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”.

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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”.

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THE BOBBIN & BEAKER. Organized in November, 1939, by Iota Chapter of Phi Psi Fraternity, and published and distributed without charge four times during the school year by students of the Clemson University School of Industrial Management and Textile Science. All rights reserved.

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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 being the last issue that the current staff will publish, we would like to thank the members of the faculty and those guest writers who have had their articles published during the past year. Without their help, it would have been impossible to have this publication.

It is our hope that these issues which we have published have been of interest to the students of the School of Industrial Management and Textile Science and to those already in the industry.

We would also like to thank our advertisers, without whose help the free distribution of this magazine would not be possible. Their continued support is sincerely appreciated.

The junior staff, headed by Sanders E. Goodman, a rising senior from Salisbury, North Carolina, will now take over for the next four issues.
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DEFERRED CURING

By Charles D. Miller
T.C. '65

For the past few years there has been a large amount of work and research directed toward the wash and wear clothing field. Many companies have tried to perfect a truly wash-wear finish, and some have succeeded in producing resins and chemicals which impart a wrinkle-resistant characteristic to the cloth. There are numerous treatments on the market today that will give good wrinkle recovery results, but this only solves half of the wash and wear problem. Fabrics treated with these chemicals were definitely wrinkle resistant, but there was no way of pressing permanent creases into them after they had once been cured. All resin treated material was cured before it was cut into garments. This meant that the stylish creases and pleats needed in trousers and other cotton garments were almost unobtainable. Naturally, the crease retention became poorer as the wrinkle resistance became better. The crease tended to straighten out just like the wrinkles. The consumer was not getting a garment that was wash and wear. He was purchasing one that could be washed and worn but without a permanent crease.

Because of this problem, cotton was being replaced by other fibers especially in certain products that required good creases. New fibers and blends became popular in men's suiting, and other fields saw a decline in the use of cotton. These fabrics could be heat set or processed in such a way that good creases could be placed in the garments. Cotton could not match their performance, and as a result, it began to decline in use.

There have been a number of processes developed recently in hopes of overcoming this problem. Some companies experimented with cutting the garments and then treating them. This process worked fairly well, but it had so many inherent weaknesses and problems that it was not placed on a full scale production. Other companies tried curing the material and then cutting it into garments. After the garments were creased, they were sprayed or sponged with a catalyst and then re-cured. This process did not give the needed results either. Another process consisted of treating the material and then drying but not curing it. The material was then kept in frozen storage until it was needed. This cold temperature kept it from curing, but the process had many complications. Actually, it was very hard to keep the resin from curing, for most resins tend to cure on storage even at low temperatures. This process is closely related to the recently introduced deferred curing process which is patented by the Koret Company of California. The Koret Company improved upon the last method mentioned and developed what is known as the Koratron finish.

In the Koratron finish the fabric is impregnated with a resin, catalyst, softener, and other agents if needed, and then it is dried but not cured. The sensitized cloth can then be stored at temperatures around 110°F for periods up to six months. The imidazolidine resin (produced by Sun Chemical Corporation) used in the finish has a proclivity toward remaining in the uncured state until very high temperatures are reached. When the cloth is needed, it can be taken from storage, cut, and pressed into the desired shape. After the creases are in place, the materials are cured so that the creases will be permanent. The high temperature curing will cause the fabric to "set up" into a permanent shape. This process of creasing and then curing gives sharp permanent creases.

The Koratron finish is composed of an imidazolidione resin, a zinc nitrate type catalyst, mykon S.F., a softener, and a wetting agent such as Tergitol NPX (non-ionic penetrant). Other chemicals can be incorporated into the finish also. Many times fluorochemical compounds and other softeners are included in the finish in order to obtain water repellence and a better hand. The resin is quite compatible with all types of chemicals and can be used in conjunction with many treatments.

The material is treated with ten to twenty-five percent resin depending on the degree of wrinkle recovery needed. After treatment, the material is dried at 200 to 300°F until it contains about eight to ten per-
The material can be stored in this sensitized state until needed by the cutters. After the garments have been cut from the material and pressed, they are cured for ten minutes at 300 to 350°F.

There have been many questions about the curing temperature and time. Many people find it hard to believe that the resin needs such a hard cure. When problems in the process occur, many people falsely pick overcuring as the problem. They blame the high temperature when, actually, undercuring is the cause. Undercuring will give very poor results in the final product. It has been known to cause seam puckering, poor creases, and a shabby surface appearance. Over-curing, which is rare, can cause odor, color changes, and excessive strength loss. The garments need the total recommended amount of heat for the specifications were set up as minimums. Many people will probably try to increase the temperature and shorten the time needed for curing, but they will not obtain good results with the resin if they do. The resin treated fabrics need a certain amount of penetrating time. This time can not be shortened with higher temperatures.

The exact chemical structure of the resin has not been determined even though a tentative structure has not been decided upon from infra red absorption. The resin is some type of imidazolidone that contains at least one (OH) group along with the two (CH₂-OH) groups. It is believed that the hydroxyl (OH) group gives the resin an added cross linkage site. At high temperatures the hydroxyl groups probably react and release water forming an ether linkage. This reaction will not occur unless high temperatures are reached. The hydroxyl group seems to give the imidazolidone extra characteristics that are beneficial in the deferred curing process.

The Koratron finish also has other qualities that are needed in a good wash and wear process. There should not be any harsh odors in the sensitized pressed or cured state. Strong odors can cause hardships to the workers and disenchantment with the consumer. The Koratron finish does not produce harsh odors in any of the three states. In fact, there is almost no odor unless overcuring occurs. The finish does not have to be after washed following curing. This makes the process faster and more efficient. The resin also has good chlorine resistance especially initially. Even though the imidazolidone is a nitrogenous reactant, it has excellent initial resistance to chlorine and good chlorine resistance after home launderings. It is generally unaffected by commercial launderings. This means that the Koratron treated fabrics can be washed and bleached without forming chloramines (—N₂HCl). These chloramines hydrolyze at high temperatures forming hydrochloric acid which degrades the garment. The finish gives excellent wrinkle recovery results along with all these other needed qualities. In fact, the finished goods seem to possess nearly all of the necessities of a good deferred curing product. Many people (consumers and researchers alike) marvel at the sharp and permanent creases of the Koratron treated garments.

