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NO. 2

10TH ANNIVERSARY EDITION

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THE
BOBBIN and BEAKER
Official Student Publication
Clemson Textile School

VOL. 8 SPRING ISSUE, 1950 NO. 2

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The Cover
Textile majors at Clemson are not always fog-bound in a sea of cotton, lint, and grease. Sometimes they have their moments of self expression in other ways than picking out a sample of cloth, manipulating a slide rule, or punching a calculator. Witness the cover for this 10th Anniversary issue, executed by James R. Anderson, the associate editor of the BOBBIN & BEAKER. Anderson refuses to say what the idea is behind the design, or give any other reason for its being. "It's just a cover," he says.

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Dean Brown Reports on Europe

By ROY F. BARRETT, TM. '50

On October 6, 1949, Dean Hugh M. Brown, of the Clemson Textile School, along with other members of the National Council of Textile Deans, sailed on the Queen Elizabeth for England. The purpose of this trip was to broaden and exchange their knowledge with representatives of the United Kingdom.

One of the first places the group visited with the College of Technology of the University of Manchester. There, the Deans were under the guidance of Professor W. E. Morton, head of the Textile Industries Department. While at Manchester, they also visited the Shirley Institute, research institute of the British Cotton Industry Research Association. Here, Dr. J. W. Hill, Deputy Director of the Institute—???

Among items of interest to be found at the Institute were, a machine shop, a library, a number of small laboratories, and an electron microscope. One of the interesting machines viewed by the Deans during their visit was an automatic doffer in action. This was developed during the war due to the shortage of doffers. It is claimed that this semi-automatic machine does a frame in much less time than did the former method.

The Deans also visited the Textile Machinery Exhibition while at Manchester. According to Dean Brown, many of the looms shown there had no top rigging over the warp; the dobbey head was level with the reed cap and positive harness motions underneath the looms. There were also spinning frames completely enclosed giving a streamlined effect, and an Italian spinning frame with a seven-roll system to give drafts as high as 300.

After leaving Manchester, the group spent a short time at Bradford where they were escorted through the school by Mr. H. Richardson. They next visited the University of Leeds, where Dr. J. B. Speakman, head of the Department of Textile Industries was their host.

At Harrowgate, they heard Prime Minister Attlee give a brief talk and later had the honor of meeting Mr. Attlee.

Upon leaving Harrowgate, the group journeyed to Galashields to visit the Scottish Woollen Technical College.

At Bollington, they visited the mill of Thomas Oliver & Sons, where they were presented samples of 300/1 Sea Island and 420/2 Sea Island yarn that was spun on mule frames.

The Deans attended the Anglo-American Textile Educational Conference at Buxton where a number of papers were presented by the British educators and members of the American group. Dean Brown, who is President of the National Council of Textile Deans, and Sir Raymond Street, of the British Cotton Board, served as co-chairmen of this meeting.

The group next went to Leicester to visit the textile school there. Here was found more knitting work than any other school which they visited.

In London, the International Wool Secretariat explained its work to them.

Among some of Dean Brown's observations during his visit was that the British classes were much smaller than ours and that the students seemed more mature. He explained that this was due to very few students being financially able to attend college. Most of the students attending college had received scholarships given either by the school or by persons connected with industry.

Another thing which Dean Brown noticed was that schools do not require as many social science courses as is the policy in the United States. They confine their work mostly to the technical side. However, their schools carry on more research than is the practice here and the industry looks to the schools for that research. These research projects are carried on both by the faculty and the students. Most of the research is of a practical nature. To give some example of the amount of research being done, during 1948, the textile staff members of Leeds University made more than thirty publications of research, in addition to forty-one special lectures to groups in the textile industry. This type of work is being done at all of the other schools. At the Buxton Conference, Dr. Speakman of Leeds University gave this quotation: "He who learns of one engaged in scientific research drinks from the clear, running stream; while he who studies under one who only teaches, sips the green pool of stagnation."
Experience Is NOT The Best Teacher

The author of this article, who wishes to remain anonymous, is a graduate of the Lowell Textile Institute, and is well known in the field of textile chemistry. His background over the years is such that he is well qualified to recount the various experiences in the splendid editorial printed below.

Very few, if any, Textile students can know for sure just what they will actually be doing when school is over. Some may never enter the Textile industry actively, at all. However, most will at some time or other earn their livelihoods, either directly or indirectly, from some phase of the Textile industry. They may be actively engaged in production or selling or may direct their activities to the financing, management or supplying. But in any event most of you are probably wondering when, where or how you may ever get the necessary practical experience in any chosen field to be an important factor therein. If so, forget it. Practical experience you get as long as you live. Besides, no tool in the whole bag of tricks of practical experience can ever be as reliable a guide as sound theory thoroughly learned, plus a mastery of the technique of applying your theory to every current daily problem.

When you emerge from school into the textile industry you will find yourself in a field where much is done by tradition as dictated by practical experience. Definitely you will find few supermen. You will find a great tendency to solve manufacturing problems by the “hunch” system. By that method a certain party—anybody—thinks himself that the source of a given trouble must be “here” or “there.” The process is then changed at the suspected point and something different—anything—is tried, to see if correction develops. If no improvement results the same system is resorted to at some other point in the process. In extreme cases the foreman is fired and another is hired who often uses the same method—often right over again—and gets the same result. Many years of observation have convinced this writer that there is too great a tendency in the Textile industry to neglect the tools we have.

ALL PROBLEMS CAN BE SOLVED

In our own experience it is possible to say that every manufacturing problem, no matter how difficult appearing, can be solved by a careful analysis of the facts (after you get them), based upon sound theory. It may be difficult, sometimes, to dig up all the pertinent facts but one must start off with the assumption that the cause is somewhere within the four walls where one works. A thorough search will eventually locate it. The first requisite is to approach the problem with an open mind and with no preconceived assumptions as to where the source of trouble “ought” to be. Measure the problem with the requisite tools, physical, mechanical or chemical. Get some figures which describe it. Find out “what” is “where” and how much there is of it. Find out whether it should be here or not. Encourage every man or department concerned to assist in digging up the facts. Let it be understood at the start that nobody is going to have his neck wrung when the cause is finally uncovered. If you follow that technique you can set off the gremlin hunt of the age. Out of it, everybody will get a little fun and also the satisfaction of having his job run better when the culprit is found. Sad to relate, this method has not always been followed. A few horrible examples of serious, though common, representative mill problems are given below, together with the solutions thereof.

A high grade woolen manufacturer in Pennsylvania suddenly found they could not longer dye any woolen piece dyes level except chrome bottomed navy blues. The dyer was charged with careless work at first and incompetency later and was finally warned that continuation of such bad work would cost him his position. After producing streaky dyed piece goods for three weeks, all of which had to be dyed Black and sold at a loss, the idea began to dawn that here was serious trouble not hither to encountered. Whatever measures of correction had been tried had proven ineffective and the writer was asked to look at the problem.

One batch of usually easy-to-dye acid dyes was run with surprisingly horrid results. All wet processing was then stopped so we could begin searching for the cause without damaging any more goods. At the same time we ran an analysis of the stained cloth, in their own Laboratory, to find out what elements might be present along with the streaks. The only thing we could find on the streaks that was not present on the undyed yarn was quite a large quantity of Aluminum. This suggested something in connection with the water supply inasmuch as they used an Alum-Soda Ash water clarifying system.

Questioning of the employees who had charge of the clarifying system at first brought out the information that no change in ingredients for the system had been made. However, being still suspicious, we questioned them further, whereupon one recalled that about a month previously they had run out of Alum and the Chief Engineer ordered them to use material from another barrel—unlabelled. The contents of the unlabelled barrel were analyzed and it turned out that the barrel contained Sodium Aluminiate. Inasmuch as Sodium Aluminiate is not precipitated with Soda Ash, as Alum is, it ran right through the clarifying system.

(Continued on page 31)
This Magazine And Its Editors

By BERLYN K. SUTTON, TM. '50

The author is greatly indebted to the past editors who were instrumental in making this story possible by submitting pertinent information contained herein.

IN THE Fall of 1939, Iota Chapter of Phi Psi Fraternity initiated a move which resulted in the foundation of a publication known as "The Bobbin and Beaker". The first issue of this magazine was published in February of 1940 with a definite purpose—"to distribute interesting subjects concerning all phases of textile manufacturing, to gain a closer tie between the Clemson Textile School and the textile manufacturers, and to afford an outlet for extracurricular activity of textile students". Staff eligibility was and has continued to be limited to any textile student possessing ability, interest, and a willingness to devote much of his time to the publication.

IN THE important initial months of this magazine, a problem was confronted which has become almost hereditary—that of obtaining adequate financial reserves to permit publication. Then, as now, the sole source of revenue was from advertisements. The first staff, under the editorship of Mr. C. E. Anderson, worked in relative "darkness", and was charged with the responsibility of producing the "first" in such a manner that "The Bobbin and Beaker" might live on and on.

Mr. Anderson presently holds the position of Industrial Engineer with Monarch Mills in Union, S. C. Upon graduation, he accepted employment with the New York Office of J. C. Penney Company where he worked as textile technician in the Research Laboratory. He remained there until February of 1941, at which time he entered the United States Army. There he served with the Armored Infantry of the Fifth Armored Division as company commander and unit S-4 until January of 1946, when he returned to inactive status with the rank of Major. Since then, his occupation has been with Dayton Rubber Company and Deering Millikin and Company.

EACH new staff has found itself faced with new problems and responsibilities. In 1940-1941 difficulty was again experienced in securing funds, as well as with details of correct mailing addresses and the acquiring of articles which would be of interest to the three different classes of readers which this publication must satisfy. (students, alumni, others). It was this energetic staff which obtained a room in the new textile building for use as an office.

Mr. William R. O'Shields, who piloted the staff as Editor that year, is presently employed at Judson Mills in Greenville, S. C., where he is Superintendent of the Preparation Department. For a short while after graduation, Mr. O'Shields was with E. I. du Pont de Nemours and Co., Inc., after which time he entered the training program at Judson Mills. During World War II, he served for a five year period, part of this being as Battalion Headquarters Commander in New Guinea and the Philippines. After discharge in 1945, he engaged in work at Judson Mills in the Laboratory and Assistant Plant Superintendent's Office.

FURTHER indications that troubles are never ending on a publication such as this are evident from the report of Mr. Gordon E. Williams who was Editor of the 1941-1942 Bobbin and Beaker. That year, students lacked the necessary interest in writing. Mr. Williams points out that "this is a tragic mistake made by far too many college students, for the student who graduates without the ability to prepare intelligent reports on his work is sadly handicapped in industry".

Mr. Williams graduated from Clemson in 1942, entered the Quartermaster Corps and later transferred to the Air Corps. His overseas duty was in China and India, where he received the D.F.C. with two oak leaf clusters. Since his discharge as a Captain in 1945, he has been with Judson Mills in Greenville, S. C., as an Industrial Engineer.

THE beginning of the war created new elements in the parade of hardships for the 1942-1943 staff, which found itself faced with a paper shortage, transportation difficulties, and a limited "no advertising" policy on the part of many supply houses. Confronted with these wartime disadvantages, the staff managed to publish commendable magazines as had been done in the past. However, due to these handicaps and the uncertainty of how many students would be in school during the subsequent year, it was decided that publication would be suspended until after the war.

