One of the BW-40-C Warpers in the new Beattie Plant, Woodside Mills, Fountain Inn, S. C.

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THE COCKER BW-40-C

The BW-40-C Warper, shown here, is an example of Cocker's engineering flexibility. It is based on Cocker's standard SD-49 Spindle Driven Warper, modified to meet the special requirements of mills like this beautiful new Beattie Plant.

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In This Issue

From the Editor ............................................. 4
Electronics in Textiles ............................... 6
IMS Re-Organizes .................................. 10
Walter F. Fancourt Memorial Seminar ......... 12
Accounting—A Useful Tool of the Modern Manager .... 14
Unfinished Business .................................. 16
Undergraduate Research Abstracts ............. 17
Outstanding Seniors .................................. 21
Industrial Management Seminars ............... 23
New Course in Textile Chemistry ............... 23
Industry Today—Education Tomorrow .......... 24
A.A.T.T. Field Trip .................................. 25
Phi Psi Initiates New Members ................. 29
Professional Development Courses for 1965 .... 31
1964 Sees Initial Fruits of IM Master’s Program .... 33
Something Old, Something New ................ 33
Now That You Mention it ........................ 34
Index to Advertisers ............................... 34

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THE BOBBIN & BEAKER is a non-profit magazine organized to serve Clemson students and the textile industry. We ask our readers to consider favorably our advertisers when buying.
This issue should contain something of interest for all of our readers. We have two excellent articles by faculty members and one by Dean Wallace Trevillian. Dean Trevillian’s article is concerned with industry and education, while Professor Gentry’s article is entitled “Electronics in Textiles”, and Professor Wannamaker’s is “Accounting—A Useful Tool of the Modern Manager.”

The Bobbin and Beaker has always been distributed free to anyone who desires it, and we hope that we can continue with this policy. However, with the rise in cost of printing, the cost of mailing, and other costs necessary to publish this magazine, each issue costs more than the previous one. To avoid additional expense of postage on issues returned due to addressee having moved without notifying us, please notify our circulation manager when you change addresses.

The staff would like to take this opportunity to wish each of you the very best in the new year.
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MAY 1967
Electronics in Textiles

By Asst. Prof. David Gentry

BIOGRAPHICAL SKETCH
Mr. David R. Gentry is an assistant professor in the Department of Textiles. He teaches Physical Textile Testing.

Mr. Gentry is a native of Easley, South Carolina. He received his B.S. degree from Clemson in 1955, and in 1957 he received his M.S. degree from the Institute of Textile Technology in Charlottesville, Virginia.

Before becoming a member of the faculty of the School of Industrial Management and Textile Science, he worked for 2½ years for the research division of the Westpoint Manufacturing Company of Westpoint, Georgia. He is presently doing research in the field of textile testing here at Clemson.

The development and perfection of electronic circuitry and equipment has had considerable impact on industry, and the textile industry is no exception. Forward thinking research people have applied electronics to textile problems and manufacturing operations. Industry management has in many instances accepted such developments immediately and has benefited considerably from their application.

Electronic apparatus has found application in three areas: testing instruments, processing aids, and control systems. Testing instruments, of course, are used for the measurement of material properties with notable developments having occurred in the evenness testers and strength testers using strain gage principles. Instruments have also been developed for electronically measuring fiber length and color and even for measuring trash content of cotton. Processing aids include such items as meters for continuous monitoring of moisture in yarns and fabrics, yarn tensioning devices, slub catchers, and yarn defect detectors. Control systems are used for automatically controlling some process variable, and those systems most commonly found in textile processing are moisture controls for drying ranges, warp drive controls for providing constant winding speeds, size-box level controls for slashers, and pH controls for wet processing.

PRINCIPLE OF ELECTRONIC MEASUREMENTS

One basic principle characterizes all electronic measuring systems and is outlined in Figure 1. The first requirement is to have a sensing device which is affected in some way by the property being measured. Following this device must be an amplifier or other modifying element which converts the variations in the sensing device to a usable signal. Third, there must be an output of the signal with this output being fed into a meter, recorded on an oscillograph, or actuating some device which controls some operation.

SENSING ELEMENTS

There are several types of sensing devices used, and these are outlined in Figure 2. A very common meth-
method for detecting property variations is to measure the change in the capacitance of an electronic circuit caused by introducing the material being measured between the plates of a capacitor. This type of sensing device has been used extensively in the newer evenness testers and instruments for measuring moisture content.

A second class of sensing elements include resistance bridges, reactance bridges, and differential transformers. The bridge type transducer consists of a Wheatstone bridge with one arm of the bridge becoming unbalanced with the sensing of the property being measured. A resistance bridge, of course, measures properties which affect the resistance of a circuit while a reactance bridge measures differences in reactance of a circuit.

The differential transformer transducer is a very important type with a schematic being shown in Figure 2. It consists of a hollow device which may be mounted on a stationary member of some apparatus and a core which fits inside the hollow tube and is mounted to a movable member. Contained in the hollow device are primary winding coils which are energized and two sets of secondary windings. The motion of the iron core imparts an excitation voltage to one of the two secondary coils and the magnitude of the electromotive force generated depends on the degree of motion of the core. Thus a signal is generated which is directly proportional to the mechanical movement of some member of a apparatus.

A third type of sensing element is the strain gage. This element is very similar to a resistance bridge transducer except that a physical movement of one of the bridge arms is caused by variation in the property being measured. This increase in length (strain) causes a change in resistance of the arm and unbalances the bridge, generating a signal which is proportional to the strain. This sensing element is most often used on tensile testing apparatus.

**SENSE ELEMENTS**

1. CAPACITOR PLATES
2. TRANSUDERS
   A. RESISTANCE BRIDGE
   B. REACTANCE BRIDGE
   C. DIFFERENTIAL TRANSFORMER
3. STRAIN-GAGE BRIDGE

**APPLICATIONS IN TESTING INSTRUMENTS**

Now for some specific applications of electronics in textiles. By far, the greatest use has been in the area of testing instruments with a notable application having developed in evenness testers. Evenness is defined as the variation in weight-per-unit length of a
strand of material. Two types of variations are involved and are known as long-term and short-term variations. Long-term variations are variations in long lengths of materials (usually 100 times the fiber length and longer) while short-term variations are variations in short lengths (one to ten times the fiber length). The Brush evenness tester was developed specifically to measure these short-term variations.

A block diagram of the tester is shown in Figure 3. The first stage of the instrument is an oscillator which changes DC voltage into a periodically charging wave form. Oscillators can change frequency from 2 cycles per second to 10 million cycles per second or more. The Brush sets up oscillations at 3.75 megacycles. Next in line is a tune plate-tune grid doubler, and as the name implies, this stage doubles the frequency of oscillation to 7.5 megacycles. It’s primary function is to energize the F.M. discriminator. The discriminator contains a capacitor (the sensing element) in its circuit through which a continuous strand is passed. The initial introduction of the strand between the plates of the capacitor produces a change in capacitance in the circuit. Since weight per unit length of the material directly influences the capacitance, the strand is simply pulled continuously through the sensing element thus causing variations in the capacitance which are proportioned to variations in the weight per unit length. These changes in capacitance cause frequency modulations which are converted into voltage variations, and therefore voltages result which are proportional to variations in weight per unit length.

The signal from the discriminator is fed to a DC amplifier which simply amplifies and refines the signal for use by the recorder (or other output receiver). This signal is fed through a cathode follower whose purpose is simply to match the amplifier signal to the recorder.

