

A Survey of the Pulp and Paper Industry in Washington and Oregon

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EXECUTIVE SUMMARY

A Survey of the Pulp and Paper Industry in Washington and Oregon

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The primary purpose of this study was to gain a better understanding of the overarching trends in the pulp and paper industries in Washington and Oregon and their effects on future employment and workforce training. The study focused on three groups of hourly occupations: production, mechanical maintenance, and electrical and instrumentation maintenance. Interviews were conducted with representatives from 18 pulp and paper mills in Washington and Oregon regarding employment, recruiting and training. A brief summary of those findings and implications are provided below:

Industry Stabilization: After decades of consolidation and employment decline, employment at the mills in this study appears to have stabilized. A total of 9,621 full-time equivalents (FTEs) are employed by these mills. Of these, 7,449 (77%) are included in the three hourly occupational groups examined in this study. There are few current vacancies, and voluntary turnover in these jobs is less than one percent.

Over the next five years, employers expect to trim employment by a total of 491 FTE across the three occupational groups. More than half of these reductions will be achieved through non-replacement of retirees. State projections of employment suggest that long-term job growth (through 2020) will be modest, however projected retirements and a shrinking labor pool will generate increased demand for new hires and replacements due to internal promotions, including additional training to ensure worker productivity.

Industry Trends : Employers plan to continue investing in new equipment and technology in the future, especially in advanced electronics and computerized control systems. Greater dependence on technology has led to more sophisticated technical skill sets for employees in all three occupational groups.

Hiring Challenges: In production occupations, employers report that applicants often fail to pass the aptitude tests, which assess mechanical, math and other technical skills that are required for entry. Competition for skilled electrical and instrumentation (E and I) employees is high, as mills increasingly depend on these employees to support the new technologies that drive production.

Employee Training : There are few differences in training content or methods across the three occupational groups. Training is typically provided on an as-needed basis while on-the-job (OJT) and is usually focused on specific equipment and production processes. Small group and classroom-based training is less common, but there appears to be a growing use of computerized methods of job training. Training in soft skills such as teamwork or problem solving is not common, though soft skills are viewed as important by employers.

Skill Gaps and Future Training : Employers identified skill gaps and new training needs in several areas. In production, employers stressed the need for stronger basic academic and technical skills and an increased understanding of how production processes work as a system. For maintenance occupations the

primary need is in staying abreast of technical changes, increasing computer skills and cross-training in different job functions.

Employers reported a need for the development of non-technical soft skills for all employees, especially team-based problem solving, conflict resolution and communications. Hourly workers are increasingly expected to self-manage, which raises the importance of these skill sets for production workers.

In general, employers report that they want training that is module-based, offers flexible scheduling, and is relatively low-cost. Computer-based training, when used in combination with other forms (classroom, OJT) is likely to see increased use in the future.

College Partnerships : There do not appear to be many ongoing partnerships between these employers and local community and technical colleges. While employers value these institutions, they expressed some concern that colleges may not be able to provide up-to-date equipment for their programs and that colleges will not be able to deliver focused, short-term training programs with the logistical flexibility that meets their needs.

Strategies for Job Seekers : Employers provided recommendations for high school students, adult job seekers and laid-off workers. The recommendations for high school students focused on gaining a strong understanding of math, sciences and computers. Courses or experience in a trade and a familiarity with systems-thinking are also important. It is unlikely that a high school student will be hired directly after graduation so they should plan on spending an additional one to two years in college or the workforce first. For adult job seekers, demonstrating a solid job history and evidence of professional advancement is key. Adults may be wise to consider jobs where future growth may occur, such as in E and I. Laid-off pulp and paper workers who want to re-enter the industry will need to account for their time and show how their transition to other employment, education or other activities demonstrates a continued effort to develop new skills and abilities.

Implications

The Retirement Effect: Turnover due to retirements over the coming years may create a lack of skilled employees, as large numbers of highly-skilled workers retire and must be replaced by less experienced workers. Employer projections show that 1,344 workers are expected to retire from these companies over the next five years; this represents 18 percent of the employees in these key occupations. The maintenance occupations will be hardest hit, with almost one-quarter of the current employees retiring within five years (24% of mechanical maintenance, 22% of E and I maintenance). Turnover in the production occupations will be about 15 percent of the current employees. Since statewide industry figures for Oregon and Washington show that over half of the current employees are at least 45 years of age, the high retirement rates will likely continue for the foreseeable future.

Of the 1,344 expected retirements, more than 78 percent will be replaced. Comparing the three groups, mechanical maintenance occupations stand to be the most disproportionately affected: While 68 percent of these retirees will be replaced over the next five years, a total of 131 positions will not. It is unclear whether the net reduction in FTE in this category is due to increased automation and process improvements, cross-training, or future outsourcing of some functions; the explanation likely varies by employer. But it does leave open the question of how employers will compensate for the skill gaps that are likely to occur. The large number of retirements for production workers will pose similar problems, as those retirees also represent the highest-skilled workers in their group. The recruitment, promotion and training of some 1,055 employees could prove to be difficult for the industry given its current hiring processes and limited training infrastructure.

It may be difficult to find replacements for these highly-trained and skilled workers. Typically employees are hired at the entry level and promoted up through the company. While this may be an effective strategy during periods when retirement rates are low or fairly constant, having to replace large numbers of senior-level workers over a shorter time frame could be a challenge for some mills. This may cause a ripple effect with implications for employment and training throughout the companies: As skilled workers retire, companies will need to promote and train their replacements. Employment gaps created by those who move up will also need to be addressed.

New workers may need to be hired to fill gaps created at the entry level. As noted at the beginning of this report, however, the future labor pool for new workers will be smaller and less well-prepared, posing additional hiring challenges. Boosting the amount of outreach between industry and secondary schools is one way to attract more young people to the industry. The industry's reputation as a declining industry has caused it to lose much luster among young people as a future career choice, even in communities where the industry is well established. Most students (and teachers) are unaware of what the pulp and paper industry has to offer; that lack of understanding and stigma as a dying industry will need to be addressed.

Changing skill requirements in this industry also call into question the efficacy of current applicant aptitude testing and assessments. As the industry begins to increase hiring to replace positions at the entry level, employers will need to take a hard look at the tools they use to determine if an applicant has the optimal mix of aptitude and attitude. The results of this survey suggest that many employers may need to upgrade their existing testing instruments to tools that do a better job of recognizing the new skill needs that have emerged over the past several years.

Training for the Future : One important implication of this internal “churning” caused by retirements, promotions and replacements is that each move is likely to require additional investments in training. As noted in this report, the overall level of skills employers will require in the future is likely to increase. Since this is an industry that has traditionally promoted from within, promotions and replacements will likely require increased capacity to train more employees, more often, in an expanding number of technical and non-technical areas.

This increased need for training will impact employers in two areas: 1) ensuring that applicants have the foundation skills necessary to succeed in the industry, and 2) providing incumbent employees with upgrade training as internal promotions shift employees up through the ranks.

Educational institutions are the primary provider of the foundational skills that young people will need to enter the industry. Increased support from the public schools, colleges and other training and service providers will be needed to share in this work: Training topics are becoming increasingly complex, and the breadth and depth of understanding needed to be an effective employee has increased. In short, the foundation skills required for employment in this industry are rising. The educational institutions that provide programs in support of this industry need to ensure that these skill requirements are reflected in their curriculum. Current efforts to develop industry-based skill standards will go a long way to ensure that training programs are on the mark.

Retirements and job promotions will increase the overall need for upgrade worker training, yet it is unclear who will provide this new training and how it will be done. For employers, expanding their relationships with local and regional colleges and other training institutions would be a wise short-term goal. This will enable colleges to better understand the specific upgrade training needed by different employers and the methods of delivery that can best meet their needs. Even colleges that are very

responsive will need time to develop new programs to address the training topics and delivery methods that employers mentioned in this study. The point is to identify what training will be required in advance, so programs are ready to be delivered when they are needed. This can only occur through more formal efforts to establish ongoing partnerships between these stakeholders.

Future research should be conducted that focuses on the effects of projected retirements and job promotions in these occupations for different regions of the state, including the anticipated demand for training and workforce development services.

INTRODUCTION

THE PULP AND PAPER INDUSTRY IN CONTEXT

The pulp and paper industry plays a prominent role in the U.S. and world economies, generating annual worldwide revenues in excess of \$500 billion, one-third of which is attributable to the U.S. industry.¹ In 2004 this industrial sector employed nearly 500,000 workers nationwide at an average hourly production wage of \$17.90.² In 1996, the total value-added of the sector was \$72.3 billion, nearly twice that of the lumber and wood products industry.³ Today, there are around 500 pulp and paper mills in the U.S., with production facilities located in 44 states.⁴

The pulp and paper making process is highly capital-intensive, and companies have experienced significant technological changes since the middle of the last century. Companies invested in new equipment and made process improvements that greatly boosted production efficiencies and increased output of modern paper machines to more than 500,000 tons per year.⁵

Despite these new technology investments and improved efficiencies, over the past 30 years the U.S. pulp and paper industry has experienced a spiral of decreasing profitability caused by global and domestic overcapacity and new low-cost global production facilities, which in turn generated downward pressures on both prices and costs. This led to a deterioration of shareholder values, share prices and financial solvency. Worldwide capacity has been estimated to be 15 to 20 percent more than sustainable demand.⁶ Due to intense competition from lower-cost foreign producers, the U.S. has changed its role from a leading exporter to a net *importer* of pulp and paper products today. Industry consolidations and acquisitions, vertical integration of pulp and paper mills, and continued investments in process technology and workforce reductions have leveraged existing capacity, further increased production efficiencies, and enhanced profitability, stock values and returns to investors.⁷ Yet these changes have not appreciably restored the economic condition of the industry as a whole.⁸

More recently, the pulp and paper industry in North America has benefited from a weaker U.S. dollar, combined with a moderate cyclical market upturn that has seen prices, volumes and financial performance of the industry improving.⁹ However, industry observers note that these short-term improvements—unless sustained over many years—are not sufficient to compensate for several decades of tepid financial performance and the weak competitive position that endures today.¹⁰

The Human Capital Connection

Efforts to improve industry performance have relied heavily on new capital investments in larger, faster and higher-capacity machines and new process technologies. However, there have also been many efforts to integrate workplace innovations such as total quality management, employee involvement, self-managed work teams, and high performance work places (HPWP) in concert with technology changes.¹¹

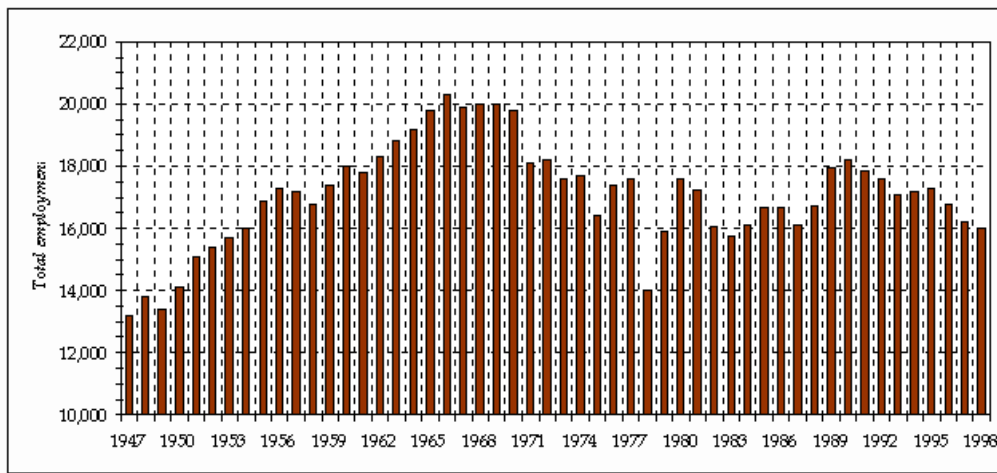
Changes due to technological innovations and workplace transformations generally underscore the importance of a well-trained workforce. In many countries the skills and quality of the labor force has long been an industry focus. The need for a more skilled workforce has also grown among U.S. companies over the past half-century, and is increasingly considered as a critical source of competitive advantage to U.S. pulp and paper producers. The American Forest and Paper Association's "Agenda 2020" identified the need for better-trained, technically skilled employees as essential to staying competitive in today's global economy.

As described later in this study, enhancing the skills and quality of new and incumbent workers is also viewed as central to improving the competitiveness of the pulp and paper industry in the Pacific Northwest.

