

**Annual Report for Period:**08/2005 - 08/2006

**Submitted on:** 06/06/2006

**Principal Investigator:** Benefield, Larry D.

**Award ID:** 0332594

**Organization:** Auburn University

**Title:**

Initiating and Sustaining Industrial Renaissance through Innovative Partnerships (ISIRP)

### Project Participants

#### Senior Personnel

**Name:** Benefield, Larry

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

**Name:** Raju, P.

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

**Name:** McCord, Robert

**Worked for more than 160 Hours:** No

**Contribution to Project:**

**Name:** Sankar, Chetan

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

Develops the KSS System for the project

**Name:** Beale, David

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

Conduct team plant analysis, short course training, and senior design projects

**Name:** Overfelt, Tony

**Worked for more than 160 Hours:** No

**Contribution to Project:**

Conduct team plant analysis, short course training, and senior design projects

**Name:** Smith, Jeffrey

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

Conduct team plant analysis, short course training, and senior design projects

**Name:** Tarrer, Ray

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

Conduct team plant analysis, short course training, and senior design projects

**Name:** Wetherby, Dennis

**Worked for more than 160 Hours:** No

**Contribution to Project:**

Recruit minority students to work on the project

**Name:** Bastuscheck, Jeffrey

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

Helps coordinate the functions of the extension agents in the project.

**Name:** Burch, Thomas

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

Dr. Burch is working with Dr. Tarrer in the area of pollution prevention and process design.

**Name:** Crayton, Evelyn

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

Dr. Crayton replaced Dr. Warren McCord and coordinates the work of the extension agents in this project.

**Name:** Strawn, Harry

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

Liasion with the county extension agents

**Name:** Harris, Shirley

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

Director of BMEP Program

**Name:** Crayton, Evelyn

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

## Post-doc

### Graduate Student

**Name:** Noll, Patrick

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

Designs the web site for the project

**Name:** Cumbie, Barry

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

In charge of designing and implementing the Knowledge Sharing System

**Name:** Harris, Nicole

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

Helps design and implement the Knowledge Sharing System

**Name:** Hegde, Seema

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

Develop and maintain KSS

**Name:** Mole, Tracey

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

Conducted project with OREX as part of Ph.D. dissertation

**Name:** Montgomery, Gina

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

Development of KSS

**Name:** Dyar, Matthew

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

Development of KSS

### Undergraduate Student

**Name:** Mixon, Elias

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

Helps design and implement the Knowledge Sharing System

**Name:** Reed, Brandy

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

Helps design and implement the Knowledge Sharing System

**Name:** Rudy, Shaun

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

Works with county agents and industry professionals

**Name:** Meade, Kelli

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

Worked on the KSS

**Name:** Robinson, Britni

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

Help faculty member on a project

**Name:** Kemp, Jontrez

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

Help faculty member on a project

**Name:** Johnson, Tocarra

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

Assist a faculty member on the AETAP project

### Technician, Programmer

**Name:** Drummond, Janice

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

Coordinates the operations and logistics of the project

**Name:** Hardy, Yvonne

**Worked for more than 160 Hours:** Yes

**Contribution to Project:**

Mechanical Engineer works with county agents and industry professionals

## **Other Participant**

### **Research Experience for Undergraduates**

## **Organizational Partners**

### **Alabama Power Company**

#### **ADEM**

Partner needed help with a condenser design. Last years' design was requested. ADEM provided a set of guidelines for efficient emissions standards for the situation the company was facing and these were used to help solve the problem. Further contact made during 2004-2005.

#### **Akzo Nobel**

Extended expertise to partner regarding the possibility of using ALS as a glue extender.

#### **AMERICOLD**

Partner wanted assistance with a safety inspection. Initial contact was with regard to a safety audit of their facility. In addition, they had some specific safety-related questions. Jerry Davis (ISE) spoke with them and referred them to the SafeState project headquartered at the University of Alabama.

#### **Anvil Corporation**

Provided valuable information regarding the use of CLS in gypsum.

#### **Astea**

Contacted partner about potential benefits of controls engineering which AETAP could provide.

#### **BASF Corporation**

Provided joint collaboration and suggestions on OREX project in polymer coating

#### **Bayer Chemical CO**

Explained two applications that AETAP have for MDI. Bayer identified individuals within the company with whom to work. Mark is with their Business Development/Synthetic Rubber section and will help select a good cursor linking agent for the ligno sulfonates. Reached technical support.

#### **Borden and Remington**

Partner agreed to work with AETAP and contributed samples of NS.

#### **BP**

BACA Product usage and marketing research. Asked for help in: using CLS, ALS & CLS from BP used in other projects; identifying new markets to sell product; and facilitating the possible sale of products to new industries. Supplied fuel for International Paper to use.

Made 37 contacts with the organization.

Made 9 more contacts on TCLP test. If the material passes the TCLP test, it will be worth \$44 million to BP.

#### **Carmeus**

Notified Thompson of the meeting time with Georgia DOT

#### **CESCO**

The partner needed defoamer samples.

#### **CET, Inc.**

Asked what levels ETI will have to meet in Pennsylvania as a client discharger.

#### **Chemical Lime - Montevallo**

Offered assistance and materials related to pavement technology.

#### **Chemical Products**

Pattie tests were performed.

85 phone calls, 5 E-Mails and 1 visit were performed.

#### **Chevron**

Partner Company uses a co-polymer in the Orex project; Further contacts were made.

#### **Coach Comm**

Needed assistance

#### **Consolidated Electrical Distribution**

Disseminated relevant research about previous projects.

#### **Continental Carbon**

Continental Carbon contributed a sample of CLS for research purposes and provided a type of carbon block that is needed by Resource Innovations, Inc. Partner company allowed us to work in their laboratory to prepare data showing the effectiveness of ligno-sulfonates in asphaltic pavement.

#### **CTS Industries**

Sent samples to partner of propylene glycol (PPO) samples to partner and offered assistance in freeze conditioning agents.

#### **E. R. Alley Associates**

Scotty wants to take CHMM tests at Auburn and needs some assistance.

#### **East Alabama Pavement**

Partner needed boil tests performed for CLS/Ca(OH)<sub>2</sub> treated aggregate. Applications of ALS in asphaltic pavement were also tested. A student performed the boil tests on site.

#### **Enviro Tech**

CLS samples and Lottman Tests were performed. There is some interest in purchasing ALS.

#### **ETI**

Partner needed help with waste water COD effluent emission problems. Another company's design was given in assistance. Partner also needed help in meeting effluent standards. General information was sent and there were discussions about this issue. Partner needed help with decontamination of oil pipes. A representative agreed to contribute to a video segment for AETAP.

79 contacts were made. Funding of \$50,000 received.

#### **Florachem**

Contacted Florachem to determine if they were interested in a previously created design of a B-pinene to myscene reactor.

#### **Georgia Highway Dept.**

Meet with company officials to discuss project

9 contacts were made and 1 visit was organized.

4 contacts on Ag Soils analysis project were made.

#### **GA Department of National Resources**

Called regarding listing of hexane as an HAP and to see if substitutes will be preferable. Hexane has been listed as a HAP.

### **Georgia Power Company**

Georgia Power is looking for a chemical engineer in the environmental area. Sent 6 to 8 resumes of possible candidates for the post.

### **Global Stone**

Discussed the dispersion of hydrated lime in asphaltic pavement with partner and informed them of strategies to employ with ALS.

### **Harris & Ford**

Partner needed help with the use of binder.

### **Huntsman û Mobile**

Inland-Application of asphaltic pavement, Enols-Fatty Acids, and Teraphathalic Acid.

### **Inland Rome**

Inland Rome has provided funds for the support of graduate and undergraduate students to study alternative uses for ammonium ligno-sulfonate (ALS), which is a byproduct of the paper making process. Currently, this product is used primarily for dust control and other low value applications. Inland has partnered with Auburn to identify and develop alternative, higher value uses. In addition to financial support, Inland has provided technical expertise, logistical support and market research.

Partner needed help with making CLS samples. A status report was sent. Partner requested assistance in developing ways to use CLS in wall board production in order to increase machine speed, reduce energy requirements, and generally speed up production.

### **International Paper**

Asked for help with regards to agent products. Asked about the use of BP BACAS for fuel. 24 contacts were made.

### **LAFRAGE**

Spoke with Mr. Rose about who to work with regarding calcium ligno sulfonate. Inquired about use of calcium ligno sulfonate as cement retardant.

### **M & M Consulting, Inc**

An analysis was sent to the partner, who was also informed how to classify the material and how to use the analysis as a supporting document. The company is looking for students to assist with enforcing regulations. The company made a donation in the amount of \$1,000 for student regulatory projects. After assisting with a previous successful project, they wished to contribute to student projects. 32 contacts were made.

### **Marie Venner**

Partner needed help with highway practices. A request was made for a copy of a report that was submitted by Mr. Tarrer 10 years ago.

### **Mcperson Oil**

Talked about possible project û Recycling of coolant. Provided information on the fuel mixture that ER Snelling (a hot mix plant) in Georgia prefers.

### **Meade Coated Board**

Asked for student to act as process control person.

### **Mikrotech MED**

Partner company wants to switch from natural gases to oil-fiber boiler; They are looking for a certified group to install their burners.

### **Mississippi National Guard**

In response to a request for assistance with hazardous materials management, offered copies of the lectures and tests used to study for CHMM.

**National Gypsum Board**

Partner provided information about the attributes of LS for reducing water requirements in producing gypsum board, and agreed to participate in evaluating samples.

**Nidek Medical**

Mr. Henry Burdick, Director of Auburn Technical Assistance Center (ATAC), passed on a lead about Nidek Medical being very interested in exploring how much Auburn could assist them with specific issues of quality and manufacturing of a key part (poppet valve) used in some products. Nidek is a company located in Birmingham, AL, having approximately 60 employees and some \$15 million in sales. They make oxygen concentrators, analyzers and nebulizers under the brandnames Mark V, Palmo Mist, and Oxycheck. The contact comes by way of delivery of some lean manufacturing training to their workforce. Their president asked how they could get some help in the ME area.

**Northway Lignin Chemicals**

Partner company handled the sample of Inland's product (ALS) and provided an analysis of the sample.

**Orex**

Orex has provided continued financial support for research and development of new PVA based products. Orex makes and sells disposable PVA products such as protective clothing, gloves and booties to the nuclear industry. These PVA products can be dissolved in water allowing the radioactive particles to be captured by filtration. This process allows a sizable reduction in nuclear waste. Orex has provided financial support for a doctoral student in chemical engineering for the purpose of developing new products based on this technology.

In addition to the financial support, Orex has provided additional testing activities in actual nuclear facilities, final processing tests, and market analyses for the new applications.

20 contacts were made.

**Owens Corning Fiberglas Corporation**

Discussed the use of TPA in roof shingles

**Parsells**

Parsells do not use anything like ALS. They make a spherical form of fertilizer. 2 contacts were made.

**Pavement Technology**

Partner company wants to use ALS in asphaltic pavement. 9 contacts were made.

**Prolific Plastics**

Offered help in recycling used oil.

**Pure Fuels**

Advised partner on how to initiate a new business in the area of used oil collection and processing.

**REH**

Provided a solution to their problem after testing. Also hosted several student projects.

**Resource Innovations**

Partner wants to implement a new project with BP's BACA product; three project proposals were derived from a site visit with a student ambassador: 1. Computer Driven Plunger Pump for improving heat transfer; 2. Use of Cuccolini Vibrating Screen Filters as approved for centrifuge; and 3. Evaporating waste water in boiler. Partner would like a rough design for a condenser/decanter system. The partner also agreed to do a video segment for AETAP.

30 more visits were made. Research for a Ph.D. dissertation is currently underway in cooperation with this client.

**Rheem Water Heaters**

Dr. Lall and Yvonne Hardy visited Rheem Manufacturing Company and met with Kendra Cleghorn, Stephen Guy, Joseph Philio and a representative from U. S. Steel who now works with Rheem. Rheem discussed with Dr. Lall and Yvonne Hardy how Rheem wants to challenge thicknesses in the heads and bottoms specifications for hydrotesting.

The group from Rheem wanted to know if AETAP could help them with this challenge. Dr. Lall acknowledged that AETAP could assist Rheem with their project. Kendra Cleghorn wanted AETAP to write up a proposal as soon as possible so that we could begin working on the project. Dr. Lall and Dr. Raju immediately developed a proposal for the project and sent it to Kendra Cleghorn and Rheem for approval. Kendra Cleghorn called Dr. Lall and Dr. Raju for clarification on the three tasks listed in the proposal. They discussed the type of input Auburn would need from Rheem in order to complete the tasks. The Auburn team told Rheem executives that task one and task two need to be completed in order to produce results in task three. In other words, if Rheem wants Auburn to conduct only one of the tasks initially, it should be task one.

Visited Rheem to discuss senior design projects.

### **Royal Jones**

Partner contacted Honduras plant about the potential for using ALS as a binder for shrimp.

### **Sanderson Farms**

There was a problem with their pelletizing mill. Suggestions were provided and the mill is working well now. There was a pilot study including a trial of ALS. Suggested that when storing the ALS, it is best to use a tank within a tank. Partner company will be willing to try a tanker load of Inland's material.

One contact was made.

### **Sherman Concrete**

Partner provided a sample of concrete admixture for research.

### **Southern Company Services**

Partner needed help with assessing the possible use of ALS in electrostatic precipitation and the treatment of coolant water. This resulted in a negative recommendation, i.e. against doing so.

### **Southern Cooperative**

Provided information to partner about using ALS as a less costly alternative to CLS.

### **Southern Lime**

Testing the lime components used to pelletize. The project involved the application of CLS in asphalt pavement dispersant.

### **Southern Patio**

Supported a student project, with five students on the team, to improve the design and lower the cost of a manufactured awning.

### **Sygenta (Renascens)**

The company is interested in ALS. Identified a couple of small consulting groups that have done marketing work in the area of ALS before. Renascens has applied for a SBA loan; With such a loan AETAP may be able to attract some projects. 3 contacts were made.