An alternate output system is one in which the signal from the discriminator is fed to an evaluator circuit and an automatic evaluator. This circuit picks up extreme signals (high and low) in a 10-second period and carries a running average to the automatic evaluator containing two meters. The nominal percent nonuniformity (%NU) meter varies with the short-term variation while the fiducial mean meter measures long-term variation.

Another testing instrument is the Custom Scientific Instrument Company’s cohesive tester. A schematic and block diagram of this instrument is shown in Figure 4. Basically, the tester consists of two sets of drafting rolls which attenuate a strand of sliver or roving with the delivery rolls being mounted on a cantilever. Cohesive of the strand causes the delivery rolls to be displaced toward the feed rolls. The core of a differential transformer is fastened to the delivery rolls and is displaced inside the hollow chamber. This displacement causes variations in electromotive force which are sent to an appropriate amplifier and recorder. In this fashion, a property causes a mechanical motion to develop and this mechanical motion is converted to electrical energy.

CONTROL SYSTEMS

A surprisingly large number of automatic control systems are used in textile processing. In fact, many of them are not electronic but are entirely mechanical as exemplified by dobby chain mechanisms on looms. Others used are hydraulic in nature and many are combinations of two or more of the various types. There are generally five levels of control systems and these include

1. single-loop control,
2. unit control operation,
3. automatic process,
4. automatic plant, and ultimately
5. an automatic business.

Most control systems are the single-loop control type with a great deal of sophistication being required for the automatic control of processes, plants, and busi-
nesses. In addition to the technical limitations, economic considerations enter in to the level of control because any operation can afford only a limited amount of new engineering and development work.

This system in reality is a very sophisticated one employing two feedback control systems to eliminate a short-term as well as long-term variations in weight.

An example of a control system which is widely used is the General Electric Thymotrol warper drive shown schematically in Figure 6. The purpose of the system is to provide a constant winding speed for the warper. In this application, the sensing element is a compress roll which rides on the surface of a warper beam. As the beam becomes larger in diameter as a result of winding yarn onto the beam, the compress roll turns faster. This faster-turning roll causes a tachometer generator to feed a signal to an electronic control circuit (E.C.C.) Thyatron tubes in the electronic control circuit then cause a proportionate variation in power to be applied to the DC drive motor (M) through the power supply circuit (P.S.C.) The change in motor speed resulting from the decreased power slows the beam down to its original surface speed. The changes in speed brought about are instantaneous, smooth, and stepless.

**SPECIFIC CONTROL SYSTEMS**

Figure 5 shows a control system applied to the drafting element of a drawing frame. This system is one which has been developed by Saco-Lowell and the Uster Corporation for the specific purpose of reducing short-term variation in sliver resulting from the various drafting processes encountered upstream from this point in the processing organization. Basically the system consists of Uster electronic measuring equipment which is similar in principle to the electronic evenness tester previously described. As the sliver enters the sensing element, a signal is produced which is proportional to the weight per unit length of the sliver. This signal goes to a time delay circuit and from there to an error detector. A tachometer-generator supplies a signal from the front roll (No. 1 in the Figure) to the error detector as does the constant rpm roll. These signals are compared with each other, amplified, and sent to a magnetic converter which regulates the control gearing. The control gearing regulates the front roll speed to lengthen heavy places or shorter light places, thus leveling variations in weight per unit length.

The range of draft in the control zone is 1.1 to 1.5, providing an adjustment of ± 20% from the reference mean. It should be readily apparent that the time-delay is necessary to allow the measured sliver to move into the control draft zone where the appropriate drafting action can be taken.

Long-term variations are compensated for by the use of an integrator and transducer. The integrator "remembers" the average level of sliver weight, and deviations from this level activates a transducer which sends a signal to the error detector and this increases or decreases the front roll speed.

In summing up what has been presented, it should be apparent that electronic applications in the textile industry are by no means an end within themselves. Quite often, the task accomplished could be accomplished mechanically or by other means. However, electronic applications have assumed a role of great importance and are performing a tremendous service for technologists and management, enabling both groups to perform their tasks much better and more efficiently.
IMS RE-ORGANIZES

By James Smith, IM '65

During the latter part of second semester of the 1963-64 school year the Industrial Management Society elected new officers. Attendance at the last three meetings of the year consisted of the newly elected officers, President, Millon Plyler; Vice President, Jimmy Smith; Secretary, Jim Jensen; Treasurer, Bobby Partridge, Historian, Butch Moss; the faculty Advisor, Mr. John Wannamaker, and a couple of stragglers. It was apparent that something had to be done to keep the club from sinking into oblivion.

The new president and vice president began searching for something to put the club back into prominence on the Clemson campus. After several long consultations and correspondence during the summer, these officers decided that an honor society was the answer. Dean Wallace Trevillian was approached and appeared to favor the idea. He had two reservations. First, the club had to vote to become an honor society and second, the club had to be truly honorary in being and not just in name.

Shortly after the fall semester began the executive committee of the old club met several times and drew up a new constitution. A meeting of the club was called and the membership voted to accept the new constitution. The new constitution limits membership to the sophomore, junior, and seniors in Industrial Management whose grade point ratio equals or surpasses 2.75 and who demonstrate potential leadership ability.

The purpose of the new club is defined in the preamble to the constitution which states: The purpose of this club shall be to promote scholarship, leadership, and fellowship among members of the Industrial Management Department and Clemson University, and, finally to promote further study and education preparatory to entering the field of management.

This new form of the Industrial Management Society has been in existence less than two months, but it is already on the road to success. Eight new members have been added to the original thirteen to bring the club's total membership to twenty one. Plans are being made to conduct several money raising projects to build and maintain a scholarship fund for deserving IM students. A club pin has been designed. As can be seen, the club is staging a winning battle to stay alive.

The club has one long run goal that merits mention. It is the goal of the IMS to initiate action toward the formation of a national IMS with chapters on all campuses that have an IM department. This will take several years, but under the leadership of the present officers the initial steps will be taken.

The Industrial Management Society is now the official honor society of the IM department. Through the efforts of the present officers it is felt that the foundation has been laid to make the club one of the outstanding organizations on the Clemson campus.
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Walter F. Fancourt
Memorial Seminar

The Third Annual Walter F. Fancourt Memorial Seminar convened Thursday, October 29 in Greensboro when top textile executives met with some 50 student and faculty representatives from 12 major colleges and universities in North and South Carolina to exchange views and opinions on the industry. Attending the Seminar from Clemson were Mr. T. A. Campbell, Jr., Wesley Connelly, Henry Milam, Millon Plyler, Charles Miller and Henry Poston.

Walter F. Fancourt, Jr., was the founder and first president of the W. F. Fancourt Company. Throughout his 50-year tenure as head of the company until his death in 1954, he maintained an eagerness to “keep the business going” by urging that industry adopt a close kinship with the textile schools and their students who would later provide the technological advances and leadership on which the textile world would grow.

Following his father’s interest in young people, and as a tribute to his father and brother, John L. Fancourt, second son of W. F. Fancourt, Jr., instituted the first W. F. Fancourt Memorial Seminar in 1962. The primary aim of the seminar is to bring industry and education together in an informal atmosphere to discuss the future of textiles, to give the students a good working knowledge of some of the problems—and the progress—of the industry and to help decide direction of future careers.

A series of lectures and discussions were held at the W. F. Fancourt Company plant. Visits to the Greensboro plants of Burlington Industries, Inc., and Cone Mills Corporation were also part of the seminar. A tour of the Research and Development Laboratories was conducted at Burlington Thursday afternoon. Students visited the White Oak Plant of Cone Friday morning.

Alfred P. Slaner, President of Kayser-Roth Hosiery Co., and Executive Vice President of its parent company, Kayser-Roth Corporation, was the principal speaker at the Seminar Banquet Thursday night at the Sedgefield Country Club (Greensboro, N. C.)

