ENGINEERING EXPERIMENT STATION

CIRCULAR NO. 59

Oregon State University

College of Engineering

RESEARCH ACTIVITIES ANNUAL REPORT

1983-1984

CONTENTS

PREFACE

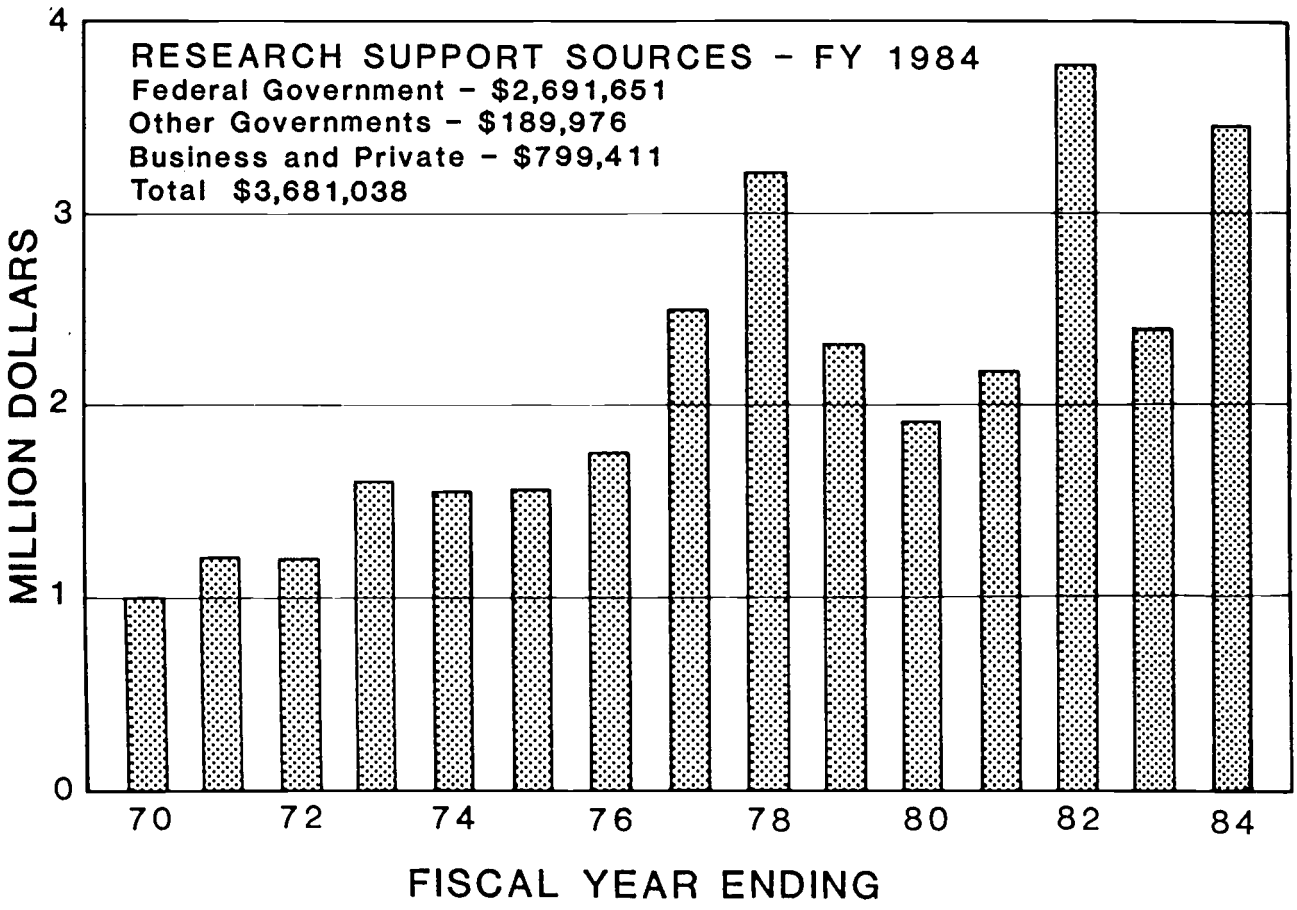
Research involvement contributes to the strength of Oregon State University's engineering programs by providing the means to involve faculty in the advancement of knowledge, and supplementing salary resources for the employment of faculty and support personnel. Because of research, more than a third 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 when research equipment is 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 provides certain summary data concerning research in the College of Engineering. The level of involvement of the College's faculty and students in research is shown, along with research expenditures and new grant dollar volumes for the 1983-84 fiscal year. Feature sections on the College's unique Molecular Beam Epitaxy Facility and Wave Research Laboratory are included. The College of Engineering section of the report concludes with a listing of the nearly 200 publications by College faculty during 1983-84. A summary of on-going engineering research in the College of Forestry is also provided. Several College of Engineering faculty are involved in these studies.

RESEARCH FUNDING TRENDS

Engineering research at Oregon State University is supported entirely by grants and contracts. No State of Oregon funds are budgeted for research operations. The graph shown below summarizes research funding trends over the years since 1970 and shows that new grants and contracts this past year are up from last year and stable when compared to funding levels over the last several years. The Federal Government is the leading source of research support.

In addition to funds for specific research grants, the graduate programs of the College of Engineering received supplemental funding of $1,193,000 this past year in the form of fellowships and equipment grants.



RESEARCH INVOLVEMENT AND PRODUCTIVITY

Table 1 shows the numbers of professorial faculty in the College's departments, degrees granted and new research grant funding for 1983-1984. Table 2 provides the distribution of actual research expenditures for the same period. Of the College's professorial faculty 47 were at least partially supported by research projects in 1983-84. Sixteen other faculty and research personnel worked on the projects, along with 79 graduate research assistants. Twenty-seven undergraduate students held part-time research-related jobs.

Table 1. Faculty, Degrees Granted, and Research Dollars

Degree Program	Faculty	Degrees Granted, 1983-84			New Research $
		Under-graduate	Master's	Doctorate	
Agricultural Eng.*	11	16	2	-	$ 36,600
Chemical Eng.	6	45	3	-	132,450
Civil Eng.	27	53	38	1	1,114,251
Construction Eng. Mgt.	-	30	-	-	-
Elec. & Comp. Eng.	24	82	45	2	376,645
Engineering Physics*	1	17	-	-	-
Industrial Eng.	10	47	2	-	165,143
Mechanical Eng.	24	68	36	5	1,646,886
Nuclear Eng.	8	11	3	-	209,063
Total	111	339	129	8	$3,681,038

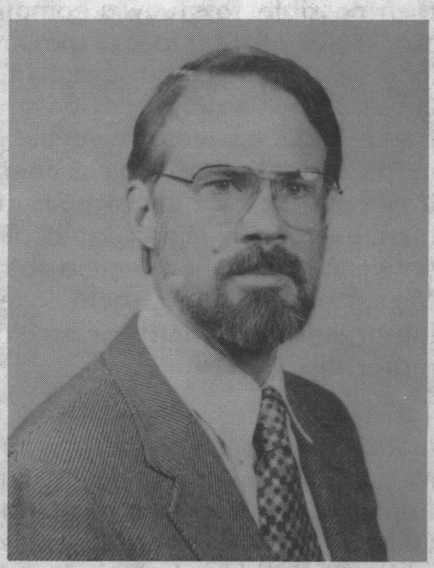
*Agricultural Engineering is a department in the College of Agriculture, and offers ABET accredited undergraduate engineering degrees. Engineering Physics is a department in the College of Science which offers only undergraduate degrees.

Table 2. Actual Research Expenditure Distribution, Dollars, 1983-1984

Expenditure Category	Agricultural Eng.	Chemical Eng.	Civil Eng.	Electrical & Computer Eng.	Industrial Eng.	Mechanical Eng.	Nuclear Eng.	Total
Personnel	330,335.47	57,845.20	562,238.64	373,738.59	250,749.88	326,586.64	80,077.37	1,981,571.79
Payroll Assessments	84,943.67	6,487.85	139,330.76	79,924.96	67,388.29	58,930.95	10,631.46	447,637.94
Supplies & Services	43,768.86	14,692,49	203,658.21	90,895.13	44,698.31	19,218.15	38,238.92	455,170.07
Equipment	18,371.03	984.17	20,694.99	6,495.21	5,590.34	1,089.00	6,853.74	60,078.48
Computer	16,415.79	4,196.14	19,601.31	6,707.65	437.47	14,501.92	4,437.10	66,297.38
Graduate Tuition	11,406.82	6,948.00	39,276.79	10,601.17	1,188.00	7,128.00	10,692.00	87,240.78
OSU Indirect Costs	26,066.00	26,834.01	167,125.18	75,187.99	13,592.79	51,722.19	42,236.57	402,764.73
Consultants	-0-	-0-	4,547.32	-0-	35.00	-0-	-0-	4,582.32
Subcontractors	-0-	-0-	89,646.00	-0-	-0-	-0-	-0-	89,646.00
Travel	4,710.12	3,867.16	40,772.71	22,891.59	12,008.85	23,917.11	10,494.62	118,662.16
TOTAL	536,017.76	121,855.02	1,286,891.91	666,442.29	395,688.93	503,093.96	203,551.78	3,713,651.65

MOLECULAR BEAM EPITAXY

Through the help of the Murdock Foundation and the Tektronix Foundation, the Electrical and Computer Engineering Department at OSU has been able to purchase a one-half million dollar instrument for advanced semiconductor research. The Molecular Beam Epitaxy system is the core of a new research effort to design, fabricate, and test semiconductor devices made from exotic materials such as Gallium Arsenide (GaAs) which are becoming significant for high speed applications such as computer memories.



