surfacing for Forest Roads," (with M.B. Takallou and R.G. Hicks), *4th International Conference on Low Volume Roads*, Transportation Research Board, August 1987.

"Alternate Surfacing for Forest Roads - An Overview," (with M.B. Takallou, R.G. Hicks, and J.W. Lund), *4th International Conference on Low Volume Roads*, Transportation Research Board, August 1987.

"Making Better Tree-Bucking Decisions: A Network Solution," (with J. Sessions and Li Guangda), *The Compiler*, Vol. 6, Issue 1, January/February 1988.

Leonard, John W.

"A Time-Dependent Radiation Condition for Transient Wave-Structure Interaction," (with J.F. Lee), *Ocean Engng*, Vol. 14, No. 6, pp. 469-488, 1987.

Leonard, John W. (continued)

"Time Domain Simulation of FEM Fluid Structure Interactions," (with J.F. Lee), *Computer-Aided Simulation of Fluid-Structure Interaction Problems*, TCCP/ASCE, Atlantic City, NJ, April 1987.

"Nonlinear Dynamics of Cable-Reinforced Membranes," (with A. Lo), *Building Structures Procs.*, Structural Congress '87, Orlando, FL, August 1987.

"Response of Guyed Offshore Towers to Stochastic Loads: Time Domain vs. Frequency Domain," (with S. Brynjolfsson), *Engineering Structures*, Vol. 10, No. 2, 1988.

McDougal, William G.

"Concrete Armor Mats: Large-Scale Wave Tank Tests," (with F. Atkinson), *Proceedings of Coastal Zone 87*, Seattle, WA, 1987.

"Laboratory and Field Investigations of the Impact of Shoreline Stabilization Structures on Adjacent Beaches," (with M.A. Sturtevant and P.D. Komar), *Proceedings of Coastal Sediments 87*, New Orleans, 1987.

"Dynamic Response of Concrete Armor Units," (with J.W. Tedesco, J.A. Melby, and P.B. McGill), *Proceedings of the 6th ADINA Conference*, Cambridge, MA, 1987.

"Wave-Induced Forces on Buried Pipelines," (with S.H. Davidson, P.L. Monkmeyer, and C.K. Sollitt), *Journal of Waterway, Port, Coastal, and Ocean Engineering*, 114:2, March 1988, pp. 220-236.

"Wave Force on Concrete Armor Units," (with J.A. Melby and J.W. Tedesco), *Journal of Waterway, Port, Coastal, and Ocean Engineering*, September 1988 (in press).

Mutti, Ruger

"Void Detection and Rigid Pavement Undersealing - A Comprehensive Approach," (with Joseph J. Sudol, and Bradley W. Love), *Transportation Research Record No. 1109*, 1987.

Schroeder, W.L.

"Application of Geotechnical Data to Resource Planning in Southeast Alaska," (with D.N. Swanson), U.S. Forest Service General Technical Report PNW-198, January 1987.

Schroeder, W.L. (continued)

"Slope Effects on Probe Densification of Sands," (with P. Leycure), *Soil Improvement, A Ten-Year Update*, American Society of Civil Engineers, GSP No. 12, April 1987.

Discussion of "Sheetpile Interlock Tension in Cellular Cofferdams," by Mark P. Rossow, *Journal of the Geotechnical Engineering Division*, American Society of Civil Engineers, Vol. 113, No. 5, May 1987.

"Wharf Bulkhead Behavior at Fulton Terminal 6," *Journal of the Geotechnical Engineering Division*, American Society of Civil Engineers, Vol. 113, No. 6, June 1987.

"Caissons and Cofferdams," Chapter 40 in *Ground Engineers Reference Book*, Butterworths, London, 1987.

"Underwater Construction of an Impervious Dam Core," (with R. Phelps and A. Tigoulet), *Proceedings, 24th Annual Symposium on Engineering Geology and Soils Engineering*, Coeur d'Alene, ID, March 1988.

"Bulkhead Failure Investigation and Redesign," (with R.D. Rieke and J.C. Crowser), *Journal of the Geotechnical Engineering Division*, American Society of Civil Engineers, Vol. 114, No. 10, October 1988.

Schultz, Robert J.

"Leveling," Chapter 6 in *The Surveying Handbook*, Van Nostrand Reinhold Company, Inc., 1987.

Vinson, Ted S.

"Nature of Fines Produced in Aggregate Processing," (with R.M. Pinter and E.G. Johnson), *J. of Cold Regions Engineering*, ASCE, 1, 1, March 1987.

"The Use of the Index of Retained Resilient Modulus (IRM_r) and Dimethyl Sulfoxide (DMSO) Accelerated Weathering Test to Determine the Potential for Moisture-Induced Distress in Asphalt Concrete Mixtures," (with J. Heinicke), Report No. 87-15, Transportation Research Institute, Oregon State University, June 1987.

Vinson, Ted S. (continued)

"Statement of Research Needs to Address Airport Pavement Distress in Cold Regions," (with R.L. Berg and H. Tomita), *Proceedings, Third Paving in Cold Areas Workshop*, Ottawa, Ontario, July 1987.

"The Dimethyl Sulfoxide (DMSO) Accelerated Weathering Test for Aggregates," (with T. Szymoniak, J.E. Wilson, and N. Walker), *Geotechnical Testing Journal*, ASTM, Vol. 10, No. 4, December 1987.

Vinson, Ted S. (continued)

"Quantity of Fines Produced During Crushing, Handling, and Placement of Roadway Aggregates," (with R.M. Pintner and E.G. Johnson), *Geotechnical Testing Journal*, ASTM, Vol. 10, No. 4, December 1987.

"Effect of Test Condition Parameters on IRM_r ," (with J. Heinicke), *J. of Transportation Engineering*, ASCE, 114:2, March 1988.

Electrical and Computer Engineering

Current Research

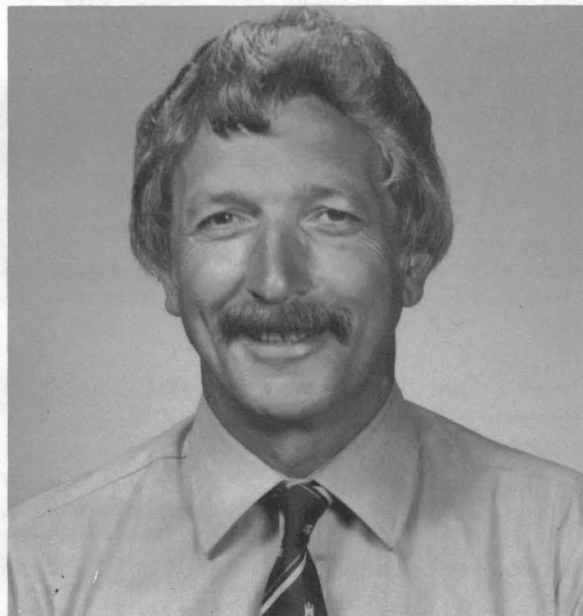
Research in the department is concentrated in the four areas of energy systems, computer engineering, systems and controls, and solid state electronic materials and devices.

Energy Systems--New solid state power electronic converters are used to develop variable speed generators and drives. With support from the Bonneville Power Administration the department has focused its research into demonstrating the effectiveness of modern electrical machines in increasing efficiency and reducing energy losses when incorporated into electric systems.

Computer Engineering--Faculty are engaged in research in digital signal processing, microprocessor applications, VLSI design, computer architecture, and in switching and coding. Very close liaison is maintained between the faculty and the computer industry within the state of Oregon.

Systems and Control--For some years the department has enjoyed an international reputation for its work carried out in systems and control. This work is supported by extensive background studies in bilinear systems theory and engineering applications, and has recently concentrated on filtering and tracking research, on suboptimal control of stochastic dynamic systems, on immune system response in collaboration with the Oregon Health Sciences Center, and in lymphatic dynamics.

Solid State Electronics--The custom-designed solid-state laboratories, which will become available when our new building is occupied during the 1987-88 academic year, will enable the electronic materials and device research



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to expand its experimental efforts. Several faculty in this group enjoy international reputations for research in devices based on silicon, III-V and II-VI materials. State-of-the-art research in molecular beam epitaxy, superlattices, quantum-well devices, microdefects in silicon, InP MISFET's, a.c. electroluminescence, fast optical detectors, traveling wave structures, defect thermodynamics, semiconductor interfaces, and GaAs MESFET's is conducted, with excellent cooperative efforts involving industry and other universities. The department plans expansion of this effort into femto-second optical spectroscopy and optoelectronics.

Graduate Faculty

Alexander, Gerald Corwin 1955 Assoc Prof. BS Oregon State 1951; ScM MIT 1959; PhD California-Berkeley 1973.

Allstot, David J. 1986 Assoc Prof. BSES, University of Portland; MSEE Oregon State 1974; PhD California-Berkeley 1979.

Amort, Donald Louis 1959 Assoc Prof. BS Oregon State 1954, MS 1960.

Arthur, John Read 1983 Prof. BS Iowa State 1954, PhD 1961.

Engelbrecht, Rudolf S. 1977 Assoc Prof. BSEE Georgia Institute of Technology, 1951, MSEE 1953; PhD Oregon State 1979.

Forbes, Leonard 1983 Prof. BS Alberta at Edmonton 1962; MS Illinois 1963, PhD 1970.

Goodnick, Stephen Marshall 1986 Asst Prof. BS Trinity 1973; MS Colorado State 1977, PhD 1983.

Herzog, James Herman 1967 Assoc Prof. BS Northwestern 1962; MS Michigan 1963, PhD 1967.

Jensen, Leland Christian 1955 Assoc Prof. BS Oregon State 1954; MS Illinois 1963.

