

GEORGIA INSTITUTE OF TECHNOLOGY  
OFFICE OF CONTRACT ADMINISTRATION  
SPONSORED PROJECT INITIATION

Date: December 5, 1979

Project Title: Planning Project for a Poultry Industry Engineering Research Institute

Project No: A-2492

Co-Project Director: R.S. Combes and R.D. Atkins

Sponsor: National Science Foundation; Washington, D.C. 20550

Agreement Period: From 10/1/79 Until June 30, 1980  
\*Includes 6 month unfunded flexibility period.

Type Agreement: Grant No. ISP-7919649

Amount: \$71,755 NSF (A-2492)  
+1,000 GIT (E-152-101)-Cost Sharing Number.  
\$72,755 TOTAL

Reports Required: Annual Progress Report (with request for renewal); Final Project Report

Sponsor Contact Person (s):

Technical Matters

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Intergovernmental Science and Public  
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Washington, D.C. 20550  
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Contractual Matters


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Mr. William A. Bryant, Grants Official  
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Washington, D.C. 20550  
(202) 632-5860

Defense Priority Rating: None

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SPONSORED PROJECT TERMINATION SHEET

2  
B-440

Date 9/16/81

Project Title: Planning Project for a Poultry Industry Engineering Research Institute

Project No: A-2492

Co- Project Director: R. S. Combes and R. D. Atkins

Sponsor: National Science Foundation; Washington, D. C. 20550

Effective Termination Date: 6/30/81

Clearance of Accounting Charges: 6/30/81

Grant/Contract Closeout Actions Remaining:

- ☐ Final Invoice and Closing Documents
- ☒ Final Fiscal Report
- ☒ Final Report of Inventions
- ☐ Govt. Property Inventory & Related Certificate
- ☐ Classified Material Certificate
- ☐ Other \_\_\_\_\_

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FINAL REPORT  
PROJECT A-2492

PLANNING GRANT FOR A  
POULTRY ENGINEERING RESEARCH INSTITUTE

PRINCIPAL INVESTIGATORS  
R. Dale Atkins, P.E.  
Richard S. Combes, P.E.

Prepared for  
National Science Foundation

by  
Engineering Experiment Station  
Technology Applications Laboratory  
Georgia Institute of Technology  
Atlanta, GA 30332

August 1981

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# APPENDIX VI

NATIONAL SCIENCE FOUNDATION Washington, D.C. 20550		FINAL PROJECT REPORT NSF FORM 98A		
PLEASE READ INSTRUCTIONS ON REVERSE BEFORE COMPLETING				
PART I-PROJECT IDENTIFICATION INFORMATION				
1. Institution and Address Georgia Institute of Technology Atlanta, GA 30339	2. NSF Program ISPT	3. NSF Award Number ISP-7919649	5. Cumulative Award Amount \$71,755	
4. Award Period From 10/79 To 6/30/81				
6. Project Title Planning Project for a Poultry Industry Engineering Research Institute				
PART II-SUMMARY OF COMPLETED PROJECT (FOR PUBLIC USE)				
<p>In September 1979, a planning grant was awarded to the Georgia Tech Engineering Experiment Station by the National Science Foundation to develop an organizational plan for a Poultry Engineering Research Institute (PERI). Due to the fact that Georgia is the largest volume producer of poultry products (broilers and eggs) in the U.S. and Georgia Tech has been involved in extensive engineering research and development for the poultry industry since 1973, a university/industry cooperative research program seemed to be a viable concept. However, several problems became evident in the evaluation process, not the least of which was the absence of any other poultry industry research center which was entirely industry supported. Typically, research centers addressing industry-specific problems (e.g. poultry disease, genetics, etc.) are government funded. In addition, the fragmented nature of the poultry industry and low profit margins seem to present difficulty in consolidating support for the PERI concept. Therefore, approximately six months into the grant period, a decision was made to abandon the PERI concept and to redirect the resources made available by the grant to a more generic research area which would serve the needs of the poultry industry as well as the needs of other industry sectors. Drawing upon the experience accumulated in our extensive contacts with the U.S. poultry industry and our knowledge of other industry sectors, the Principal Investigators and the NSF Program Managers decided to evaluate the viability of a Materials Handling Research Center.</p> <p>We established material handling as our major thrust and pursued industrial and trade association contacts. We began our investigation of Georgia Tech's resources and found a group at Georgia Tech that was already pursuing the establishment of such a Center. Jointly, we pursued contacts and began to establish a base of support.</p> <p>We determined that we needed more effort to clearly define the support base and the research areas so we have proposed to NSF to aid us in this area.</p>				
PART III-TECHNICAL INFORMATION (FOR PROGRAM MANAGEMENT USES)				
1. ITEM (Check appropriate blocks)	NONE	ATTACHED	PREVIOUSLY FURNISHED	TO BE FURNISHED SEPARATELY TO PROGRAM
				Check (✓)      Approx. Date
a. Abstracts of Theses	X			
b. Publication Citations	X			
c. Data on Scientific Collaborators	X			
d. Information on Inventions	X			
e. Technical Description of Project and Results		X		
f. Other (specify)				
2. Principal Investigator/Project Director Name (Typed) R. Dale Atkins	3. Principal Investigator/Project Director Signature		4. Date 8/81	