Prof. John Arthur

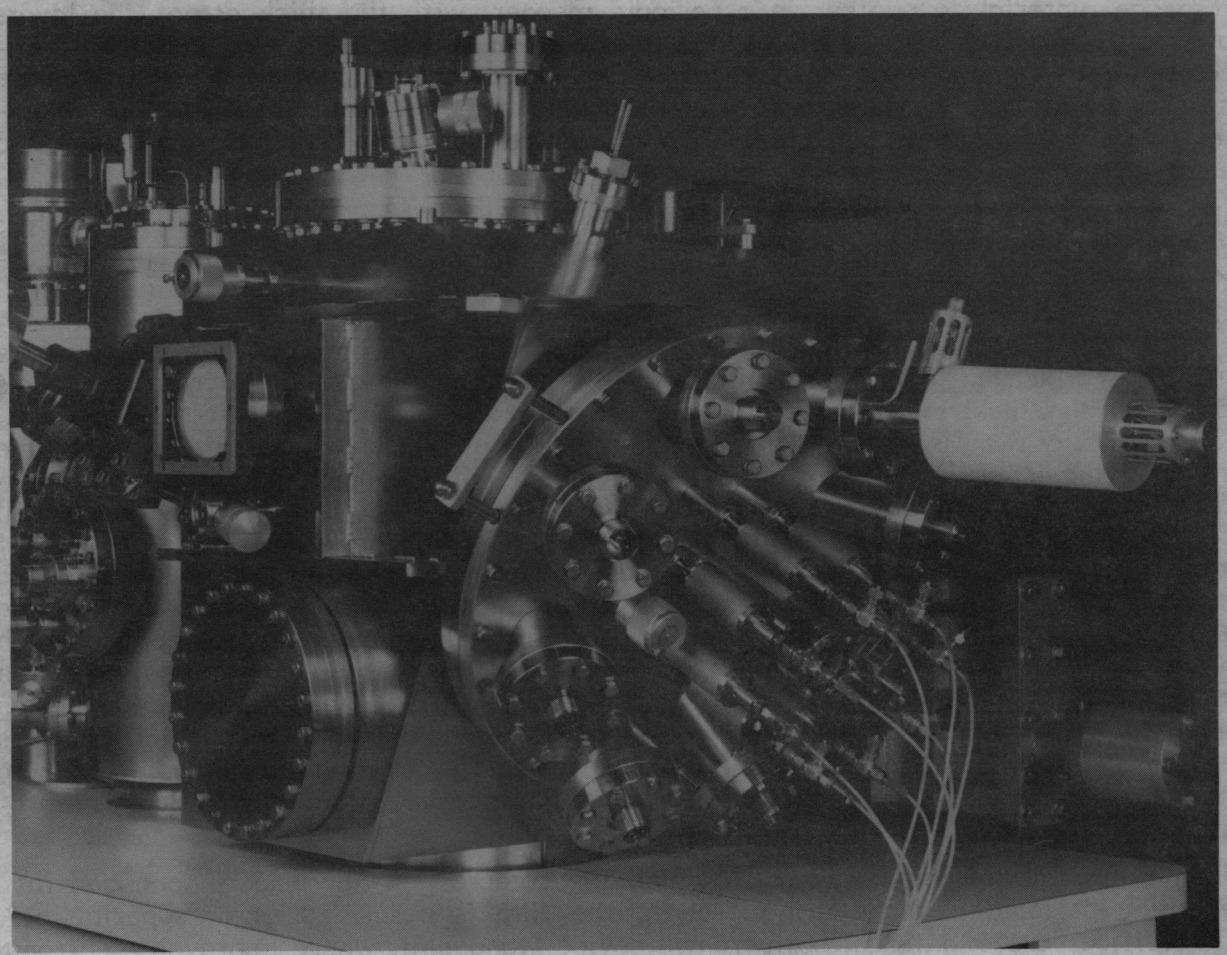
Molecular Beam Expitaxy (MBE) is a very new technology for the production of ultra-thin crystals of semiconductor material. Crystal size is important in modern high frequency electronics because in most cases the response speed of a solid state device, such as a transistor, is dependent on the dimensions of the semiconductor crystal from which the device was fabricated. This is due to the time required for electrons to pass through the crystal; hence, faster devices can be made from thinner crystals. MBE also can be used to grow multilayered crystals or "superlattices". A superlattice is a crystal in which the composition changes abruptly from one material to another in a periodic manner, with the thickness of the layers ranging from a few hundred atoms to as little as one atom layer. Besides the fundamental interest in a crystalline material which does not occur in nature, superlattices are of practical importance because they can show enhanced electron "mobilities" or velocities. Such materials have attracted much interest for high speed computer memories and microwave devices.

MBE is most simply described as an improved method of vacuum evaporation which is carried out under ultra-high vacuum conditions; the extremely clean ambient environment of the MBE chamber minimizes the contamination of the growing crystal. Molecular beams used to form the crystal are generated by slowly evaporating the constituent elements from heated crucibles. The beams are directed at a crystal surface (substrate) which has been thoroughly cleaned in vacuum; the molecules from the beams adsorb on the substrate surface and react to form the compound semiconductor, e.g., GaAs. Epitaxy is defined as the growth of a crystalline layer on a substrate such that the atoms in the layer are in an ordered arrangement with respect to atoms in the substrate. Epitaxial growth can occur when the substrate surface is initially cleaned of all foreign atoms and when the substrate temperature during growth is high enough that atoms and molecules arriving at the surface diffuse over the surface sufficiently to arrive at ordered lattice sites; that is, those spatial positions which "match up" with the locations of the atoms in the substrate. Because of the very clean environment in which the crystal films are grown, growth rates can be very slow without contamination of the growing crystal; typically one atom layer per second is used. Because molecular beams which can be turned "on" and "off" in fractions of a second by simple mechanical shutters are used, it is possible to change the composition of the growing film completely from one atom layer to the next, and in the process, to produce atomically abrupt "hetero-interfaces".

When a crystalline film is grown in which the composition has been so changed in a repeating periodic fashion during growth, the film is described as a "superlattice". Superlattices are of interest both from a device standpoint, where improved electronic

properties result, as mentioned above, and from a fundamental standpoint, since it is then possible to study a completely new, tailor-made material not found in nature. The properties of interfaces, the boundaries between materials of different composition, have long been of great interest in research, but have been extremely difficult to study because such a small fraction of the total volume of a solid is normally part of the interface. Superlattices, however, have a substantial fraction (sometimes most) of the atoms in the interfaces. The properties of the superlattice are thus more representative of interface atoms than of bulk atoms. For example, it has recently been found that superlattices can be constructed of layers of material that normally have different spacing between atoms; however in the superlattice the atomic spacing is approximately constant throughout. The different layers are alternately in tension and compression. The resulting crystal, with built-in strain, has very different properties from either of the parent materials.

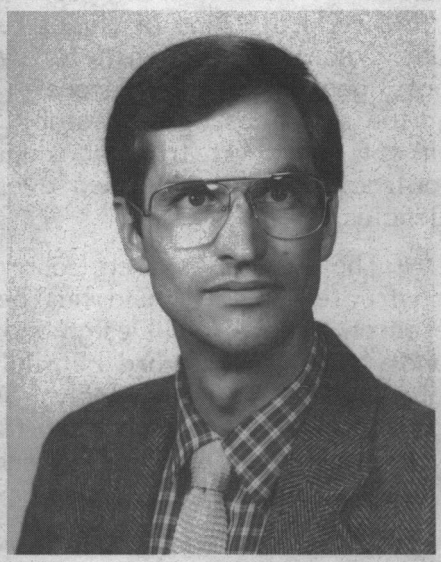
The demand for an impressive number of unique devices, such as high speed memory elements, low threshold lasers, long wavelength detectors and oscillators has already made MBE a commercially significant technology. It is a process which is having a major impact on semiconductor technology and our understanding of how crystals grow. The OSU MBE research effort is headed by Professor John Arthur who invented the process while at Bell Laboratories several years ago. The laboratory provides research activities for three additional faculty members and about a dozen graduate students at present. The gift of a minicomputer system from Hewlett Packard to automate the MBE system will allow further expansion of these activities in the near future.



Molecular Beam Epitaxy Facility

THE O.H. HINSDALE WAVE RESEARCH LABORATORY

The O.H. Hinsdale Wave Research Laboratory at Oregon State University is the largest university owned and operated water wave testing channel in the world. The facility is used to examine the interaction of large-scale waves with ocean and coastal structures, marine vehicles, and the sea floor. Research studies conducted at the laboratory typically utilize physical models to investigate the behavior of the wave environment, to quantify wave-induced forces and to examine model response. The major advantage in conducting wave studies at the laboratory is that both simple periodic and random wave tests can be conducted at large Reynolds numbers where viscous distortion of model results is minimized.