Kiaci, Sajfe 1987 Asst Prof. BS Washington State 1982, MS 1984, PhD 1987.

Kolodziej, Wojciech J. 1980 Asst Prof. MS Technical U of Warsaw 1974; PhD Oregon State 1980.

Lauw, Hian 1978 Assoc Prof. BSEE Delft U (Holland) 1966, MSEE 1968, PhD 1977.

Lenders, Patrick M. 1986 Asst Prof. ENG Univ Libre (Bruxelles) 1972; Ph.D. Colorado State 1985.

Looney, James Chester 1957 Assoc Prof. BS Oregon State 1954, MS 1960, EE 1963.

Mohler, Ronald Rutt 1972 Prof. BS Penn State 1956; MS Southern California 1958; PhD Michigan 1965.

Murray, John M. 1987 Assoc Prof. BS Southern Florida 1970, MS 1970; PhD Clemson 1974.

Owen, Sydney John Thomas 1975 Prof. and Head BSc Nottingham (England) 1957, PhD 1961.

Plant, Thomas Kent 1978 Assoc Prof. BS Kansas State 1968; MS Iowa State 1969; PhD Illinois 1975.

Rathja, Roy C. 1977 Assoc Prof. BS California-Davis 1969; MS Oregon State 1973, PhD 1980.

Saugen, John Louis 1964 Assoc Prof. BSEE Washington 1955, MSEE 1958, PhD 1964.

Stone, Solon Allen 1956 Assoc Dean of Engineering, Prof. BS Oregon State 1952.

Tripathi, Vijai Kumar 1974 Prof. BSc Agra U 1958; MSc Tech Allahabad U 1961; MSEE Michigan 1964, PhD 1968.

Van Vechten, James A. 1985 Prof. AB California-Berkeley 1965; MA Chicago 1967, PhD 1969.

Wager, John Fisher III 1984 Asst Prof. BS Oregon State 1977; MS Colorado State 1978, PhD 1981.

Wallace, Alan Keith 1984 Assoc Prof. BEng Sheffield (England) 1963, PhD 1966.

Weber, Leonard Joseph 1954 Prof. BS Oregon State 1952; MS Washington 1962.

New Research Grants and Contracts: 1987-88

Principal Investigator	Project Title	Agency	Amount
Forbes, L.	Preliminary Work on Radiation Hard III-V Mesfet Devices	ONR	5,000
Goodnick, S.M.	High Energy Electron Injection into Semiconductor Supperlattices	ONR	90,000
Herzog, J.H.	Gift of Software	Intel	44,706
Jensen, L.C.	Design and Fabricate Fault Locator	USDE/BPA	14,213
Lauw, H.K.	Variable-Speed Generation Research	USDE	420,286
Mohler, R.R.	Nonlinear Statistical Analysis and Signal Processing	ONR	30,000
Mohler, R.R.	Analysis of Convenient Structurally Decomposed Models in Immunology	NSF	38,200
Mohler, R.R.	Analysis of Convenient Structurally Decomposed Models in Immunology	NSF	50,000

Murray, J.M.	Silicon Compile the Sandia Decoder Circuit and the "Watchdog" Circuit	Sandia/USDE	4,645
Owen, S.J.T.	Automated Corrosion-Current Measuring System	USDE/BPA	24,667
Owen S.J.	To Silicon Compile a Decoder Circuit and the "Watchdog" Circuit	USDE/Sandia	4,645
Plant, T.K.	Donation of 80-28-7 Math Co-Processor Chips	Intel	1,874
Tripathi, V.K.	Application of Moment Method Techniques to Propagation Structures and Circuit Elements in Microwave and Millimeter Wave Circuits	EEsof	36,823
Wallace, A.K.	A Study of the Performance of Adjustable Speed Drives with Emphasis on a Practical Application (Supplement)	USDE-BPA	40,690

Faculty Publications: 1987-88

Allstot, David J.

"Improved Operational Amplifier Compensation Techniques for High-Frequency Switched-Capacitor Circuits," (with H.C. Yang and J.R. Ireland), in *Digest of the Midwest Symposium on Circuits and Systems*, August 1987, pp. 952-955.

"A High-Swing CMOS Operational Amplifier Topology," (with J.J. Yang), in *Digest of the Symposium on Circuits and Systems*, August 1987, pp. 212-215.

"High-Speed Quarter Micron Buried-Channel MES-FETs with Improved Output Characteristics for Analog Applications," (with P.C. Canfield, et al.), in *Proceedings of the 1987 Cornell Conference on High-Speed Semiconductors*, August 1987, pp. 247-254.

"Buried-Channel GaAs MESFETs with Improved Small-Signal Characteristics," (with P.C. Canfield, et. al.), in *Digest of the Gallium IC Symposium*, Portland, OR, October 1987, pp. 163-166.

"An Equivalent-Circuit Model for Two-Stage Operational Amplifiers," (with H.C. Yang), in *Digest of the IEEE International Symposium on Circuits and Systems*, Helsinki, Finland, June 1988.

"A Class-AB CMOS Operational Amplifier," (with C. Yu and J.J. Yang), in *Digest of the IEEE International Symposium on Circuits and Systems*,

Allstot, David J. (continued)

"GaAs Buried-Channel MESFET Analog Integrated Circuits," (with H.C. Yang and P.C. Canfield), in *Digest of the IEEE International Symposium on Circuits and Systems*, Helsinki, Finland, June 1988.

Arthur, J.R.

"The Effect of Lattice Mismatch on the Dynamical Microstructure of III-V Compound Surfaces," *J. Vac. Sc. Tech.*, A5(4), 2007, 1987.

Forbes, Leonard

"A Desktop Computer Based Calculation of High Frequency MOS C-V Curves," (with B. Rastegar), *IEEE Transactions on Electron Devices*, Vol. ED-34, No. 2, pp. 427-432, 1987.

"Buried Channel GaAs MESFETs with Frequency Independent Output Conductance," (with P. Canfield), *IEEE Electron Device Lett.*, Vol. EDL-8, No. 3, pp. 88-89, 1987.

Goodnick, Stephen M.

"Non-Equilibrium LO Phonon Effects in GaAs/AlGaAs Quantum Wells," (with P. Lugli), *Phys. Rev. Lett.* 59, 716, 1987.

"Two Dimensional Electron Transport in InP Surface Layers," (with G.R. Baily, R.E. Owens, and C.W. Wilmsen), *J. Vac. Sci. Tech.* B5, 976, 1987.

Goodnick, Stephen M. (continued)

"Subpicosecond Dynamics of Electron Injection into GaAs/AlGaAs Quantum Wells," (with P. Lugli), *Appl. Phys. Lett.* 51, 584, 1987.

"Structure of the Si/Oxide Interface," *EMIS Data-review of Si/SiO₂ Interface Structures*, Institute of Electrical Engineers, 1987.

"Electron-Electron Scattering During Photoexcitation in Quantum Wells," (with P. Lugli), *Solid State Electronics* 31, 463, 1988.

"The Effect of Electron-Electron Scattering on Non-equilibrium Transport in Quantum Well Systems," (with P. Lugli), *Phys. Rev. B* 37, 2578, 1988.

Herzog, James H.

"A Design Methodology for Distributed Microprocessors in Real-Time Control Applications," *Proceedings of the Second International Conference on Computers and Applications*, Beijing, Peoples' Republic of China, June 1987.

Kolodziej, Wociecz J.

"On Superfast Filter Design and Synthesis," (with A. Pacut), Paper FA-8.9, *Proceedings of the 26th IEEE Conference on Decision and Control*, Los Angeles, 1987.

"Signal Processing of Structurally Decomposing Systems," (with R.R. Mohler), *Proceedings of ISSPA-87*, Brisbane, Australia, 1987, pp. 327-332.

"Conditionally Linear and Non-Gaussian Processes," in *NonGaussian Signal Processing*, Wegmen and Schwartz, Eds., North Holland, 1987.

"On Conditionally Linear Filtering, Control and Cooling," in *Lecture Notes in Control and Information Sciences*, Germoni, Ed., Springer Verlag, 1987.

"Structurally Decomposing Processes," *Proceedings of the First International Conference on Advances in Communication and Control System*, Washington, DC, June 1987.

Lenders, Patrick M.

"Distributed Micropogramming," *Twentieth Annual Workshop on Microprogramming*, December 1987.

Lenders, Patrick (continued)

"A Generalized Message-Passing Mechanism for Communicating Sequential Processes," *IEEE Transactions on Computers*, June 1988.

Mohler, Ronald R.

"On Conditionally Linear Filtering, Control, and Coding," in *Stochastic Modelling and Filtering*, (A. Germani, ed.), Springer-Verlag, New York, 1987.

"Conditionally Linear and Non-Gaussian Processes," in *Non-Gaussian Signal Processing*, (E. Wegman, S. Schwartz, eds.), North Holland, Amsterdam, New York, 1987.

"Bilinear Systems and Control," in *Encyclopedia of Physical Science & Technology*, Academic Press, New York, 1987.

"A Controllability Study for a Team Linear Quadratic Game," *IEEE Trans. Aerosp. & Elect. Sys.*, AES23, 1987.

"Foundations of Immune Control and Cancer," in *Advances in Communication and Control Systems*, O.S.I. Publications, Distributed by Springer-Verlag, New York, 1987.

"On Identification of Non-Gaussian Time Series," *Proc. IEEE Conf. Acous. Sp. & Sig. Proc.*, Dallas, 1987.

Murray, John M.

"Systems Architecture and Silicon Compilation: An Educational Experience," *Seventh Annual University/Government Microelectronics Symposium*, Rochester, NY, June 1987.

Owen, John

"InP MISFET Technology," (with J.F. Wager and S.J. Prasad), *J. Electrochemical Society*, Vol. 131, 1-160, 1987.

