

Minority involvement in the North American paper industry is dependent on increasing the number of minority students in science and engineering

Matthew J. Coleman

The demographic makeup of the U.S. paper industry, like most other U.S. manufacturing industry, is changing rapidly as non-traditional workers (the euphemistic phrase for someone other than a male of western European ancestry) move into hourly and managerial positions at an increasing rate. Although corporate cultures and the industry's traditional occupational standards are responding, in many cases this response is more slowly than the increase in non-traditional workers might require.

Tappi Journal previously has covered the increasing role of women in the paper industry (July 1988, p. 46). This article deals with minorities of non-traditional ethnic or racial background in the U.S. pulp and paper industry.

Minorities in the U.S. paper industry, and to a certain extent the Canadian industry, include Blacks (African Americans), Hispanics, American Indians (Native Americans), and recent immigrants (refugees from Caribbean nations, Southeast Asia, and Central America). One group not classified a minority by the Equal Employment Opportunity Commission (EEOC) are Asian Americans (ethnic Chinese, Japanese, and Koreans).

Two groups that are distinct because of native language, though not of minority status, are French-speaking Canadians and Spanish-speaking immigrants from South and Central America (as distinct from Hispanic Americans and illegal immigrants from Latin America). Increasing numbers of engineers from the Mideast and the Indian subcontinent (including Pakistan) are working in the paper industry, but their education, usually in engineering and often from a U.S. or western European school, has given them access to most parts of the paper industry.

The engineers and scientists from India are a good example of how a group that is distinct, and has a truly non-western culture, can enter and thrive in the paper industry. Interviews with several leading Indian-born scientists in the paper industry gave some insight into the elements of their success.

The primary reason for their acceptance is, of course, education. The paper industry needs well-educated people and is willing to take those who meet the criteria. There are two pulp and paper science schools in India which teach a good curriculum of science and engineering courses for the paper industry. In addition, English is the common second language, giving Indian students and graduates an incentive to come to North America. The Indian paper industry, although active, is small compared to the U.S., Canadian, or Western European paper industry, and the Indian schools produce more graduates than there are positions in their own industry, creating an incentive for many of them to emigrate.

The individuals interviewed said that they had experienced little discrimination, but the cultural differences, especially at the mill level, are quite significant—many Indians found it difficult to adjust at first. In almost every case known to those interviewed, the difficulties were lessened as the person had the chance to work and use his or her education to help in the work at the mill.

The interviews with every person connected with this article brought out the fact that education was the key to minority participation in the paper industry. There appear to be few cultural barriers in this industry which cannot be overcome with a degree in science or engineering.

Minority distribution in the paper industry

Research for this article focused on where minority participation was concentrated in the paper industry. It also examined factors which enhance or inhibit increased minority participation. The U.S. and Canadian paper industries are not strictly comparable, although for the purposes of this article they are listed together in **Tables I and II**.

Geographically, Blacks are the dominant minority in southern mills. In the Southwest, Hispanics are the largest group, with Blacks and Native Americans common. In the Pacific Northwest and British Columbia, and throughout much of the non-urban area around the Great Lakes, Native Americans are the significant minority. Mills located in the urban areas of the Great Lakes regions have

more Black and Hispanic participation with very few Native Americans. The Northeastern U.S. has the fewest minority employees. However, in Maine and in Eastern Canada, French-speaking workers represent a significant group of employees (they are dominant, of course, in Quebec) with Native Americans the only significant minority.

The paper industry has been relatively open to hiring minority workers; in regions where a minority population has been high, the paper industry has reflected such in hiring and employment. However, minority workers are not evenly represented throughout the paper industry by occupation; few are in professional or management positions and, until recently, few were in the skilled trades. This, though, is true in all of industry where strict educational requirements for professional positions, especially technical positions, eliminate many applicants. In fact, access to unionized skilled labor positions by minorities was limited or nonexistent for many years.