There has been some trouble with shade changes on a few of the garments. Some dyes are too sensitive to be used with the Koratron finish. The high curing temperatures cause sublimation of some type of degradation in the dye molecule. This usually causes a shade that is lighter than the original. Some companies are finding that the length of storage before curing also has an effect on the amount of shade change. Because of this, it is very hard to match some colors that are to be treated with the Koratron finish.

At first there were many degradation problems with one-hundred percent cotton. The cotton fabrics suffered from abrasion at points of stress such as the cuffs. The garments were almost worn apart at the cuffs. It was discovered that in the curing process the cuffs received direct heat from the top of the curing ovens. This meant that they received a larger amount of heat than the other parts of the garment. This problem was solved with the use of shields that protect the cuffs from the direct heat. One-hundred percent cotton is used with good results in many products now. A high percentage of the dacron cotton blends is treated with Koratron also. These blends give extra strength and longevity to the garment. The Koratron finish probably has the best over-all results when applied to these blends.

The Koratron finish is beginning to give the textile industry a new look. Previously, the material was cured at the finishing plants and then sent to the garment makers to be cut and pressed. Since the situation is now reversed, the garment makers have been installing curing ovens so that they can handle these new products. Traditionally, the garment makers had nothing to do with finishing and the finishers had nothing to do with garment making, but since the advent of deferred curing many garment makers have contemplated not only curing the garments but finishing them also. The garment maker could install a small finishing operation along with the curing ovens. This finishing operation could specialize in the application of the Koratron finish. The finishing plants could add a garment making process to their system also. They are already set up for finishing and curing and they could possibly include a cutting and sewing process without too much remodeling expense. It is very possible that either the garment makers or the finishers might venture out into the others area as a result of the Koratron finish.
Through the new deferred curing process, the textile industry can give the consumer truly wash and wear garments. The consumer will have conveniences never before possible. He will be able to wash his pants (and possibly shirts, blouses, and other garments in the future) and let them dry wrinkle free with sharp creases wherever needed. Clothes finished with this process should require no more care than washing and drying, and if strict quality control regulations are followed, the consumer will put his trust in deferred curing.

GLASS: Breakthroughs Coming

One of the lesser-known members of the textile industry's fiber family is beginning to flex its developing muscles with a view toward barging into major consumer markets.

If the effort is successful, it may be that within a few years glass fiber will be an important element in the production of clothing, passenger car tires and automobile bodies. General application of glass fiber in these fields is at least several years away, according to most textile scientists, but they freely predict that the time will come when the applications can be made easily.

The movement of glass fiber toward consumer goods has been slow but steady, and it has been picking up steam in recent years.

Glass fiber drapery material has been popular for many years, and a glass fiber bedspread, made from a thinner and stronger glass yarn, is increasing in popularity. The application of glass fabrics to clothing is still largely in the experimental stage but textile researchers believe there is considerable promise in blends of glass and other fibers, particularly wool and rayon.

The major problem in developing a glass fiber fabric for clothing is apparently in the production of material which has a proper "hand" or feel. Discoveries in the past few years which have made possible very thin glass yarns are expected to lead to fabric developments incorporating large quantities of glass fibers.

Thus far, the big movement by glass fiber materials into consumer goods has been in the fast-moving boat business. About two-thirds of all pleasure boats now produced incorporate glass fiber materials in hulls and other structural features.

There has been some use of glass fiber in automobile bodies (Studebaker's Avanti and Chevrolet's Corvette) but there has been no wholesale effort thus far to adapt the material to standard production models. Glass fiber will not rust, but production costs are higher than for steel, and glass fiber manufacturers think they are at least five years away from a real breakthrough in the automobile body market.

Manufacturers of both glass fiber and passenger car tires are more optimistic in their outlook. A great deal of work has already been done on the use of glass fiber in automobile tires and some models are available in limited areas. Glass has been found to be particularly suitable for a new type of tire in which the pattern of cord and fabric runs across the face of the tire instead of around it.

While glass fiber manufacturers continue their efforts to develop larger consumer markets for their goods, the major customer for glass fiber materials is still the giant building materials industry. Glass fiber has long been popular among builders because it is strong and stable, durable, will not absorb water, takes little space and has high resistance to heat, fire and chemicals.

There are times when unexpected products result from the experiments to produce better industrial and consumer glass fiber materials. One such time was when an aircraft corporation was working with glass and plastic, and came up with a type of lightweight armor plate that is capable of stopping 30- and 50-caliber machine gun bullets.

The armor plate is now being used in Vietnam—but it is a type of glass fiber “muscle” the marketing experts had not anticipated when they first spoke of strengthening glass fiber’s position in major markets.
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an opening / an opportunity / a career / a break / a future / a spot / a chance
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Professional Development Courses

The Professional Development Courses in the School of Industrial Management and Textile Science begin the eighth year in June. Below is a list of all the courses that will be offered this summer and the dates which they will be taught.

Some of the courses are offered in cooperation with various professional organizations. The responsible organizations are listed immediately below the course number. These courses are not limited to the use of the organizations shown.

