1957

The Bobbin and Beaker Vol. 15 No. 4

Clemson University

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SUMMER 1957
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COVER: A microscopic photograph of a knitted fabric showing the interlacing of the yarn.
Photography by Brogdon Nichols; Layout by Ted Pappas.

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CLEMSON SCHOOL OF TEXTILES

Located strategically in the heart of the South, Clemson has kept in touch with its educational needs and has been a rallying point for the social and industrial progress of several generations. It was natural, then, that when the textile industry began to realize the advantages of bringing the units of that industry in closer contact with the sources of raw materials, particularly cotton, they should turn to Clemson for leadership in solving problems inherent in such an important move. The response was enthusiastic.

By 1898, when only a fourth of the textile industry was in the South, a textile building was completed at Clemson, modeled after the typical mill construction of the period and the first textile students were enrolled. By 1900, when there were 28 Clemson graduates, four were textile majors.

These young men went out to prove to the textile industry that training was an advantage, not only to themselves but to those who employed them. By the 1930's the enrollment was 300 students, and the textile industry was eagerly seeking qualified graduates from Clemson School of Textiles to fill positions that were formerly achieved by years of laborious endeavor.

The technical requirements of the industry were advancing by leaps and bounds, mechanically, chemically, and in every other respect. Research, much of it done at Clemson, was extending the knowledge of fibers and manufacturing processes.

The old building, built in 1898, its basic equipment, and the teaching staff were outgrown. As a result in 1938 the School moved into Sirrine Hall, the commodious new building that now houses the Textile
School. This building is an ornament to Clemson College, having more than two and a half acres of floor space, and would probably cost more than $2,000,000 at present construction prices.

EQUIPMENT

Immediately after the war, machinery was purchased with approximately $50,000 from the Legislature, and in 1950 there was an overall expansion expending nearly $200,000 which was given by friends in the industry in addition to the donations of equipment approximating $20,000. These expansions, with the machinery moved from the old building, gave the School ample equipment worth approximately $1,500,000 for training all types of textile processing from raw fiber to finished fabric. Instruction is given on cotton and all types of fibers, including wool in the American Worsted System. Modern testing laboratories having the latest types evenness testers, uniformity analyzer, strain gage testing devices and other modern equipment are used both for instruction and research.

This is a fine opportunity to express appreciation for the wonderful co-operation our School has had with all the various machinery manufacturers who very carefully helped us fill our needs for this modern plant. A list of the equipment and corresponding companies is another item submitted today.

FACULTY

The faculty has grown since 1936 from fifteen members to an average of twenty-six during the period 1950-56. Of the faculty four have their Doctorate degrees and sixteen have their Master's degrees. Practically all have had considerable experience in the industry, ranging from three to ten, or more, years before coming into the Textile School.

SIRRINE FOUNDATION—To make it possible to have a highly qualified staff in the School of Textiles, the industry-supported foundation was established during the war. The funds in this foundation have been contributed by the textile companies in the State and now total over a million dollars. The income from this large fund is used exclusively for the School of Textiles at Clemson primarily to improve the teaching staff. Under the present plan, the School of Textiles is benefiting in five ways: (1) Enhancement of the retirement payments by the State for all members of the staff retiring with the rank of associate or full professor; (2) The Foundation contributes half of the salary for an "Extra Professor" in each of three departments. The additional faculty members have research projects but take classes for short periods to enable the regular teachers to visit mills, attend conferences, etc.; (3) The Foundation greatly increases the travel funds to facilitate visitation and study of the mills in the State; (4) Foundation funds have been contributed for maintaining a textile division of the Main Library in Sirrine Hall. The contributions provide for the salary of a librarian and an annual allotment for books and equipment for the library.

ENROLLMENT

The enrollment at Clemson has increased from third place in 1946 to first place in 1950 and the average enrollment from 1950 to 1956 has been 537 students, which is the highest of any of the ten United States textile schools. The enrollment at present is 328. In line with what is hoped will be a temporary trend in all the American textile schools the enrollment has fallen off from the high levels around 1950-52. At that time Clemson School of Textiles had one-fourth of the students enrolled at Clemson and one-fourth of the total enrollment for the ten American textile schools. A strong recruitment program is underway that is expected to greatly increase the textile enrollment in the next year or so.

ORGANIZATION

The School is organized in four main divisions corresponding with those found in industry: Yarn Manufacturing, Weaving and Designing, Textile Chemistry and Textile Management.

The Yarn Manufacturing Department is a service department in the School of Textiles. There is no degree offered by the department but all students in the School take courses in the department.

This department has the usual functions of supervising teaching, advising on curriculum and acting as an administrative unit of the College. This department carries on its share of the research work done by the School.

The courses in this department are divided among opening and cleaning, carding and sliver preparation, roving and spinning.

Yarns of various kinds are processed, both for teaching purposes in the Yarn Manufacturing Department and for the use of the Weaving and Designing Department and for the Textile Chemistry Department. The department is equipped to process cotton, worsteds and the various man-made fibers.

The Weaving and Designing Department is a service department in that it teaches courses required for graduation in Textile Engineering and Textile Manufacturing. No degree in Weaving and Designing is offered.

The main objective of this department is to train men for leading positions in the textile industry. Positions which may result directly from courses completed in this department are Fabric Designer, Overseer of Weaving or Supervisor in a knitting plant. Of course, these are not ultimate goals of our graduates. Training, as a whole, is received from various departments which make it possible for graduates to rise to high positions in the textile in-
dustry such as Managers and Vice-Presidents.