Occupational distribution

The positions held by minority workers in the paper industry (see Table II) are skewed to the hourly/production classes of jobs. While no direct breakouts of minorities in the paper industry compared to other industries were available, interviews with senior managers were used to develop and confirm the distributions as shown in Table II.

The first three columns of Table II cover the primary minority groups working in the paper industry. Their occupations in the paper industry are primarily in the lowest paying, least desirable areas—the woodyard and wood harvesting. All three have made inroads into the production area, helped in part by anti-discrimination laws which opened up the unions to minorities in the 1970s. The areas of lowest participation are in the scientific and engineering jobs. Very few of the minority students who possess a scientific or technical education have chosen to pursue a career in the paper industry. These scientific and technical jobs are the doorway into management in the paper industry, but getting minorities into these scientific and technical jobs will require educational guidance beginning as early as 6th grade.

In the United States, employment of Blacks has been increasing at the corporate level in the forest products, paper, and allied industries from a combination of factors including EEOC guidance, an increase in the number of black college graduates in non-technical fields, and corporate hiring policies which respond to the community labor pool. Most corporate minority employees are in clerical, administrative, and other support functions.

The distribution of minority workers throughout the paper industry is directly related to the type of degree or education they have. Since few minority students select engineering or science as a career, and few of those who do, choose to work in the paper industry, minorities are virtually nonexistent in the professional areas of the paper industry (Table III).

I. Geographic distribution of minorities* and distinct language subgroups

	Blacks	Native Americans	Hispanic Americans	Recent Immigrants	French Speaking	Asian Americans
Northeast and North Central U.S.	S		S	S		
Maritimes and Maine		S			D	
Rural Great Lakes and Central Canadian Provinces		D				
Urban Midwest (Rust Belt)	D			S		
Southeast U.S.	D					
Southwest U.S. (including Texas and Southern California)		S	D	S		
Pacific Northwest (including B.C., Alaska, and Northern California)		D		S		S

*As defined by U.S. EEOC.
D = Dominant minority
S = Secondary minority



Increasing industry minority participation

Managers in many U.S. paper mills have expressed concern over difficulties in hiring and keeping skilled workers and technically trained personnel in the industry. Lacking the glamour or even the visibility of other industries and professions, it has become increasingly difficult to recruit engineers and scientists into the paper industry because of the decreasing number of science and engineering graduates and the increasing competition from other industries.

While paper industry support programs for students studying science or engineering at the undergraduate and graduate level are common, programs to actually increase the number of students entering college with a goal of working in the paper industry are almost nonexistent. These programs, especially those aimed at minority students, offer the potential to "sell" the benefits of an education that leads to an engineering or science career in the paper industry to a person who may only see options of lawyer, stockbroker, or drug dealer—the three most common professions listed by minority high-school seniors in a 1987 survey taken in the New York City area.

While the better-paying, mid-level jobs in North America go to the technically trained, these students did not know that. Many students choose careers in business, especially banking and finance with law being a close third, because it is portrayed as a profession with high—indeed, almost unlimited—earning potential, possessing an aura of glamour and mystique. The popular media and

real-world surroundings certainly influence the choices given.

While the most successful lawyers and stockbrokers and drug dealers have high potential earnings, their population percentages are very low compared to the number of people employed in engineering, scientific, and technical jobs. According to census data, the median income for lawyers and stockbrokers is less than the median income for an engineer with the same years of experience, and the potential for serious employment dislocation among stockbrokers and drug dealers is significant.

At this time, minority college students in the United States do not choose engineering or science as a profession. The top minority high-school students tend to choose a career in medicine, law, or business. There are many explanations given for this, but two primary ones are: (a) a degree program in engineering or science requires more math than any of the other professions and (b) there are few if any engineers or scientists to be role models in the minority community.

The math requirement for science and engineering is perhaps the most critical. To have the option of majoring in science or engineering requires that a student take math every year from eighth grade on so that they can take calculus in the first year of college. If a student cannot take calculus in his or her freshman year, it is almost impossible to complete a science or engineering undergraduate course of study in four years. At \$4000-\$10,000 per year, an extra year or two of college becomes an unaffordable luxury.