Also speaking was Morris Frank, sports columnist of the Houston (Tex.) Chronicle.

Others who participated in the Seminar as lecturers were Clifton Hill Karnes, Director of Central Research & Development Laboratories for Burlington Industries, Inc., and John W. Bagwill, Vice President in Charge of Industrial and Public Relations for Cone Mills Corporation.

A panel of five specialists from different segments of the industry discussed job opportunities in the industry. These included Robert Dale McCabe, of New York, Managing Director of the Underwear Institute; Joel B. Nev, Director, Greensboro Field Office, United States Department of Commerce; Otis Little, Personnel Director of J. P. Stevens & Co., Greensboro; Reuben Ball, of Charlotte, President, National Association of Hosiery Manufacturers, and John W. Bagwill.

The colleges and universities participating in the Seminar were Belmont Abbey College, Clemson University, Davidson College, Duke University, Elon College, Guilford College, High Point College, North Carolina State College, University of North Carolina, University of South Carolina and Wake Forest College.
To users of combed mercerized yarns and industrial sewing threads the “S.C.T. Diamond” is a well known and highly respected mark.

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S.C.T. is one of the few textile companies that maintain package bleach plant completely separated from its package dye house. Both plants are equipped with the very latest designs of dyeing and bleaching machinery.
ACCOUNTING -- A Useful Tool Of The Modern Manager

By JOHN M. WANNAMAKER

The author holds both the B.S. and the M.S. degree from the University of South Carolina. He worked with private industry prior to pursuing work on his advanced degrees. He has taught accounting for three years at Louisiana State University and is presently a candidate for the Doctor of Philosophy degree from that institution.

He is a member of Beta Alpha Psi national honor accounting fraternity, the American Accounting Association, and Phi Beta Kappa. He became a member of the faculty of the School of Industrial Management and Textile Science at Clemson in September 1963.

Although the double entry system of accounting as we know it today was formalized in published works only two years after Columbus discovered America, it is believed by some scholars that this publication only described the system of accounting which had been gradually evolved and had probably been in use in substantially the same form for at least three centuries. If one accepts these ideas, accounting as we know it has been used for almost 800 years. The question might be asked, "How can a discipline which is that old be termed a tool for a modern manager?"

One answer to this question might be that businessmen over the centuries have found accounting to be a useful art which aids immeasurably in the decision-making role. In order to fulfill their role in society, businessmen are constantly making decisions concerning the investment of utility (service potentialities, which are commonly called assets), in order that the using up of these service potentialities will in turn generate other service potentialities (assets). It is with this process of using up service potentialities that the accountant primarily concerns himself. In accounting terminology the used up service potentialities are called expenses, and the service potentialities which are generated are called revenues. In a certain sense, revenues are rewards of efficient business decisions, and expenses are the efforts expended in order to achieve the rewards. The business decision-maker measures his "efficiency" with one of the final products of the application of the accountant's art — the income statement. This statement, then, covers the dynamic aspect of a manager's decisions to use up certain assets in order to generate other assets. The principle of dynamics involved is the movement of assets out of the asset category into the category of used-up assets (expenses) and the movement of other assets from the category of potentiality into the realm of newly created assets (revenues).

For a given period of time, the accountant's income statement sets forth the total new assets generated (revenues) and deducts from this magnitude the total of old assets used up (expenses); the difference, if positive, indicates that the managerial decisions were effective and, if negative, that the decisions were ineffective (if we assume that the generation of a net income is considered effective decision making). This, however, is only a part of what the accountant's art does for the manager.

In order for a manager to make effective decisions, he must have some means of knowing those service potentialities (assets) which he has at his disposal at any given moment of time. The accountant's art provides him with this information in the form of a position statement commonly called a balance sheet. Without this information, a manager would be compelled to make "hunch" decisions, because he would not know whether he had the economic where-with-all to carry through a given decision to its anticipated satisfactory conclusion.

The ideas behind accounting methodology are universal in that the means (hand-written, punch card, or electronic) of recording and reporting the vast amount of financial data which an effective manager needs is not a factor which limits the application of accounting. The speed with which the particular manager (firm) desires the financial information will govern the type of equipment to be used to record, manipulate, and report the data. If at some time in the future all accounting becomes computerized, the
principles being taught today will be just as applicable, the sole difference will be that the device for recording, manipulating, and reporting the information will be a complex machine, but people who know what they want the computer to do for them must still program the computer, set up the data gathering for the computer, and interpret the data which the computer furnishes, and finally must check the computer’s work to determine its accuracy.

All of the preceding discussion has been in very broad terms and possibly somewhat perplexing, but I trust not boring. I have tried to give a thumbnail sketch of what accountants attempt to achieve as their ultimate objective. I think there are few, if any managers, who would disagree with the objective of accountant’s reports; but there may be many who may disagree with the techniques and procedures used by accountants to arrive at the conclusions. There is, for instance, the problem of the accountant’s unit of measure of the service potentials which he attempts to measure. The good old Uncle Sam dollar is the unit of which I am speaking. It changes its size over the years and the accountant has sometimes been criticized for treating all dollars recorded in the accounts as homogeneous; when, in fact, they are not. There have been various proposals to solve this problem, one of which is to convert all dollars to “current” dollars by using some index factor. The next question which presents itself, is what type of index shall be used, a general purchasing power index or a specific index constructed for each particular industry. Even if accountants could agree on which type of index is the best to use, they would say that we are getting away from the verifiable, objective (cost) basis of accounting and introducing subjectivity into the accounts.

This serves to introduce my thesis that all managers should know something about accounting. Under our present system of budgeting for a future period of time, trying to compel events during that time period to conform to plans (budgets), and comparing actual results with budget projections, the manager must of necessity have considerable sophistication in the area of accounting. This is not to say I believe that we should teach managers to be accountants, because managers need much more than a knowledge of accounting to be effective and successful managers; but accounting is one management tool which will make a manager a better manager if he can effectively master and use it for the specific purposes for which it is intended. Managers need to know what accounting reports and magnitude can and cannot do. With some of the relatively recent refinements of accounting for budgeting and cost control purposes, which is called “managerial” ac-

counting” this discipline has become a relatively important tool in cost control, hence leading to greater managerial efficiency. Accounting serves only as one element for cost control; it cannot in and of itself control costs. Accounting cannot, in reality, control anything; it is people (managers) who control things. Therefore, managers must know how to use this element of cost control effectively, and in order to use it effectively, they must have more than a passing acquaintance with the discipline of accounting. Accounting can record and report only those transactions and events which are quantifiable in its measuring unit (the dollar). It can record and report qualitative events only in narrative (footnote) form, if the accountant deems such to be significant to the interpretations of financial statements.

Even the transactions and events which are recorded, summarized, and reported are recorded and reported in accordance with certain so-called “generally accepted” accounting principles or conventions. The idea I am trying to get across is that accounting is a discipline in its own right, and that those who would effectively use the products of this discipline as a tool in the decision-making process would do well to acquaint themselves, to some extent, with the mechanics used by accountants in arriving at the magnitudes to be placed in the accounting reports.

It is with the conviction that students in the Industrial Management curriculum should have the opportunity of choosing accounting as an area of secondary concentration that two new elective courses in accounting have been placed in the IM curriculum, Accounting 301 and 302—a two semester course in intermediate accounting theory. With these two accounting courses to round out the income tax course and the second course in commercial law, the interested IM student is given the opportunity to place twelve of his eighteen elective hours of credit in an area which will be of utmost benefit to him in any management capacity to which he may aspire.