### **Thermalex**

Needed assistance with a technical project.

### **Tom Spink Consulting**

Received information about the procedures for making Calcium Ligno Sulfonate (CLS), along with insightful warnings.

### **Tung Pham Consultant**

Partner representative, Mr. Pham, will work with us on making enols from agents' products.

**USDA Soil Dynamics Lab**

USDA Soil Dynamics Laboratory has been working with student groups on the design of soil sampling equipment and other production agriculture project equipment and other unique designs. Not only is this useful to USDA labs, but also to American farmers. For example, a conceptual design and prototype of a cover crop roller was completed by a student group and tested by USDA. The concept design has now been filed for a U.S. Patent protection and test results have resulted in a publication.

This design has been demonstrated to farmer groups who are very interested in the new technology. We plan to advertise and disseminate it through 'field days' and the county agent system that is part of this proposed work. This is a unique way of disseminating new technology through county agents. The original idea was for industries/county agents to request information from AETAP.

Completed the project.

**Voigt England**

The partner has several ongoing student projects and student employment opportunities are available.

**Wellborn Cabinet, Inc.**

Discussion about working with Auburn University Co-op program.  
Possible projects discussed.

**West Point Stevens (Orex)**

Met with Mr. Abercombie û worked out details for preparing OREX's large samples. West Point Stevens will assist us in making large samples of VBA solution for testing in the OREX student project.

**Whitfield Foods**

Proposed two new approaches to treating their waste: 1. ultrafiltration or 2. evaporation using a small separate unit. Recommended that an evaporation system could be installed to treat their waste water, with a 6 to 8 month payback period.

2 contacts were made.

**Yamaha Motor Manufacturing****Zinkan**

Sent partner PDO samples and information about ALS.

**WalMart Distribution Center**

Set up senior design projects. The project objective is to minimize the pallet congestion in the dry goods picking area of the distribution center. The pallet congestion is caused by the non-synchronized operation of the tow trucks moving pallets to the floor and the forklifts used to place the pallets in the storage racks.

**Milliken**

Visited and toured the LaGrange facilities and met with several staff engineers. Set up two senior design projects for Spring 2004. One of the projects involves intra-plant shipping operations and the other involves work force allocation and planning in a coloring operation

**Donaldson, Inc**

Visited the Auburn facility to discuss the results of a previous senior design project (from Spring 2003) and the potential for future projects. The current project involves a statistical capability study of a new steel blanking process.

**Morris Forest Products**

In January 2004 Mr. Morris the president and owner invited Yvonne Hardy and Shaun Rhudy to a site visit at his new plant and enquired about the needs of the industrial and mechanical engineering departments. The visit revealed many small projects that were potential senior design projects for students at Auburn University. In April, Dr. Smith, Aurealian Simunescu, and Yvonne Hardy revisited the plant to see how AETAP could help them. Since the first visit, Morris had signed a contract with three companies to make porch decks that can be assembled in

just 15 minutes, and were thus in dire need of more space and a better plant layout to allow their factory to work more efficiently and be flexible at the same time. He also gave us the layout they have already worked on for the current plant.

A new layout for the facility was completed as a student project during 2005. A video was shot at the plant showcasing the work.

### **Sears**

The Sears repair center in Chattanooga has requested assistance with the product flow, inventory, and ergonomics associated with their repair products. Several projects are being discussed.

### **UPS Distribution Center**

Discussed potential senior design projects for ISE students in their Montgomery facility.

### **Coachcomm**

Initial contact regarding technical assistance involving a wireless communications project. Unable to provide assistance in the timeframe required by the company.

### **Jack Spring & Sons**

Initial contact regarding providing limited testing services (Rockwell Hardness testing for some of their products).

### **Cox Containers**

Initial contact regarding a packaging problem with one of their plastic container products that is being used for model fuel.

### **NASA**

Dr. Beale is working at NASA-Marshall Space Flight Center on a sabbatical. He has helped initiate contacts with NASA scientists and the National Center for Advanced Manufacturing (NCAM) in order to establish and solidify linkages to AETAP and the county agent system. A NASA composite rocket tank liner project was completed successfully during Fall 2004. A donut design project has been implemented during 2005-2006.

### **Morgan County**

On November 17, 2003 we met with ACES Agent Mrs. Julie Dutton in Hartselle, AL. She recommended we contact the Morgan County Industrial Board and the Chamber of Commerce. Companies she recommended we contact: Boeing, Solutia, 3M, BP, etc.

### **Montgomery County**

On November 19, 2003 we met with ACES Agents Ms. Judy Brown and her replacement Mr. George Tabb in Montgomery AL. They recommended we write a letter to local businesses with our mission statement and local success stories. Suggested companies to contact were: Chester Fried, Dana Corp., Hager Hinge, etc.

### **Tallapoosa County**

In November 2003 we met with ACES Agent Mr. Thomas Futral in Dadeville, AL. He told us he has already talked with some companies in his area. Companies he wanted us to contact were Morris Forest Products (possible automation project), and Cal-Pine Power Company (natural gas generator), etc. He suggested we should start with Morris Forest Company as they are working on a deal with Lowes. They have a kit for a prefabricated deck that can be assembled in 15 minutes. They also make short logs for specific applications and are considering installing new equipment that will do this more efficiently. Target: lower cut percentage to 40%.

Cal-Pine: Energy Company, generating power by natural gas. They are two years behind. Deregulation cut because of 9/11, bad guidance. Mr. Futral also knew we had worked with Wellburn on a project, as ATEC, that helped them get back on their feet.

Mr. Steve Wonderledge works with the forestry industry a lot. Mr. Futral felt that we could really make a difference in Tallapoosa. He was willing to do whatever is needed for us to make contact with the industries in Tallapoosa County.

### **Macon County**

In November 2003, we met with ACES Agent Mr. John Pulliam in Tuskegee, AL. Mr. Pulliam recommended we contact Ms. Anderson, the Director of the Chamber of Commerce and Mr. Powell the Mayor of Shorter. Companies to contact: Future Tier 1 supplier for Hyundai, Tuskegee Ready Mix, Inc., etc.

**Shelby County**

In December 2003, we met with ACES Agent Mr. Ricky Colquitt in Columbiana. He is contacting six companies in his area to schedule some site visits for AETAP. We also made a presentation to the South Shelby Chamber of Commerce on January 8, 2004.

Mr. Colquitt went through the list of industries that we gave him and picked six companies that he will contact and schedule some site visits with. These are: Bama Truss & Components, A.C. Legg, Inc., Joseph Lumber Forest Enterprises, Inc., Heart of Dixie Game Calls, Specification Rubber Products, Inc., and Vulcan Engineering

**Elmore County**

In December 2003, we met with ACES Agents Mrs. Marilee Tankersley and her replacement Mr. Rick Beauchamp in Wetumpka, AL. They recommended writing a letter that AETAP and ACES could send to local companies.

**Clay County**

In December 2003, we met with representatives from Wellborn Cabinets and ACES Agent Mr. Tom Farrow. Wellborn Cabinets has several projects that AETAP could work on. In January 2004 we took a senior design group out to the plant. On August 24, 2004, Yvonne and Dr. Sankar met with the Clay County ACES County Coordinator, Mrs. Moorehead, and the MIS Director of Wellborn, Mr. Wylie. They went on the tour of the factory and saw their RFD and SAP System. This is a family owned business with about 2,000 employees but only 4 engineers. Made further contact during 2004-2005.

**Jefferson County**

In January 2004 we met with ACES Agent Mrs. Jackie Ramsey. She recommended writing a letter to local companies and setting up a meeting at the Botanical Gardens. Mr. Hubbard suggested that we appear on his weekly TV show to do a Q&A Session about AETAP.

On August 19, 2004, Dr. Burch, Dr. Tarrer and Yvonne Hardy visited with Jefferson County's Extension Coordinator, Mrs. Jackie Ramsey. Mrs. Ramsey invited three other key people from Jefferson County who had attended the Intensive Economic Development Training Course at Auburn University on July 26, 2004. Ms. Karen McCoy, Manager of Existing Industry, Birmingham Regional Chamber of Commerce, Mr. Nigel Roberts, Economic Development Specialist of Jefferson County Commission, and Ms. Elizabeth Slater, GIS Analyst, Regional Planning Commission of Greater Birmingham. Mrs. Ramsey suggested the idea of starting a Jefferson County committee for AETAP.

**Lee County**

In January 2004 we visited Mr. Chuck Browne. He requested information on AETAP so he could take the information to the Chamber of Commerce meeting, and planned to set up a date for us to do a presentation at one of the Chamber of Commerce meetings.

**Chilton County**

In February 2004 Ms. Gay West invited Shaun Rhudy and Yvonne Hardy to their annual industrial board breakfast. She invited us to set up a display booth and to give them information on what AETAP can offer to industry in Chilton County. Ms. West also e-mailed a list of companies that attended the annual industrial board breakfast. She suggested that we write letters to each of the companies to let them know that we are interested in working with them.

**Coosa County**

In March 2004 Mr. Roger Vines invited Shaun Rhudy and Yvonne Hardy to their monthly County Commissioners Meeting to give a presentation on what AETAP can offer Coosa County.

**Allied Energy Systems Inc**

17 contacts made about use of ethanol.

**Auburn Investment Casting**

Work on centrifuge

**Bowater Inc**

Discussion about reuse of oil

**Cobleেকে**

Initial contact

**Walmart**

Development of computer simulation model for the picking operations at the distribution center. Computer model provides an animation of the picking process. Funding of \$9,500 received.

**Eastman Chemicals**

13 contacts made during 2004-2005

**Electrical Connectors**

Industrial engineering project

**Euro Pro**

Possible project on hardness testing of ceramics, metals and plastics.

**Exxon Company**

Initial contact on a possible project

**Yamaha Motor Manufacturing**

Possible project on failure analysis of steel suspension parts

**Georgia Pacific Corporation**

Initial contact regarding fuel oil.

**Huntsman Corporation**

Making pesticides from cottonseed oil

**Inland Containers**

17 contacts during 2004-2005.

**Innovative Machines**

Design of a mechanical punch press

**Lawyer**

Testing of rubber bumper

**Mathews Meat Market**

Design of a website. Dr. Beale and Yvonne visited with Mr. Reggie Blair Friday, December 3, 2004. Possible projects discussed included: a spreadsheet to tally daily orders, a way to help with their drainage system, and a recommendation for the best material for the walls in the meat cutting area. Elias and Yvonne went back out to Matthew's Meat Market on January 4, 2005 to discover what type of programming he would need to tally up his everyday business. Elias also discussed with the owner how he could develop a website to showcase some of his custom made smoked sausages. A sample website has been built.

**Omega Steel Products**

Initial Consultation

**City of Orange Beach**

Soil Color chart investigation

**Freddie Smith**

Helped in patent search process

### **Plantation Pipeline**

Initial contact

### **Prime Engineering**

3 contacts made to establish project details.

### **Sans Peur**

Arranged student project; the company builds helicopter subassemblies.

### **Shell Chemical Company**

29 contacts during 2004-2005 regarding the use of ethanol.

### **SIEMENS**

Four separate simulation-based analyses of alternative line configurations and traffic levels at the Siemens VDO manufacturing facility. Received \$21,000 to conduct the project.

### **Sony Corp**

Employment of AU graduates

### **Wehadkee Yarn**

Soil testing work.

### **Westinghouse Electric Corporation**

Initial project discussion

### **Young's Refinery**

Initial contact

### **US Corps of Engineers**

Requested an intern to work at Westpoint Lake during Summer 2005.

### **AL State Dept. of Rehabilitation**

Work possibility with IT background

### **Irondale Custom Machine**

Manufacture small parts and spare parts for local industries in Birmingham using a Cad Cam, CNC machines and lathes in their machine shop. Expressed interest in assistance and partnership with AETAP to help them link the manufacturing side of the industry with the programming side. Would like to be able to draw a part and then send that drawing directly to a machine in the factory to make the part. They make parts for U.S. Steel, Norfolk Southern, SMI, and International Paper.

### **Baldwin County**

Baldwin County meeting on Monday, Jan. 10, 2005. The southern part of the county relies almost exclusively on the hospitality industry. There is a tremendous need for civil engineers in that area, as an entirely new downtown in the Gulf Shores area is currently under construction as a result of damage from Hurricane Ivan. In manufacturing, Procel is producing extruded plastic material with some fiber, but has used their entire capacity for this year already and are desperately looking for staff.

### **Bullock County**

Elias and Yvonne visited Mr. George Tabb January 26, 2005 to find out what type of website he wanted for his county. He also introduced us to Mr. Cope, who is familiar with much of the industry located in Bullock County. Mr. Cope requested that AETAP come down and visit with some of the industry contacts in Bullock County.

**Tallegega County**

Wanda Jurriaans, the Talladega County Extension Agent, contacted AETAP to participate in a roundtable to introduce county industries to AETAP, and provide a forum to discuss their technical assistance needs. Ms. Jurriaans developed an intensive campaign to invite businesses to the roundtable, and a number responded positively. In February, 2005, AETAP faculty and staff met with approximately fifteen industry leaders to describe the range of assistance that is available, and listen to issues and problems being experienced by businesses in the county. This roundtable meeting is expected to result in a number of collaborations over the next few years.

**Barbour County**

Visited to provide information on AETAP

**Bryant's Winery**

Initial visit

**City of Auburn**

Discussion about technology park

**Eufaula Tribune**

Possible project

**GEO Speciality Chemicals****Mobile Lawyer**

Discussion about rubberlike bumper and testing of it

**Major Oil**

Marketing used oil

**Mobile County**

Set up a workshop at Mobile county

**Bearden Brown**

Help in developing a solar turbine/ chimeny that will generate electricity

**US Peroxide**

Consultation on Oxidation

**Umicore**

Interested in recycling chemical waster

**Other Collaborators or Contacts**

Wayne State University/ Greenfield Coalition: The impetus for the Greenfield Coalition was the sense that traditional academic studies in manufacturing engineering were devoid of real manufacturing experiences. Greenfield, along with its partner Focus:HOPE, has created a learning factory that brings reality-based education back to manufacturing. The instructional materials developed in the learning factory will be disseminated to the ISIRP partners. They presented their work during the October 2004 workshop sponsored by ISIRP, which was very well received.