"Efficiency Improvements in ZnS:Mn ACTFEL Devices Driven by a Stepped Pulse Train," (with R.C. McArthur and C.C. Zhu), *Society for Information Display Conference*, New Orleans, LA, May 1987.

Pacut, Andrzej

"How to Use the Mann-Whitney Test to Detect a Change in Distribution for Groups," *Acta Neurobiol. Exp.*, 47, pp. 19-26, 1987.

Pacut, Andrzej (continued)

"On Fast Filter Design and Synthesis," (with W. Kolodziej and R.R. Mohler), *Proc. 26th CDC*, Los Angeles, CA, 1987.

Tripathi, Vijai K.

"Analysis and Modeling of Multilevel Parallel and Crossing Interconnection Lines," (with R. Bucolo), *IEEE Trans. Electron Devices*, pp. 630-638, March 1987.

Van Vechten, James A.

"Vacancies, Dislocations and Carbon Interstitials in Si," *Phys. Rev. B* 35, 864 (1987).

"Kink Site Saturation Mechanism for Whisker Growth Under Sputtering Conditions," (with W. Solberg, P.E. Batson, J.J. Cuomo, and S.M. Rossnagil), *J. Crystal Growth* 82, 289 (1987).

"Atomic Model for EL2 in GaAs," (with J.F. Wager), *Phys. Rev. B* 35, 2330 (1987).

"Simple Theory of Defects in Ternary and Multinary Semiconductors or What is Wrong with Binaries and Can We Fix It by Going to Ternaries," Ternary and Multinary Compounds, (*Proc. 7th International Conference*, Snowmass, CO, USA, 1986) edited by S.K. Deb and A. Zunger (MRS, Pittsburgh, 1987).

"A Model for the Growth of Carbon Filaments by Ion Bombardment of Carbon Surfaces," (with W.A. Solberg, I.L. Spain, and N.E. Pederson), 1987.

"Self-Diffusivity of Si," *EMIS Data Review*, RN1.13, Institute of Physics, London (1987).

"Mobility Enhancement of Modulation-Doped Materials by Low-Temperature Optical Annealing of Spacer-Layer Defect Charge State," (with R.J. Higgins, K.P. Martin, D.A. Syphers, and S.C. Palmateer), *Phys. Rev. B* 36, 2707 (1987).

"Structure of Laser-Pulse-Plasma-Induced Carbon Clusters: Explanation of the Magic Numbers," (with D.A. Keszler), *Phys. Rev. B* 36, 4570 (1987).

"Atomic Model for the ELO Defect in GaAs," (with J.F. Wager), *J. Appl. Phys.*, 62, 4192 (1987).

Wager, John F.

"Surface Recombination Velocity and Bulk Lifetime in GaAs and InP," (with B. Rastegar), *Semicond. Sci. Technol.* 1, 207 (1986).

Wager, John F. (continued)

"InP MISFET Technology," (with S.J.T. Owen and S.J. Prasad), *J. Electrochem. Soc.* 134, 160 (1987).

"Atomic Model for EL2 in GaAs," (with J.A. Van Vechten), *Phys. Rev. B* 35, 2330 (1987).

"GaAs MESFET Interface Considerations," (with A.J. McCamant), *IEEE Trans. Electron Devices* ED-34, 1001 (1987).

"Phosphorous Vacancy Nearest-Neighbor Hopping Instabilities in InP Capacitors," (with M.T. Juang and J.A. Van Vechten) in *Dielectric Films on Compound Semiconductors* (1987).

"Diamond-Like Carbon Films Prepared by Plasma-Enhanced Chemical Vapor Deposition," (with S.B. Kim), in *Atomic and Molecular Processing of Electronic and Ceramic Materials*, Edited by I.A. Aksay, G.L. McVay, T.G. Stoebe, and J.F. Wager (MRS, Pittsburgh, 1987).

"Atomic Model for the ELO Defect in GaAs," (with J.A. Van Vechten), *J. Appl. Phys.* 62, 4192 (1987).

Wallace, Alan K.

"The Magnetic Elevator for Solids: A Tubular Linear Reluctance Motor" (with V. Ranawake), *IEEE Vehicular Technology Soc. Maglev and Linear Drives Conference '87*, Las Vegas, NV, May 1987.

"The Effects of Motor Parameters on the Performance of Brushless dc Drives," (with R. Spée), *IEEE Power Electronics Specialist Conference '87*, Blacksburg, VA, June 1987.

"Modeling of Brushless dc Drive Systems with Pulse-Width Modulated Excitation," (with R. Spée and J. Davis), *6th International Conference on Mathematical Modeling*, Washington University, St. Louis, MO, July 1987.

"Performance Evaluation of AC Adjustable Speed Drives," (with R. Spée), *IEEE Industrial Applications Annual Meeting*, Atlanta, GA, October 1987.

"The Simulation of Brushless DC Drive Failures," (with R. Spée), *IEEE Power Electronics Specialist Conference*, Japan, April 1988.

"Performance Characteristics of Brushless DC Drives," (with R. Spée), *Trans. IEEE IAS*, June 1988.

Industrial and Manufacturing Engineering

Current Research

The Department of Industrial Engineering is involved in Research in the design of new systems integrating robotics and computer-aided manufacturing and in the improvement of productivity in existing organizations. The development and installation of new systems involves the integration of many critical elements. Product design, equipment evaluation and selection, production scheduling, inventory management, information systems, process control, and the assurance of high quality are all concerns of the industrial engineer.

Recent research activities within the Department have involved the development of hardware for both robotic materials handling systems and automatic test equipment along with the design of decision support systems for operators and maintenance personnel. Currently, work is being performed in areas concerned with the automatic assembly of electronic components, interactive control systems for robots, and the design of operator-computer interfaces involving artificial intelligence. With the recent acquisition of additional computer-aided design equipment, the development of an integrated manufacturing



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laboratory is progressing. Future research will make use of this facility to investigate the optimum configuration and content of manufacturing cells designed to minimize production costs.

Graduate Faculty

Fichter, Eugene Frank 1977 Assoc Prof. BME Rensselaer Polytechnic Institute 1967; MS U of New Brunswick 1973; PhD Monash U 1977.

Funk, Kenneth H. II 1980 Asst Prof. BA Taylor U 1975; MS Ohio State 1977, PhD 1980.

McDowell, Edward David 1974 Assoc Prof. BS Ohio State 1965; MS Ohio U 1970; PhD Ohio State 1974.

Olsen, Eldon A. 1980 Assoc Prof. BS Utah 1966; MS Montana State 1969; PhD Oregon State 1979.

Randhawa, Sabah Uddin 1983 Asst Prof. BS U of Engineering and Technology (Pakistan) 1976; MS Oregon State 1980; PhD Arizona State 1983.

Safford, Robert Reese 1985 Assoc Prof. BIE Ohio State 1964, MSc 1965, PhD 1971.

West, Thomas Moore 1976 Assoc Prof, Head of Department. BS Tennessee-Knoxville 1963, MS 1965; PhD Oregon State 1976.

New Research Grants and Contracts: 1987-88

Principal Investigator	Project Title	Agency	Amount
Fichter, E.F.	Triangulation Robot System	Northrup	41,433
Fichter, E.F. Fichter, B.L.	Leg Mechanics of Arthropods	NSF	39,676
Fichter, E.F. Fichter, B.L.	Leg Mechanics of Anthropods	NSF	54,459
Funk, K.H.	Intelligent Air Attack System: Aircrew Interface Module Version 2 (Supplement)	CSC	18,676
Funk, K.H.	Intelligent Air Attack System: Pre-Mission Briefing and Information Integration Subsystems	CSC	44,713
Funk, K.H.	Intelligent Air Attack System: Task Support Subsystem	Naval Weapons Center	49,507
McDowell, E.D. Randhawa, S.U. Funk, K.H.	An Expert System Based Dental Furniture Shop Scheduling System	ADEC, Inc.	9,814
Randhawa, S.U.	A Simulation Model to Study the Impact of Receptionists on DMV Field Offices	ODMV	7,875
Safford, R.R.	Development and Recruitment of Graduate Interns for Research Exchange Program	Navy Supply Center	22,736
Safford, R.R. (Co-P.I.)	Human Factors in Public Transit System Safety	USDOT	93,863

Faculty Publications: 1987-88

Fichter, Eugene

"A Stewart Platform-Based Manipulator: General Theory and Practical Construction," *Kinematics of Robot Manipulators*, MIT Press, Cambridge, MA, 1987.

"Arthropods: 350 Million Years of Successful Walking Machine Design," (with B.L. Fichter), *Proceedings of the Seventh World Congress on the Theory of Machines and Mechanisms*, Sevilla, Spain, September 17-22, pp. 1877-1880, 1987.

"Building an Expert System for FMS Scheduling," (with J. Kim and K. Funk), presented at *1988 U.S.A.-Japan Symp. on Flexible Automation*, 18-20 July, Minneapolis, MN.

Fichter, Eugene (continued)

"Towards an Expert System for FMS Scheduling: A Knowledge Acquisition Environment," (with J. Kim and K. Funk), presented at *2nd Intern. Conf. on Expert Systems and the Leading Edge in Production Planning and Control*, 3-5 May, Charleston, SC.

"A Survey of Legs of Insects and Spiders from a Kinematic Perspective," (with B. Fichter), presented at *IEEE Intern. Conf. on Robotics and Automation*, 24-29 April, Philadelphia, pp. 984-986, 1988.

"Determining Kinematic Parameters of Arthropod Legs," (with S. Albright and B. Fichter), *Trends and Developments in Mechanisms, Machines, and Robots -- 1988*, ASME, DE - Vol. 15-3, pp. 247-251.

