

Station News

Georgia Tech Engineering Experiment Station

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EES Holds "Best Ever" External Advisors' Meeting

Members of the EES External Advisory Board took their annual look at the Station April 6-7 and liked what they saw, complimenting EES on the progress made since last year in cooperative effort and planning for the future.

"We are impressed with the quality of your people, your programs, and the fact that you ask us how to improve," said Dr. Joseph A. Saloom, senior vice president and director, Components Technology Center, M/A-Com, Inc. "We also are impressed by what you know about your markets and R&D trends."

The advisors saw "terrific improvement in cooperative effort," particularly with the establishment of the microelectronics and materials handling research centers. But they still felt that the issue of academic interaction needs to be explored more aggressively.

Dr. George E. Dieter, Dean of Engineering, University of Maryland, commented that EES should attempt to "see what cooperation looks like from the academic side... until you know how they feel, you can't solve the problem." William R. Rambo, senior scientific advisor at SRI International, added that EES and the schools should capitalize on the resources they have to offer each other.

The group was pleased that EES had taken a "first cut" at creating a planning document, and recommended that we "keep at it" in a continuous refining process. They suggested that we focus on questions like these:

- What is our vision for the future? What and where do we want to be — and why?
- What should be our state and national role? Our relationship with industry?
- What are the strategic issues?

What areas do we want to be #1 in and why? Looking at the areas we are working in now, which ones should be increased, decreased, or kept the same in emphasis?

- What should be our relationship with the academic side?
- How should career development and planning be handled for that essential element — people?
- What contingency plans should be made, in case of "surprises"?

They unanimously agreed that EES should change its name to one more descriptive of its mission. Dieter facetiously suggested: Georgia-Tech Research Institute for Technology and Science (GRITS)!

The advisors also urged EES to do political lobbying for measures, such as extension of the R&D tax credit, that affect its well-being.

Dr. David Morrison, President of IIT Research Institute, commented that

the EES and individual lab plans are heavy on the quantitative aspects and the Station must deal with the qualitative aspects. "Are there market needs you want to serve?" he asked. "What will it take to do that?"

Dr. Charles M. Johnson, manager, Advanced Studies & Analysis Division, I.B.M., suggested three program areas to look at: areas of high national interest, possible spin-offs to make Georgia a higher technology state, and research areas industry won't handle.

William B. Leithauser, manager, Facilities Planning & Support Operation in General Electric's Major Appliance Business Group, stressed that if EES planned to grow by 15% a year, personnel training would be an essential ingredient for success.

Dr. Edward W. Ungar, director, Battelle Columbus Division, also attended the two-day meeting, but had to leave before the general debriefing.



Six of EES's external advisors watch Jim Hubbard of EMSL demonstrate the transmission electron microscope. Standing from left to right, they are: William Leithauser, George Dieter, William Rambo, Charles Johnson, Joseph Saloom and Edward Ungar. (Photo by Alan David)

TAL Advises On Deep Basing

"Deep base" concepts have been studied for a variety of defense applications for a number of years. In fact, the Air Force currently is looking at deep basing as a possible long-term solution of the problem of missile survivability and endurance — for the 1990's and beyond. This would involve tunneling thousands of feet into the earth. Such a facility would be required to operate in the pre-attack mode for at least ten years, and for up to one year independent of external support after post-attack "button-up." The complex would include a tunneling machine that could dig out of the cavern in preparation for missile launch, as well as launch control and life support systems for the crew.

A major problem with this concept is how to get rid of the tremendous amount of waste heat that would be generated by the necessary power plant, equipment and people. The tunnel would be insulated from the surrounding rock environment, which at these depths has normal temperatures ranging from 70° to 100°F.

Enter Georgia Tech. The Technology Applications Lab (TAL) and the School of Mechanical Engineering (ME) submitted a joint proposal to study the feasibility of using heat pipes to dissipate the waste heat to the surrounding rock. The Air Force Ballistic Missile Office funded the study for a nine-month span ending this May.

Heat pipes are passive devices that ideally will act isothermally to conduct waste heat from the source to a "heat sink," where the heat is dumped. They are sealed, fluid-filled tubes with wicks. Waste heat applied at the lower end of the tube causes the liquid in the pipe to evaporate. The vapor rises to the other end of the pipe, where it condenses, and the heat is dissipated to the cooler rock surrounding the pipe. The condensate (fluid) travels back down the wick, and the process begins again.

ME Professor Gene Colwell, a recognized expert with 20 years of experience with heat pipes, is co-principal investigator on the project, along with Walter (Bo) Hendrix, chief of TAL's Process Technology Division. Working

with them are Wesley Pidgeon and Michael Brown of TAL and Julio Santander, an ME graduate student.