JUNE 7 through 18:
- P. D. 43—Basic Textile Chemistry
  Palmetto Section of the American Association of Textile Chemists and Colorists

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
  Southern Textile Methods and Standards Association
- P. D. 44—Advanced Textile Chemistry
  Palmetto Section of the American Association of Textile Chemists and Colorists

JULY through 23:
- P. D. 25—Yarn Manufacturing (a repeat)
- P. D. 41—Methods Analysis and Time Study (a repeat)
- P. D. 47—Quality Control
  Palmetto Subsection, American Society for Quality Control
- P. D. 56—Weaving: Fabric Design and Development
- P. D. 79—Graduate Seminar in Industrial Management: A Survey of Recent Literature and Developments

Both P. D. 56 and P. D. 79 are new courses. The purpose of P. D. 56 is to familiarize the individual with basic fabric design by giving a practical working knowledge of the weaves used in the fabrication of materials. This will include a study of designs, drawing in drafts, chain drafts, reed plans and box plans. Since the course is directed toward all phases of design, a practical working knowledge of the construction of cam, dobby, jacquard, and box mechanisms will be covered. P. D. 79 is limited to holders of bachelor's degrees, awarded prior to 1960, and presently employed in managerial positions. The following areas will be specifically treated: Financial Analysis, Management Simulation (Computer Management Game), Managerial Economics, Managerial Policy, Production Control, and Quality Control.

Catalogs, with application forms, will be available in April from Prof. C. V. Wray, Sirrine Hall, Clemson University, Clemson, S. C.
A Big Name in Apparel and Household Fabrics

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We are proud that we have been privileged to participate in Dan River’s many multi-million dollar modernization projects through the years.
THE TEXTILE INDUSTRY HAS MANY PROBLEMS

By J. H. Marvin, Associate Professor
Yarn Manufacturing Department

Textile manufacturers are striving to produce their goods at a pre-determined cost and deliver them satisfactorily to the customer. Each mill has its own problems, however, many are similar among the various types of mill operations. In order to be more specific, let us think of a mill making ladies cotton dress goods of different styles and patterns.

Some of the general problems are found in any industry. A summary of the problems would be as follows: (1) securing the baled cotton, (2) planning and controlling the flow of the stock, (3) processing the stock properly, (4) supervision of the personnel, (5) controlling the cost, (6) upkeep of equipment, buildings and machinery and handling of supplies, (7) handling of the payroll and personnel work, (8) keeping necessary records of all the mill activities.

If we try to picture the mill in operation, we can better understand and define these problems. There are hundreds of machines and various equipment. Also these machines will be of various types because of the different processes throughout the plant. Approximately twenty-five different types of machines are used and the number of each depends on the particular process.

The kind of cotton that will make possible the cloth quality desired will be selected. The cotton fibers in the bales will be a definite size suitable for this type of goods. These bales will be secured by dealing with the cotton market. Upon their arrival at the plant they will be checked and stored until needed for processing.

Plans are made to equalize the flow of the stock through the mill so that the cloth order can be filled on a promised date. This will require each phase of the processing to be readied and occupied with the right amount of stock and completed on time. Here we are concerned with changing the baled cotton into yarns and preparing them for the weaving of these yarns into cloth. As I mentioned already, it takes many kinds of machines to handle the stock in changing it to different size yarns from a bale. The movement of the stock from one process to another requires many various types of containers and transport equipment.

Quality work throughout the mill is another daily problem. Both the mechanical and the human element is involved here. Each machine has to be set up to do its work properly. Some will require mechanical changes for making the yarns and cloth according to specifications. Everyone is also concerned with keeping the amount of stock waste to a minimum.

The supervisors have a big job in directing the work of the personnel responsible to them. The duties of each person are explained for the carrying out of the production plans and machine operations. This work, of course, has to be done effectively in order to meet the quality and cost requirements.

The machinery requires careful daily servicing for keeping it operating properly. Certainly repairs will have to be made as needed. Some parts of the machines will require replacement. There are times when new cost-saving machinery will be needed to replace the present machines. The buildings require the usual upkeep, such as painting. Over a period of years, building additions or improvements may be needed.
The purchasing and distribution of supplies is another daily task that requires systematic requisitions.

The payroll has to be made every week for each employee to receive his earnings. The information is obtained and the amount determined to be paid each job according to the work performed.

Getting the personnel needed for the jobs and carrying on the services for their individual benefit is also carried out. Some of the individual benefits may be operation of a cafeteria and a medical room, company insurance, a bonus or profit sharing plan, a safety program and deductions from their earnings as social security dues and the like.

Throughout the mill data is recorded daily. These records are kept by the different office personnel. They will be used for many purposes such as supplying the management and supervisors with information. Also, these records will be used within the department and inter-changed with others.

Who are the people that are running the textile plants? Since my job is teaching here in the Industrial Management and Textile Science School of Clemson University, I will direct my answer to the young people of the industry and the student, past, present, and those of the future. They are handled by men that have acquired the experience and knowledge necessary to analyze. These men have developed their minds to think logically after many years of effective study. Now everyone recognizes the importance of study to train the mind to think profitably. The biggest problem of a teacher is to get the student not to just memorize facts, but use them as a basis for theoretical analysis. Maybe the student thinks the teacher is being dogmatic to give a question that requires some special thought. It requires time to develop the mind to analyze, therefore, one should consider this at an early age or in the case of a college student, at least upon entering the institution.

Several years ago, Mr. A. B. Sibley, then Vice-President of Judson Mills, one of the Deering-Milliken Mills, stated in the Bobbin and Beaker that there were more good jobs than good men. I believe the ability to think is one of the top requirements to qualify as a good man. Certainly one that can determine the best solution to the problem at hand, whether it be large or small.
Glen Raven Mills
Opens New Office

Glen Raven's new office building is a circular structure designed for maximum efficiency. The building stands on company property in Glen Raven, two miles north of Burlington. The circular design of the building provides maximum floor area for the minimum exterior wall length and also places all interior functions at a minimum distance from each other.

Built of attractive brick in two colors, plus steel, concrete and glass, the circular building contains over 20,000 square feet. The daring concept of the building has already caused a good deal of interest throughout the textile industry.

