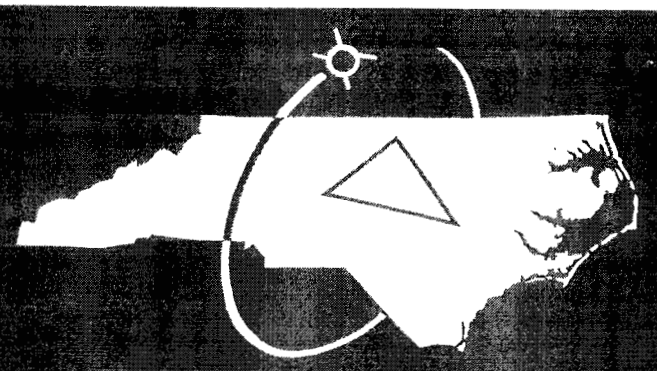

NORTH CAROLINA SCIENCE AND TECHNOLOGY RESEARCH CENTER

A STUDY OF THE THESES PRODUCED AT THREE UNIVERSITIES FOR POSSIBLE COMMERCIAL APPLICATION

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Technical Report No. 104

A STUDY OF THE THESES PRODUCED AT THREE UNIVERSITIES FOR POSSIBLE COMMERCIAL APPLICATION

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North Carolina Science and Technology Research Center
Research Triangle Park, North Carolina

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A STUDY OF THE THESES PRODUCED AT THREE UNIVERSITIES FOR POSSIBLE COMMERCIAL APPLICATION

By Frederick O. Smetana
North Carolina Science and Technology Research Center

INTRODUCTION

In many regions of the nation, graduate students conducting thesis investigations are the area's most numerous research group. Each year thousands of theses are presented to university graduate schools in partial fulfillment of degree requirements.

With this vast involvement in graduate thesis research it would be strange, indeed, if some significant scientific results and technological innovations did not emerge. Such developments are often the foundation stones for material progress. To maximize this progress, then, it is desirable to glean all the worthwhile information from such research, which is supported at no little expense by the taxpayer.

Usually a dozen or so copies of the thesis are prepared for distribution to the University library, the supervising department, interested faculty, and personal libraries. One copy of each doctoral thesis goes to University Microfilms to be microfilmed. Copies of the film are then distributed to subscribing libraries. No such distribution is made of Master's theses, however.

Feeling the pressure to publish, university faculty and students have been more prompt to extract the significant kernels and report them than formerly. Yet, one often retains the feeling that the originator of the work may not recognize an important application of his work or techniques outside his usual field of interest. To determine to what extent this might be the case, an experimental program was undertaken by the North Carolina Science and Technology Research Center with the support of the National Aeronautics and Space Administration to examine the graduate theses produced at the University of North Carolina at Chapel Hill (UNC), Duke University, and North Carolina State University at Raleigh (NCSU) for previously unexploited technology of direct commercial interest. If such technology were found to be abundant, then it would be of definite economic value to the nation to examine and report on all theses produced in the United States.

This is a report on the results of this investigation.

REVIEW ACTIVITY

Since "Dissertation Abstracts," published by University Microfilms, receives relatively limited distribution in the technical community, it was decided to include Doctoral theses in the review as well as Master's theses. The complete files of departments of engineering, natural and physical sciences, and health were reviewed and a list of 5,825 titles compiled,dating from 1893 through the June 1967 commencement. This list was circulated to a group of five staff engineers of broad professional experience in the manufacturing industry. This group selected 797 titles which were thought to be of sufficient interest to warrant review of the abstracts of the documents. On the basis of these abstracts, full copy was requested on 304 theses. These were then reviewed and a group of 119 theses was selected as containing possible innovations in processes or materials or novel concepts for instruments or devices. A review by the senior technical staff of STRC placed 19 theses in the category of containing possible products or processes of commercial interest and 60 in the category of containing possible technical contributions to current commerial practice. The titles and other pertinent information are listed in the table. The theses in these two groups were then submitted to recognized knowledgeable reviewers in industry and universities for their evaluation as to the commercial applicability of the material.