**Activities and Findings**

**Research and Education Activities: (See PDF version submitted by PI at the end of the report)**

The major research and education activities performed during 2005-2006 were: (1) Training the diverse workforce of tomorrow, (2) Catalyzing and enhancing the enabling infrastructure and partnerships, and (3) Stimulating knowledge transfer into innovations using Information Technology.

These activities made it possible for AETAP to marshal the diverse resources and interests of different (a) units of a state cooperative extension system, (b) departments of an academic institution, (c) research laboratories, (d) industrial development units of private corporations and government, and (e) manufacturing companies in order to form Initiating and Sustaining Industrial Renaissance through Innovative Partnerships (ISIRP).

The three research and education activities are explained below:

(1) Training the diverse workforce of tomorrow: ISIRP has trained undergraduate and graduate students, along with local county workforces, and has brought them up-to-date with modern manufacturing technologies and processes.

During 2005-2006, the ISIRP team (a) conducted 5 workshops at Auburn University, to train county agents of the Alabama Cooperative Extension System (ACES) and 50 minority students, (b) conducted a workshop in two counties to discuss problems presented by 10 industry participants and share AETAP's faculty expertise with them, (c) oversaw one Ph.D. student in Chemical Engineering, who completed his preliminary examination based on an AETAP project, (d) supervised one M.S. student in Mechanical Engineering, two students in Industrial Engineering, and one M.S. student in MIS, who graduated based on their work on AETAP projects, (e) employed 7 undergraduate, 4 graduate students and 1 mechanical engineer, (f) trained 75 undergraduate students through 3 capstone senior design projects, and (g) trained 8 graduate students through 5 faculty research projects.

Further details about these are provided in the Training and Development section of this report.

(2) Catalyzing and enhancing the enabling infrastructure and partnerships:

During 2005-2006, the ISIRP team visited and worked with (a) 74 companies, (b) 13 county extension agencies, and (c) 1 research organization. The team had 347 interactions with these organizations. Further details are provided in the partner organizations section and outreach activities section of this report.

**Influence at the Regional Level:** As a result of the extensive interactions among AETAP partners, the county agents have become very enthusiastic in their support for the activities of ISIRP projects. For example, the extension agents from Mobile and Jefferson counties organized a workshop specifically aimed at industries in their counties on August 11, 2005 and January 27, 2006. These workshops generated a great deal of interest in this project and the extension agents are now adding links to the AETAP/ISIRP web pages to their county web pages; in addition, they have requested that AETAP faculty/students use mass media (such as newspapers, radio, TV) in their counties to showcase the research capabilities of Auburn University. Two presentations were made using radio and TV outreach programs during this period.

These activities have further led to Dr. P.K. Raju, AETAP's Director, being invited to participate in a state-level conferences on economic development during this reporting year. In addition, he has been tapped to serve as a board member of the I-85 corridor alliance and also named the chair of its technology cluster. During the April 2005 workshop hosted by AETAP, three industry partners shared their success stories of projects conducted in partnership with AETAP faculty and staff.

**Influence at the National Level:** The National Academy of Engineering has been tasked to develop a report so that future funding from NSF can be directed to institutions that provide an integrated approach to research, education, and outreach. They requested a written response to the white paper released during Feb. 2005 entitled, 'Assessing the Capacity of the U.S. Engineering Research Enterprise.' The AETAP project team showcased the ISIRP project as an example of implementing some of the ideas brought out in the white paper and submitted a written response to the National Academy of Engineering. The AETAP team has become involved in helping disaster prone areas due to hurricanes and tornadoes. This has led to extensive work with extension agents and community directors at these counties.

In addition, Dr. Evelyn Crayton, Co-PI in this project was invited to be a member of the panel that reviewed many of the proposals that were submitted for funding under the PFI program during 2005.

(3) Stimulating knowledge transfer into innovations using Information Technology: A Knowledge Sharing System (KSS) has been built and is made available to the administrators of AETAP via our website: [www.eng.auburn.edu/aetap](http://www.eng.auburn.edu/aetap). The KSS has become very helpful in producing the annual report.

The KSS is being developed using an Oracle 9i Application Server, Application Portal, and Inter-Media Search Engine. During 2005-2006, the

KSS was presented to the county agents and faculty members in a series of workshops. They rated the system as very valuable and expected it to assist them in achieving their industrial liaison tasks. The application supported by this system makes it possible to track individuals, ongoing projects, and partnership milestones. This capability is essential to ensure accountability and timely compliance with deadlines. In addition, a simple search engine function has been enabled. So far, 75 dynamic web pages have been released, 20 tables have been designed, and 8 processes have been described. The data input to the system currently uses a batch process where the partners complete a 'project interaction form' and submit it to the project team. This system has been used extensively in developing the data used to complete the current annual report.

During 2005-2006, our efforts concentrated on using the Oracle system as a prototype and developing a system based on Php/mysql. This will provide an ability for the system to be self-sustaining.

A PowerPoint presentation made by Dr. P.K. Raju, Co-PI on this project during the April 25, 2005, workshop is attached as a file. This presentation summarizes the project activities and findings during 2005-2006.

**Findings: (See PDF version submitted by PI at the end of the report)**

The findings and conclusions that can be drawn regarding the ISIRP project during 2005-2006 are (1) The partnership between ACES and AETAP is very beneficial in implementing economic change in the region, (2) Effective use of information technology is perceived to be an important need by ISIRP partners, (3) Academic departments at Auburn University benefit tremendously from the partnership, (4) Industry partners perceive strong value added from ISIRP projects, and (5) a proactive role might be better suited for AETAP to be self-sustaining in the future. These are described in turn below.

(a) Partnership between ACES and AETAP is very beneficial in implementing economic change in the region: As many as 89 companies contacted AETAP (Auburn Engineering Technical Assistance Program) during the course of the reporting period seeking technical assistance and technology transfer. This has led to the development of 112 industrial research projects, 3 capstone senior design projects, and 347 interactions. This interaction between industry and academia has been very beneficial to faculty members, students, and industrial participants alike.

A key finding is that an effective partnership between outreach organizations such as the Alabama Cooperative Extension System (ACES) and research and teaching organizations such as the College of Engineering and College of Business at Auburn University produces effective results in solving industry problems, thereby helping the local economies. In addition, the students and faculty members become much more sensitive to the needs and expectations of local industries thereby counterbalancing the 'ivory tower' mentality of many academics.

A second finding is that the ACES agents, whose primary role is to disseminate agricultural research and home economics to people in their counties, are now being trained to enable them to extend this to include industrial extension services. With the change in society to manufacturing and information based products, the needs of the people in Alabama's counties have changed considerably. New mediums such as the Internet provide access for company personnel to look for solutions to problems without needing to first consult the local county agent. At the same time, the time required to relay the results of research being performed in university labs to the industries that could use the research is increasing; frequently, the main beneficiaries of the research are geographically distant from the university performing the research and local companies may not benefit. Many of the Masters and Ph.D. students in science and technology come from foreign countries and they frequently return to their own countries when their studies are completed, taking with them valuable innovations that might have benefited local counties and communities in the US.

Alabama's extension agents have been at the forefront of efforts to adapt to this change by working with the College of Engineering at AU and communicating the discoveries that take place to local companies. However, the change process is uneven and the benefits are not well documented. Without close connections between the extension agents and the research community at AU, many of the innovations might not reach the local population, thereby depriving them of possible economic benefits. In addition, the extension agents may have to forge new ties with manufacturing and service companies in their counties and communities - a major challenge indeed. The ISIRP project helps facilitate this change process in Alabama and is using multiple intervention mechanisms and processes (such as workshops, meetings, KSS) to effect the change.

(2) Effective Use of Information Technology is perceived to be an important need by ISIRP Partners: The KSS has been developed to provide project administration modules. It has taken longer than expected to develop and stabilize the system and the company interactions forms are still being manually input into the system. The security for this system was breached during Dec. 2004 and a major effort had to be undertaken to make the system secure. Even though the development of the KSS provided enormous training opportunities for graduate and undergraduate business and engineering students, more effort needs to be devoted to stabilizing and operationalizing this system. The Oracle system has been unwieldy and difficult to maintain and manage. Therefore, efforts are being made to change the system so that it is based on MySQL

which is supported by the University. We found that it is important to base the system on a solid foundation (server, language etc.) which are stable and maintained on a periodic basis. We continue to deal with the difficulty of freezing the design of the system and making it operational. This experience has given the faculty members and students involved in this project a good lesson in how to develop and design information systems.

When we discussed the system requirements with the extension agents, we were told that it would be very helpful if AETAP/ISIRP could provide one-on-one training on computers and information systems for them and for the industry participants. The training will involve explaining the basics of using computers, e-mails, use of web sites etc. They stated that such training will be of major assistance to them since they do not have a formal background in computers and information systems. They believe such training will improve both their productivity and their ability to interact with the ISIRP partners.

(3) Academic Departments at Auburn University benefit tremendously from the partnership: According to Prof. Jeff Smith, 'The Industrial and Systems Engineering department has benefited greatly from its involvement with ISIRP.' Through ISIRP projects, 11 undergraduate students and 4 graduate students have been directly involved with industry projects over the last year. Not only have these projects had direct benefit to the companies that sponsored them, but the students have also gained invaluable industrial experience that will benefit them throughout their engineering careers.' A Ph.D. student in the Chemical Engineering department recently successfully defended his preliminary oral exams based on an AETAP project and two Masters students and one Ph.D. student in the Department of Management have benefited significantly by working on the AETAP project. One Masters student in Mechanical Engineering was also supported by an AETAP project.

(4) Industry Partners Perceive Strong Value added from ISIRP Projects: Three industry partners representing OREX/ETI, Resource Innovations, and Euro-Pro Operating, LLC, made presentations during the April 2005 workshop highlighting success stories related to the projects performed in their companies by AETAP associates. Walmart Distribution Center obtained significant help from the industrial engineering projects that were performed on its premises. They were able to obtain high quality multi-disciplinary technical assistance and technology transfer through this project at a very reasonable cost. They stated that they could not have easily obtained such assistance from industry consultants. A letter from Resource Innovations is enclosed.

(5) The AETAP has been a reactive organization that responds when clients call and ask for help. Funding by the NSF helped showcase the abilities of AETAP to multiple partners and has resulted in significantly more interactions with the community. An important finding was that for long-term sustenance, AETPA has to assume a more proactive role. That is, it has to identify certain areas that need major technical and engineering assistance and use its expertise to help find new solutions. AETAP is working to find out multiple areas where such proactive effort could be made. These are:

- (a) use forensic engineering methodologies to find solutions to issues created by natural disasters in the regions served by Auburn University. AETAP is working with officials in Baldwin County and cities in that region in order to find innovative engineering solutions to issues that arise during natural disasters such as hurricanes and tornadoes. Use county agents from ACES to deliver workshops based on the materials developed by the AETAP team.
- (b) document the problems and solutions with companies such as Wellborn Cabinet, NASA/ Tethers Unlimited Inc., Resource Innovations, Euro-Pro, Haldex, Advanced Technology Institute, and MSC Software Corporation., and showcase projects that require teams of engineers and managers with different disciplinary backgrounds to work together in order to solve real-world problems. The case study format will be used in such documentation.
- (c) Do not charge for the first visit and charge for the subsequent visits in solving industry problems.

### **Training and Development:**

During 2005-2006, the ISIRP team: (1) conducted 5 workshops to train county agents of the Alabama Cooperative Extension System (ACES) and to showcase ISIRP project results to potential industrial partners; (2) employed 7 undergraduate, 4 graduate students and 1 mechanical engineer; (3) trained 75 undergraduate students through 6 capstone senior design projects; and (4) trained 20 graduate and undergraduate students through nine industry research projects.

We describe these activities next.

(1) Workshops: A short course was offered to county agents on April 20, 2005 on the fundamentals of pollution control, automation, manufacturing systems, indoor air quality, and KSS. The objective of the workshop was to familiarize 10 county agents and six industry personnel with these technologies and how they are used in industry. Graduate students, undergraduate students, and faculty members also participated in the workshop. In addition, during the afternoon, a round table discussion was held where the country extension agents discussed the developmental issues in their country with the faculty members. The industry participants described the impact of AETAP on their companies during the presentations.

An industry roundtable was held on August 11, 2005, at Mobile, AL, with 5 industry participants, 20 ACES agents, 4 faculty members, and 3 staff. The purpose was to showcase the success of the ISIRP project and understand issues affecting local industries. This meeting was very well received.

Another workshop was held on Jan. 27, 2006 at Birmingham, AL, with about 10 industry participants, 10 ACES agents, 5 faculty members, and 4 staff. The purpose was to understand the problems presented by industry participants and explain how AETAP could help solve these problems.

On February 22, 2006 AETAP faculty presented at a roundtable discussion setup by Ms. Wanda Jurriaans in Talladega County. Five faculty members, two staff, and two extension agents made a presentation and held a round-table conference with the participants.

Another workshop was held on at Auburn University for the BellSouth Minority Engineering Program students on March 4, 2006. About 45 students participated in this meeting. The focus of the workshop was to share skills for 'real world' engineers, and to provide an overview of several engineering departments' involvement in AETAP. The motivational speaker for the leadership portion of the workshop was Warren Smedley of Fortiphy, LLC. Smedley's leadership training session was excellent, with his learning objectives focused on tools for building teamwork and relationships, forms of communications and their impact, and the dynamics of communication and leadership styles. Forty students attended the Saturday workshop. Evaluation results were favorable with students responding that the workshop provided them with information on how to get involved in research, ideas for their senior design projects, and team building and communication skills exercises that were fun and challenging. Highlights of AETAP were presented by student participants. The presenters shared what AETAP is, the partners involved, what the students and professors do, the companies that are assisted, current projects that the engineering teams are working on, and impacts on the economy.