In subject matter, this department deals with the principles of weaving and knitting design and the construction of various types of fabrics with respect to texture, design, color, appearance and end use. Patterns range from small stripes and figures on dobby looms to large flowered designs on Jacquard machines. Some of these fabrics are drapery, dress goods, bedspreads, curtain marquisettes, upholstery cloth and knit goods. Yarns used in these fabrics include cotton, filament rayon, nylon, acetate and blends of these fibers.

This department is also concerned with the preparation of yarns for weaving and knitting. Throwing includes processes for preparing filament synthetics for weaving or knitting. Warp preparation includes the necessary processes to strengthen warp yarn and put it in a form required for weaving.

In all these processes of yarn handling and fabric development, the mechanical aspects of the machines are studied as well as the thread manipulation.

The Textile Chemistry Department is different from the other divisions of the Textile School in that it offers its own degrees, both graduate and undergraduate, as well as functioning as a service division for the other departments of the School.

The curriculum in Textile Chemistry is planned especially to prepare students for positions of responsibility with any concern which processes textiles chemically, or which supplements the great textile industry from a chemical point of view. The strength of this curriculum is pointed up by the fact that in textiles and its related fields we have records of many men who today are in highly responsible positions including many presidents and executive officers. This is more especially outstanding because the oldest graduates of this curriculum are just now reaching the forty-five year bracket.

Because of ever advancing developments in the field of textile chemistry, trained men for research, development and production are extremely essential. This is no longer a mere routine business of dyeing and printing so many thousand yards of cloth a week, but today is a field of constant and often dramatic new ideas which change ordinary cloth into sparkling prints and solid shade fabrics which have high style attractiveness, coupled with remarkable serviceability. In addition to special finishes, the ever-broadening field of man-made fibers continues to offer additional opportunity and challenge to young chemists. The fibers which are not on the market are by no means the final word in this area, because the producers of these fibers find by tailoring synthetics to more and more specific uses, they can open the door to a multitude of new ones.

Since South Carolina does a higher percentage of chemical processing of textiles than any other state, and since more chemists are employed in textiles and its supplementary concerns than in any other field in South Carolina, it seems essential that this major segment of our economy be properly staffed so that the State may maintain its leadership in this direction.

The Textile Management Department has the responsibility for the instruction in all phases of management function in the industry. The courses include practical mill management, textile costing, quality control and time and motion study. In this department are also grouped strong courses in physical textile testing and textile microscopy.

Considerable research is carried on, one professor devoting most of his time to X-ray studies of textiles and another full time on applied research in textile processing and testing machinery.

In addition to the work offered in the four textile departments, all students are given a strong academic background in the other schools on the campus.

CURRICULA

The Clemson School of Textiles offers three courses leading to the degree of Bachelor of Science: Textile Chemistry, Textile Engineering, and Textile Manufacturing. A full major in Knitting is offered as an option under Textile Manufacturing. Graduate work leading to a Master of Science degree is offered in Textile Chemistry and Dyeing.

Textile Chemistry: The work of textile chemists includes the various phases of textile coloring, bleaching, printing, dyeing and finishing of textile yarns and fabrics, as well as the manufacture and sale of dyestuffs. Graduates have positions such as Bleachery Chemist, Dye Foreman, Designer, Laboratory Chemist, Textile Chemist, Research Assistant and Sales Representative.

In Textile Chemistry the School offers graduate work leading to a Master’s degree and has two teaching fellowships and two sponsored fellowships.

Textile Engineering: Students following this curriculum receive instruction in basic textile courses for a total of thirty-six college credits; the remainder are in Physics, Mathematics, English, Economics, and Mechanical Engineering. Graduates in this curriculum are prepared to enter the research and development fields which are being emphasized by the textile industry as well as the field of production. They are also prepared to go forward with postgraduate studies.

Textile Manufacturing: This curriculum is followed by those textile students who intend to enter the production and management phases of the textile industry. Those students who desire training in the knitting field may elect to take the knitting option under Textile Manufacturing during the junior and senior years. The curriculum shows that they receive sixty-five of their college credits in subjects
taught in the Textile School and that they are well prepared for rapid advancement in textile plants. It is recommended that all textile under-graduates find work in textile mills during summer vacations. This experience always aids them in their upperclass textile courses and also allows the students to make contacts with possible future employers.

**Knitting Option:** This option for the junior and senior years has been set up under Textile Manufacturing to embrace every phase of the knitting industry. Students will study such fields as circular body knitting and design, circular hosiery knitting and design, flat and warp knitting, full-fashioned knitting, knit garment manufacture, dyeing and finishing of knit goods, and knitting mill practices. Because of the selected courses in this curriculum, students will not only be prepared for the knitting industry, but for almost every other field in textiles, especially yarn manufacturing.

**RESEARCH**

Over the last decade, the School of Textiles has increased its emphasis on various types of research. Under the Sirrine Foundation more than half of the faculty are engaged to engage in research each summer, and have carried on a large number of projects. Most of these are of applied research character but some are of more fundamental type.

During the past eight or nine years the School has accepted contract research, having several projects a year, which have amounted to approximately $200,000.

These programs have included evaluation studies of fibers, yarns, sewing threads and fabrics from various types of natural and synthetics fibers. A good proportion of the work has been on investigations of dyeing, sizing, resin coating, etc. A few of the contracts have been for machine and testing equipment development.