Prof. Charles Sollitt

The dominant feature of the laboratory is a reinforced concrete channel 342 feet long, 12 feet wide, and 15 feet deep. The channel is recessed into the ground with a freeboard of 3.5 feet. Waves are generated by a hinged-flap waveboard at one end of the channel and are absorbed on a 1:12 sloped beach at the other end of the channel. The beach is constructed from 12-foot square concrete panels, bolted to the channel walls through stainless steel inserts. The panels are used to simulate other bottom profiles as well. The waveboard is a 5000 pound aluminum weldment, hinged at the bottom of the channel. Polypropylene wipers sliding on stainless steel plates seal the sides and bottom of the waveboard, providing minimum leakage and allowing operation of the wave generator with water on only one side. Attached to the dry back side of the waveboard is a servo-controlled hydraulic actuator. The actuator is powered by a 3500 psi, 60 gallon per minute oil hydraulic pump and a 150 horsepower electric motor. An error minimization scheme controls the waveboard motion by comparing waveboard displacement, measured by a linearly variable displacement transducer, to a transformed input voltage from either a periodic function generator or a random wave signal from a PDP 11/23 computer.

Breaking waves up to five feet in height can be generated in a water depth of 11.5 feet. Either periodic or random waves are generated in a frequency range of 0.1 to 1.0 hertz. Random waves, to simulate real ocean wave measurements or extreme design conditions, may be generated by filtered analog signals or by discrete digital time sequences synthesized via finite Fourier transform algorithms.

A PDP 11/23 control processor, operating under the RT-11 system, is used for data acquisition and analysis as well as waveboard control. Peripherals include a 15 megabyte disk drive, nine channel magnetic tape transport, 64 channel analog to digital converter, printer, plotter, and color graphics terminal. Twenty channels of strain signal conditioning and matched precision filters are available as well as a full complement of pressure, strain, displacement, velocity, and acceleration transducers. Wave profiles are monitored acoustically.

A tow carriage, capable of traveling at speeds up to 12 feet per second while towing a 500 pound load, runs along the top of the channel walls. A work carriage with a ten-ton winch also traverses the full length of the channel. The laboratory is an open air

facility with the exception of the center third of the channel which is covered by a 100-foot square, 35-foot high, clear span roof.

Example sponsored research studies conducted at the Wave Research Laboratory include: mobile breakwater performance, wave force coefficients for biofouled cylinders, protection of slopes for arctic oil exploration and production artificial islands, buoy dynamics, current meter dynamics, ocean outfall behavior, wave loads on artificial reefs, geotextile applications in marine foundations, sea floor stability, wave forces on marine pipelines, armor stability, wave loading on caissons, cable fairing behavior, current loads on trawling equipment, and membrane structure behavior on waves. Contractual work has been evenly divided between private industry and governmental agencies.

The Wave Research Laboratory, located at the corner of 35th and Jefferson, was constructed in 1973 and has been actively engaged in ocean and coastal engineering research since 1974. Design and construction were initiated with a major contribution of funds from Mr. Howard Hinsdale of Portland, Oregon. Additional donations were received from Bohemia, Inc., ESCO Corp., and CH2M-Hill. Oregon State University contributed construction capital through the Sea Grant College Program, research overhead return from the Colleges of Engineering and Oceanography, and a loan from the OSU Foundation. The Laboratory has been self-supporting since 1976.

The Wave Research Laboratory was directed by Dr. John H. Nath from 1974 until 1981. The present director is Dr. Charles K. Sollitt of the Ocean Engineering Program in the Civil Engineering Department.

Wave Research Facility

NEW RESEARCH GRANTS AND CONTRACTS

1983 - 1984

The following listing provides names of principal investigators (faculty), research subjects, granting agency designations and project budgets for new grants and contracts.

AGRICULTURAL ENGINEERING

Booster, D.E.	Reduced Tillage Practices for Vegetable Crop Production	PRC	3,000
Booster, D.E.	Strawberry Production Mechanization	Oregon Strawberry Comm.	9,400
Miner, J.R.	Research on Seed Harvesting and Processing	USDA-ARS	24,200

CHEMICAL ENGINEERING

Knudsen, J.G.	Effect of Corrosion Inhibitors on Fouling Characteristics of Cooling Tower Water	HTRI	43,250
Levenspiel, O.	Problems in Gas/Solid Contacting	NSF	67,900
Levenspiel, O.	Radiant Heating of a Fluidized Bed for Silicon Production	Jet Propulsion Lab.	10,300
Mrazek, R.V.	Mechanism of H_2S Release in Kraft Smelt Dissolving	Weyerhaeuser	11,000

CIVIL ENGINEERING

Bell, C.A.	Evaluation of Asphalt Properties and Their Relation to Pavement Performance	OSDT	39,153
Hicks, R.G.	Optimizing Mix Ingredients for Rubber Modified Asphalt Pavement (Supplement)	Alaska	31,673

CIVIL ENGINEERING (continued)

Hicks, R.G.	Evaluation of Crushed Aggregate Asphalt Pavement Life	Alaska	62,400
Hicks, R.G.	Study of Alternative Systems for Surfacing Forest Roads	USDA-USFS	139,995
Hudspeth, R.T.	Assignment to Naval Civil Engineering Laboratory (IPA)	Navy	8,044
Hudspeth, R.T.	Assignment to NCEL (IPA)	Navy	13,083
Klingeman, P.C.	FY 1984 Cooperative State Water Resource Research Institute Program	USGS	115,000
Klingeman, P.C.	Preliminary Appraisal of Fishery Enhancement Using Rock Structures-Meacham Creek	CTUIR	1,800
McDougal, W.G.	Wave Tank Tests	Tekmarine	27,700
McDougal, W.G.	Model Experiments at OSU Wave Tank Facility	Tekmarine	35,200
Nath, J.H.	Sonic Wave Profiler	U of WI	5,600
Nath, J.H.	Hyrodynamic Roughness of Marine Growths on Cylinders	NSF	70,000
Nath, J.H.	Determining Hydrodynamic Coefficients for Cylinders-Pronounced Growth (Supplement)	Chevron	2,500
Nath, J.H.	Hydrodynamic Tests of Garden Banks Cylinders with Marine Growths	Chevron	70,199
Nath, J.H.	Breaking Waves-Their Influence on Wave Spectra	ONR	53,928
Nelson, P.O.	Prepare Report Describing Experimental Design for Analysis of Sediment Pollution	EPA	9,730
Schultz, R.J. Rosenfeld, C.L.	Sediment Studies on the North Fork of the Toutle River	Army	69,766
Sollitt, C.K.	Reduce and Interpret Current Meter Data from the Carquinez Straits Test	Navy	24,903
Sollitt, C.K.	Wave Tank Testing Services	Tekmarine	23,304

CIVIL ENGINEERING (continued)

Sollitt, C.K.	Abbreviated Current Meter Field Studies	Navy	8,629
Sollit, C.K. Hancock, D.	Coos Bay Offshore Disposal Site Investigation (Supplement)	Army	18,787
Vinson, T.S.	Physical Model Studies to Investigate Effects of Arching and Lateral Load Transfer	SOHIO	68,319
Washburn, J.L.	Assignment to Naval Civil Engineering Laboratory (IPA)	Navy	1,728
Williamson, K.J.	Bioaccumulation of Sewage-Sorbed Toxicants	EPA	212,810

ELECTRICAL & COMPUTER ENGINEERING

Lauw, H.K.	Capability Extensions to the Universal Machine Code	Ontario Hydro	24,433
Lillevik, S.L.	Real-Time Data Quality Assessment of Undistributed Data Acquisition Systems	SCEEE	11,898
Mohler, R.R.	Assignment to the Naval Postgraduate School (IPA)	Navy	69,760
Owen, S.J.T.	Molecular Beam Epitaxy	Murdock	150,000
Owen, S.J.T.	Electrical Properties of Annealed and Implanted Gallium Arsenide (Supplement)	NSF	9,831
Powers, V.M.	Array Logic Design Methods	Intel	9,991
Powers, V.M.	Distributed and Host-Driven Analysis Study	Navy	9,353
Plant, T.K.	Integrated Photodetectors for Gb/S Instrument Applications	Tektronix	69,000
Saugen, J.L.	Spectral Methods for Malfunction Identification	Navy	22,379

INDUSTRIAL & GENERAL ENGINEERING

Fichter, E.F. McDowell, E.D.	Investigation of a Novel Robot Arm (Supplement)	NSF	5,000
Funk, K.H.	Interface for a Tactical Decision Aid	Battelle	30,143
Riggs, J.L.	The Oregon Productivity Center (Supplement)	USDC	85,000
Riggs, J.L.	Productivity Applications	Industry	45,000