Of the 19 theses containing possible products or processes, reviews indicated that:

1 idea was in the process of being patented
3 concepts were now the basis of commercial products (whether derived from the thesis or not could not be determined)
4 ideas had been superseded by improvements
2 concepts were not sufficiently developed to accurately judge their applicability but may be worth pursuing
9 ideas were regarded as offering too little improvement over existing techniques to warrant further investigation

Of the 60 theses with possible contributions but with no salable products or processes:

11 were in the area of metallurgy and materials
4 were in the area of testing techniques
1 was a contribution to electrical technology
6 were related to insecticide and fungicidal activity

The remaining 38 were in the area of chemical processes.

The information contained in these theses was found to lie in one of the following classes:

(1) of scientific interest only
(2) superseded by improved methods
(3) published and in general circulation
(4) of no commercial interest
(5) insufficiently detailed to form a definite conclusion
(6) techniques and results known in industry

CONCLUSIONS

As a result of this survey of the theses published at three North Carolina Universities, it is concluded that information of possible commercial interest is being carefully extracted for presentation in archive journals or patent applications by the authors themselves or their supervising professors. No concept of immediate commercial interest was found that had not been pursued in this fashion. The project demonstrated that this mechanism functions more effectively than had been originally presumed.

One of the problems encountered in obtaining reviews of the theses was in finding individuals with the requisite technical competence and also an awareness of the market requirements and risk capital available. To obtain satisfactory reviews also requires a great number of individual reviewers since no one is competent in more than a few limited fields.

The information of immediate commercial interest contained in these theses seems to be receiving adequate public exposure; it is concluded, therefore, that no additional reviewing mechanism need be created.

University Thesis Study

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79 THESES SELECTED FOR FINAL REVIEW

Theses with Possible Products or Processes

Author and Title	School	Year	Comments
Bond, S. M. The Fungicidal Activity of Some Derivatives of Rhodanine	Duke	1950	Possibly of interest although quite old
Possible instruments involving electrical or nuclear effects			
Bumgardner, L. T. The Use of Pulsed Nuclear Magnetic Resonance Techniques in the Study of Biological Systems	Duke	1966	Does not yet appear ready for commercial use
Haire, M. J. Evaluation of a Gamma Battery Based upon the Photoelectric Effect	NCSU	1967	Probably useful only in high cost applications
Hunt, J. M., III Study of a Reciprocating Electromechanical Transducer	Duke	1967	Not now being developed further. May be of interest to makers of portable generators or engine manufacturers
Martel, C. R. Construction and Testing of an Apparatus for Calorimetric Measurements	NCSU	1954	Nothing new here
McKnight, J. S. A Meter for Quantitatively Evaluating Tremor in Parkinson's Disease	Duke	1962	Paper based on thesis has been published; other methods now used
Mehta, P. K. Investigations on the Utilization of Calcium Carbonate Waste Sludge from the Sugar Factories for the Manufacture of Portland Cement	NCSU	1962	Did not appear to have economic application in the U. S.