The Editor-in-Chief during this significant year was Mr. M. D. Moore, Jr., who now is with Enoree Mills in Enoree, S. C., where he has been engaged in setting up and getting into operation a laboratory and standards department and acting as "pinch-hitter" for the Night Superintendent. Some two months after graduation, in 1943, Mr. Moore was called to the service of our country. He underwent officers training at Fort Benning, Georgia, and after receiving his commission spent periods in Texas, New Jersey, and Pennsylvania at various camps and duties. Later he saw duty in the European Theater of war, and after cessation of hostilities was in the Army of Occupation. Being engaged in the Army Education Program, he was offered a furtherance of education by schooling in Paris and England. Upon discharge, Mr. Moore accepted a position on the faculty of the Clemson School of Textiles which he occupied for one semester, after which he became engaged in work for his present employer.
IT was three years later that "The Bobbin and Beaker was reactivated, and again it was Phi Psi Fraternity which set the precedent, reviving the element of education which it had founded six years before. With a Fraternity loan for the purpose of beginning the administrative details, this staff found itself in much the same situation as the 1939-1940 group. Under the Editorship of Mr. William E. Broadwell, the first post war issue of this magazine made its appearance in November of 1946.

The chief difficulty, which time greatly eliminated, was a lack of experienced staff members. It was during this year that the two-color cover on this magazine was first presented. This was quite an improvement over the old black and white cover. The 1946-1947 staff is due great praise for reviving this activity which has given and will continue to give students the opportunity to exercise their "hidden talent" as well as inform the textile industry that there is a Clemson which is greatly interested in them.

Mr. Broadwell was winner of the National Phi Psi fraternity award in 1947. Upon graduation, he studied at the Institute of Textile Technology. Since 1948 he has attended Harvard Business School, from which he expects to receive a M.B.A. degree in June of 1950. His intention is to enter the textile industry upon graduation.

IN 1947-1948, under the direction of Editor Harold R. Valerius, it seems that only minor troubles were encountered, and these were overcome with satisfaction. Mr. Valerius was in the Army for two and one-half years, this time being mostly spent in the Hawaiian Islands with the Adjutant General's Office. He received his degree from Clemson in June of 1948, and has since been employed by E. I. du Pont de Nemours as an Equipment Development Engineer at the Seaford Nylon Plant of Seaford, Delaware.

During the 1948-1949 session there was a decided lack of cooperation from students in writing for the magazine. It was in this year that Professor Robert K. Eaton, who was serving as Faculty Adviser for The Bobbin and Beaker, passed away. Mr. Eaton had been on the Clemson faculty since 1923, acting as Dean of Clemson Textile School from 1943 to 1945.

Two issues appeared that year, under the Editorship of Mr. Robert J. Cheatham, Jr. Mr. Cheatham served with the Ninth Army in the European Theatre for a period of two and one-half years. Having attended Clemson for one semester before entering the Army, he returned in 1946, and received his B.S. Degree in June of 1949. Since then, he has been engaged in employment for United Rayon Mill at Elberton, Georgia.

IN THE tenth year of this magazine, the present staff is honored to carry on an activity which was started a decade ago with definite goals to be reached.

It is interesting to note that each staff, even though it has been confronted with a different array of obstacles, has met these situations, and even made some valuable contribution to, or improvement in, The Bobbin and Beaker. This should be an inspiration to the ones in the future who are privileged with the responsibility of "carrying on". These men will face other and some of the same drawbacks. It is this experience of meeting and overcoming the difficulties which furnishes the greatest value of working on a student publication! It is this experience, also, which provides the concrete proof that one of the purposes set forth ten years ago is being realized—-that of providing an extracurricular outlet for textile students. It is hoped that The Bobbin and Beaker readers of the past have realized some value in the literature which has been presented, since that is the primary purpose of the magazine, and the objective which each staff must strive to obtain.

To the staffs of the future we say this: Never forget that in your hands is one of the greatest college opportunities to be had, and with you rests the duty of presenting Clemson Textile School and the textile graduate of this school to the industry!
Textiles In South And Central America

By MR. W. B. HANKINSON
United Merchants and Manufacturers, Inc.

ABOUT THE AUTHOR: Mr. Hankinson, a graduate of the Georgia Tech school of electrical engineering, has been with the United Merchants & Manufacturers Corporation since 1931, and has ten years of experience behind him with the company's mills in South America. He is now in charge of the Service Department, and is well qualified to discuss the opportunities in South America in the field of textiles.

STUDENTS of Latin America have noticed that during the past two decades there has been an increasing trend toward industrialization throughout quite a few of the countries of South America. In the past, the economies of all of these countries were based almost entirely on agriculture and, although the production of food stuffs, etc., is still a leading occupation, employment rolls throughout the various industries are increasing by leaps and bounds. Manufacturing is mainly confined to consumer goods such as farm products, tobacco, shoes, small electric appliances, but also includes petroleum and a few isolated cases of the heavier industries such as steel and iron works.

ARGENTINA AND BRAZIL BIGGEST TEXTILE PRODUCERS

In the forefront of this movement stands the textile industry which in most cases comes second only to the production of food, beverages and tobacco. Argentina and Brazil are naturally the biggest producers of textile fabrics, being the two largest and most economically advanced countries of South America. For instance Brazil operates around three million spindles and ninety thousand looms and Argentina has a smaller amount of machinery. To a lesser extent other countries also boast of their textile industry such as Peru with its Grace Mills, and Mexico with its Burlington-sponsored plants, as well as Venezuela and Uruguay (which are more or less in the infant industry stage.)

In Brazil, the majority of the textile industry is centered in the region of the very modern and swiftly expanding City of Sao Paulo. In Argentina the center of industrial activity is Buenos Aires with its population of almost three million. Practically all of the textile industry is located in and around this metropolis of South America.

JOINT OWNERSHIP OF MILLS

Almost all of the mills throughout South America are owned jointly by foreign capital and capital of the country, in which they are located. Both the officers and stockholders are more or less divided between citizens of the country and so-called foreigners (such as English, Americans, Germans, French, etc.)

An adequate labor supply for textile mills does not present any grave problems. In Argentina and Brazil, there is no great difficulty in obtaining alert, intelligent workmen who, if not already partially skilled in textile trades, can be quickly taught how to run the various machines. In the case of supervision or top management, however, it is another story, as experienced, well trained and well educated technical supervisors must be imported from abroad. It is this sphere that opportunity lies for the American textile and engineering student.

As my experience has been confined to the methods and operations of the foreign plants of United Merchants and Manufacturers Inc., I can only describe their procedures but in general I think these are used by the majority of American firms operating in South America.

To begin with, only top personnel is ever sent to South America (with the exception of a few specially skilled workmen such as loom fixers.) This is due to a desire to keep down overhead and also because laws of the different countries forbid any factory to have more than 25% of its employees rolls composed of foreigners.

SELECTION A PROBLEM

In order for a man to be sent to South America, it is necessary that he not only have a textile or engineering degree but that he also have ample practical experience in a mill. Since aside from the administrative function of his job
he must also be thoroughly enough versed in the operation of the various machines that he can act as an instructor or as a "trouble shooter" as the case may be.

To meet this problem we are engaging in a training program for which we hire several promising graduates each year. These men are placed in our domestic mills for a period of at least twelve months. During this time they actually work on the various machines in the different sections. This, of course, may seem to be a review to some of the textile students but it is a very necessary step, if a supervisor in a South American mill is to be capable of answering the many, many questions which will arise daily. It is also almost vitally necessary that the students have a knowledge of the Spanish language and very valuable also is some acquaintance with Latin American social customs and psychology. When going into a South American country, he must recognize that he is the foreigner and the guest of the country into which he is moving. Customs may be slightly different and it is up to him to adapt himself insofar as possible, to the customs of that country. If he should go to a large city, such as Buenos Aires, or Sao Paulo, he will find living conditions very satisfactory and comparable to those in any large city in the United States. Should he go to one of the smaller interior towns he will find conditions far more primitive than he would find in a small town in the United States. In general he should investigate thoroughly the country to which he contemplates going as well as the company which he intends to join.

OPEN FIELD

It can readily be seen that opportunity for advancement is great and any young man, who is genuinely interested in living abroad can find ample territory in which to grow and expand his knowledge of textile manufacturing. He will find that he is not restricted to one unit of the mill as much as he would be here in the United States but, being a member of management, he is also involved in personnel policy, general administration of the mill, etc. These opportunities are not limited to textile graduates but are also open to mechanical, electrical and chemical engineers as our plants operate their own steam and power as well as their own bleaching, dyeing, printing and finishing departments.

United Merchants and Manufacturers' policy is to hire a man for two years, send him down with traveling expenses fully paid. Should he desire to stay with the company after his two year period, he is sent back to the States for a two month vacation, after which he is sent back to South America for another year.

Having spent ten very informative years in an "American" company mill, in Buenos Aires, I can heartily recommend this field to any textile graduates interested in foreign service.

It is with pleasure that the
Bobbin and Beaker announces that

MARION KIRBY

and

SAM MORRAH

have been approved to edit this magazine for the year 1950-51.

Mr. Kirby is from Laurens, S. C. He has served capably on the present staff and was recently elected to head the Phi Psi Fraternity for the coming year.

Mr. Morrah, who has also been a reliable staff member this year, has been outstanding in the Clemson Corps of Cadets where he has held the position of Battalion Sergeant Major. He was recently taken into Scabbard and Blade, Clemson's top military fraternity.

He is from Greensboro, N. C.
"Orlon"—du Pont's Latest

By D. M. THORNTON, Manager
Sales Development Section, Acetate Division
E. I. du Pont de Nemours & Company, Inc.

The first half of the 20th century has seen phenomenal changes in the fields of transportation, communication, and power. The airplane, automobile, radio, telephone, and hydroelectric power generator have been revolutions in their respective fields. The advent of synthetic fibers has been the herald of tremendous changes in the field of textiles that can be expected during the years ahead. One has but to mention the impact of nylon on the women's full-fashioned hosiery market or the growing acceptance of rayon for automobile tire cord to be aware of the present dynamic nature of the textile industry.

In 1948, some 6.5 billion pounds of apparel type textile fibers were consumed in this country. Whereas in 1914, the production of synthetics was negligible, by 1939 synthetics accounted for 9% of total fiber consumed and in 1948 the synthetic fiber production was 19% of the total. This growth has been due primarily to the fact that synthetics are engineered to meet functional and aesthetic demands by consumers and at a price that gives maximum value per unit cost.

Other important changes in the textile industry are due directly to the emergence of synthetic fibers. The experimental production of men’s suiting fabrics has been accomplished in two-thirds as many processing steps as is normally required for the production of an equivalent wool fabric. Other processes, still under development, permit the production of similar synthetic fabrics in even fewer processing steps. Thus the era of revolutionary change in textile machinery also is well under way.

FIRST PLANT AT CAMDEN, S. C.

One of the latest additions to the field of man-made textiles is "Orlon" acrylic fiber—a product of Du Pont research and development. The first "Orlon" plant is under construction at Camden, S. C., and is expected to be in operation by the latter part of this year. The plant (known as the May plant) will produce continuous filament "Orlon" only in deniers of 400, 200, and 100. All of the first production is expected to be 2.5 denier per filament. In the meantime, pilot plant facilities have been in operation and the small poundages produced have been utilized in the market development of promising end uses. The interest shown by the industry has been widespread and it has not been possible to comply with all the many demands for samples for evaluations.

The question might be asked—why this tremendous interest in "Orlon"? Basically, the answer lies in the combination of useful properties in "Orlon" which indicate its applicability to a wide variety of textile uses. It is desirable to emphasize the fact that combinations of properties determine the utility of a fiber in any end use. No

Shown above is Orlon in a few of its applications
fiber is universal in application. Each serves in end uses where its combination of properties commend it over competing fibers.