Besides the sponsored research and that supported by the Sirrine Foundation, the School has carried on a continual program of developments of testing equipment and textile machinery improvement. These have resulted in patent searches on more than fifty items of which twelve have been patented and applications pending on a dozen or so more. Several of these developments have been taken by machinery companies for manufacture and sale to the industry. All patents are assigned to the College, which will receive nominal royalties from the companies manufacturing the items for the industry.

**OTHER AGENCIES**

Due to Clemson's central position in the Textile Industry, a number of the other agencies have located at Clemson College. These include the following:

1. One of the large U.S.D.A. Production and Marketing Administration fiber and spinning research laboratories, in charge of Mr. J. T. Rouse, is located in the school.

2. The Division of Technical Service of the American Cotton Manufacturers Institute, in charge of Mr. John T. Wigington, has been at Clemson since 1941. With Mrs. Helen Beasley as Fiber Technologist, the division operates a modern cotton fiber testing laboratory for technicians in cotton fiber testing.

3. The U.S.D.A. Southeastern Cotton Ginning Research Laboratory, in charge of Mr. J. A. Luscombe, is located at Clemson to study the effect of ginning methods.

4. The U.S.D.A. Extension Service makes Clemson College headquarters for a Cotton Utilization Specialist, Mr. William J. Martin, who carries on liaison work between the Southern Regional Research Laboratories and the Textile Industry and disseminates information from the textile schools and various cotton research groups.

The School of Textiles is very fortunate in having all these agencies located at Clemson and is aided greatly by the close cooperation of the school faculty with these research staffs.

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STANLEY, N. C., U. S. A.
The Southern Duramold Shuttle

By G. D. McGill, Southern Product Manager
Steel Heddle Manufacturing Co., Greenville, S. C.

Sometime ago it became apparent that increased loom speeds, heavier fabrics, and the growing scarcity of acceptable dogwood blocks (the material from which loom shuttles are ordinarily made) were creating an ever-growing need for some material for the manufacture of loom shuttles. Better than 15 years ago the Southern Shuttles Division of the Steel Heddle Manufacturing Company began their development of this radical improvement. The search for an acceptable material, exhibiting the required physical properties, has been going on since that time. Approximately 3 years ago this long and arduous experimentation finally bore fruit in the form of the development of the material from which the present-day Southern Duramold shuttle is molded and manufactured.

Prior to that time this experimentation had touched upon the possibility of using almost every imaginable type of plastic material—all-macerated, all-fabric, paper-base, flock-filled, pure resin, etc. Numerous and exhaustive tests were run, also on every conceivable resin formulation; the UREAS, MELAIMINES and rubber phenolics, to mention a few. Some of these combinations had in their initial testing looked very promising, but more exhaustive subjection to the rigors of loom operations always showed material weaknesses, and material variations, which developed into premature failures. One by one each of these test formulations had to be discarded as unsuitable.

Several years ago it became irrevocably apparent that fabric reinforcement of the side wall sections of any molded shuttle was necessary to withstand the abuse imparted to the shuttle by the loom. This has been the basis of all recent experimentation. However, in the past, all-fabric prototypes had been worked with and had been found unsuitable due to their brittleness in the center sections, and their inability to properly receive the shuttle tip. For these reasons it has also become apparent in recent years that a center section of macerated material was preferable when the block was molded.

This is basically the construction of the present Southern Duramold shuttle. The wall sections of this shuttle are reinforced with multiple laminations of tough, strong, wear-resistant fabric, while the center portions are molded with reinforcements of more-resilient, macerated or chopped fabric. This combination has been proven to be optimum construction for greatly increased shuttle life.

The present-day Duramold shuttle is molded for Steel Heddle by the Westinghouse Electric Corporation, at their plant in Hampton, South Carolina. While the molded blanks themselves are a combination of two hetrogenous materials in their raw form, they become upon molding, through the intense heat and pressure applied, one homogeneous unit when they immerge from the mold. The flow of the phenolic resin used in molding causes a uniform mass throughout the entire shuttle blank, and leaves it without bond lines or seams. Much work has been done over recent years to determine the proper fabric for use in reinforcing the side walls, and also for use in the chopped state to reinforce the center section. The fabric presently used in the Southern Duramold shuttle has been proven by exhaustive testing to be best suited to this end.

The advantages of the Duramold shuttle as compared to the conventional dogwood shuttle are many.
1. The increased wear resistance of the material radically improves the life expectancy of the shuttle.

2. Due to the improved toughness of the material, the majority of premature failures through fracture, etc., are removed.

3. By the very nature of the material the variations brought about by atmospheric change in temperature and humidity, which so often plague the weaver, are eliminated.

4. Because the materials have no granular structure, the natural defects even in good dogwood, are eliminated.

5. As the material has no grain, scarred end grain will not raise the humidity-change.

6. The nature of the material causes it to become smoother as it wears, thereby reducing the amount of sanding necessary during operation to obtain a satisfactory finish.

7. In most instances the slight increase in weight is beneficial to the weaving operation as power settings on the loom can be backed off.

8. The much denser nature of the material allows for more precise and longer-lasting fit of the component parts into the shuttle, thereby reducing eye-rocking, loose-grips, etc.

Repeated large-scale loom applications have proven that the DURAMOLD shuttle will outlast the conventional shuttle 3 times or better, enabling very marked savings to be effected in the overall shuttle costs per year to various mills. The economic operation of these shuttles has been proven time and time again, and their use has resulted in reduced costs and improved quality in each application.