MECHANICAL ENGINEERING

Adams, R.L.	Radiative Contribution to Heat Transfer Between High-Temperature Fluidized Beds	NSF	98,722
Boubel, R.W.	Assignment to Office of Assistant Secretary of Defense (IPA)	DOD	166,320
Burke, P.	Examination of Silicon Wafers	SEH, America	20,000
Mingle, J. Boubel, R.W.	Identification of Hydrocarbon Species Condensing from Jet Engine Exahust-Cooled Air	Navy	35,373
Thresher, R.W.	Wind Turbine Test and Evaluation	EPRI	68,458
Welty, J.R.	Combined Cycle Biomass Energy Research Project	USDA-S&E	1,161,672
Welty, J.R.	Volumetric Air Heating Receiver Model	Battelle	71,357
Wilson, R.E.	Darrieus Rotor Aerodynamics (Supplement)	Sandia	24,984

NUCLEAR ENGINEERING

Binney, S.E. Ingle, J.D.	Fission Product and Chemical Monitoring (Supplement)	S&L	25,915
Binney, S.E.	Evaluation of Natural Radioactivity Levels-ALTi-OXY Extraction Process	Albany	2,961
Dodd, B. Wang, C.H.	Reactor Sharing Program	USDOE	10,000

NUCLEAR ENGINEERING (continued)

Dodd, B.	Nuclear Reactor Operator Training for Disadvantaged Americans	U of VA	12,750
Dodd, B.	A Continuation of the Analysis of the Potential Consequences and Required Measures Associated with the Transportation of Radioactive Materials	ODOE	26,000
Hornyik, K. Robinson, A.H.	Transient Thermal Hydraulic Analysis of a Pressurized Water Reactor	PGE	31,983
Robinson, A.H. C.H. Wang	The Nature of the Deterring Process	Army	99,454

FELLOWSHIPS AND EQUIPMENT GRANTS

1983 - 1984

Various outside interests annually give financial and other resources which support College of Engineering programs. Those related principally to research and graduate education are listed here.

Electrical and Computer Engineering

Owen, S.J.T.	High Technology Education Development	ECC	630,089

Chemical Engineering

Wicks, C.E.	Weyerhaeuser Fellowship		9,000
Wicks, C.E.	Equipment Grant	Chevron	10,000
Wicks, C.E.	New Faculty Support	Union Oil	10,000
Wicks, C.E.	Equipment Grant	Proctor & Gamble	5,000
Wicks, C.E.	Equipment Grant	Shell	6,000

Civil Engineering

Layton, R.D.	Traffic Safety and Highway Safety Fundamentals Short Courses	OTSC	55,000
Nath, J.H.	Workshop on Natural Hazards-Research Needs in Coastal and Ocean Engineering	NSF	25,248
Schaumburg, F.D.	Graduate Traineeship in Water Pollution Technology	EPA	14,637

Industrial Engineering

Fichter, E.F.	Graduate Research Support	SME	5,000
Riggs, J.L.	Equipment Grant	TEK	155,000
Riggs, J.L.	Equipment Grant	SME	1,500
West, T.M.	Equipment Grant	Hewlett Packard	24,000

Mechanical Engineering

Adams, R.L.	Fluid Mechanics of Ink Jet Printing	Tektronix	30,000
Bushnell, D.J. Davis, L.R.	Equipment Grant	Hewlett Packard	25,000
Calder, C. Kennedy, T.	Equipment Grant	Tektronix	40,000
Welty, J.R.	Equipment Grant	Chevron	10,000
Welty, J.R.	Weyerhaeuser Fellowship		12,000
Welty, J.R.	New Faculty Support	Union	10,000
Williams, J.	Equipment Grant (Smart Products Design Lab.)	Misc.	100,000

Nuclear Engineering

Ringle, J.C.	Graduate Fellowship-Dirk M. Anderson	NSF	7,300
Wang, C.H.	INPO Fellowship (Harris)	INPO	8,000

FACULTY PUBLICATIONS
1983 - 1984
OREGON STATE UNIVERSITY
COLLEGE OF ENGINEERING

AGRICULTURAL ENGINEERING

Booster, D.E.

"Status of Harvest Mechanization of Horticultural Crops," (with G.K. Brown, et al.), American Society of Agricultural Engineers, ASAE Publication 3-83, 1983, 78 p. Portion of text on small fruit harvesting in the United States released for publication as Oregon Agricultural Experiment Station Technical Paper 6451.

"Vibrational Removal Techniques: High Density Applications," (with B.F. Cargill), In: Principles and Practices for Harvesting and Handling Fruits and Vegetables, (Michael O'Brien, Burton F. Cargill, and Robert B. Fridley, eds.), AVI Publishing Co., pp. 189-220, 1983.

"Berry Harvesting: III. Cane and Bush Berry Harvesting," In: Principles and Practices for Harvesting and Handling Fruits and Vegetables, (Michael O'Brien, Burton F. Cargill, and Robert B. Fridley, eds.), AVI Publishing Co., pp. 503-524, 1983.

Cuenca, R.H.

"Techniques For Estimating Irrigation Water Requirements," (with R.D. Burman and A. Weiss), In: Advances in Irrigation - Vol. 2, D. Hillel (editor), Academic Press, New York, pp. 335-394, 1983.

"Procedure and Feasibility of Regional Irrigation Scheduling," (with R.G. Evans and C.E. Brockway), Proceedings, Agricultural Conference Days, Oregon State University, pp. 325-329, February 1983.

"Application of Penman Equation Wind Function, Closure," (with M.T. Nicholson), Journal of Irrigation and Drainage Engineering, ASCE, Vol. 109, No. 2, pp. 283-286, June 1983.

"Application of Regionalized Variable Analysis to Climatic Data," (with K.Y. Amegee), Proceedings, Second International Meeting on Statistical Climatology, Lisbon, Portugal, pp. 2.5:1-8, September 1983.

English, M.J.

"A Growth Model for Coho Salmon Including Effects of Varying Ration Allotments and Temperature," (with P.D. Corey and D.A. Leith), Aquaculture, 30, 125-143, 1983.

"Design of an Energy-Efficient Pipe-Size Expansion," (with G.E. Laliberte and M.N. Shearer), ASCE Journal of Irrigation and Drainage Engineering, Vol. 109, No. 1, March 1983.

Hellickson, M.L.

"A Slotted Floor Portable Shelter for Lambing in Winter Rainfall Pastures," (with M.T. Nicholson), Transactions of the ASAE, 26:3(853-857), 1983.

"Designing Bulk Potato Storage Structures," (with W.A. Matson), Pacific Northwest Extension Publication PNW236, July 1983.

"Reduced Winter Ventilation in Broiler Houses," (with P.K. Ryan and H.S. Nakaue), American Society of Agricultural Engineers Paper No. 83-4514, December 1983.

"Above-Ground Covered Waste Stacking Facility - Rigid Frame Post Construction," Blueprint plans prepared for USDA-SCS, Portland, OR, December 1983.

Kirk, D.E.

"Clarification of Pear Juice by Hollow Fiber Ultrafiltration," (with M.W. Montgomery and M.G. Kortekaas), Journal of Food Science, 1983.

Kolbe, E.R.

"Use of Wire Rope on West Coast Draggers," (with R.E. Meredith), Department of Agricultural Engineering, OSU, Unpublished Final Report, 165 pp., 1983.

"Refrigerated Storage of Fish at Sea, With Particular Reference to Thermal Insulation," (with J.H. Merritt and W. Robertson), Canadian Institute of Fisheries Technology Final Report, 230 pp., 1983.

"Crevice Corrosion--A Problem With Stainless Steel in a Seawater Environment," OSU Marine Advisory Program Bulletin, in press.

Matson, W.E.

"Designing Bulk Potato Storage Structures," (with M.L. Hellickson), PNW 236, July 1983.

"Kerosene Space Heaters," FS 300, October 1983.

Moore, J.A.

"Bacterial Pollution from Agricultural Sources: A Review," (with S.R. Crane, M.E. Grismer, and J.R. Miner), Transactions of the ASAE, 26(3):858-866 & 872, 1983.

"Modeling Dairy Waste Management Systems' Influence on Coliform Concentration in Runoff," (with M.E. Grismer, S.R. Crane, and J.R. Miner), Transactions of the ASAE, 26(4):1194-1200, 1983.

AGRICULTURAL ENGINEERING (continued)

Moore, J.A. (continued)

"Producing and Utilizing Methane Gas from Dairy Manure--Fact or Fiction?" Proceedings of the 1983 Lower Columbia Dairy Short Course Sponsored in part by the Animal Science Department, Oregon State University, Corvallis, OR.

CHEMICAL ENGINEERING

Levenspiel, O.

"The Uses of Magnetic Fields in the Processing of Solids," (with E. Jaraiz-M. and T.J. Fitzgerald), Chem. Eng. Sci., 38 107 (1983).

"A Warning on the Misuse of the Dispersion Model," (with T.J. Fitzgerald), Chem. Eng. Sci., 38 489 (1983).

"Simple Experimental Method for Finding the Kinetics of Gas-Solid Reactions," (with G. Davis), I. and E.C. Fundamentals, 22 504 (1983).

"Design of Long Heat Regenerators by Use of the Dispersion Model," Chem. Eng. Sci., 38 2035 (1983).

"The Magnetic Distributor-Downcomer (MDD) for Fluidized Beds," (with E. Jaraiz-M., G.T. Zhang and Y. Wang), Powder Technology, 38 53 (1984).