VARIED PROPERTIES
"Orlon" possesses a generally high level of outstanding properties and in addition is unique among all fibers in offering the combination of characteristics best expressed by:

- Appealing texture
- Durability or resistance to degrading influences
- Ease of care
- Covering power or bulk with light weight

 Appealing texture is one of the most important characteristics demanded in an apparel fiber. "Orlon" offers an extremely appealing texture combined with desirable ease-of-care features and a high level of durability. The appealing texture of "Orlon" fabrics is due to their warm, crisp hand combined with very attractive draping characteristics. "Orlon", like cotton, is readily wetted by water or perspiration, which is an exceedingly important aspect of the comfort of garments, particularly, those worn next to the skin.

(Continued on page 38)
Clemson Students' Paper Wins Contest

JAMES L. NEAL, T. C. '50

THE Piedmont Section of the American Association of Textile Chemists and Colorists held the first of their planned annual student chapter contests in Winston-Salem on April 1st.

Students from Clemson and North Carolina State College participated since only these schools have textile chemistry departments within the Piedmont Section which is composed of members from South Carolina, North Carolina, and Virginia.

At the technical session of the Winston meeting, two papers were presented from each school. "The Effect of Abrasion on the Dyeing Characteristics of Cotton" was prepared by Kenneth Jenkins of Asheville and Harold Keels of Greensboro, North Carolina. "An Investigation Between the Amount of Dye and Sensation Obtained and Its Possible Application in Textile Dyeing" was prepared and presented by Hanri Cikurel of Izmir, Turkey. These students were representing North Carolina State College.

"The Dyeing of Nylon With Vat Colors at Normal Temperatures" was prepared by Thomas Carter of Langley, South Carolina, James L. Neal of Fort Mill, South Carolina, and Neal Westmoreland of Winston-Salem, North Carolina.

"Testing for Honeydew on Raw Stock Cotton" was prepared by W. H. Keasler of Westminster, South Carolina. This group of students represented Clemson College. These papers were based on research on textile subjects carried out by the students during the current year. The judges for the contest, Dr. Harley A. Jennings, Dan River Mills, Danville Virginia; Linton C. Reynolds, Riegel Textile Corporation, Ware Shoals, South Carolina; and Clarence Hooper, Burlington Mills, Burlington, North Carolina, stressed originality, scientific and practical value in presenting the awards.

Members of the Student Section Contest Committee which was responsible for conducting the contest are as follows: A. R. Thompson, Chairman, Ciba Company, Inc.; W. L. Barker, National Aniline Division, Allied Chemical & Dye Corporation; S. H. Williams, General Dyestuff Corporation, all of Charlotte, North Carolina. The Clemson paper prepared by Thomas Carter, James L. Neal, and Neal Westmoreland was awarded first place with second place going to the paper prepared by Hanri Cikurel from North Carolina State College.

From its earliest introduction, one of the problems in handling nylon was to dye this fiber with colors which has a satisfactory degree of fastness to light and washing. This problem led the Clemson students to select this subject for research. In the work, an effort was made to find a solution to the difficulties encountered by the finishing plants in obtaining both these specifications in a satisfactory range of colors.

Since vat colors are the answer to the problems of fastness on many other fibers, the application of this group to nylon has been the subject of much experimentation since this fiber first appeared on the market. However, the members of this group have proven to be inconsistent in their behavior when applied to nylon, some members giving shades of very good resistance to wet processing, but often very poor light fastness. The vat colors must, in most cases, be applied to nylon at high temperatures near the boiling point of water. Even under this condition a characteristic behavior of all the dyes of the vat group toward nylon cannot be obtained, some giving very good shade depths, while others hardly stain the fibers. Also, many of the dyes giving fair depths of shade are radically changed at the high temperatures used, and in many cases their light fastness is sharply lowered.

After many trials with different chemical assistants it was found that by treating the nylon with one of the common organic acids the affinity of the nylon for the vat colors was greatly improved. Following up this lead, a procedure was developed by which nylon could be dyed at a low temperature (120-140 degrees F.) with vat colors.

It is felt that the work finished so far on this problem shows promise that the method developed by these students for dyeing nylon may make possible the following:

1. Improved light fastness with the majority of vat colors, together with the elimination of radical shade changes on exposure to light.
2. A higher degree of wet fastness than possible with most of the dyes in use on nylon at present.
3. Better color yields with most of the vat colors, and tremendous increases with many.
4. A better range of shades, by making it possible to use dyes which show little affinity for untreated nylon.
5. Easier production of union shades on nylon mixed with other fibers.

The officers and senior members of the Section expressed themselves as being greatly pleased with the quality of the work apparent in all the student papers presented and feel that the student contest has established itself for the future.

The following faculty members and students from Clemson were present at the Winston meeting: Dr. Joseph Lindsay, Jr., Dr. James H. Langston, Dr. William T. Rainey, Jr., Thomas Carter, Roy H. Boggs, Arthur W. Bloxham, Jack A. Ingle, Thomas L. Howle, H. Islam, William L. Mathias, Guy N. Thompson, and James L. Neal.
Clemson's Textile School, 1896-?

JACK L. BROCK, TM '50, and
ROBERT L. GREGG, TM '50

The evolution of Clemson's School of Textiles, one of the greatest textile schools in the world, is not the result of any individual's accomplishments, or of any institution's accomplishment. It is the result of concerted action by our industrious and progressive leaders who possessed the insight and wisdom to see what the future held and holds in store for the youth of our country.

J. H. M. Beatty, at one time a prominent textile executive, said, "The best way to develop an industry is to develop those engaged in that industry". Now let us go back a few years and view the development of the textile industry in South Carolina.

There is evidence from a Charles Town Gazette of December 22, 1763, establishing the fact that cotton goods were then made in this state, but the first mill (containing 8,400 spindles and 300 looms) was built by William Gregg in 1846. After a long and bitter fight in the General Assembly, Gregg secured his charter for the organization of his mill at Graniteville. The outstanding periods in South Carolina's development of the cotton mill industry may be dated in the year 1847, when the Graniteville company first put its goods on the market, and the early 80's when other pioneers began to see the possibilities of the greatest industry in our state.

At the beginning of the Civil War there were eighteen mills in the South, and eleven survived. Between this catastrophe and the movement of 1880 only three mills were developed. Then, with a spirit of wisdom and courage, an unusually able group came forth to build up and guide the present-day textile industry.

The men blazing the trail for a rising picture of industrial romance were D. E. Converse, Lewis W. Parker, Captain Ellison A. Smythe, Col. J. P. Hammett, Dr. C. C. Hamrick, Captain J. H. Montgomery, Leroy Springs, and D. A. Tompkins.

D. A. Tompkins, who was promoter of the South Carolina Textile school, North Carolina Textile school, and Mississippi Textile school, once said, "I conceive Clemson College to have been established in deference to the wishes of the people of the state to have a school where the youth of the state could, in getting an ordinary college education, do it in a way that would qualify them to find an easier entrance into some profitable occupation than it was found could be done from the ordinary literary institutions. The education and training given at such an institution ought to be of a kind that is calculated to be most useful to the graduate and also of the greatest advantage to the other people of the state at large".

MOVE FOR CLEMSON BEGUN

Ben Tillman, an Edgefield farmer, began in 1883 to agitate the matter of South Carolina's establishing an agricultural college. This agitation led to a convention of state farmers in 1886, and the acceptance of (by the General Assembly of South Carolina) the Honorable Thomas G. Clemson's request in November, 1889, resulted in the founding of Clemson Agricultural College.

His will provided for the founding of Clemson Agricultural College on the greater part of his Port Hill estate (then 800 acres), and for it's control by a board of trustees. His will also provided funds ($58,539) which he had in various investments. Thus Clemson College was established as one of the many Land Grant Colleges under the Morrill Act of the U. S. Congress of 1862.

Mr. Clemson, having studied in Paris under some of the greatest scholars of his day, was well-fitted for the founding of a great technical school. His ideal was an institution where the poorer boys of South Carolina might acquire scholarship and technical ability. Clemson College, located on the old homestead of John C. Calhoun—the dividing line between Oconee and Pickens counties in the picturesque foothills of the Blue Ridge Mountains, some nine hundred feet above sea level—commands an excellent view of the mountains to the north and west, some of which attain an altitude of nearly 5,000 feet, and provides a aura favorable to the highest physical and mental development of our youth.

The Board of Trustees began a building program for Clemson in 1890, and the institution was open for admission in 1893. Clemson was, as the name "Clemson Agricultural College" implies, chiefly a school of Agriculture, but with a field so discernable as textiles hitherto growing around her, and an eye on the "ideal" of Mr. Clemson, the school seemed made for the pioneering textile field.

TEXTILE SCHOOL FOUNDED

A few years later in 1896 the Textile School was founded. Mr. Whit Dillard, Textile School Mechanic, is capable of recalling many interesting and memorable facts about early Clemson: the non-paved streets, the old oak-post supported lamps for night lighting the sidewalks, the old stockade used to hold and shelter State labor, which manually constructed the textile building, and the few buildings of a growing institution set aside in a peaceful forest like a glowing ember becoming brighter and brighter until it bursts into flame and lights up the surrounding countryside.

The original textile building, completed in 1898 and now known as the Physics Building, was designed for educational and experimental work from plans furnished by experienced mill designers. The two-story left wing and the three-story right wing, with the stairway tower in the middle, characterizes the building as retaining a mill feature. This 168' x 75' building was equipped with a system of steam heating humidifiers, shafting, and automatic sprinklers all installed in the most approved manner, and ten thousand dollars worth of machinery which was contributed to the college by manufacturers.

THE BOBBIN AND BEAKER
The entire equipment of machinery was given as follows:

Maxon Machine Works, Taunton, Mass.—One revolving flat card, one drawing frame, one spinning frame, one plain loom, and one dropbox loom.

Saco-Pette Machine Shops, Biddeford, Me.—One revolving flat card, one drawing frame, one railway head, one slubber, one roving frame, one spinning frame, and one spooler.

The Draper Company, Hopedale, Mass.—Two Northup looms, one beam warper, one spooler, one twister, spindles, separators, lever screws, cradles, temples as required.

The D. A. Tompkins Company, Charlotte, N. C.—One combination yarn reel, one band machine, one warper beam, one doffer box, one loom box, one electric switch board, one drawing-in frame.

The A. T. Allston Machine Company, Pawtucket, R. I. —One combination breaker and finisher ladder, with hopper feeders attached.

Westinghouse Electric and Manufacturing Company, Pittsburgh, Pa.—One 30 H. P. electric motor.

Jones and Laughlin, Pittsburgh, Pa.—All shafting, hangers, pulleys, couplings, etc.

Metalllic Drawing Roll Company, Indian Orchard, Mass. —Metallic drawing rolls as required.

At the time this constituted very ample equipment for spinning and weaving, and the machinery came from the shops of builders of the most modern cotton-mill machinery.

The curriculum committee of Clemson College, which consisted of the Hon. R. W. Simpson, the Hon. D. K. Norris and President Henry S. Hartzog, held a meeting in Charlotte, N. C., and adopted the following course of study for the textile department at Clemson:

**FIRST TEXTILE CURRICULAR**

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**SOPHOMORE CLASS**

| Math    | 5      | Wood Work | 2      |
| English | 5      | Mech. Drawing | 2     |
| Descrip. Gmty. | 2 | Foundry | 2      |
| Chemistry | 3 | Chemical Lab. | 4      |
| Nat. philosophy | 2 | Drill | 2      |

Second term—Chemistry first half; Descriptive geometry second half.

Second term—Chemical laboratory first half; Mechanical drawing second half.

