FY 1987: A Year of Transition

GTRI Director Donald Grace characterized FY 1987 as a year of transition in his look at ‘GTRI—Present and Future’ during the GTRI employee meetings held October 13-16. "But we’re in much better shape than a year ago. I’m more confident about the shape we’re in, where we are, where we’re going, and the role we all will play in it," he said.

He stressed that GTRI had come through the year successfully despite painful, but necessary, changes in the way it does business. GTRI is growing in every way—in research contract volume, research quality, personnel, and in other assets, he said.

Dr. Grace first focused on the causes for this transitional state: the death of President Petitt, with its fallout of administrative changes; implementation of the new cost recovery system; the delay in final government approval of the new overhead rate; uncertainty and fluctuations in major programs, such as SDI; and trends toward larger, more interdisciplin ary contracts.

Turning to positive results, he revealed: "We experienced more benefits than we expected at the end of the first year of the new cost recovery system. Instead of the $5 million in cost overruns we expected in the changeover, they totaled only $1.6 million. And we had more than $1 million left to spend on capital equipment—the most we’ve had since 1983."

Another new direction is a deliberate effort to get researchers more involved in management decision-making. The nine cost reduction task forces have made their recommendations, Dr. Grace said. He expects the committees to go on with implementing their recommendations—probably with significant changes in committee memberships.

Other important committees at work are a task force for the development of new broad-based contract vehicles and the Senior Technology Guidance Council, which has developed a list of underpinning technological thrusts that will be targets for internal research support.

GTRI has submitted a $1.25 million request for increased continuation funding to the legislature that would bring that component of State funding to $10.75 million. At least one half is required for increased out-of-pocket costs, such as utilities, increased retirement benefits, and pay raises. The other half would be used for internal research and capital equipment.

Touching on objective measures of growth, Dr. Grace said total GTRI expenditures were $75.1 million in FY 1987 and are projected at $85.5 million for FY 1988. Sponsored personal services were $25.4 million in 1987 and are estimated at $29 million in 1988.

Total GTRI staff stood at 1,370 at the end of FY 1987, the first time this figure has risen above 1,200 since 1983. FY 1988 total employment is 1,422 as of September 30.

Vital Statistics

How did GTRI fare in FY 1987? Here is a comparison with FY 1986:

<table>
<thead>
<tr>
<th>Category</th>
<th>FY 1986</th>
<th>FY 1987</th>
</tr>
</thead>
<tbody>
<tr>
<td>Expenditures</td>
<td>$122.8 million</td>
<td>$125.4 million</td>
</tr>
<tr>
<td>Total Expenditures</td>
<td>$65.8 million</td>
<td>$76.1 million</td>
</tr>
<tr>
<td>Proposal Activity</td>
<td>$13,000</td>
<td>$14,000</td>
</tr>
<tr>
<td>Awarded</td>
<td>$75.5 million</td>
<td>$80.3 million</td>
</tr>
<tr>
<td>Research</td>
<td>$105,500</td>
<td>$117,400</td>
</tr>
<tr>
<td>Industry</td>
<td>$65,983</td>
<td>$69,456</td>
</tr>
<tr>
<td>Full-Time Professionals</td>
<td>1,643</td>
<td>1,756</td>
</tr>
<tr>
<td>Full-Time Support</td>
<td>1,043</td>
<td>1,127</td>
</tr>
<tr>
<td>Part-Time Staff</td>
<td>1,000</td>
<td>1,067</td>
</tr>
<tr>
<td>Students</td>
<td>1,000</td>
<td>1,080</td>
</tr>
</tbody>
</table>

There will be no GTRI-wide Christmas party this year. Instead, GTRI will have a social event—probably a picnic— involving entire families in the spring or early summer. It promises to be a super new tradition!

Why no Christmas party? The GTRI administration asked the administrative network representatives to poll the labs and service groups. They asked employees how they felt about the Christmas party and what alternatives they would suggest.

Back came the consensus of replies: Schedules are already too full in December. Most units have their own smaller parties. The GTRI party involved employees only—families weren’t included. It didn’t accomplish its goal of getting the Cobb County and campus folks together.