Fichter, Eugene F. (continued)

"Analyzing Dynamics of Arthropod Walking," (with V. Moyer and B. Fichter), *Proceedings, 10th International Conference IEEE Engineering in Medicine and Biology*, New Orleans, LA, November 4-7, 1988.

Funk, Kenneth H.

"A Knowledge-Based System for Tactical Situation Assessment," *Annals of Operations Research*, Vol. 12, 1988, pp. 285-296.

"Building on Expert System for FMS Scheduling," (with J. Kim, E.F. Fichter, and K.H. Funk), *Proceedings, USA-Japan Symposium on Flexible Automation*, 18-20 July 1988, Minneapolis, MN.

"Development of a Decision Support System for Submarine Approach Officers: A Progress Report," (with J.L. Kaiwi), NPRDC TN88-56, Navy Research and Development Center, San Diego, CA, September 1988.

McDowell, Edward D.

"Analysis of the Use of Limit Numbers in ANSI Z1.4 Using a Simulation Model," (with S. Randhawa and R. Grinde), *Int. J. Prod. Res.*, Vol. 25, No. 2, 1987.

"The Economic Design of Sampling Control Strategies for a Class of Industrial Process," *IEE Transactions*, Vol. 19, No. 3, September 1987.

"Optimal Inspection Policies in a Serial Production System Including Scrap Rework and Repair: An MILP Approach," (with B.J. Yum), *Int. J. Prod. Res.*, Vol. 25, No. 10, October 1987.

"ANSI/ASQC Z1.4 Performance Without Limit Numbers," (with S. Randhawa and R. Grinde), *Journal of Quality Technology*, Vol. 19, No. 4, October 1987.

"A Simulation Analysis for a Transtainer-Based Container Handling Facility," (with S. Randhawa and Y. Chen), *Computers and Industrial Engineering*, Vol. 14, No. 2, February 1988.

"Containerized Container-Ship Load Planning: A Methodology and Evaluation," (with S. Randhawa and G. Martin), *Computers and Industrial Engineering*, Vol. 14, No. 4, 1988.

McDowell, Edward D. (continued)

"Optimal Allocation of Inspection Effort in Multi-State Production Systems: A Survey of the State of the Art," (with B.J. Yum and A.B. Bishop), *Proceedings, IXth International Conference on Production Research*, Cincinnati, OH, August 1987.

Engineering Design in the IE Curricula," *Proceedings, 1988 American Society for Engineering Education Conference*, Portland, OR, June 1988.

Olsen, Eldon D.

"Economic Impact of Proposed Oregon Forest Practices Rules on Industrial Forest Lands in the Oregon Coast Range: A Case Study," (with D.S. Keough and D.K. LaCourse), *OSU FRL Bulletin No. 61*, 15 pp., 1987.

"Logging Incentives Systems," *OSU FRL Bulletin No. 62*, 19 pp., 1988.

"Determining Costs of Logging-Crew Labor and Equipment," (with Stephen Bushman), *OSU FRL Bulletin No. 63*, 22 pp., 1988.

"Economic Evaluation of Commercial Thinning Alternatives in a Western Hemlock-Sitka Spruce Forest," (with L.D. Kellogg), *Western Journal of Applied Forestry Technical Notes*, January 1988.

"Soil Compaction: An Economic Model," (with Rodney Stewart and Henry Froehlich), *Western Journal of Applied Forestry Technical Notes*, January 1988.

"Value Recovery from Trees Bucked on a Landing and at the Stump," (with G.E. Murphy), *Forest Products Journal*, 38(9):49-52, September 1988.

Randhawa, Sabah U.

"Analysis of the Use of Limit Numbers in ANSI Z1.4 Using a Simulation Model," (with R. Grinde and E. McDowell), *Int. J. Prod. Res.* 25, 2, 301-313, 1987.

"ANSI/ASQC Z1.4 Performance Without Limit Numbers," (with R. Grinde and E. McDowell), *Journal of Quality Technology*, 19, 4, 204-215, 1987.

"A Simulation Analysis for a Transtainer-Based Container Handling Facility," (with Y. Chung and E. McDowell), *Computers & Industrial Engineering*, 14, 2, 113-125, 1988.

Randhawa, Sabah U. (continued)

"Computerized Containership Load Planning: A Methodology and Evaluation," (with G. Martin and E. McDowell), *Computers and Industrial Engineering*, 429-440, 1988.

"A Simulation Model for Mechanized Log Harvesting Systems," (with E. Olsen and C. Wiese), *Simulation*, 1988.

"A Simulation Model to Study the Impact of Resource Change on Motor Vehicle Division Field Offices," (with N. Mills), *Proceedings, 10th Conference on Computers & Industrial Engineering*, March 1988.

"Site Selection to Minimize Fuel Handling and Transportation Costs," (with T. West and N. Mills), *Proceedings, Institute of Industrial Engineering International Conference*, May 1988.

"Multicriteria Evaluation of Manufacturing Systems," (with T. West), *Proceedings 3rd International Conference on CAD/CAM, Robotics and Factories of the Future*, August 1988.

"A Multi-Phase Approach to Siting Convention Facilities," (with N. Mills and T. West), presented at ORSA/TIMS Joint National Meeting, Denver, CO, October 23-26, 1988.

"A Decision Support System to Evaluate Potential Power Plant Locations," (with T. West and J. Kim), presented at ORSA/TIMS Joint National Meeting, Denver, CO, October 23-26, 1988.

Safford, Robert R.

"Program Provides Routine to Simplify Analyses in Engineering Economics," *Industrial Engineering*, Vol. 19, No. 11, November 1987.

"Development of an Industrial Engineering Software Library," American Society of Engineering Education, Northwest Regional Meeting, Spokane, WA, 1987.

West, Thomas M.

Engineering Economics, (with J.L. Riggs, W.F. Rentz, and A.L. Kahl), First Canadian Edition, Ryerson Limited, Toronto, 1987.

A Summary of the Tax Reform Act of 1986, McGraw-Hill Book Company, New York, NY, 1988.

"A Multicriteria Approach to Evaluating Sites for the Small Biomass-Fueled Electrical Generation Plants," (with R. Wright and N. Mills), *Proceedings, Institute of Industrial Engineers International Conference*, Washington, DC, 1987.

"Sensitivity Analysis in IMS Equipment Selection," American Society of Engineering Education National Conference, Reno, NV, 1987.

"Site Selection to Minimize Fuel Handling and Transportation Costs," (with S. Randhawa and N. Mills), *Proceedings, Institute of Industrial Engineers International Conference*, Orlando, FL, 1988.

"Multicriteria Evaluation of Manufacturing Systems," (with S. Randhawa), *Proceedings, Third International Conference on CAD/CAM, Robotics and Factories of the Future*, Detroit, MI, 1988.

"A Multi-Phase Approach to Siting Convention Facilities (with N. Mills and S. Randhawa), presented at ORSA/TIMS Joint National Meeting, Denver, CO, October 23-26, 1988.

"A Decision Support System to Evaluate Potential Power Plant Locations," (with S. Randhawa and J. Kim), presented at ORSA/TIMS Joint National Meeting, Denver, CO, October 23-26, 1988.

Mechanical Engineering

Current Research

The department has a strong on-going research program in the traditional areas: design, mechanics, materials, thermal engineering, and fluid mechanics. The specific applications motivating our research change over the years and the distribution of activity among the specific areas fluctuates, but the basic fundamental thrusts have remained relatively constant. At the start of this decade, the overwhelming research application area was energy. While energy research still plays a major role in the department, with significant projects in wind, biomass, and fluidized beds, there has been increased activity in other areas, particularly design, robotics, fundamental combustion, mechanics, and materials. We continue to constantly explore the many possibilities which come to our research attention. Three elements are common to all research problems we undertake. The problem must be scientifically exciting to an individual faculty member, technologically relevant to society, and pedagogically suited for a master's or doctoral thesis.

Current research thrusts are in:

Design - machine design, design methodology, computer-aided design (CAD), and expert systems.

Materials - advanced composite micromechanical and thermo physical properties, study of dimensional stability of solids, composite design for superconductors, effect of microstructure on properties in superconductors.

Mechanics - composites, micropolar and nonlocal elastic solids, laser/material interactions, dynamics of mechanical systems (specifically, mechanical



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manipulators, cable systems, and rotors), stability analysis, and digital control.

Thermal Engineering and Fluid Mechanics - heat transfer - convection studies including gas fluidized beds, electronic circuit board cooling, and liquid metals; **thermodynamics** - heat pump and power plant design, ice and frost formation, and second law analysis; **combustion** - solid, liquid, and gas fuel burning in fires and combustors, flame stabilization and quenching phenomena, experimental investigation of ionic and atomic species of combustion, and biomass combustion; **fluid mechanics** - aerodynamics of wind turbines, buoyant jets, and fluidization of particle beds.

Graduate Faculty

Baker, Warren S. 1980 Extn Energy Specialist, Asst Prof. BA Illinois 1964; PhD Edinburgh 1976.

Bushnell, Dwight J. 1976 Assoc Prof. BS Utah 1967, MS 1968; PhD Brigham Young 1974.

Calder, Clarence A. 1978 Assoc Prof. BSME Oregon State 1960; MS Brigham Young 1962; PhD California-Berkeley 1969.

Davis, Lorin R. 1969 Prof. BA Brigham Young 1958, BESME 1959; MSME Purdue 1961; PhD Illinois 1964.

Kanury, A. Murty 1985 Prof. BEng Andhra U Waltair (India) 1961; MS Minnesota 1963, PhD 1969.

Kennedy, Timothy C. 1976 Assoc Prof. BS SUNY at Buffalo 1968; MS Stanford 1969, PhD 1972.