II. Minority distribution by occupation in the paper industry

	Blacks	Native Americans	Hispanic Americans	Recent Immigrants	French Speaking*	Asian Americans	Mideastern and Indian Subcontinent
<u>Hourly and production</u>							
Woodlands and logging	X	...	...	...	X	...	...
Woodyard and fiber prep	X	X	X	...	X	...	...
Production	X	X	X	X	X	X	X
Maintenance and technician	...	...	...	...	X	...	...
General labor (USDL unclassified jobs)	X	...	X	X	...	...	...
<u>Salaried and managerial</u>							
Engineer	...	...	...	...	X	X	X
Scientist	...	...	...	...	X	X	X
Mill management	...	...	...	...	X	...	...
Corporate function (non-managerial)	X	...	...	...	...	X	...
Participation at 30% in regions of participation							
* Outside of Province of Quebec							

This is not an insurmountable obstacle, though. In a survey of students at an all-Black college, 43% had taken four years of math during high school and 82% had three or more years. However, most had little guidance counseling or exposure to career options in science or industry. Guidance counselors did not suggest summer school or extra classes during their senior year for those with 3 years of math, although the extra math course would significantly broaden the options of most students.

The subject of role models, while discussed by many of those interviewed for this article, was less defined. What many minority students seemed to lack was sufficient awareness of what science or engineering jobs are like, and what education it would take to become an engineer or scientist.

Several minority college students interviewed commented that they were never told or made aware of most of the majors available in college, much less what professions and jobs would be available to them and based on their major after graduation. One young woman said that she was eighteen before she talked to anyone about jobs and careers, and even then she was told "Get a college degree, and you can get a good job anywhere." She majored in psychology and has yet to find work in that field, there being approximately 10 psychology graduates for every

position requiring that education in the United States.

What is needed are people who can meet with younger students, especially in the early high-school years, and explain what the paper industry does and what jobs there are within the industry. This could avoid the problem that some mills have with the need to train people educated for one profession for which there are few jobs, to one which is very open for people with the proper training and education.

A recent interview with a mill manager emphasized this point with the comment that the manager could hire an individual with a four-year degree and several years of work experience in a non-technical field (in this case elementary education) for the same price as a high-school graduate with four years of industrial work experience. The career potential of the college graduate was somewhat higher, but only if the individual went back to school for additional technical training.

Demographics of the future

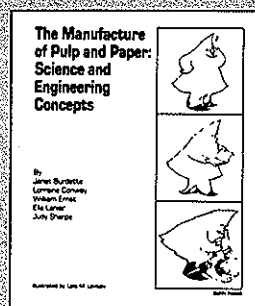
In the past, large numbers of engineers were the children (usually sons) of immigrant factory workers or of other engineers. The engineering career was seen as a solid step up from the career of a factory worker parent and a

How some companies are getting these books in local schools

If reading about *The Manufacture of Pulp and Paper: Science and Engineering Concepts* makes you wish middle school students in your area were using it, you CAN do something about it.

Jack E. Chinn, chairman, president, and CEO of Madison Paper Industries, bought 360 copies for schools in his area. Clarence H. Hornsby, Jr., president of Bowater Carolina Corp., bought 1000. And what do local school officials think?

"The quality of content and presentation of this material is excellent," said Stan Mathews, Waterville, Maine, Jr. High School guidance counselor. "We are confident the educational value of the program will prove itself in areas other than the field of science. Our state, and especially central Maine, is very dependent upon the paper industry to provide jobs and a solid base for the local economy. It is important that we promote understanding of this relationship, provide education in basic engineering and scientific principles, and inspire our young people, the workers of tomorrow, to prepare for the future. We greatly appreciate Madison Paper Industries' support in this effort."



To order copies of *The Manufacture of Pulp and Paper: Science and Engineering Concepts*, call the TAPPI Service Line. Inside the United States, the tollfree number is 1-800-332-8686; in Canada, it is 1-800-446-9431; outside North America, call 404-446-1400, between the hours of 8:00 a.m. to 5:00 p.m., eastern time, Monday through Friday.