The AETAP student presenters were Kelli Meade, Matt Dyar, Gina Montgomery, and Student from Industrial Systems. Kelli is a computer science student in BMEP and is involved in assisting with the design of webpages for small companies, Matt Dyar and Gina Montgomery, both Masters students in Management & Information System are involved in developing the Knowledge Sharing System, and Graduate Student from Industrial Systems, works with Dr. Smith on industry projects.

The participants evaluated the workshops on a five-point scale (1=strongly disagree, 2=disagree, 3=neither agree nor disagree, 4=agree to 5=strongly agree). The results are shown in Table 1 and enclosed as an Attached File. The strong responses provide significant evidence that the county agents perceived the workshops to be valuable and helpful in achieving the goals set forth in this project. It also shows that the industry participants considered that they received significant benefits as a result of attending these workshops.

We studied the influence of the ISIRP project (AETAP) on the workshop participants' perceptions regarding technical assistance and industrial development. The extension agents reported that the need for technical assistance is very high in their counties (mean of 4.6 in a 5.0 scale, with 1 being very low and 5 very high). They perceived that the technical assistance provided by AU's College of Engineering during 2005-2006 was well above average (means of 3.8) and that the ISIRP program has helped them focus on providing technical assistance (mean of 3.8). In the future, they expect this project to help them more(mean of 4.2). These values show that the county agents and industry participants perceive that the project has provided significant technical assistance and industrial development in their counties.

Questions were also asked about the utility of the workshop in providing valuable materials and information to the participants. They perceived that the program really helps AU students obtain real-world experiences while in college (mean of 5.0 on a 5.0 scale). They also found the success stories of AETAP participants to be especially compelling (mean of 4.9 on a 5.0 scale). The presentations by the companies listing the issues of concern to them was very helpful to the participants (mean of 4.8 on a 5.0 scale). The workshop provided sufficient information regarding the capabilities of AETAP and services they provide (4.7 on a 5.0 scale). The workshop was also helpful in informing participants about the research efforts at Auburn University (mean of 4.5 on a 5.0 scale). The workshop made it possible to share information about the projects that are being conducted at Auburn University (mean of 4.2 on a 5.0 scale). The KSS system will be of value to them in contacting industries (mean of 4.0 on a 5.0 scale). Overall, they perceived that the workshop increased their interest in making industrial and manufacturing contacts that might be interested in receiving technical assistance and technology transfer(mean of 4.2 on a 5.0 scale).

The evaluations included questions regarding the organization of the workshop. The fact that the means of all responses exceed 4.0 (Table 1) shows that the participants really enjoyed the workshop. The participants perceived that the facilities were good (mean of 4.9), the time, date, and location were all convenient (mean of 4.7), and the workshop was well organized and presented (mean of 4.7). In addition, they perceived that the workshop met their expectations (mean of 4.6), materials were helpful (mean of 4.4) and were presented at an appropriate level (mean of 4.4), proceeded at the right pace (mean of 4.4), and were of the right length (mean of 4.3).

In addition, the participants included written comments about the workshop. They stated that the strengths of the workshop were: particularly useful to industry, very helpful for agents to learn about industry, especially liked student and industry working together, and very valuable connection to multiple resources.

They stated that the workshop could be improved as follows: needed to include more industries and need to inform all extension agents

#### (2) Employment of Students by ISIRP Project:

The ISIRP Project employed 7 undergraduate, 4 graduate students and 1 mechanical engineer during this reporting year. Two graduate students were in charge of developing the KSS. They were assisted by an undergraduate student, who is a minority student. The AETAP coordinates and manages the ISIRP project. A minority woman, who graduated with a B.S. in Mechanical Engineering, is now working as an engineer with the project. Her role is to work with industries and county agents to fulfill the goals and objectives of the project. An engineering undergraduate student assists her in fulfilling her tasks.

In addition, a technical assistant (also female) is employed by the project on a part-time basis to provide secretarial and administrative liaison with the partners, faculty, students, and research organizations.

The contribution of the ISIRP project to the development of these students is explained in further detail in the Contributions section.

#### (3) Capstone Senior Design Projects

75 undergraduate students were trained through 6 capstone senior design projects in different areas of mechanical, chemical, and industrial systems engineering disciplines. The highlights of these projects are provided below.

- a. Faculty: Dr. Smith; Sponsor: Wal-Mart Distribution Center. The Wal-Mart Distribution Center is located in Opelika, Alabama and is responsible for shipping grocery products to approximately 181 stores in Alabama, Georgia, Florida, and Puerto Rico. This senior design project analyzed the congestion caused by unload/ replenishment processes in the warehouse and develop a method to reduce the congestion without adversely affecting the operations. Funding received: \$1,000
- b. Faculty: Dr. Smith; Sponsor: Morris Forrest Product Assembly Facility: Design the layout for their new assembly facility in Roanoke, AL. Involved learning about their products, components, raw materials, and manufacturing processes and designing a layout for a substantially larger facility than the company recently purchased.
- c. Faculty: Dr. Smith; Sponsor: Wal-Mart Distribution Center. Develop a computer based methodology to assign picking slots to products such that picker productivity is increased and product damage is decreased.
- d. Faculty: Dr. Smith; Sponsor: Rheem R&D Layout:
- e. Faculty: Dr. Beale; Sponsor: Sans Peur Project. Building helicopter subassemblies
- f. Faculty: Dr. Smith; Sponsor: Wal-Mart Distribution Center: Gathered and determined standards for Receiving and Replenishing process. The group began to determine how to develop a cost for assigning a product to a lot and how to give a layout and overall cost based on the specific placement of teams. The group also finished making tables and graphics associated with the movement and breakdowns of products. The group finished allocating the cost to relocate products. The group then analyzed different trips to obtain the ones that corresponded with product family. From these trips then compared the sequence that they were picked from their suggest layout to Wal-Mart's current layout.

#### (4) Industry Research Projects

20 graduate and undergraduate students were trained through nine industry research projects. The projects are summarized below:

- a. Faculty: Dr. Tarrer; Sponsor: BP: We are currently having a TCLP test done on Cobalt material. Should fail this test it will cost BP about \$44 million dollars to process the materials. All the other test have been done on the material. If the material passes the TCLP test it could be worth a significant amount. Either way the material represents a good potential.
- b. Faculty: Dr. Tarrer; Sponsor: Chemical Products. Checking to see whether a sample of ethanol sample will help them save costs.
- c. Faculty: Dr. Smith; Sponsor: Walmart Distribution Center. Development of a computer simulation model for the picking operations at the distribution center. This project involves collecting a significant amount of data from the distribution center prior to development of the computer model. The computer model will provide an animation of the picking process and will predict picking performance under a variety of staffing and equipment configurations.

- d. Faculty: Dr. Tarrer; Sponsor: ETI. Investigation of polyvinyl alcohol film developments pertaining to radioactive particle decontamination.
- e. Faculty: Dr. Tarrer; Sponsor: Eastman Chemicals. Largest chemical production unit in the world. Has three plants that make co-product terephthalic acid. They are working with Chemical Products to make use of the acid co-product of Chemical Products.
- f. Faculty: Dr. Smith; Sponsor: Siemens. Developed a short course on simulation. Four separate simulation-based analysis involving the analysis of alternative line configurations and staffing levels at the Siemens VDO manufacturing facility.
- g. Faculty: Dr. Beale. Sponsor: Solar Power. Involved in developing a solar turbine/chimney that will generate electricity.
- h. Faculty: Dr. Sankar; Sponsor: AETAP. 'Development of AETAP website.' This work includes developing a website for AETAP.
- i. Faculty: Dr. Sankar and Dr. Raju; Sponsor: AETAP. 'Development of Knowledge Sharing System.' A Ph.D. student and a Masters student from Management Information Systems are currently developing the Knowledge Sharing System.

### **Outreach Activities:**

During 2005-2006, the ISIRP team visited and worked with (1) 89 companies, (2) 6 counties, (3) 1 research organization, (4) was recognized at the University level, and (5) made 4 presentations at state and local economic development forums. The team had 347 interactions with these organizations. Partner organizations provided financial and/or in-kind support, supplied facilities and/or equipment, collaborated in the research, and/or exchanged personnel.

(1) Companies: 89 companies participated in the project in multiple ways, providing in-kind support, facilities, collaborative research, and/or exchanging personnel. The names of the companies and the details of interactions carried out so far in this project are provided in the Partner Organization section of this report. The participation with 6 companies on senior capstone design projects and 9 companies on industrial research projects is explained in the Training section of this report.

(2) Six Counties: Members of the ISIRP team visited the 6 target counties in Alabama (Jefferson, Bullock, Baldwin, Talledega, Mobile and Clay) identified in the ISIRP project proposal. The objectives of these meetings were to reach out to members of communities who are not usually aware of the activities of Auburn University faculty members for the purpose of enhancing participation in technology transfer, public understanding of science and technology, increasing science learning, and raising awareness with regard to the opportunities for careers in science and engineering. Also, we wanted to find out exactly how we could make industries in these target counties aware of the opportunities available to them through the ISIRP program. Through visiting the agents in these counties, we were invited to Chamber of Commerce meetings, County Commissioner meetings and Industrial Board meetings in these counties. The details of the interactions carried out in these counties are provided in the Partner Organization section of this report and summarized below.

(3) Research Organization: Dr. Beale is currently working on a research project at NASA-Marshall Space Flight Center, building on the work he did during 2004-2005.

(4) Recognitions: Dr P.K. Raju, received the Auburn University Faculty Award for Excellence in Outreach 2004 for his work with the region's industries. This was the culmination of a rigorous selection process held at the university level and he was nominated by his department head. Similarly, Dr. Chetan Sankar of the College of Business was nominated by his college for the 2005 Faculty Award for Excellence in Outreach.

(5) State Level Representation: Due to the increased visibility of AETAP due to the ISIRP program in the State of Alabama, Dr. Raju, Director of AETAP was invited to make presentations at 4 local and state economic development forums.

### **Journal Publications**

Raper, R.L., P.A. Simionescu, T.S. Kornecki, A.J. Price, and D.W. Reeves., "Cover crop rollers: a new component of conservation tillage systems.

Applied Engineering in Agriculture", Applied Engineering in Agriculture, p. , vol. , (2005). Accepted

Mole, Tracey. L., Tarrer, R., "Biodegradability and Effluent Disposal Processes of Polyvinyl Alcohol Compounds", Journal of Water Environment Research, p. , vol. , ( ). Submitted

Tracey Mole, "The Auburn Engineering Technical Assistance Program Investigation of Polyvinyl Alcohol Film Developments Pertaining to Radioactive Particle Decontamination.", Dissertation, p. 1, vol. , (2005). Published

Mole, Tarrer, Eden, Burch, Johnston, "A Systematic Approach for Synthesis of Optimal Polymer Films for Radioactive Decontamination and Waste Reduction", The Journal of Computer Aided Chemical Engineering, p. 1, vol. , (2005). Published

Mole, T, "A Systematic Approach for Synthesis of Optimal Polymer Films for Radioactive Decontamination and Waste Reduction", ESCAPE 15 Lecture Series. Barcelona, Spain., p. 1, vol. , (2005). Published

### **Books or Other One-time Publications**

Cumbie, B. Sankar, C.S., and Raju, P.K, "Facilitating Technology Transfer Among Engineering Community Members", (2005). Book, Accepted

Editor(s): Elayne Coakes & Steve Clarke

Collection: Encyclopaedia of Communities of Practice in Information and Knowledge Management

Bibliography: Idea Group Publishing

### **Web/Internet Site**

**URL(s):**

[www.eng.auburn.edu/aetap](http://www.eng.auburn.edu/aetap)

**Description:**

This website provides an overview of the services provided by the ISIRP partners.

### **Other Specific Products**

**Product Type:**

**Data or databases**

**Product Description:**

In order to provide a forum for the dissemination of technology transfers (both successful or unsuccessful) that occurred as a result of this project and others, a KSS is being developed and will be fully operational by the end of this project.

**Sharing Information:**

This KSS will be available to all the ISIRP partners so that they can learn from each others' experiences and avoid having to "reinvent the wheel." Other researchers will be able to access this system via the website of the AETAP project. They will have to obtain login privileges to access specific information related to individual projects.

**Product Type:**

**Other inventions**

**Product Description:**

Cover Crop Rollers: A Potential New Component of Conservation Tillage Systems developed by Dr. Raper, USDA, is an example of technology that is being transferred to the end-users (farmers in the State) through the county agent system.

Raper, R.L. and P.A. Simeionescu. Smooth rolling cover crop roller. U.S. Patent (Filed 12-29-2003)

Conservation tillage is used on approximately 37% of U.S. farmland. This figure is expected to grow, as is the number of acres on which cover crops are used. Cover crops are increasingly being used throughout the U.S. to enhance winter rainfall infiltration and to prevent soil erosion. Cover crops also increase the buildup of organic matter in the soil, which leads to improved soil structure. Currently, almost all farmers that are using cover crops are using chemical means to kill them before planting their cash crops. However, in South America where chemicals are not used as often, the use of rollers is relatively common as a method to end the life cycle of the cover crop. However, the South American rollers

are smaller and must be operated at slower speeds because of their vibration. As the use of cover crops spreads, it is anticipated that many farmers would opt to use a mechanical kill method which is much cheaper and environmentally friendly than the chemical kill now used. The current cost estimate for mechanical rolling is \$1.50/A, while chemical spraying is \$12.00/A. It is hoped that the use of our invention would facilitate the adoption of rollers, thus increasing the adoption of cover crops due to our invention's ability to be operated at a faster speed than current rollers.