Author and Title	School	Year	Comments
Thurstone, F. L. Fetal Electrocardiography and Heart Rate Determination	NCSU	1961	This technique is in use
Possible analytical instruments involving mechanical, thermal, or optical properties and liquid diffusion			
Bowman, J. F. Analysis of the He-Ne Gas Laser for Use in Ultra-Precision and Surface Quality Measuring Techniques for Production Processes	Duke	1967	Concept only; insufficient detail for commercial user comment
Clark, R. L. Measurement of Soil Moisture Content by Light Reflection	NCSU	1965	Consultants feel this is an interesting concept but whether worth developing depends on value of measurement
Goforth, S. T., Jr. Analysis and Experimental Verification of a Probe Method for the Thermal Conductivity of Small Specimens	NCSU	1963	Consultants feel it's an interesting idea for special applications but none were able to cite advantageous situation
Holland, C. N. The Design, Instrumentation, and Results of the First Series of Tests on Two Machines to Study the Mechanical Properties of Fine Grained Soils	Duke	1960	Basic idea is used only in research; improved machines available
Pugh, C. E. Strain Studies Utilizing Diffracted Light	NCSU	1963	The means for producing the diffraction grating is the subject of a patent application
Rao, A. N. Development of an Improved Crimp Tester	NCSU	1959	Consultants feel that significant aspects of this technology are now used
Rozett, R. The Measurement of Liquid Diffusion Coefficients by Means of a New Capillary Technique	NCSU	1958	This technique is being used in improved form

Author and Title	School	Year	Comments
Singh, K. P. Investigation of Polycarbonate as a Photoelastic Coating Material	NCSU	1967	Industrial concern has been marketing such material for this purpose for several years
Swanson, R. W. Instrumentation of a Field Survey Meter for Soil Moisture Determination	NCSU	1954	Being marketed in improved form
Tatum, E. F. Design and Construction of an Apparatus to Determine the Emissivity of Metals Between 100°F and 1000°F	NCSU	1958	Consultant indicates improved techniques are available
Varn, D. W. Measurement of Thin Film Thickness by the Method of an Oscillating Quartz Crystal in the Vacuum Chamber	Duke	1963	Successful commercial instrument uses this scheme

University Thesis Study

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79 THESES SELECTED FOR FINAL REVIEW

Theses with Possible Contributions but no Salable Products or Processes

Author and Title	School	Year	Comments
Agnew, L. S., Jr. Problems and Properties of Barytes-Colemanite Concrete	NCSU	1960	No use in cement products industry
Arthur, G. L., Jr. An Investigation of the Deodorizing and Decolorizing of Menhaden Oil	NCSU	1925	Newer methods available
Bair, W. M. An Evaluation of Wood Adhesive Bond Integrity Tests--Shear, Tension, and Torsion	Duke	1962	Nothing really new
Baird, B. R. Dimensional Stabilization of Wood by Vapor Phase Chemical Treatments	NCSU	1967	Nothing new
Ballance, J. B. Phase Equalibria Involving the τ Phase in the Ternary System Nickel-Vanadium-Boron	NCSU	1966	Published paper
Ballard, L. F. Electronic Conduction in Organometallic Complexes of Transition Metals	Duke	1966	Published paper
Bashaw, J. D. Experimental Studies of Some Organic Semiconductors	Duke	1964	Unable to determine if this is novel but is an area of great industrial activity
Campbell, G. G. An Investigation of Improving the Durability of Exterior Finishes on Wood	NCSU	1967	Evaluation continuing

Author and Title	School	Year	Comments
Christison, I. B. Testing Fungistatic Activity of Some Organic Compounds Against Fungi Pathogenic for Man	Duke	1952	Generally old but consultants indicate may be of interest
Christison, I. The Antifungal Activity of Some Organic Compounds Against Fungi Pathogenic for Man	Duke	1953	Generally old but consultants indicate may be of interest
Clarke, F. I. An Investigation of the Feasibility of Using Neutron Activation Analysis for Determination of Toxic Metals in Textile Wastes	NCSU	1964	Of possible interest
Connelly, F. J., Jr. The Recovery of Fish Solubles from Stickwater	NCSU	1951	Probably uneconomical
Deo, S. K. Two-Phase Drying of Peanuts for Control of Mold Growth	NCSU	1966	Of limited interest
Erickson, E. E. A Continuous Countercurrent Liquid-Solid Contactor: Its Development, Construction, and Performance	NCSU	1957	Better methods probably available
Ferrari, T. E. Effects of 3,5-Diiodo-4 Hydroxybenzonitrile (Ioxynil) on Respiration	NCSU	1967	Follow-up work has been done
Fortna, B. L. The Reaction of Dithiocarbazates with Chloroacetic Acid	Duke	1957	Old, possibly of interest for fungicide, etc.
Gokcen, U. Qualitative and Quantitative Determination of Fibers and Fiber Blends with Pyrolysis and Gas Chromatographic Techniques	NCSU	1964	Of scientific interest only