The list price is \$12.00 each; the member price is \$8.00. Quantity discounts are available, dropping the member price for 100-499 copies to \$6.00 each, 500-999 to \$5.00 each, and 1000+ to \$4.00 each. The order number is 0101R148.

—Janet G. Crane



respectable and attainable career goal. The pool of potential engineers has been reduced, not only by the decline of production factory jobs, but also by changing expectations and opportunities available for children of blue collar or technical workers.

There is now a need to actively recruit minority students into science and engineering. The sidebar interview with Kenneth Taylor of Simons-Eastern Consultants, Inc. in this article describes one program addressing this problem.

The reason for the emphasis on math education and tracking minority students was brought to the fore in a paper titled "Demographic Imperatives for Science" written and presented by Harold Hodgkinson to the symposium Competition for Human Resources in Science and Engineering in the 1990s. Hodgkinson notes that by the year 2020, the U.S. population will be 48% "minority."

Even more important for the education system, in 1982, 26.3% of 5-17-year-olds were minorities. In 2020, 47.3% of 5-17-year-olds will be minorities. This is not a problem except that minority children do not score as well as white students on such standard tests as the SAT, especially at the critical "high end" — over 750 out of a possible 800 on the math portion. These "high end" students become the scientific and technical leaders, the role models for a

generation. Among students scoring over 750, Blacks appeared at only 2.7% of the expected frequency. (That is, with a 100,000 population which is 10% Black, if 10% of all students scored over 750, the statistical projection would be that 10% of 10,000, or 1000 Blacks, would score over 750. Instead, only 27 Blacks score over 750.) Hispanics appear at only 6.1% of expected frequency, while Asian children appeared at 611% of expected frequency. Hodgkinson's report also notes that the sensitivity of SAT scores to early education and support through programs such as Head Start shows that performance can be increased through better education (1).

Another problem in increasing the pool of potential scientists and engineers by increasing minority participation is retention in high school. The dropout rate for minority students in general is higher than for White and Asian students. However, when focusing on minority males—the largest potential pool of engineering and scientific talent—the dropout rate is closer to 50%. In large urban areas in the Northeast, the high-school dropout rate for Black males is 60%. The dropout rate is of special concern for the paper industry because a high-school education has become the defacto minimum education standard for even production and maintenance jobs in many mills (2).

Educating the potential paper scientist

Robin E. Swofford

The middle school years, 6th through 8th grade, are crucial years for stimulating and directing a young student's interest in mathematics and the sciences. Children at this age who decide science, math, and engineering are "boring" or "no fun" may narrow their future options by courses not taken. There have been few books and support materials available for middle school students which bring science and engineering concepts to life through their application to everyday products and processes. The papermaking process is now a notable exception because of the textbook *The Manufacture of Pulp and Paper: Science and Engineering Concepts* published in 1988 by TAPPI PRESS.

Designed as a workbook for students aged 10 to 14, it was developed under the auspices of the National Science Foundation. Several middle school teachers were coauthors, along with William Ernst, Georgia Institute of Technology. Goals are identified at the beginning of each of the three

sections, and valuable words are bold-faced for easy recognition.

Following the objectives of each section, the student is provided with a concise explanation of the topic, which is followed in turn by relatively simple experiments to support the information presented in the lesson. The experiments are interesting and enjoyable to the students and provide hands-on learning. At the conclusion of each section, there is a supplementary challenge for the exceptionally bright child or the child who needs additional reinforcement on a particular concept.

At the conclusion of each phase, the students are furnished with a summary of the main ideas presented in that lesson as well as a brief evaluation section. Consequently, *The Manufacture of Pulp and Paper: Science and Engineering Concepts* uses a multisensory or multidisciplinary approach to learning which enables the child to understand and apply the concepts presented.

This book enables students to learn and experience basic engineering concepts which otherwise might not be encountered until high school or college. In addition, it may spark interest in the fields of pulp and paper production.