**Sharing Information:**

This invention, although developed before the ISIRP project, is being shared with the county agents so as to benefit the targeted counties in Alabama with the greatest potential economic impact.

**Product Type:**

**Patent**

**Product Description:**

Steward, et al., "Strippable PVA Coatings and Methods of Making and Using the Same," Patent application filed, Serial No. 10/947,580.

**Sharing Information:**

This is a patent filed by the company.

### Contributions

**Contributions within Discipline:**

Some of the significant contributions made by participants in the ISIRP project to the engineering discipline are: (1) Design of a new course to improve senior design projects, (2) Discovery of a new strippable coating to protect workers from radioactive contamination, (3) Assisting an industrial partner (OREX) to become more environmentally responsible, (4) Assisting Resource Innovations to automate their plant and become globally competitive, (5) Improving the cleanability, reliability, and sound quality of the vacuum cleaner product, while minimizing its cost and increasing sweeper weight for Euro-Pro Operating, LLC, (6) Designing a new factory layout for Morris Forrest Products, (7) Reducing manufacturing costs at Southern Patio, (8) Development and delivery of a course on discrete-event simulation, and (9) remove congestion control at Walmart Distribution Center, and (10) model alternate line configuration at Siemens. These are described below.

(1) Design of a new course to improve Senior Design projects: In the Mechanical Engineering senior design course, students must innovatively design and build a machine to satisfy an industrial sponsor's needs. Students are immersed in the design process, beginning with a problem statement from the sponsor, through conceptualization and design realization on paper, and finally to a physical prototype which they construct themselves. Given the constraint that the project must be completed in 2 semesters and on a tight schedule, there is little room for error, so the students must be both effective designers and machine builders. It is not unusual for a part or motor to be undersized, or a linkage that does not quite move as intended. Students currently draw parts and assemblies using CAD software, and may consider stress and motion analyses on selected parts. However, what if the students could combine the capabilities of CAD with stress analysis of FEM and motion analysis to analyze and test the entire mechanical system during the design phase? The testing of a physical prototype could be accomplished on the computer, and further refinement of the design performed on the computer if necessary, before a single physical part is constructed. This process is called 'Virtual Prototyping (VP)', and is commonly used by practicing engineers who have access to high-end software and years of on-the-job training. Unfortunately, due to academic time constraints, there is not enough time to teach students VP software, which takes years. So, working with MSC Corporation, a maker of VP software, AU initiated a course in VP during Spring 05 that uses special education software that students can readily grasp without a steep learning curve. The course is based on Solid Edge as the CAD engine, Working Model for 2-D mechanism motion, and Visual Nastran for 3-D motions and finite element analysis. MSC has been a close collaborator in the process, providing software and support throughout. They have a vested interest in this project, because they expect eventually to market the software to students nationwide, with Auburn University serving as the test site. As the semester progresses, students are seeing the value of virtual prototyping as a tool to improve the design of the final product. Students in the VP class who are also in Senior Projects are now using VP on their projects. In summary, we improved mechanical engineering student design project results by significantly improving the design process and shortening the design time. This was accomplished by integrating CAD with force, finite element and motion analysis, applied to all machine components.

(2) Discovery of a new strippable coating to protect workers from radioactive contamination: OREX was seeking a strippable coating that was peelable and did not leak and came to AETAP to develop this product. The company receives contaminated materials from a nuclear plant. They then use a processor that minimizes the wastes in contaminated clothing and products. They load the contaminated clothes into processing machines, after which all that is left are the zippers and latex. They were looking for a strippable coating that could be applied to contaminated surfaces of the processing machines, allowing the coating to be peeled off or stripped from the surface, thereby reducing the radioactive waste sticking to the surface of the machines. This would allow workers to go into the processing machines to clean them up without exposing them to high risks. OREX and AETAP developed a coating using a polymer called, Polyvinyl alcohol, a unique combination of materials. This

product was developed in 2 years and will probably be commercialized next year. Due to the use of this coating, the hazard to workers at OREX has decreased considerably and they are able to process a large amount of protective clothing from the nuclear industries. The productivity increase is very important, since the outage time of the machine costs roughly \$20,000 per hour. The project was realized in a very short time since the company was able to develop a marketable product in under 18 months by working with AETAP.

In the past three years, since they began to work with AETAP, OREX has grown tremendously. The CEO of the company expects that within the next year, 80% of the nuclear plant workers in the U.S. will be wearing OREX protecting clothing and sending their products to the company for processing. AETAP's unique invention is thereby helping OREX serve the nuclear industry in a much safer and productive manner.

(3) Help OREX be Environmentally Responsible: In another project, OREX worked with AETAP to control the amount of Organic contaminants the company was discharging in their waste water treatment system. The intention was to be proactive in terms of being environmental responsible. They use waste water treatment to get rid of some of the radioactivity. They worked with AETAP to reduce the amount of organics the company was discharging. AETAP helped the company change the process so that it is now well below the waste water treatment compliance regulations. These changes saved approximately \$1 million per plant compared to a standard anaerobic digestion system.

(4) Assist Resource Innovations to automate their plant and become globally competitive: Resource Innovations manufactures specialty chemicals and works with local plastic companies. The chemical business is very competitive, and RI must be very efficient in what they produce. Previously, they had been doing most of their work manually and lacked the resources to upgrade the company. With the help of AETAP, they have developed a modern automated system for manufacturing their chemicals and are now looking to expand their operation to a much larger facility. They plan to continue to use AETAP for worker training in the new facility.

(5) Improve the cleanability, reliability, and sound quality of a vacuum cleaner product, while minimizing the cost and increasing sweeper weight, for Euro-Pro. The student project team undertook the following design modifications: Redesign of the brush bar & side sweeper drive train mechanism, redesign of the handle, development of a handle pole whose height is user-adjustable, and development of a suction (vacuum) system for the sweeper. Other considerations in design included raw material and processing costs, purchased component costs, compliance with applicable standards, adequate performance ('cleanability') and product life, overall product quality, manufacturability of designed components and assemblies, and a required production time per unit. A small handheld and battery operated vacuum cleaner was redesigned to incorporate a centrifugal pump compressor, new drive train and improved side sweeping action.

(6) Design a new factory layout for Morris Forrest Products: Morris Forrest Products is a small wood products manufacturer located in Davidson, Alabama. The company recently developed and was awarded a large contract for the manufacture of 'ready-to-assemble' deck products. To meet a huge increase in customer orders, the assembly and inventory storage areas had to be expanded. This project involved the design of a layout for the newly acquired assembly building. This project lasted three months and the final deliverables were three possible facility layouts, along with the analysis that led to the layouts.

(7) Reduce manufacturing costs at Southern Patio: During the fall of 03 and spring 04, AETAP undertook a project to improve the design of an awning currently manufactured by Southern Patio Inc. The awning comes in a kit that is easily assembled and attachable to any exterior wall of a home. At the time of the project, there were a number of components that were expensive to manufacture and which drove up the cost of the awning considerably. One such component - the torsion bracket - was undersized and deformed excessively. Students redesigned the torsion bracket and several other parts, including an improved method to raise the awning, and a new system to provide a constant preferred pitch angle. Students analyzed the system, designed new parts and sized those parts to withstand expected loads, and replaced the old parts with the new ones in an existing awning. These and other design improvements are expected to lead to a reduced manufacturing cost and reduced price for the awning in a very competitive marketplace. Based on manufacturer's estimates, potential savings are \$50/unit in manufacturing costs, resulting in savings of  $\$50/\text{unit} \times 7000 \text{ units/year} = \$350,000/\text{year}$

(8) Development and delivery of a course on discrete-event simulation: Another AETAP sponsored project involved Dr. Smith giving a 3-day short course on the Arena discrete-event simulation tool to the Industrial Engineering department staff at Siemens VDO in Huntsville, Alabama.

(9) The Wal-Mart Distribution Center is located in Opelika, Alabama and is responsible for shipping grocery products to approximately 181 stores in Alabama, Georgia, Florida, and Puerto Rico. This senior design project analyzed the congestion caused by unload/ replenishment processes in the warehouse and develop a method to reduce the congestion without adversely affecting the operations. Another project is the development of a computer simulation model for the picking operations at the distribution center. This project involves collecting a significant amount of data from the distribution center prior to development of the computer model. The computer model will provide an animation of the picking process and will predict picking performance under a variety of staffing and equipment configurations.

(10) Siemens: Developed a short course on simulation. Four separate simulation-based analysis involving the analysis of alternative line configurations and staffing levels at the Siemens VDO manufacturing facility were developed.

### **Contributions to Other Disciplines:**

The ISIRP project contributed to other disciplines by (1) training several Management Information Systems students, (2) Providing technical assistance to the USDA Soil Dynamics Laboratory, and (3) Changing the role of ACES extension agents from an agricultural orientation to a manufacturing orientation. These are described below.

(1) A major contribution of this project is to the training of Management Information Systems (MIS) students in the College of Business as part of the effort to develop a Knowledge Sharing System (KSS) using an Oracle software platform. This experience exposed them to real-world issues in terms of normalizing the data base, constructing a data schema, and implementing their design. During Dec. 2004, an external intruder gained access to the KSS server and the system had to be shut down. It took two months to bring the system back on line with enhanced security and firewalls fully implemented, and it also needed the help of another faculty colleague in the College of Business. This provided a real-life problem solving experience for both the students and the faculty members in the College of Business. In addition, this system has been migrated to a MySQL based platform so that it can be self-sufficient once the funding is completed. This project provides needed training to MIS students on a real-world project and is expected to be of use to the AETAP staff once the system is operational.

(2) Another AETAP project led to working with Dr. Randy Raper in the USDA Soil Dynamics Laboratory: An existing 8 HP tiller was modified so that it could penetrate the soil at least 10'. Dr. Raper, along with Dr. Beale, made a presentation of this technology during an AETAP workshop and brought the tiller to the conference center so that the participants were able to see the impact of the design work. This project contributed to the agricultural engineering discipline.

(3) The ISIRP project is closely involved in changing the role of Alabama Cooperative Extension System (ACES) extension agents from a primarily agricultural orientation to a manufacturing orientation. With the change in society to manufacturing and information based products, the needs of the people in the counties have changed considerably. The introduction of new mediums such as the Internet provide access for company personnel to look for solutions to problems without needing to first consult the local county agent. At the same time, delays in relaying the results of research being performed in university labs to the industries that could use the research is increasing; frequently, the beneficiaries of the research might be geographically distant from the university and local companies may thus miss out on useful innovations. Extension agents at AL have been at the forefront of adapting to this change by working with the College of Engineering at AU and communicating the discoveries that take place to the local companies. This project is helping make progress in implementing this change process.

### **Contributions to Human Resource Development:**

Dr. Jeff Smith received the Outstanding Faculty Award at the College of Engineering 2005 Recognition Ceremony. Also Dr. Smith was nominated for appointment as an Alumni Professor by his department this year. Dr. Chetan Sankar of the College of Business was nominated by his college for the 2005 Faculty Award for Excellence in Outreach. Dr. Sankar's accomplishments with AETAP were highlighted in his dossier. Dr P.K. Raju, received the Auburn University Faculty Award for Excellence in Outreach 2004 for his work with the region's industries.

Mihaela Dupac successfully defended her Masters Thesis in Mechanical Engineering on April 7. This work has been supported by AETAP with funding from Haldex Brake Company, Prattville, AL. Dr. P.K. Raju was her advisor. Tracey Mole successfully completed his preliminary oral exam on March 14. He is completing his PhD in Chemical Engineering. His thesis is being supported by AETAP with funding from Orex Technology; Inc. Dr. Ray Tarrer is his advisor. Dr. Tom Burch of the department of Mechanical Engineering has also contributed to this project.

Students benefit significantly from interacting with companies and in learning how to set up, manage, and carry out real-world projects. Most of the projects that we participate in as part of ISIRP are exactly the types of projects that our students will work on once they enter the workforce. This provides an invaluable educational experience for the students and gives them valuable skills and confidence that makes them stand out from their peers during their job search. Moreover, company interactions and projects also provide development opportunities and benefits for faculty members by providing interesting and realistic experiences that can be brought into the classroom. We provide below extracts of comments from some of the students who worked on this project during 2004-2005. These comments show the role the ISIRP project plays in developing human resources.

Shaun Rhudy: I have been working with the Auburn Engineering Technical Assistance Program since August of 2002. This is my third year working with AETAP and I am finishing up my final semester to receive my Bachelor of Science degree in Mechanical Engineering. This has been a very rewarding experience for me, this entire time. This year especially has been a great opportunity. I have been working closely with

Dr. Beale since August 2004. We are involved with a senior design project sponsored by NASA. We should be completely finished by May 2005. Working on this project has provided me with a great sense of accomplishment. We have used our understanding of the subjects that we learned during our coursework, and we have applied that understanding to this project. We had to build an automatic wrapping machine. This is a really hands on example of an automation project. That is to take something that was previously done by hand and to build a machine to complete the task. My role with AETAP carries my responsibilities far beyond the classroom. I have had to work as a student liaison to state extension agents as well as to industry partners. I have learned a great deal from working with the project leaders of this grant. Their hard work has been a real inspiration. Through all of their efforts, I have truly been motivated to do my best work. My role includes publicizing AETAP workshops and contacting state and private agents for recruiting projects. This experience has been cross disciplinary to say the least. In school I would just work with other mechanical engineering undergraduate students. With AETAP, I work with undergraduate and graduate students in all the engineering disciplines as well as students in business and marketing. I also work with professors in various engineering and business fields. Outside of Auburn University, I contact Alabama County Extension agents and industrial partners. Their participation in this grant shows me what to expect after I graduate. I hope that you will continue funding for this effort and AETAP. I want others to share in this experience, so that they may gain as much as I have. AETAP is a great resource to our state.