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Unfinished Business

The elections are over and the nation is looking ahead to January when President Johnson will begin a new Administration and a new Congress will take office in Washington.

The textile industry has a number of items of unfinished business which must be attended to by the new Administration and the new Congress.

First, the two-price cotton system must be laid to rest permanently. At present, the system is at rest for a two-year period which ends in 1966.

Second, the textile program announced by President John F. Kennedy in May 1961 must be fulfilled if the textile industry is to be permitted to develop all of its potential. Fortunately, for the industry and for the nation, President Johnson has committed himself to the unfulfilled portions of the program.

Third, there must be a continuing analysis of the foreign trade situation to insure that it never again gets out of hand and to bring all textile imports under a system of controls such as those presently in effect for cotton textiles.

None of these items of unfinished business is asking for special attention or special treatment. Each is fully justified by the force of events taking place each day.

Their justification doesn’t mean that they will be developed, however, without hard work and effort on the part of everyone in the textile industry.

---

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Undergraduate Research Abstracts

Editors Note: This is a continuation of an article from the Fall Issue 1964.

The Effects of Advertising on the Clemson Students’ Buying Habits
Carlisle C. Norwood

In recent years advertising has come to be a deciding factor in the success or failure of many firms; it is therefore necessary that surveys be taken to determine the products wanted by the public and what affects their choice of these products. That is, which advertisements do they like best, and through what media are the most reached.

A survey was taken from 100 Clemson men living in the university dormitories, and it was found that all felt that advertising affected the products they purchased. It was also concluded from the survey that their interest was captured by animated cartoons and scientific facts, and the maximum number of them will be reached by television and magazine advertising.

If a firm is to succeed, advertising surveys are a must, an although the one run here was very simple, it pointed out its importance very strongly.

Why Saco-Lowell Came South
James Terry Owens

The purpose of this paper is to show why Saco-Lowell, one of the largest textile machinery manufacturers in the South, decided to change its location from Maine to the Carolinas. In personal interviews with an executive at Saco-Lowell, who played a part in the migration of the company to the South, the major economic reasons were revealed. The main reason was to be nearer to the market for their products. The transportation costs that were saved were enormous. There were other factors that were favorable in the South, but these were subordinate to nearness to market. These were labor factors such as wages, attitudes, skills, etc.; nearness to materials, climate, and local industry structure.

Mining, Milling, and Uses of Vermiculite-Zonolite Company
Samuel L. Ramsey and Don H. Adkins

This paper is intended to bring to light a relatively new mineral vermiculite. This paper begins with the discovery of vermiculite and continues to give information relating to its prospecting, geological composition, and its characteristics.

Also included in the paper are the present mining procedures that have developed after years of experimentation with different techniques of obtaining the ore. Included in the mining section are some of the problems that are encountered and how they are solved.

In the next section there is a thorough discussion of the milling procedures used at the Kearney, South Carolina, mill. This is a discussion of the operations concerned in abstracting the mineral from the raw material brought from the mine, right on through the process until the vermiculite is ready to be shipped to the expanding plant.

The paper is concluded with a complete discussion of the present uses, potential uses, and uses in the experiment stage.

Wool—From the Sheep to the Consumer
Lenz S. Randall

This paper, Wool—From the Sheep to the Consumer, was written largely from library books obtained from the Clemson University Textile School Library. The material was supplemented with interviews with company management and from my own experience in a textile mill.

I chose this topic primarily because I wanted to learn something of the woolen processes. I plan to go with Johnston Mill on completion of graduation and this is another basic reason for my interest in this subject.

I feel that the objective of this paper was accomplished satisfactorily, for I do feel that I learned a great deal about the processing of wool performing research for this paper.

The Industrial Management Department of Clemson University designed this course primarily to give the student a chance to conduct primary research on his own. This was one of the difficulties I encountered while writing this paper. It was difficult to conduct primary research on such things as the processes which wool undergoes. The main portion of the primary research had to be conducted in the portion of the paper entitled, “A Look to the Future.” With the exception of the above difficulty, I think the objective of the paper was accomplished satisfactorily.
Plant Relocation of the Pelton and Crane Company
John A. Richards and Fred L. Wallace

A long history of unsatisfactory dealings with the A. F. of L.-C. I. O. United Auto Workers Union manifested itself in several ways: Pelton & Crane Company's inability to compete economically with other surgical and dental supply companies, a severe shortage of skilled labor, and management's incapacity to return a fair and equitable dividend to their investors. In the early 1950's the Pelton & Crane Company officials realized that, to keep abreast with the industry's technological advancements and to improve their economic condition, a move from Detroit and U.A.W. was a necessity.

After considering several possible new sites, Charlotte, North Carolina was selected. The reasons for this selection were many and varied.

Charlotte offered an abundant water supply, a natural resource vital to Pelton & Crane manufacturing processes. The electric power that Duke Power supplies is one of Pelton & Crane's most used utilities.

Due to the nature of the equipment that Pelton & Crane manufactures, they find it necessary to ship almost exclusively by truck. In this respect, a better site could not have been chosen because Charlotte has in excess of one hundred trucking companies.

Pelton & Crane's needs, while being varied, are more or less concentrated around the metalworking and its supporting industries. Because Charlotte is the center of the South's metalworking and supporting industries, it again was the most likely choice.

Skilled labor in the classifications that Pelton & Crane desired was not readily available in Charlotte. However, within a few months after the move was completed, the Company was fully staffed with trained employees and operating at efficiencies here-to-fore unknown.

In the few years that the Pelton & Crane Company has been located in Charlotte, their sales increased 75⅞, net earnings increased from $49,123 to $140,139. Presently, the Company is expanding its production facilities and developing new products.

A Survey of the Labor Turnover in the Textile and Metal Product Industries in Oconee County
William E. Smith and Robert W. Griffith

This report determines the extent and causes of labor turnover in textile and metal product industries in Oconee County.

The extent of labor turnover in Oconee County was 24.3% in textile fabrication plants, 5.5% in textile finished product plants, and 14.1%; in metal product plants. These are comparatively high turnover rates; therefore, it should be pointed out to the companies how much this high rate of turnover is costing. These costs have been enumerated in the text, and ways to improve employee turnover has been cited in Appendix B.

Factors under the headings of type of labor, wage rates and fringe benefits, and working conditions were studies in relation to textile fabrication plants, textile finished product plants, and metal product plants. This was done for the purpose of determining which factors affected labor turnover the most. The main factors were found to be: age, sex, wage rates, and shift differentials.

A company's turnover rate has considerable immediate significance. It should be computed honestly and studied carefully. It is also important to remember that computing the turnover rate is only preliminary to analyzing it, as has been done in this report.

Reactions of the People of the Clemson Area to the Present State Sales Tax and Its Proposed Increase
Lannie H. Thompson and William R. Burnette

The findings of this paper indicate that a tax is not feasible at this time. After studying the tax law and then talking to the people of this area, it was found that the ordinary individual knew very little about the actual content of the law. Their knowledge consisted of knowing the tax rates and little more. It was obvious from talking to these people that more money for education is necessary, but none of them wanted to pay for it. This feeling was also found to be evident in the town of Clemson itself, where most of the people are touched by the University every day. Since no one wanted to raise taxes, other methods for raising revenue were offered. These suggestions ranged from legalized gambling to a two percent property tax, and neither of these is feasible.

In conclusion, it can be said that the state of South Carolina is in for a bad time if the sales tax is raised. However, one bright spot is that the opinions of sales tax and education found in this area may not represent the feeling of the entire state.