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## SUMMARY

In September 1979, a planning grant was awarded to the Georgia Tech Engineering Experiment Station by the National Science Foundation to develop an organizational plan for a Poultry Engineering Research Institute (PERI). Due to the fact that Georgia is the largest volume producer of poultry products (broilers and eggs) in the U.S. and Georgia Tech has been involved in extensive engineering research and development for the poultry industry since 1973, a university/industry cooperative research program seemed to be a viable concept. However, several problems became evident in the evaluation process, not the least of which was the absence of any other poultry industry research center which was entirely industry supported. Typically, research centers addressing industry-specific problems (e.g. poultry disease, genetics, etc.) are government funded. In addition, the fragmented nature of the poultry industry and low profit margins seem to present difficulty in consolidating support for the PERI concept. Therefore, approximately six months into the grant period, a decision was made to abandon the PERI concept and to redirect the resources made available by the grant to a more generic research area which would serve the needs of the poultry industry as well as the needs of other industry sectors. Drawing upon the experience accumulated in our extensive contacts with the U.S. poultry industry and our knowledge of other industry sectors, the Principal Investigators and the NSF Program Managers decided to evaluate the viability of a Materials Handling Research Center.

We established material handling as our major thrust and pursued industrial and trade association contacts. We began our investigation of Georgia Tech's resources and found a group at Georgia Tech that was already

pursuing the establishment of such a Center. Jointly, we pursued contacts and began to establish a base of support.

We evaluated possible areas of research and attempted to determine their feasibility. Two areas which were possibilities were 1) computer aided facility design and 2) relationship of throughput and capacity in warehousing.

We determined that we needed more effort to clearly define the support base and the research areas so we have proposed to NSF to aid us in this area.



## I. INTRODUCTION

The planning project with the National Science Foundation began as a Poultry Engineering Research Institute and finished with a focus on material handling research. The transition took place because the industry specific concept appeared to be too narrowly defined to obtain sufficient industry support. Starting with the poultry industry, we began looking for an area that was a generic thread common to all or most industries. After talking to industry personnel it appeared as though material handling was an area that had commonalities within many industries. As it developed, this was also an area where we had expertise here at Georgia Tech. We pursued these avenues until we reached a point at which we focused on Dr. John White, Professor in the School of Industrial and Systems Engineering, as a possible center director, because of his experience and reputation within industry.

## II. ESTABLISHED INITIAL INDUSTRY CONTACTS

The Georgia Tech research team began this project by contacting as many poultry processing and trade associations as possible to present them with the idea and concept of a Poultry Engineering Research Institute. In order to broaden our scope and our contacts, we visited and talked with such people as the Georgia Poultry Federation, the Pacific Poultry and Egg Association, Virginia Poultry Federation, Minnesota Turkey Processors Association, and the Arkansas Poultry Federation. This was done through either meetings that had been set up for some other purpose or through a meeting which was directly established for presenting this concept. For example, the California meeting was set up in conjunction with the Pacific Egg and Poultry Association Annual Conference which was presenting a Department of Energy seminar. Each of these meetings was designed to introduce as many industry members as possible to the Poultry Engineering Research Institute concept.