Seema Hegde: I am a research assistant working with AETAP and am pursuing a Masters in MIS. Working with the KSS team, I have had the opportunity to learn and use the Oracle systems, to help in developing a comprehensive knowledge management system. Also, working with AETAP has helped me to know the issues involved in technology transfer between academia and industry. I have larely performed my MIS final project based on this, where I intend to study how IT is currently being used by the ACES extension agents, and what can be done to further the use of IT as an important enabling tool in their work. Moving from a background in EE into MIS, I have enjoyed learning the practical and business aspects of applying technology and integrating it into the community. This project gave me an excellent insight as to how productive active interaction between researchers and industries can be. I got an opportunity to learn to use an Oracle database system. I also got to meet with the agents from ACES and learn first hand what their needs were, and work on a way to meet it. While the professors gave us the requirements for the project and guided us on its direction, we were encouraged to look for and work on innovative solutions ourselves, which was an extremely motivating factor for me.

Elias R. Mixon III: I am a recent graduate of Auburn University that obtained my degree in Management of Information Systems. I have been working with AETAP/LITEE for about one year and a half. This project has helped me enhance my professional career by giving me the opportunity to utilize classroom theories and principles in a real work environment. It also gave me a real understanding of meeting deadlines and user satisfaction. This project really has benefited me and I hope that other students would have such a great learning experience as I did.

Barry Cumbie: I am a doctoral Student in Management of Information Technology and Innovation. I have been working with AETAP since Jan. 2003. This project has had a rich contribution in my education. While earning my Master's Degree, I was able to perform hands-on technical work with new information technology not available to most students. Additionally, I was able to interact with engineering professors, ACES agents, and people in the industry which provided real world relevance to the concepts learned in my coursework. Now that I am a doctoral student I have been able to participate on a broader level. In my studies I am able to relate relevant research topics to the situations that I have encountered throughout my participation with AETAP. I am and will continue to explore research that will have a positive impact on both my progress as a student as well as solving pertinent issues in the industry. Working closely with professors is crucial to me as someone who has interest in becoming a university professor. I am able to participate first hand on valuable research and learn about new research issues. This project has had a rich contribution in my education. While earning my Master's Degree, I was able to perform hands-on technical work with new information technology not available to most students. Additionally, I was able to interact with engineering professors, ACES agents, and people in the industry which provided real world relevance to the concepts learned in my coursework.

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Through this project I have continued to identify areas of research that are important to small and medium enterprises. Currently, I am developing a study in the area of disaster recovery that has the potential to inform small business owners about the necessity and best practices to ensure business continuity after a disaster. Working closely with professors is crucial to me as someone who has interest in becoming a university professor. I am able to participate first hand on valuable research and learn about new research issues.

Yvonne Hardy: For the past three years I have been working as a mechanical engineer/liaison for the Auburn Engineering Technical Assistance Program. Now, working with AETAP for the past three years has really motivated me to pursue a master's in Mechanical Engineering. Working with professors such as Dr. Tarrer, Dr. Raju, Dr. Smith, Dr. Burch and Dr. Sankar has shown me that professors really work hard. They make students and industry contacts aware of how important new technology is in this country. By working with these professors I have noticed how much they actually care about what they do to help people grow and develop with new technology. Working

with the professors and seeing how important it is to stay abreast of current and upcoming technology has really motivated me to further my education. By working with AETAP, I have been given the opportunity to talk with many CEOs and managers of different industries and they all have stressed to me how important it is to further your education to succeed in the business of manufacturing. The project provided me with opportunities for professional networking; greater research collaboration; advice on how to balance research, and service. Personal benefits include friendship, role modeling, socialization into the academic/industrial culture, emotional support, inspiring self-confidence and encouragement, providing frank but confidential feedback, and sharing ideas. The professors I worked with would not take anything less than the best from me. They knew exactly what my capabilities were and they wanted exactly that from me.

Gina Montgomery: I am currently a graduate student in the Masters of Management Information Systems program. However, beginning this Fall, I will transfer into the Doctoral program for the Management of Information Technology and Innovation. My experience with AETAP has been vast, although only having spanned four months.

In my four months with the group I have been exposed to various responsibilities normally relegated to those higher up in academics: As part of a team, presented at a student training workshop, Assisted with development of ideas for an NSF research proposal, As part of a team, designed a new database structure for the Knowledge Sharing System (KSS) as part of grant-funded research, coded a new end-user interface for the Knowledge Sharing System (KSS) as part of grant-funded research, built slide material for use in a research grant proposal presentation at the University level, and given proper access rights to serve as Oracle database administrator for the current Knowledge Sharing System servers.

AETAP has given me first-hand exposure to how things truly work in the academic realm. I begin my Doctoral work this fall, so I find great value in participating in the research proposal process. Additionally, I have been able to create a network of contacts that expands across various College of Engineering departments and includes ACES employees. Dr. Chetan Sankar serves as my primary contact for project management within AETAP. However, I have also worked directly with Dr. P.K. Raju, Yvonne Hardy, and Jan Drummond.

My undergraduate research experiences in computer science exposed me to technologies and small-scale implementation. Graduate research through AETAP has broadened my knowledge to include the industry-level policies and procedures that relate to various technologies, as well as considerations for implementation on a larger scale.

Direct access to Dr. Sankar and Dr. Raju has not only sped up the development process for the rebuild of the Knowledge Sharing System (KSS), but has also strengthened the end-product. Faculty members within AETAP have been very supportive and encouraging of research ideas and outreach possibilities brought to the table during our weekly meetings. Any time I need something clarified, a timely response from AETAP members is received. This responsiveness has increased my personal output on the projects at hand.

Faculty members have listened to my ideas and treated me as more of an equal than a student, as compared to most faculty/student situations. This response from faculty members has made me feel respected, which in turn increases my enthusiasm about the projects at hand and my dedication to AETAP.

Matt Dyar: I am a Masters student getting my graduate degree in MMIS. I have been working with AETAP for 6 months now. Working with an organization such as AETAP has been an enlightening experience. I have enjoyed working with and learning from professors and faculty outside of the classroom. Working with an AETAP development team has helped grow my team building and leadership skills, as well as many other skills that will help me after graduation in the real world. It has given me the opportunity to collaborate with students and faculty on a much higher level and it has been a rewarding experience.

#### **Contributions to Resources for Research and Education:**

The project is developing a Knowledge Sharing System (KSS) that will provide an invaluable information resource for academia, industry, and researchers in the field. The contribution here is in the integrated approach that analyzes complete systems through the interdisciplinary nature of the project teams. The use of the KSS and its ability to provide answers to simple technology transfer questions will save the time of the research partners in ISIRP. In addition, it will also provide the industrial partners with a quick response for their most frequently asked questions. The ISIRP partners will then be able to use their time more effectively, addressing and providing significant benefits through their interaction with smaller companies that cannot afford to maintain a large in-house engineering staff.

This project has been instrumental in establishing a partnership between industries, local and state governments, Auburn University, Wayne State University, and NASA. This unique partnership has focused on improving the economy in the region and in providing real-world experiences to engineering and business students at Auburn University.

The current list of partners is provided in the participant list.

#### **Contributions Beyond Science and Engineering:**

The results from the ISIRP project have contributed to the public welfare beyond science and engineering. This project has resulted in (1) Discovery of a new strippable coating to protect workers from radioactive contamination, (2) Enabling OREX to become more environmentally responsible, and simultaneously protecting Alabama's environment (3) Making it possible for Resource Innovations to automate their plant and become globally competitive, (4) Improving the cleanability, reliability, and sound quality, while minimizing the cost and increasing sweeper weight for a vacuum cleaner produced by Euro-Pro Operating, LLC, (5) The design of a new, more effective, factory layout for Morris Forrest Products, (6) Reducing manufacturing costs at Southern Patio, (7) reducing congestion in material handling at Walmart Distribution Center, (8) aligning flow of parts at Siemens Manufacturing, (9) assisting entrepreneurs test alternate fuels, and (10) The development and delivery of a course on discrete-event simulation. In summary, the ISIRP project is continuing to contribute to the public welfare in Alabama significantly by developing an effective partnership among academic departments at Auburn University, research laboratories, ACES extension agents, manufacturing companies, and industrial development units, making the state's industries more competitive in today's global marketplace and thus protecting the jobs of Alabama workers.

#### Special Requirements

**Special reporting requirements:** None

**Change in Objectives or Scope:** None

**Unobligated funds:** less than 20 percent of current funds

**Animal, Human Subjects, Biohazards:** None

#### Categories for which nothing is reported:

**EASTERN TECHNOLOGIES, INC.**

Post Office Box 409  
Ashford, Alabama 36312

Dr. Ray Tarrer  
230 Ross Hall  
Chemical Engineering Dept.  
Auburn University, AL 36849-5127

Subject: AETAP

Dr. Tarrer,

I wanted to contact you and let you know how much we appreciate the assistance that the AETAP program provided ETI. It is a very effective program and I hope that it will continue to be available to small businesses such as ours in the future.

Due to the information we obtained through the AETAP program we were able to eliminate or delay several major waste water treatment upgrades that saved ETI tens of thousands of dollars and improved our waste water quality to the City's treatment system. This improved waste water quality will also allow the City of Ashford to better meet their applicable waste water quality standards.

Please let me know if you need any detailed information with regard to the how the program assisted us in this area. Again thanks for your assistance.

Sincerely,

A handwritten signature in black ink that reads "Mark Fellows". The signature is written in a cursive, flowing style with a long horizontal stroke extending to the right.

Mark Fellows  
Vice President  
Eastern Technologies, Inc.



# Industrial Renaissance Through Innovative Partnerships

**Dr. P.K. Raju, Director**  
**Auburn Engineering Technical Assistance Program**  
**Samuel Ginn College of Engineering**



**April 20, 2005**

# Presentation Overview



- What is AETAP
- Partners
- What we do and Companies Assisted
- Current Projects
- Knowledge Sharing System
- Impacts on Economy

# What is AETAP



The Auburn Engineering Technical Assistance Program is a coalition of Auburn University Engineering departments focusing on the needs of Alabama's manufacturers. AETAP was conceived to help Alabama Manufacturers increase their competitiveness in a rapidly changing world of international commerce.

# Our Partners



- Auburn University (AETAP, College of Business, BMEP)
- Alabama Cooperative Extension System
- Wayne State University
- NASA
- Alabama Power Company
- Alabama Development Office
- City of Auburn
- Bessemer Chamber of Commerce
- Montgomery Chamber of Commerce
- **Thirty Seven Industries .... and growing**

# Goals of AETAP



- Provide cost effective high quality technical assistance and technology transfer to industries
- Train a diverse technologically literate workforce in modern manufacturing technologies and processes
- Facilitate the transformation of knowledge into innovations that will create new wealth and strengthen the regional economy
- Make available a Knowledge Sharing System to facilitate virtual communication among industries, researchers and county agents

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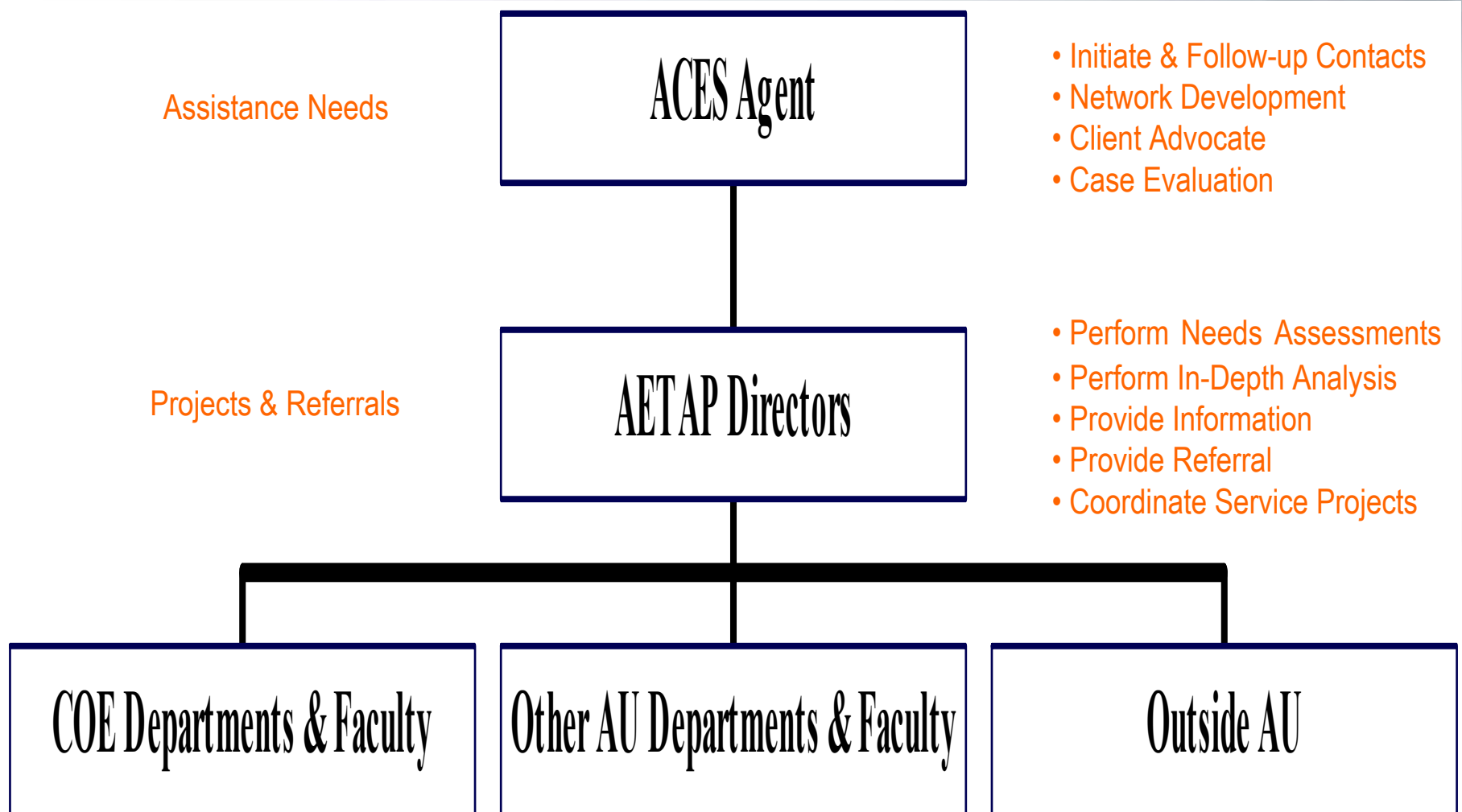
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# Cooperating to Deliver Industrial Extension Services