The Conversion of Neutral Sulfite Semichemical Black Liquor to Acetate and Formic Acids in the Pulp and Paper Industry
W. Price Timmerman, III

In June of 1958, Sonoco Products Company of Hartsville, South Carolina, culminated eight years
of research and an investment of some $250,000 beginning operation of their Chemical Recovery Plant. This plant is the first plant in the world for the conversion of pulp mill black liquor to acetic and formic acids on a commercial basis.

The process consists of the concentration of the waste product, black liquor, to 40-45% solids, followed by approximately stoichiometric acidification with H\textsubscript{2}SO\textsubscript{4} to liberate the acetic and formic acids from their sodium salts; this acidified liquor is solvent-extracted countercurrently with 2-butanone (MEK) to recover the acids; the mixed acetic and formic acids are refined for sale—the acetic product being glacial (99.5%) and the formic product being 90% acid. The raffinate from the extraction is sold to draft mills for its salt cake value.

Startup and operational problems have been numerous and equipment corrosion proved to be very serious on most equipment. The economics of the overall process are discussed with emphasis on the utility of such a process in improving the economics of cross-recovery between neutral sulfite semichemical and kraft mills.

**The Hartwell Dam Project and Its Effects on Surrounding Areas**

Robert F. Tucker and Ronnie E. Crolley

The purpose of the research paper was to study the effects of the Hartwell Dam Project on the surrounding areas. Through personal interviews, research, correspondence with Chambers of Commerce in the area, Corps of Engineering at Hartwell, Georgia, Dr. Stepp of Clemson University, and personal knowledge the authors have come to the conclusion that there are both favorable and unfavorable effects on the area. The project actually discourages industry from locating in the area by converting a flowing stream into a reservoir, by producing a cheap power, and by the loss of private and municipal water rights. The project would provide a flood control preventative only in the area below the dam to the Clark Hill Reservoir and not all the way to Augusta as was expected. Next, the authors feel that the project gives a tremendous helping hand to navigation from Augusta to Savannah. Lastly, the authors feel that the project serves best the realization of one of the purposes for which it was intended.

**An Objective Analysis of the Development of the Trade Union in American Industry, and Its Effect on the Industrial Complex**

Edward J. Werntz and Bobby E. Kemp

The union movement in America is an important part of our industrial system. We see that the union has both good and bad points in its system of collective action. We can see how the union alters and impedes the growth of industry through stern collective bargaining. But, on the other hand, we note its power to protect the individual worker from unfair arbitrary action by management. We show that there does exist an element of corruption in the union, but again we see the union has given the workers organized representation in public affairs through the union's political activities.

In the long run, we do not see how the union can hold its relative strength in the labor market unless it unionizes the marginal women workers that tend to hold more and more of the clerical jobs. Also, men of higher levels of white collar workers see advancement in the management end of industry and therefore exclude themselves from the union.

In all, it does seem that the unions are losing relative strength, though not necessarily absolute strength. We can evidence a stronger position being taken by management against unions. The steel strike in 1959, the Lookheed position in 1962, all give glowing support to this.

**Fiberglass Reinforced Plastic**

Robert L. Matthews and Newton F. Manly, III

FRP is a relatively new product in the glass and plastic industries; 1946 being about the time it was first introduced. FRP is being used in many new products and at the same time replacing other established materials, not thought to have a substitute. This leads to the problems of whether FRP should be used or not, and if so, which of the fifteen processes now available would produce the results desired. Each of these processes a FRP material of different property characteristics and it is up to the designer to match the process to the product. Regardless of which process is used, FRP in the broad sense has these basic advantages: a favorable strength-weight ratio, good dielectric properties, corrosion resistance, and favorable cost/performance combination.

Most of the present applications of FRP are centered around three main areas: Construction, Transportation and Electrical. The largest single use of FRP is in the manufacture of pleasure boats. Other major uses of FRP are automobiles, construction paneling, and printed electrical circuits.

The most important applications of FRP in the near future are in the field of military components and also transportation vehicles.

It is evident, that end users in all fields of industry may benefit and profit significantly from increased use of FRP in the future.
Some talk about

FLETCHER SHUTTLES

The other day one of our nice customers made a comment. “You fellows might be third in the ‘Big 3’” he said, “but Fletcher Shuttles are tops with us”.

We’ve heard this kind of remark more and more here of late. (And don’t think we don’t like it. We’re human, too, you know.)

Anyhow, when we passed the remark along to the boss he brought us back to earth. “When we get up there on top we’ll pay attention to compliments”, he barked. “But while we’re in third place, pay attention to complaints”.

Smugness is a luxury you can’t afford when you’re only number three.

That’s why we keep everlastingly at it—trying harder, improving our service and putting more time in making the best shuttles even better.

All Fletcher Shuttles are Fully Guaranteed for Quality and Performance.

FLETCHER Shuttles

Southern Pines • North Carolina
Outstanding Seniors . . .

Gerald Wayne Caughman is a twenty-two year old Industrial Management major from Lexington, South Carolina. He has been an honor student every semester at Clemson.

On campus, Jerry has been very active in several organizations. He was director of Tigerama held in November. He is president of Kappa Delta Chi social fraternity, a member of Blue Key and the High Court, and is listed in Who's Who in American Colleges and Universities.

W. Wesley Connelly is a Textile Management major from Spartanburg, South Carolina. He is twenty-two years old and is married. To aid with his college expenses he received a David Jennings ('02) Memorial Scholarship.

While at Clemson, Wesley has been an active member of several campus organizations. This year he serves as president of the American Association of Textile Technology, secretary of Phi Psi, and advertising manager for the Bobbin and Beaker. He is enrolled in the Advanced ROTC.

During the past three summers, Wesley has gained valuable experience in his major field by working with Beaumont Mills in Spartanburg.

After graduation, Wesley plans to enter the Army for a two year tour of duty.

MARSHALL WHITE, JR.

Marshall White, Jr., a twenty-one year old textile chemistry major, is a native of Rock Hill, South Carolina. He is better known to his friends as Sonny. To aid with his expenses at Clemson, he has received a Leon Lowenstein Foundation Scholarship, an Elk’s Scholarship, and a Belk’s Scholarship.

On campus, Sonny is a member of Phi Eta Sigma, Phi Kappa Phi, Phi Psi, YMCA Senior Council, American Association of Textile Chemists and Colorists, Residence Hall Supervisors Association, and the Honors Program. He serves as treasurer of Phi Psi, chairman of the Men’s Residence Court, and circulation manager of the Bobbin and Beaker. He received highest honors during his freshman year and high honors during his sophomore and junior years.

Sonny has gained valuable experience in the textile industry by working for three summers in the Research and Development Laboratory of the Rock Hill Printing and Finishing Co.

After graduation he plans to attend graduate school.

GERALD W. CAUGHMAN

During vacations Jerry has worked one summer with Pacific Mills and several summers as a linesman’s helper with an electric cooperative.

After graduation Jerry would like to go to graduate school at the University of North Carolina to work towards a master’s degree in business administration.

W. WESLEY CONNELLY, JR.
So many good things begin with ENKA

- NYLON YARNS • Continuous filament yarns • Crepset® nylon—the yarn with the "crepe" built in! • Blanc de Blancs® (white of whites) nylon yarn • Enkatron® and Enkalure® • Enkaloft® textured continuous filament carpet yarn • INDUSTRIAL NYLON YARNS • for tires, seat belts and other uses • TEXTILE RAYON YARNS • Natural continuous filament rayon yarns • Jetspun® solution-dyed continuous filament rayon yarn • Softglo® mellow luster rayon yarn • Skyloft® textured yarn • RAYON STAPLE FIBERS • Enka Zantrel® Polynosic® fiber • Kolorbon® solution-dyed carpet staple • Textile staple • High-crimp carpet staple • Skybloom® super-cramp and high-crimp rayon fibers • Fiber I. T.® improved tenacity staple • INDUSTRIAL RAYON YARNS • Suprenka® high-tenacity rayon yarns • Suprenka Hi-Mod™ high modulus rayon yarn • Tyrex® rayon tire yarn • POLYESTER tire yarn.