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Programs for the future

To increase minority participation in the engineering and scientific professions in the paper industry, it will be necessary to increase the total number of minority students studying science and engineering. As noted in the preceding paragraph, improving test scores will allow more minority students to choose a science or technical career. Many programs supporting math and science education at the high school and middle school have been proposed and implemented as in the case of MATH-COUNTS. In addition, programs specific to the paper industry are needed to increase student awareness of the careers available.

The NSF, in its annual report, has projected a shortage of 500,000 engineers and scientists in the United States alone by 2000. While this projected shortage will probably be overcome through re-education, stepped-up recruiting, and education of new engineers and immigration of engineers from overseas, the demographic makeup of the paper industry will be altered. New engineers and scientists in the paper industry will as likely as not be female, speak English as a second language, and be as keen as their present-day counterparts to take over the reins of leadership as soon as they can.

In addition, the paper industry will end up more closely aligned with the schools that produce their technical staff. As Manville Forest Products Corp. has done (described in a sidebar to this story), taking control of your staff's education may be the only way to take control of your future.

Minority perceptions of the paper industry

The research for this article involved gathering relevant literature and studies and talking with people in the industry, both minority and non-minority about this subject. Due to the legal implications, it is a topic that is not comfortably discussed "on the record" by personnel managers in the industry. As a result, a decision was made to not list the attribution of quotes.

On the mill and corporate side, every mill manager and personnel manager expressed the thought that they were primarily interested in a person's technical qualifications when hiring, and that sex and race were not a factor, even for supervisory or managerial positions.

This did not fully agree with the comment from a recruiter in the paper industry who said, "The higher the position in a company or mill, the more often I am asked to find non-minority candidates." The scarcity of minority candidates in general creates the opposite problem when a company is seeking to fill a federally mandated quota. To meet these needs several engineering consultants had active recruiting programs for minority engineers.

When speaking with minority employees of paper companies or supplier companies, the most common comment was their extreme visibility. Most said they had experienced very little overt discrimination or negative reaction to their employment, but often felt set apart from their peers and co-workers. As one so aptly put it, "When the only other people like you at a TAPPI Conference are serving the food and cleaning the rooms, you feel very alone."

III. Engineering degrees awarded by group, 1985 and 1987

Group	Year	Bachelors	Master's	Ph.D.
Total	1985	204,064	43,910	11,821
	1987	203,055	47,947	13,040
Women	1985	62,448	9,724	2,135
	1987	61,487	11,443	2,442
Blacks	1985	8,019	788	133
	1987	9,205	1,005	137
Hispanics	1985	4,613	668	218
	1987	5,266	954	217
American Indians	1985	656	108	13
	1987	662	91	15
Asians	1985	9,903	2,631	619
	1987	13,112	3,239	662
Minority subtotal	1985	23,191	4,195	983
	1987	28,245	5,339	1,031
Foreign	1985	10,628	9,638	2,878
	1987	11,345	11,557	4,054

Includes agriculture, natural resources, computer and information sciences, life sciences, mathematics, physical science, and engineering (3)

1. Survey results of students from Jarvis Christian College, Hawkins, Tex.

1. Age of students:

18 — 7%	25 — 4%
19 — 16%	26 — 1%
20 — 22%	27 — 1%
21 — 22%	30 — 1%
22 — 10%	39 — 1%
23 — 10%	43 — 1%
24 — 4%	
2. Years of college completed:

1 year or less — 15%
2 years — 27%
3 years — 34%
4 years — 24%
3. When students decided to attend college:

6th through 8th grade — 26.4%
9th through 10th grade — 28.3%
11th (junior year) — 15.1%
12th (senior year) — 14.2%
After graduation — 16%
4. How many students have decided on a major — 97.2%
How many have not — 2.8%
5. Of those who have decided on a major, when they decided on that major:

During high school — 47%
Freshman year of college — 28%
Sophomore year of college — 16%
Junior year of college — 5%
Still undecided — 4%
6. How many years of mathematics each student took in high school:

None — 0%
1 — 1%
2 — 17%
3 — 39%
4 — 43%
7. Which of the following classes were taken during high school:

Chemistry: 1 year — 97%	2 years — 3%
Biology: 1 year — 83%	2 years — 17%
Physics: 1 year — 96%	2 years — 4%
8. Were options for a major in college affected by the choice of classes taken in high school?