# AETAP Activities Highlights



- During the period 1996-2005, provided technical assistance to 920 manufacturing units, with 32 faculty and over 4500 students participating in AETAP projects. This activity helped engineering students get experience in solving real-world problems
- Sixteen Workforce Development seminars of interest to manufactures in Alabama were organized during 1996-2005
- Ten workshops were organized during 1996-2005 to develop engineering know-how for ACES county agents as they coordinate AETAP activities in Alabama counties
- Obtained \$2.7 million in funding from NSF, NIST, NASA, ATN, ACES and Auburn University
- Through successful proposals, received funding from industry for company specific projects totaling \$1.2 Million (FY 97-05)

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# What AETAP can do for you



- **Quality Improvement Assistance**
- **Materials Analysis and Failure Analysis**
- **Technology Awareness Demonstrations**
- **Preventive and Predictive Assessments**
- **Continuing Education and Training**
- **Site Visits To Help Problem Solving**
- **Noise and Vibration Abatement**
- **Technical Problem Assistance**
- **Access To Rapid Prototyping**
- **Plant Safety Assessments**
- **Lean Manufacturing**
- **Factory Automation**
- **Waste Reuse**
- **Business Planning**
- **HVAC Analysis**

**And many others...**

# A Few of the Companies We have Assisted



- **U.S. Steel**
- **Mercedes Benz**
- **Kimberly Clark**
- **Capitol Vial**
- **Americold**
- **SMC South**
- **Michelin North America**
- **GKN Westland Aerospace**
- **Southern Company Services**
- **Hoerbiger Drive Tech USA Inc**
- **Haldex Brakes Corporation**
- **Hyundai**

# Types of AETAP Projects



## **Undergraduate Student Course Project**

- Developmental in nature
- Longer turn-around times
- Conducted over 1 or 2 semesters
- Supervised by Faculty
- Sponsor pays material costs

## **Graduate Student Thesis Project**

- Developmental in nature
- Supervised by Faculty
- Sponsor pays for graduate student time and university overhead

## **Faculty-Driven Student Project**

- Short turn-around time
- A small group of faculty and students (can be graduate or undergraduate)
- Sponsor pays for faculty and student time and university overhead

## **Faculty Consulting Project**

- Very short turn-around time
- Faculty only
- Sponsor pays for faculty time and university overhead

# Types of AETAP Projects



## Undergraduate Student Course Project

- Developmental in nature
- Longer turn-around times
- Conducted over 1 or 2 semesters
- Supervised by Faculty
- Sponsor pays material costs

## Graduate Student Thesis Project

- Developmental in nature
- Supervised by Faculty
- Sponsor pays for graduate student time and university overhead

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# Benefits



## **Students**

- Experience in solving real world problems

## **Faculty**

- Industry Contact – Possibility for future projects

## **Sponsor**

- Brains & time of highly creative Auburn Engineering students who can develop a vision into reality
- Expert advice from AU faculty
- Design, developmental work or testing according to agreed timeline

## **AETAP**

- Facilitate Industry-Faculty-Student interaction
- Bragging rights

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# Technical Assistance Program

## Examples of Potential Benefits



<b>Name</b>	<b>Location</b>	<b>Date</b>	<b>Potential Benefits</b>	<b>Project Details</b>
<b>Morris Forrest Products</b>	<b>Davidson, AL</b>	<b>2004</b>	<b>Increased Inventory Space and Increased Productivity</b>	<b>Designed a Plant Layout for Their New Assembly Facility</b>
<b>Wal-Mart</b>	<b>Opelika, AL</b>	<b>2004-2005</b>	<b>More Streamlined Operations</b>	<b>Developed a computer simulation for slot picking operations</b>
<b>ETI/Orex</b>	<b>Dothan, AL</b>	<b>2004-2005</b>	<b>Reduced Volume of Radioactive Waste</b>	<b>Developed a Strippable Coating for Entrapping and Disposing of Radioactive Waste</b>
<b>Lawson, Davis, Pickren &amp; Seydel</b>	<b>Atlanta, GA</b>	<b>2004-2005</b>	<b>Aid in Court Case</b>	<b>Validating approach for testing lime in cement</b>
<b>NASA</b>	<b>Huntsville, AL</b>	<b>2004-2005</b>	<b>Automation of a Labor Intensive Process</b>	<b>Design and Build a Prototype Machine</b>
<b>Resource Innovations, INC.</b>	<b>Cartersville, GA</b>	<b>2005</b>	<b>Worker Recruitment and Training</b>	<b>Provide the Man Power to Start Up a New Chemical Process</b>
<b>Chemical Products Tech.</b>	<b>Cartersville, GA</b>	<b>2005</b>	<b>Reduction of Disposal Cost on a Current Process</b>	<b>TCLP Testing and Recyclability Assesment</b>

# Technical Assistance Program

## Examples of Potential Benefits



<b>Name</b>	<b>Location</b>	<b>Date</b>	<b>Potential Benefits</b>	<b>Project Details</b>
Rheem	Montgomery AL	2005	Increased Efficiency in Research and Development Laboratory	Redesign the Layout of the Water Heating System
Euro-Pro	Auburn, AL	2005	New Product Design	Prototype Design Retrofitting of Current Sweeper Device
Southern Patio	Atlanta, GA	2004	Stronger and Cheaper Products	Evaluate and Redesign Outdoor Patio Awnings
Siemens VDO	Huntsville, AL	2005	Increased Productivity	Simulation Analysis of Electronics Assembly
Wal-Mart	Opelika, AL	2004	Better Distribution System	Isle Congestion Study
Wal-Mart	Opelika, AL	2005	Assigning Slots to Products Such that Costs are Minimized	Product Slotting Study
Siemens VDO	Opelika, AL	2005	Simulation Short Course	Develop Arena Discrete Event Simulation Tool

# The Knowledge Sharing System



- A technological solution used to Facilitate Interactions among People
- A **Google™-ization** of Technology Transfer & Technical Assistance
- A tool to Capture & Report the economic impact of AETAP & partner activity

# Impacts on the Economy



**Recruit new industry**  
**Support and grow existing industry**  
**Develop new industry**

# Hoerbiger Hydraulics



**Job Creation: 30**

**Capital Investment: \$3M**

Proximity of large ME department part of decision to locate here. Interested in fluid mechanics expertise and opportunities for technical service through AETAP.

# Technical Assistance Program

## Examples of Estimated Impact



Name	County	Date	Impact	Project Details
Americold	Cullman, AL	1999	Annual savings of \$144,000	Installed ultrafiltration unit for high priced detergents to allow reuse
Capital Vial, Inc.	Auburn, AL	2001	Saved \$10,000	Quicker troubleshooting of pneumatic and glycol problems
Eastern Technologies, Inc.	Dothan, AL	2003-2004	Help gain funding for startup business with Orex; total package \$1.3 M from DOD; 10 new jobs	Develop new process for strippable coatings made of PVA (polymer)
McPherson Oil	Birmingham, AL	2003	Profit of \$100,000	Help production and sales of used oil
Over 1000 companies	Throughout Alabama	1996-2000	Over \$3 M	Recycle oil by using a fuel for paper companies.
SMC South	Auburn, AL	1999	Annual savings of \$180,000	Design and implement automated dispenser for control bail
U.S. Steel	Fairfield, AL	1999	\$4.9 M annually by saving 200 jobs	Develop training for environmental programs

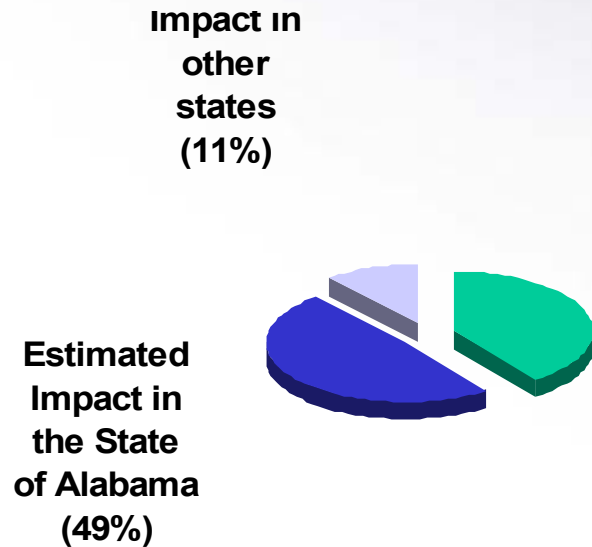
# Technical Assistance AL

## Examples of Measured Impact

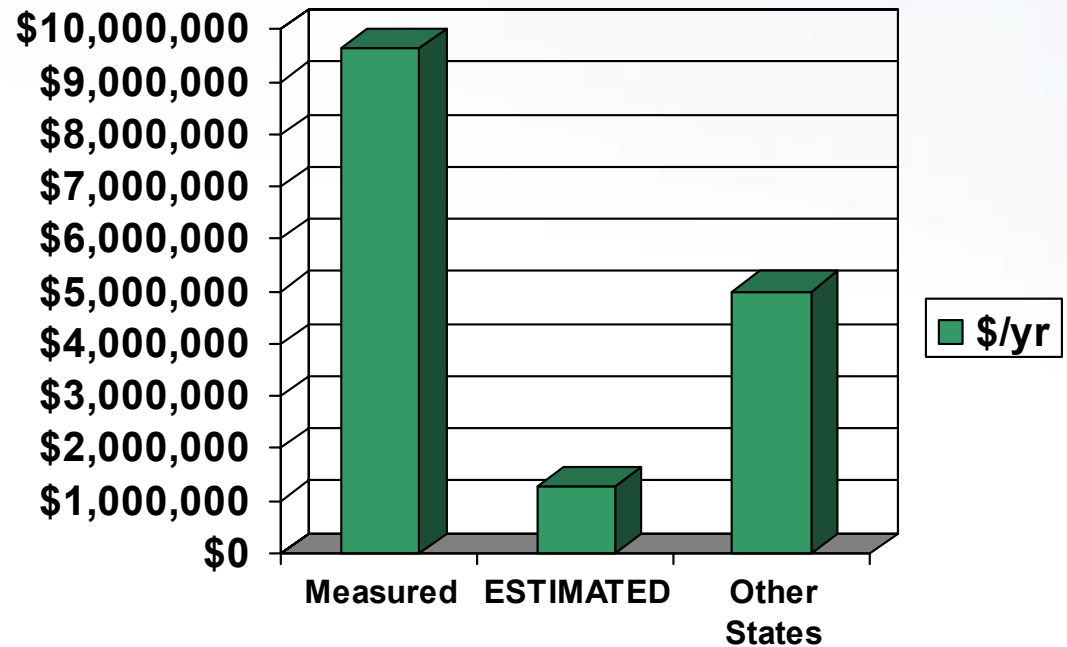


Name	Location	Date	Annual Impact	Project Details
Auburn Apparel	Selma, AL	1998	\$100,000	Reduced lead time, increased throughput
Auburn Mill Works	Auburn, AL	2000-2001	\$50,000	Automation of door mold assembly process
Celotex	Birmingham, AL	200-2001	\$50,000	Materials/waste handling
GKN	Tallassee, AL	2000	\$50,000	Improved manufacturing
Haldex	Prattville, AL	2000-2001	\$60,000	Modal analysis testing of brake pads
Laser Fabrication	Alexandria, AL	2000-2001	\$100,000	Design and development of wheelchair ramp for a bus
Muleshoe Specialty	Jackson Gap, AL	2000	\$100,000	30% increase in product production
Superior Metal System	Midland City, AL	2000-2001	\$50,000	Design & analysis of rollers for a metal forming machine
Uniroyal Goodrich	Opelika, AL	2000-2001	\$20,000	Develop & implement technology to reduce noise emission from transportation carts; flow analysis of compressed air plant piping
West Point Stevens	Valley, AL	2000-2001	\$50,000	Improved ergonomics

# Impact Analysis of Technical Assistance Projects (1998-2003)



Measured Impact in the State of Alabama (40%)



Thank You



Auburn Technical Assistance Program

[www.eng.auburn.edu/aetap](http://www.eng.auburn.edu/aetap)



**Table 1**

**Industrial Renaissance through Innovative Partnerships Workshop**

**April 20, 2005**

**The Grand National Lodge & Conference Center  
Auburn Engineering Technical Assistance Program**

**WORKSHOP EVALUATION**

N=18

- I. We want to study the influence of the ISIRP project (AETAP) on your perceptions regarding technical assistance and industrial development provided by the College of Engineering, Auburn University, in Alabama. Please answer the following questions.