Author and Title	School	Year	Comments
Haller, M. W., Jr. Dispersion of Uranium Monocarbide Particles in Uranium	NCSU	1967	More development contemplated
Hann, R. A. An Investigation of the Drying of Wood at Temperatures Above 100 Degrees Centigrade	NCSU	1965	Nothing new
Hansen, C. A. The Treatment of Domestic and Industrial Wastes by Flotation	UNC	1942	Insufficient information given
Hansen, D. A Study of the Influence of Size on the Performance of a Moving-Bed, Liquid-Solid Contactor	NCSU	1957	Little new information
Jin, C. R. A Study of the Partition Coefficient of O-Phenylphenol Between Polyethylene Terephthalate Fiber and the Aqueous Phase in Relation to Carrier Dyeing	NCSU	1960	Possibly of interest but probably well-known
Jowdy, A. W.,Jr., A Study of Insoluble Solids as Emulsifiers	UNC	1955	Insufficient information given
Kakar, S. K. The Effect of Various Substances on the Internal Structure of Polyethylene Terephthalate Filament and their Ability to Function as Dyeing Assistants	NCSU	1965	Possibly of interest but probably well-known
Kammereck, R. Thin Layer Chromatography of Disperse Dyes on Cellulose Acetate	NCSU	1966	Of possible limited interest
Kapashi, S. S. Mechanism of Carrier Activity in Dyeing Polyethylene Terephthalate Fiber with Non-Ionic Dyes	NCSU	1959	Possible of interest but probably well-known

Author and Title	School	Year	Comments
Kaplan, M. P. A Study of the Spectral Non-Additivity of Selected Direct Dyes in Water, Organic Solvent and Water-Organic Solvent Media	NCSU	1967	Probably well-known
Kenyon, W. G. Alkylations of Phenylacetic Type Esters and Nitriles and of Certain Phenylhydrazones by Means of Alkali Amides	Duke	1964	Scientific interest
Kim, C. H. An Investigation of the Influence of Cold Work upon the Corrosion Resistance of a Duralumin Alloy	NCSU	1967	Of scientific interest only
Kim, D. W. An Experimental Study of Yarn Bulkiness under the Conditions of Continuous Compression and Recovery	NCSU	1963	Of scientific interest only
Koburger, J. A. The Identification of Growth Stiumlants for the Lactic Streptococci	NCSU	1962	Of scientific interest only
Kothari, H. N. Equilibrium Absorption of Dyes on Orlon	NCSU	1953	Of no interest
Lawton, E. L., II Crystallization of Amorphous Polyethylene Terephthalate Induced by Liquids	NCSU	1966	Possibly of interest but probably well-known
Leake, P. H. The Structure Determination and Synthesis of Some Polycyclic Aromatic Compounds	Duke	1954	Old but possibly of interest as a fungicide
Lemons, J. H. The Effect of Various Substances on the Internal Structure of Amorphous Polyethylene Terephthalate and their Ability to Function as Dyeing Assistants	NCSU	1963	Possibly of interest but probably well-known