During the past few years, all of the mills in the Glen Raven group have been modernized and enlarged and much new equipment has been installed. At the present time, Glen Raven equipment and processes are as modern as any in the United States, according to company spokesmen.

In hosiery, Glen Raven turns out a full line of seamless and full-fashioned hose, as well as stretch support hose. There is nylon and Dacron tricot used for lingerie, loungewear and sleepwear, a stretch tricot and brushed and sueded nylon tricot. The men's wear division includes three basic slacks fabrics for boy's and men's slacks.

The item that brings a glow of pride to Glen Raven is Panti-Legs. This idea originated with Glen Raven and has proven to be a highly desirable product in the market, though at the same time it is felt that Panti-Legs also serves a need rather than being just a luxury item. It is a one-piece sheer nylon panty and stocking combined to give greater covering, eliminating the panty line that usually shows through a skirt.

Glen Raven's uniform grey goods are another source of pride to the company. These goods are turned out in Dacrons, nylon and Dacron/cotton blends. End uses for fabrics include uniforms worn by nurses, technicians, laboratory workers and waitresses.

Glen Raven’s "Sunbrella" fabrics of 100% Acrilan acrylic fiber are considered by awning manufacturers to be the finest outdoor fabrics produced. They point out that "Sunbrella" fabrics are lightweight, dry quickly and are highly resistant to deterioration from sun and weather. "Sunbrella" fabrics are guaranteed by Glen Raven for five years, and are used for awnings, tentings, boat tops and a variety of outdoor furniture items.
Two products that are receiving special Glen Raven attention are Clan Crest fabrics and "Buca-roni" boucle. The boucle is the newest Glen Raven product, developed in Glen Raven's yarn division for swimwear, shirts, double-knits and sweaters. It has excellent stretch and recovery and is adaptable to many end-uses.

The Clan Crest fabric is dubbed "A Perfectly Blended Fabric." It is 50% Orlon/50% viscose, is pleatable and can be used in women’s dresses and jumpers, in sportswear, robes and men's shirts. It is available finished from Glen Raven for use in end-products and is also available as piece goods.

The people at Glen Raven are carrying forward the torch lighted in 1841 when Jesse Gant started in the textile business, turning out gingham-type fabrics. When the mill was destroyed in the great war between the North and the South, his son, John Quentin Gant, came out of the army and joined Alamance Mills, the first colored goods mill in the South.

John Gant formed a partnership with Berry Davidson to build his first plant at Altamahaw. He later bought Mr. Davidson's interest and formed a new partnership of Holt, Gant and Holt with Lawrence S. and Banks Holt. This partnership continued until 1925. Thus the modern Glen Raven Mills was founded.

Industrial Management Seminar Series

SCHOOL OF INDUSTRIAL MANAGEMENT AND TEXTILE SCIENCE. CLEMSON UNIVERSITY

2:00 P.M. Sirrine Auditorium Sirrine Hall

SPRING SEMESTER

MARCH 4, 1965

MR. MARION M. JOHNSON
Vice President, Executive Director Personnel & Public Relations Brown-Forman Distillers Corporation, Louisville, Kentucky

“The Executive of the Future”

MARCH 18, 1965

MR. JOHN A. LABEREE,
Southern District Manager, Extension Division, Public Relations Department, E. I. du Pont de Nemours and Company, Atlanta, Georgia.

“The Role of the Large Corporation”

MAY 6, 1965

MR. JAMES F. LINCOLN,
Chairman of the Board, The Lincoln Electric Company, Cleveland, Ohio.

“The Lincoln Electric Company Incentives”

THESE SEMINARS ARE OPEN TO ANYONE WHO MAY WISH TO ATTEND
From the Department of Industrial Management

In this first "column" from the desk of the IM Department Chairman the profiles of two of the department's most important groups of students will be analyzed . . . the Freshman and the graduate student. Without the first there can in fact be no department . . . without the latter chances for the IM Department to grow and prosper are considerably diminished.

FRESHMAN

The primary goal and ultimate purpose of the Department of Industrial Management is to attract, retain and prepare a fair share of the best students entering Clemson each year. Not only is this essential for the department but it is absolutely essential that a stream of top level college talent be continuously fed into the mainstream of American industry. This process, of course, must start with the Freshman.

Below are some compiled statistics about IM Freshman entering Clemson in September of 1964.

1. Of the initial 110 reporting to Freshman orientation, 66 were from South Carolina . . . the remainder from 14 other states. By mid-term the total beginning number of new freshman was 126. Late registrants and transfers accounted for this increase.

2. In terms of preparation for college (using Freshman math as a guide) 30% required remedial mathematics, 43% were taking algebra and trigonometry and 27% were taking analytic geometry and calculus. (Note: The first math course for which IM credit is given is analytic geometry and calculus)

3. During and at the end of the first semester a number of transfers and drops occurred. Table I indicates the magnitude and direction changes. The net loss was eight freshman students.

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<th>TABLE I — IM FRESHMAN STATISTICS</th>
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<td>1st Semester 1964-65</td>
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<td>1. Total beginning enrollment</td>
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<td>Net Loss</td>
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GRADUATE

At the beginning of the 1964 fall semester three students had already received the Masters Degree in Industrial Management. Their scholastic profile was: Average undergraduate grade point ratio 2.63. Average total graduate record examination scores (verbal and quantitative) was 1063. Two received undergraduate degrees from Clemson; one from Oklahoma State University.

Continuing or beginning Master's graduate work were nine students representing four colleges or universities six undergraduate fields. At mid-term one student had completed the course of study and received his graduate degree. Two students dropped out of the program and one new student entered. Two foreign students representing Norway and Korea are presently enrolled. At the present time eight students have been accepted for August 1965 enrollment in the Masters program.

In January of 1965 a new degree, the Ph.D. in Engineering Management was approved by the University. Core of this program will be graduate courses in engineering, management, economics and mathematics. Inquiries have already begun.
HOW TO SURVIVE

Of the 100 largest corporations in the United States 50 years ago, only 29 are still on the list.