**JUNIOR CLASS**

| Math    | 5      | Machine Shops | 5      |
| Physics | 2      | Mech. Draw & Design | 3      |
| Textile Eng. | 5 | Textile Eng. | 6      |
| English | 2      | Drill     | 2      |

**SENIOR CLASS**

| Textile Eng. | 8      | Shop Work | 5      |
| History     | 2      | Mech. Drawing | 2      |
| English     | 2      | Textile Eng. | 8      |
| Military Science | 1 | Drill | 2      |

This course as laid out comprised a system of liberal education and culture as a part of the textile training. The first two years of the course were the same as those of the mechanical department. The object was to make a course in which the students were not only given special knowledge and training on textile subjects, but were at the same time, and along with special education, receiving the advantages of a good general education.

Mr. J. H. M. Beatty, the first Director which is equivalent to a Dean of Textiles at Clemson until he resigned in 1905, sums it up as: "the purpose of the school is to teach the arts of cotton manufacture, and to give practice in applying methods and principles employed in these arts—in short, to tell the individual what to do, show him how to do it, and then let him practice with his brains and fingers in doing it. The school was established primarily to direct young men who wished to make the cotton mill industry their business in their study of cotton; to teach its manipulation and the after process of manufacture demanded by trade, and as a result, to help build up the Southern milling industry."

But had Mr. Beatty realized the development of synthetics, he might have reworded his statement which deals only with cotton.

**GROWTH EVIDENT**

As the Textile Department opened on September 14, 1888, Clemson enrolled 416 students. The school year of 1889-1900 saw from an enrollment of 461 students, a graduating class of 28, four of whom received Textile degrees. In the class of 1901 there were 483 students with 31 being graduated. nine of these graduates were textile men. The textile class of 1902 increased, and from a student body of 500 with 59 graduates, 17 men graduated in Textiles. The Textile School of Clemson has constantly grown, though not without variation, to an average enrollment for the year 48-49 of 813 students, of whom approximately 150 graduated in February, June and August periods.

There have been five deans of Textiles at Clemson: J. H. M. Beatty approximately 1898-1905; C. S. Doggett, 1905-1927; H. H. Willis, 1927-1945; R. K. Eaton, Acting Dean from 1943-1945; and H. M. Brown, 1945 to —. For the year 1926-1927, the Textile Department was under the School of Engineering and Dean S. B. Earle was in charge. Much of the progress made by the school can be attributed to these worthy gentlemen.

In 1921, the United States Department of Agriculture, in cooperation with Clemson College, established a cotton spinning laboratory in the Textile School at Clemson. This laboratory, with only one similar laboratory which is maintained in College Station, Texas, was set up to test cotton samples from various Federal and State experimental stations throughout the Cotton Belt, in connection with the Federal-State cotton breeding and improvement programs. These cottons are tested for their fiber and spinning qualities.

In May 1927, Phi Psi Fraternity chartered Iota Chapter at Clemson College. Phi Psi is the largest and most respected textile fraternity in the world, and its alumni hold some of the highest positions of trust and responsibility in all branches of the industry.

The Iota Chapter of Clemson College bases its membership on scholarship and personality, taking into its fold only the top ranking men of the Textile School. The students majoring in Textile Chemistry, Textile Engineering, and Textile Manufacturing are eligible for membership. In

(Continued on page 36)
This article is a digest from some of the information found in the December 15, 1949, issue of the American Wool and Cotton Reporter. We express our appreciation to that publication for permitting this condensed version appearing here.

Textile mill construction is the best example of industrialization in the South today. And, according to the construction firms who are responsible for this building, no abatement is seen for the immediate future as they always seem to have new contracts. Millions and millions of dollars have been spent in the textile industry since 1944, for new construction, remodeling, and new equipment. Textiles have undoubtedly led the way in the industrial expansion of the South in this, the greatest period, from 1945 to 1949. There has never been a period like it before.

And, it's not over yet. Many mill men, engineers, and observers report that corporations have programs calling for huge outlays of money for continued expansion within the next few years.

Typical of this trend is shown by the Daniel Construction Company, Inc., of Greenville, South Carolina and Birmingham, Alabama, which has completed four finishing plants in the past year alone. This brings to 28 the total number of large plants which they have built since 1944.

Another organization which has had no small part in the expansion of the South is the C. M. Guest & Sons Company, general contractors of Anderson, South Carolina and Greensboro, North Carolina. Since the end of the war, they count almost fifty projects to their record of achievement, most of which have been textile mills or major modernization programs.

J. P. Stevens & Company, Inc., has probably had the most extensive post-war expansion program, with over a dozen additions to their chain, centered mostly in the Carolinas. Deering, Milliken & Company, as well as Textron, Inc., are other concerns which have made notable expansion progress during this post-war period.

It is interesting to note that in almost all instances of new mill construction and enlargement, new machinery was installed throughout as textile men sought to bring their plants and equipment up-to-date with the latest machines and processes.

No one knows just how long the present rate of expansion will continue, but mills have enough work planned to keep the process going for several years, some having programs calling for a ten year period or more for completion.

SOUTHERN STATES INVITE MANUFACTURING

And, the various Southern states are making the most of the many advantages of building the textile industry in the South. Through the various State Planning Commissions, much data is available to interested parties which point out the possibilities of locating in this section, including the pleasant community characteristics for workers and their families.

In addition to that, good government in these states has made the overall picture much more attractive. The tax structure in South Carolina, for instance, is ideal for industries large or small. And, according to L. W. Bishop, director for the South Carolina Research, Planning & Development Board, the movement of industry into the state is like taking the cork from the bottle.

South Carolina has led this section in its post war expansion, with the Piedmont section being the principal area for textile production, although many plants have been established elsewhere in the state. In all cases, the people were anxious to work and there was an abundant supply of excellent labor.

Besides the addition of many new mills into the state, many of the giant established concerns such as Springs, Self, Deering, Milliken, Stevens, and Textron have been among those to undergo expansion. This is proof to many observers that profits lie in the combination of location, able workers, skilled management, and sound government both on the state and local levels.

Mr. Bishop points out that the executive department and legislature members know that payrolls and not taxation bring the greatest prosperity to communities. "They believe that industry should bear its proper share of governmental costs but they do not believe that industry should be persecuted or penalized by taxation or by burdensome regulations," he says.

As a result of this philosophy of life, almost half a billion dollars have been spent or allocated for industrial expansion in South Carolina since 1945, with textiles being the principal spender.

Many of these new mills have been built outside of the congested city areas with no problem arising from any scarcity of labor. As a matter of fact, there is to be found throughout the state an abundance of native-born workers, skilled in their jobs, and within easy traveling distance of any mill in the section.

Thus it is that the movement to South Carolina is like taking the cork from the bottle. Once the cork has been removed and the flow of liquid has been started, there seems to be little to stop the flow. However, the South Carolina Research, Planning & Development Board makes no effort to detract from the advantages of other states. If merely states, to those interested, what the state and its communities have to offer, what the tax structure is, facts about the labor supply, utilities and highways, and always facts about the people.

The Southern States offer a fertile territory for textile

(Continued on page 34)
Textile Research At Clemson

By WILLIAM M. KIRBY, JR., TM '50

WHAT is one of the key words in the textile industry today? It is no longer practical to assume that, "it is running right now so let well enough alone," but the big question is how are we going to improve the quality of textile fabrics and yet maintain production so that the price range will remain within the means of Mr. Average Public? The answer is research. Dr. H. M. Brown, Dean of the Textile School, has installed a research program that may prove beneficial to all phases of manufacturing and finishing of textile fabrics. The following experiments are now or have been made by different professors under the supervision of Dr. Brown.

SPINNING DEVICE

Mr. William Sproule is experimenting with a new spinning device which employs an entirely different technique to the spinning and twisting processes. This device will insert the twist to the drafted sliver between the delivery rolls and thread guide which seems to result in the following features:

1. Fewer ends down
2. Better package yarn
3. More production
4. Better quality yarn
5. Reduction in labor cost
6. Decrease in tension of the yarn between delivery rolls and thread guide which is the most sensitive point.

Other information regarding this invention is not available at this time but further tests and studies are being made.

CONSTANT RATE LET-OFF

Turning our attention toward the weave room we find that Professor W. H. Frick has been making a number of experiments on a constant rate type let-off which would let off the same amount of warp each pick—pick by pick—throughout the entire weaving of a beam. To perform these tests a loom was set up to make 56 picks per inch using a warp count of 16's and varying the filling counts from 11's to 33's. By adjusting an old type semi-automatic Barlet let-off motion so that the whip roll would not operate to keep constant tension on the warp, a constant rate of let-off was obtained. A filling count of 16's was used as a starting point; when working down to a coarser yarn the tension increased for several inches at each change of the count but would then remain constant. When working upwards to 33's the same results were obtained with the warp becoming slacker but at no time throughout the experiment was there too much or too little tension to prevent weaving of the cloth. The same pick gear was used and the amount of depression of the warp ends were measured under similar conditions at each change of a filling count. After completing this run of cloth under the constant let-off set up, the loom was converted back to normal operation and the same filling counts used. The cloth made under the two different methods was then sized, stretched, and allowed to dry under tension not holding the width constant, after which a comparison was made and no noticeable physical difference existed.

The advantages of this type let-off principle would be:
1. to change the rate of take-up it would only be necessary to change a crimp gear;
2. (2) would make a more uniform product;
3. (2) simple adjustment for style changes.

More research will be done on this principle when necessary supplies are received that have been ordered.

The textile school has also carried out some research in conjunction with the Du-Mont Laboratories on the Cathode-Ray Oscillograph. Until recently, the primary use of the Cathode-Ray Oscillograph was in the field of electronics.

For the study of loom motions and timing, the Polar-Coordinate Indicator was found to be suitable in the study of textile machinery. Dr. Brown reports that a loom can be checked in a matter of minutes and that the timing of the shedding, picking, boxing, stop motions, and shuttle speeds were satisfactorily checked at Clemson.

This new application of the Cathode-Ray Oscillograph will possibly aid in research and production problems which should result in improved machinery, better products, and more economical operation of textile mills.

STROBSOSCOPIC STUDY

Various stroboscopic means and high speed photography have been employed in the study of running looms in the past. These studies have required special lighting arrangements and other elaborate means to make these observations.

Professor E. A. LaRoache, in cooperation with General Radio Company, has completed a rapid stroboscopic study of production looms. His chief goal was to develop a method that would, (1) be sufficiently rapid to make it practical to check looms in production in order to correct defects before they could cause stoppages or seconds; (2) be compact and streamlined for minimum interference in the loom aisles; (3) operate in normal mill illumination; (4) not interfere with the operation of the loom while making the test. By employing certain techniques they were able to make a study of loom timing and consider the Strobolight method to be of outstanding value for critical observation study of the various phases of the weaving operation. The apparatus is easy to use and it is believed that experienced operators can check the timings at the rate of only two or three minutes per loom.

MEASUREMENT OF SPECIFIC SURFACE

A recent development of the textile industry is the measurement of fiber specific surface by passing air through a compressed plug of fibers.

(Continued on page 28)
Let's Visit The Textile School

MARSHALL M. CLINKSABLES, TM '50
JOHN COTHAN, TM '50. Photographer

This photographic essay is designed to illustrate the content and activity of the various laboratories to be found at Clemson's Textile School. It is hoped that in this way the reader who has never visited Clemson will become more familiar with the school and its instruments of training.

Some elements of the textile education progress at Clemson have been necessarily omitted from this story. They are the Jacquard Laboratory, the Junior Dobby Laboratory, the Sophomore Weaving Laboratory, and the Textile Library.

We wish to thank the Department Heads and Professors for rendering aid in the preparation of this article.—Editor.