*Patents pending

AMERICAN ENKA CORPORATION

New Course in Textile Chemistry

A doctoral program in chemistry with major emphasis on textile chemistry is one of the newer courses of study being conducted by the Clemson University Graduate School.

Announced jointly by Dr. Howard L. Hunter, dean of the College of Arts and Sciences, and Dr. Wallace D. Trevillian, dean of the School of Industrial Management and Textile Science, the program is the first to be offered in the Southeast, combining the extensive theoretical studies of the chemistry department with the more specialized work of the textile chemistry department in a cooperative interdisciplinary program.

The graduate degree will be a Ph.D. in chemistry with a major in textile chemistry.

Complete information about requirements for admission to the new program may be obtained from the Dean of the Graduate School, Clemson University. Some fellowships are expected to be available for qualified applicants.
INDUSTRY TODAY --
EDUCATION TOMORROW

Wallace D. Trevillian, Dean
School of Industrial Management
and Textile Science

Newsweek, in its November 2, 1964 issue, describes the 16 billion dollar a year textile industry as being in the midst of a renaissance.

In an address to Clemson faculty and students on the opening day in September 1898, Clemson's president Hartzog commented, "Today the doors of the first textile school in the south are thrown open to students." The 67 years that intervene between 1898 and the present have witnessed revolutions in all phases of the industry. South Carolina has shared exceedingly well in the developments since 1898. Today:

1. 344 plants are located in 37 of the state's 46 counties.
2. Nearly 140,948 employees annually earn more than $460,270,287 representing 60.4 per cent of the state's industrial payroll.
3. 2,381,374,524 for the fiscal year ending June 30, 1963, representing 57.3 per cent of the value of the state's industrial payroll.
4. 6,954,478 spindles, accounting for 33.8 per cent of the nation's active spindles as of June 30, 1963; 153,879 looms; produced 1,039,000,000 linear yards of cotton broad woven goods in the first quarter of 1963 to account for 41.9 per cent of the national total.
5. South Carolina is now the nation's greatest producer of broad woven goods. Its finishing plants process about 30 per cent of the nation's yardage.
6. The annual value of textile products in the Palmetto State has almost tripled since World War II and now approaches two billion dollars.
7. Over 33% of the American textile industry is in South Carolina.

Clemson's contribution to these developments in South Carolina in the last 67 years has been in education (teaching and research), educating the manpower and leadership for the industry.

A questionnaire mailed to 2,100 former students got a 66 1/2 response. Of those heard from 75% are still in textiles and the positions of those directly in textiles are distributed as follows:

<table>
<thead>
<tr>
<th>Position</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>President, Vice-President, General Manager</td>
<td>7.89%</td>
</tr>
<tr>
<td>Plant Managers &amp; General Superintendents</td>
<td>8.27%</td>
</tr>
<tr>
<td>Superintendents</td>
<td>9.40%</td>
</tr>
<tr>
<td>Technical Superintendents and Asst. Superintendents</td>
<td>14.54%</td>
</tr>
<tr>
<td>Overseers</td>
<td>15.66%</td>
</tr>
<tr>
<td>Assistant Overseers</td>
<td>7.52%</td>
</tr>
<tr>
<td>Trainees</td>
<td>10.28%</td>
</tr>
<tr>
<td>Staff</td>
<td>18.79%</td>
</tr>
<tr>
<td>Research</td>
<td>2.26%</td>
</tr>
<tr>
<td>Sales and Service</td>
<td>6.52%</td>
</tr>
<tr>
<td>Office Managers</td>
<td>1.00%</td>
</tr>
</tbody>
</table>

Total                                | 100.00%    |

Statistics such as these can never tell the full story of Clemson's contribution, for this survey dealt only with textile graduates. It does not include graduates from engineering, chemistry, physics, agriculture, arts and sciences, and industrial management—many of whom have followed a career in textiles.

The renaissance referred to by Newsweek is exemplified by such innovations as central air systems, automatic doffers, "shutterless" looms and electronic controls—to name a few conspicuous technological changes occurring through the industry.

Even for the casual observer, the sophisticated equipment displayed at the Hanover Textile Machinery Exposition in 1963 and the Greenville Textile Show in 1964 reflects clearly the rapidity of change that is taking place for this industry. The many different languages heard at these industrial shows, the foreign trademarks on machinery, the labels on the finished products, all dramatize the international aspects of the industry as the world wide market becomes meaningful to both the producer and the consumer. It has been said that the first thing an underdeveloped country starts to produce is textile goods or a moving picture. Parenthetically—the movie industry was in a slump until it was realized the objective was to produce entertainment, whether it be for a fifty foot screen or a twelve inch screen is incidental. There may be some parallel to this in the renaissance occurring in textiles. Alert management is geared to produce fabric which is completely different from fabric of bygone days and when it is technologically feasible, the final products might

THE BOBBIN AND BEAKER
well be “simplified” to the extent that little similarity will exist between the old processes required for the end product.

The Wall Street Journal in recent months too has had encouraging reports for the public regarding the industry. Less surprising has been the range of optimistic statements made by the executives, all reflecting a new day for the industry.

But, what about the schools historically responsible for furnishing talent to the industry? What changes are occurring on the campus? Curriculum development seldom make headlines. At Clemson much has changed since Dr. Hartzog announced the opening of the first textile school in the south.

The undergraduate offerings of the School of Industrial Management and Textile Science in 1965 include three distinct courses of study. They are:
1. The Bachelor of Science in Textiles.
2. The Bachelor of Science in Textile Chemistry.
3. The Bachelor of Science in Industrial Management.

THE BACHELOR OF SCIENCE IN TEXTILES

There exists a body of knowledge peculiar to textiles, which makes the application of scientific principles to textiles unique. Hence, the student selecting this curriculum will discover constant challenges and opportunities worthy of his talents.

The course work is divided into five areas for emphasis.

Quantitative Measurements and Analysis: Basic disciplines in this area include analytic geometry, calculus, statistics, costing analysis, and quality control.

Basic Science: This includes physics and chemistry. On this foundation the more specialized courses are developed.

Communication: This includes special courses dealing with the use of language, both written and oral. This ability is further developed in seminar and research courses and emphasized in all courses.

Social Science and Humanities: By studying English literature, the history of western civilization and economics, the student is given a broad base from which to explore additional knowledge in such areas.

Textile Science: These courses include the body of knowledge unique to textiles and reflect the necessity of strong science and mathematics background. Examples of the subjects covered are, machine mechanisms, the interactions of the mechanical operations used in fiber processing, the geometry and properties of fiber, and instrumentation.

THE BACHELOR OF SCIENCE IN TEXTILE CHEMISTRY

Preparation for a future in the modern textile industry requires training in a great many areas of science. The manifold types of materials used in the textile industry; such as natural fibers, synthetics polymers, dyes, and finishing agents; necessitates a working knowledge of the fundamental concepts underlying the properties and behavior of these products along with their practical utilization. The curriculum in Textile Chemistry is designed to accomplish this purpose by including courses in chemistry, mathematics and physics. It includes courses in fiber and fabric formulation, dyeing, polymer chemistry, colloid chemistry and inorganic chemistry all related to textiles. Other areas of study include statistics, quality control and fiber science.

In 1965 the two curriculums referred to above replace the three previous curriculums in textiles known as Textile Science, Textile Chemistry and Textile Management.