The other 71 have disappeared. Some have merged with other companies. Some have shrunk below the level of the largest hundred. Others have, of course, gone out of business completely.

No one will ever know all of the reasons for 29 companies surviving while 71 others disappeared. There is, however, one reason which stands out like a beacon in the night.

The 29 companies which are still “on top” have survived and grown because of their ability to meet the challenges of a constantly and rapidly changing world. They are the ones which respect tradition but are not bound by it. They are the ones who believe their products to be the best in the business but who are constantly poking, prying and experimenting to make them even better.

A company—like an individual—needs more than imagination and ingenuity to insure success. On the other hand, 71 companies in existence 50 years ago have proved, the hard way, that you don’t get very far without the ability to meet and master the challenge of changing times.
Outstanding Seniors...

BOBBY J. PARTRIDGE

Bobby J. Partridge is a twenty-two year old native of Calhoun Falls, South Carolina. He is majoring in Industrial Management and has selected textiles as his option.

Bobby has been very active in several organizations on campus. He is a member of Phi Kappa Phi Honor Society, Iota Mu Sigma Honor Society, the Society for Advancement of Management, and the American Association of Textile Technology. He is a senior Senator and serves on the Judiciary committee.

CHARLES DALTON MILLER

Charles Dalton Miller, a twenty-one year old Textile Chemistry major, is a native of York, South Carolina. He received a Ciba Scholarship to aid with his expenses at Clemson.

On campus Charles has been active in several organizations including the American Association of Textile Chemists and Colorists, Phi Kappa Delta Social Fraternity, Phi Psi and Society for Advancement of Management. He serves as president of AATCC and junior warden of Phi Psi. He was a member of the Taps junior staff and is an active participant in intramural sports.

Charles has gained valuable experience in textile chemistry by working during the summers with various chemical corporations. He worked one summer each with General Dye Corporation, Sullivan Southern, and Sun Chemical Corporation.

After graduation Charles plans to go to work with some chemical corporation and in two or three years he would like to attend graduate school.

BOBBY LEE WATERS

Bobby Lee Waters is a twenty-two year old Textile Management major from Calhoun Falls, South Carolina. He has received honors every semester at Clemson.

Bobby is enrolled in Army ROTC and is a Distinguished Military Student. He presently serves as the executive officer for E Company. He will receive a commission upon graduation in May.

To aid with his expenses, Bobby has received a scholarship from J. P. Stevens and Company.

Bobby has gained valuable experience in the textile industry by working with Calhoun Mills, a division of Burlington Industries, in Calhoun Falls, South Carolina. He has worked there for the past seven summers as well as on weekends and holidays.

After graduation, Bobby plans to accept a position with Burlington Industries, but he will have to interrupt his training program to serve a two-year tour of duty in the Army.

THE BOBBIN AND BEAKER
REVIEW AND OUTLOOK

The textile industry’s prospects for a good year during 1965 are excellent, continuing the period of dramatic improvement begun last year, according to the industry’s chief spokesman, President William E. Reid of American Textile Manufacturers Institute.

Mr. Reid, who is also president of Riegel Textile Corporation, said that the industry, for the first time in many years, is keeping pace with the nation’s overall economy, sharing with other industries the benefits stemming from a faster climbing population, more employment and rising incomes.

Among the major indicators of the textile industry’s currently good position and favorable outlook are employment and wages. Mr. Reid said total textile employment increased about 3,300 between August and October 1964 and by about 11,000 from October 1963 to October 1964, reversing a long downward trend in textile employment.

The October 1964 total of textile jobs was 908,600 and the rate of increase was 30 per cent higher than the rate for all other manufacturing industries. Thus, the net effect, Mr. Reid indicated, is that the textile industry is providing more and better-paying jobs than ever before.

In addition to more and better jobs, Mr. Reid said the industry’s member companies are providing better machinery and equipment for its production processes and personnel.

“Textile firms poured an estimated $750-million into modernization and expansion of plants in 1964,” Mr. Reid said, citing figures compiled by the U. S. Department of Commerce. He also said that modernization and expansion spending during the first quarter of 1965 will be at an annual rate of $950-million, continuing the textile industry’s record of spending more of its net worth for modern machinery, equipment and plants than any other major American industry.

Mr. Reid also said that demand for textile products rose substantially during 1964 and that fiber consumption at the mill level was at an all-time high. In addition, he said research is getting increased emphasis and that more and better new products are resulting from new and improved machines.

“There can be no question that the single most important factor in the 1964 success was the coming of the one-price cotton law,” Mr. Reid said. The law, passed in April, provides American mills with the ability to buy American-grown cotton at the same price it is sold to foreign manufacturers.

“The U. S. Department of Agriculture has estimated cotton consumption for the 1964-1965 crop year at 9.7 million bales, an increase of more than a million bales over the previous year. This increase is largely attributable to the one-price cotton policy,” Mr. Reid said.

“With all these gains in the industry and particularly in the proven benefits of one-price cotton, it would seem obvious that the future health of the industry depends in large measure on continuation of some form of one-price cotton program when the present law expires,” he added.

Mr. Reid said that the one-price cotton law has made it possible for American textile companies to compete with foreign manufacturers at the raw cotton level and that international trade agreements for cotton textiles have limited the advantage foreign manufacturers hold with their vastly lower wage rates.

“The textile industry now enjoys its first general prosperity in many years,” Mr. Reid concluded. “To fulfill the promise of 1965 and beyond, the industry will have to continue its progress in technique, management and marketing, and it must fight to keep American mills in fair competition with the rest of the world.”
Chatham’s New Blanket Process

By Thomas D. Efland, Associate Dean
School of Industrial Management and Textile Science

Nothing is ever really new; however, old ideas rejuvenated with a fresh approach and expertly executed can give a company a new product. Needle punch methods of producing fabrics date back to patents as early as 1868 in the U. S. issued to Crossley on his crude machine and they have been issued frequently to others since as machine improvements have been made and more variety developed in the fabric. The latest step in this evolutionary cycle is covered by patent 3,112,552 issued to Dr. Alexander M. Smith of the Chatham Blanket Company.