Cotton Classing Laboratory—The cotton classing laboratory is located on the top floor, the West wing of the building. The long side of the room faces North, giving an excellent light with no reflections. It is used during school session for grading and stapling cotton in the cotton marketing class, and is used during the summer by a special four week cotton classing school. The laboratory is supplied with a set of Universal Standards for grading.
Dobby Laboratory (Senior)—The Senior Dobby laboratory is used to teach Fabric Development to Senior students. Two students working as a team are required to design, make all calculations, and other data necessary for a fabric they have designed or for experimental fabrics submitted by the instructor. They are also required to tie on their own warps and make necessary adjustments on the looms so as to produce good quality cloth.

Cam Loom Laboratories—The Cam Loom laboratories contain twenty-one cam looms. Studies of the construction, mechanical operation, and adjustments of the cam loom are made. Also, analytical study of the loom, adjustment and timing of the shedding motion, picking motion, beating-up motion, gearings, speeds, and production.
Opening, Cleaning, and Picking Laboratory—In the Opening, Cleaning, and Picking laboratory studies are made of the equipment used to open, blend, and clean the raw materials, and to prepare cotton and other staple fibers for succeeding yarn manufacturing processes. All equipment necessary to perform such duties is provided for in this laboratory. Some of the equipment is as follows:

- 2—Hopper type blending feeders
- A Vertical opener
- No. 11 Condensing section
- No. 12 Lattice opener

Carding Laboratory—The Carding laboratory consists of the following machinery:

One roller-top card, two revolving flat cards, three conventional drawing frames, one controlled draft drawing frame, and one lap winder.

The objective of this laboratory is to acquaint the student with the carding process, which enables him to learn the primary carding procedure.
Organic Chemistry Laboratory—The organic chemistry laboratory is located in the basement of the East wing of the building. The laboratory is equipped with the usual apparatus for carrying on experiments. Various experiments which are directly related to textiles are carried out.

Microscopy Laboratory—The Microscopy laboratory is designed to train the student in the use of the basic microscopic analysis of textile materials. This training includes not only the mechanics of manipulating the microscope but, more important, the study of all types of commercial textile fibers. These fiber types are examined for their individual characteristic which gives the student a means of recognizing different types of fibers, an understanding of the variety of features that can be studied by a microscope, and an ability to interpret and understand magnified images. The standard chemical laboratory compound microscope is used in all examination tests, it is also the basic instrument in conjunction with the necessary accessory equipment, used in micrometry, elementary cross-sectioning and polarized light analysis.
Physical Testing Laboratory—The purpose of the Physical Testing laboratory is to give the student an understanding of the most important machines and techniques used in physical testing of fibers, yarns, and fabrics. Sample selection and a statistical analysis of experimental results, along with the applications of testing in modern textile research are stressed.

Spinning Laboratory—The spinning laboratory is used for practical instructions in spinning and twisting. It is equipped with thirteen spinning frames and five twisters. They are short frames, having from thirty-six to eighty spindles each, the short frames being excellent for instructive purposes. These frames include the various long draft systems. Sixty winding spindles complete the machinery layout.
The Division of Technical Services of the American Cotton Manufacturers Institute, Inc., maintains its headquarters in the School of Textiles at Clemson College, Clemson, South Carolina. The chief function of the Division is to keep Institute members informed regarding the researches of all agencies concerned with cotton. It also maintains a modern cotton fiber testing laboratory. The purpose of this laboratory is two-fold. First, it makes available to cotton mill facilities for training their workers in all the techniques of cotton fiber testing. Second, it makes available to the mills a laboratory where they may have their cotton tested on a fee basis.

Dyeing Laboratory—The dyeing laboratory is located in the basement of the East wing of the building. The laboratory contains desks and steam baths for classes in bleaching, dyeing, printing, and finishing. Here the student actually dyes, bleaches, and prints various fabrics or yarns. Reactions of certain dyes on different fibers is observed. Studies are made of the correct procedures in dyeing.
Roving Frame Laboratory—The roving frame laboratory is equipped with seven roving frames. Three of these frames are conventional frames and four are long draft. Two of the long draft frames have been converted from their original conventional style to their present long draft status, and the other two frames are new. With this setup, practically any combination or range of drafts prevalent in modern roving processing can be accomplished.

Combing Laboratory—The combing laboratory has all the necessary equipment to instruct the student in the combing procedure. It has a long and a short piecing comb, two sliver lappers, one ribbon lapper, and one drawing frame. By observation the student learns to readily distinguish between combed and carded sliver. Primary mechanical motions of the comb are explained, while practical experience in operation of the various machines is the objective of this course.
Warp Preparation Laboratory—The warp preparation laboratory contains new warp preparation equipment which includes a spindle-drive rayon warp and a seven-can rayon slasher. Supplementary slashing equipment includes a fifty gallon stainless steel size kettle, and beam handling hoist and carrier system.

With this equipment it is possible to warp and slash all types of yarn including nylon, viscose and acetate rayon, spun rayon, cotton, wool and blends of these fibers.

Knitting Laboratory—The knitting Laboratory is equipped with most of the machinery to give a B. S. degree in Knitting. That equipment which is lacking will soon be installed. The following machines are now on hand:

Semi-automatic and automatic hosiery machines (for both men’s and women’s hosiery), Body, Loopers, Hand knitting machines, Braiders, Sewing machines.
Slasher Room Controls

By JAMES R. ANDERSON, TM. '50

It was not until the late 1920's and early '30's that cotton mills in the United States turned their attention to more economical control of their production. They were, along with all other American industry, in the midst of the depression which followed the crash of '29, and were in desperate straits. They were faced with the problem of keeping their mills in operation and at the same time pinch pennys wherever they could. It was a notorious fact that mill operation was pitifully inefficient, and had been for many years. Thus, with these circumstances as a background, the scene was set for the changes which were to follow.

Of particular significance was the situation in the Slasher Room. The mills called in the various instrument companies and dumped the problem of control firmly in their laps. Their directive was: Give us better operation of the slasher, and give that to us at a lower cost.

Immediately the question arises as to just why the slasher was chosen for such concentrated effort. The reason is apparent. As the old adage states, "As goes the slashing, so goes the weaving." Neither the slashing operations or the weaving was satisfactory as far as the mills were concerned.

Various instrument companies accepted the challenge, and they rolled up their sleeves and embarked on a period of trial and error in an effort to bring about some improvements.

They began with the size cooking kettle. The mixing of the size generally takes place around 80 degrees F, but under the old conditions, it was found that not all was going into solution even then. So, air was introduced under pressure to help break up the lumps.

It was also discovered that there was a Critical Point in the cooking of size at a temperature of about 180 degrees F. The control of the kettle from the mixing temperature of 80 degrees F to about 160 degrees F is relatively simple, and the temperature can be raised as fast as desired.

However, from about 160 degrees F to 190 degrees F, in the critical zone, control is very critical. All starch is made up of little grains and it reacts to heat just as popcorn does in the kitchen of your home. We have all seen the "popping" effect of this delightful food when we hold it over the heat and it suddenly begins to pop and expand considerably.

So it is with the starch used in the slasher room. In order to make the finest possible size, which has the smoothest quality and is the most viscous, the starch mus "pop." In so doing, it absorbs more water, and completes the mixture. This takes place at approximately 180 degrees F.

It was further discovered that if the temperature in this zone is raised too fast, not all of the starch will pop, and even by lowering the temperature and again raising it to the critical point, the remaining starch will not pop. In other words, the critical point can be reached once, and only once. After it has been passed, there is nothing more that can be done.

Here was the point where the mills were having the most trouble. They were not deriving the full value from their mix and consequently the size which was put on the warp was rough and not uniform. This caused bad weaving. All too often size was mixed merely on the experience of the men in the slasher room. They, like anyone else, were not accurate enough to be able to properly control all the mixing elements.

Therefore, the first step in the modernization program was to devise a control for the mixing operation. A timing-cam was subsequently designed that would fit the cooking schedule for the particular mill concerned. This controls the amount of steam entering the kettle by means of a valve. When the temperature reaches the critical point, it remains relatively constant. Here, the corn starch pops, and it is also at this point where a great amount of steam is necessary to insure the complete popping of the starch mixture. Previous to the days of timing controls, this step in the mixing process was where the least amount of error on the part of the slasher men would ruin the entire batch.

As the starch begins to pop, the steam valve opens slowly at first, then rapidly until for the first time, it is wide open. It is here that the full steam pressure is necessary, as the actual popping operation requires a great amount of steam. At this point, even though the steam is entering as rapidly as possible, the actual size temperature remains relatively constant—at approximately 180 degrees F. As long as the supply of steam is adequate, the popping takes place and upon completion of the reaction, the additional steam entering will continue to raise the temperature of the size mix to above 200 degrees F, where it cooks for about one and one quarter hours.

From here, the size mix goes to the storage kettle until ready for use. Controls were applied here, too, as lack of proper attention at this point had caused much trouble in the past. The investigators concluded that, having gone to much trouble in preparing the size compound, it was expedient to give every precaution to the compound in each step that would follow until the size was actually on the loom and weaving cloth. If the cooked size were to be placed in an uncontrolled kettle, its temperature would vary with the necessity of reheating at the size box. This would tend to partially destroy the desired characteristics which were so carefully controlled in the previous operation. Wet steam used in the size box would dilute the mix, it would lose some of its desired viscosity, and the resulting weaving would be bad.

As a result of this, a control was produced to maintain the storage kettle at the specified temperature. At the

TWENTY-FOUR

THE BOBBIN AND BEAKER
same time, two outlets were installed in the kettle, one at the bottom, and the other two inches above the closed coil. This latter opening was connected directly to the size box on the slasher and by its location insured that the level of size in the kettle would never get below the coil itself. If this were to happen, the size would tend to bake onto the coil, and eventually become so thick as to form an insulation around it. The bottom opening is a drain used only when emptying the kettle and for washing purposes.

From the storage kettle, the size is then ready to be applied to the warp yarn passing through the size box. Controls here maintain the level of the size in the box, and its temperature at a constant point. The temperature control is particularly important as the viscosity of the size will vary tremendously with a small change in temperature. Constant viscosity, of course, is the determining factor in the amount of size that penetrates the yarn and that, after all, is its primary purpose.

The final, although none-the-less important step, is the temperature in the multiple cylinder type slasher. There is a marked variation in the drying qualities with a variation in temperature, and uneven temperatures would give many headaches in weaving. The two types of temperature controls commonly in use are by steam, and by the condensate in the cans. The former type, using the temperature of the steam as a measure of the can temperature, is not as accurate as the condensate, as steam will not indicate the slight variations as quickly as water. And it is not surprising, then, that instruments which make use of the condensate are becoming more popular and satisfactory in most mills.

When the steam enters the can, it will eventually condense into water and settle at the bottom. This water, or condensate as it is called, is drawn off through the condensate line, and passes around a bulb, which is the instrument of measurement.

There are several types of bulbs used, the vapor type being considered the most satisfactory because it gives the most accurate reading and the quickest. For example, a mercury filled bulb will take 13 seconds to record a 3 degree change of temperature. Using gas in place of the mercury, the same change is shown in 9 seconds. With a vapor, the time is only 7 seconds.

Mercury and gas have a uniform rate of expansion. In other words, the equation of both would be a linear type, which gives the same distance between increments at any point on the graph. Thus, the readings at one point are no more accurate than those at any other point. Vapor, on the other hand, is not linear in its rate of expansion. At points near the bottom of a tube of vapor, it is highly compressed. However, as the graph rises, it indicates that the density decreases considerably. This means that with higher temperatures, more accurate readings can be made. Thus, as used on the slasher cans, closer control and finer adjustments can be achieved.

The bulb thermometer, then, is constantly indicating the temperature of the condensate as it comes out from the cans. When that temperature drops below a predetermined point, it is an indication that the can is cooling off, and more steam is admitted until that condensate reflects the change.