Finally, it should be stated that the DURAMOLD shuttle can no longer be considered in the light of an experiment. Its adaptability and economic acceptance has been proven and numerous mills are at present replacing their conventional shuttles of this type on a large scale. Many mills have completely equipped their looms with this radically improved unit, and are extremely pleased with the results and savings being received from their use. The units presently in the field number many thousands and orders for the Southern DURAMOLD shuttle continue to grow at a most gratifying rate.

At the present time, due to mold considerations, the Southern Shuttles Division of the Steel Heddle Manufacturing Company is limited in what they can supply to certain looms running shuttles in the medium size range. However, work is constantly going on to develop new molds, and it is expected shortly that we will reach the state where we can produce in the DURAMOLD material any shuttle for an automatic, filling-replenishing loom.
A New Idea In
Filling Preparation

Prepared by Universal Winding Co.
Providence, R. I.

Basic Explanation
UNIFIL brings the whole process of filling preparation into the weave room and integrates it with the loom. It is not merely an attachment; nor is it only a winding machine. It is a mechanism designed and built right into the loom itself. It performs the following cycle of operations automatically:
1. It winds.
2. It transfers to the shuttle.
3. It strips.
4. It returns empty quills to the winder.

In so doing it presents economics and quality improvements impossible to achieve with any combination of conventional equipment, automatic or otherwise.

The UNIFIL SYSTEM replaces the present rotary hand-filled battery on the automatic loom.

QUILL HAULING and BATTERY PLUGGING will be eliminated completely.

THE WEAVER will tend Unifil, thereby centralizing responsibility.

THE LOOM FIXER will do normal fixing on the Unifil.

A UNIFIL FIXER will be required for major overhaul of the unit. (a unit can be replaced in two minutes.)

BOBBINS will be altered to incorporate small wire cleats to pick up the end.

There should be a very real saving in the annual cost of bobbins. The Unifil uses 14 bobbins at any one time. This compares with from 300 to 400 bobbins per conventional loom.

Will UNIFIL Improve My Quality?
Unifil can improve quality in many ways:

a) LOCALIZED SUPPLY — large cone at the loom.
b) CONTROLLED TENSION — bobbins wound by same tension.
c) HAND SOILAGE — eliminated.
d) MIXED FILLING — eliminated. The elimination of manual handling insures clean filling and reduces the possibility of shell-offs.
e) SCATTERING OF BAD QUILLS and yarn throughout weave room eliminated.

All the above factors point to improved fabric. There will be a marked reduction in filling bands—particularly important in colored and loom-finished goods. An over-all upgrading of cloth should be possible and, in some cases, a premium price will result. The president of one of the mills now running UNIFILS has given us permission to quote him as saying that UNIFIL eliminates chafed filling and filling bands encountered with conventionally prepared filling.

Versatility
UNIFIL will prove extremely valuable to mills producing a wide variety of fabrics. The problem of inventory control is minimized. All that is required when changing filling is to change the supply package, the tension, and the increment feed which regulates the diameter of the bobbin.

Waste
UNIFIL will reduce waste in several different ways. Hand soilage will be minimized because bobbins are no longer handled individually.

Waste at the leading end of the bobbin is minimized. A consistent length of yarn is drawn from the nose of the bobbin and held in the drum and the transfer clamp. At transfer this length of yarn is picked up by the aspirator and deposited in the waste container. Bunch waste can be closely controlled as all bobbins go to the same loom and the factor of safety to insure against runouts can be decreased. It should also be remembered that all UNIFIL waste is clean and high grade and easy to sort, where desired. We have evidence that up to 50 per cent less waste will be made on the UNIFIL SYSTEM than on the conventional.

THE BOBBIN AND BEAKER
Loom Efficiency

In our limited field tests we have not been able to prove increased loom efficiency. However, our tests have shown less filling stops. In view of this, we feel that production installations will appreciate an increase in efficiency.

Just What Is UNIFIL—Mechanically?

We have told you the four basic functions of UNIFIL. In order to perform these operations, we have developed the following mechanical components which are brought together—on the loom—to give a completely automatic system:

A. A Supply Creel: A one to six pound supply package is used as a supply to the UNIFIL, and from there the filling is never touched. Inasmuch yarn comes in the form of cones, cheeses, bobbins, pirns, etc., we have provided means for utilization of any conventional supply package. The normal set up is that of a magazine creel in which two packages may be tied together, thereby giving a long running time and making less critical the time of supply tie-in.

B. An Empty-Bobbin Magazine: This magazine feeds the new, clean bobbins to the winder unit.

AWinder Unit: The heart of the system—a completely new unit for winding consistently uniform bobbins right on the loom, and synchronized to the loom speed.

1) Bunch Control: It is well known that control of bunch is important, and therefore, we have designed a bunch builder giving extreme accuracy and control of bunch waste. This is entirely mechanical in operation and works as a time function.

2) Avoidance of “Tails”: Conventional systems invariably create the problem of uncontrolled tails on bobbins usually due to the fact that the tail is gripped in the bobbin chuck and later removed. Inasmuch as our system employs an entirely different means of starting the winding, we have no tail to become troublesome in the shuttle, thereby completely avoiding the problem.