Dr. Smith’s invention embodies the basic component of barbed needles as are used in all other needle punch machines, but he has configured his machine to cause these needles to more effectively accomplish the locking of the fibers in a mat. Rather than drive the needles into the fiber mass normal to its surface as do most previous machines, the needles enter at an acute angle to the surface. By driving the tufts of fibers in at an angle, a second set of needles operating from the opposite side of the fiber mass can act in coordination so that the loops of fiber can actually be interlooped with each other similar to the chains in a knitted fabric. Earlier machines were designed with one needle platen, thus the fiber layer had to be punched from the opposite side on successive passes through the machine.

Interlocking the fibers by the geometrically arranged needles increases the structural integrity of the fabric in the widthwise and lengthwise direction as well as preventing separation of the fiber layers. Older needled fabrics usually required a woven scrim to enhance the lengthwise and widthwise strength and were usually plagued by a strong tendency to delaminate. Such inherent faults, now overcome by the interlooping of the fiber tufts, have to date, prevented the wide use of needled fabrics for many end uses.

Perhaps as important as the invention itself, the excellent engineering of the needling unit makes the process practicable by incorporating four needling stations in the same high speed machine. The drive mechanism advances the material through the unit at a rate coordinated with the needle strokes to give the patented interlocking of the loops. The needle platen operate at speeds in excess of 750 strokes per minute which with their 13,000 pairs of needles gives a punch density of 2200 to 2300 punches per square inch of material.

The needle platen are pivotally mounted with a needle bed at the end of the rocker arm. The mass is kept to a minimum by embedding the needles in fiber glass fabric and epoxy resin rather than using the older methods of wood or metal plates. The needle beds actually oscillate between air springs which extend the entire length of the needle bed and prevent deflection in the very light weight plates. The rocker arm method of operating the needles allows for having equal masses moving in equal and opposite directions which cuts down vibration usually developed in large oscillating machines. The air springs which stop the back throw of the needle plates can be varied in stiffness by the amount of air pressure in them, thus it is possible to tune the system by using a pressure regulator to vary the pressure. Once the unit is at operating speed and the air pressure has been adjusted to the tuned value, it is only necessary to supply enough power to overcome the machine friction and the energy required to force the needles into the fiber mass.
The needling machine has been incorporated into a system at Chatham Blanket Company to produce material for blankets directly from fiber without spinning or weaving. The process would fall in the general category of non-woven fabrics and the trademark "Fiberwoven" has been applied by the company. This promotes a positive image rather than the negative one implied by the term non-woven. However, there is no weaving involved in the process. The product produced by the system before finishing resembles a heavy dense felt of the width necessary for fabricating blankets.

The line begins with woolen cards feeding onto a conveyer belt with a traversing device laying the webs in a crisscross fashion to give considerable lateral orientation to the fibers and to give a sufficient linear density for the blanket to be produced. Two or more 100-inch cards are used or four 60-inch cards. A series of threads are laid between the fiber layers to help transport the fiber forward although satisfactory material can be produced without these. The fiber matrix is transported into the needling machine where the four stations impart sufficient penetrations at one pass and the fabric is rolled for the finishing process in units up to one thousand pounds.

In finishing, the fabric is napped on conventional equipment but fewer passes are required and much less energy is used to produce a lofty surface than on a woven material. Dyeing finishing and fabrication are similar to conventional blanket manufacturing except that the much larger rolls of fabric facilitate the finishing through lower handling costs and improved cutting efficiency.

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**WHY SPEND SO MUCH?**

The textile industry's various member companies are expected to spend a total of $760 million this year for new plants and equipment.

That's an awful lot of money.

It's far more than the government will allow as a tax credit on buildings and machinery.

It's a big chunk of the total profit the industry made last year when, as a whole, textile companies could call less than three per cent of their total sales receipts "free and clear".

It's an amount greater than the sales of all but one of the many American textile companies.

Why go through all the agony of planning to spend that much money if it's more than the government allows for depreciation, more than the total sales of every individual company except one, a measurable piece of total industry profits?

Why spend it?

For nearly 175 years, the textile industry has been developing itself as a modern, progressive, dynamic industry.

It intends to stay that way.
Industrial Management
Undergraduate Research Abstracts

The following undergraduate research was completed by Industrial Management students during the fall semester 1964-1965.

The Elberton Granite Industry
John S. Ayers

The purpose of this research was to investigate the Granite Industry in the relatively small town of Elberton, Georgia, and to determine its importance to that community. After making the study, I have reached the conclusion that Elberton revolves around the granite industry and is very dependent upon it.

The granite industry is by far the most important in Elberton. Approximately seventy percent of the non-farm workers there are employed in some capacity by the granite quarries or plants. These workers are paid about five and one-half million dollars each year. It is also the largest industry in Elberton. Over one-third of all monumental granite produced annually in the United States come from Elberton. There are a total of ninety-nine companies actively engaged in the granite industry in some way.

Granite has been the center of Elberton’s growth for many years. Supported by this booming and progressive industry, Elberton’s future looks very prosperous. Elberton is truly the “Granite City of the World.”

A Study of Harvesting and Transporting Containers for the South Carolina Grape Crop
James L. Leslie, Jr.

During the months of June and August 1965, an experiment was conducted in the South Carolina grape fields to determine the relative damage and change in sugar content of grapes shipped in five different containers and the relative ease of handling of these containers in an effort to select a superior container for use by the South Carolina grape farmers.