### A. Evaluated Responses

In general, the response from industry contacts, which included poultry production companies as well as poultry industry equipment manufacturers, was good. However, the concept of direct industry financial support of research is a new one in the poultry industry, since past research has been largely funded by the Federal government through the U.S. Department of Agriculture. Trade associations, which are strong entities in the industry, were generally enthusiastic but at the same time noncommittal about the concept. Individual Georgia companies who have worked with Georgia Tech in the past were very supportive of the concept. In particular, equipment manufacturers which work

exclusively with the poultry industry were interested in the possibility of Georgia Tech involvement in research. This interest is probably due to the fact that much of the recent innovation and improvements in poultry processing equipment has come from European companies, and there is a definite "innovation gap" between the European and U.S. research organizations. Although there was a good deal of interest in response to Georgia Tech's extensive contacts with the industry, a clear concept of how to secure the needed industry commitments for initial and sustaining financial support was not evident. Upon analysis of the types and content of industry responses to our concept, it was decided that only a specific, well-defined research program which would address a real need in the industry would generate wide spread support. It was further decided that using a single research area as the basis to build an industry-specific research center would be inappropriate and possibly short-lived.

#### B. Searched for Underlying Generic Area

With these ideas in mind we began looking for a more general area which we felt could serve the poultry industry as well as serve other industries and be better received and supported. It did not take long to perceive that a major problem within many areas is that of material handling. We at Georgia Tech conducted a earlier study in the poultry industry with the National Science Foundation which looked at automated handling techniques. This study showed that one of the major problems within the industry is one of moving the processed product from one area to another. It is very labor intensive and there is very little automation in transferring the birds from one section to another section which is essentially all done by hand.

We felt the problem of material handling was a common thread which ran through many different process and manufacturing systems. In order to verify this belief we visited several manufacturing facilities and discussed with them where their problem areas are. One of the main problem areas was that of material handling. This concept of material handling also carries over into large warehousing and distribution systems. After much discussion with these people we felt that material handling and automation in this area represents a potential for improved industrial productivity.

### III. ESTABLISHED MATERIAL HANDLING AS MAJOR THRUST

As a result of this prior effort we determined that we should begin evaluating Georgia Tech's resources, pursuing industrial and trade association contacts within the material handling area and evaluating our base of support.

#### A. Evaluated Georgia Tech Resources

In order to find out exactly where our capabilities in material handling were at Georgia Tech we contacted the Manufacturing Technology Center, the Industrial and Systems Engineering School and the Mechanical Engineering School to determine what kinds of resources we had at Georgia Tech in material handling. A number of experts in the area of materials handling were identified at Georgia Tech. Dr. James Apple, an expert in material handling, was a professor here for many years before his death in 1978. Dr. John White, a professor at Georgia Tech, is an international expert in the material handling area. He is very closely associated with the Material Handling Institute and with the American Institute of Industrial Engineers. He had served as the first committee chairman of the College Industry Council on Material Handling Education. We approached both the Industrial and Systems Engineering School here at Georgia Tech and the American Institute of Industrial Engineers, headquartered in Atlanta, and discussed with them the possibility of establishing a Material Handling Research Center here in Atlanta. The ISyE School was very much interested in working together with the Engineering Experiment Station to pursue the establishment of such a center.

## B. Pursued Support

Through the Office of Interdisciplinary Programs, John White and Dale Atkins actively pursued industrial and trade association contacts to gain exposure for the perceived Material Handling Research Center. Because of Dr. John White's stature in the material handling field with regard to companies and trade associations, he was chosen to act as a focal point and as a proposed Executive Director of the proposed research center. He and Mr. Atkins pursued support through material handling trade shows with contacts that were made at the trade shows and also through personal contacts and visits with people both in the material handling industry and within the end users industry. We discovered, there is virtually no industry which does not need good material handling techniques. Many of these techniques employ very low technology and many areas of research are essentially open. The industrial engineers natural inclination is toward optimizing both production and material flow. It is this area which needs tremendous work and research.