THE PULP AND PAPER INDUSTRY IN WASHINGTON AND OREGON

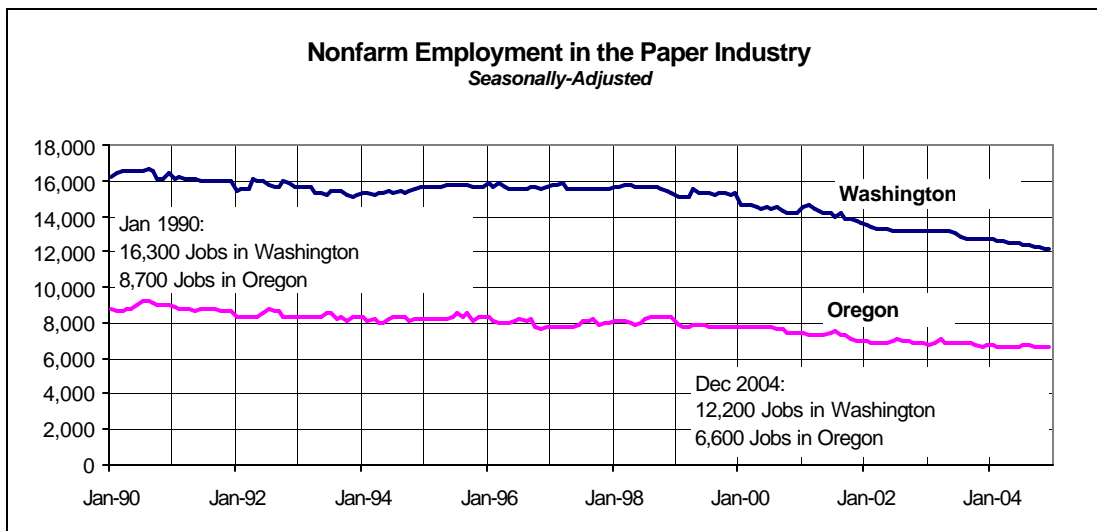
The downward employment trends in the national pulp and paper industry have been even more pronounced among companies in the Pacific Northwest, where there has historically been a high concentration of this industry, due in part to its proximity to abundant natural resources and a well-developed forestry industry. As shown below, employment in Washington’s pulp and paper industry peaked in the mid-1960s at over 20,000 employees.

Figure 1
Employment in Washington Pulp & Paper, 1947-1998
Source: Washington Employment Security Department



In Washington and Oregon, where the industry experienced solid growth and profitability through the 1960s, pulp and paper has continued to experience a downward trend over the past several decades. Although Oregon did not experience as severe a decline in employment as Washington from the mid-1970s through 1990, employment in both states has continued to experience a gradual yet steady decline, with somewhat deeper declines for both states occurring over the past six years (see Figure 2).

Figure 2



More recently, as the U.S. and state economies have improved, employment reductions appear to have slowed, and the market for pulp and paper products has improved somewhat, suggesting that the industry has probably stabilized for now.

An Economic Engine

The Northwest pulp and paper industry is a significant economic driver for both states, providing employment with wages that exceed the overall average for manufacturing. In 2003 total payroll for the industry was over \$727 million in Washington, and \$404 million in Oregon.¹² As shown below, inflation-adjusted wages in Washington have continued to rise, with an average annual wage of \$56,389 in 2003.¹³ A somewhat different pattern occurred in Oregon during the same period, where wages vacillated and dropped slightly, then increased to an average wage of \$59,441 in 2003.¹⁴

Figure 3

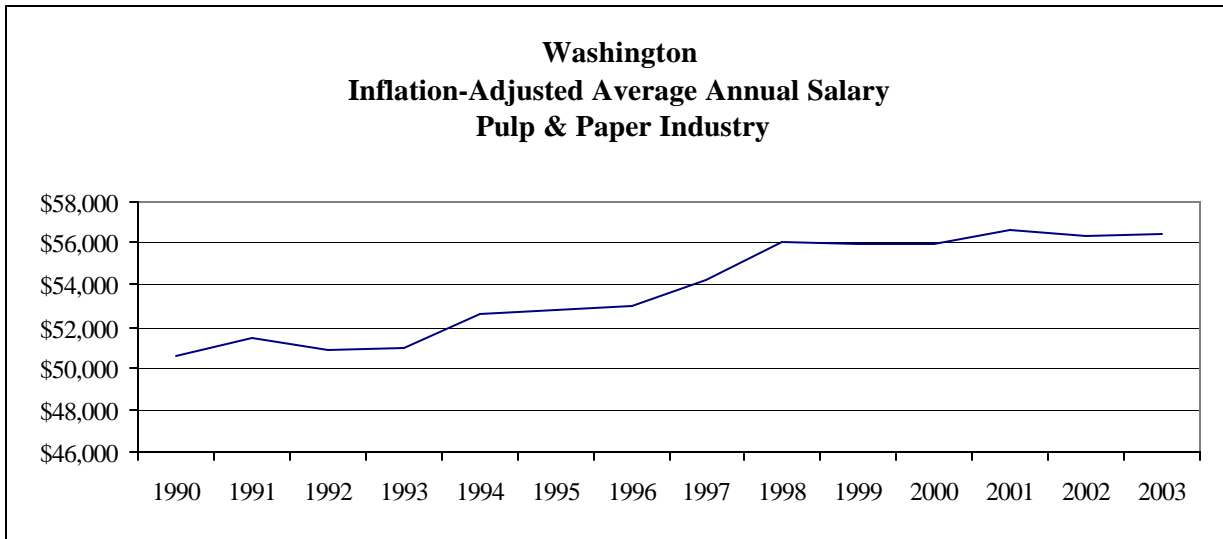
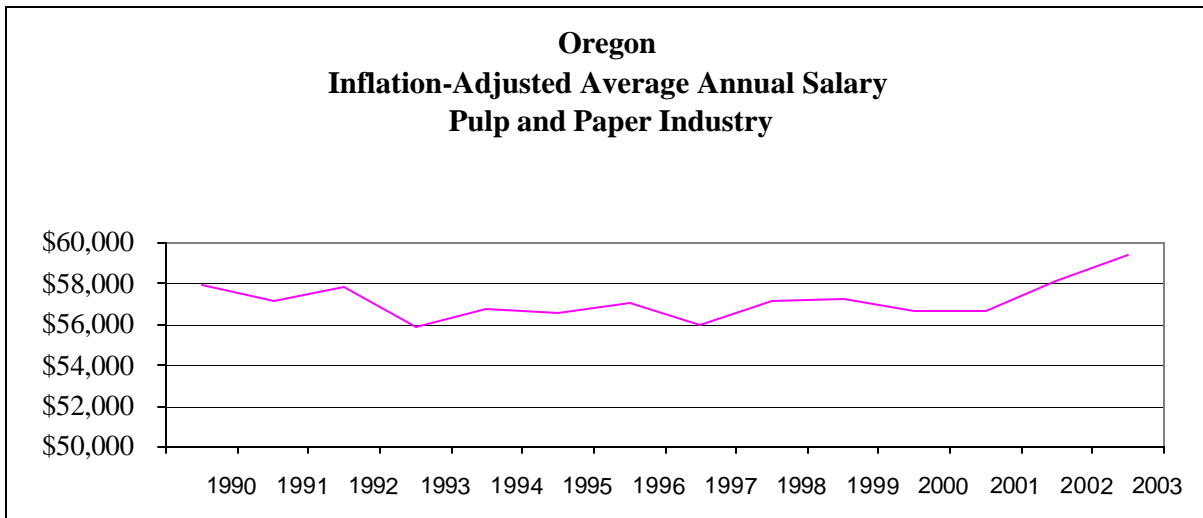


Figure 4



In addition to a competitive family wage, this industry offers employees excellent health care and retirement benefits. Moreover, in both states the pulp and paper industry generates a high “multiplier” effect, where each pulp and paper job supports the creation of additional jobs in other sectors of the

economy. In Washington, pulp and paper has the second-highest employment multiplier of all manufacturing sector jobs in the state: each pulp and paper job supports the creation of 4.7 additional jobs in the state.¹⁵ In Oregon this multiplier effect ranges from 2.2 to 4.4.¹⁶

Long-Term Employment Forecasts

Some forecasts suggest that employment in paper and paper products will continue to stabilize over the next 25 years, buoyed by higher demand as personal income grows at home and abroad. However, employment growth is predicted to be marginal for the industry as a whole in Washington State: The Office of Financial Management (OFM) forecasts that annual employment in the paper and paper products industry will not grow until around 2010, when employment will see a modest 0.5 percent increase through 2020.¹⁷ Washington's Department of Employment Security projections are slightly different but tell essentially the same story: that employment in paper and paper products will increase only slightly, growing just 0.2 percent between 2007-2012 to employment of 13,300.¹⁸ This is the same rate of growth forecast for the state's entire manufacturing sector during the same period, and slightly better than forecasts for related sectors such as wood products or printing. As the OFM report noted:

Many of the same forces affecting lumber and wood products apply to the pulp and paper industry. Environmental laws have significantly affected the paper industry's production requirements, and limits in log harvesting and processing have affected the supply of raw materials. Indeed, these factors have contributed to several plant closures in the state during the last decade. To its advantage, the paper industry is somewhat more flexible than lumber in acquiring raw resources. Chips can be imported and recycled paper can be used. Many paper plants already process a significant amount of recycled materials. A significant portion of the industry's production in Washington is exported (p. 3-6).¹⁹

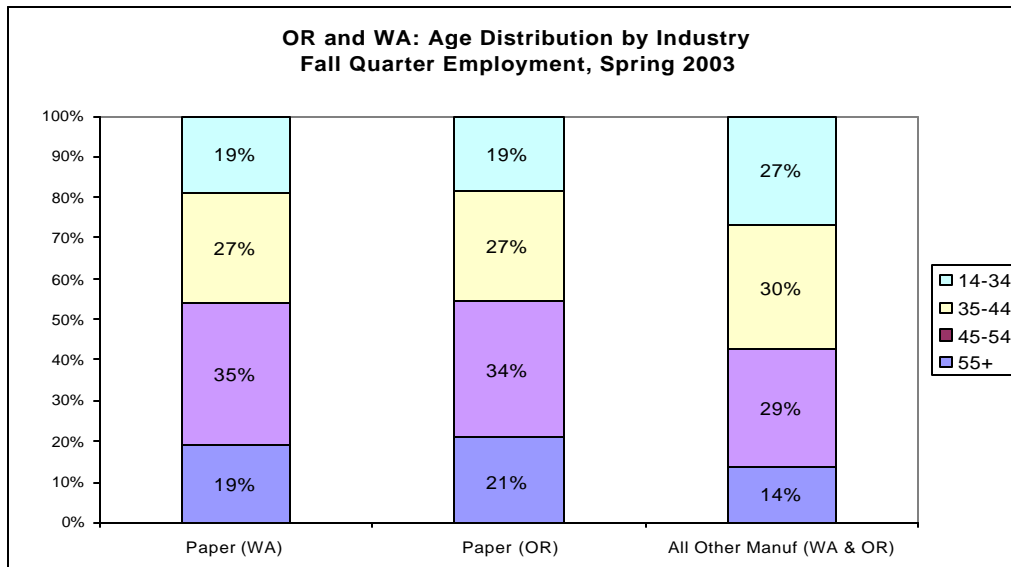
In Oregon, the long term forecast is less favorable: The Oregon Employment Department projects that employment in paper manufacturing of around 6,600 will decline by 12 percent between 2004 and 2014—a net employment loss of around 800.²⁰ In related industries, wood products is projected to see the largest decline, with a loss of around 1,700 during the same period. While these employment trends are cause for concern, just as in Washington these declines are occurring at a much slower rate than in the prior decade.

Population Dynamics: A Changing Labor Force

Changing labor force demographics and projected retirements in the pulp and paper industry portend additional challenges for employers in Washington and Oregon. Put simply, over the coming decades the pool of working age adults will shrink, while retirements among the most experienced workers in this industry will grow. These factors may make it difficult for pulp and paper employers to attract and train employees to fill positions that become available due to retirements and internal promotions.

As shown below, the demographic profiles of this industry in these two states are remarkably similar. Past cycles of employment reductions weeded out many of the younger workers with less seniority. Hence, the pulp and paper industries in both states consist of large cohorts of employees that are fast approaching retirement age. Over half the employees are at least 45 years old. (See figure on the following page.)

Figure 5



Long-term population forecasts for both states suggest that the distribution of working-age cohorts will slow considerably through 2030, even as the total population increases. In-migration will likely moderate the decline in labor force growth, but it will likely not reverse the trend.²¹ Between 2004 and 2030, the number of Washington workers over 55 years old will increase by about 89 percent, while those aged 16 to 54 will increase by only 22 percent. In short, the pool of available working-age individuals is likely to shrink over the next 25 years, which could make it more difficult for pulp and paper employers to hire new workers or to recruit experienced workers from other industries or competitors.