Samples were taken in the field before the grapes were placed in the experimental containers and again at the processing plant after the grapes had weathered the entire harvest and transportation process. Each of these samples was analyzed for damage and sugar content and the difference between the field sample and the sample taken at the processing plant was computed for each container. Any change in damage and sugar content was assumed to have occurred while the grapes were in the shipping containers. This data was analyzed in such a manner as to remove such extraneous variables as location of vineyards (distance of haul), time elapsed between picking and processing and different handling techniques of growers. This data indicated that although there was significant variation in sugar content with respect to time elapsed between picking and processing and with respect to location of vineyards, there was no significant variation of sugar content of grapes transported in the five experimental containers. The damage data, however, indicated that there was significant variation in the damage to the grapes transported in the various experimental containers. The plastic lug and the wooden lug were significantly lower in percent damaged than the peach field box, the bushel basket, and the 3/4 bushel basket.

The observations of the relative handling ease indicated that the use of the peach field box and the grape lug resulted in from three to five times the dead weight of that involved with the use of the plastic lug. The necessity of placing lids on baskets before stacking in the truck and also the removal of the lids before dumping at the processing plant resulted in definite labor inefficiencies for the basket. The plastic lug needed no lid, it was light and readily accepted by the pickers and loading crews alike. The stacking characteristics of the plastic are excellent, making it easily handled by hydraulic fork lifts.

It can be concluded that, from the standpoint of lower damage and higher efficiency of handling, the plastic lug is best suited of the five tested containers for use by the South Carolina grape growers.
Profit Potential Analysis of a Going Concern  
Thomas C. Hamm

An attempt has been made to examine a going concern that has been mismanaged to the point of perpetual financial losses. The basic assumption of this paper was that good management could correct this situation and cause the firm to produce a profit. The examination was to discover the profit potential of the firm and to find the cost of reaching this potential.

It was noted that this going concern could naturally be divided into three separate facilities. These are in order taken up, the hotel facility, the restaurant facility, and the rentable property facility. Based upon discussion with many business men located in the same city with this firm it was found that about $23,000.00 was needed to renovate the hotel facility. Based upon projection of the business volume of local competition, the hotel's business volume was estimated. After deducting known operating cost, adjusted for the increase in business, from the gross revenue the net profit was determined for the hotel facility.

The analysis of the restaurant was conducted in much the same way. The cost of improving this facility was estimated to be approximately $8,000.00. Gross revenue was based here as in the analysis of the hotel facility on local competition business volume; however, actual cost data was not available. To determine costs, a similar restaurant was consulted in a similar town. These cost figures along with verification from other sources were used to obtain net profit for the restaurant facility.

The rentable property facility's analysis was conducted with actual rent figures projected for that part of the facility that was vacant. Renovation cost was obtained from local contractor and found to be approximately $5,000.00. Miscellaneous cost items such as maintenance, insurance, taxes and so on were deducted from this part of the enterprise.

Various related questions were considered, such as the cost of reshaping the public image of this long down-graded firm. Another question was the effects of the by-pass being presently constructed around the city. Outdoor advertising seems to be the answer to the by-pass problem. While newspaper and radio campaigns seems to be the answer to the image problem.

After all figures were in and all computations made it was found that $38,005.00 needed to be spent improving the facilities. It was likewise found that profit of $42,616.95 could be expected from each year's operation of the facilities.

Using the appraised value of the building and equipment and adding the capital outlays currently needed and dividing this into the expected net profit the annual return on investment was found to be 21.8 percent.

Finally the question was raised as to whether or not this rate of return justified the risk. The answer to this question must come from the prospective investor.

Sale-Leaseback Transactions  
David J. Weeks

Finance is one of the most challenging fields in our modern day society. Through the different methods and techniques of finance, millions of dollars are made and lost every year. Rules are set down to follow, but they are not always fully dependable. Only through research, long years of experience, and the instinct of knowing the right answer at the right time, can one determine which decision should be made, and when they are often-times wrong.

This report delves into one of the many financing techniques which are at the disposal of the business world. Just mentioning the Sale-leaseback Transaction proposes a decision to be made. The party (usually a business rather than an individual) has to decide whether to place a large sum of capital into fixed assets or to lease them. The report of course leans toward the sale-leaseback of assets, however, both sides of the picture are presented.

Volume I gives a thorough understanding of the topic. It shows precisely how this type of financing works, and why it is good or bad for certain parties concerned.

Volume II goes into the accounting aspects of the transaction. It shows how the companies would handle the transaction on their books. Also, there is a short section on alternatives to the sale-leaseback transaction.

I found the research on this topic to be of great interest. It has its disadvantages, but the benefits that can be realized are fantastic. For a company that has to put most of their capital into disposable goods, the sale-leaseback is an excellent way to obtain needed assets (land, buildings, and etc.). On the other hand, it is a fine investment for parties that have a large sum of excess capital. They own the assets while in reality someone else is paying for them, and at the same time they are drawing interest on their investment that is higher than they can get through most other types of investment.

SPRING ISSUE 1965
The department store customer who picks his way through a selection of cotton shirts to choose one with "Pima Cotton" label may not realize it but he is adding another chapter to a memorial for a man nobody knows.

The unknown man is an Indian. His name has never been a part of recorded history, and nobody knows when he lived. Historians are fairly certain, however, that he lived in Arizona—specifically Northern Arizona.

The general picture of Arizona Indians of the past is one of a half-naked, painted young buck astride a galloping pony swooping down on an isolated ranch or a California-bound wagon train.

That picture could hardly be farther from an accurate one for the obscure Indian for whom Pima cotton shirts are a memorial. He was a farmer. Actually, he was a farmer in about the sorriest sort of farm land—harsh, dry, cool land with a short growing season.

But he was a good farmer. He was the first cotton farmer in what has become the United States.

Research, excavations, and other physical evidence show that Indians in the Southwest were growing, spinning and weaving cotton several hundred years before the New World was discovered. Spanish conquistadores searching for gold in 1539 found the natives in well-made cotton garments. Cotton cloth has been recovered from burial sites of cliff-dwelling tribes who lived even before that date.