## C. Evaluated Base of Support

As a research team we had investigated many different areas of material handling with regard to manufacturing and processing and began to build a substantial base of support. In Table 1 is listed a summary of the companies which expressed an interest in providing support for this research center. We did not, at this point, pursue a dollar amount or try to determine the type of contract which might be written to satisfy the client companies but we would be prepared to pursue this in the future. There are several equipment manufacturers in this list of supportive companies which have indicated an

Table 1. Candidate Firms for Membership in the  
Material Handling Research Center

Allis Chalmers	General Motors
Bell and Howell	Harnischfeger
Bethlehem Steel	Honeywell
Boeing	International Business Machines
Briggs and Stratton	J.I. Case
Burlington	Lear Siegler
Burroughs	Litton
Caterpillar	Lockheed
Cincinnati Milacron	Mannesmann Demag
Coca Cola	R.C.A.
Conco-Tellus	Rockwell International
Control Data	Shell Oil
Deere and Company	Sperry
DuPont	SPS Technologies
Eastman Kodak	Steelcase
Eaton	Tektronix
Exxon	Texas Instruments
Ford	Western Electric
General Dynamics	Westinghouse
General Electric	Xerox

interest in providing us with equipment and systems and instrumentation to be able to support and equip laboratory space.

Each of these companies is fully aware of the problems that exist with regard to handling, storing, and controlling materials. It is because of this interest and concern that they are able to be supportive of such a center. They feel that there are many areas of basic research which can be done in order to facilitate this material handling problem. The base of support that we have established among these companies is essentially nationwide. The center of this base, the heavy manufacturing area, is in the mid-west and that is where many of the material handling equipment companies are located. However, many of the other companies that are end users of the material handling equipment are located in essentially in every part of the country. Georgia Tech's Annual Material Handling Management Course which this year consisted of approximately 55 people came from every part of the country and represented all different types of manufacturing and the U.S. Government. Many of these companies have in the past supported this type of research at least on a limited basis. We feel that they would be very interested in supporting a center that would provide them a service of helping them do their strategic planning and helping them to do the most up-to-date items that are necessary to properly handle materials. One President of a large electronics firm said to us "that material handling is the last frontier with regard to improving productivity in this country."



#### IV. EVALUATED POSSIBLE AREAS OF RESEARCH

During the course of events on this project we looked at many different areas of research which we felt we could pursue and in which we felt that the companies would be interested. There were many different areas where companies were interested, but only a few which were generic enough.

##### Research Opportunities

Examples of research topics which were anticipated for the center include:

- o Material handling systems simulation;
- o Storage/retrieval system design with alternative levels of automation and mechanization;
- o Computer-aided material handling equipment selection models;
- o Computer-aided plant layout;
- o Robotics applications;
- o Automatic identification systems;
- o Computer-aided planning and scheduling;
- o Group technology/material handling interfaces;
- o Material cost modeling and measurement;
- o Transportation/distribution system optimization;

- o Generic material handling software development;
- o Proprietary market research and product development for material equipment suppliers.

Each of these categories is very wide-ranging and the composite of these categories is almost all encompassing. It would be virtually impossible for any group or center to address all of these different areas of research. Preliminarily, we narrowed the field of possibilities down to computer-aided facility design and relationship of throughput and capacity. These two areas seem to hold great promise with regard to the increased productivity and possible research and development techniques that can be developed from these two areas of research.

Some of the services anticipated which we believe the center might be able to provide at some point and time are:

- o Provide a comprehensive library of material handling literature;
- o Offer an extensive collection of movies, video tapes, slides and equipment;
- o Establish a material handling equipment demonstration laboratory;
- o Organize and conduct field trips/tours nationally;
- o Conduct seminars for material handling engineers and top management;
- o Develop software systems to facilitate the design of material handling systems;

- o Distribute news letters from member companies, reciting new developments, trends and new installations nationally; and
- o Aid in reducing lag time between market development and marketplace application.

Each of these were areas in which we felt as though the center might provide a service which would be paid for by the member companies. The services would be applications-oriented and would perhaps provide the means of transferring the technology that was being developed.

## V. DEVELOPED PLAN OF ACTION/CONCLUSION

Because of the change of direction in the middle of this project we feel that we do not have sufficient time or money to fully develop a base upon which to submit a full proposal to establish a Material Handling Research Center. We made some great strides in developing the concept but we do not feel at this time that we have a sufficient base of support and sufficient development of a concept with regard to how the companies would interact and support such a center. It is, therefore, our plan of action to submit to the National Science Foundation a proposal to reinforce and substantiate our concept with regard to material handling. We feel that the concept of a generic center would be more valuable than the industry specific center such as a Poultry Engineering Research Institute. The base of support that can be provided in this area of material handling is very very broad and stretches across almost all industries, including food processing, manufacturing, fabrication and assembly.