Larson, Milton B. 1952 Prof. BS Oregon State 1950; MEngr Yale 1951; MS Oregon State 1955; PhD Stanford 1961.

Olas, Andrzej 1984 Asst Prof. MS Warsaw Technological U 1962; PhD Polish Academy of Sciences 1973.

Onwubiko, Chinyere 1986 Asst Prof. BS Mississippi State 1977; MS Southern Methodist 1978; PhD Mississippi State 1982.

Peterson, Richard B. 1985 Asst Prof. BS Nevada-Reno 1979; MS California-Berkeley 1982, PhD 1984.

Philbrick, David A. 1983 Assoc Prof. AB Brown U 1970; PhD California-Berkeley 1976.

Rawers, James C. 1982 Asst Prof. BS Ohio State 1965; MS U of Dayton 1967; MS Notre Dame 1969; BS Oregon State 1975, MS 1977, PhD 1979.

Reistad, Gordon M. 1970 Prof and Department Head. BS Montana State 1966; MS Wisconsin 1967, PhD 1970.

Smith, Charles E. 1961 Prof. BSME Oregon State 1955; MSME Rensselaer Polytechnic Institute 1958; PhD Stanford 1962.

Ullman, David G. 1984 Assoc Prof. BS Cincinnati 1968, MS 1970; PhD Ohio State 1978.

Walker, Stel N. 1984 Asst Prof. BS Oregon State 1970, PhD 1976.

Warnes, William H. 1986 Asst. Prof. BA Univ of Cal-San Diego 1979; MS Wisconsin-Madison 1981, 1983, PhD 1986.

Welty, James R. 1958 Prof. BSME Oregon State 1954, MSME 1959, PhD 1962.

Wheeler, George M. 1980 Extn Energy Specialist, Asst Prof. BS MIT 1967; MS California-Berkeley 1970, PhD 1972.

Wilson, Robert E. 1957 Prof. BS Oregon State 1955; MS Illinois 1956; PhD Oregon State 1963.

Wolff, Ernest G. 1987 Assoc. Prof. BSc Massachusetts Inst of Tech 1956; PhD Imperial College. (London) 1961

New Research Grants and Contracts: 1987-88

Principal Investigator	Project Title	Agency	Amount
Bushnell, D.J. Kanury, M.A.	Fuel Standards Development: Testing and Evaluating the Combustion Characteristics of Selected Biomass Fuels	USDE-BPA	88,639
Olas, A.	Computer Aided Tolerance Analysis Study of Spectra-Physics Experimental Scanner Optics Chassis	Spectra-Physics	13,000
Olas, A. Ullman, D.G.	Pressure Differential Testing and Analysis on 750F Spindle-Bearing Structure (Supplement)	Spectra-Physics	12,500
Peterson, R.B.	Gas Phase Energy Deposition by Electron Impact Processes	NSF	66,418
Peterson, R.B.	Gas Phase Energy Deposition by Electron Impact Processes (Supplement)	NSF	42,656
Philbrick, D.A.	Energy Efficient New Home Video Training Tapes (Supplement)	USDE-BPA	166,770
Philbrick, D.A.	Technical Assistance for Residential and Commercial Sectors (Supplement)	ODOE-BPA	506,000
		ODOE-USDE	185,869

Philbrick, D.A.	Residential Demonstration Program	ODOE	21,321
Rawers, J.C.	Evaluation of Zircaloy Research and Development Samples	Babcock & Wilcox	4,984
Reistad, G.M. Larson, M.B.	Study of Centrigual Casting Gating Design	Precision Castparts Corp.	20,396
Reistad, G.M. Saborio, S.A.	Grant-in-Aid for Salvador Aceves Saborio	ASHRAE	6,000
Ullman, D.G.	Conceptual Design Capture System	Hewlett-Packard	3,100
Ullman, D.G. Dietterich, T.G.	Development of Mechanical Design Process Understanding	Schlumberger	26,000
Ullman, D.G. Dietterich, T.G.	Understanding and Improving the Mechanical Design Process	NSF	109,998
Wade, J.E.	Extreme Winds at FAA Repeater Sites	FAA	1,500
Walker, S.N. Wade, J.E.	Regional Wind Energy Data Base Management and Wind Forecasting	USDE-BPA	78,923
Warnes, W.H.	Fracture Properties of Injection Molded Fe	Omark Industries	7,167
Welty, J.R.	Development of Diagnostic Tools for High Temperature Fluidized Beds	NSF	129,998
Wheeler, G.M. Bushnell, D.J.	Energy Analysis and Diagnostic Program	UCSC	91,075
Wheeler, G.M. Bushnell, D.J.	Proposed Energy Analysis and Diagnostic Center (Supplement)	UCSC	15,000
Wilson, R.E.	Aerodynamic Transient and Yaw Effects on HAWT Loads and Performance	SERI/USDE	38,841

Faculty Publications: 1987-88

Baker, Warren S.

"Using Inexpensive Spreadsheets in Energy Management Training Programs," Proceedings of the American Solar Energy Society 1987 Annual Conference, Portland, OR, pp. 203-205, July 1987.

"Daylighting Micro-Computer Software Comparison," Energy Note N204, July 1987.

"Daylighting Micro-Computer Tools," Energy Note N205, July 1987.

"Construction Material Pricing and Energy Conservation," 12th Passive Solar Conference Proceedings, pp. 330-332, July 1987.

Baker, Warren S. (continued)

"The Design, Construction and Testing of a Low-Cost Batch Solar Water Heating Collector," (with Tom Wykes), 12th Passive Solar Conference Proceedings, pp. 480-484, July 1987.

"An Event Recorder to Determine Lighting Fixture "ON" Time During Unoccupied Periods," (with Andrew Golay and Art Neeley), *Proceedings*, Third National Conference on Microcomputer Applications in Energy, November 1988.

Baker, Warren S. (continued)

"Using Microcomputers to Improve the Energy Code Revision Process," *Proceedings*, Third National Conference on Microcomputer Applications in Energy, November 1988.

"Using Microcomputer Spreadsheets to Improve Lighting Energy Audits and Auditor Training," *Proceedings*, Third National Conference on Microcomputer Applications in Energy, November 1988.

Bushnell, Dwight J.

"Analysis of Wood Combustion Based on the First and Second Laws of Thermodynamics," (with A. Dadkhah-Nikoo), *ASME Journal of Energy Resources Technology*, Vol. 109, pp. 129-141, September 1987.

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"Inherent Oxidation Protection of Fe-5Cr-15Ni-2Si-4.5Mo," *Oxidation of Metals*, Vol. 28, No. 3/4, p. 183, 1987.

"Fracture Properties of Laser-Glazed Zircalloy," (with J. Sizemore), *Journal of Engineering Fracture Mechanics*, Vol. 27, No. 2, pp. 205-214, 1987.

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"Geothermal Energy," Chapter 45, *ASHRAE Handbook 1987, HVAC Systems and Applications*.

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"Use of Ceramic Heat Exchangers in Wood-Fueled Power Plants," (with J. Ranasinghe), Proceedings of the 1987 ASME-JSME Thermal Engineering Joint Conference, March 1987.

"Evaluation of Storage Volumes for Geothermal District Heating Systems," (with T. Lawrence), *ASHRAE Transactions 1987*, Vol. 93, Pt. 2.

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"Mechanical Design Methodology: Implications on Future Developments of Computer-Aided Design and Knowledge-Based Systems," *Engineering with Computers*, Vol. 2, 1987, pp. 21-29.

"Preliminary Results on an Experimental Study of the Mechanical Design," (with L. Stauffer and T.G. Dietterich), *Proceedings, NSF Workshop on Design Theory and Methodology*, February 1987, Oakland, CA, pp. 1-24.

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"Protocol Analysis of Mechanical Engineering Design," *Proceedings, 1987 International Conference on Engineering Design, WDK 13*, Boston, MA, August 1987, pp. 68-73.

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"A Comparison of the Results of Empirical Studies into the Mechanical Design Process," (with L. Stauffer), *Design Studies*, Vol. 9, No. 2, Butterworths Ltd., April 1988.

"A Model of the Mechanical Design Process Based on Empirical Data: A Summary," (with T.G. Dietterich and L. Stauffer), *AIEng88 Conference*, Palo Alto, August 1988.

"Data Representations for Mechanical Design Based on Empirical Data," International Computers in Engineering Conference, San Francisco, August 1988.

Wade, John E.

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"Local Windflow Studies at the Whisky Run Wind Generation Facility," (with S.N. Walker and J. Lambert), presented at the 1987 ASME-JSME Solar Energy Conference, Honolulu, HI, 1987.

"Estimating Extreme Winds at Wind Energy Conversion Facilities," (with R.J. Wittrup and N.G. Butler), presented at the Annual American Wind Energy Conference, San Francisco, CA, 1987.

"Biological Wind Prospecting in Third World Countries," (with S.N. Walker), presented at the 9th Annual American Wind Energy Conference, Honolulu, HI, September 1988.

Walker, Stel N.

"Precipitation Effects on Anemometer and Wind Turbine Performance," (with J.E. Wade), *Proceedings, Sixth ASME Wind Energy Symposium*, Dallas, TX, February 1987.

"Research Studies Being Conducted at the Whisky Run Wind Farm," (with J.E. Wade), *Proceedings, Sixth ASME Wind Energy Symposium*, Dallas, TX, February 1987.

Walker, Stel N. (continued)

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"Effect of Precipitation on Wind Turbine Performance," (with J.E. Wade), Final Report, Solar Energy Research Institute, Contract DE-FCOZ-86CH10289, PWE Report 87-731-D, November 1987.