Yes — 40%
No — 60%
9. Did the students partake in any serious career planning while in high school (i.e., meet with career counselor, attend "Career Days," or similar activities)?

Yes, a great deal — 22%
Some — 58%
None — 20%
10. The percentage of students able to identify the following as process industries:

Airlines — 2%
Oil refineries — 20%
Automobile manufacturing — 14%
Banking — 2%
Pulp and paper manufacture — 30%
Transportation — 2%
Insurance — 1%
Pharmaceutical manufacturing — 17%
Medicine — 2%
Lumber — 10%
11. How many students have been in, or applied for, an internship program in business or industry — 18%
How many have not — 89%
12. How many have ever talked to recruiters from heavy or process industries — 11%
How many have not — 89%
13. How many have visited a paper mill or oil refinery — 9%
How many have not — 91%
14. The percentage of students able to identify the following countries as major paper producers:

U.S.A. — 64%
China — 6%
Finland — 6%
Canada — 17%
Mexico — 2%
Uganda — 1%
Germany — 5%
15. The percentage of students who thought each of the following areas of the U.S. produces the most paper?

Northeast — 6%
West — 9%
Southeast — 7%
Midwest — 15%
Don't know — 63%
16. The percentage of students planning to go on to further education after undergraduate schooling — 82%
Those not planning further education — 18%
17. Degrees sought by those planning further education:

A master's or Ph.D. in present major — 58%
A second undergraduate degree — 2%
Medical or dental school — 4%
An M.B.A. or business-related graduate degree — 20%
Professional certification (CPA, MAA, etc.) — 11%
Military — 2%
Divinity school or music conservatory — 3%
18. Percentage of students who have learned to use a personal computer for writing or preparing spreadsheets — 56%
Those who have not — 44%

According to one Black engineer at a Southeastern paper mill, the strong economy and rapid expansion of the industry during the past three years has been a boon to minorities. "We have been so busy that no one really had time to worry about who you were or what you looked like. I've had a chance to prove myself to my boss."

There were a number of negative reactions to this study, with several minority engineers asking why I was dredging through this and creating a problem. School personnel were much more supportive, and almost all were concerned over the declining numbers of students, especially minority students in engineering and paper science. Two schools said they had no minority students in their paper programs at all, and one paper company manager said they had been unable to recruit a single minority engineer or technical employee in two years.

Minority student perceptions of the paper industry

As a part of the research for this article, a baseline survey of minority college students was conducted to find out basic information such as:

- When they made a decision to attend college
- When they decided on a major
- How much guidance counseling they received before college
- The impact of high-school education on college choices

- Current level of knowledge of the paper industry.

The survey was conducted at Jarvis Christian College, Hawkins, Tex., a member of the United Negro Colleges. The students were all full-time students, primarily in their final two years of undergraduate studies.

The survey results (Fig. 1) indicate areas where increased exposure of the paper industry would be extremely helpful in recruiting minority students. These students, the vast majority of whom were considering advance education after college, had a very limited awareness of the paper industry even though most were from the Southeast.

The lack of corporate contact and recruiting was also apparent, but understandable in the light of the small number of science graduates from the school. There was a great deal of interest in additional programs which would give students immediate employment opportunities after graduation. □

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Manville Forest Products Corp. devises creative solutions to education and training needs

Manville Forest Products Corp. (MFP), located in West Monroe, La., is in many ways a typical paper mill in a typical social and economic setting. Located on the edge of a medium-sized city, its labor and management needs are filled for the most part by local residents. As with most U.S. paper mills, long-term technical staffing needs had concerned upper management, but Manville's response has been unusual.