In Southwest Washington, the projected employment drop-off is even more severe than for the state as a whole: Of 3,916 workers employed in the pulp, paper and paperboard mills during the second quarter of 2003, around 41 percent were 45-54 years old, and 21 percent were 55-64 years old. This age differential—the difference between “boomer”-aged workers (45-54) and those in the next older age group (55+)—is around 20 percent, among the highest of all industries in the region. These combined groups represent around 60 percent of total employment, and show that over the next 20 years turnover due to retirements is likely to be large and continuous. More immediate is the retirement of a large group of very experienced older workers, and the skill gaps their departure could create. As Bailey (2004) has noted, the combination of slow growth in the future working-age population and an imminent wave of retirements suggests that the pulp and paper industry will need to make some adjustments to cope with these changing demographics.²²

The racial and ethnic composition of the labor pool will also change: labor force growth rates of non-white and especially Hispanic persons of working age are expected to be considerably higher than for whites. Continued racial and ethnic diversification poses some critical issues for employers, including those in the pulp and paper industry: As new technologies and process changes continue to be implemented, employer expectations about the skill levels required of workers have increased. However, participation rates of non-whites in secondary and post-secondary education remain far below those of their white counterparts.²³ For instance, in 2000 only 53 percent of the Washington Hispanic population 25 years or older completed high school or equivalency, compared to 90 percent for the whites in the same age group.²⁴ In short, another challenge to the Northwest pulp and paper industry is that the future pool of new applicants are likely to be much more ethnically diverse than it is now; but these same individuals may be less well prepared than those who have been hired in the past.

RESEARCH METHODS

WSU researchers met with project sponsors and stakeholders to determine the design for this project. It was decided that telephone interviews of all major pulp and paper mills in Washington and Oregon would be conducted. Telephone interviews were deemed preferable to a mailed questionnaire because of the qualitative nature of many of the questions. The one-on-one nature of the telephone interviews also helped to ensure good response rates from the industry.

A total of 19 pulp and paper mills were identified by the project sponsors and Skills Panel members. Contact information was collected for each company; a number of contacts were identified by members of the Pulp and Paper Skills Panel, who had personal contacts at most of these companies or were among the interviewees themselves. Staff from Lower Columbia College distributed a notice informing each company about the purpose of the study and formal invitations were extended. This included sending a letter and information briefer via email to each company.

Each company was asked to identify an internal coordinator whose job it was to help identify, secure and schedule interviews with appropriate individuals. The letter and information briefer was forwarded to each interviewee by the coordinator or by WSU.

EMPLOYER INTERVIEWS

We prepared and used a detailed interview protocol (see Appendix A) that included questions on the following categories of information:

- Employment trends, wages, turnover and anticipated retirements
- Future employment demand forecasts
- Future industry changes
- Assessing applicant qualifications
- Current training provided and delivery methods
- Training investments and budgets
- Future training needs and delivery methods
- Strategies for job seekers – how they should prepare to enter this industry.

Interviews were conducted in April and May. A total of 24 interviews were conducted across the sites. Only one of the 19 mills contacted did not participate in the study. In several cases, due to incomplete data, questions about data elements or calculations, the quantitative data was integrated and returned to contacts at the company, who corrected or verified the data.

Typically, interviewees included the human resources manager but sometimes included one or more of the following:

- Training and Development Managers
- Business Development Managers
- Operations Managers
- Plant Supervisors
- Maintenance Superintendents
- Engineers

Occupational Groups

It was determined during the design phase of the project that the primary units of analysis would be three different groups of hourly workers. Specifically, data was collected for workers in hourly production occupations, and workers in two different types of maintenance occupations:

- **Production occupations**: Machine setters, operators, tenders, and similar occupations that are **directly** tied to regular production work.
- **Mechanical Maintenance occupations**: including millwrights, machinists and related maintenance/repair occupations that **support** production work.
- **Electrical & Instrumentation Maintenance occupations**: including electricians, electronic system and instrumentation technicians, and related occupations that **support** production work.

FINDINGS

Our data analysis approach summarized the quantitative responses and identified the primary themes contained in the qualitative responses. All findings are presented in aggregate form to ensure the anonymity of each respondent.

STAFFING TRENDS: CURRENT STAFFING AND PATTERNS OF JOB GROWTH

The first set of interview questions focused specifically on budgeted staffing patterns in Full Time Equivalent (FTE) units for each of the three occupational groups. Historic growth patterns (past 3 years), projected FTE growth over the next two and five-year periods, and replacements due to turnover and retirements were the primary focus of data collection and analysis in this section.

Currently Budgeted FTEs

As shown in the table below, production employees account for the bulk of employment at these sites (56 percent), with 5,382 FTEs. The maintenance fields are more specialized and have smaller departments and staffs: There were 1,485 FTEs in mechanical maintenance and 582 in electrical and instrumentation (E and I) maintenance.

In our interviews with employers, we found that the division between these three occupational groups was not always clean, due in part to participation in apprenticeship programs in the maintenance fields: Since internal promotion is highly valued in the pulp and paper industry, most of the apprentices are selected from within the company, usually from the production ranks. A few companies include the apprentices in the count of mechanical or E and I maintenance, while others tally them in production until they complete the apprenticeship.

Table 1

Current FTEs per Occupational Group		
Occupational Group	FTEs	Percent of Total Employment
Production	5,382	56%
Mechanical Maintenance	1,485	15%
Electrical and Instrumentation Maintenance	582	6%
Total Employment in the Occupational Groups	7,449	77%
Total Employment at the 18 Mills in the Study	9,621	100%

Historic Staffing Trends: Changes in FTEs over the Past Three Years

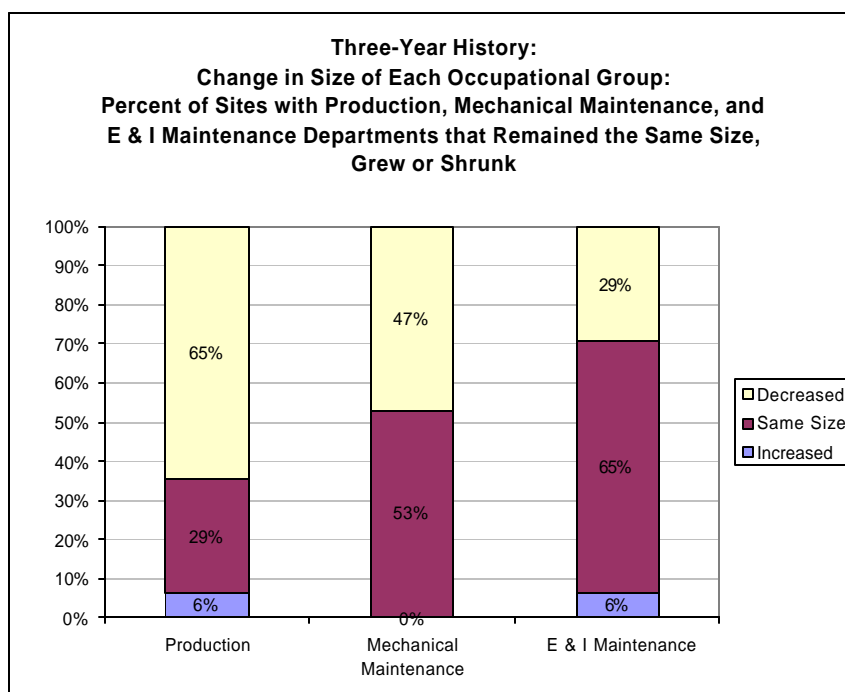
In the past three years, the production, mechanical maintenance, and E and I maintenance departments stayed the same size or decreased in size at most of the mills interviewed. As shown below, almost two-thirds of the mills (65%) reported that they employ fewer FTEs in production occupations today compared to three years ago. Almost 30 percent of the mills stated that their production departments have

remained the same size over the past three years. Only one of the 17 mills that provided data for this question reported growth in the number of production FTEs.

Mechanical maintenance departments were about equally likely to have stayed the same size (53%) or declined in size (47%). Electrical and instrumentation maintenance departments were the most likely to have remained the same size (65%), and only about 30 percent of the companies reported that their E and I departments employ fewer FTEs than three years ago.

This pattern seems consistent with the general shift in the industry towards more automated processes, which has reduced the need for production employees. Comments by employers also suggest that the reduction in production occupations has been partially offset by a growing dependence on E and I maintenance employees to install, operate and service the technologically-sophisticated new equipment.

Figure 6



The data also allowed for a comparison of changes in FTE employment among the three occupational groups. As shown below in Table 2, over the past three years (2002-2005) the total number of FTEs has declined in each of the three occupational groups, with the steepest percentage declines occurring in mechanical maintenance occupations (-14%).

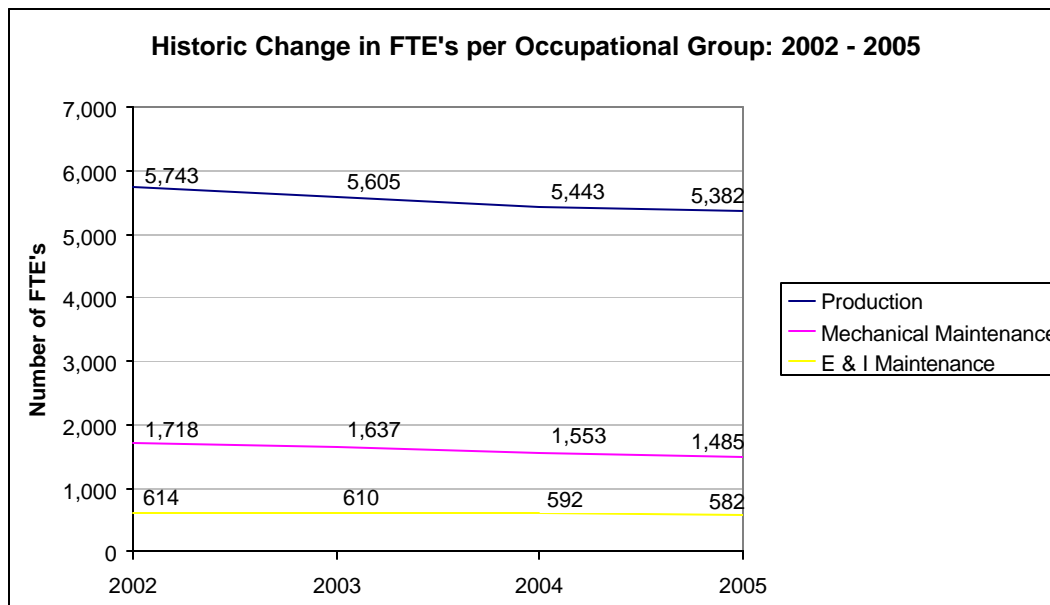
Table 2

Historic Change in FTEs per Occupational Group (Past Three Years)			
Occupational Group	Number of Mills²⁵	Net Change in FTEs	Percent Change in FTEs
Production	17	-361	-7%
Mechanical Maintenance	17	-212	-14%
Electrical and Instrumentation Maintenance	17	-29	-5%

What is more interesting is the trajectory of these declines since 2002: In general, the data suggest that employment reductions in each occupation leveled off over the three-year period, with fewer overall reductions in each occupational group occurring in the later years.

This trend toward stabilization is consistent with the labor market data trends and comments from employers that employment reductions prior to 2002 were generally more severe. For instance, one employer reported that employment at his plant has declined 32 percent since 1990. As another employer noted: “We haven’t hired many people in operations since 1997. In the early 90s we had around 1,400 employees at the plant. It has pretty much been going downhill ever since.” They have 510 employees today.

Figure 7



Projected Staffing Trends: Changes in FTEs over the Next Two and Five Years

Although employment declines have leveled off somewhat, employers report that there will continue to be some reductions in the number of FTEs in all three occupational groups over the next five-year period. As shown on the next page in Figure 8, these declines are expected to be relatively gradual.

More than half of the companies (56 %) reported that they expect to trim production employment further over the next five years, either by reducing the number of existing positions or by not replacing positions vacated by employees who retire over the next five years. As shown on the next page in Table 3, the 18 mills expect to trim an additional 325 production positions over the next five years. This 6 percent decline is relatively modest compared to the total employment of production workers. No employers anticipated adding any new production FTEs during this period.

Fewer than half of the mills (47 %) expect to reduce mechanical maintenance positions over the next five years; however, the numbers are proportionately larger than for production workers. As shown below, employers expect to trim 151 positions from this group, for an overall reduction of 10 percent.²⁶ Only one employer expected to add any new mechanical maintenance employees.

Only about 29 percent of employers (5) expect to reduce the number of electrical and instrumentation maintenance positions over the next five years. Indeed, most employers (65 %) anticipate that employment in these occupations will stay the same; one employer expects to increase the number of FTEs in this occupational group over the next five years.