"An Analysis of the Wind Power Potential at a 200-Turbine Wind Park in the Altamont Pass," (with J.E. Wade), Final Report, R. Lynette & Assoc., Inc., PWE Report 12287, November 27, 1987.

"Retrospective Analysis of the Wind Power Potential at a 400 Turbine Wind Park on Section 33 in the Tehachapi Mountains," (with J.E. Wade), Final Report, R. Lynette & Assoc., Inc., PWE Report 11187, November 27, 1987.

"Local Flow Measurements for Micrositing," (with J.E. Wade), Final Report, Solar Energy Research Institute, Contract DE-FC02-86CH10251, PWE Report 87-823, January 1988.

Warnes, William H.

"Determination of the Average Critical Current from Measurements of the Extended Resistive Transition," (with D.C. Larbalestier), *IEEE Trans. Mag.*, 23, (1987).

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"Current Transfer Effects and Their Influence on the Experimental Critical Current Density of Multifilamentary and Monofilamentary Composites," (with L. Cooley and D.C. Larbalestier), *Advances in Cryogenic Engineering: Materials*, Vol. 34, Plenum Press, NY, 1009 (1988).

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Wolff, Ernest G.

"Prediction of the Microyield Strength of Polymer Matrix Composites," (with S.T. Crane), *J. Composites Technology & Research*, Vol. 10, No. 4, November 1988.

"Radiation Effects on Low Expansion Coefficient Glasses and Ceramics," (with E.J. Friebele, Paige Higby, et al.), *J. American Ceramic Society*, November 1988.

"Low Expansion Materials," Part 6, Chapter 3, pp. 6-16 to 6-21 in *Handbook of Applied Thermal Design*, (Eric C. Guyer, editor-in-chief), McGraw-Hill Book Co., New York, 1988.

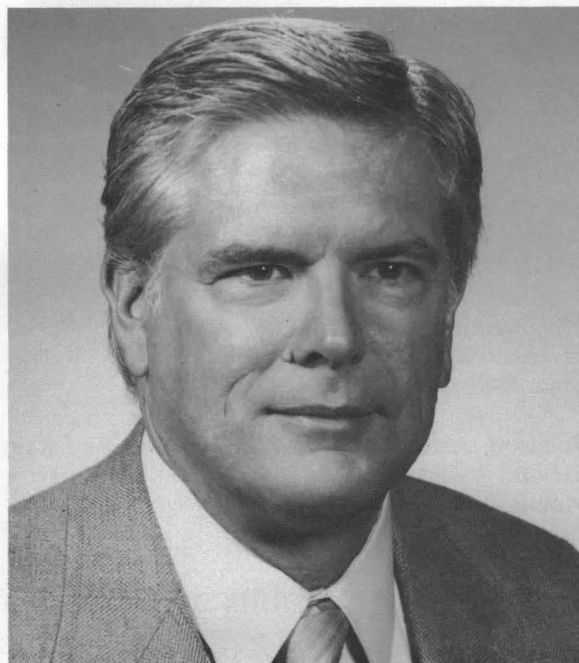
Nuclear Engineering

Current Research

Current areas of research interest in Nuclear Engineering are oriented toward the nuclear power industry and space reactors. Topics include reactor thermal hydraulics, transient behavior, safety problems, waste management, nuclear fuel management, environmental monitoring, transportation of radioactive materials, and reactor materials. Some specific projects are: (1) the development of expert systems for in-core fuel management and the classification of nuclear reactor accidents, (2) best estimate thermal hydraulic analyses of nuclear reactor components and system transients, (3) scaled models of nuclear reactor system components for flow visualization, (4) the study of zirconium corrosion in light water reactors, and (5) space reactor neutronics design.

The Department of Nuclear Engineering is equipped with state-of-the-art nuclear instrumentation and computing facilities. Micro- and mini-computers include an Apollo 3000, IBM ATs, and two microcomputer laboratories. The department's Apollo and IBM ATs also provide access through the network to larger computers, such as off-site Crays. In addition, the department has a remote job entry terminal linked with major computer facilities throughout the nation.

The department is housed in the Radiation Center. This center is an instructional and research facility especially designed to accommodate programs involving the use of radiation and radioactive materials. This unique facility was designed and established to accommodate internal and off-campus instructional and research programs involving nuclear engineering, nuclear science, radiation protection, and other related areas. Major nuclear and radiation devices are housed in the center including: a 1-MW thermal TRIGA Mark II research reactor; a 300-curie cobalt-60 irradiator; a 300-kVp X-ray generator; gamma ray spectrometers and associated Ge(Li) detectors; a 14-MeV generator; neutron diffraction equipment; a neutron radiography facility capable of taking still or very high speed radiographs (20,000 frames per second), and a variety of instruments for radiation measurement and monitoring. The center is equipped to package radioactive materials for transportation to both national and international destinations.



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Graduate Faculty

Binney, Stephen Ellis 1973 Assoc Prof. BS Oregon State 1964; MS California-Berkeley 1966, PhD 1970.

Dodd, Brian 1978 Assoc Prof., Reactor Administrator, Radiation Center. BS U of London 1969, PhD 1973.

Higginbotham, Jack F. 1987 Asst. Prof., Senior Health Physicist, Radiation Center. BS Kansas State 1981, MS 1983, PhD 1987.

Johnson, Arthur Guy 1966 Prof., Prof. Radiation Health; Director, Radiation Center, and Reactor Administrator. BS Missouri 1956, MS 1958.

Klein, Andrew C. 1985 Asst Prof. BS Penn State 1977; MS Wisconsin 1979, PhD 1983.

Reyes, Josè N., Jr. 1987 Asst. Prof. BS U of Florida 1978, MS 1984; PhD U of Maryland 1986.

Ringle, John Clayton 1966 Assoc Dean Graduate School, Prof. BS Case Institute of Technology 1957, MS 1959; PhD California-Berkeley 1964.

Robinson, Alan Hadley 1966 Prof, Head of Department. BS Swarthmore 1956; MS Stanford 1961, PhD 1965.

New Research Grants and Contracts: 1987-88

Principal Investigator	Project Title	Agency	Amount
Binney, S.E.	Design of Actinide Burning Reactors	Norcus	1,800
Binney, S.E.	Hanford Nuclear Waste Repository - Analysis, Monitoring, and Design	ODOE	7,500
Binney, S.E.	Clean Use of Reactor Energy (CURE)	Westinghouse	9,500
Dodd, B.	Regional Radiological Technical Assistant Summer School	ODOE	16,000
Dodd, B.	University Reactor Use Sharing Program	USDOE	35,000
Dodd, B.	Spent Fuel Cask Concerns	ODOE	15,245
Higginbotham, J.F.	Investigations of the Response of Personnel Dosimeters to Various Radiation Exposures	Sechan	34,432
Klein, A.C.	Space Reactor Neutronics Design Study	Rasor	8,342
Klein, A.C.	Innovative Fusion Reactor Design Analysis	USDOE	10,000
Klein, A.C.	University/DOE Laboratory Cooperation	NORCUS	4,500
Klein, A.C.	University/DOE Laboratory Cooperation	NORCUS	2,000
Klein, A.C.	Course in Fundamental Nuclear Plant Engineering	PGE	8,278
Klein, A.C. Reyes, J.N. Robinson, A.H.	Study of Corrosion Behavior of Fuel Cladding Materials under Nuclear Power Reactor Operating Conditions and Environments	Teledyne	50,000

Reyes, J.N.	Two-Phase Natural Circulation Experiments in a Flow Visualization Loop	OSU	4,000
Robinson, A.H.	An Expert System for Classification of Emergencies	PGE	49,452
Robinson, A.H. Jordheim, D.P.	Fellowship in Nuclear Engineering in Behalf of Daniel P. Jordheim	INPO	9,500
Robinson, A.H. Reyes, J.N.	On-Line Advanced Plant Simulator (OLAPS) for Thermal Hydraulics Simulation and Faster Than Real Time Transient Analysis of PWR Systems	PGE	38,334

Faculty Publications: 1987-88

Binney, Stephen E.

"Fingerprinting Economic Heavy Minerals and Sources of Marine Placers in the Pacific Northwest by Instrumental Neutron Activation Analysis," (with C.D. Peterson; invited), Pacific Northwest Metals and Minerals Conference, Portland, OR (April 1987).

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"Calculation Assessment of the Measureability of Key Radionuclides for Severely Failed Nuclear Power Plant Fuel," (with Richard D. Harris), *Nuclear Technology*, 79, 322 (1987).

"Stability Analysis for Distributed Systems," (with Shyr T. Luo and Wojciech J. Kolodziej), *International Journal of Systems Science*, 19, 377 (1988).

"In-vivo Counting of Americium-241 in Human Lungs and Tracheobronchial Lymph Nodes," (with Allison R. Northcutt and H. Earl Palmer), *Health Physics*, 54, 73 (1988).

"An On-line Reactivity and Power Monitor for a Triga Reactor," (with Alla J. Bakir), 11th Triga Owner/User Conference, Rockville, MD, (1988).

Dodd, Brian

"The Risks of Radioactive Material Transportation Accidents in the State of Oregon," Annual Meeting of the Health Physics Society, Salt Lake City, UT (1987).

"Radioactive Material Transportation Accident Emergency Response - The Oregon Experience," Emergency Response - ANS Topical Meeting, Charleston, SC (1988).

Dodd, Brian (continued)

"Evidence of Possible Flooding of the Reflector at the Oregon State University TRIGA Reactor," (with A.G. Johnson and J.V. Anderson), 11th TRIGA Users Conference, Bethesda, MD (1988).

Higginbotham, Jack F.