"Elutriation from Fluidized Beds," (with M. Colakyan), Powder Technology, 38 223 (1984).

"The MDD, A Magnetic Distributor-Downcomer for Fluidized Beds: Preliminary Studies," (with Y. Wang, E. Jaraiz-M., and G.T. Zhang), Fluidization Conference at Kashikojima, Japan, May 1983 in "Fluidization," D. Kunii and R. Toei eds., p. 241, AIChE Publications 1984.

Mrazek, R.V.

"An Automated Calorimeter for Heat Capacity Measurements from 5 to 300 K. The Heat Capacity of Cadmium Sulfide from 5.37 to 301.8 K and the Relative Enthalpy to 1103.4 K," (with R.P. Beyer and M.J. Ferrante), J. Chem. Thermo., 15, 827, 1983.

"Leaching Rates for the HCL Extraction of Aluminum from Calcined Kaolinic Clay," (with R.S. Olsen, S.J. Bullard, W.G. Gruzensky, and J.L. Henry), U.S. Bureau of Mines Report of Investigation. No. 8744, 1983.

"Process Applications," (27 pp). Illustrations of typical thermodynamic calculations. An introduction to "Thermodynamic Data for the Elements and Oxides," L.B. Pankratz, U.S. Bureau of Mines Bulletin 672, 1983.

CHEMICAL ENGINEERING (continued)

Wicks, C.E.

"Fundamentals of Momentum, Heat and Mass Transfer, (with J.R. Welty and R.E. Wilson), John Wiley and Sons, Third Edition, 1983.

"Large Scale Extraction of Pyrrololizidine Alkaloids From Tansy Tagwort," (with A.M. Craig and G. Sheggeby), Veterinary and Human Toxicology 37, No 1, 1984.

CIVIL ENGINEERING

Bell, C.A.

"Development of Rational Pay Adjustment Factors for Asphalt Concrete," (with P. Puangchit, R.G. Hicks, and J.E. Wilson), Transportation Research Record 911, Transportation Research Board, 1983.

"Use of the Shell Bitumen Test Data Chart in Evaluation of Asphalt Data," Proceedings Association of Asphalt Paving Technologists, Vol. 52, 1983.

"Application of Resilient Modulus Test Equipment and Procedures for Subgrade Soils, - Part 1: Materials Testing," (with J.R. Montalvo, J.E. Wilson, and J.T. Schofield), Final Report to Oregon Department of Transportation and U.S. Department of Transportation Federal Highway Administration, July 1983.

"Application of Resilient Modulus Test Equipment and Procedures for Subgrade Soils, - Part 2: Application of Results in Pavement Analyses and Designs," (with J.R. Montalvo, J.E. Wilson, and J.T. Schofield), Final Report to Oregon Department of Transportation and U.S. Department of Transportation Federal Highway Administration, July 1983.

"A Comparison of Civil Engineering and Highway Engineering Education and Technology in the U.S.A. and Great Britain," Report to the Carnegie Trust for the Universities of Scotland, October 1983.

"Effect of Season of the Year on Pavement Response," (with R.F. Bibbens and R.G. Hicks), Transportation Research Board, 1984.

"Comparison of Diametral and Triaxial Repeated Load Testing Techniques for Untreated Soils," (with J.R. Montalvo and J.E. Wilson), Transportation Research Board, 1984.

"Effect of Mix Conditioning on Properties of Asphaltic Mixtures," (with Ok-Kee Kim and R.G. Hicks), Transportation Research Board, 1984.

Hicks, R.G.

"Determination of Resilient Properties of Unbound Materials with Diametral and Cyclic Triaxial Test Systems", ASTM STP 807, "Properties of Flexible Pavement Materials," American Society for Testing and Materials, October 1983 (with S-Y Hsu and T.S. Vinson).

"Development of Rational Pay Adjustment Factors for Asphalt Concrete," Transportation Research Record 911, 1983, pp. 70-79, (with Prachaub Puangchit, James E. Wilson and C.A. Bell).

"Effect of Percent Compaction on Asphalt Pavement Life," ASTM STP 829, American Society for Testing and Materials, January 1984 (with C.A Bell and J.E. Wilson), pp. 107-130.

"Effects of Season of the Year on Pavement Response," prepared for Presentation at the 1984 Annual Meeting of Transportation Research Board, August 1983 (with Roy E. Bibbens and Chris A. Bell).

"Effect of Mix Conditioning on Properties of Asphaltic Mixtures," prepared for publication at the 1984 Annual Meeting of Transportation Research Board, November 1983, (with Ok-Kee Kim and C.A. Bell).

"Performance of Open-Graded Emulsion Mixes for Road Surfaces," Proceedings, New Zealand Roading Symposium, Wellington North, New Zealand, August 1983, Vol. I, pp. 9-22.

"Comparison of Asphalt Mix Design Methods in the Pacific Northwest," Transportation Engineering Report 83-11, Department of Civil Engineering, Oregon State University, September 1983 (with James R. Lundy).

"A Perspective on Road Surfacing," presented at the Forest Roads Conference, OSU College of Forestry, Corvallis, OR, May 1984.

"Evaluation of Rubberized Asphalt Surfacing Material: Mt. St. Helens Study," Draft report to Federal Highway Administration, June 1984 (with James R. Lindy and Emery Richardson).

Hudspeth, R.T.

"Hydrodynamic Interference Between Floating Cylinders in Oblique Seas," (with Min-Chih Huang and J.W. Leonard), Applied Ocean Research, Vol. 5, No. 3, July 1983, pp. 158-166.

"Hybrid Time Domain Model of Drifting Buoy," (with J.H. Nath), Proceedings 1983 Marine Technology Society.

"FEM Solution of 3-D Wave Interference Problems," (with M.-C. Huang and J.W. Leonard), Proceedings Seventh Conference on Ocean Engineering, Republic of China, Taipei, September 23-24, 1983.

Hudspeth, R.T. (continued)

"Stream Function Solution for Steady Waves," (with M.-C. Huang), Proceedings of the National Science Council, Republic of China, Part A; Applied Sciences, Vol. 7, No. 4, October 1983, Taipei, Taiwan, pp. 294-300.

"Nonlinear Transient Response of Deep-Ocean Pipelines," (with M. Zimmerman, J.W. Leonard, J. Tedesco, and L. Borgrnan), Proceedings Pipelines in Adverse Environments II, ASCE, San Diego, CA, November 1983, pp. 722-736.

"Environmental Forces on Ocean Platforms," NCEL 1681 TN, NCEL Ocean Platforms Seminar, Naval Civil Engineering Laboratory, Port Hueneme, CA, Nov. 1983, pp. 27-84.

Editorial, Journal of the Waterways, Port, Coastal and Ocean Engineering Div., ASCE, Vol. 109, No. 4, Nov. 1983, pp. 359-362.

"Wave Interference Effects by Finite Element Method," (with Min-Chih Huang and J.W. Leonard), ASCE, Journal of the Waterway, Port, Coastal and Ocean Engineering Div., (in press).

"Stream Function Solutions for Steady Waves," (with Min-Chih Huang), Journal of Continental Shelf Research, (in press).

"FEM Solution of 3-D Wave Interference Problems" (with Min-Chih Huang and J. W. Leonard), ASCE, Journal of Waterways, Port, Coastal, and Ocean Engineering (in press).

"Finite Water Depth Effects on Nonlinear Waves" (with H. Tuah), ASCE, Journal of the Waterways, Port, Coastal and Ocean Engineering Division, (in press).

"Finite Element Modeling of Pipeline Response," (with J.W. Leonard, J.W. Tedesco and M. Zimmerman), final report submitted to The American Gas Association, Feb. 1984, 292 p.

"High Reynolds Number Wave Force Investigation in a Wave Flume," (with J.H. Nath), final report to Naval Civil Engineering Laboratory, Port Hueneme, CA and Minerals Management Service, Reston, VA, Feb. 1984, 205 p.

"Analysis and Validation of Morison-Type Wave-Force-Prediction Models for Ocean Structures," (with H.M. Dummer and J.H. Nath), Technology Assessment and Research Program for Offshore Minerals Operations, 1984 Report, Dept. of the Interior, Minerals Management Service, pp. 259-267.

Klingeman, P.C.

Riparian Zone Systems, Uses, and Management: Phase I, (with W.D. Honey and R.J. Seidler), Oregon State University, Water Resources Research Institute, Corvallis, September 1983.

Layton, R.D.

"Effective Transportation Systems for the Management of New Forests," (with G. Brown and J. Studier), to be presented at the 1983 National Convention, Society of American Foresters, Portland, Oregon, October 1983.

"Use of Meteorological Information for Surface Transportation," Handbook in Applied Meteorology, John Wiley and Sons, Inc., to be published, 1984.

Leonard, J.W.

"Hydrodynamic Interference Between Floating Cylinders in Oblique Seas," (with R.T. Hudspeth and M.-C. Huang), Applied Ocean Research, Vol. 5, No. 3, pp. 158-166, July 1983.

"Nonlinear Transient Response of Deep-Ocean Pipelines," (with M. Zimmerman, J. Tedesco, R. Hudspeth, and L. Borgmann), Procs., ASCE 2nd Specialty Conference on Pipelines in Adverse Environments, San Diego, CA, November 1983.