Figure 8

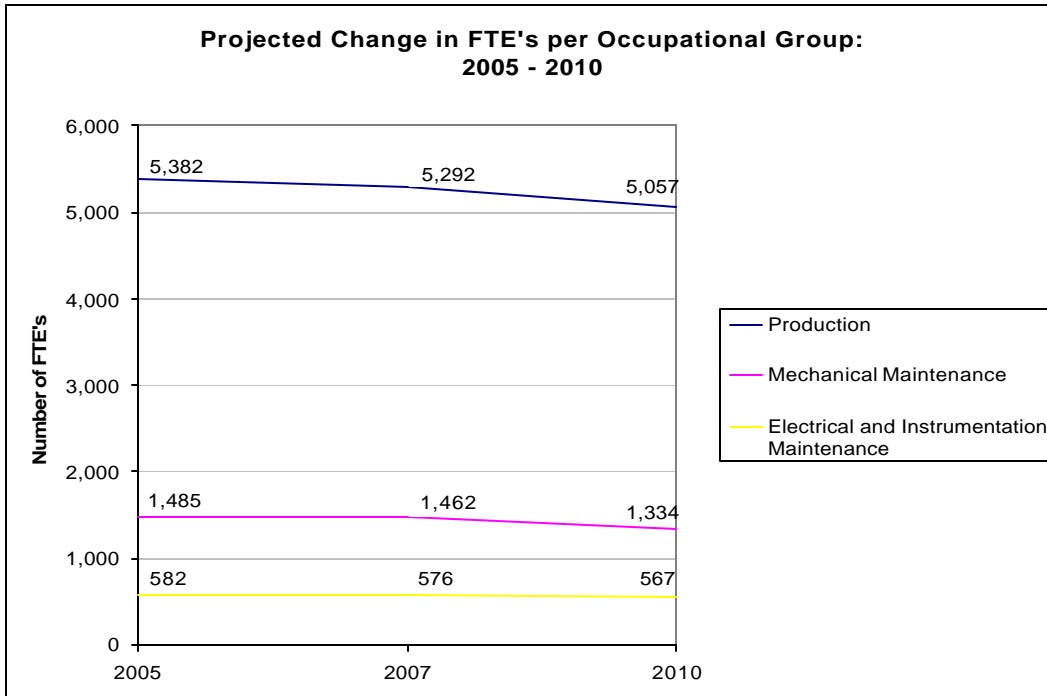


Table 3

Occupational Group	Number of Mills	Net Change in FTEs	Percent Change in FTEs
Production	18	-325	-6%
Mechanical Maintenance	18	-151	-10%
Electrical and Instrumentation Maintenance	18	-15	-3%

Retirements and Turnover

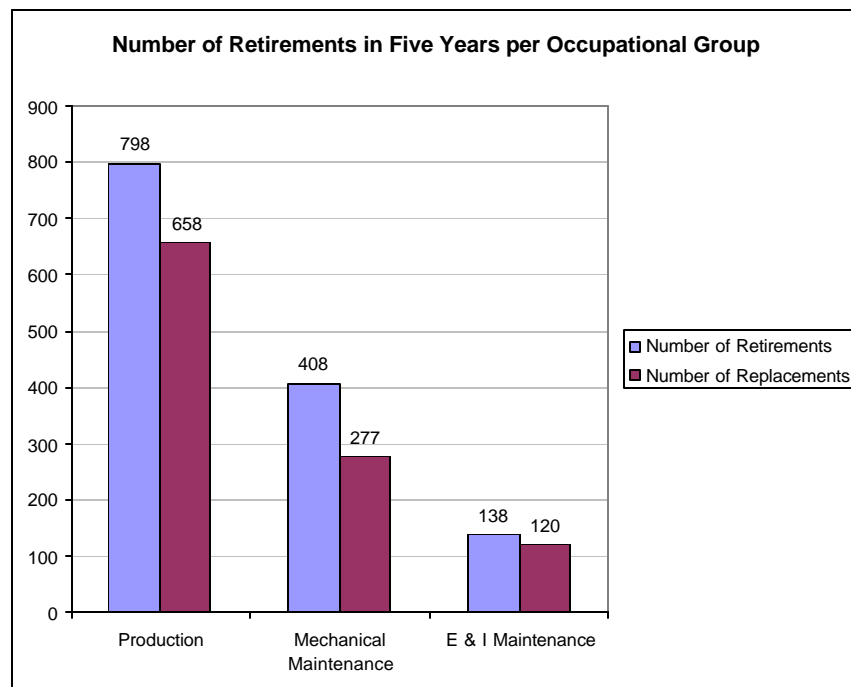
As mentioned earlier, most companies expect employee retirements to account for additional reductions in employment over the next five years. Indeed, a few companies reported having achieved nearly all of their past FTE reductions through retirements. Non-replacement of retirees will account for 59 percent of the anticipated reductions in all three occupational groups over the next five years.

Taken overall, of the 1,344 expected retirements that are forecast to occur for all three occupational groups, around 78 percent of those FTEs will be replaced. Employers indicate they plan to hire, promote and train employees to fill the 1,055 FTE positions that will become available due to retirements over the next five years.

As shown below, the distribution of retirements and replacements varies somewhat among the three occupational groups:

- For production occupations, employers anticipate a fairly large number of retirements over the next five years (798), which accounts for around 15 percent of current production employment. Employers anticipate that 658 (82%) of the production retirements will be replaced.
- For mechanical maintenance, the proportion of anticipated retirements is proportionately greater. Anticipated retirements of 408 employees represents around 24 percent of all current mechanical maintenance employment. Employers report that they will replace 277 (68%) of the mechanical maintenance retirees. This represents the largest net reduction in FTE (-131) among the three occupational groups.
- Finally, for electrical and instrumentation occupations, the number of expected retirements over the next five years (138) are comparatively high at around 22 percent. Employers expect to replace 87 percent of these positions with new workers, however, so the total number of FTE reductions for this occupational group will be relatively low.

Figure 9



Voluntary turnover (excluding retirements and terminations) has averaged less than 1 percent per year for the past three years in all occupational groups. In most cases, employment in the mills is highly sought after, and employees tend to remain with the company. As one respondent stated, “these jobs are good jobs in this community”. What little turnover exists is generally due to the difficulties of shift work, which varies among employers. For instance, some mills run on a rotating 12-hour shift schedule, which requires two 12-hour day shifts, two 12-hour graveyard shifts, and then four days off. “The people who adjust well love the schedule,” said one employer.

However, not all employees flourish in this environment, and the rigors of shift work are often a shock to new employees. As one employer noted: “We choose good people but they don’t always realize what they are getting into. The majority of people we lose are because of that [difficulty adapting to shift

work].” Shift work is especially challenging for new hires because the seniority system gives employees with more tenure at the mill greater personal flexibility for structuring their hours and shifts. Newer employees have fewer options and tend to work the less-desirable shifts, which can contribute to turnover.

Current Vacancies

At the time of the interviews, there were 36 job vacancies across the three occupational groups. As shown below, production accounted for the largest number of current openings. Given the long history of employment reductions at most mills, the low number of vacancies does not seem especially surprising. It is worth pointing out that the number of openings in E and I maintenance occupations is proportionately higher than the other two occupational groups.

It should be noted that these data represent a snapshot view of openings at the time of the interviews. Of course, employment openings are in a constant state of flux so these numbers may or may not be representative of the overall hiring landscape at other times. Several employers noted that they had “just filled” one or more positions in some of these areas.

Table 4

Current Vacancies per Occupational Group	
Occupational Group	Vacancies
Production	23
Mechanical Maintenance	6
Electrical and Instrumentation Maintenance	7

Wages

The Figures on the following page depict the median wages and wage ranges reported for each occupational group at the entry level and after 10 years of experience.²⁷ Figure 10 shows that the median entry-level wage for production workers—the “middle” wage in the distribution of wages reported by employers—was \$18.19 per hour.

Median wages for both mechanical and E and I maintenance occupations at the entry level were identical. This is because at most mills, these employees are part of the same general maintenance department, and these occupations follow the same negotiated wage scale. It should also be noted that while employers frequently cited different wage ranges for maintenance occupations, few mills hire maintenance employees at the entry-level. In most cases, apprentices or other trainees earn a lower wage while they participate in training, which increases incrementally following completion of training and performance milestones built into the program and wage agreement.

At 10 years of experience median wages increase considerably for production workers to \$24.34, and the range of wages narrows. As with entry-level maintenance wages, experienced mechanical and electrical and instrumentation employees command identical median wages. Here the range is considerably narrower, which reflects union bargaining agreements on wages, which are generally uniform for maintenance occupations.

Figure 10



Figure 11



Industry Trends

The most commonly cited trends reported by the pulp and paper employers included in this study are increased levels of automation and use of distributed control systems.²⁸ As mentioned in the introduction of this report, the continued application of new automation systems is associated with a general decline in the number of production workers, both historically and in future estimates. In particular, manual labor production jobs will become scarcer. One respondent explained the situation this way: “We can’t afford to pay someone \$20 an hour to clean up. This is a very competitive business; foreign firms pay very low wages. We have to reduce those costs.”

As production occupations de-emphasize the focus on physical labor, employers report that these jobs will become more technical and require new skill sets. These employees will need to be comfortable working with computers. Equipment monitoring will most likely take place in a control room, rather than on the floor, with a single employee monitoring multiple pieces of equipment. Production employees will need a higher-level understanding of the systems and processes throughout the plant, not just their department or piece of equipment.

Mechanical maintenance jobs are also becoming more technical. Employers are focusing more on predictive/preventative maintenance, particularly in the area of precision measurement devices. This is a shift away from the historical focus on installation and repair. Cross training is also becoming more common in the mechanical maintenance occupations.

As the plants become more technologically sophisticated, employers’ focus is shifting away from production positions and towards the highly skilled electrical and instrumentation maintenance occupations. Within E and I maintenance, upgrade training in the complex electrical and instrument technologies is ongoing. Many of the control systems require programming skills.

Some respondents mentioned mill-specific future trends, such as diversifying the product line, installing turbine generation equipment, and improving documentation of equipment and processes. Increasing use of video tracking systems, vision technology, and the use of computerized displays to collect, analyze and use data, were also cited by some employers.

RECRUITING

The recruitment and selection of hourly employees was another area of interest to project stakeholders. The data from these mills shows that relatively few employers have hired many new employees over the past several years. However, the changing nature of production work and projections for retirements suggests that recruitment and selection practices are an important topic for employers, who may need to adjust their selection and training functions to address changing labor market conditions and skill requirements in the future.

Assessing Applicant Qualifications

Production Applicants: For the production positions, all the mills in this study assess applicant qualifications with a combination of resume review, testing and interviews. Initial applicant screening is occasionally done by an outside entity, such as the regional employment (Worksource) office. The mills first review an applicant’s work history and education. Employment stability is the most important factor at this point. Although work experience in the pulp and paper industry is an advantage for applicants, it is not a necessity.

Testing: The applicants selected out of the pool of resumes are invited to complete a series of tests. The battery of tests most often includes the following five:

1. Bennett mechanical aptitude
2. Math
3. Perceptual speed
4. Written communications
5. Spatial visualization

Some employers use the following tests instead of (or in addition to) the previous five:

- SRA Mechanical Aptitudes Test. Composed of 3 major components of mechanical aptitude: mechanical knowledge, space relations, and shop arithmetic
- SRA Verbal Form A. General ability test. Used as a measure of an individual's overall adaptability and flexibility in comprehending instructions and in adjusting to alternating types of problems.
- Flannigan Mechanical test. Measures a person's ability to understand mechanical principles and analyze mechanical movement.
- Test of Adult Basic Education (12.9 grade level required)
- Manual speed and dexterity

Structured Interviews: The structured interview process generally involves multiple interviewers. Sometimes the interviews are conducted in a single interview with a panel of interviewers. Other employers divide the interview protocol into separate topics and have the applicant complete a separate interview for each topic. At some mills, the Human Resources department participates in the interviewing process, while at others the interviews are conducted entirely by the hiring departments themselves. The structured interview generally examines attitudes towards supervision, safety, and teamwork, among other topics.

Many employers use the Nowlin selection process. This process includes a battery of tests (the first five tests mentioned above) and a structured interview.²⁹ This process culminates in a master score for each candidate. This score attempts to predict the candidate's likelihood of success in this type of career. The applicants are then ranked, and hiring decisions are made. Some employers simply hire from the top down depending on how many positions are open. Others are more stringent in their requirements. For instance, one respondent mentioned that their goal is to hire applicants who score at least "one standard deviation above the average."

For some employers, the Nowlin process seemed to work well, while others are moving away from it. The unsatisfied employers found that the process encouraged the hiring of people who were "nice but unqualified." They want to move to an application process that requires more of a focus on an applicant's practical demonstration of skills.

Background Checks: The final step in the hiring process is to complete background checks (employment, criminal, driving, verification of school records), drug tests, and physical tests. This process and the methods used vary from employer-to-employer.

Maintenance Applicants: For most employers, hiring for mechanical and E and I maintenance positions is based on the same process as for production workers; however, employers tend to place a higher emphasis on the mechanical test scores and interviews. Some tests have different (and typically higher) cut-off scores for maintenance occupations than for production. Maintenance applicants will sometimes be required to complete a hands-on skill test or simulated demonstration. One employer conducts a group dynamics test, in which the applicant works with a team to resolve a problem. They are scored on observed interactions, teamwork, and results. The applicant may also have to complete a state-required test for the specific trade, such as electrical maintenance or pipefitting. Some companies have developed

internal tests for maintenance millwright and E and I maintenance. Unless the mill has an apprentice program, they generally hire only journeyman-level applicants.

Hiring Challenges

Testing: Employers reported that the main and most difficult challenge in hiring for entry-level production occupations is finding applicants who can pass the mechanical aptitude and math tests. Indeed, some employers reported having to process between four and 30 applicants for every candidate that they eventually hire. A manager described the difficulty in finding applicants with math skills: “Math is the test subject area most often failed by applicants. This is not calculus but basic computational math, fractions.”