The most prevalent suggestion for an alternative function was a picnic or similar event. People said they wanted the GTRI party to be at a time of year with a less crowded social calendar. They also suggested that it be on a nonworking day so the employees’ families could participate. A picnic, they pointed out, would be something that the entire family could enjoy. And its informal nature would be more likely to foster interaction among the GTRI staff.

Committee to Plan Social

A committee chaired by Lee Hughley soon will begin exploring what kind of event will replace the Christmas party as well as how to proceed with planning it. If you are interested in participating in this effort or have ideas to propose for consideration, contact Lee Hughley. Write him at GTRI-RCO, 227 CRD; send him a PROFS note, or call him at 4-3444.

Technology Areas Selected

The following areas have been selected by the Senior Technology Guidance Council as targets for internal research funding. A full report on these areas and the Technology Area Guidance Teams appointed to define research programs within each area will be in the next Connector.

- Low observables
- Software computer technology
- Coherent radar technology
- Antenna development
- EW techniques and technology
- Multiplespectral sensors
- Compressive receivers
- Environmental sensing
- Applications of coherent sources
- E/O materials and applications
- Space power
- Process chemical technology
- Strategic materials

Published monthly for employees of the Georgia Tech Research Institute

Volume 4 Number 1

October 1987
Chemical Vapor Deposition: A New Way to Make Less Brittle Ceramics

by James E. Kloeppe, RCO

Imagine never again changing your car’s engine oil, or worrying that your radiator may overheat. In the future, engine lubrication and cooling systems may become unnecessary, thanks to recent advances in ceramics technology.

Ceramics are remarkably useful materials. Install a ceramic component in an aircraft engine, and it keeps its shape at temperatures that would melt metal. The part is also less susceptible to fatigue and wear, doesn’t corrode in the presence of moisture, and is relatively lightweight.

But one major drawback has limited the industrial use of ceramic materials. If struck sharply, they often shatter like glass. Because of their brittleness, ceramics cannot be trusted for many high-stress applications.

To make ceramics more durable, research scientist Jack Lackey in the Energy and Materials Sciences Laboratory is using a process known as chemical vapor deposition. In CVD, two or more chemicals in gaseous form flow into a furnace, where they are heated. When they get hot enough, the gases react and produce a solid deposit on a substrate located in the furnace. While CVD has been used in the manufacture of such familiar items as cutting tools and optical coatings, the technique has been applied only recently to ceramics.

Before establishing a structural ceramics CVD research effort at Tech in early 1986, Lackey was a researcher at Oak Ridge National Laboratory. There he developed a faster technique, now patented, which cut the CVD infiltration time from weeks to hours. At Tech, Lackey is continuing his research into the deposition process, and developing a variety of ceramic coatings and composites that can survive in such structural applications as turbine blades, missile nose cones, and piston rings.

Fiber-Reinforced Composites

For example, Lackey’s group is creating innovative fiber-reinforced composites by chemically depositing a ceramic material onto, around, and within a fibrous form. “As the coating deposited on the fibers becomes thicker and thicker,” explains Lackey, “the voids become smaller and smaller.”

The fibers making up the form strengthen the composite, much like a steel reinforcing bar strengthens concrete. Fiber-reinforced composites formed by CVD are denser and stronger than those generated by conventional techniques.

Superconductor Components

In a similar approach, Lackey’s group is investigating the possibility of using CVD for mass-production of special superconductor components such as magnets. “Because the new high-temperature superconducting material is a brittle ceramic,” says Lackey, “it is difficult to fabricate intricate shapes by conventional means.”

Under a recently awarded grant from the National Science Foundation, Lackey is teaming up with Brent Carter and Norm Hill of Tech’s School of Materials Engineering to explore the feasibility of depositing the new superconducting material by CVD.

Built-in Lubricants

Another type of ceramic composite Lackey and his coworkers are experimenting with is a dispersed-phase composite, created by depositing a number of materials simultaneously onto a substrate. One extremely useful application of this technique arises when boron nitride—which acts as a solid lubricant—is one of the deposited materials. By incorporating such a built-in lubricant, these new composites could be used under conditions where normal oils break down, such as at high temperature and in space.