THE BACHELOR OF SCIENCE IN INDUSTRIAL MANAGEMENT

“I believe, however, that time will show that the management schools of the country have taken a major turn in the past ten years and that the study of management decision-making on a national basis is both more demanding of talent and productive results than ever before.” So says Howard Johnson, Dean of the School of Industrial Management of M.I.T., Dean’s Report 1964.

The ten years referred to in Dean Johnson’s report is the same ten years that Clemson has offered this degree. It is no accident that Clemson took the lead in this turn. (See Bobbin and Beaker, “Mathematics and Management” by Dr. C. H. Whitehurst, April 1964).

Since the Management curriculum has been reviewed recently in Bobbin and Beaker it is referred to here only for continuity and to emphasize that the undergraduate programs of this school include three major curriculums. The graduate programs will be discussed in a later issue.

These curriculums are based on the premise that the best education is that education which provides the student with a foundation from which to study and learn the rest of his life.

The course of study a student selects for four years is but one part of his education and development and the curriculum can be no better than the teacher responsible for the courses. Clemson takes particular pride in the caliber of its faculty. The faculty is fully cognizant too of the necessity of continued study and
research—if for no other reason than to avoid obsolescence. In this school alone two faculty members are currently writing dissertations for completion of the Ph.D. One is on leave of absence studying for a terminal degree. One resigned in order to work toward a Ph.D. at Clemson. One is completing his internship for the C.P.A. certificate. Others are constantly attending professional seminars and participating in refresher courses—still others plan study leaves in the near future. Now, there is no more a division between research and teaching careers. The entire staff is responsible for teaching, ultimately all will be responsible for research too. Furthermore, in addition to the academic environment, a good part of the student's development depends on his choice of friends, his extracurricula activity, yes, even the bull sessions, and certainly his church. Clemson provides all of this—and a lot more.

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A. A. T. T. Field Trip

The Student Chapter of A.A.T.T. at Clemson University made a most enjoyable field trip on Thursday, November 12, 1964. The twenty-five members accompanied by Mr. Richardson, the faculty adviser, made the trip to Greenwood, S. C. The group making the trip left the campus around eight A.M. and arrived in Greenwood about nine thirty A.M. There they were met by Mr. M. V. Wells, the Personnel Director of Greenwood Mills. He escorted the group to the Adams Plant, which is Greenwood Mills' most modern plant in production at present, and which produces combed cotton goods. The group was divided into sections of five or six and each section was given a guide who took them on a tour of the plant. Since the guides were all Clemson graduates there was probably as much talk about Clemson as there were questions asked about the Adams Plant. But everyone was given a chance to ask any question about anything he would like to know concerning Greenwood Mills. After the tour of the Plant, it was approaching lunch time so the group was taken to the Greenwood Country Club where they were treated to a delicious meal.

After leaving the Club, the group headed for their next point of interest, the Chemstrand Nylon Plant near Greenwood. This plant has been in operation since September 1950 and produces only nylon yarns. Again the group was divided, given a guide, and shown through the plant. When the tour ended, the field trip was over except for the return journey to Clemson.

TWENTY-SIX
HOW DO YOU SPELL CAREER OPPORTUNITY?

In textiles, it’s spelled B-U-R-L-I-N-G-T-O-N, where career opportunities are as varied and diversified as the endless array of quality Burlington products. For information on a challenging, rewarding career in textiles, write to the Personnel Director at:

Burlington Industries, Inc.

EXECUTIVE OFFICES: GREENSBORO, N. C.
YOUTH... our future!

Cone Mills, a major producer of high quality and modern fabrics, is staffed to meet the needs of today. Yet we are already looking at the 70's and beyond to determine our needs as industry becomes increasingly complex.

To maintain our standards, we are seeking young people with imagination and initiative.

If you are interested in becoming a part of our future, write
Industrial Relations Department, Cone Mills Corporation, Greensboro, N. C.

CONE MILLS CORPORATION
“Where fabrics of tomorrow are woven today.”

EXECUTIVE OFFICES
Greensboro, N. C.

FINISHING PLANTS
Carlisle & Greenville, S. C.
Greensboro & Haw River, N. C.

MANUFACTURING PLANTS—Avondale, Cliffs Side, Greensboro, Forest City.

SALES HEADQUARTERS — Cone Mills Inc., New York
On November 30 the Iota Chapter of Phi Psi initiated four seniors, three juniors, and one sophomore.

The Seniors are Kenneth A. Eubanks, a 21 year old Textile Management major from Lyman; Michael L. Lee, 21, also a Textile Management Major from Walhalla; Kenneth J. Rowe, a 21-year old Textile Chemistry Major from Manning, S. C.; and Clarence L. Fowler, 21, another Textile Management Major, from Duncan, S. C.

Among the juniors was Sanders E. Goodman, 20, a Textile Science Major from Salisbury, N. C. Also in the group were David L. Settle, a junior from Inman, S. C., and Will T. Brown, Jr., 20, a Textile Chemistry Major from Covington, Ga.

The one sophomore initiated was Mac Harley, a nineteen year old Textile Chemistry Major from Barnwell, S. C.

The Brothers of Iota Chapter are happy to welcome this new group of brothers in the fraternity!

On October 26 the brothers had a steak supper at the home of the faculty advisor, Mr. David Gentry. The group had a good time renewing friendships after a long summer vacation.
**Special**

TEXTILE DICTIONARY

for BEST RESULTS

in Textile Processing

**C**

**Combed** (Ko’-t’-hemk)

A durable anti-bacterial additive for textiles. Provides fixed, lasting protection against germ, mildew, perspiration colors and other colors of bacterial origin. Easily applied during dyeing or finishing operations. Will cause no shade change in dyed and printed colors, no yellowing of whites. Does not affect the hand of the finished goods. Compatible with most types of finishing materials.

**D**

**Discolite** (diz-koh-lit-e)

Concentrated sodium sulphonate formaldehyde available in lump, pebble, rice or powder form. A powerful reducing agent, stable at high temperatures. Widely used to effect reduction and solution of vat dyes, and for discharge effects when applied to colored grounds. Effective when mixed with vat colors and discharge pastes wherever the reducing agent must retain its reducing power after being dried into the fabric.

**Dispersal** (dis-pahr-sal)

A long chain ethylene oxide condensate in the form of a colorless, neutral, somewhat viscous liquid. Fully resistant to hard water, and miscible with water in all proportions. A retardant and leveling assistant in vat dyeing. Used widely as a dispersing agent in dyeing synthetic fibers with dispersible dyes and for fast color salts and bases. In Napthol dyeing and printing. Effective in stripping to prevent redeposition of the color on stripped goods.

**N**

**Neofinish** (neh-o-fish)

Non-ionic softener dispersible in hot water, suitable for all textile fibers, both natural and synthetic. Compatible with all types of finishing materials, including resin finishes. No development of color or odor in goods finished with Neofinish, even in storage. No yellowing at time of application.

**Neowet** (nay-o-wet)

Complex Polyethylene Ether in the form of a pale yellow, slightly viscous liquid. A non-ionic surface active wetting agent, effective at all temperatures. Completely compatible with enzymatic desizing agents and readily soluble in water. Contains 1%, active ingredients. Widely used in scouring all types of textile fabrics and for general wetting purposes.

**Parolite** (pah-roh-lit-e)

Zinc sulphonate formaldehyde in the form of white crystalline powder. A highly concentrated stripping agent for all forms of wool and modern synthetics. Completely soluble in water. Leaves stripped goods soft, completely free of zinc dust and in most receptive condition for further processing. Often completely strips goods where other stripping agents fail. Very effective in discharge printing on acetate rayon.