Author and Title	School	Year	Comments
Link, J. B. Analysis and Design of a Double-Sideband Suppressed-Carrier Modulator Using a Switched Autotransformer	Duke	1964	Better methods available
Linn, B. O. Acylations of Sodio Ketones with Acid Chlorides to Form β-Diketones. Synthetic Applications	Duke	1956	Scientific interest
Lohr, D. F., Jr. The Synthesis and Properties of Some Heterocyclic Diaryl Sulfides	Duke	1963	Scientific interest
Lohr,D. F., Jr. Synthesis and Reactions of Heterocyclic Systems Containing Sulfur	Duke	1965	Scientific interest
Lundquist, G. E. Mechanical and Physical Properties of Barytes-Colemanite Concrete	NCSU	1952	No use to concrete industry
Oner, H. A. Some Observations of the Interaction of Organic Solutes with Polyesters by Means of Gas Chromatography	NCSU	1967	Possibly of interest but probably well-known
Otter, M. L. S. The Synthesis and Antimicrobial Activity of Some 5-Alkyl-4-Thiazolidones	Duke	1959	Old, but possibly of interest
Pai, P. S. Some Aspects of Dyeing with Reactive Dyes in Solvent-Water Systems	NCSU	1964	Probably well-known
Palma, O. J. The Effect of Sodium Silicate on the Efficiency of Bleaching Cotton with Hydrogen Peroxide	NCSU	1959	Well-known in textbooks
Porter, H. K. Synthesis of Some Fungicidal Aromatic Compounds	Duke	1951	Old, but possibly of interest

Author and Title	School	Year	Comments
Rash, F. H. Alkylations and Other Condensations of o- and p-Tolunitriles and of a Sulfonamide by Means of Sodium Amide	Duke	1967	Scientific Interest
Rawicz, F. M. Some Aspects of the Mechanism of Dyeing Polyethylene Terephthalate Fibers with Non-Ionic (Disperse) Dyes in the Presence of Dyeing Assistants	NCSU	1958	Possibly of interest but probably well-known
Rex, R. L. Fire Resistance of Wood Treated with Double-Diffusion Chemicals	Duke	1965	No interest
Rubin, A. J. Foam Separation of Microcontaminants by Low-Flow-Rate Methods	UNC	1966	Insufficient details
Satapathy, D. M. The Effect of Swelling on the Relative Absorption of Substantive Dyes by Cellulosic Materials	NCSU	1966	Probably well-known
Serinken, S. H. Investigations Concerning the Use of Fiberglass Reinforced Rods in Prestressed Concrete	Duke	1961	No value
Sinclair, E. F. Synthesis of Some Organic Compounds of Possible Antimicrobial Activity	Duke	1956	Old, but possibly of interest
Snyder, J. L. A Study of the Influence of Resin Utilization Efficiency on Flat-Pressed Flake Board Properties	NCSU	1964	Paper on this work published
Stone, J. A. Thiazolo (3,2-a) Pyridinium Salts Having Functional Groups	Duke	1966	Scientific interest
Tellman, S. J. The Influence of Wood Surface Properties on the Quality of Adhesive Joints: An Annotated Bibliography	Duke	1965	Nothing new

Author and Title	School	Year	Comments
Tetenbaum, M. Fungicidal Activity of Some 3-Benzylrhodanines	Duke	1955	Possibly of some interest although dated
Unal, G. A Study of Vacuum Concrete	Duke	1962	Possible specialized application but no general interest
Walsh, W. K. The Effect of Water on the Kinetics and Diffusion in Radiation Grafting of Acrylonitrile to Cellulose	NCSU	1967	Activity of recognized and well-published group
Work, S. D. Acylations and Other Condensations of Dianions of β-Diketones, Imides and Amides. Acetylation of 1,3,5-Triketones by Boron Fluoride	Duke	1963	Of scientific interest only
Woods, J. O., Jr. Static and Sustained Load Tests on Ordinary and Lightweight Prestressed Concrete Beams	Duke	1966	Information probably well-known by now
Yarrington, N. L. Two Synthetic Studies of Quinolizinium Derivatives	Duke	1962	Scientific interest
Zinn, M. F. The Synthesis of Some Aromatic Systems Having Nitrogen at a Bridgehead Position	Duke	1965	Scientific interest