A program to create skilled and trained paper technicians had been envisioned by Harry W. Sherman, a former president of MFP. This program was to be made as convenient and accessible to company employees as possible for a variety of reasons. Foremost was the desire to encourage people to upgrade their job skills to benefit their productivity and potential. But also in the plan was

the long-range goal of being able to integrate job promotions, enhancements, and career paths into a required level of education.

To do that would require more specialized education than the local schools could provide. The Northeast Louisiana University campus was located nearby in Monroe, but it did not offer engineering or paper science related courses.

In the fall of 1986, Roger Somsen, MFP's customer service manager at the time, and Charles Holder, director of research and development, met with the University's dean of applied sciences and continuing education director to put together a curriculum of paper science and technology courses.



The program was started in the spring of 1987, and currently includes five paper science courses and a recommended curriculum for an associates degree. (Both the certificate and the associates degree program is still under review with the University Regents and has not been formally accredited as of this time.)

The five paper science classes consist of one introductory course and four specialized advanced courses. All of the paper science classes are taught by Somsen at the NLU campus. A TAPPI Learning Center was purchased by MFP, donated to NLU, and is used as an integral part of the course work. A second TAPPI Learning Center was purchased by MFP and was set up in the mill in a special office that is open 24 hours a day, 7 days a week so that no matter what shift an employee works, he or she can always have access to the equipment.

Somsen has been pleased with the Learning Center because it reduces the instructor workload in the introductory course, where its interactive approach works well with re-introducing workers to studying, allowing more time to be devoted to difficult concepts and troublesome areas. Its varying levels of instruction allow a student to repeat material at increasing levels of difficulty at a self-regulated pace—a necessity for non-traditional students in what may be their first classroom experience in 20 years.

All of this is only one part of the plan originally formulated by Sherman and Somsen for Manville. The plan was to create a "Manville Forest Products University" from which employees could get an accredited four-year degree in paper science or technology, or any number of other courses needed to pursue a career at MFP. Teleconferencing, satellite video-conferencing, interactive computer-based self study, and video in addition to standard classroom lecture presentations cover the spectrum of possible methods of taking education opportunities to all Manville employees in the future.

The management of Manville Forest Products Corp. are not "pie-in-the-sky" idealists, though; all of this is designed to improve the financial performance of MFP. As Sherman said, "If we want profits and market share and to be competitive in the world marketplace, and right now every market is the world marketplace, we must have the best quality product at the lowest price. If we want quality," he says, "then we must build it in from the start, with quality people, who are educated and trained to do their jobs better than anyone else. Then you will make a quality product because your people won't stand for producing anything less. This is what makes a company competitive in the world market, not after-the-fact quality control

The first graduates of the paper science curriculum: (L-R) Bonnie Goodman, Joe Coley, Eddie Murphy, Dennis Covington, Wayne Walker, Larry Risdal, Wayne Joiner and Doug Wall



efforts or short-term fixes or production gurus. We need to take care of problems with our own resources, and take charge of opportunities the same way. When we do, the bottom line will take care of itself."

MFP's education program is affecting human resources development in several positive ways. The company has been able to attract local residents who are likely to stay with the company throughout their careers, and to attract other paper industry professionals who are interested in the opportunities with a company which emphasizes education. In addition, in surveying Manville employees for education needs, some unexpected areas where training and education were needed were uncovered. These were not at the college course level, but at the middle- and high-school level. Out of this came a closer working relationship with local high schools for supplemental classes for employees and a chance to work with middle- and high-school teachers to tell them about MFP. This gave the teachers the background to talk to their students about job requirements at Manville and encourage students to remain in the educational system.

Students receive certificates

Eight MFP employees have been presented with certificates signifying their status as the first students to complete the paper science portion of the pulp and paper science and technology curriculum at Northeast Louisiana University.

The eight recipients are J. W. Coley, Dennis Covington, Bonnie Goodman, Paul Wayne Joiner, Samuel Eddie Murphy, Larry Risdal, Charles Wayne Walker, and Doug Wall.