3) Clean Yarn: By avoiding any handling of yarn from start to finish of the bobbin cycle, we have completely sidestepped the problem of bobbin soilage due to handling. The full bobbin is carefully held so that it is delivered to the shuttle without soiling. Furthermore, extreme care has been exerted in the design to prevent oil leakage from the mechanism. The interior of the winding head, which is oil lubricated, contains a carefully thought out system of oil slingers, hardened and polished shafting, and oil seals to prevent seepage. Furthermore, as a safeguard, the entire mounting is designed with a reservoir to catch any seepage, should it occur. In this way the lubricant is entirely isolated from the loom, and it is felt that every conceivable safeguard has been taken to prevent damage to the cloth from this source.

4) End Control: Because of the fact that the automatic cycle depends on complete control of the end at all times, we have designed special mechanisms to make sure that the end is not lost. For example, when transferring a full bobbin from the winder spindle to the full bobbin magazine, both ends are carefully gripped, so that they may be re-engaged at the next instant. These mechanisms have undergone design and redesign to make them as foolproof as possible, and at this reading we feel completely satisfied that they are not a source of trouble.

D. A Full-Bobbin Magazine: To store and feed the wound bobbins to the loom as required. In order to provide the loom at all times with an adequate supply of bobbins prepared ahead, our mechanism is designed so that the winder will provide this reservoir and then shut off. This enables the winder to “relax” periodically and still keep the loom supplied.

E. A Stripper: To receive the bobbins as they are ejected from the loom and to strip the bunch cleanly. Inasmuch as the mechanism is required to strip off bunch waste and present a clean bobbin to the winder, it has been most important to obtain a high degree of efficiency in this stripping operation. Furthermore, we have carried a design a step further to provide a safeguard in the event that stripping may not be 100 per cent complete. This safeguard takes the form of a special detecting mechanism, which will automatically reject for operator attention any bobbin which has not been cleaned correctly.

F. Build: The build of the bobbin is accomplished by a 1½-inch traverse employing either 5, 7 or 10 winds. Winds can be changed by changing gears in the housing.

Doffing The Full Bobbin

At the completion of the winding operation, the traverse bar thread guide moves against the sizing rod trip lever, and in activating this lever, the thread guide is lifted out of engagement with the traverse bar and the following action takes place:

1. The eccentric on the cam shaft releases the bobbin support.

2. As a result the clutch is released and the spindle is stopped through a braking action applied by the bobbin driver against the bunch builder bracket.

3. The traverse cam, driven directly from the spindle through a chain of gears, also stops.

4. By the action of the sizing rod being tripped, the cycle pin clutch wedge control latch is released and in the event of a completely filled full bobbin magazine, the cycle of the winder is arrested by an interlock mechanism and no action takes place. In such cases, the winder will cycle at the completion of the next loom transfer. However, in the event of a partially filled full bobbin magazine, the winder will cycle immediately upon the completion of a full bobbin in the spindle.
The cycle cam which is now in operation causes the bobbin support to retract far enough to allow the full bobbin to drop out of the winding position onto the Rest Plate of the full bobbin magazine.

The upper and lower grips advance from either side and proceed to clamp, cut and retain the yarn which runs from the full bobbin on the rest plate back through the thread guide and tension to the supply.

The lower grip and shear assembly with the end from the full bobbin continues to travel in an outward direction, depositing the end on the yarn tensioning drum. The end is clamped on the drum, released by the lower grip and shear assembly and held in place until the drum tooth transfers it to the outer surface of the rotating drum. The end traverses down the drum to coincide with the full bobbin in the full bobbin magazine.

The upper grip, meanwhile, carries the supply end of the yarn inward to a position in line with the cleats of the empty bobbin which has moved into the winding position. During this operation, the thread guide is retrieved by the upper grip carrier to the bunch building position. The bunch builder is then cocked and bobbin is started. As the bobbin begins to revolve, the yarn is engaged in the cleats and the end is pulled from the upper grip. The upper and lower grips return to their normal positions and the cycle is complete.

**NOTE:** While the above operations are outlined as a sequence, they should not be considered as such since many of the operations are being performed simultaneously.

**Full Bobbin Magazine**

As previously mentioned, the full bobbin is held the rest plate until the lower grip has made its outward traverse and end is deposited at the tension drum.

The rest plate is then depressed, allowing the full bobbin to drop by gravity into the full bobbin magazine. This drop is retarded by a counterweight, located in the lower part of the magazine chute, to correctly position the full bobbin. A butt clamp is provided to prevent rotating or excessive movements of bobbins in the full bobbin magazine and is retracted during the transfer of the loom or the winder to facilitate repositioning of the bobbins.

**Loom Transfer**

When the feeder has indicated that the bobbin in the shuttle is ready for transfer, the action of transferring is accomplished in exactly the same way as is performed on a conventional Draper Loom, utilizing existing parts with the exception of the transferrer hammer.

The end of the yarn of the bobbin in the transfer position in the full bobbin magazine extends through the yarn clamp which is in its open position. When the transferrer hammer is actuated and places the full bobbin in the shuttle, the yarn clamp is closed and holds the end during the first pick. As the lay moves toward the front center, the clamp is recocked and the drum end transferred into a secondary clamp which positions it slightly lower than the bottom of the tension drum. Since the drum continues to rotate, the end works off the bottom but is still retained by the secondary clamp. In the meantime, the end from the yarn clamp together with the end held by the Stafford cutter are cut by the selvage cutter and dropped into the path of the suction clearer. These ends are held in their respective positions until the next loom transfer, at which time they are released and deposited in the waste container through the air clearer system.

**Stripping**

As the bobbin is transferred out of the shuttle, it contacts a shutter rubber inserted into the back wall of the shuttle directly below the ring clamp. This shuttle rubber imparts a spinning motion to the bobbin and increases the length of the trailing yarn end, important to added efficiency in stripping.