**V**

**Vatrolite** (vat-roh-lit-e)

Concentrated sodium hydrosulphite in the form of white crystalline powder. A powerful reducing agent for vat colors, ideal for dry feeding because of its free flowing, dustless character. Completely soluble in water. Effective stripping agent for direct, sulphur and vat colors on cellulosic fabrics. Quickly removes rust stains from cotton goods. May be stored indefinitely. Available with optical whites and in buffered formulas for high temperature use without excessive alkalinity.

**Velso Softener** (vel-soh)

A highly sulphonated tallow in the form of a creamy white paste, easily dispersed in water. Used in general finishing of all types of textile fabrics. Widely used in wetting agent, wet or change color in high temperature operations such as calendaring or drying. Has no effect on lightfastness of color.
Courses for Professional Development, a Clemson University program designed to keep industrial personnel in step with advancements in science, technology and management begins its eighth annual schedule of classes this summer in the School of Industrial Management and Textile Science.

Courses to be offered in 1965 and the dates for each are as follows:

**JUNE 7 through 18:**
- P. D. 43—Basic Textile Chemistry

**JUNE 21 through 25:**
- P. D. 22—Introduction to Textile Manufacturing, Dyeing and Finishing

**JUNE 21 through JULY 2:**
- P. D. 25—Yarn Manufacturing
- P. D. 38—Supervisor Development
- P. D. 41—Methods Analysis and Time Study
- P. D. 44—Advanced Textile Chemistry

**JULY 12 through 23:**
- P. D. 25—Yarn Manufacturing (a repeat)
- P. D. 38—Supervisor Development
- P. D. 41—Methods Analysis and Time Study (a repeat)
- P. D. 47—Quality Control
- P. D. 56—Weaving

One new course which should be of interest is P. D. 79—Graduate Seminar in Industrial Administration: A Survey of Literature and Developments Since 1960. This course will be offered July 12 through July 23 and is limited to holders of bachelor's degrees awarded prior to 1960. These persons must be presently employed in a managerial position. Following areas will be specifically tested: Managerial Policies; Managerial Economics; Production Planning and Control; Industrial Dynamics; Financial Analysis; Quality Control.

In April a catalog, containing all pertinent information, along with application forms, will be mailed to those who have received these in the past as well as anyone requesting copies. For this, and any additional information, write Prof. C. V. Wray, Sirrine Hall, Clemson University, Clemson, South Carolina.
Always open

At Whitin, the doors are always open for new ideas and to new people. The success of any organization is directly proportional to its willingness to base its growth on the thinking of dynamic, creative, forward-looking people — people with the special knowledge and abilities to translate new ideas into practical plans and programs. Whitin has welcomed many. Each has made significant contributions to the improvement of Whitin products and services.

From this “open door policy” Whitin expects to provide additional benefits for its customers — “extra” values to make their mill operations more profitable.
1964 Sees Initial Fruits of IM Master’s Program

The department of industrial management in Clemson University’s School of Industrial Management and Textile Science awarded three history-making advanced degrees this year, setting a pattern of leadership for the quality training of potential industrial leaders and executives for South Carolina and the Southeast.

First to receive the degree, at February commencement exercises, was Roy A. Dalton, a native of South Carolina and Clemson graduate. Although sought by several of the nation’s largest corporations in such diverse fields as railroad transportation and petroleum, Dalton elected to cast his lot with Fieldcrest, Inc., a North Carolina textile firm.

Richard B. Autry, a graduate of Oklahoma State University, was also awarded the M.S. in industrial management, in June. Bruce M. White of Greenville, another Clemson graduate with an English major and mathematics minor, received his master’s degree at the university’s August graduation. He has been awarded a fellowship to continue study toward the Ph.D. at the University of Florida.

“The industrial management master’s program since its inception less than two years ago,” relates Dr. Clinton H. Whitehurst, head of the Clemson IM department, “has attracted wide attention in the Southeast with its orientation toward providing a top-rated management degree for the engineer and physical scientist. Graduates from liberal arts curricula are not, however, excluded; in fact, they are encouraged to apply. Necessary remedial mathematics and/or other course deficiencies can usually be completed during the summer sessions of any first order college or university.”

Fourteen students began the fall semester as candidates for the IM master’s degree. Graduates of six colleges or universities, their preference in undergraduate study shows four mathematics majors, two each from engineering, economics and textiles, and one each from physics, forestry, accounting and business administration.

Two foreign students, representing Norway and Korea, began their studies in industrial management at Clemson this fall.

SOMETHING OLD, SOMETHING NEW

While textile scientists continue to develop the glamorous world of man-made fibers, another industry group is investigating the chances of developing a good natural fiber from the hide of an ugly, out-of-the-way animal.

The animal is the musk ox, a friendly and easily tamed resident of the Arctic regions.

The musk ox has roamed the world’s frozen wastes for centuries and his coat has perhaps provided warmth for Eskimos and other residents of the far north. However, it has been only recently that serious consideration has been given to spinning and weaving or knitting the long, fine fibers in the musk ox’s fleece.

These high quality fibers are beneath the shaggy, dark-brown, coarse coat of the musk-ox. From six to eight pounds of the under layer are shed during the summer and musk ox “ranchers” believe it is possible to develop a method of “combing” the fine fibers from the animal’s hide rather than to depend on nature.

Thus far, the effort has been proved to be worthwhile. De-haired musk ox fiber—that is, fiber with the coarse outer hairs removed—has been found to be between Iranian and Mongolian cashmere wool in terms of quality. In terms of cost, thus far it has carried a price tag higher than cashmere.

The musk ox fiber development project is really a very modest one thus far. About 33 of the animals are presently pastured at the University of Alaska, with hopes of increasing the herd to about 100 in the next four years. In addition to the University herd, there is another maintained in natural surroundings on an island in the Bering Sea. They are cared for by the U. S. Fish and Wildlife Service.
Now that you mention it... 

... the reason most people know very little about what's going on in the world is that this information isn't included in the comic strips.

... there aren't nearly enough crutches in the world for all the lame excuses.

... the advantage of having a large vocabulary is that you can reject the big words and choose those you can spell.

... you can say anything you want to in Russia—once!

... tomorrow is one of the greatest labor-saving devices known.

... with modern women putting up such a false front, a man never knows what he's up against.

... by the time you can afford to lose a golf ball most of us can't hit it that far.

... a feminine woman will never be out of style.

... nothing grieves a student more than to study the wrong lesson and learn something that he wasn't required to learn.

... it's impossible for a woman to be married to the same man for 40 years. After the first twenty, he's not the same man.

... a tree is an object that will stand in one place for years, then suddenly jump in front of a lady driver.

... even a live wire needs good connections.

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Index to Advertisers

American Enka Corporation .................................................. 22
Beaunit Corporation ............................................................. 11
Burlington Industries, Inc. ..................................................... 27
Cocker Machine & Foundry Company ......................................... 2
Cone Mills Corporation .......................................................... 23
W. F. Fancourt Company ....................................................... 35
Fletcher Industries ............................................................... 20
Gaston County Dyeing Machine Company ................................... 13
Greensboro Loom Reed Company, Inc. ..................................... 10
Greenwood Mills ................................................................. 29
North Chemical Company, Inc. ............................................... 31
Pioneer Heddle & Reed Company, Inc. ..................................... 16
Ralph E. Loper Company ........................................................ 10
Royce Chemical Company ..................................................... 30
Simmons Machinery Company, Inc. ......................................... 15
Sonoco Products Company ..................................................... 5
Steel Heddle Manufacturing Company ...................................... 36
Whitin Machine Works .......................................................... 32

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