"Influence of Lasalocid Level on Forage Intake, Digestibility, Ruminant Fermentation, Liquid Flow and Performance of Beef Cattle Grazing on Winter (with K.A. Jacques, R.C. Cockran, L.R. Corah, T.B. Avery, and K.O. Koellner), *Animal Science Journal*, 65, 777, 1987.

"Argon-41 Production and Evolution at the Oregon State University TRIGA Reactor (OSTR)," (with L.G. Anellis and A.G. Johnson), TRIGA Owner/User Conference XI, Bethesda, MD, April 1988.

Johnson, Arthur G.

"Evidence of Possible Flooding of the Reflector at the Oregon State University TRIGA Reactor," (with T.V. Anderson and B. Dodd), 11th TRIGA User's Conference, Rockville, MD (1988).

"Argon-41 Production and Evolution at the Oregon State University TRIGA Reactor (OSTR)," (with L.G. Anellis and J.F. Higginbotham), 11th TRIGA User's Conference, Rockville, MD (1988).

Klein, Andrew C.

"Activation Product Transport in a FLiBe-Vanadium Alloy-HT9 System," (with D.K. Sze), *Journal of Nuclear Materials*, v. 149, p. 261-265 (1987).

Klein, Andrew C. (continued)

"Design of a Laboratory Autoclave to Evaluate the Oxidation Rate of Fuel Cladding Under Isothermal and Thermal Gradient Conditions," (with M.A. Maguire), *Environmental Degradation of Materials in Nuclear Power Systems--Water Reactors*, G.J. Theus and J.R. Weeks, eds., The Metallurgical Society, 1988.

"An Assessment of and Validation Study of Nuclear Reactors for Low Power Space Applications," (with S.R. Gedeon and D.C. Morey), OSU-NE-8702, Oregon State University, Corvallis, OR (June 1987).

"Assessment of Nuclear Reactor Concepts for Low Power Space Applications," (with S.R. Gedeon D.C. Morey), *Transactions of the Fifth Symposium on Space Nuclear Power Systems*, CONF, Samms, M.S. El-Genk and M.O. Hoover, eds., Albuquerque, NM, pp. 167-170 (January 1988).

"Microgravity Thaw Experiment (MITEX)," (with K. Stump, G. Wallis, W.J. Krotuik, and B.J. Webb), *Transactions of the Fifth Symposium on Space Nuclear Power Systems*, CONF-880122, Samms, M.S. El-Genk and M.O. Hoover, eds., Albuquerque, NM, pp. 317-324 (January 1988).

"Zircaloy Oxidation in Nuclear Systems, A Literature Review," (with S.R. Gedeon and J.A. VanWinkle), OSU-NE-8802, Oregon State University, Corvallis, OR, April 1988.

"Scanning Electron Microscopy of Zircaloy-4 Oxides," (with A.I.A. Almarshad), OSU-NE-8803, Oregon State University, Corvallis, OR, April 1988.

"Thermal-Hydraulic Design Analysis of the Thermal Gradient Test Facility (TGTF)," (with A.Y. Lafi and J.N. Reyes), OSU-NE-8804, Oregon State University, Corvallis, OR, May 1988.

"Thermionic Space Reactor Design Study," (with S.R. Gedeon), OSU-NE-8807, Oregon State University, Corvallis, OR, July 1988.

Klein, Andrew C. (continued)

"First Interim Report: Phase II of a Study of Corrosion Behavior of Fuel Cladding Materials Under Nuclear Power Reactor Operating Conditions and Environments," (with J.N. Reyes, Jr., A.Y. Lafi, J.A. VanWinkle, and A.I.A. Almarshad), OSU-NE-8809, Oregon State University, Corvallis, OR, September 1988.

Reyes, José N., Jr.

"Thermal-Hydraulic Design Analysis of the Thermal Gradient Test Facility (TGTF)," (with A.C. Klein and A.Y. Lafi), OSU-NE-8804, Oregon State University, Corvallis, OR, May 1988.

"Spent Fuel Consolidation Analysis," (with K. Pauley and T. Eichenberg), OSU-NE-8808, Oregon State University, Corvallis, OR, July 1988.

"First Interim Report: Phase II of a Study of Corrosion Behavior of Fuel Cladding Materials Under Nuclear Power Reactor Operating Conditions and Environments," (with A.C. Klein, A.Y. Lafi, J.A. VanWinkle, and A.I.A. Almarshad), OSU-NE-8809, Oregon State University, Corvallis, OR, September 1988.

Robinson, Alan H.

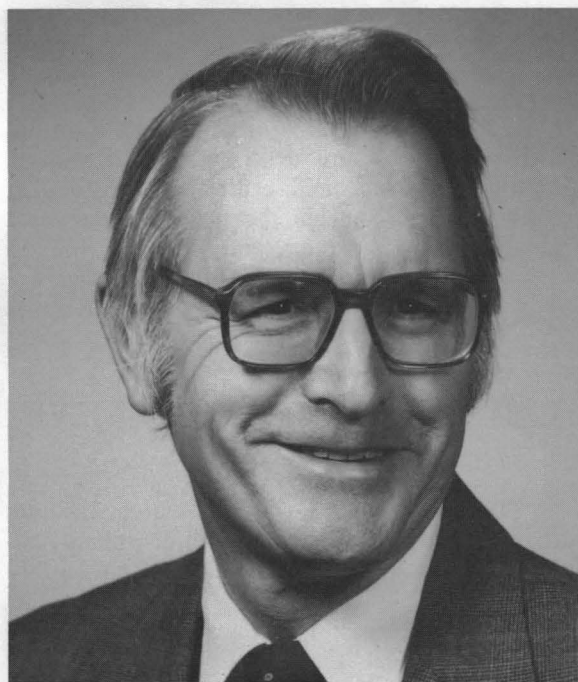
"An Automated Search Procedure for Fuel Shuffling in PWRs Including Rotation Effects," (with J.O. Heaberlin and G.L. Wang), ANS Topical Meeting on Artificial Intelligence and Other Innovative Computer Applications in the Nuclear Industry: Present and Future (August 1987), Snowbird, UT.

"Expert Systems Based on LISP-FORTRAN Hybrid Programming with Applications to Engineering Problems," (with J.O. Heaberlin), ANS Topical Meeting on Artificial Intelligence and Other Innovative Computer Applications in the Nuclear Industry: Present and Future (August 1987), Snowbird, UT.

Forest Engineering

College of Forestry

Research activities in the Forest Engineering Department focus on harvesting methods, logger training, logging technology, road construction, and the environmental impacts of forestry activities upon soil and water. The primary goal of the Forest Engineering research program is to provide new knowledge about forest operations and how they perform technologically, economically, and environmentally. A companion goal is to prepare scientists for careers in research through graduate education and the application of research results. Research programs tend to focus on problems and practices related to forested lands of Oregon and the Pacific Northwest. In addition to the undergraduate degree program in Forest Engineering, the department offers graduate degrees with specialties in logging engineering and forest hydrology. The department also has an active extension program dealing with forest harvesting and environmental impacts.



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Research Expenditures: 1987-88

Faculty	Subject Area	State* of Oregon	Research Grants
Adams, P.W.	Soil and Water	\$ 4,513	\$ 7,200
Atkinson, W.A.	Administration	91,234	0
Beschta, R.L.	Channel Characteristics/Riparian Zones	106,464	95,000
Froehlich, H.A.	Stream Protection/Landslides	92,590	79,000
Kellogg, L.D.	Mechanical Harvesting	3,000	97,134
Kramer, B.	Transportation Network Analysis	6,000	0
Mann, J.W.	Overstory Removal	12,552	0
Mann, J.W./Pyles, M.R.	Skyline Mechanics	0	127,542
McNabb, D.H.	Machine Site Preparation	6,150	0
Olsen, E.D./Garland, J.J.	Logging Labor Force	0	68,198
Olsen, E.D./Garland, J.J.	Optimal Bucking	0	25,000
Olsen, E.D.	Road Construction Costs	3,000	0
Pyles, M.R.	Slope Stability	24,670	0
Pyles, M.R./Kliwer, J.E.	Road Subgrade	0	15,000
Sessions, J.	Transportation Systems	58,039	0
	Totals	\$408,212	\$514,074
	TOTAL		\$922,286

*Forest Research Laboratory

RESEARCH CENTERS AND INSTITUTES

Programs for the centers and institutes shown in Figure 1 are described in this section, along with research and extension budgets that are administered outside the normal department channels. These centers and institutes have a public interaction role,

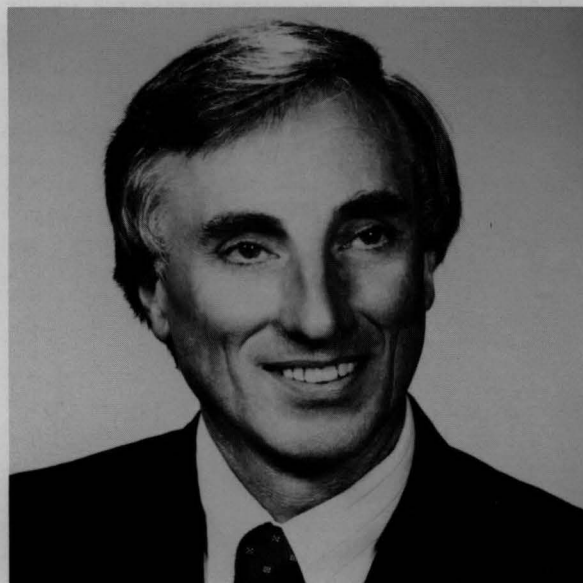
or are multidisciplinary in nature. They typically are advised by a governing board of directors drawn from both outside and within the University itself. The role is an important one because of the direct tie provided between the University and the public it serves.