After the empty bobbin has been ejected and enters the receiver chute, it is guided through a series of brushes to trap the trailing end of yarn and continues its downward movement, coming to rest on the bobbin safety latch. It remains in this position until such time as the bobbin stripper ejector activates the bobbin safety latch causing it to be withdrawn and thereby allowing the bobbin to drop to the stripper floor where it remains until the ejeetor returns and pushes it into the stripper bobbin guide clamp where it is held for stripping.

Since the bobbin, when ejected from the shuttle, has a trailing end which has been cut by the Stafford thread cutter, this end is picked up by the bristles of the revolving brush as the ejected bobbin passes through it and the end is carried over the revolcing stripper cone. The yarn is caught under one of three pick-up fingers which in turn cause the yarn to be wound onto the revolving cone. The three cleaning fingers of the cone oscillate inward and outward thereby pushing the yarn off the cone into the waste collector of the stripper.

The bobbin remains in the stripping position until the next bobbin drops to the floor of the stripper and this latter bobbin is moved into the clamp position by the ejeetor. The stripped bobbin is then advanced to an intermediate position and the bobbin from the intermediate position is forced forward into a caliper device. This device detects bobbins which still retain yarn, either as a result of a break during stripping or early transfers, and holds them in this position until another bobbin enters the stripper clamp.

At this time, the unstripped bobbin is advanced and
falls into a chute and drops into the reject tray, removing the bobbin from the conveyor system. If on the other hand, the caliper detects no yarn on the bobbin tray from whence it is picked up by the magnetic bobbin lifter and returned via the conveyor system to the empty bobbin magazine.

**The Conveyor System**

The conveyor system constitutes an endless belt, with magnetic lifter, running from the stripper to the empty bobbin magazine. The conveyor is driven from the stripper whose power is derived from the loom cam shaft by a belt drive. In turn the conveyor system powers the tension drum through a flexible shaft connected to the upper conveyor pulley.

**Total Bobbins Per Unit**

Fourteen bobbins are required per loom for loom winder operation. These bobbins are scheduled for use in the following manner:

- Empty bobbin magazine: 4
- Winder spindle: 1
- Full bobbin magazine: 6
- Shuttle: 1
- Stripper: 2

The bobbins used are standard bobbins with starting cleats added.

**Tending**

We might break down the essential operations to be handled as follows:

- a. Yarn Hauling
- b. Creeling
- c. Waste Removal
- d. Tending Misses
- e. General Inspection
- f. Routine Maintenance
- g. Failure Corrections

The breakdown of these duties might fall in the following manner:

1. Weaver handling all tending of misses and general inspection.
2. Cone creeler to handle everything connected with preparation of filling and waste removal.
3. Loom Fixers to handle routine maintenance at the loom, replacing unit when major repair work is necessary.
4. Unifil Fixer specifically trained to handle major repairs, overhauling and assist loom fixers for a large quantity of units. If this were not possible, major repair work could be done by Universal Winding Company, either by returning units to the plant in Providence or by Servicemen at the mill.
The purpose of the textile school's magazine, THE BOBBIN & BEAKER, is service to Clemson's textile students and also to be used as a medium of exchange for mill men who wish to express their views on subjects which are associated with the industry.

In return they receive through reading this magazine the thoughts of others who participate in this exchange of articles. All persons who receive THE BOBBIN & BEAKER, approximately 2400, acquire essential information concerning new developments in the industry that occur most frequently in these times of mechanization.

This has been the purpose of this student publication since its beginning and the old staff has successfully completed its endeavor. It is now our duty, the new senior staff, to prove ourself by supplying the readers of this magazine with interesting and necessary facts at the time they are developed. We will endeavor to accomplish this task.

The new staff, as shown below is headed by C. E. Griffin, a textile manufacturing major from Forest City, North Carolina, as Editor. The new Business Manager is H. E. Jennings, a textile manufacturing major from Newberry, South Carolina. J. C. Glasgow, a textile engineering major from Conway, South Carolina, will serve as Circulation Manager, and C. T. Sanders, a textile manufacturing major from Richburg, South Carolina, will be the new Advertising Manager.
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Representatives of Six Nations Studying at Clemson School of Textiles

Kenneth W. Powers ’59

Pictured above are the ten foreign students enrolled in the textile school this semester at Clemson. Three of these students are from Korea. Junekey Lee from Taegu, Korea, is majoring in Textile Manufacturing, and is on a full scholarship from La France, Park Avenue, New York. Yong Joon Lee from Seoul, Korea is majoring in Textile Manufacturing and has received honors the first semester of this year. Dong Wha Kim, who is also from Seoul, is a member of Phi Eta Sigma, the National Manufacturing Association, and the Presbyterian Student Association, has received high honors his first three semesters at Clemson, and is now on a Keeever Starch Scholarship.

Imad Mohamad Nawam from Sidon, Lebanon, has received honors the first semester of his Junior year and is a Textile Manufacturing student. Jorge M. Gemayel, who has previously worked with the Draper Corporation, is from Puebla, Mexico, active in the Newman Club, majoring in Textile Manufacturing, and is starting the International Club for foreign students at Clemson. Mohammad I. Nasim is from Karachi, Pakistan and is majoring in Textile Manufacturing. Guillermo Sanchez, a Textile Manufacturing major, is from Havana, Cuba, active in swimming and the Freshman YMCA Council, and has received honors the first semester of this year.