A noted Arizona cotton breeder once pointed out that members of the Hopi tribe stopped only a few years ago in their practice of raising isolated patches of cotton in the state's high, cool northern regions. He cited the Hopi cotton as an example of the adaptability of plants to environment, saying "Instead of growing tall on a strong stalk, Hopi cotton had a weak stem which caused it to lie on the ground where the warmth of the earth made survival and production of lint possible."

Because of its ability to survive under adverse conditions, Hopi cotton is still being studied by cotton breeders.

Other observers of Indian cotton did not restrict their interest to its hardiness.

The head of the U. S. Boundary Commission reported in 1854 that he saw cotton being raised by Pima and Maricopa Indians that was equal to the best Sea Island cotton. Another man, ten years later, said that cotton flourished with "remarkable luxuriance" in Pima villages.

The agricultural skill of the Southwest's old Indian cotton farmers is especially noteworthy. While it is true that their cotton adapted itself to the conditions at hand, it was still necessary for the Indians to devise an irrigation system and some sort of crop rotation and planting schedules that took the character of the land and the short growing season into consideration.

But for all its glory, the Indian cotton business never did blossom. It remained for the white man to turn Arizona cotton into a commercial crop, beginning around 1912 when Arizona was admitted to the Union.

However, just the knowledge that some obscure Indian may have made the Arizona highlands the nation's oldest cotton producing area—pre-dating even the traditional cotton country of the Deep South—conjures up some second thoughts about the old days.

That stately Indian standing on an old, forgotten butte gazing toward the distant horizon possibly had his mind on things other than Spanish conquistadores or wagon trains or horse soldiers. He may have been trying to figure out where to put next year's crop, or how to meet the economic threat posed by upstart cotton planters in far-off Mississippi.

TWENTY-FOUR

THE BOBBIN AND BEAKER
Demand For College Graduates Grows As Textile Field Broadens

Clemson University graduates for decades have been among the higher echelons of administration and research department in practically every U. S. textile firm. “We must keep the pipeline of talent flowing, however, and the School of Industrial Management and Textile Science is doing just that,” says Dean Wallace D. Trevillian.

“Majors in such fields as mathematics, management, engineering, physics, and chemistry—all have unique opportunities awaiting them in this old but dynamic industry. The possible spectrum of inventiveness includes concepts not yet dreamed and runs from a better fishing line to an improved space suit for an evening on the moon.”

Any statistics to reflect the rapid developments of the textile industry are out of date before they can be published. The same is true regarding Clemson’s growth and developments. “We would have to publish a catalogue daily to be really up to date the dean said.

“A subjective gage of the industry’s remarkable achievements can be understood partially by simply riding through the Carolinas and witnessing first hand the new factories in the fields. Increased capital spending, mergers, effective cotton legislation, research, and the status of the economy as a whole have all contributed to a resurgence. The contributions of these factors coupled with talented executives and professional management have speeded up the renascence of the industry.

While the industry is employing and needs engineers, scientists, and management majors, the hard core of educational responsibility for the industry remains with the textile schools. The textile major per se at Clemson University may select an undergraduate curriculum of a bachelor of science; in addition to a basic education this curriculum concentrates on the principles of science, engineering and technology as it relates to textiles.

“On the other hand, he might choose the textile chemistry undergraduate curriculum, making it possible to continue for the master’s degree and the Ph.D. in chemistry with a major in textile chemistry. Other students may select an undegraduate degree in management with a secondary concentration in advanced textile technology.”

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SPRING ISSUE 1965
Kotton Korner

First Drunk: Say, know what time it is?
Second Drunk: Yeah.
First Drunk: Thanks.

* * * * * * *

After a rather exciting date with a sweet young thing, her escort, a bit anxious, asked: Do you tell your mother everything you do?"
She looked at him and said: "Certainly not. Mother doesn't give a hoot about what I do. It's my husband who's so inquisitive."

* * * * * * *

Why is Mr. Smith pacing up and down his front porch? He's awfully worried about his wife.
Is that so? What does she have?
The car.

* * * * * * *

Physician, to nervous student: The best thing for you to do is to give up smoking, drinking and late hours.
Student: I don't feel that I deserve the best. What is your second best solution?

* * * * * * *

Nurse (in mental hospital): There is a man outside who wants to know if we have lost any male patients.
Doctor: Why?
Nurse: He says that someone has run off with his wife.

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A durable anti-bacterial additive for textiles. Provides fixed, lasting protection against germs, mildew, perspiration odors and other odors 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® (di'sék'o-lîte)
Concentrated sodium sulphoxylate formaldehyde available in lump, pea, rice or powder form. A powerful reducing agent, stable at high temperatures. Widely used to effect reduction and solution of vat colors, 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.

**P**

Parolite® (pär'ô-lîte)
Zinc sulphoxylate formaldehyde in the form of white crystalline powder. A highly concentrated stripping agent for all forms of wood 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® (vät'ô-lîte)
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 cellulose fabrics. Quickly removes rust stains from cotton goods. May be used indefinitely. Available with optical whites and in buffered formulas for high temperature use without excessive alkalinity.

**Neowet X** (né'ô-wët)

**Neozyme** (né'ô-zîm)
Denaturing agents made up of amylolytic, proteolytic and fat splitting enzymes available in the form of crystalline powder or liquid concentrate for high or low temperature requirements. Neozymes quickly remove all trace of starch glue or gelatin string without danger of damage to even the most delicate fabrics. For best results, use with Neowet to speed saturation.

**Velvosofter** (vëlv'ô-soft'èr)
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. Will not "smoke off" or change color in high temperature operations such as calendering or drying. Has no effect on light fastness of colors.

Strategically placed warehouses plus company owned trucks add up to fast dependable delivery, every time.

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