"Review of Preminary Analysis Techniques for Tension Structures," Contract Report for Naval Civil Engineering Laboratory, Port Hueneme, CA, Ref. PON62583/82 M R674, November 1983

"AGAPIPE - A Finite Element Computer Program for Nonlinear Dynamic Response of Bottom-Laid Deep Ocean Pipelines," (with J. Tedesco, M. Zimmerman, R. Hudspeth), Press, 3rd Conference in Computing in Civil Engineering, San Diego, CA, April 1984.

"A Finite Element Algorithm for the Nonlinear Dynamic Response of Deep Ocean Pipelines," (with J. Tedesco and M. Zimmerman), to appear in Procs., 12th Southeastern Conference on Theoretical and Applied Mechanics, Pine Mountain, GA, May 1984.

"Wave Interference Effects by Finite Element Method," (with R.T. Hudspeth and M.-C. Huang), Journal of the Waterway, Port, Coastal and Ocean Engineering Div., ASCE, in press.

"FEM Solution of 3-D Wave Interference Problems," (with R.T. Hudspeth and M.-C. Huang), Journal of the Waterway, Port, Coastal and Ocean Engineering Div., ASCE, in press.

"Statistical Evaluation of Steel Beam Column Resistance," (with H. Kotoguchi and H. Shiomi), in press.

CIVIL ENGINEERING (continued)

Leonard, J.W. (continued)

"Nonlinear Hydrodynamic Response of Large Bodies Interconnected by Cables," (with H.Tuah), in press.

"Nonlinear Hydrodynamic Response of Flexible Cable-Reinforced Membranes," (with A. Lo), in press.

McDougal, W.G.

Wave Setup/Setdown and Longshore Current on Non-Planar Beaches," (with R.T. Hudspeth), Coastal Engineering, 7:103-117, 1983.

"Longshore Sediment Transport on Non-Planar Beaches," (with R.T. Hudspeth), Coastal Engineering, 7:119-131, 1983.

"Hinged Floating Breakwater," (with P.A. Leach and C.K. Sollitt), Proceedings of the Coastal Structures Conference '83, 1983.

"Wave-Induced Pressures on Buried Pipelines," (with S.H. Davidson and C.K. Sollitt), Proceedings of the Pipelines in Adverse Environments II Conference, 129-143, 1983.

"Force Transfer Coefficients for 8-Inch Diameter, Marine Roughened Cylinders from Garden Banks, Gulf of Mexico," (with J.H. Nath), Report to Chevron Oil Field Research Co., 180 pp., 1983.

"Tri-Lock Wave Stability Tests," (with C.K. Sollitt), Report to Tri-Lock, A Gulf Interstate Company, 83 pp., 1983.

"Hinged Floating Breakwater: Theory and Experiments," (with P.A. Leach and C.K. Sollitt), Ocean Engineering Report, Department of Civil Engineering, Oregon State University, 98 pp., 1983.

"Wave Forces on Buried Marine Pipelines," (with S.H. Davidson and C.K. Sollitt, Sea Grant Report, Grant Number NA81AA-D-00086, Project Number R/CE/12, 71 pp., 1984.

"Geotextile Stabilization of Seabeds: Theory," (with C.K. Sollitt) Engineering Structures, in press.

"Geotextile Stabilization Seabeds: Large Scale Experiments," (with C.K. Sollitt) Engineering Structures, in press.

Nath, J.H.

"Numerical Model Improvement for NDBO Buoy and Drogue," Final Report for NOAA Data Buoy Center, July 1983.

CIVIL ENGINEERING (continued)

Nath, J.H. (continued)

"Force Transfer Coefficients for 8-inch Diameter, Marine Roughened Cylinders from Garden Banks, Gulf of Mexico," (with W.G. McDougal), Final Report to Chevron Oil Field Research Company, September 1983.

"Vertical vs. Horizontal Cylinders in Waves," Proceedings of the ASCE Conference on Pipelines in Adverse Environments II, San Diego, CA, November 14-16, 1983.

"Hydrodynamic Roughness of Marine Growths on Cylinders," Final Report to National Science Foundation, December 1983.

"High Reynolds Number Wave Force Investigation in a Wave Flume," (with R.T. Hudspeth), Final Report to Naval Civil Engineering Laboratory, Port Hueneme, CA, February 1984.

Peterson, J.

"Bibliography on Lumber and Wood Panel Diaphragms," Journal of the Structural Division, ASCE, Vol. 109, No. 12, December 1983.

Schroeder, W.L.

"Soils in Construction," John Wiley and Sons, New York, 1975; 2nd Ed., 1980; 3rd Ed., 1983.

"Soil Properties for Slope Stability Analysis; Oregon and Washington Coastal Mountains," (with J.V. Alto), Forest Science, Vol. 29, No. 4, 1983.

"Creep Studies for Southeast Alaskan Forest Soils," (with Walter Hoeffner), Engineering Experiment Station, Oregon State University, Corvallis, OR, July 1983, 113 pp.

"Internal Stability of Circular Sheet Pile Cells," Preprint, A.I.D. Seminar, Tunis, Tunisia, August 1983.

"Geotechnical Properties of Southeast Alaskan Forest Soils," Civil Engineering Department, Oregon State University, Corvallis, OR, August 1983, 98 pp.

"Caissons and Cofferdams," Chapter 38 in Ground Engineers Reference Book, Butterworths, London, 1984 (in press).

"The Engineering Approach to Landslide Risk Analysis," Proceedings, USFS Workshop on Slope Stability: Problems and Solutions in Forest Management, Seattle, WA, February 1984.

Schroeder, W.L. (continued)

"Roads, Precipitation and Debris Torrents in Two Coastal Oregon Watersheds," (with George W. Brown), Proceedings, Symposium on Effects of Forest Land Uses on Erosion and Slope Stability, Honolulu, HI, May 1984.

Tedesco, J.W.

"Nonlinear Dynamic Response of Bottom-Laid Deep-Ocean Pipelines," (with M. Zimmerman), Department of Civil Engineering, Oregon State University, Corvallis, OR, August 1983.

"Nonlinear Transient Repsonse of Deep-Ocean Pipelines," (with M. Zimmerman, J.W. Leonard, R.T. Hudspeth, and L. Borgman), Proceedings of the Conference on Pipelines in Adverse Environments, ASCE, San Diego, CA, November 14-18, 1983.

"AGAPIPE--A Finite Element Computer Program for Nonlinear Dynamic Response of Bottorn-Laid Deep-Ocean Pipelines," (with M. Zimmerman and J.W. Leonard), Proceedings of the Third Conference on Computing in Civil Engineering, ASCE, San Diego, CA, April 2-6, 1984.

"A Finite Element Algorithrn for Nonlinear Dynamic Response of Deep-Ocean Pipelines," (with M. Zimmerman and J.W. Leonard), Proceedings of the Twelfth Southeastern Conference on Theoretical and Applied Mechanics, Calloway Gardens, Pine Mountain, GA, May 10-11, 1984.

"A Procedure for the Prediction of the Seismic Response of Shallow Liquid Storage Tanks--An Overview," (with C.N. Kostem), Proceedings of the 8th World Conference on Earthquake Engineering, San Francisco, CA, July 21-28, 1984.

Vinson, T.S.

"Determination of Resilient Properties of Unbound Materials with Diametral and Cyclic Triaxial Test Systems," (with S-Y. Hsu and R.G. Hicks), Properties of Flexible Pavement Materials, ASTM STP 807, American Society for Testing and Materials, 1983.

"A Mechanistic Approach to Pavement Design in Cold Regions," (with J.P. Mahoney and W.L. Zirjacks), Proceedings, Fourth International Conference on Permafrost, Fairbanks, AK, July 1983.

"Dynamic Properties of Naturally Frozen Silt," (with C.R. Wilson and P. Bolander), Proceedings, Fourth International Conference on Permafrost, Fairbanks, AK, July 1983.

Vinson, T.S. (continued)

"Laboratory Modeling of Uniaxial Freezing in Saline Gravel," (with L.J. Mahar and R.M. Wilson), Proceedings, Fourth International Conference on Permafrost, Fairbanks, AK, July 1983.

"Properties of Geotextiles in Cold Regions Applications," (with J.R. Bell and T. Allen), Proceedings, Fourth International Conference on Permafrost, Fairbanks, AK, July 1983.

"The Role of Specific Surface Area and Related Index Properties in the Frost Heave Susceptibility of Soils," (with R.D. Rieke and D.W. Mageau), Proceedings, Fourth International Conference on Permafrost, Fairbanks, AK, July 1983.

"Role of the Fines Content in the Frost Heave Susceptibility of Coarse-Grained Soils," (with F. Ahmad), Report No. 83-14, Transportation Research Institute, Oregon State University, August 1983.

"Dynamic Properties of Naturally Frozen Ice," (with T. Hammer), Report No. 83-13, Transportation Research Institute, November 1983.

"Cement Stabilization for Road Construction in Cold Regions," (with J.P. Mahoney and M.J. Kaminski), Proceedings, Third International Cold Region Engineering Specialty Conference, Edmonton, Alberta, April 1984.