The remaining three, Ilson Naghettini, Jose Barbosa da Silva, and Lucio Taboada Tenan, are professors from the Technical School of Chemical and Textile Industry at Rio de Janeiro, Brazil. They are on a Point 4 Program Scholarship, and the main purpose of their course at Clemson is to observe the methods of teaching, the American equipment, and the relationship between the Textile Plants and the Textile School.

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The Westinghouse Textile School

By Wayne Freed '59

The Westinghouse Electric Corporation and the Clemson College Textile Department recently presented a technical school covering electrical drives used in a typical textile mill. The school was held Monday through Thursday, March 18-21, at the Textile School of Clemson College.

This school included the operation and maintenance of all textile drives, such as cards, spinning frames, slashers, etc., as well as AC and DC theory, AC Induction Motors, and DC Motor Theory. This show was the second of its kind held by Westinghouse, the first being held in Charlotte last fall.

The school had a seven man faculty headed by J. C. Marous, the author of the course's textbook. All instructors for the school were Westinghouse specialists. The staff included Mr. Marous and F. K. Shealy, Charlotte; S. A. Bobe and J. G. Stephenson, Atlanta; M. H. Fisher and C. P. Waker, Pittsburgh, Pennsylvania; and J. B. Wrenn, Buffalo, New York.

Marous, a native of Pittsburgh and a graduate of the University of Pittsburgh, is consulting and application engineer for North and South Carolina. Shealy, a Charlotte associate, is an electrical supervisor, with a degree from Tulane. He is a native South Carolinian.

Bobe, a Washington State graduate, and Stephenson, Auburn, are consulting and application engineers in the Atlanta offices. Stephenson, associated with the textile industry for 15 years, works primarily with range and slasher drives.

Fisher, a graduate of Auburn, with a master's degree from Pittsburgh, is manager of the General Mills Section, Industry Engineering, in Pittsburgh. Walker, a native of nearby Walhalla, is with the company's East Pittsburgh Works. Another Pitt alumnus, Wrenn is with AC Motor Engineering at Buffalo and is distinguished as a designer of Textile Motors. He taught spinning frame classes at the school.

The course was primarily for master mechanics and electricians from the various mills of this region. The first day twenty mills were represented by some eighty men. The number of representatives varied from day to day as different material was covered which was of particular interest to these men.

The only cost to the mill representatives was (1) a place to stay and (2) their meals. The course itself cost them nothing.

The students were registered and welcomed by representatives of both Clemson College and Westinghouse. Mr. J. O. Buchanan of the Greenville office acted as Moderator to keep things on schedule. The speakers, demonstrators and students had to be kept on schedule in order to cover the fifteen subjects which were included in the four day course.

The school included on Monday, DC Theory and AC Theory, and AC Induction Motors; Tuesday, Picker, Opener, and Card Drives; Drawing Frames, Lap Winders, Roving Frames, Spinning Frames, Twisters and Spoolers, and Loom Motors; Wednesday, AC Motors and Control Maintenance, DC Motor Theory, Warper Drives, and Slasher Drives; Thursday, Range Drives, Warper, Slasher and Range Drive Maintenance.

On Thursday afternoon a self-graded quiz completed the course. Then the diplomas were awarded at the final dinner which was held at the Clemson House on Thursday night. The program for the evening included L. C. Moore, Southeastern Region Engineering and Service Manager for Westinghouse as the speaker. J. J. Hill, Carolinas District Manager awarded the diplomas at the conclusion of the program.

The text of the course was "The Electrical Handbook for Textile Drives." It has long been the desire of mill personnel to have a handbook devoted entirely to textile drives because of the growing complexity of electrical drives and the extensive use of individual drives in the Textile Industry of today. Mr. Marous, the author, has succeeded in satisfying this desire by his skillful handling of the material contained in this handbook. Each drive is discussed in the order in which the product is generally processed and the information is reduced to the basic fundamentals so that it might be of maximum use to the Mill Electrician and the Master Mechanic. Simplification of this handbook is due to the extensive use of photographs, wiring, and schematic diagrams.

It was felt that this school would increase the technical knowledge of the mill representatives and assist them in development of new applications. It was hoped that attendance was profitable to the students and to the mills which they represented.

THE BOBBIN AND BEAKER
Your Future in Textiles

By H. B. Wilson
Assistant Professor, Textile School

This year the demand for textile graduates is greater than ever before in the history of Clemson's Textile School. The seniors now have a choice of numerous positions in the field of textiles and at the highest salaries ever offered.

For our graduating high school readers, you are approaching the final phase of preparation for your life's work. As you look toward a college education, you must make a decision that will determine the pattern of your life. More than two million persons are on the payrolls of the textile industry. It is the second largest industry of our country, outranked only by food processing. Just to give you a few figures that are true in the State of South Carolina—70 percent of all wages paid last year dealt directly with textiles—73 percent of all jobs dealt with textiles—75% of state taxes came from the textile industry—capital investment in the textile industry is approximately 73% of the total in South Carolina.

The textile industry will need 2500 textile school graduates in the next ten years. If Clemson and all the other textile schools combined were to turn out
their peak production of textile graduates, it would be impossible to fill the need of the industry.

A number of textile foundation scholarships are set up by various mills to help make a college education financially possible for students who are interested in a career in the textile industry.

The following will be given major consideration in granting awards:
(1) Academic record of the applicant
(2) Character of the applicant
(3) Need for financial assistance
(4) Leadership in school activities
(5) Employment record of parent of guardian.