Complicating the assessment process is the fact that some of the respondents reported that their entrance tests are out of date and should be revised. However, there was also reluctance among some employers to update their testing process because the current tests were so expensive to develop. As a result, there is a lot of institutional resistance to replacing or modifying these tests. As one respondent stated, “Corporate doesn’t want our selection system to change because it was a bear meeting the EEO requirements for the test; it was expensive so we’re stuck with it.” Some respondents would like to incorporate better screening of basic math, reading, memorization, and manual dexterity.

Employee Skills: The skills expected of production applicants have become more complex over time. One respondent explained the shift in skills expected of the production workforce: “In the past it was about brute force physical labor. As we automate more, strength is less important than intelligence and higher levels of skill. [In production employees] we need process understanding and a disciplined approach to doing the work.” Several other employers echoed similar sentiments about the increased importance of knowledge and technical skill over physical strength:

“There aren’t any unskilled blue collar jobs anymore.”

“The biggest thing we find in interviews is people who say ‘I’m a hard worker.’ They want to come and use their back, but that’s not enough.”

In addition to the math and mechanical skills, the mills also look for good physical capabilities, soft skills (interpersonal, communication, teamwork, and managerial skills), a high-energy, positive attitude, and an interest in lifelong learning.

Several employers reported that the local school systems are not doing enough to support the industry. They are finding that the schools are not developing sufficient math and computer skills. Others mentioned that high schools have reduced their emphasis on the trades, especially programs that would provide opportunities to become comfortable with mechanical, physical, and chemical processes. This reduced emphasis on vocational education has also decreased the awareness among young people about the pulp and paper industry as a viable career field. One manager asked “How do we backtrack into the colleges and high schools to get people to realize that these are viable jobs that have good benefits, and they ought to be thinking about them as more than just a fallback position?”

“There aren’t any unskilled blue-collar jobs anymore.”

Seniority Rules: Union-company agreements about seniority dictate that new hires will start at the lowest levels of a job classification, then move upward in rank and pay over time with satisfactory performance, moving into new positions as they become available. However, employers are very interested in attracting highly qualified (even over-qualified) entry-level employees because they are seeking applicants who have the skills and talents to be promoted to the highest levels over time. A manager

explained her hiring strategy: “[Our] expectation is you may hire in and do utility work and sweep floors, but we want those higher-level skills there because when it’s your turn to advance, you’ll need them.” Some employers noted that it can be difficult to find this ideal combination of “aptitude and attitude”, along with a willingness to start at the bottom of the organization. As another employer put it: “We’re looking for people who can come into this business and advance. They’re not going to be hired into the upper positions, but we expect them to be able to advance.”

Diversity: A number of respondents reported that finding qualified women and minority applicants is one of their major challenges. These respondents explained that their workforce does not reflect the demographic makeup of their community. They have found that the women and minorities who apply for positions often have difficulty passing the math and mechanical aptitude tests. Other respondents described their workforce as diverse and reflective of the overall community. It is not clear whether these employers are more successful than other companies due to particular recruitment or hiring practices, the makeup of the available workforce, or other factors.

Employee Referrals: Applicant referrals from current employees can be both a boon and a detriment to hiring new and experienced employees. While employees’ referring qualified applicants is generally encouraged, one respondent explained the difficulties caused by recruiting friends and family of employees: “The problem is they’re not always the best workers, or even the best qualified. There’s an attitude that they’re entitled to a job here because their relatives have a job. We need to be better disciplined about really evaluating the skills of new applicants.” Although few employers reported nepotism is a widespread problem, several admitted that it sometimes occurs.

Production Hiring: Some of the respondents report that there are no major difficulties with hiring in the production occupations. The employers who have no significant hiring challenges are generally located near large metropolitan areas. And, past employment declines in the industry may have produced somewhat of a “buyer’s” market for employers, who are selective about recruiting smaller numbers of new hires. One employer described their hiring situation: “When we run an ad in the Sunday paper, we get 800-1000 applicants. It’s a very good place to work. We draw from a quite large labor market area, centrally located between three metropolitan areas, so our population base is close to a half million.” Several other respondents mentioned that in the past they had few recruiting difficulties because they were able to draw applicants from other industries, such as aluminum, or from other manufacturing firms that were downsizing.

Maintenance Hiring: Most respondents stated that currently there were few major challenges to hiring qualified mechanical maintenance applicants. As noted earlier, many mills anticipate additional reductions in mechanical occupations in the future, but few cited any short-term concerns. It would appear that employers are satisfying their occasional need for additional mechanical maintenance employees through internal apprenticeship programs, or by attracting a sufficient pool of journey-level applicants.

In contrast to the mechanical maintenance occupations, competition for qualified electrical and instrumentation maintenance applicants is intense, especially for candidates with instrumentation skills in combination with pulp and paper industry experience. A number of respondents explained that there aren’t enough E and I journeymen in the field, and the schools aren’t producing them at a fast enough rate. With the continued trend toward increased use of automation, it can be difficult to find E and I applicants who have skills in the latest equipment, especially if they have been in the field for many years. (The digital automation skills may be quite different from the skills they were originally trained in.)

Employers who are looking for candidates with *both* electrical and instrumentation skills have an especially difficult time finding qualified applicants. At least two mills hire electricians and cross-train the instrumentation skills in-house because they’ve had such difficulty finding applicants with both skill sets.

Because there is such competition for E and I applicants, many respondents mentioned that it is a challenge to find applicants who are willing to relocate. Any internal limits on salary and tenure can also make it difficult to compete with other companies that offer a better wage progression or faster promotions. Mills located far from metropolitan areas also find it hard to attract qualified candidates.

Mills in the state of Oregon expressed frustration over the state licensing requirements for electricians. It is very difficult for them to find qualified applicants who also meet the licensing requirements. This requirement makes attracting out-of-state candidates especially challenging.

Minimum Qualifications for Entry-Level Production Occupations

About two-thirds of the employers require a high school diploma or GED from entry-level production applicants. Beyond that, there are few consistent minimum education or experience requirements. Some employers do not require high school completion or a GED, but the applicant has to pass the internal tests. Others expect to see up to two years of college.

Expectations regarding work experience also vary. Most respondents mentioned that experience in pulp and paper is desired but not necessary. Some employers require prior industrial experience. Others simply want to see two years of continuous employment, preferably with advancement. Some have no previous employment requirements. Prior work experience with shift work or physical labor could be an advantage. Employment or educational experience that shows mechanical aptitude is also desirable.

There are no minimum specific skills that are required by any employer. However, employers do look for evidence of the ability to learn and an interest in continued learning, such as taking classes after high school graduation, regardless of the subject. They look for people with a good work ethic and the motivation to advance up the job ladder. Applicants need the ability to understand mechanical processes and to interpret the mechanical functions as displayed on computers.

Employers would like to see good skills in communications, teamwork, and decision-making, and the ability to develop good managerial and leadership skills. In some mills, floor-level leadership is the purview of hourly employees, who are relied upon to manage their own operational groups. Some respondents reported that no upper-level managers are available after-hours or on the weekends; these mills depend heavily on hourly employees to ensure that the production system continues to function properly. Employees need to be able to make good decisions, avoid or resolve conflicts, and keep everything moving on their own.

TRAINING

In general, there are relatively few differences in the content and methods of training across the three occupational groups. Indeed, while we examined some of the differences in training for new hires vs. incumbent workers in each group, there were many consistent themes. In all cases, the provision of technical training and the emphasis on technical skills development is paramount. Non-technical “soft skills” training, while deemed desirable by all employers, is typically not provided by employers. On-the-job training (OJT) continues to be the delivery method of choice; however, there is increasing recognition of the value of other approaches. Training issues are described in the context of several different topics:

- Current training for new and incumbent workers
- Employee skill gaps
- Most effective training delivery methods
- Future training needs
- Training budgets and costs

Training for New Workers

For new production employees, most employers offer a formal orientation that lasts between 20 hours and two and a half weeks. The primary focus of these orientations is safety; however most companies include a broad range of additional topics, which may include any of the following:

- How to operate a forklift and other machines, such as cranes
- Company background, policies and procedures
- Human resources policies, such as harassment prevention
- Organizational culture
- ISO-related quality training
- Work process fundamentals (special topics such as heat exchange)
- Overview of the production process
- Ergonomics
- Environmental protection
- Cursory computer training

Most technical training topics for new hires are specific to a particular job, function and department. This training tends to be machine or process-specific, and is usually provided by pairing a new employee with an experienced operator or department supervisor. Some of the companies have a formalized “checklist” system for technical training whereby the employee either needs to complete certain tasks or be tested on various bodies of knowledge to complete their probationary period and to move up in the company.

One company requires employees to take a math class through the local community and technical college, along with a technology course specific to their job. The courses were designed internally by mill staff about 25 years ago. The technology courses are primarily self-study, and the math course is delivered via standard classroom instruction.

While some of the companies offer classroom instruction for at least part of the orientation, on-the-job (OJT) training is by far the most common training delivery method. OJT is most often conducted by an experienced peer, with whom the new employee is paired. Occasionally the new employees are simply assigned to a particular shift (2 new employees per shift). Beyond OJT, other less-used training methods employed by the companies for new hires include classroom instruction, computer-based training, and self-study guides, workbooks and manuals.

Most companies do not teach soft skills to new employees, though they expect new employees to exhibit them. The few organizations that provide training on soft skills in the new employee orientation tend to focus on teamwork, ethics, problem solving, and communications.

Since new employees in the maintenance occupations are journeymen, their training primarily consists of safety information and a general orientation to the mill. Some mills rotate the new maintenance employees through different areas of the mill, three months in each area, to give new maintenance workers familiarity in the production system and processes used in each area. Mechanical maintenance employees may also receive additional technical training on specific pieces of equipment.

Most of the training for the maintenance occupations is also via OJT. In general, maintenance workers receive a broader array of training than production employees, and the use of different training methods is more common. Other training methods include classroom instruction, self-study modules (via computer-based training and hard-copy manuals/workbooks), and checklists. Training is provided by in-house instructors, peers, consultants and vendors. It is conducted both on- and off-site. Employers reported that E and I maintenance employees are more likely to attend off-site training than mechanical maintenance workers.

Training for Incumbent Workers

As production employees move up in the company, they receive upgrade training for the next position they are about to begin. This training is usually conducted on the job, by shadowing the peer they will be replacing. Checklists are commonly used to ensure competency. Production employees also receive training in any new procedures and equipment at the mill. In addition, they also receive annual updates to their safety and compliance training.

Mechanical maintenance employees receive training in new equipment and processes, as well as ongoing training in technical topics, such as hydraulics, motors, pumps, wood, bleaching, chemistry, and electronics. They also receive general training in preventive/predictive maintenance, as well as vendor-specific training. Safety is also an area of regular training.

Due to the increasing reliance on automated systems, E and I training is a high priority, and tends to be more “continuous” than for the production or mechanical occupations. One employer explained the focus on E and I training at their mill: “There’s more structured training in E and I than anywhere else. We depend more and more on them to keep the plant running. They have to stay current.”

Like in mechanical maintenance, E and I maintenance employees receive training in new equipment and processes, along with ongoing training in topics such as distributed control systems (DCS), computer training, computer-based maintenance systems, and control and distribution systems. Regular upgrade training is provided on national codes and standards. Vendor training is also common, and regular safety training is expected.

As mentioned earlier, training in soft skills is not very common for any of the occupational groups. Employers who do offer soft-skills training incorporate the following topics: diversity and tolerance, communications, conflict resolution, and the “Seven Habits of Highly Effective People”. Production employees who move into team leader roles receive training in leadership, teambuilding, and coaching, among other topics.

As with new hires, trainers of incumbent maintenance employees include peers, vendors, and occasionally, consultants brought on-site. Sometimes employees are sent off-site for training; this is usually part of a train-the-trainer effort where they will bring the knowledge back to the mill and train others. One employer bought an old school building that they use for a training site. It gives them the option to provide “on-site” training without the distractions of being too close to the mill. The training delivery methods for incumbent maintenance workers include classroom, OJT, small groups on the production floor, checklists (sequential tasks to learn), online or computer-based training, and self-study via manuals and workbooks.

As companies delegate more day-to-day production management responsibility to hourly workers, organizational structures have flattened, and the need for mid-level supervisors has declined. This fact was mentioned by several employers and is instructive because of the implications for how mills conduct training. As one respondent noted: “One-on-one—supervisor to employee [is the best training method]. But we’ve got to figure out a different way because the supervisor position will continue to shrink, even disappear. A lot of their work will be replaced by computers, then hourly workers will have to run the show.”

Because supervisory positions are becoming scarcer, the old norm of one-on-one training with a supervisor is becoming less common. In addition, many companies have increased their reliance on computer-based training modules. In some companies, computer-based training is used to deliver policy-level information, and at others, technical training is provided via computer modules. Some companies have developed their own computer-based training, and others bought off-the-shelf training modules. As might be expected, the quality of the online training varies. Some employers are very pleased with it, and others are waiting to see how effective it is as more complex computer training is produced.