Each condensate line is an independent unit, regardless of the number of cans on the slasher, so that changes in one unit do not effect the others.

The heating of the cans is an important step, and one that can cost money in the waste of steam if not properly controlled. Before the steam is turned on, the cans are full of air. As the steam enters, the air will attempt to find an outlet, and if there is no means of handling this air, it will remain in the cylinders and act as an insulation. Eventually, it will find its way clear through the steam traps, but the big problem is to remove it quickly. Under such an arrangement, there will still be a thin film of air left which will act as a barrier to the transfer of heat to the drying surface.

Similarly, water logging can result if but a single steam trap is used for all the cylinders. This accumulation of condensate causes uneven drying temperatures, increased steam consumption, and a general reduction in efficiency.

By the use of special thermostatic air vents and draining system for each cylinder, the initial heating time has been found to be much less than before. These fully automatic units continue to function at all times, and help to keep a constant flow of condensate and air from the cans during the entire operation. As a result, the overall costs of operation are reduced and a more uniform product results.

By the time the warp on the slasher has passed over the last can, the process is complete and the yarn is ready for the weave room. So it was that better operation was achieved in the slasher room. The changes and procedures noted briefly in this discussion have been some of the more important improvements that have been affected. They have been made only after a great deal of study and research by many men, and the results have more than repaid the mills who have made use of them. But the trend has not stopped there. Each day new ideas are developed which will better serve the efforts of mill operators in their goal to produce a better product at a lower cost.
Iota chapter of Phi Psi assembled one night during the last week in March to record for posterity the distinguished array of members pictured above. Included in the portrait are the sixteen new pledges who qualified for membership in the recent elections held by the chapter. As is the custom, the "Worms" represent all phases of the textile curriculum, and have distinguished themselves in scholarship, character, leadership, and personality.

Brother Harold Hart, Executive Secretary of Phi Psi, and distinguished figure in the state of New Hampshire, visited Iota chapter for a few hours in February of this year. He was entertained at a dinner in the Poinsett Hotel in Greenville, South Carolina, at which time such topics that pertain directly to the fraternity were discussed at great lengths.

ANNUAL CONVENTION

Phi Psi held their annual convention on May 5, 6, 7, 1950 at the New Ocean House, Swampscott, Mass., and the Clemson chapter has, for the last several months, been busy working on the projects which were displayed there.

GREENVILLE ALUMNI CHAPTER

On Friday night, March 31st, of this year, three of the active chapter members and two faculty members of Phi Psi exchanged ideas with several Greenville alumni members of the fraternity about the reactivation of the Greenville Alumni Chapter of Phi Psi.

Through the efforts of James R. Anderson, chapter president, and Foster Cathcart, and Marion Kirby of Iota chapter, and Professors A. E. McKenna and T. A. Camp-bell of the textile school, the group met with Brothers W. R. O'Shields, John Shell, and Gordon Williams of Judson Mills, and W. K. Stringfellow of Dunean Mills for dinner at the Poinsett Hotel in Greenville.

The general theme of the conversation centered around the number of Phi Psi men in Greenville and vicinity and how to best go about contacting them for the purpose of reactivating the Greenville Alumni chapter. The chapter has not been active since shortly before the War, and it is felt that there is a great need for such a group. The interest shown by the alumni present was gratifying. They have all agreed to make as many contacts as possible in the next few weeks, and all Phi Psi men are urged to contact the Clemson Chapter simply by returning the coupon below. Clemson will act as a clearing house for all the names received and, if it is found that there are other groups outside of the Greenville area, it will be possible to suggest the formation of other alumni chapters. It was decided to wait until the Fall before going ahead with any definite plans, but all members are urged to contact the school immediately so that plans can be worked out.

Return to PHI PSI FRATERNITY,
Textile School Clemson College,
Clemson, South Carolina

Name ____________________________
Address ___________________________
City _____________________________ State ____________________________

THE BOBBIN AND BEAKER
CLEMSON AATCC ACTIVITIES

The Clemson College student chapter of the A. A. T. C. C. is a student affiliate of the national organization of the American Association of Textile Chemists and Colorists. The National Organization is made up of men and women in the textile field, or in any allied branch of textiles, whose objective is to aid in the advancement of textiles through applied chemistry. Through their affiliation with the National Chapter, the student chapters are urged and encouraged to participate in various types of contests, research while in school, and in selecting suitable problems for thesis work. Due to the limited amount of time a student has to apply to such work while in school, the research problems so designed are not too extensive.

If the work being done by a student is considered to be of great importance, the work is sometimes carried over for the next graduating class. This has happened quite often at Clemson.

The members of the Student Chapter receive the “Dye-stuff Reporter” twice a month. This magazine covers all the current news and development in the field of Textile Chemistry. In addition to these two publications a month, each member receives a yearbook once each year.

In order to become a member of the Clemson Chapter of the A. A. T. C. C. a student must be a Textile Chemistry major, must be at least a sophomore, and must have completed his work in analytical chemistry. Upon graduation, student members automatically become Junior members in the National Organization.

Each year the outstanding senior who has done the best work in Textile Chemistry is awarded a prize plus a year’s subscription to the National Organization of the A. A. T. C. C. This award is made by the Clemson Chapter of the A. A. T. C. C. to publicly recognize such achievement and to further encourage work of such calibre.

BOBBIN AND BEAKER

ASTE NEWS

The American Society of Textile Engineers has recently received a number of replies to the information blanks which were mailed to textile engineering alumni. It is gratifying to note that most graduates are interested in the recently sponsored Alumni bureau which enables the Textile School to maintain contact with its textile engineering graduates. Specifically, this bureau is a file of up-to-date addresses of textile-engineering alumni. From past experience, it has been found that quite often prospective employers come to the Clemson campus or write to the Dean’s office for the purpose of seeking men who have had some experience in a given field. With the presence of the bureau, it will be more likely that these sought after men will be placed.

Much interest has been shown in this textile engineering society from other schools such as Lowell Textile Institute, Alabama Polytechnic Institute, and Georgia School of Technology. Consequently, a constitution is now in committee which will be applicable to a national organization similar to the local society. This constitution, when completed, will be presented to these interested schools in the hope that they will form their own engineering society.

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TWENTY-SEVEN
TEXTILE RESEARCH AT CLEMSON
(Continued from page 15)

An air-flow instrument has been designed at Clemson by Dr. H. M. Brown and experimented with by Professor J. S. Graham. If promises to be superior to some other instruments for measuring specific surface area of fibers. The instrument consists of a simple constant-pressure pump and timer system, whereby a stop watch automatically records the time-of-fall of a piston falling due to gravitational pull, moving a fixed distance and thereby displacing, under constant pressure, a definite volume of air through a porous media having fixed weight and volume. This rate of air flow has been found to be inversely proportional to the specific surface area of the fibers in the wad. The advantages of this Air Flow Instrument over other models are: (1) It is simple in design, (2) easy to move about, (3) requires no motor or pressure line connections, (4) gives an absolute rate of air flow through a fixed plug of fibers, rather than a reading which must be interpreted by means of a calibration curve.

FIBER STRENGTH TESTER

Another important development in the Clemson Textile Department is the Fiber Strength Tester designed by Dr. H. M. Brown which is a constant rate-of-loading fiber strength testing machine to be used for testing a flat bundle of fibers. The gauge length of the specimen is adjusted.

The machines available at the present time for testing fiber strength give variation in rate-of-loading of the specimen and also produce varying inertia errors. The machine designed at Clemson is expected to reduce these above mentioned errors, and in addition makes an automatic recording of the results.

TENSIOMETER

The Boulin Instrument Corporation is now marketing the Boulin-Clemson "Pneumatic" Tensiometer which was perfected in our textile department. To operate this tensiometer the trigger is drawn thereby retracing the two outer pulleys so that yarn may be centered in the pulleys. When the trigger is released the outer pulleys place tension on the yarn. The dial which was set on zero is now adjusted so that colored index in the window of the barrel will be exactly parallel to the vertical line on the barrel. The reading may be taken with yarn laced around the pulleys or after the trigger is drawn and the yarn laced around the pulleys or after the trigger is drawn and the yarn removed, as the indication on the dial does not change until manually altered. Another advantage of this instrument is its ability to hold any predetermined tension setting for the purpose of checking against yarn tensions, in which case the indication will be simply in terms of "correct" or "incorrect" tension. The Boulin-Tensiometer may be used in places where readings would be difficult to obtain with other Tensiometers. The present model has a range of 0 to 100 grams.

IN CHEMISTRY

A number of experiments are being conducted by the staff and students of the Textile Chemistry Department.

(1) Experiments with nylon in an attempt to get dyes of better fastness.

(2) Methods to improve the color fastness in cotton hosiery.

(3) Working on a quick method of detecting honeydew (a sweet liquid excreted by most aphids on cotton which becomes gummy on the cards causing the fibers to run badly and resulting in very neppy goods.)

(4) Continuing the study on viscose and acetate fibers beyond the point that was reported at the National American Association of Textile Chemist and Colorist last fall at Atlantic City. (Note: The paper, by Dr. J. E. Lindsey, on this subject won one of the prizes in this National Convention). The results obtained from nylon dyes look very promising and will be reported at the Spring meeting in a paper of The Piedmont Section of the American Association of Textile Chemist and Colorist.

VARIETIES OF COTTON TESTED

The farmers, breeders, and textile men of South Carolina may be interested to know that Mr. R. C. Hendrix has run some tests on samples of cotton taken from winners of the five acre contests in which 41 counties of South Carolina was represented. Fourteen ounces of each sample was run through the picker, card, drawing, roving and spinning frames under normal operating conditions producing three counts, 28's, 28's, and 36's. The yarn breakage strength and general appearance test were then made and submitted to the Department of Agriculture for future studies which should be of value in that it would:

(1) Give a research worker a base for setting up a program to determine variations in quality of cotton grown in each county.

(2) Important to cotton buyers in that it would be of a benefit toward selecting the cotton most suitable for a particular fabric.

(3) Aid the farmer in choosing the variety of cotton most suited for the local area.

The most significant phase of this experiment related to the textile industry was the processing of such a small amount of cotton under normal conditions and being able to make these tests. Professor Hendrix is planning to write an article on the technique that was used and problems encountered.

FIBER DENSITY PROJECT

Methods used in the past for determining the density of fibers all require a great length of time and run into a rather high cost. To overcome these difficulties, a Fiber Density Project is now being conducted by Professor C. V. Wray of our Textile School. The following remarks make up a short outline of the work completed and are by no means complete.

TWENTY-EIGHT
The first objective was to find the best wetting agent for cotton that would not cause bubbles to cling to the fibers. Several agents were tested with cotton samples and Victawet was found to give the best results. Cotton samples were then allowed to condition under standard testing conditions for a period of fifteen hours. The weight of the cotton sample was taken before and after placing same in the wetting agent, making a correction for the weight being taken in air before placing in the wetting agent. The weighing of the cotton sample was made while in the agent and at different intervals and the density indicated was found to change with time. Based upon the change of density of the samples with time it was decided to try purified cotton samples in the Victawet to see if with impurities removed, the density reading would remain more constant. Several tests proved that even with purified cotton the apparent density changed with time when placed in the wetting agent. Then methyl alcohol followed by distilled water was used both with regular and purified cotton samples, but again there was variation with time. Next butyl carbinol was used as the liquid in which to weigh the samples and it was found that the density remained rather constant but still not as much as was desired or thought to be correct.

It was then decided to run special variety samples through a Shirley analyser before placing them in butyl carbinol for the density weighing test. At this time not enough of these samples have been run to give an accurate answer as to what the results are going to be but if such a method is developed it will be of value to cotton breeders and to mills in determining the cellulose content of cottons.