High-Temp Engine Parts

“There is a lot of interest right now in developing ceramic piston rings and cylinder liners for diesel engines,” says Lackey. “These ceramic parts could operate at higher temperatures, increasing engine performance and efficiency, while thermally insulating the metal engine block from the severe heat.”

Because a considerable portion of an engine’s energy goes into circulating the lubricant and coolant, an ultimate goal is to do away with engine lubrication and cooling systems altogether. While not yet rolling off the assembly line, some Nad ceramics research the cars of tomorrow may just be down the road.

Library Supports GTRI Research Needs

by Karen Pedersen, Library

As part of the Georgia Tech Library’s continuing effort to support the research activities of GTRI faculty and staff, the position of GTRI liaison librarian has been created within the Research Information Services (RIS) department. Recently, the library was hired to assume these duties.

Access to a wide range of up-to-date information is essential to GTRI’s ongoing research and development operations, and the Library uses a variety of computer-based information resources to meet this need. The Library’s Online Information System, which is available through the campus computer network, comprises the Georgia Tech Library Catalog plus several periodical databases—Magazine Index, Management Contents, Trade and Industry Index, and Computer Database. The Library also plans to load some technical databases in the near future.

In addition, the Library houses several compact disk searching systems that provide demographic and business/financial data. These easy-to-use, interactive systems utilize a microcomputer to search databases contained on compact disks.

The mission of RIS is to provide information services to campus researchers. One service is online searching of computer-readable databases. Database searching may be used to locate journal articles, technical reports, patents, standards, statistical data, federal contracts, information about corporations, news items, and much more. There are databases covering virtually all subject areas and types of material.

The advantages of database searching are in-depth retrieval of information and the option of obtaining your results in machine-readable form for later manipulation by a word processing program. Some databases also allow downloading data into Lotus 1-2-3. For example, the Wharton Econometrics databases contain time series data that are suitable for spreadsheet presentation. Search results from DMS Contract Awards, a database of all unclassified U.S. government prime contracts of $25,000 or more, may be downloaded in a format compatible with software packages like Lotus or DBase. Through the LENDS Service, RIS will deliver library materials, including books, photocopies of journal articles, and microfiche copies of technical reports to campus locations. RIS also will request photocopies or loans of library materials not available at Georgia Tech from off-campus sources. You may request this service by calling RIS at 894-4511, by campus mail, or by using VMAL, PROFS, or the electronic messaging feature of the Library’s Online System.

RIS can support your research through a wide range of other information services. Please contact us at 894-4511 about your library research needs.

GTRI to Have Open House

GTRI will hold Open House, along with the academic colleges, as part of the activities offered during Alumni Homecoming Weekend. The Open House will be Friday, November 6, 2-4 p.m. GTRI activities will center in the Baker Building. Nick Faust will demonstrate the geographic image processing. Garth Freeman will demonstrate applications of the scanning electron microscope; and Paul Wine will show how lasers are used in atmospheric chemistry research. Tours will begin every 20 minutes from the Baker auditorium. Also in the auditorium, the new laser disk program, "Research at GTRI," will be shown continuous- ly and refreshments will be served. All GTRI staff members are invited.

UNITED WAY
Norwegian Scientist at EML for Sabbatical Year

Dr. Rolf B. Haugen, a visiting scientist from Norway, is spending his sabbatical year working in the Physical Sciences Division of the Electromagnetics Laboratory (EML). Dr. Haugen is head of a group in the Norwegian Telecommunication Research Department that performs research in the areas of fiber optics, microwaves and communications, and signal processing and satellite communications.

At Tech, Dr. Haugen is researching the physics behind optoelectronic devices, such as light modulators, lasers, switches and photodetectors. He came to Georgia Tech because of its work in semiconductor growth techniques, specifically molecular beam epitaxy (MBE). "We are planning to build an MBE lab in Norway," Haugen says, "so my U.S. visit is focused on investigating this technique."

Dr. Haugen has already spent two months at Varian, the company that built Georgia Tech's MBE equipment. "He's brought us a new technique from Varian that is working very nicely here," says Dr. Chris Summers, chief of EML's Physical Sciences Division. "It's an extremely precise tool for measuring atomic layer-by-layer variations in very thin film crystal growth."