The logistics of providing training for these employees can be very challenging. It is difficult to pull employees off of the production floor during their regular working hours, and they often do not want to attend training in their off-time. A manager explained the challenge of fitting training into an already tight schedule:

“The economics of training are tough—you’ve got guys working 4 days on, 4 days off, 12-hour shifts. It’s hard to pull them off the job for training. We can’t often have groups go together; we can’t afford to let them go. And we find it’s hard to get them to attend training on their days off—they don’t want to do it.”

Self-paced training can ease the logistical challenges of training, and computer-based training is popular because it can provide self-paced training that is interactive. One manager explained the attraction of online training: “The logistics [of providing training] are hard. You can’t shut down production to do training, and online is cheap, popular and we can get more people trained quicker.”

Apprenticeship programs are a separate type of maintenance training program provided on-site at some mills. They are typically four to five years long and are based on a highly structured set of standards and expectations. Apprentices learn both through job shadowing and classroom learning.

The priority placed on training at these companies varies widely, with the exception of safety training, which is a high priority across all the companies interviewed. Some companies offer training on an ad-hoc basis, with little documentation. One respondent described the training at his company as follows:

“We really don’t do a very good job of training for any of these positions. As the competition heated up we tried to cut costs, and training was one of the first things to go. Most of what we do now is hit-and-miss; we still don’t have much structured training.”

Other employers offer a highly developed training program with both computerized and hard copy documentation, and multiple training delivery methods.

Employee Skill Gaps

Technical Gaps for Production Employees: The largest technical skill gap for production employees is the ability to work with computers and technology. At some mills, employers reported that over half of production employees aren’t comfortable with computers. Respondents mentioned that older workers can be resistant to learning computer skills. Workers need to understand the computer systems controlling the machinery as well as learn basic software, such as Microsoft Office, Corel, and email software. As one respondent explained, “We don’t all need to be experts in computers but we need to understand the use of different software and how things work.”

Employers also stressed that production workers need the ability to learn process flows and how all the different areas of the mill are interconnected. As one respondent stated, “there’s not enough awareness of how the work in one area [of the mill] affects another. We need more cross-training between jobs but also between departments.” Cross training is often a sensitive issue with unions, who have seen their members affected by years of job reductions in the industry and view cross-training as a strategy to cut additional hourly jobs. Although this study did not ask specifically about the use of cross training for individual positions, the few mills that have systematically implemented cross-training in their mills reported fewer gaps in technical skills compared to the other mills.

“[We] want to get employees to learn *why* they do what they do. Most people don’t have the big picture.”

Employers also reported gaps in the higher-level process thinking among their production employees. For instance, one step beyond simply being able to operate the computer system is having the ability to

translate the computer display into a physical process. One manager explained the focus on process-level thinking at his mill as follows: “We want our operators to be able to troubleshoot systems problems.”

Many employers mentioned that production employees could use more mechanical skills, and some saw room for improvement in the basic understanding of math, chemistry, fluid mechanics, and distributed control systems. Basic business acumen was also lacking in some mills. As one manager stated, “We expect departments and crews to operate like small businesses.”

Technical Gaps for Maintenance Employees: For mechanical maintenance workers, respondents explained that the new focus on predictive/preventive maintenance has left some skill gaps among existing employees. Some employers said mechanical maintenance workers need stronger skills in specific areas such as laser alignment with small tolerances, and fine precision tuning. Along the same lines, some mechanical maintenance workers could improve their familiarity and comfort with using computers and technology to prevent or troubleshoot problems.

The ability to use computers also affects mechanical maintenance workers’ communication skills. One respondent noted that “some employees have fallen out of the loop” because they are unable to use the email system in the mill. Others have difficulty with the computerized maintenance work-order system.

Respondents noted room for improvement in the technical knowledge on some topics, such as distributed control systems, roll grinding and machining, lubrication, vibration, hydraulics, pneumatics, software, and new automation and upgrades.

Within E and I maintenance, many employers saw skill gaps in upgrade training due to the fast pace of technological improvements. Technical subject areas that need improvement include distributed control systems and programmable logic controllers. For some workers, computer skills could also be improved, especially among older workers who became journeymen prior to the widespread computerization.

Cross-training was sometimes mentioned as a way of closing a skill gap in E and I maintenance as well. As mentioned above, it is difficult to find electricians who are cross-trained in instrumentation. Some respondents mentioned that instrumentation was a skill gap for the electricians and vice versa. In addition, some respondents explained that they have only one employee trained in some of the highly specialized equipment. They would like to increase the amount of cross-training for certain types of skills so that they will not be so dependent on a single employee.

Soft Skills Lacking in all Groups: Employers see a lot of room for improvement in the soft skills of workers in all three occupational groups. As might be expected, in an industrial work environment most of the training focus is on technical skills. As one employer noted: “The hard-edged technical stuff we know how to do. We have high-level chemical and electrical engineers in-house so we have the ability to deliver that training.” However, employers generally acknowledge the importance of soft skills to employee and organizational effectiveness, and they believe that such skills are important. As one respondent put it: “Many of our failures are soft-skill related. We still have a long way to go.”

Problem solving is a highly valued soft skill that employers say could be further developed. Employers want to see the “ability to analytically solve problems using a systematic approach to get to the root cause.” In this area, respondents mentioned a need for skills in finding, analyzing, and using data, and discovering causes, effects, and solutions.

In particular, respondents mentioned the need for problem solving in a group environment. This incorporates technical skills and contextual knowledge, systems-level thinking, teamwork, conflict resolution skills, communication skills, interpersonal skills (including valuing diversity), and collaboration skills (including cross-functional team skills). The focus on teamwork seems to be industry-wide, as explained by one manager: “Teamwork—it’s how a mill operates. We have to work together, more now than ever before.” Conflict resolution skills were also identified by many respondents as an

important area for improvement. This point is especially relevant because many mills reported they are moving towards self-directed work teams. As one respondent explained, “We’re losing more supervisory slots so workers need to be able to manage themselves – and their own groups.”

Employers reported that an important role of experienced employees in all groups is as teachers and mentors. As production employees progress through a series of different and more difficult jobs, the ability of skilled workers to pass on their knowledge—both formal and informal knowledge about their jobs—to a junior person is critical to ensuring that workers are taught how to do their jobs correctly and efficiently. One employer noted that the ability to teach others was a highly valued skill that was not being actively developed at his mill. “A good trainer is worth his weight in gold.”

In addition to the ability to teach, the ability to learn and take ownership of their learning is also valued. One respondent noted that “A lot of our mechanical maintenance guys seem to lack initiative—they’ve been here awhile. They wait for the assignments to come to them, just as it’s always been.” In contrast, a manager at a different mill explained that the E and I maintenance workers don’t display this skill gap: “These guys tend to be self-starters; they’re very skilled and have a lot of initiative. They don’t wait for someone to tell them what to do.”

Finally, some employers reported that among team leaders there is a need for basic skills in leadership, supervision, management, facilitation, and public speaking. As noted earlier, while employers report that these soft skills are important, training to support development of these skills among hourly employees is rarely provided. As one manager noted: “We need it but we don’t train for it much. The lead operators are supposed to lead, but we don’t teach them how.” Other soft skills that were mentioned—although less frequently—include the flexibility to deal with change, time management skills, and writing skills.

Most Effective Training Delivery Methods

While all of the companies rely heavily on OJT as their primary training delivery method, most of the respondents stressed that a combination of classroom/book learning and on-the-job training is the most effective. The classroom provides the larger conceptual framework, but there’s no substitute for the opportunity to “get in there and get your hands dirty” applying new learning on the job. Many respondents mentioned that if the workers don’t have the ability to use the training soon after the learning process, they lose much of the new information. As one employer put it: “It’s great to send someone to an outside workshop but the real learning occurs when they apply it at the worksite. Sometimes we have a disconnect where [employees] go out for training but it’s a long time before get to use it so they lose about 90% of the learning.”

In general, interactive training is highly valued, whether it is incorporated into the classroom, small group instruction on the floor, one-on-one job shadowing, or computer-based instruction. Employees learning, discussing and questioning how to do certain aspects of their jobs is consistent with the best approaches to OJT, where skilled senior employees work closely with new workers to help them develop the skills necessary to perform their jobs well. As with any job, this mentoring relationship also helps new employees learn about both the formal (documented) and informal ways in which production work actually gets done.

Future Training Needs

The study also investigated what new training employers think will be needed over the next two to five years. While this was a separate topic from the discussion of employee skill gaps described earlier, the responses were almost identical. This fact suggests that the kinds of future training needs identified by employers are consistent with the current gaps they are experiencing. It also serves to confirm the

importance employers attach to employee training for the future of their companies and the industry as a whole.

New Technical Training

- New technical training for the production occupations will focus on automation, DCS, computers, systems thinking, and new equipment, materials, processes and safety training.
- New technical training for the mechanical maintenance occupations will cover the same areas as the production occupations, plus statistics, precision maintenance, advanced hydraulics, vibration analysis, fan pump, bearings, lubrication tracking.
- New technical training for the E and I maintenance occupations will include a strong focus on keeping up with changes in technology, specifically automated computer electrical technology, production system integration, new control systems, absorption chillers, chilled water systems, GE universal control, GE DC2000, GE DC innovation.

New Soft-Skills Training

- New soft skills training for all occupations will center on teamwork, problem-solving, leadership, coaching, conflict resolution, communications, ethics, organizational values, motivation, people skills, time management, and adaptability.
- For E and I in particular, one respondent noted that more E and I employees may work remotely in the future (from home or other sites) so they will need training in how to organize, communicate, and self-manage remotely. “The conundrum is that in E and I there may be increased use of non-group training delivery – training in isolation – but we also need to work and function in teams.”

Future Training Delivery Methods

Employers report that they want training that offers flexible scheduling and just-in-time availability, is low-cost, and minimizes travel costs and time. For these reasons, the mills in this study plan to rely heavily on computer-based training in the future, via the Internet, CD-ROMs, and virtual meetings/instruction.

While the employers seem to be moving universally to incorporating computerized training approaches, many respondents were ambivalent about the new training methods. Some respondents were eager to try computer-based training. They had comments such as the following:

“There’s great appeal to using online and PC-based training, but we haven’t done much of it yet.”

“We would like to do more computer-based training so long as it’s interactive.”

“If we can get employees comfortable with using computers, we would like to add some online training, but they’re not ready for it yet.”

Other respondents were a bit unsure of the value of the new computerized training methods:

“Sometime it seems like there’s a worship of the newest delivery method, not necessarily what works best. But the (online and computer-based) technology is better than in the past...But our online training is very good. It emulates a real classroom environment.”

“We will still need stand-up instructors. You can’t do all of this online or with videos. But a lot of younger workers prefer the high-tech approach.”

Future training methods mentioned by respondents include the following list:

- On the job
- Computer-based or online training
- Inviting colleges to teach on-site
- Classroom
- Simulation
- Videos
- Small-group discussion
- “Net” meetings or classes that enable workers from different mills to receive instruction together
- “Chunking” training into smaller segments or modules
- Vendor-based training
- Self-study using written documentation

Community and Technical College Partnerships

Interestingly, most mills do not have a true “partnership” with their local community and technical college. That is, there were few instances in which an employer reported an ongoing relationship with an individual college in which there was frequent communication around the topic of training. The few cases where a formal partnership has been drawn up are related to an apprenticeship program or a worker retraining grant.

In some cases, the mills have expressed a strong desire to be able to send their employees to a local college for training. For instance, one employer tried a creative method to set up training for their employees with the local college. They hired an instructor from Perry Technical Institute to come to their site and provide six months of instruction. At the same time, they gave money to their local college for one of their instructors to sit in on the training and develop the capacity to offer that training at the local college in the future. While the employer was happy with the training from Perry Tech, the follow-on local training from the local college never got off the ground.

Other respondents were more reserved in their opinions of working with colleges as training partners. Some respondents stated that pulp and paper skills are so specialized and the equipment is so expensive that they would not expect their local CTC to be a source of training. “[A] question we consider about college programs is – do they have enough money to stay up-to-date on their equipment? It needs to be the current technology.” Another hesitation with sending employees to regular college classes is the logistical challenges. “College programs are fine, but most of our training is one-by-one as we can fit it in, not through structured classes. It needs to be flexible, when *we* can fit it in.”

It is important to note that most employers value programs offered by local colleges. Indeed, employers do recognize the value of a certificate or a degree for the basic academic and technical preparation it can provide, especially when combined with some practical experience. As one employer noted, however, some employees are not motivated to pursue additional training: “People who come in with classroom preparation, skills, they learn quicker, and they take advantage of training and the chance to learn new things. But, we also have employees who are not inclined to do more training, they’re just getting by.”