They have completed a preliminary analysis of the thermal characteristics of the rock environment and are currently involved in the conceptual design phase. "We are executing a conceptual design of a heat pipe heat dissipation system for each practical Deep Base application," said Hendrix. "We also will recommend laboratory and prototype system test programs leading to design information for the manufacture, installation, operation and maintenance of full-scale systems."

Large ECM Upgrade Study Under Way

The Systems Engineering Lab (SEL) is conducting a \$3.2-million program to support upgrade of an electronic countermeasures (ECM) system for tactical aircraft. The basic objective of the study is to define requirements for updating a 10-year-old Air Force ECM pod so that it will continue to be an effective ECM asset for the near- and longer-term.

"The ALQ-131 System Update Missionization Study (SUMS), which includes a major subcontract to ARINC Research Corporation, is probably the largest analytical study in EES history to be focused on a single production system," said Project Director Jerry Heckman. "The monthly workload will peak this summer at a level equivalent to about 33 full-time professionals — 23 at EES and 10 at ARINC."

SEL's Countermeasures Development Division has overall responsibility for the project, with major assistance from the Concepts Analysis Division. Electronics and Computer Systems Lab personnel are assisting in the area of antennas. EES work focuses on ways to improve the pod's ECM performance, while ARINC is assessing improvements in logistics support and operational availability.

The SUMS team is hard at work looking at proposed modifications and available technology, and will make recommendations for integrating modifications into the production system. EES task leaders are Larry Stroud, Bud Sears, Steve Livesay, and Vic Tripp. The program sponsor is the Aeronautical Systems Division at Wright-Patterson Air Force Base.

RAIL To Open Eskimo Camp

Nick Currie, Jerome Callahan and Chris Lott of the Radar and Instrumentation Lab (RAIL) are suiting up for a chilly spring. They will be spending the month of May camping out in a double-wide trailer in a remote location above the Arctic Circle!

Their mission? To measure the radar reflectivity of sea ice in order to discriminate between multiyear (thick) and first-year (thin) ice. They will be making low-angle measurements at 10 GHz, 16 GHz and 35 GHz under contract with the Canadian Department of Fisheries and Oceans.

"The ultimate application," said Currie, "is to allow the petroleum industry to bring icebreaker tankers in so that drilling can be conducted year-round. Currently, they have to shut down about seven months a year. With a shipboard method of discriminating between safe, thin ice and ship-damaging, thick ice, the icebreakers could open up the Arctic oil fields for 12-month operation."

The intrepid EES trio, plus five Canadians, will set up their radar camp on the northwest side of Baffin Island, just south of Lancaster Sound. Currie says the site is 200 miles east of the north magnetic pole and 100 miles west of Greenland. Besides their long underwear, they will be taking radar equipment and a computer for on-site digital analysis.

Currie says they're looking forward to the entertainment provided by a nearby Eskimo village, as well as observing the local wildlife — mainly seals and polar bears. "We'll have an armed Eskimo guard at all times," he said, "since I understand that polar bears are among the few animals that hunt humans for pleasure."

How did this unusual project come about? A couple of years ago, Currie presented a paper on millimeter waves at the URSI Specialist Conference on Land and Sea Backscatter. There he met a Canadian oil company engineer who was seeking information on solutions to the industry's problems with sea ice. A seed was planted which eventually led to this contract with the Canadian government.

Productivity Expert Joins EES Staff

Orlando J. Feorene has joined the EES staff as a principal research engineer to work in the area of manufacturing productivity. He will devote two-thirds time to the resources laboratories and one-third time to activity in the School of Industrial and Systems Engineering.

Feorene is the first of several planned new staff appointments under the Vice President for Research's Senior Research Faculty Leadership Grants program. This program provides up to \$200,000 over a two-year period to support new faculty who will strengthen and/or broaden the national and international stature of Georgia Tech's research program.

An industrial engineering graduate of Ohio State University, Feorene had a 37-year career with Eastman Kodak Company. He rose from supervisor of

ARA Catering Manager Sharyn Henry (right) shared tips on entertaining and party food samples at the Georgia Tech Women's Forum birthday party April 14. Forum officers enjoying the spread are (from left) Rita Bryan, Carolyn Mahafey (EES), Carol Cook, Linda Bowman, Ginny Gross (EES) and Jennifer Tatham. (Photo by Pat Stone)



the Methods Engineering Department to director of the Industrial Engineering Division, and from 1977 until retirement was director of Eastman's Management Services Division. The last position entailed directing a worldwide staff of 1,000 engineers and scientists in management consulting in industrial engineering, computer information and control systems, and operations research.