CARDING

Professor T. A. Hendricks has been doing research on the roller top card to determine which direction the workers should rotate. The stock used in this experiment was 1 9-16" staple, 1 1-2 denier cut acetate which is one of the synthetics that commonly has the higher fiber breakages and usually has a higher nep count. This study was made with an average from 5 to 38 pounds per hour with the workers turning clockwise and then counter clockwise at each time the production gear was changed. Professor Hendricks first attempted to make his study by determining the nep count but the card was set up to Laco-Lowell's recommendations and no neps were made. Then he decided to make the experiment on the principle of fiber breakage under the same conditions as listed above. The results of this experiment indicates that the direction the rollers rotate does not affect the breakage of the fibers. The stock was then run through the drawing, roving and spinning processes and was reported to be of good spinnability.

MINIATURE SPINNING

A principle of Miniature Spinning which would enable (Continued on page 30)
TEXTILE RESEARCH AT CLEMSON

(Continued from page 29)

the cotton produced from a single plant to be processed and the yarn subjected to various tests is being conducted by Professor J. H. Marvin. If perfected, it would make it possible for a cotton breeder to test the cotton from single plants of different varieties of cotton to determine which was best suited for a particular soil or specific use in the textile industry. For this experiment, 120 grains of cotton were run through the card, drawing, roving, and spinning frame, with colored stock being used for piecing up to reduce the amount of waste to the sample. It required one and one-half hours to run this sample.

The breaking strength and general appearance compare favorably with yarn run under normal conditions. Many obstacles were encountered and a number of improvements on the feeding and delivery techniques are to be made.

X-RAY STUDY

Dr. A. N. J. Heyn has been experimenting with small-angle scattering of x-rays to study the micellar structure in cellulose fibers.

In addition to the research on diffraction and scattering of x-rays at small angles, Dr. Heyn has made a study on the relationship of wax content to maturity of cotton. The wax content method may be carried out with a small amount of error but it has the disadvantage in that it requires a considerable length of time to make the test.

NEW TEMPLE

The Textile School developed a new temple that works on an entirely different principle. This new temple has been used on spun rayon sheeting that is very hard to hold without damaging the fabric. Future experiments are now being made by a machine company and we are looking forward to having more information on this in the near future.

Professor R. C. Lathem has been experimenting with the processing of 100% ramie on the standard cotton system but as yet there are no results available and more studies are being made on this subject.

WAVE EFFECTS ON PHYSICAL PROPERTIES

Professor L. H. Jameson has been making a study of the effects of different weaves on the physical properties of rayon fabrics. The weaving of these fabrics were made under standard conditions, using 150 denier filament rayon for both warp and filling, with an 88 by 80 construction. This experiment was limited to weaves completing on eight harnesses; such as, regular twills, broken twills, basket weaves, rib, honeycomb, granite and combinations of the weaves listed below. A total of fifteen samples were subjected to the following test of both filling and warp (1) breaking strength, (2) elongation, (3) take-up, (4) shrinkage, (5) tear resistance, (6) fabric assistance, (7) weight and ounces per square yard. Each weave was classified as to texture and surface characteristics (1) open and close, (2) firmness and sleazy, (3) long floats and short floats. Warp tension and other conditions were kept constant for all the weaves. Results and conclusions are not available at this time as other studies are being made.

Compliments of

ABBOTT MACHINE COMPANY

Wilton, New Hampshire
Experience Is NOT The Best Teacher

(Continued from page 5)

(Continued on page 32)
Experience Is NOT The Best Teacher
(Continued from page 31)

the same beaker, to the same shade as they used on their blankets, and the same differences were readily apparent between the yarn from the small bobbin and the inside of the large bobbins. The mill discontinued steaming, found that they could weave with no additional trouble, and their filling streaks stopped completely.

INDUSTRY DOES NOT USE OWN KNOWLEDGE

Difficulties such as the above can be related without end. They occur day in and day out. All of these cases were serious to the plants involved. However, they are only cited here to point out and to illustrate the thought that industry does not use the simple tools at its own disposal, before calling for outside help. No imagination was needed to run down the gremlin in any of the cases given. The only requirement was an open mind and the effort of common sense over a few days, at most, and the answer was as clear as crystal.

In this connection it seems to me that it is of great importance that the technician should not underestimate his own ability. He can do anything, if he will only do it right. The fact that a certain operation has been conducted for fifty years in the same way is the best argument there is for thinking up a new method. One should always be on the alert to shorten and improve methods and one who is not bound by the rule of practical experience is in a good position to try something new and different, provided his theory is sound.

It has been demonstrated over the years, that very proficient technical people have often neglected to claim the financial remuneration that the quality of their services seemed to warrant. Having that in mind the technical graduate should never forget that he is "in business" in his chosen scientific field, just as much as though he were a sole owner of an establishment. He is selling his services. He should be jealous at all times to see that the quality of his work is superior to that produced by others. But, after demonstrating superior ability he should not fail to claim commensurate reward. At the same time it is well to start out with the knowledge that management has problems. One of the important problems is to "maintain salary schedules" which is another way of saying "Hold the line."

However, it should be distinctly understood that "holding the line" is not the problem of technical personnel of superior ability. Management knows very well that the salary cost for superior men is not a fraction of the cost for men of lesser capabilities. They have to be produced, but they pay.

"KNOW-HOW"

This calls to mind the case of a dyer acquaintance, now deceased. He was called to a carpet mill to dye a particular shade of grey that no one had so far been able to produce, in a time when salaries and wages were far less than now. The manager gave instructions to dye one 500 lb. batch. When it came out satisfactorily he asked to have another 500 lb. batch dyed. The second lot also came out as desired, whereupon he asked for the bill. My friend said "One hundred dollars." At that point the mill manager nearly exploded and exclaimed "Itemize that bill!" The friend called for a sheet of paper and itemized the bill as follows:

"For dyeing two batches of wool yarn $5.00
For knowing how 95.00"

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TEXTILE CONSULTANT

Clemson, S. C.

THIRTY-TWO
Do not forget to keep your eye on the value of "Knowing How."

Naturally no employer is going to pay extraordinary prices for ordinary results, but I will venture the thought that anybody who produces extra fine results and goes to his employer for a raise will get it. If such a request were refused twice the only logical procedure would be to make a change because it would have been clearly demonstrated that the connection had no future. There are such places, though happily they are a small minority.

Progressive managements are trying to get the best out of their technical men by opening up possibilities for creative thinking for them both in production and distinction. The textile industry is one of the best places in the world to try that because so little of it has been tried until recent years. There is no question but what the age of bluster and bull-dozing is passing out and an age of careful and scientific thought is coming in. In fact, it is already in.

In general the new technical graduate should take no thought for the security of a comfortable berth, a pay-check or a pension fund. Our forefathers did not come over here to get a pension nor even to found a nation. They came over here, facing possible death for themselves and their families, simply to find a place where an individual would have the privilege of working, to produce a livelihood for himself and his family. There was no such thing as security then. There is not now. The hazards faced by them and by us are different, but ours are no less hazards.

**WE FACE HAZARDS**

The principal hazards which we face are two. One is the possibility of restricted personal freedom. The other is economic and has to do with long range changes taking place in the value of our money. These changes are rendering doubtful the value of every long-term dollars contract such as bonds, endowments, insurance, pensions and social security. History does not yet record the name of any nation that has ever started out on such a course which ever finally stopped before its money was worthless.

However, in every nation which has undergone such long range changes in the value of money, the textile industry has turned in the most outstanding record of any industry, particularly for the stockholders of the outstanding units. In this respect the textile industry far outstripped its nearest competitors, the natural resources industries. This is well illustrated and documented by William S. Landis, Vice-President of American Cyanamid Corporation until his death, in a study entitled "An Engineer Looks at Inflation," which was prepared for and circulated by The Duke Endowment.

There is no doubt that the textile industry has at last entered upon a phase of development in this country which is destined to carry it to great heights. This development is going to require scientifically trained men familiar with theory, who can use it and adapt it to new machines, new processes, or new fabrics. With such basic conditions the future can only be much greater than the past and you can be very certain that the rewards and opportunities will keep pace with effort, ingenuity and results.

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**GREENVILLE, SOUTH CAROLINA**

**SPRING, 1950**
SOUTHERN BOOM

(Continued from page 14)

manufacturing as well as a host of other types of industries. During the eight years just passed, sixteen Southern states boomed the value of their manufactured products six points above the total United States average, a fact which is indicative of the tremendous sweep which industry including textiles is making in this area.

Gaining its impetus from the feverish activity during the recent war, the trend toward development of manufacturing industries in the Southeast has continued at a steady pace, according to R. P. Jobb, manager of development service of the Atlantic Coast Line Railroad Company, Wilmington, North Carolina.

Great effort is being made on the part of the people of the South to acquire a balanced economy between agriculture and industry. Mr. Jobb points to the part played by the many natural advantages of the area, and how the citizens are thinking in terms of the future by taking careful inventory of the facilities available, and those which will be needed. As a result, the utilities such as railroads, electric power and highway facilities are being constantly enlarged.

THE MODERN MILL

With this tremendous influx and expansion of textiles in the South has appeared an entirely new type of mill architecture which is to be seen over the countryside. This is the one-floor plant which, in the opinion of John A. McPherson of Greenville, South Carolina, is the building of the future.

He points out, in tracing the growth of the textile industry in the South, that prior to the Civil War there were few plants in existence, and it was not until 1870 that any significant growth was noted. The present century has witnessed the addition of bleaching, dyeing, printing, and finishing, and today the South has the distinction of being the principal producer of textiles in America.

This has been, to a great extent, at the expense of the North and East. According to Mr. McPreson, the most important factors effecting this move were capable management and efficient and co-operative labor. Whereas good management can get along with poor labor, the reverse is not true. Good labor poorly managed will usually fail.

Although the South has had the advantage in lower labor costs, the relative difference in real wages between the North and South is practically equalized. However, the differential due to climate and cost of living still exists, and is an important factor.

A good manager attempts to anticipate problems in advance, but he cannot wait for future inventions and progress that may come at some later date. He must build for his day and his time.

This principle is made clear by a study of the past. The first mills were built to take advantage of river power. Today, electrical power enables a great flexibility in location and arrangement of machinery to best take advantage of the smooth flow of production.

The single-story design serves the most interests best in this respect. The one-level operation permits ease of future growth and expansion. With a flow in a U line of progress, both raw material and the finished product enter and leave the same side of the plant, which concentrates the shipping and receiving departments for best supervision. In the use of a one-story building, many columns are eliminated, which permits the maximum flexibility in machinery arrangement. The square design predicted for the future makes for the shortest and most direct access to all services.

There are many other advantages too numerous to mention, but according to Mr. McPherson, they are worthy of comparison and study by those contemplating new plants.

OPTIMISM IN THE SOUTH

One of the main factors in this development of the South is the optimism and spirit of co-operation shown among its people. The Southern Railway System is typical.

Knowing that the area they serve was of great economic potential, they established early in their history a department to advise people on problems of agriculture and industrial development. The agents in these departments worked with the farmers and business men for mutual advantage and today the signs of this effort are everywhere.

In the period from 1939-1945, the South's textile production increased by a billion dollars. Other industries such as food and mineral production have increased the value of their products by a similar amount so that today the South has a well-diversified and growing list of industries.

The Southern has done much to bring about this happy situation. The Southern's President, Ernest E. Norris said of the South's future: "It's an optimism compounded of the faith and aspirations of all Southerners. It's an optimism born of the certain knowledge that our Southland is today the brightest star on opportunity's horizon. And, it's an optimism nourished by an awareness that, great as our past growth and progress has been, the best is yet to be."