Employers were also clear about the realities of employment in an industry in which agreements between the company and union gives priority to employee tenure before the level of academic preparation of new

employees. Some employers expressed concern that local colleges do not always grasp the implications of this fact for training programs they offer for employers, and for new or potential employees who have an interest in working in the industry. As one employer noted:

“I don’t think the college really understands this point, or the process: It’s a seniority-based system, so the opportunities have to go to the most senior people. For someone to come in with a degree, classroom experience in this industry, that’s great, but they’re still going to start at the very bottom in a position that’s far beneath what they learned through their classes—it can take 5 or 10 years to move up much. And the union will never give up on the seniority system.”

In summary, most of the connections with local community and technical colleges function on an informal, as-needed basis. Mills work with local colleges in a variety of areas:

- Pre-employment testing and test preparation (TABE)
- Math classes
- Literacy classes
- Trade-specific training
- Advanced topics for maintenance fields
- Pulp and paper classes (if the CTC has a pulp and paper program)
- Administration of self-study
- Source of applicants and interns

Community and technical colleges that the mills have worked with (either currently or in the past) include the following:

- Bellingham Technical College
- British Columbia Institute of Technology
- Chemeteka Community College
- Clark College
- Clover Park Technical College
- Columbia Basin College (WA)
- Grays Harbor Community College
- Lower Columbia College
- Lynn Benton Community College
- Oregon Coast Community College
- Perry Technical Institute

Involvement with four-year universities isn’t as common but was mentioned at the following institutions:

- Oregon State University (Source of interns)
- University of Oregon (Source of interns)
- Western Washington University (Environmental programs)
- University of Washington (Pulp and Paper lab)
- University of Washington – Tacoma (Engineering and management courses)

Training Budgets

Several interview questions sought to determine companies’ overall investment in training for each of the three occupational groups. In general, the data collected in this section proved to be extremely varied and incomplete. Employers frequently reported different approaches to computing training investments, most of which were not readily comparable. Rather than attempting to interpret incomplete or inconsistent data, some general themes regarding training investments are summarized below.

Annual training budgets vary widely, from \$47,000 to \$2 million at each mill. Broken down roughly by the total number of employees at each site, this equates to a range of \$230 to \$4,184 annually per employee.³⁰ Most of the training budgets included the costs for tuition, books, equipment, and travel. Occasionally, the estimates included the cost of instructors or the wages of the training management staff. There was not often a separate cost for training facilities; when there was, it was included in the budget. Lost production was not a factor since the mills do not close down production for training, however wages paid to employees who attend training during their shifts was sometime included as a training cost. Overtime wages could be seen as an ancillary cost of training, but they were not included in any of the budgets.

While the interview protocol asked the respondents to break down the training costs by new versus incumbent workers in each of the occupational groups, most of the respondents did not have their budgets available with this type of breakdown. In fact, some respondents reported that they no longer have a dedicated training budget. At these companies, managers propose to corporate management the type of training that they would like to conduct, and each training proposal is accepted or denied individually. Many respondents reported that the largest proportion of their training costs is devoted to safety training.

Some employers noted that training budgets have steadily declined as their companies have downsized over the years, reducing their capacity to provide some forms of training to hourly employees. Even though there is recognition of the importance of employee training for increasing productivity and future competitiveness, short-term pressures to reduce costs have increased the amount of scrutiny about the value of training. As one manager noted: “The questions we get are – is there much ROI [return on investment] to sending our people to training? We’re running pretty lean already; there are costs to taking workers away from their jobs.”

STRATEGIES FOR POTENTIAL NEW WORKERS

Finally, there was an interest by the sponsors of this study in understanding what factors pulp and paper employers considered to be important for entry into any of the three occupational groups. The interview protocol asked respondents for any advice they would give to three types of potential new workers in the industry: high school students, adult job seekers, and laid-off workers. In general, the input provided by employers confirmed many of the themes that emerged in response to other interview questions.

Strategies for High School Students

The respondents stressed that high school students should gain a good understanding of math, chemistry, and computers. As one manager suggested to high school students, “Learn your math. Math proficiency is important for a lot of reasons: it provides you with not only the ability to execute problems, but it helps you think about things differently.”

“Take the tough math, science and computer courses.”

Respondents recommended taking some vocational courses as well, especially in areas that show mechanical aptitude, such as metal shop, welding, automotive technician, or woodshop. High school students should develop process thinking and the ability “to visualize what’s going on inside a black box and be able to mentally configure that process.” Respondents suggest gaining exposure to the industry through summer jobs or internships.

Most respondents explained that it is very unlikely that a high school student would be hired directly after graduation. They recommend that high school graduates gain at least one to two years of college or work experience before applying to work at the mills. College coursework should focus on math, chemistry, computers and engineering. The work experience should show dependability and advancement.

Experience working nights and weekends and/or industrial experience would be especially valuable. As two managers explained:

“There’s absolutely no chance that they would get on here [right after graduating]. They need a strong work history to get past the interview process. Get a job now; get some skills; do a good job now; continue to make good steady progress in your job until you have enough experience.”

“It’s almost as important to emphasize what we’re not...The stereotype is changing somewhat. The days of thinking that you could come from high school without the education because a mill worker just turns valves and does manual labor are long gone. You just can’t do it anymore without those [higher level] skills.”

High school students should develop interests and skills in the following areas: a desire to learn and advance through the company, a good work ethic, an ability to adapt to changes in the industry, and good teamwork, interpersonal, and interviewing skills. A focus on safety is also highly desirable.

One respondent suggested that high school students considering the industry should focus on gaining the skills and certifications for the E and I occupations. “E and I is the future of this industry. It’s one of the few growth jobs. The industry is becoming highly-specialized in this area.”

Finally, as many respondents explained, the mills themselves need to do better outreach to high school students.

“[We need to] do more around letting high school students know that if being in an office doesn’t sound interesting, we have jobs that people might find interesting...lots of people find them interesting and challenging...[They] can make a career.”

“We do not promote the pulp and paper industry very well. The UW [University of Washington] does promote it but just the high end jobs.”

“Part of it falls back on us to help them get here. We need to do career fairs, etc.”

Strategies for Adult Job Seekers

The suggestions for adult job seekers are generally the same as for high school students; however, there was a greater emphasis on job history. Employers like to see steady employment (or military experience) with continuous advancement. As one manager explained, “This is a long-tenure company so we’re looking for people with stable employment histories, not a pattern of job-hopping.” Since adult job seekers tend to have longer job histories, they have more opportunity to gain a solid base in general industrial/manufacturing skills. Respondents recommend that adult job seekers think about how their previous experience can be applied to this field.

Taking classes, regardless of the subject, shows an interest in lifelong learning. Employers recommend that adult job seekers brush up on their math (including statistics), computer, and mechanical skills in order to pass the entrance exams. Taking at least one class on the industry (i.e., pulp and paper technology, or modern equipment production processing) and general safety training would also be helpful.

In general, employers recommend that adult job seekers carefully consider the industry before committing to a career in pulp and paper. As one respondent suggested, “Look carefully at your options since this is not a growth industry.” They recommend that adult job seekers target specific skills for the occupations that are hiring, such as E and I. However, this can be a long road: “You’d have to get into some business where they offer a four to five year apprenticeship before we’d look at you. It would probably take six to ten years after high school to get your journeyman status.”

Strategies for Laid-Off Workers

For workers who were laid-off from their jobs, respondents place a strong emphasis on what the workers did after they were laid off. Managers like to see continuous efforts towards self-improvement. The quotes included below are typical of the suggestions provided by employers:

“Are you showing some areas of growth? Do you seem to have a sense of direction?”

“Improve your skills in all areas. Show that you’ve continued to grow, develop new skills.”

“Take upgrade training, vocational courses. Show you are trying to ‘better’ yourself. We’re looking for lifelong learners.”

“[They need to] differentiate themselves from others—did they ‘upgrade’ and improve themselves and their skill sets while they were unemployed or employed elsewhere? They need to show motivation, an effort to gain new skills.”

Respondents suggest that laid off workers be prepared to have an open and honest conversation about the circumstances of the lay-off. “If you think someone’s lying to you, you’re less likely to hire them, whatever the reason.” Employers noted that applicants will need to be prepared to account for all gaps in employment.

Managers made the point that workers with previous experience in the pulp and paper industry still need to pass all of the entrance exams, background checks, drug tests, etc. Some indicated that many laid off workers also had difficulty passing some of the employment tests, which effectively eliminated their chance at employment. Finally, as some employers noted, laid-off workers will need to be prepared for a loss in seniority. They will need to be flexible about working in new areas and jobs for which they may initially be overqualified.

CONCLUSIONS AND IMPLICATIONS

The primary purpose of this study was to understand some of the changes in the pulp and paper industries in Washington and Oregon and their effects on future employment and workforce training for three groups of hourly occupations: production, mechanical maintenance, and electrical and instrumentation maintenance. The results of this study identify several important themes and issues for further discussion among industry, education and workforce development service providers.

CONCLUSIONS

Industry Stabilization, Modest Growth

The survey data suggests that employment in the pulp and paper industry in both states is stabilizing. After several decades of decline, employment cutbacks in regional pulp and paper mills have slowed. The 18 mills included in this study now employ 7,449 workers in the three occupational groups. These jobs represent high-wage employment: New production employees earn a median wage of over \$18 per hour, while production workers with 10 years of experience earn over \$24 per hour. Median wages for experienced workers in both maintenance occupations are over \$28 per hour.

Over the next five years, employers report that they will continue to reduce hourly employment; however, those reductions will be relatively modest: Employers anticipate eliminating an additional 491 FTE, a reduction of less than seven percent of current employment. Some employers project modest employment growth in some areas, particularly electrical and instrumentation maintenance. Almost 60 percent of all future reductions will come through non-replacement of retirees.

Analyses of state labor market and demographic data are reasonably consistent with the forecasts provided by employers: Long-term labor market projections show that the industry will experience modest employment growth over the next 15 years. Projected retirements and changing demographics of the future labor pool will likely pose some significant hiring and training challenges for the industry. Recent economic reports suggest that the pulp and paper industry is currently experiencing favorable market conditions and growth; however, it remains to be seen if the industry will be able to maintain this momentum.

Industry Trends: A High Tech Environment

Employers report that investments in new equipment and technology are likely to continue. Automation, advanced electronics and distributed control systems have become the production backbone of the industry, and that trend is likely to continue. Indeed, these companies will likely need to make even more investments in technology in the future to remain competitive.

For employees in all three occupational groups, expanded use of high technology is likely to increase the need for skill sets and knowledge related to computers and advanced production systems. Mechanical maintenance jobs are becoming more technical, with increased focus on predictive/preventive maintenance, which also required the ability to use computer-based monitoring systems and equipment.

Technological advances and the installation of computerized production and control systems has greatly increased the industry's dependence on skilled E and I employees. The fast pace of change in pulp and paper technology requires that E and I employees receive continuous upgrade training in order to be effective and productive.

Hiring Challenges

Although few vacancies currently exist at these mills and turnover is extremely low, employers do report that finding qualified workers can be a challenge. In production occupations, finding workers with sufficient mechanical and mathematical skills can be challenging, and there is a high failure rate among new applicants who are required to pass internal testing in these areas.

While there are relatively few significant hiring challenges for mechanical maintenance occupations, finding the right combination of “aptitude and attitude” is sometimes a challenge. The competition for qualified E and I employees is extremely high, especially for those who have pulp and paper experience and who have been cross-trained in electrical and instrumentation job functions. Recruiting and retaining women and ethnic minorities is an ongoing challenge for most employers.

Some employers report that that local school systems are not doing enough to equip potential new hires with the academic and vocational skills they will need to enter the industry. Employers also point out that union-company agreements about seniority dictate that new hires—whether a high school or college graduate—will start at the lowest levels of a job classification before moving up in rank and pay, which can discourage highly-skilled applicants from pursuing employment in the industry.

Finally, while the testing and assessment process used for new hires has proven effective in the past, some companies reported that their entrance tests are out of date and should be revised. There is some reluctance among some employers to do this, however, because of the costs and time required to develop and validate new tests and procedures.

Employee Training

There are relatively few differences in the training content and methods across the three occupational groups. Company-sponsored training for new workers generally consists of a general orientation and on-the-job training (OJT) in specific equipment, job functions and production processes. Safety is a predominant training topic for new and incumbent workers at all levels.

Training for existing production workers typically is provided on an as-needed basis, OJT, and is usually specific to the operation of new equipment and processes. For the maintenance occupations, additional training in technical areas is provided, including advanced technical topics and national standards, preventive/predictive maintenance, and new E and I systems. Training in soft skills (teamwork, problem solving, communications, etc.) is not typically provided by employers; when it is offered, it tends not to be systematic or ongoing. However, employers acknowledge that soft skills are important, and they expect to see those qualities in employees.

OJT is the predominant method of training delivery for all occupational groups and is viewed as effective. In some cases, small group and classroom formats are employed. In maintenance occupations, the use of vendor-provided training is more common for teaching how to install, maintain and repair new equipment. Computer-based training appears to be gaining in popularity because of the low cost and increased flexibility it provides to workers in a continuous-production environment. However, most employers report that a combination of conceptual/classroom learning and hands-on training is the most effective method for delivering training.