Feorene is a Fellow of the American Institute of Industrial Engineers. He is a director of the Ohio State University Research Foundation, and received the outstanding and distinguished alumnus awards from the university's College of Engineering. He also represented Eastman on the board of Georgia Tech's Material Handling Research Center.

Professional Activities

ECONOMIC DEVELOPMENT LAB

An article by **Jim Thomas** and **Pamela Esquivel**, entitled "Small Firms Can Export Too," appeared in the March issue of *Apparel Industry*.

Steve Losser gave a presentation on "Trade Adjustment Assistance" in March at the annual meeting of the Hardwood Dimension Manufacturers Association in Bermuda. He and **Ed Lindsey** gave a similar presentation to the organization's board of directors in Atlanta.

Larry Edens performed technical and managerial assistance for the Korea Credit Guarantee Fund in South Korea February 17-March 26.

Jim Muller installed his financial modeling computer program and trained staff members of the Puerto Rico Trade Adjustment Assistance Center (Southeastern TAAC counterpart) in San Juan March 23-25.

ELECTROMAGNETICS LAB

David Schmieder and **Marshall Weathersby** presented a paper on "Measurement of Clutter Effects on Static Target Detection" at the IRIS Specialty Group Meeting on Targets, Backgrounds, and Discrimination held in Orlando February 15-17. They, **Gene Loefer**, and **Mark Finley** are the authors of an article, "An Infrared Background Clutter Model Using 3-D Computer Graphics," published in the March/

April issue of *IEEE Computer Graphics & Applications*.

ENERGY & MATERIALS SCIENCES LAB

Bob Cassanova and **Steve Bomar** gave a presentation on the Solar Thermal Advanced Research Center program at the Department of Energy's Quarterly Review Meeting in Washington, D.C., March 21-24.

John Brown participated in a symposium on Advances in Materials Analysis on April 15 at the American Museum of Science and Energy in Oak Ridge.

OFFICE OF THE DIRECTOR

Jim Wiltse is a session chairman for the Second Workshop on Polarimetric Radar Technology, to be held in Huntsville on May 3. He will chair a session and present a paper at IEEE Ohmcon in Detroit in June. Wiltse also is chairman of the SPIE Millimeter-Wave Technology Symposium, set for August in San Diego.

SYSTEMS ENGINEERING LAB

On April 8, **Jane Batson** spoke to a group of computer and engineering honors students at the University of Alabama on "The Use of Computers in Electronic Warfare."

TECHNOLOGY APPLICATIONS LAB

Mike Smith presented a paper entitled "Evaluation of Heat Recovery Systems in Poultry Processing Plants" at

the 59th Annual Pacific International Egg and Poultry Exposition in San Diego March 16-18.

Wayne Daley was coauthor of a paper entitled "An Experimental Investigation of the Thermal Stability of Multiple Heat Sources in a Moist Porous Medium," presented in March at the ASME-JSME Joint Thermal Engineering Conference in Honolulu.

At the Department of Energy Photovoltaic Systems and Application Project Integration Meeting in Albuquerque April 12-14, **Larry Banta** made a presentation on "Field Site Data Acquisition and Analysis for the Southeast Residential Experiment Station."

Tom McGowan is coauthor of "Experimental Wood Gasification for Textile Drying," presented at the 1983 Industrial Energy Conservation Technology Conference and Exhibit in Houston, Texas, April 18-20. McGowan has been awarded the following patents: "Steam Injection System for Control of Wood Gasifier," "Air Cooled Grate and Ash Removal System for Wood Gasifier," and "Method of Disposal of Tar Effluent While Controlling the Operation of a Gasifier."

On March 29, **Charles Duke** gave presentations for the Georgia Safety Council seminar in Atlanta on "Job Safety Analysis" and "Accident Investigation Procedures."

ALL IN A DAY'S WORK Mechanical Services

This is the first in a series of articles highlighting the work of EES's Service Departments. Leading off is an interview with Carroll Garrett, manager of the Mechanical Services Department (MSD). Garrett came to EES to manage the machine shop in December 1981, bringing with him 27 years of experience in the field. For 7½ years he was manufacturing manager at Scientific Atlanta, supervising 150 employees, and for 8½ years he had his own machine shop.