Scale: 1 – strongly disagree; 3- neither agree nor disagree; 5 – strongly agree

	Mean
1. Industries in my county need technical assistance/industrial development.	4.6
2. The status of technical assistance and industrial development provided by the College of Engineering at Auburn University in my county is excellent.	3.8
3. During the past year, the ISIRP project helped me to focus more on providing technical assistance and publicizing availability of College of Engineering resources to manufacturing industries in my county.	3.8
4. In the future, I expect the ISIRP project to help me to focus more on providing technical assistance and publicizing availability of College of Engineering resources to manufacturing industries in my county.	4.2
5. The KSS system will be of value to me in contacting industries.	4.0
6. The workshop was helpful in informing me about the research efforts at Auburn University (HVAC, Automation, Pollution Prevention, Manufacturing)	4.5
7. The workshop provided me information on how to improve the efficiency of some of the plants in my county.	3.9
8. The workshop made it possible to share information about the projects in the manufacturing area that are being conducted by Auburn University.	4.2
9. The workshop provided sufficient information regarding the capabilities of AETAP and the services they provide.	4.7
10. I liked listening to the success stories of AETAP.	4.9
11. The presentations by companies listing the issues of concern to them was helpful.	4.8
12. This program really helps AU students obtain real-world experiences while in college.	5

II. AGREE-DISAGREE QUESTIONS – Please mark your answer with an (X) for each of the following questions.

Scale: 1 – strongly disagree; 3- neither agree nor disagree; 5 – strongly agree

	Mean
1. The workshop met my expectations.	4.6
2. The workshop was presented at a level compatible with my background and experience.	4.4
3. The workshop proceeded at just the right pace.	4.4
4. The workshop was just the right length.	4.3
5. The workshop materials supplied were helpful.	4.4
6. The workshop was well organized and presented.	4.7
7. The facilities were good.	4.9
8. The time, date and location of the conference was convenient.	4.7

### SHORT RESPONSE QUESTIONS

Will you recommend this workshop be offered again to other ACES Agents and industry representatives?  
If yes, why? (14)

- Okay to offer to agents who haven't yet been exposed to info.
- Particularly useful to industry that is not aware of opportunities to industry with specific needs.
- Could be a great benefit to local industries.
- It's a great partnership for ACES w/ the University.
- To help industry stay domestic.
- This is vet helpful for agents to learn about industry and for industry to learn about services of ACES.
- Especially liked the student and industry idea sharing.
- Very Informative. Also very helpful in networking with companies who we do business with.
- Very valuable connection to multiple resources.
- Information was timely and Beneficial

If not, why not?

- Need to include more industries
- All agents need to know

Would you like an AETAP representative to visit with you to showcase this program to your clients in the next three months? Yes-9 no-2 not sure -4

- Only b/c we have an existing relationship
- They have been to my county recently
- possible, chamber forum or workshop

**-Of value to Mobile and Baldwin county**

If yes, what is the name of your county/ company?

**-Morgan County, Elmore, Carters Bluff, Mobile/Baldwin, Chilton county Extension**

**-Lets plan a presentation to about 30 people of West Ga Nanobusiness Alliance**

Would you like to host a workshop in your county if resources are provided?

Yes-6                      no-2                      other:

Other: **maybe, W/a, possibly , I'll ask , Maybe limited # of industries in our county (might partner with adjoining county)**

**-we would, this was very helpful**

When would you like the next workshop to be held?

2 to 3 months                      4 to 5 months -3                      6 or more months-7

**-or once a years for two days include a tour**

Any other comments:

**-Great Program-Everyone Benefits!**

**-I am looking forward to the visit in my county with a client. The tv offer is still on.**

**-prefer students and industry on program. Shorten presentations-maybe fewer but longer presentations. Some are repeats in each meeting. Would like an Opportunity to tour an industry-would prefer a meeting once a year for two days or one day with half in morning classroom with afternoon tour.**

**-Thanks for the time and Interest**

**-Two day training with tours of a successful Industry project would be great.**

## Industrial Renaissance through Innovative Partnerships Workshop

January 27, 2006

*A Workshop at Birmingham Botanical Gardens*

Birmingham, AL

Auburn Engineering Technical Assistance Program

### WORKSHOP EVALUATION

Scale: 1 – strongly disagree; 3- neither agree nor disagree; 5 – strongly agree

	Mean
1. Industries in my county need technical assistance/industrial development.	4.4
2. The status of technical assistance and industrial development provided by the College of Engineering at Auburn University in my county is excellent.	4
3. During the past year, AETAP helped me to focus on providing technical assistance and publicizing availability of College of Engineering resources to manufacturing industries in my county.	4.1
4. In the future, I anticipate AETAP to help me to focus more on providing technical assistance and publicizing availability of College of Engineering resources to manufacturing industries in my county.	4.6
5. The KSS system will be of value to me in contacting industries.	4.6
6. The workshop was helpful in informing me about the research efforts at Auburn University (HVAC, Automation, Pollution Prevention, Manufacturing)	4.5
7. The workshop provided me information on how to improve the efficiency of my plant/plants in my county.	4.3
8. The workshop made it possible to share information about the projects in the manufacturing area that are being conducted by Auburn University.	4.5
9. The workshop provided sufficient information regarding the capabilities of AETAP and the services they provide.	4.4
10. I liked listening about the success stories of AETAP.	4.6
11. The presentations by companies listing the issues of concern to them was helpful.	4.5
12. This program really helps AU students obtain real-world experiences while in college.	4.6
13. This workshop encourages active teamwork between AETAP/ACES and Industry.	4.6
14. The workshop met my expectations.	4.5
15. The workshop was presented at a level compatible with my background and experience.	4.6
16. The workshop proceeded at just the right pace.	4.6
17. The workshop was just the right length.	4.6
18. The workshop materials supplied were helpful.	4.5
19. The workshop was well organized and well	4.6

presented.	
20. The facilities were good.	4.6
21. The time, date and location of the workshop was convenient	4.3

## SHORT RESPONSE QUESTIONS

1. Will you recommend this workshop be offered again to other ACES agents and industry representatives?

If yes, why? 7

Can be very beneficial and cost effective

Because it creates awareness as to the resources available at Auburn University

Problem solving at industries

People need to know more how Auburn University can help

Build relationships and inform ACES Agents of success and potential opportunity

If not, why not?

2. Would you like an AETAP representative to visit with you to showcase this program to your clients or your company in the next three months?

Yes 1 visibility no 1 not sure 6

3. If yes, what is the name of your county/ company?

Blount County

Individual

4. Would you like to host a workshop in your county if resources are provided?

Yes 2 no 2 other 4

5. When would you like the next workshop to be held?

2 to 3 months 4 to 5 months 2 6 or more months 3

6. Are there other topics that would be of interest to your industry/the industries in your county? Please name them.

Grant outcome

7. Should more time be spent on the information covered in this workshop?

If so, how much?

No

No change needed in the amount of time for each topic

8. What are the strengths of this workshop?

Information Sharing

Information on what is available

Discussion- sharing information

The diversity of the group and their experience

Multiple presenters with different backgrounds/ areas of expertise

Very detail and informative

Discussion and examples

9. What improvements could be made to the workshop?

More attendees

10. Any other comments:

You might try internet conferences or video; the very best conference and send out cds

We need to look at ways to get more participation

**AETAP/ BMEP Workshop**  
**March 4, 2006**  
**Auburn Engineering Technical Assistance Program**  
**WORKSHOP EVALUATION RESULTS**

Please circle your affiliation: Faculty Student 33 Other

Scale: 1 – strongly disagree; 3- neither agree nor disagree; 5 – strongly agree

	Mean
1. The workshop was helpful in informing me about the research efforts at Auburn University.	4.4
2. The workshop provided sufficient information regarding the capabilities of AETAP and the services they provide.	4.1
3. The leadership and team working exercises were very helpful.	4.4
4. This program really helps AU students obtain real-world experiences while in college.	3.8
5. The workshop met my expectations.	3.8
6. The workshop was presented at a level compatible with my background and experience.	3.9
7. The workshop proceeded at just the right pace.	2.9
7. The workshop materials supplied were helpful.	4.0
8. The workshop was well organized and well presented.	4.2

**SHORT RESPONSE QUESTIONS**

11. Will you recommend this workshop be offered again to other BMEP students?

If yes, why?

1. Yes, It provides them with information on how to get involved in research and get experienced.
2. Good for leadership skills
3. Only for the student experiences, Dr. Ralph Zee and Warren Smedley
4. Valuable information
5. Yes, it gives you many ideas
6. Yes, if they are interested in AETAP
7. Yes, because it informs people about very helpful functions in our school which no one knows much about.
8. Every student needs communication and teamwork training prior to team assignments in class.
9. Great leadership suggestions
10. Yes, Very informational
11. Skills presentations leadership is valuable information

12. Any and all information presented is useful and lets students know what's out there.
13. Yes, but make is a bit shorter.
14. Yes, because I took it.
15. Very Informative and fun
16. It was good hearing experiences from those involved in AETAP and it was informative.
17. It was very informational and often people are left out from knowing about opportunities.
18. Yes, because it was helpful
19. Yes, but only if it is shorter
20. To be honest it was rather long. However, I did have fun during the workshop.
21. To show more opportunities and options that is out there.
22. Great information
23. It was fun
24. Yes, because it allows interaction with faculty and gain information on projects.
25. It provides valuable information and expose them to other engineering disciplines and opportunities.

If not, why not?

1. No
2. No, not really interesting nor helpful.
3. No, Long, drawn out, and boring.
4. Too long
5. It needs to work toward building cohesion in the group

12. What are the strengths of this workshop?

1. Informative and Warren Smedley is an excellent speaker! Smedley should be the only speaker. Everything else was boring and confusing. Just let Smedley speak next time and make it three hours shorter.
2. Detailed information
3. It tells us what to expect from engineering. It also gives the students the experience of working in groups.
4. Good presentation
5. Dr. Ralph Zee used lovely teaching methods to facilitate learning. He used working examples. Very effective.
6. Valuable information
7. The variety
8. The activities, food, and good presentations are strengths
9. The leadership workshop
10. Wide variety of department information provided.
11. Displays how students can get involved.
12. Student presentation
13. Presenter was great. Most of the AETAP presenters were also really good.
14. Lots of information
15. Information
16. Teamwork and building relationships
17. It provided a lot of useful information

- 18. Information about AETAP
- 19. Well organized
- 20. The leadership session
- 21. Warren Smedley was a very nice speaker and the workshop was quite entertaining.
- 22. The information and real-life situation examples.
- 23. Activity
- 24. Fun
- 25. Activities, project presentations
- 26. Leadership activities

13. What improvements could be made to the workshop?

- 1. Shorter, much shorter. I've got too many classes during the week to waste FIVE hours of my Saturday watching Power Point slides.
- 2. Cut down the length of the presentations.
- 3. Make the workshop shorter.
- 4. The workshop should do a presentation on all engineering fields.
- 5. Shorten the time of the program.
- 6. The professor presentations need to be much shorter. Some of them went over my head.
- 7. Make presentations shorter
- 8. Make them more time friendly
- 9. Maybe the timing
- 10. Make it a little shorter
- 11. Better break-up of straight informational presentations.
- 12. More breaks
- 13. Cut out specifics on projects (i.e. Industrial Engineering presentation was way too much information)
- 14. Condense the ISE a bit and use more common terms.
- 15. Time
- 16. Shorter duration
- 17. Real food for breakfast
- 18. Better organized
- 19. Find a way to make it shorter in length
- 20. Shorten it to about 2 hours
- 21. Have it at a different time and better food
- 22. More energetic presentations
- 23. The presentations should maybe not be so long
- 24. Not be so long
- 25. Time management
- 26. More activities
- 27. Fun
- 28. The workshop is very time consuming perhaps scheduling it over two days will help a higher attention span and interest from the students.

## Mobile County Evaluation Tally

August 11, 2005

### **1. What were the strengths of the AETAP Presentations?**

- **The presenters were very knowledgeable of their topics. The topics were diverse and interesting.**
- **The knowledge base is very impressive.**
- **Specific examples of your projects, from day to day uses such as the awning hardware, to the technical applications in the nuclear industry.**
- **Knowledgeable subject matter with good verbal aids.**
- **Very informing**
- **The knowledge of the providers and the PowerPoint presentations.**
- **Information available.**
- **They were clear and concise with their goals. Also, the use of Real World Work Experience that the students performed was very good.**
- **Knowledge of speakers, PowerPoint presentation graphics and links, Note students were excellent. Tracey Mole was the best presenter.**
- **Provided information on AETAP. I did not realize it existed. I think this is a very useful resource for any community or business.**
- **The knowledge of the individuals and the use of video. It is wonderful to see these young people get practical experience with companies and public presentations.**
- **The presentations were very informative and quite interesting.**
- **Informative**
- **Very Informative**
- **The participants' knowledge and communications skills in their presentation effects.**
- **The management and information systems was most informative to my interest**

### **2. What were the weaknesses of the AETAP Presentations?**

- **Some aspects of the presentation may have gotten a little too technical.**
- **Some of the presentations were a little slow.**

- **Some aspects of the faculty presentations were focused more on technical, rather than applicable aspects.**
- **Some of the speakers were hard to hear and understand.**
- **Need to use mike more often; soft voices**
- **Much of the information was extremely technical and appeared to be geared for engineering companies, not as much for this present community.**
- **Presentation; more persons in value in computer knowledge**
- **Some of the information regarding the aerospace “rocket” engineering was really over many of the audience heads and could have been downsized a bit, but it was great information.**
- **Dr. Hartfield’s presentation was good but extremely technical in nature. I would keep the content but eliminate or scale back some of the highly technical aspects. To most of the non-engineers, it truly was “rocket science”**
- **Some was very technical**
- **I think that in some cases you tried to provide technical info that many could not understand. That was not your problem.**
- **Some of the presenters voices did not carry over well maybe you all can attach the small microphones to their clothing.**
- **Some presentations were not vocally clear (volume)**
- **You did not identify your audience and tailor your presentation to them**
- **You were way over their heads.**
- **Range of visual presentation could be expanded**
- **N/A**
- **To analytical**

### **3. Suggestions for improvement of the AETAP Presentations**

- **Perhaps the use of more practical applications and examples**
- **Presentations should be prioritized based, and not so industry specific.**
- **More contact with the community advertisement**
- **Presentations should keep the “audience” in mind and be modified accordingly.**
- **Overall it was a great presentation.**
- **I would eliminate some of the more technical aspects of the presentations.**

- **None**
- **N/A**
- **Overall very informative and interesting. AETAP is something that I think could be very valuable to our city's economy.**
- **Spend time on who you are speaking to and customize the presentation to them.**
- **Expand the presentations to cover the age groups affected and how others may enter the fields as a career opportunity.**
- **N/A**
- **Adapt the presentation to the industry in the area.**