—Matthew J. Coleman

Middle-school math: the key to future scientists and engineers

Kenneth Taylor, the retired president of Simons-Eastern, has been involved with a program called MATHCOUNTS, which is designed to provide a competitive and supportive atmosphere for junior-high/middle-school students interested in mathematics.

MATHCOUNTS is a nationwide mathematics contest sponsored by the National Society of Professional Engineers, the CNA Insurance Companies, the National Council of Teachers of Mathematics, the National Aeronautics and Space Administration, the Cray Research Foundation, the General Motors Foundation, and the Department of Education.

At the state level, MATHCOUNTS is sponsored by the state society—here it is the Georgia Society of Professional Engineers—and administered by chapters at the local level.

Taylor's interest and passion for the subject speak for themselves, and the following paragraphs were transcribed from a meeting with him.

If a student doesn't start taking math classes in junior high and continue through high school, he will not be able to complete an engineering or science major in four years. That is the underlying reality behind Taylor's interest in the MATHCOUNTS program. Our university systems do a good job of supporting students once they get into college and choose a major or move on to graduate school; the problem is in developing a sufficiently large pool of students. That is where grassroots programs such as this are critical.

"We need to steer more students into technical careers. There are so many opportunities for them if they can get started in the right way. As a nation, we are rapidly outstripping the supply of students who want to major in science and engineering. We can import some, but we need to develop our talent right here."

"MATHCOUNTS is designed to motivate students when they are in junior high, in 7th or 8th grade. Junior high is where you start targeting education, students have electives and educational 'tracks.' This is where they first get exposed to mathematics as a science and a language. Waiting until Career Day in their junior or senior year of high school is too late. They won't have the right background, and it will be too late to pick up the right courses for a technical major in college."

"It is especially difficult to regain lost time with math courses. Math courses are tightly interlocked sequentially during these formative years, and you can't take three simultaneously if one depends on prior knowledge of the other."

"State and Chapter MATHCOUNTS volunteers start by sending information to counselors in approximately 300 junior high/middle schools. Each school then conducts its own competition for science and math students. The winners in each school comprise a team of four and a coach to compete in a county or regional run-off. Four teams from

each of these competitions move up into the state level to determine who goes on to the national meet in Washington, D.C. The national winners are honored by the President of the United States.

"Recently, I had the opportunity to be a proctor for the DeKalb County (Georgia) competition. It is just amazing to see the level of problems that these young students are able to solve. They are serious students, and well represented by minority members and women, which is very encouraging because it means we are reaching the 'non-traditional' students.

"This is a wonderful program for encouraging young students, but we need more activities like this. The level of interest and motivation was exceptional. They were cooperative, responsive, and disciplined. We need more programs aimed at this age group.

"There are more opportunities later to work with minority students and those with non-traditional backgrounds, but then we are playing 'catchup.' One of the best approaches is with a co-op program such as Georgia Tech has. I am a strong supporter of co-op programs, because you can place a student in a paper mill or design office to give them practical experience. These programs are undoubtedly the best way to attract to our industry young people who have committed themselves to a technical major. However, this method does not provide the broadened interest in science early enough in high school.

"We must depend on our teachers to develop and guide students in their career paths earlier in the school educational process. This requires more support than our Legislature is willing to grant in our one state, as we see teachers' salaries as a political issue and not a basic education benefit.

"We find that the math teachers look forward to participating in the MATHCOUNTS program as it develops enthusiasm among the students. These are the types of programs that technical societies and engineering societies should be involved with. We need to start supporting science at a far younger age than we have traditionally done. We need to sell students on the idea of pursuing a technical career. Industry has supported education well over the years, and this is just an extension of that support to students at an earlier age."

"The challenge to our industry is to extend our past support of the upper grades and college level to students earlier in the educational process. In accomplishing this goal, we must be assured we are reaching all of the qualified students—suburban, inner-city, and rural—to resolve the demographic differences that have been traditionally part of our engineering base."□

—Matthew J. Coleman