Dr. Haugen is participating in the work conducted by Dr. Summerson's group in building superlattice structures based on layers of different semiconductor materials. If you are interested in a list of software available in the Software Evaluation Lab, the CRSD Helpdesk has a list available. The list of software available is listed below.

Dr. Haugen will be at Georgia Tech for a year. (Photo by Joe Schwartz)

If you are interested in a list of software available in the Software Evaluation Lab, the CRSD Helpdesk at 477-1373 has a list of which software is available.

**Software Evaluation Lab**

by Pat Mathiasmeier, CRSD

The CRSD Information Center provides a software library checkout service to Georgia Tech employees and departments to help the Tech community make more informed software purchasing decisions. The Software Evaluation Library contains software that has been purchased for the Training Facility and is not currently being used in CRSD, as well as software donated by the Office of the Vice President for Research and IBM. Georgia Tech employees may sign out software for evaluation.

The library was established so that departments and individuals who are making software purchasing decisions will be able to test their data with several packages in order to make the best decision. Copies of older versions or some software also are available for those with old data and no way to read it.

Individuals signing out software will be given a copy of the President's letter of August 22, 1986, outlining the Georgia Tech policy on software piracy. They will be asked to sign an agreement stating that the software will not be duplicated while in their possession. It is NOT to be copied or used by departments in lieu of purchasing.

Individuals may check out one piece of software at a time for a period of four weeks. If someone else requests the software during this period, the user will be asked to return it after two weeks. Lost or damaged software or documentation will be replaced by the responsible department.

Departments with software that is no longer in use can donate it to the Software Evaluation Library. This will give other units a chance to evaluate it.

ECONOMIC DEVELOPMENT LAB

David Clifton has been appointed to the advisory board for the Georgia Governor's Growth Strategy Commission.

Carol Allen has been named editor of the newsletter of the Atlanta section, Society of Women Engineers. In early October, Art Brown gave a presentation on "High Development in Hazardous Waste Management" at the Association for Solid Waste Management Professional Fall Conference in Atlanta (GA) and served on the panel for waste disposal and treatment options at the American Institute of Hydrology Annual Fall Conference in Atlanta. He also was appointed environmental control editor for "TAPP Journal." New research covered significantly to the 10th World Energy Engineering Congress, in Rome, Italy, in late September. Alan Paechek made a presentation on "The Georgia Energy Analysis and Diagnostic Center." Doug Moore on "Energy Usage Modeling through Statistical Analysis," and Mike Brown on "Economic Efficiency of the Innovative Environmental Service." In mid-October, John Adams and Doug Moore spoke on energy conservation and energy efficiency to the Naval Facilities Engineering Command in Charleston.

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PERSONNEL NEWS

ECONOMIC DEVELOPMENT LAB

James B. Officer has been named director of the Madison Regional Office, and Rick Duke has been named deputy director of the Raleigh Regional Office.

Bob Lane now heads up the Applied Research Branch in Durham under new head John Ward Leon. The branch has added Richard Tate, SRS, to its staff. Meeting Coordinator Joe Yarbrough is now working full time as a RA’s aide. Scott Rice, a Rome Regional Office, now heads the Technology Center, has two new RE’s: Mike Little and Mike Davis.

Paul Beauregard is a new chemical technician III in the Analytical Instrumentation Branch, and Susan Horn is a new RE I in the Safety Group.

EDUCATION LAB

Charlotte Jacobs is a new RE II in the Millimeter Wave Technology Division. She has just completed her Ph.D. in industrial and systems engineering at Georgia Tech, and previously taught at the University of Alabama. Jacobs has been with the Branch since 1983 as an intern. She is married to Jeff Jacobs.

SYSTEMS LAB

V. Thomas Barnhouse has joined the Electromagnetic Effectiveness Division as an RE II. She formerly worked at TelEkidy in Falls Church, VA. She was named to high-power microwave and millimeter wave américan nationaliste, and recently received an engineering degree from the University of West Florida. Her husband has joined the university faculty as well, and their home is located halfway between the two, (wherever they’ll get at the Tech-Ga game) and their son has recently joined them.