Water Resources Research Institute

The Water Resources Research Institute was organized to coordinate multidisciplinary efforts necessary for solution of critical water problems. The Institute goal is to foster, encourage, and facilitate research and education related to all factors that affect the quantity and quality of water available for beneficial use. The Institute is administered under the Vice Present for Research, Graduate Studies, and International Programs, through the Colleges of Agricultural Sciences, Engineering, and Forestry. The membership, which includes all people in higher education in Oregon who are engaged in water resources research and training, currently numbers about 200 persons in 31 different departments.

Extensive facilities are available to Institute members and students for research and students for research and training. These include forested watershed lands and associated field equipment, soil laboratories, water and waste treatment facilities, fresh water and marine science laboratories including oceanographic research vessels, experimental streams, an electronic computing center, a hydraulics laboratory, and a radiation center. Research assistantships and fellowships are available through many of the member departments. The Institute provides support for selected portions of the research and training programs in water resources at universities in Oregon.

The Institute works closely with federal and state agencies. Seminars are sponsored during fall and spring terms to address water issues. Research reports are given wide distribution through the Institute's information dissemination program. Research projects are conducted in the areas of water supply and quality, planning and management, systems analysis, legal and institutional complexities, and water uses and use impacts.



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Research Expenditures: 1987-88

Faculty	Subject Area	Research Grants
Curtis, L.	Bioenergetics of Grass Carp: Water Quality Implications	\$ 16,836
Fish, William Oregon Grad. Center	Behavior of Runoff-Derived Metals in a Well Defined Paved-Catchment Pond	14,692
Istok, J.D.	Geostatistical Analysis of Pesticide Contamination in Ground-water Aquifers	11,189
Klingeman, Peter C.*	Application of Economic Analysis to Water Allocations for Fish Habitat Enhancements, John Day Basin	20,938
Klingeman, Peter C.	Sediment Monitoring Program - Sturgeon Lake Phase II Lake Restoration Project	16,818
McIntire, C.D.	Effects of Simulated Land-Use Practices on the Productive Capacity of Streams	9,401
Nelson, P.O. Baham, J.E.	Laboratory Study of In-Situ Reclamation Process for Metals-Contaminated Soils	17,974
Shelby, B. Johnson, R.L.	Comparison of Whitewater Recreation Opportunities and Benefits of the Rogue, Deschutes, and Clackamas Rivers, Oregon	8,201
	TOTAL	\$116,049

*1987-88 Civil Engineering portion of a total grant of \$131,490

Transportation Research Institute

The Transportation Research Institute (TRI) was established in 1962 to enhance research and interaction within the University and to serve as a link with other universities, industry, and government on transportation-related issues. The institute conducts a variety of research efforts, including traditional single-disciplinary and multi-disciplinary research, and also serves as a clearinghouse and central source of transportation-related information.

The institute consists of a highly qualified professional and academic staff drawn from the Colleges of Engineering, Forestry, Agricultural Sciences, Oceanography, Business, Science, and Liberal Arts. The major areas of activity include transportation system economics, policy, and regulation; geotechnical engineering and highway materials testing; transportation system planning, traffic operations, and safety; low-volume road design, construction, and maintenance; transportation for resource development; rural transportation; sociopolitical and behavioral factors; and environmental and energy factors. An advisory committee of professionals familiar with the transportation issues and problems in the Northwest provides policy guidance as well as suggestions to the TRI staff.

Extensive facilities are available to institute members and students. These include computerized literature search capabilities, an electronic computing center, and a complete soils and materials testing laboratory. The laboratory houses two electrohydraulic closed-loop servo-system (MTS), as well as a walk-in cold room for testing frozen soils. Also available are complete hydrology and hydraulic labs for drainage and hydraulic studies and 14,000 acres of timberland reserved for teaching and research, available through the College of Forestry.



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Major activities over the past years has been in the area of research and technology transfer. Research clients include Oregon Department of Transportation; Oregon Traffic Safety Commission; U.S.D.A. Forest Service; Federal Highway Administration; Urban Mass Transit Administration; Office of the Secretary, U.S. Department of Transportation; and Alaska Department of Transportation. Efforts in technology transfer have been sponsored by Oregon Department of Transportation, Federal Highway Administration, and Oregon Traffic Safety Administration.

Extension Energy Program

The OSU Extension Energy Program is a cooperative effort of the College of Engineering, the OSU Extension Service, and the Oregon Department of Energy. It is one of seven program areas making up the Oregon State University Extension Service.

Extension Energy specialists and agents help solve energy-related problems for homes and businesses. Staff in five locations provide service throughout Oregon: central Oregon (Bend); southern Oregon (Medford); the southern Willamette Valley (Eugene); northwestern Oregon (Portland); and eastern Oregon (La Grande). Three faculty members in OSU's Mechanical Engineering Department provide technical support for the field staff.

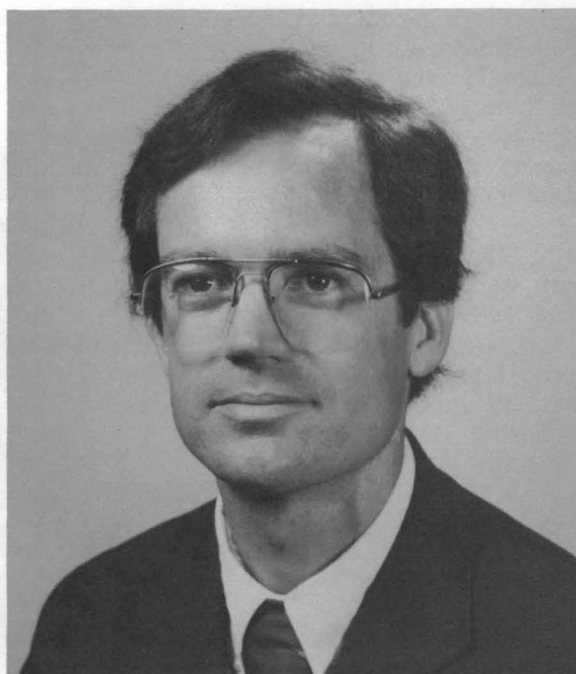
Since the program began in 1980, Oregon's Extension Energy Program has provided information and technical assistance to more than 60,000 Oregonians. It has developed a strong reputation based on responsive service and high quality education materials and programs.

Major program thrusts occur in four areas.

Low Income: Training is provided to help improve the housing of low-income individuals. Specific programs include training for community action weatherization crews, workshops to support self-help projects, and information and training for social agency staff who directly help low-income households.

Professional Training: Programs and materials are developed to update the expertise of professionals who provide energy-related services. Activities include organizing a monthly Commercial Energy Forum at which up-to-date information on energy-related products and designs is presented to engineers, architects, utility energy auditors, and other professionals. Video tapes of these programs are distributed statewide.

New Home Construction: The Extension Energy Program has been particularly successful in developing programs and materials to improve the quality and comfort of new homes. One- and two-day workshops presented by Extension Energy staff reach over 500 builders annually. Over 8000 copies of manuals written by OSU to support these programs have been printed and used



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throughout the northwest. Extension Energy staff have received additional grants to update these materials, and to develop a video-tape-based training program on how to build energy efficient homes.

Small Businesses: Program personnel provide assistance to help small businesses remain competitive and efficient. Restaurants, groceries, and small businesses along the coast, in southern, central, and eastern Oregon have taken advantage of site visits and training programs to understand where they can save energy and money. Farms in eastern Oregon are benefiting from improved access to weather information and technical help from agents on ways to improve water management and irrigation system efficiency.

OSU Extension Energy staff work with students and other faculty to conduct applied research on the performance of energy-related products in the northwest. Examples have included monitoring the performance of woodstoves, batch solar collectors, and different glazing materials. These studies have frequently led to recommendations to manufacturers on ways to improve their products.

Funds for the OSU Extension Energy Program are provided by the Bonneville Power Administration, the U.S. Department of Energy, and the State of Oregon. In addition, special grants have been received to support the development of training materials and the delivery of specific training programs.

The Extension Energy staff present seminars, workshops, and conferences throughout the year. For more information about these programs, available information materials, and other services, one should contact: OSU Extension Energy Program, Oregon State University, 344 Batcheller Hall, Corvallis, Oregon 97331, (503) 754-3004.

Energy Analysis and Diagnostic Center

The wood products industry, food processors, and other manufacturers in Oregon will reap bigger profits in the coming years with the help of Oregon State University's Energy Analysis and Diagnostic Center.

Under the direction of Greg Wheeler, OSU Extension energy specialist and assistant professor of mechanical engineering, and Dwight Bushnell, associate professor of mechanical engineering, the center is conducting free energy audits and recommending energy-saving actions this year for 30 manufacturers with gross annual sales under \$50 million and annual energy bills under \$1.5 million.

Audits of 36 manufacturing plants completed thus far estimate annual savings of from \$4,476 to \$534,162 and energy savings of from 0.2% to 53%. Many of the recommended actions have payback periods under two years.

The center is one of 13 across the country managed by the University City Science Center of Philadelphia with funding from the U.S. Department of Energy.

Extension Energy Projects: 1987-88

Subject Area	Granting Agency	Grant Amount
Energy Efficient New Home Video Training Tapes	USDOE/BPA	\$ 265,495
Technical Assistance to Schools, Homeowners, and Businesses	Oregon DOE/USDOE	204,277
Technical Assistance to Builders, Utilities, Businesses, and Irrigators	Oregon DOE/BPA	481,000
Residential Construction Demonstration Program	Oregon DOE/BPA	21,321
Energy Efficient Manufactured Homes	Oregon DOE/BPA	25,000
Energy Analysis and Diagnostic Center (Greg Wheeler - Project Leader)	USDOE	91,075
Basic Energy Program	State of Oregon	37,055
TOTAL		\$1,125,223