To emphasize this growth, the "Blue Book" of Southern Progress shows that Southern states have increased their manufacturing by 90% since 1939, and estimates the value of such products to be in excess of $37,000,000,000 in 1947.

In an effort to better serve this new South, the Southern system conducts a never ending program of expansion and modernization of their facilities. They, along with many others, believe that tomorrow will be an even greater day.

(Continued from page 14)
Texize research, keeping pace with the latest developments, meets every changing requirement of the Textile Industry. For every phase of warp sizing, there's a Texize product that will do the job and do it well.

Let the Texize staff apply their experience and knowledge to your individual problem. Contact us now for a survey of your needs. No obligation.
Clemson’s Textile School, 1896—?

(Continued from page 13)

the early 30’s there were nearly 300 students enrolled in the Textile School. The building, machinery, and all training facilities were insufficient to take care of the number enrolled in this school. Dr. E. W. Sikes, then President of Clemson College, and Dean H. H. Willis, then Dean of Textiles, appeared before the State House Committee on Education with the request for a new and larger textile plant at Clemson College.

In addressing the committee, Dr. Sikes and Dean Willis pointed out that South Carolina had more active spindles and looms than any other state, that the value of the output of the South Carolina mills was enough to justify such a plant for training textile students in South Carolina, that 85% of those gainfully employed in South Carolina industries were in textiles, and that the payroll of mills in this State was approximately $60,000,000 annually.

NEW TEXTILE BUILDING

At that time, Clemson’s School of Textiles had grown in enrollment from 65 students some ten years before to 292 students, and all graduates who desired jobs in the industry during that period had been placed. Dean Willis also pointed out that the request for Clemson Textile graduates was increasing.

The State House granted the request and appropriated the major part of the $475,000 for the new building.

This building, with 127,900 square feet of space, valued with contents in 1945 in the Survey Report of Public Higher Education in South Carolina, made by the Division of Surveys and Field Services of George Peabody College for Teachers, at $545,000, and containing fourteen classrooms, twenty-seven laboratories, two shops, and an auditorium was easily capable of accommodating a much greater enrollment and many additional research laboratories.

The establishment of the J. E. Sirrine Textile Foundation has made available a great portion of the funds necessary in carrying out many proposed projects of the school.

Mr. J. E. Sirrine, for whom the new Textile building was named, gave impetus to a movement for a great Textile School at Clemson, the work of which is now destined to provide leading men for the advancement of textile industry, not only of South Carolina, but of the world.

Courses for the early Textile School were divided into three groups: The Division of Textile Chemistry and Dyeing, the Division of Carding and Spinning, and the Division of Weaving and Designing. Since then these courses have been altered with subjects being added or removed from the curricula as the changes in industry fluctuated and demanded.

Out of ten principal textile schools, only two are older than Clemson. It was the first Textile School to be established in a Land Grant College, and is one of the most complete Textile Schools to be found in any American college.

At present, approximately twenty-five percent of Clemson students are choosing a textile course. The Textile School of Clemson is truly a pioneer, and proudly lives up to the highest “ideal” of Mr. Clemson.
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26th YEAR OF CONTINUOUS SERVICE TO TEXTILE MILLS

SPRING, 1950 THIRTY-SEVEN
"Orlon"—Du Pont's Latest

(Continued from page 10)

Durability is much more than just resistance to abrasion. It is resistance to all types of degrading influences, such as sunlight, acids, solvents, heat, mildew, insects, and bleaching agents. It is lack of shrinking or lack of stretching during washing. For instance, "Orlon" sets a completely new standard for durability in sunlight, when compared with any other natural or synthetic fiber.

Ease-of-care involves mainly the maintenance of dimensions of a fabric or garment during washing or during use, the ability to use fabrics without ironing or with substantially no ironing, and the rapidity of drying of an article after washing. "Orlon" is almost completely stable dimensionally in properly finished fabrics. In addition, "Orlon" shows a negligible change in dimensions with changes in relative humidity. "Orlon" can be stabilized by heat to produce a permanent pleat or crease which will be retained after repeated laundering. Creases put into "Orlon" with a warm iron are easily removed at the same ironing temperature and can be put in repeatedly without damage.

"Orlon" offers covering power or bulk with light weight. It is possible to produce from "Orlon" an awning fabric that is only 60% as heavy as current standard cotton awning fabric, yet which gives adequate coverage or protection with greater ease of handling and exceptionally long life. Men's suitings fabrics of 100% "Orlon" have demonstrated that "Orlon" is up to 30% thicker per unit weight than comparable all-wool suitings. It is also true that a 100% "Orlon" suitings—30% lighter in weight than the same wool suitings—would be equal in thickness and equal in warmth.

This fact has been demonstrated in thermal insulation tests involving wool and "Orlon" suitings.

DYEING EFFECTS LIMITATIONS

The continuous filament product from our first plant cannot be adequately colored by conventional dyeing methods and processes, so our efforts to date have been concentrated largely in industrial uses such as wet and dry filtration, awnings, sailcloth, outdoor furniture, auto tops, and sewing thread, where dyeing requirements are at a minimum or where adequate coloration appears attainable by existing techniques. In the domestic field, emphasis has been on curtains—ninons, marquissetes, casement cloths, drapery linings—and related items. Only limited work has as yet been conducted in the apparel fields in items such as men's shirts—both business and sport types—uniform cloths, and in decoration and striping effects. We cannot overlook, however, a strong and growing interest among leading textile concerns in "Orlon" fabrics for all types of apparel uses. This is arising from the pleasing textural appeal of these fabrics, their ability to recover from wrinkling and mussing, the lack of surface pilling in napped or sueded fabrics in laundering and in wear, their stability against slippage, and their bulk for light weight.

FURTHER RESEARCH

In addition to continuous filament yarn, we are examining the possibilities of "Orlon" acrylic staple on a research and development basis. In this work we have achieved much improved dyeing characteristics which, coupled with its other properties, make it an extremely interesting product from a market standpoint.

(Continued on page 40)
RESPONSIBILITY

BERLYN K. SUTTON, T.M. '50

In society are to be found three general attitudes toward the question, "shall I accept responsibility while a college student?" One may as well ask himself if he wishes to become educated while in college. It is not too difficult for one to classify himself as to the three attitudes. He may do this by simply considering the following statements.

In one class, and a rather distinguished group, are those who realize the value of experience, and are prone to accept every opportunity within their ability and time limitations. By this it is not meant that a person of such desire will be a "yes" man to all proposals. Careful thought and consideration must be devoted in order to ascertain the prospects of accomplishing the task efficiently. One must make a decision as to his willingness to accept the inevitable personal sacrifices which will be experienced. Finally, one must feel reasonably certain that he is capable of executing an acceptable performance.

A second class is saturated with the group of beings who are "in the middle of the stream". In them is a doubt as to whether it is more important to devote their time to outside activities or to have their spare moments consumed by personal amusement. Some are properly fitted in this group; however, there are others who are potent with ability and intelligence, but for various reasons tend to waste their talents in the form of an inactive brain. If one finds himself in this group he should be greatly concerned.

Finally, there are in existence those persons who will not accept responsibility, cannot see any value in the acceptance of responsibility, and have no respect for those who are attempting to further their education by participating in responsibility. Such thinking is readily distinguishable in college society.

Perhaps if the members of these last two groups only foresaw what lies ahead of them in the industrial world, with its many harassing and time consuming activities, they too would take advantage of their opportunities which are constantly waiting to be adopted and developed. Is there actually a necessity of such concern? The author profoundly states a "yes" to this question. The reason is this. Everyone must sooner or later bear responsibility, and there is no time like the present.

Following is an analysis of the situation as the author sees it: the why's of responsibility acceptance.

It is an unavoidable human fault to be born into this world imperfect in every way, and to remain in this state of apathy in all undertakings throughout life. But, there is no law, no code of ethics, and no religious doctrine which states or would lead one to believe that he cannot work with vim and vigor toward this unobtainable crest of perfection. It is an accepted fact that experience is the best teacher, and that the most effective method of learning is by making mistakes. This is indicative by the fact that colleges stress laboratory work very strongly. These college years can be one's experimental days in more ways than one! It is entirely possible to detect and correct fallacies of thinking and principle before the time arrives when one must pay in more expensive and detrimental ways. The sooner one begins eliminating these errors of the novice, the sooner he will be capable of accepting the responsibilities which are encountered in the business world. In order that one receive the maximum degree of benefit from his college experience, he must accept his problems with the knowledge that mistakes are unavoidable, and expected of the beginner; however, he must strive to commit each error once only! He should have no real fear, but an abundance of concern and interest. Through such experience one eventually gains a confidence in his own decisions. This should be evaluated as one of the most important aspects of education. A theoretical knowledge without the ability to reach effective decisions is of no worthwhile value to anyone.

The lack of ability to express one's self in writing is one of the most serious handicaps which can be experienced. There have been many people with brilliant thoughts and not the ability to benefit others with their knowledge. Too, there is always the danger of misrepresentation and disillusionment on the part of an author. He must be particularly careful to write exactly what he means, because he is responsible for anything which appears under his name. Few, if any, people are naturally gifted with this power; consequently, it is to everyone's advantage to develop this ability continuously. This is particularly necessary in the textile industry, which has in the past few years has grown to be one of the most intricately organized businesses to be found. With this growth and development has come a demand for many reports of various types. It is imperative that these reports be accurately, concisely, and intelligently written. By accepting every opportunity to write and speak, one is able to cope very satisfactorily with this problem. In college, such experience is readily obtainable by working on any publication or by acquiring membership in any one of the forensic societies.

It is impossible for any one to conceive of the problems which unceasingly arise in any business organization unless he actually obtains experience. Almost any extracurricular activity offers some attraction in this respect; however, in none is the opportunity to receive diversified training so great as it is in the college journalistic field. With this activity comes the inherent financial difficulties, the valuable experience of making contact with the business world, the necessary practice at composition, the experience of "meeting the deadline", and any number of smaller de-

(Continued on page 40)
Responsibility  
(Continued from page 39)

tails. All of these and many others too are to be encountered in the progressive business organization of 1950.

Some people will shun the thought of being subjected to these laborious responsibilities; they feel that they are being subjected to such great burdens. While this may be true, they are forgetting one important thing. This “undesirable” burden is not all bad. On the contrary, responsibility is one of the greatest character builders to be found anywhere. It will subordinate many problems which might otherwise seem difficult, and that in that way eventually cause one’s life to become seemingly less complicated. Everyone lacks that supreme character which is to be regarded as an ultimate goal for all humanity. This is just one intangible reward which one is eligible to receive if he will only partake of a little worry.

If students are to be motivated into taking full advantage of the benefits which are potentially available to them, they must be made to realize that they are far from the state of efficiency which they must acquire if they are to become a successful man of the world. This efficiency is obtainable only through experience, which may be had by merely accepting responsibility.

“Orlon”—Du Pont’s Latest  
(Continued from page 38)

“Orlon” staple offers the opportunity of approaching the desirable features of wool—the ability to recover from mousing and wrinkling and a soft warm hand—with the additive of ease-of-care features found only in the man-made fibers. Inherent mothproofness, dimensional stability, and long life resulting from resistance to degradation are added features of “Orlon” staple fabrics. The development efforts with “Orlon” staple are still in the pre-commercial stage and much remains to be learned about it by the textile technologists who are working with this material of so many fascinating possibilities.

It remains for the future to tell the part that will be played by “Orlon” and the other new synthetics in this revolution within the textile industry. The textile school graduate of today is truly fortunate to enter an industry with the promise that the textile industry holds for the years immediately ahead.

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