Dr. Francisco Stolze has retired.

OFFICE OF THE DIRECTOR

Gay Farnsworth, former student assistant and member of the Alumni Affairs Committee, has returned to Texas to begin her Air Force career.

BAA’S AND INSTRUMENTATION LAB

Congratulations to Helen Williams and Phyllis Hinton, both promoted to word processor specialists, and to Annette Weinerbarger, promoted to senior secretary.

Janice Dietz is a new clerk typist I in the Technology Development Division. Welcome to GRAs Kristi Jenoff, Nilsen, William Powell, Robert Stroud, Joseph Mydans, Carson Hanner, Kenneth Harrison, Robert Vargo, and Michael Nett. Also, congratulations to Glenn Service Groups.

Human Resources welcomes Paulette Colon, senior secretary, and Christopher Ruffin, clerk typist II.

Mike Biddle to Willie Brown, Support Services, and Portia Hudson, Facilities Management.

SYSTEMS ENGINEERING LAB

Walter Addison was well-deserved the month’s Gift of the Award in August for successfully coordinating the writing and editing of our volume final report. The report was completed according to the original schedule despite a three-month halt in the project caused by the government sponsor and the resignations of the project director and engineering secretary originally charged with writing the report.

The Concepts Analysis Division welcomes seven new employees in the Human Performance Branch. Mike Kelly is a new PRS, and Kathie Coogler is the new branch secretary. Coogler received a B.A. (magna cum laude) in journalism from Georgia State University in August. In the Mission Analysis Branch, Martin Uhlira is a new SRS, coming to Tech from UCR, and Robert Hanna, a new RE I in the CAD art department. Finally, Tom Simmons and Bill Klein have joined the Sensor Performance Branch as GRAs.

The Electronic Support Measures (ESM) Division welcomes two new GRAs: James Corbett, Rob Butser, and Jeff Dillon as co-ops, and the following GRAs: Phillip Bergmeier, Mike Childers, Scott Reuter from ECRD, Henry Hendri, Mike McClanbor, Robert Rabaud, Rich Warfield, and Allan Williams.

Former co-ops Byron Coker and Lee Evans have joined ESM as RE I’s. Coker is in the Surveillance Technology Branch, and Evans is in the Emerlant Identification Branch.

Nell Lareau has joined ESM as an RE II in the Surveillance Technology Branch. She was an RE I in the Defense Systems Division a few years back.

SEL editor-in-chief Bill Williams has resigned. Also resigning is Susie Drake, who is getting married and moving to Arizona.

MARKETING & TECHNICAL SERVICES

Wade Garreno has joined the Advanced Technology Division as an SRS. A U.S. Air Force veteran, he received his MSE from the Air Force Institute of Technology. Wright-Patterson AFB. In his most recent assignment at Eglin AFB, he directed the procurement of threat simulators for the tactical fighter aircraft.

Terrie Parra has joined the Defense Electronics Division as an electronics technician I.

Vincent Luciani and Linda Rechmann Selek are new GRAs.

James P. Jacobson resigned to serve our country as a second lieutenant in the U.S. Air Force.

The majority of this staff gain is due to an increase in student employment, Dr. Grace noted. "Many of our graduate research assistants have risen from a low of 75 in 1984 to 170 currently. Our fiscal engagement appears good," Dr. Grace said. "The first quarter of FY 1988 saw total research awards amounting to $28.4 billion, more than twice as much as for a similar period in any year in the past. This figure represented 108 separate contract awards. He added that, as of August 31, 1987, the number of research proposals outstanding was up 40% and the dollar volume of proposals under review was up 50% from the same time in 1986—amounting to some $250 million!" (See box, page 1.)

"In summary," Dr. Grace said, "The challenge before us is to ensure that, with the expanding backlog, we continue to emphasize high-quality research and hire only quality people. The internal research expendi tures are directed toward improving the center of gravity of our research capability. Our organizational structure enhances, and does not inhibit, our ability to work on multidisciplinary programs. We properly leverage our considerable investment in GRAs—both to their and GTRI's benefit. We never forget that our real strength is in our research and support staff—it is they who make GTRI a great place to work."