Williamson, K.J.

"Bacterial Toxicity and Metabilism of Hydrazine Fuels," (with D.A. Kane), Archives of Environmental Contamination and Toxicology, 12, 447, 1983.

"Accumulation of Cadmium by Abarenicola Pacifica," (with S.N. Oakley, P.O. Nelson), J. of Science of the Total Environment, 28, 105, 1983.

"Dissolved Oxygen Limitations in Activated Sludge: Laboratory Studies," (with G.R. Swanson and P.O. Nelson) Accepted by J. Water Pollution Control Federation, 1983.

"Sulfide Control of Cadmium and Copper Concentration in Anaerobic Estuarine Sediments," (with R.J. Davies-Colley and P.O. Nelson), Submitted to Marine Chemistry, 1983.

"Adsorption of Cadmium and Copper by Estuarine Sediments," (with R.J. Davies-Colley and P.O. Nelson), Accepted by Environmental Science and Technology, 1983.

"Intragastric Administration of Dibromomethane to Rats," Final Report, Air Force Office of Scientific Research, 1983.

ELECTRICAL AND COMPUTER ENGINEERING

Engelbrecht, R.S.

"Passive Source Localization from Spatially Correlated Angle-of-Arrival Data," IEEE Transactions on Acoustics, Speech, and Signal Processing, August 1983.

Kolodziej, W.J.

"On a Suboptimal Nonlinear Filter," the 22nd IEEE Conference on Decision and Control, San Antonio, TX, December 1983.

"On a Simple Adaptive Tracking Filter," OSU-ONR TR 83-6, 1983.

"An Optimal Control Problem Using Incomplete Data," (to appear in SIAM Journal of Control and Optimization).

"A Two-Step Bilinear Filtering Approximation," IEEE Transactions on Acoustics Speech and Signal Processing (in press).

"Analysis of a New Nonlinear Filter and Tracking Methodology," IEEE Transactions on Information Theory (in press).

Lauw, H.K.

"Variable-Speed Generation with the Doubly-Fed Machine," IEEE Power Engineering Society Seminar, Portland, February 16, 1983; DOE/EMI Workshop, Denver, CO, August 1983.

"Load Shedding and Generator Rescheduling by Quadratic Programming - Part I: Linearized Model by Sensitivity Coefficients," IEEE Trans. on PAS (in press).

"Load Shedding and Generator Rescheduling by Quadratic Programming - Part II: Optimization Procedure and Its Applications," IEEE Trans. on PAS (in press).

Lillevik, S.L.

"Real-Time Data Quality Assessment of Distributed Data Acquisition Systems," (with C.T.W. Rentola), Final Report to AFOSR, Contract F49620-82-C-0035, August 1983.

"Data Quality Assessment Using Linear Predictive Filters," (with C.T.W. Reutola), Final Report to AFOSR, Contract F49620-82-C-0035, Subcontract SCEEE 83 RIP 21, June 1984.

"Throughput of Multiprocessors with Replicated Shared Memory," (with J.L. Easterday), AFIPS Conf. Proc., NCC '84, Vol. 53, July 1984.

Mohler, R.R.

"On Nonlinear Filtering and Tracking," in Signal Processing in the Ocean Environment, (E. Wegman, Ed.), Marcel Dekker, New York, 1983.

"Suboptimal Control of a Class of Stochastic Systems with Random, Partially Observable Parameters," Proc. American Auto. Control Conf., San Francisco, 1983.

"A New Nonlinear Filtering Algorithm," Proc. SIAM National Meeting, Denver, 1983.

"Analysis of a New Nonlinear Filtering and Tracking Algorithm, IEEE Trans. Info. Th. (in press).

"The Evolution of Bilinear Systems," Special IEEE Centennial Press Book on History of System and Control Engineering, 1984.

"A Two Step Bilinear Filtering Approximation," IEEE Trans. Acous. Speech and Sig. Proc. (in press).

"Conditionally Bilinear Filter with Tracking Application," J. Franklin Inst. (in press).

Owen, S.J.T.

"Mechanisms of the Negative-Resistance Characteristics in a.c. Thin-Film Electroluminescent Devices," IEEE Trans. Electron Devices, ED 30, 5, 452, (1983).

"Mechanisms of the Negative-Resistance Characteristics in a.c. Thin-Film Electroluminescent Devices," Proc. Society for Information Display, 24, 4, 1983.

Hysterisis Phenomena in Thin-Film a.c. Electroluminescent Devices, International Conference on Electroluminescent BadStuer GDR (October 1983) (Invited Paper).

"Conductivity of Si-ZnO p-n and n-n Heterojunctions," J. App. Physics, January 1984.

"Deep Traps and the Mechanisms of Aging in a.c. Thin-Film Electroluminescent Devices," Proc. Society for Information Display, 1984.

Plant, T.K.

"The Origin of a Hole-like Capacitance DLTS Peak in Ion-Implanted n-GaAs MESFETs," (with F.H. Yang and S.J.T. Owen), Proc. Semi-Insul. III-V Materials Conference, Kah-Nee-Ta, OR.

ELECTRICAL AND COMPUTER ENGINEERING (continued)

Saugen, J.L.

"Spectral Methods for Malfunction Identification," Progress Report, Naval Contract N00406-82-d-0675 (OSU-1) 15 June 1983-30 September 1983, Submitted to Mike Kelf, CODE 531, Naval Undersea Warfare Engineering Station, Keyport, WA, November 1983.

Tripathi, V.K.

"Lattice Matched and Mismatched Multiquantum Well Heterostructure Photodiodes for Operation at 1.1 to 1.5 mm," (with P.K. Bhattacharya), Elect. Letters, November 1983.

"The Microstrip Open-Ring Resonator," (with I. Wolff), to appear in IEEE Trans. Microwave Theory Tech., Vol. MTT-32, January 1984.

"Perturbation Analysis and Design Equations for Open- and Closed-Ring Microstrip Resonators," (with I. Wolff), to appear in IEEE Trans. Microwave Theory and Tech., Vol. MTT-32, March, 1984.

"Analysis and Design of Branch Line Hybrids with Coupled Lines," IEEE Trans. Microwave Theory Tech. (in press).

Wallace, A.K.

"Voltage Controlled 60 Hz Linear Induction Motor Drives," Electrical Machines & Power Systems, 1983.

"The Function of the Reaction Rail in the Development of a LIM Propulsion System for Urban Transit," Trans IEEE, IAS, September 1984.

"LIM Propulsion in the Detroit Downtown ICTS," Second International Symposium on Advanced Propulsion & Control in Urban Transit, Urban Mass Transit Administration, U.S. Dept. of Transportation, March 1984, Baltimore, Massachusetts.

INDUSTRIAL AND GENERAL ENGINEERING

Fichter, E.F.

"Connectivity-Three Mechanical Couplings and the Algebraic Complexes They Trace," ASME Transactions, Journal of Mechanisms, Transmissions, and Automation in Design, Vol. 105, pp. 58-61, 1983.

"Determining the Motions of Joints on a Parallel Connection Manipulator," (with E.D. McDowell), Proceedings of the Sixth World Congress for the theory of Machines and Mechanisms, New Delhi, 1983.

"A Computer-Aided Design and Drafting Package for Educational Use," Proceedings of the Sixth World Congress for the Theory of Machines and Mechanisms, New Delhi, 1983.

INDUSTRIAL AND COMPUTER ENGINEERING (continued)

Riggs, J.L.

Productivity by Objectives (with Felix), Prentice-Hall, Inc., Englewood Cliffs, NJ, 1983, 287 pp.

"Round Eyes in Japan," Manufacturing Productivity Frontiers, pp. 23-25, July 1983.

"New Expectations," Journal of Commerce, August 1983.

"Productivity Measurement by Objectives," (with G.H. Felix) National Productivity Review, pp. 386-394, Autumn 1983.

"Prosperity and Productivity," Proceedings of IIE Region X Conference, Seattle, WA, October 1983.

Productivity Primer, monthly publication of the Oregon Productivity Center, Corvallis, OR, 1981-

MECHANICAL ENGINEERING

Adams, R.L.

"Gas Convection and Unsteady Conduction in Fluid Bed Heat Transfer", Chapter 23 of Handbook for Heat and Mass Transfer Operations, to be published 1984.

"Heat Transfer in Large Particle Bubbling Fluidized Beds," J. of Heat Transfer, Vol. 106. No 1, February 1984.

"Radiation View Factors Between Axisymmetric Subsurfaces within a Cylinder with Spherical Center Body," (with B. Mahbod), J. of Heat Transfer, Vol. 106. No. 1, February 1984.

"Drop Formation Characteristics of Drop-on-Demand Jets", (with J. Roy) to be presented at Society of Photographic Scientists and Engineers 37th Annual Conference, May 1984.

"Air Flow Effects on Drop Formation for Air-Assisted Drop-on-Demand Ink Jets", (with J. Roy) presented at Society for Information Display International Symposium, June 1984.

"A Model of the Radiative Contribution to Heat Transfer in a High-Temperature, Large-Particle Gas Fluidized Bed", (with B. Mahbod) presented at ASME/AIChE National Heat Transfer Conference, August 1984.