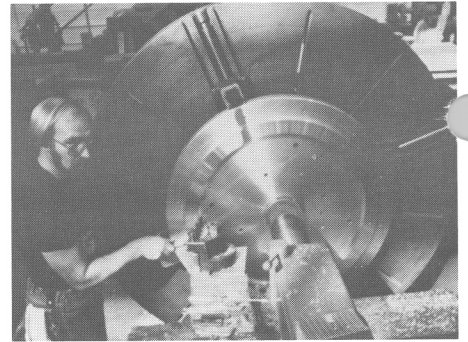
“We’re the manufacturing arm of EES. We provide complete machining, fabricating, welding, finishing and assembly services, as well as consultation in areas of design, methods, costs and proposals. The department has two locations: the main campus shop with 14 employees and the smaller Cobb County facility with 8 people. They have a combined total of over 13,000 sq. ft. of floor space, including

the high bay area in Hinman. We have nearly 90 different machine tools and assorted pieces of support equipment.

We do work for all the labs, but our biggest customers are the Electromagnetics Lab and the Systems and Techniques Lab, followed by the Radar and Instrumentation Lab. The most difficult parts we have to make are mixers for EML. They’re extremely small, high-precision parts that have to be made to close tolerances. We also can handle very large parts — up to 6,000 pounds — with our overhead cranes.

Although most of our work comes from EES, we also receive work from the academic side. We keep busy, but we can do more outside work.

Jobs may come to us in the form of engineering drawings, a simple sketch, or verbal instructions, depending on complexity. One thing we can be sure of, though: Because of the R&D nature of the projects at Tech, most jobs provide unique challenges and skills not



Carlton Osborne turns a tapered ring in the EES machine shop's 65" swing Safap lathe. (Photo by Tom Brown)

required in the average machine shop. Our 22-person staff includes skill levels ranging from mechanical technician I to instrument maker, but we have a lot of outstanding people with a tremendous background of experience and expertise, and I would like to see them utilized more fully.

One area where we could be used more is in manufacturing consultation on costs, tooling, design, scheduling, mil spec requirements, etc. We also have a fairly extensive inventory of materials, and this can save the client time and money.

We have a vigorous program of replacing and upgrading equipment. In the 16 months I've been here, we have bought five new major pieces of equipment, and will add two more before June 30. We're excited about a very sophisticated piece of numerical control equipment we're getting next fiscal year — a CNC milling machine.

Our people have a tremendous sense of accomplishment and pride in the work they do, and are always asking how they can better serve the labs and how they can help sell EES. Our goal is to provide the labs with the services and products they need. //

Strictly Personal

ECONOMIC DEVELOPMENT LAB

Ed Lewis has resigned as director of the Southwest Georgia Area Office in Albany. Administrative Assistant **Joan Meeks** also has resigned.

Jim Muller has transferred from TAAC in the Business Development Division to the Industrial Extension Division, where he will work on manufacturing productivity.

Welcome to **E. Gerry Doubleday**, senior research engineer in the Business Development Division, and to the following new employees in the Environmental Safety and Health Division: **Rufus C. Williams**, clerk-typist II, **Lauri S. Baker**, accident prevention officer, **Daniel J. Ortiz**, research associate I, and **Martin T. Milton**, research associate I.

ELECTRONICS & COMPUTER SYSTEMS LAB

The Command and Control Branch has attained Division status; **Bennett Teates** is division chief.

Welcome to **Calvin Jameson**, research engineer II in the Electromagnetic Effectiveness Division, and **Judy Post**, research scientist I in the Command and Control Division.

Judy and **Juan Santamaria** are the proud parents of a son, Jason Charles, born April 8.

ENERGY & MATERIALS SCIENCES LAB

Ginny Gross has been named program coordinator for the Georgia Tech Women's Forum.

OFFICE OF THE DIRECTOR

Administrative Secretary **Kathy Barbay** has resigned effective April 27.

RESEARCH COMMUNICATIONS OFFICE

Our deepest sympathy to **Jackie Erney**, whose brother died April 8.

SERVICE GROUPS

Supply Services welcomes **Junice Hall**, clerk-typist II.

Mildred Heyser, Accounting, is conference leader for the Southern Baptist Convention's Adult Sunday School Training Clinic.

SYSTEMS ENGINEERING LAB

Concepts Analysis Division: **Mary Ann Ingram** has come aboard as a research engineer I, and **Gretchen Lochridge**, clerk I, has resigned.

Electronic Support Measures Division: Congratulations to **Henry Owen** and **Steven Olivier**, who received their master's degrees in electrical engineering in March.

TECHNOLOGY APPLICATIONS LAB

Queen Buford is transferring to the Economic Development Lab, where she will be a staff assistant.

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