A number of the scholarships are available and range from $200 to $750 per year. The amount of the scholarship is usually paid directly to the college, and the difference between the scholarship payment and the total charges by the college is paid by the student. These scholarships are terminated if the student does not maintain a satisfactory record at college.

If you are interested in a career in textiles or a chance to qualify for one of the above mentioned scholarships, contact Mr. Gregg Hughes, Director of Student Aid, Clemson College, Clemson, South Carolina. If you or your parents would like to visit our Textile School, or the campus, get in touch with the writer here at Clemson.

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Outstanding Seniors --

By Wayne Freed, '59

Frederic W. Reinholdt, Jr., known to everyone as "Fred" is a Textile Manufacturing major from Chetex, Wisconsin.

Fred has gotten his experience in the textile field by working in the summers with the Joanna Western Mills in Chicago, Illinois. Besides gaining valuable experience in the workings of the textile industry, Fred's summer employment is also helping to pay his way through school.

Much of Fred's school activities are tied around his association with the Air Force ROTC program. This year he is the Group Training Officer for the 1st Group with the rank of Cadet Captain. Fred also attended summer camp last year at Webb AFB in Texas, where he acted as Squadron Commander with the rank of Cadet Major. Fred has also played a major role in Clemson's marching band of which he has been a member for four years. In the marching band he acted as 1st Sgt. last year and Drum Major this year.

William T. Linton, Jr. from Columbia, S. C. is a Textile Manufacturing major. "Bill", as he is known to the students, is quite active in campus functions.

In the ROTC program, Bill is a Company Commander with the rank of cadet Captain. He is also a member of the Senior Platoon. High on the list of Bill's activities is the fact that he is at present the President of the National Textile Manufacturers Society. This list includes such things as YMCA Cabinet, Chaplain for Senior "Y" Council, Senior Representative to Student Assembly, and Social Chairman of the Presbyterian Student Association.

In his senior year, Bill has acted as hall counselor to help pay his way in school. He has also worked two summers with Pacific Mills in Columbia, S. C., to help and to gain that necessary extra experience needed in today's textile industry.

Joel Patrick Campbell, better known as "Pat" around school, is a Textile Manufacturing Major from Anderson, S. C. Pat has become familiar to the readers of this magazine through his unceasing efforts as Editor of THE BOBBIN & BEAKER.

Pat received scholastic honors in his Sophomore year, and was a member of Phi Psi, the textile school honorary fraternity, in his senior year. Pat's other activities include the Freshman and Sophomore YMCA Councils, National Textile Manufacturers Society, Executive Sergeants and THE BOBBIN & BEAKER staff. Pat's honors were climaxed in his senior year by his admission to Tiger Brotherhood, which is a local organization that stresses leadership qualities.
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SUMMER ISSUE 1957
Where Are They Now?

A survey was made of the Class of 1943 . . . the following graduates were located.

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<th>Name</th>
<th>Position &amp; Company</th>
<th>Address</th>
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<tbody>
<tr>
<td>Cheston, B. A. (Chestochowski)</td>
<td>Head, Textile Research, Proctor &amp; Gamble; MA&amp;R Bldg., Ivydale, Cincinnati, Ohio</td>
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<tr>
<td>Christman, M. S.</td>
<td>Production Superintendent, Pacolet Mfg. Co., No. 4; New Holland, Ga.</td>
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<td>Cornwell, John B., Jr.</td>
<td>Superintendent Mills Mill. Saxon Plant; Spartanburg, S. C.</td>
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<td>Glenn, C. J.</td>
<td>Quality Control, Abbeville Mills Corporation; Abbeville, S. C.</td>
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<td>Goudelock, G. E.</td>
<td>Payroll Department, Sonoco Products Company; Hartsville, S. C.</td>
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<td>Graham, J. S.</td>
<td>Asst. Professor of Textile Testing and Research; Clemson College, Clemson, S. C.</td>
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<td>Harris, J. B., Jr.</td>
<td>Vice-President, Greenwood Mills; Greenwood, S. C.</td>
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<td>Howell, Bob</td>
<td>Salesman, Raw Materials &amp; Yarns; John Stickley &amp; Co.; Charlotte, N. C.</td>
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<td>Liner, Robert A.</td>
<td>Superintendent, Greenwood Plant, Greenwood Mills; 315 Cambridge, Greenwood, S. C.</td>
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<td>McCarthy, J. J.</td>
<td>Textile Department, Johns Manville; 152 Dukes Parkway, Somerville, N. J.</td>
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<td>Miller, J. H.</td>
<td>Major, United States Army; 8063 Mid Haven Road, Baltimore 22, Maryland</td>
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<td>Pitts, P. L.</td>
<td>Manager, Pitts Country Market; Clinton, S. C.</td>
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<td>Stanley, T. E.</td>
<td>Branch Manager, McBee Company; Box 9148, Raleigh, N. C.</td>
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<td>Stone, James C.</td>
<td>Cost Controller, Riegel Textile Corporation; Ware Shoals, S. C.</td>
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<td>Strom, L. S.</td>
<td>Registered Pharmacist, Strom’s Drug Store; McCormick, S. C.</td>
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<td>Templeton, W. D.</td>
<td>Overseer Spinning, Springs Cotton Mills, Eureka Plant; 170 York St., Chester, S. C.</td>
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<tr>
<td>Wood, Charles R.</td>
<td>President, Stationers Distributing Co.; 4924 Lake Drive, Ft. Worth, Texas</td>
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