"An Instrument for Local Radiative Heat Transfer Measurement in a Gas Fluidized Bed at Elevated Temperatures", (with N. Alavizadeh, J.R. Welty, and A. Goshayeshi) presented at ASME/AIChE National Heat Transfer Conference, August 1984.

MECHANICAL ENGINEERING (continued)

Boubel, R.W.

"Effect of Low-Proof Fuel Alcohol on Crankcase Oil Dilution in an Otto-Cycle Engine," (with J.G. Mingle), DOE/BC/10343-1, U.S. Department of Energy, Bartlesville, OK, July 1983.

Burke, P.M.

"Computerized Materials Data Systems," J.H. Westbrook and J.R. Rumble, Jr., Eds., National Bureau of Standards, Washington, D.C., 1983.

Larson, M.B.

"Preliminary Study of Radiantly Heated Fluidized Beds for the Production of High-Purity Silicon," Final Report to JPL, 1983 (co-authors O. Levenspiel and G. Zhang).

"'DOUPIPE' A Double Pipe Heat Exchanger Rating and Design Program," LLNL Micro-CAE Software Copyright 1983, The Regents of the University of California, September 12, 1983 by Milton B. Larson.

"'DELAWARE' A Shell and Tube Heat Exchanger Rating and Design Program," LLNL Micro-CAE Software Copyright 1983, The Regents of the University of California, September 12, 1983 by Milton B. Larson.

Rawers, J.C.

"Creep and Transient Testing of Irradiated Type 316 Stainless Steel," Accepted for publication in Materials Science and Engineering, 1984.

"Impact Testing of Laser-Glazed Charpy Samples," International Journal of Fracture, (in press).

"Laser-Glazing Low Carbon Iron Charpy Samples," Journal of Materials Science (in press).

Reistad, G.M.

"Forced Geoheat Recovery for Moderate Temperature Uses," (with G. Bodvarsson), Journal of Volcanology and Geothermal Research, Vol. 15, 1983.

"Evaluation of Dual Source Evaporator for Residential Heat Pumps," (with J. Griffiths and S.Lang), ASHRAE Transactions, Vol. 90, 1984.

"Geothermal District Heating Models: A Review of Compatibility and Validity," (with T. Lawrence), ASHRAE Transactions, Vol. 90, 1984.

Smith, C.E.

"An Aeroelastic Analysis of the Darrieus Wind Turbine," (with E.E. Meyer), AIAA Journal of Energy, September 1983.

MECHANICAL ENGINEERING (continued)

Thresher, R.W.

"Electrical Energy from the Wind," (with R.E. Wilson), ASME, Mechanical Engineering, January 1984.

Wilson, R.E.

"Analysis of Wind Turbines in Yaw," (with S. Chaiyapinunt) prepared for Rockwell International Corporation, Energy Systems Group, Golden, CO, under Contract ASC 51298PB, September 1983.

"Fixed Wake Theory for Vertical Axis Wind Turbines," ASME Winter Annual Meeting, November 1983, Boston, MA.

"Fixed Wake Analysis of Vertical Axis Wind Turbines," (with S.N. Walker), Journal of Fluids Engineering, December 1983.

"Fundamentals of Momentum, Heat & Mass Transfer," (with J.R. Welty and C.E. Wicks), John Wiley & Sons, 1969 (2nd Edition, 1976, 3rd Edition, 1984).

"Electrical Energy From the Wind," (with R.W. Thresher), Mechanical Engineering, January 1984.

NUCLEAR ENGINEERING

Binney, S.E.

"Design of an Automated Flow Loop for Routine and Post-Accident Radionuclide Analysis," (with C.W. Bennett, J.D. Ingle, Jr., M.D. Naughton, and G.P. Lahti), Trans. Am. Nucl. Soc., 44, 486, 1983.

"Relative Advantages of On-Line and Grab Sample Systems for Reactor Coolant Post-Accident Analysis," (with E.I. Jolma, G.R. Davidson, and M.D. Naughton), Trans. Am. Nucl. Soc., 45, 264, 1983.

"Postaccident Systems for Monitoring of Primary Coolant for Fission Products, Boron, pH, and Chloride," (with G.R. Davidson, G.P. Lahti, J.D. Ingle, Jr., J.C. Westall, C.W. Bennett, E.I. Jolma, and D.M. McDonald), EPRI Report, NP-3373, 1984.

Dodd, B.

"The Use of Fault Tree Analysis to Minimize Research Reactor Downtime," (with C.H. Wang and T.V. Anderson), International Symposium on the Use and Development of Low and Medium Flux Research Reactors, MIT, Boston, MA, 1983.

"The Oregon State University TRIGA Reactor (OSTR)," (with C.H. Wang and A.G. Johnson), International Symposium on the Use and Development of Low and Medium Flux Research Reactors, MIT, Boston, MA, 1983.

Dodd, B.

"Personnel Dose Reduction by the Use of a Computer Code to Verify the Self-Protection Status of Research Reactor Fuel," Computer Applications in Health Physics, 17th Midyear Topical Meeting of the Health Physics Soc., Pasco, WA, 1984.

AREAS OF CURRENT RESEARCH EMPHASIS

Agricultural Engineering

Irrigation
Farm structures
Waste management
Seed harvesting
Straw burning

Chemical Engineering

Heat exchanger fouling
Air pollution control
Fluidized bed combustion

Civil Engineering

Asphalt materials
Environmental engineering
Erosion control
Hydrodynamics
Artificial islands
Marine and harbor structures
Forest slope stability
Sediment transport

Electrical and Computer Engineering

Solid state electronics
Computer engineering
Systems engineering
Materials engineering

Industrial Engineering

Productivity
Expert systems
Robotics
Engineering economics

Mechanical Engineering

Wind power generation
Biomass energy production
Solar energy production
Robotics
Structural dynamics
Fluidized bed combustion
Computer-aided design
Air pollution control
Materials science
Fluid mechanics

Nuclear Engineering

High speed motion neutron radiography
Neutron radiography
Reactor safety
Environmental radiation
Nuclear instrumentation
Reactor dynamics
Radiation safety
Nuclear fuel management
Radiotracer methodology

FOREST ENGINEERING RESEARCH

(COLLEGE OF FORESTRY)

1983-1984

Faculty	Subject Area	State* of Oregon	Research Grants
Adams, P.	Soil Water	$ 10,519	$ 29,411
Beschta, R.L.	Water Quality	47,436	0
Brown, G.W.	Administration	96,433	0
Froehlich, H.A.	Stream Protection	8,528	12,000
Froehlich, H.A.	Soil Protection	24,154	33,167
Kellogg, L.D.	Small Log Harvesting	38,185	40,314
LeDoux, C.B. Sessions, J.J.	Harvest Unit Design	36,754	0
Olsen, E.D.	Harvesting Systems	15,769	0
Olsen, E.D.	Aerial Load Lifting	0	55,000
Pyles, M.R.	Slope Stability	20,256	32,261
TOTALS		$298,034	$202,153
TOTAL		$500,187	

*Forest Research Laboratory

DIRECTORY OF RESEARCH FACULTY

Dean of Engineering
Fred J. Burgess
Covell Hall 201
(503) 754-4525

Assistant Dean for Research
W.L. Schroeder
Covell Hall 219
(503) 754-3001

Agricultural Engineering J.R. Miner, Department Head Gilmore Hall 100 (503) 754-2041	Booster, Brooks, Cuenca, English, Hansen, Hellickson, Kirk, Kolbe, Moore
Chemical Engineering C.E. Wicks, Department Head Chemical Engineering 103 (503) 754-4791	Dudukovic, Frederick, Knudsen, Levien, Levenspiel, Mrazek
Civil Engineering and Construction Engineering Management F.D. Schaumburg, Department Head Apperson Hall 206 (503) 754-4934	Bell (C.A.), Bell (J.R.), Bella, Hicks, Hudspeth, Klingeman, LaBaun, Laursen, Layton, Leonard, McDougal, Miller, Nath, Nelson, Northcraft, Peterson, Phelps, Pritchett, Rogge, Schroeder, Schultz, Slotta, Staton, Vinson, Williamson
Electrical and Computer Engineering S.J.T. Owen, Department Head Dearborn Hall 303 (503) 754-3617	Alexander, Amort, Arthur, Bucolo, Engelbrecht, Engle, Forbes, Herzog, Jensen, Kolodziej, Lauw, Lillevik, Looney, Magnusson, Mohler, Plant, Powers, Rathja, Saugen, Short, Tripathi, Weber
Industrial and General Engineering J.L. Riggs, Department Head Covell Hall 210 (503) 754-4645	Fichter, Funk, McDowell, Randhawa, West
Mechanical Engineering J.R. Welty, Department Head Rogers Hall 204 (503) 754-3441	Adams, Boubel, Burke, Bushnell, Calder, Davis, Holley, Kennedy, Larson, Olas, Philbrick, Rawers, Reistad, Saletore, Ullman, Wheeler, Wilson, Zaworski
Nuclear Engineering C.H. Wang, Department Head Radiation Center C 102 (503) 754-2341	Anghaie, Binney, Dodd, Johnson, Ringle, Robinson, Woods