Data on the training budgets among the different mills varied greatly. The information provided was not generally comparable across the mills or occupational groups. Training costs and budgets frequently covered tuition, equipment and travel. Employee wages were sometimes included, as were the costs

associated with training facilities or staffs. Some employers reported that training budgets have been reduced as the industry has downsized and that there is an increased focus on justifying the value of training.

Skill Gaps and Future Training

Employers reported skill gaps in all occupational groups. These gaps represent areas where employers expressed the need for new or additional training. In production, the emphasis was usually on basic academics and technology: stronger math, chemistry, mechanical & computer skills. In addition, the ability of employees to demonstrate higher-level systems thinking was identified as critical.

In the mechanical maintenance occupations, skill gaps include laser alignment with small tolerances and fine precision tuning, computers, and a higher level of technical knowledge. For E and I maintenance workers, the skill gaps to be addressed through upgrade training are caused by the fast pace of technological improvements. Higher-level computer skills, deeper knowledge of technical topics, and more cross training in electrical and instrumentation are needed.

Employers also reported a need for improvement in the soft skills for all three occupational groups. Problem solving—especially in a team environment—is a highly valued skill that could be more fully developed. The ability to locate, analyze and use data to solve work problems is increasingly important in a high tech production environment. Teamwork, conflict management and basic leadership skills are becoming more important as hourly workers assume functions that in the past were the purview of middle management. The ability to teach and mentor other employees was also identified as important.

Finally, employers value training that is low cost, offers flexible scheduling, and reduces the need for travel. Delivering training in smaller “chunks” or modules can help to focus the training and reduce time away from the job. Computer-based training—used in combination with small group and OJT—provides companies and employees with much flexibility and is likely to see increased use among these companies.

College Partnerships

There do not appear to be many formal partnerships between these employers and local community and technical colleges. There were few instances in which an ongoing relationship with frequent communication was noted. Moreover, while these employers value the programs and services provided by local colleges, many expressed some hesitations about depending on these colleges for training. One concern is whether colleges have the resources needed to purchase up-to-date equipment that can be used to train new and incumbent workers. Another is simply the logistical challenge associated with scheduling and delivering training to workers in a continuous-production environment, where the costs associated with sending employees offsite to training can be prohibitive.

Strategies for Potential New Workers

Employers were clear about what they look for when assessing new applicants. For high school students, a good understanding of math, sciences and computers is paramount. Gaining some practical experience in the trades and understanding industry processes were also among the useful suggestions offered to high school students by these employers.

For adults, having a solid educational background and the right mix of courses is also important, since they will need to pass the entrance tests. However demonstrating a solid job history and evidence of professional advancement is also key since these employers tend to hire for the long term. Adults may be wise to consider job classifications where future growth may occur, such as in E and I.

Laid-off pulp and paper workers will need to account for their time and show how their transition to other employment, education or other activities demonstrates a continued effort to develop new skills and abilities.

IMPLICATIONS

There are a number of implications that can be drawn from the survey data collected for this study, several of which are discussed below. These issues appear to be the most provocative as they integrate topics that cut across the survey categories and point to areas where further discussions and research may be needed.

The Retirement Effect

Although it does not appear likely that the pulp and paper industry will see much new employment growth anytime soon, the survey data does suggest that turnover due to retirements over the coming years could create a skills vacuum in some areas, as large numbers of highly-skilled workers retire and must be replaced by less experienced workers. Employer projections show that 1,344 workers are expected to retire from these companies over the next five years, nearly 1,055 (78%) of those positions will need to be replaced; however the recruitment, promotion and training these employees could prove to be difficult for the industry given its current hiring processes and limited training infrastructure.

Mechanical maintenance occupations are those that stand to be affected the most. Proportionately, the number of retirements in this occupational group is considerably higher than the other two: 408 retirements are projected, and it is anticipated that 277 (68%) of these positions will be replaced. It is unclear whether the net reduction of 131 FTE in this category reflects some combination of reduced need due to increased automation and process improvements, cross-training, or future outsourcing of some functions; the explanation will likely vary by employer. But it does leave open the question of how employers will compensate for the skill gaps that are likely to occur. The large number of retirements for production workers will pose similar problems, as those retirees also represent the most highly skilled workers in their group.

In short, it seems reasonable to conclude that it may be difficult to find replacements for these highly trained and skilled workers. One reason is that hourly positions are typically replaced through internal promotions as they become available. While this may be an effective strategy during periods when retirement occur at a low or stable rate, having to replace large numbers over a shorter time frame could be a challenge for some mills and may cause a ripple effect with implications for employment and training: As skilled production and maintenance workers retire, companies will need to promote and train their replacements. Employment gaps created by those who move up will also need to be addressed.

New workers may need to be hired to fill gaps created at the entry level. As noted at the beginning of this report, however, the future labor pool of new workers is likely to be smaller and less well prepared than the workers they are to replace, posing additional hiring and training challenges. A related issue is how to improve recruitment of qualified new workers to the industry. Boosting the amount of outreach between industry and secondary schools is one way to attract more young people to the industry. The industry's reputation as a declining sector has caused it to lose much luster among young people as a future career choice, even in communities where the industry is well established. Most students (and teachers) are unaware of what the pulp and paper industry has to offer; that lack of understanding and stigma as a dying industry will need to be addressed. Expanding student internships in these mills is another way to stimulate interest among young people in the industry and forge stronger relationships with local educational institutions.

Changing skill requirements in this industry also call into question the efficacy of existing tools and processes to assess new applicants' qualifications. As the industry begins to increase hiring to replace positions at the entry level, employers will need to take a hard look at the tools they use to determine if an applicant has the optimal mix of aptitude and attitude. The results of this survey suggest that many employers may need to upgrade their existing testing instruments to tools that do a better job of recognizing the new skill needs that have emerged over the past several years.

Training for the Future

One important implication of this internal "churning" caused by retirements, promotions and replacements is that each move is likely to require additional investments in training. As noted in this report, the overall level of skills employers will require in the future is likely to increase. Since this is an industry that has traditionally promoted from within, promotions and replacements will likely require increased capacity to train more employees, more often, in an expanding number of technical and non-technical skill areas.

This increased need for training will impact employers in two areas: 1) ensuring that applicants have the foundation skills necessary to succeed in the industry, and 2) providing incumbent employees with upgrade training as internal promotions shift employees up the ranks.

Public schools are the primary provider of the foundational skills that young people will need to enter the industry. Increased support from the public schools, colleges and other training and service providers will be needed to share in this work. Training topics are becoming increasingly complex, and the breadth and depth of understanding needed to be an effective employee has grown substantially for hourly employees. In short, the foundation skills required for employment in this industry are rising for all levels of employment. The educational institutions that provide programs in support of this industry need to ensure that these skill requirements are reflected in their curriculum. Current efforts to develop industry-defined skill standards will go a long way to ensuring that employers' education and skill requirements are clear, and that training programs and workforce services are on the mark.

Retirements and job promotions will increase the overall need for upgrade worker training, yet it is unclear who will provide this new training and how it will be done. For employers, expanding their relationships with local and regional colleges and other training institutions would be a wise short-term goal. This will enable colleges to better understand the specific upgrade training needed by different employers, and the methods of delivery that can best meet their needs. Even colleges that are very responsive will need time to develop new programs to address the training topics and delivery methods that employers mentioned in this study. The point is to identify what training will be required in advance so programs are ready to be delivered when they are needed. This can only occur through more formal efforts to establish ongoing partnerships between these stakeholders than currently exists.

Future research should be conducted which focuses on the effects of projected changes in these occupations for different regions of the state. In regions where one or more large pulp and paper mills operate, for instance, retirement and employment forecasts may have a more pronounced effect on the demand for training and workforce services than in regions where employer forecasts are more moderate and future demand for these services is less pronounced. This information would be useful to assist educational institutions and workforce development service providers in responding to the changing employment and skill needs of the industry.

NOTES

- ¹ “Profits leap ahead in '99.” Paper and forest products industry survey. Standard & Poor’s, New York, April 13, 2000.
- ² “Employment, hours and earnings from the current employment statistics survey.” U.S. Bureau of Labor Statistics, July, 2005.
- ³ “The pulp and paper industry.” Washington State Employment Security Department/LMEA, January, 2005.
- ⁴ Technical Association of the Pulp and Paper Industry (TAPPI). (2005). TAPPI Journal, www.tappi.org (September). See also: “Profits lean ahead in '99.” *Op cit*.
- ⁵ “Today’s paper industry, its character and structure.” Center for paper business and industry studies, Institute of Paper Science and Technology, Georgia Institute of Technology, 2001.
- ⁶ McNutt, J. (2003). Presentation for the Sloan workshop on globalization: The paper industry. Center for paper Business and Industry Studies, Georgia Institute of Technology.
- ⁷ Urmanbetove, A. (2003). U.S. pulp and paper industry review: 1970-2000. School of Economics, Georgia Institute of Technology. See also: Jaakko Poyry Consulting, Presentation for the Institute of Paper Science and Technology, Georgia Institute of Technology, 2000.
- ⁸ Li, H. and McCarthy, P. (2004). Prices, industry consolidation, and profit margin. School of Economics, Georgia Institute of Technology.
- ⁹ “U.S. Paper/board production rises in 2004 to 91.47 million tone.” Looksmart Industry Review. www.looksmart.com:www.findarticles.com/p/articles/mi_qa3636/is_200504/ai_n13634551. See also: Cenatempo, D. and McNutt, J. (2005). “State of the North American pulp and paper industry: An update and outlook.” Center for Paper Business and Industry Studies, Institute of Paper Science and Technology, Georgia Institute of Technology
- ¹⁰ Cenatempo, D. and McNutt, J. (2005). *Ibid*.
- ¹¹ Parsons, C. (2004). “Workplace transformations and human resource management practices in the pulp and paper industry.” Center for Paper Business and Industry Studies, Institute of Paper Science and Technology, Georgia Institute of Technology
- ¹² Washington State Employment Security Department, 2005; Oregon Employment Department, 2005.
- ¹³ Inflation adjusted average annual salary, pulp and paper industry, 1990-2003” Washington State Employment Security Department, 2005
- ¹⁴ Oregon Employment Department, 2005
- ¹⁵ “Total employment per direct job in manufacturing.” Washington State Office of Financial Management, July 2004.
- ¹⁶ Oregon Employment Department, 2005. Actual values differ by sub-sector. For instance, the multiplier for pulp mills is 4.4, while the value for paper mills is 2.9. Unlike Washington, which uses an input-output model to estimate employment multipliers, Oregon uses a Social Accounting Model to determine employment multipliers for key industry sectors. Under this approach a multiplier of 4.0 indicates that, under the current economy's structure, a marginal change of one job in the "direct industry" (e.g., pulp mills) would stimulate a marginal change of 3.0 jobs in all other industries.
- ¹⁷ “Long-term forecast of the Washington labor force.” Washington State Office of Financial Management, 2005 (April).
- ¹⁸ “Annual average nonagricultural wage and salary employment, estimates for 2002 and projected 2007 and 2012.” Washington State Employment Security Department, April 2005.
- ¹⁹ “Long-term forecast of the Washington labor force.” Washington State Office of Financial Management, 2005 (April).
- ²⁰ “Employment projections by industry: 2004-2014.” Oregon Employment Department, July 2005.
- ²¹ “Long-term forecast of the Washington labor force.” Washington State Office of Financial Management, 2005 (April).
- ²² Bailey, S. (2004). “Demographic trends in southwest Washington’s labor market: Revenge of the baby boomers.” Washington State Employment Security Department.
- ²³ Miller, S. An American Imperative: Accelerating Minority Educational Advancement, Yale University Press, 1995.
- ²⁴ “Long-term forecast of the Washington labor force.” *Op. cit*.
- ²⁵ All but one of the 18 mills surveyed provided a numeric response to the historic change in FTEs.
- ²⁶ It should be noted that one company accounts for nearly half of the total anticipated reductions in mechanical maintenance, which they expect to achieve largely through retirements.
- ²⁷ This study did not attempt to account for other compensation due to health care benefits, retirement or pension plans, bonuses or overtime pay, which would considerably boost overall compensation.
- ²⁸ Distributed Control Systems (DCS) generally refers to computer-based control systems where several sections of a plant have their own processors, which are linked together to provide both information dissemination and manufacturing coordination.
- ²⁹ In the Nalon process, almost all applicants who test are also interviewed (in order to create the composite score). In other assessment practices, the applicant must pass the written tests in order to be invited to interview.
- ³⁰ Fifteen mills were able to provide estimated training budgets.

APPENDIX A: INTERVIEW W PROTOCOL

Pulp and Paper Industry Survey

Revised 4-15-05

Date _____
Company Name _____
Respondent Name/Phone # _____ / _____
Company Site Coordinator Name/Phone # _____ / _____

Introduction and Preamble:

Hello, this is (Name) from Washington State University. I know (Company Site Coordinator Name) spoke with you about the study we're doing on the Pulp and Paper industry. Is this a good time to talk?

(If No, rescheduled date/time)_____

Great, thanks for agreeing to participate. WSU's Social and Economic Sciences Research Center is conducting this study for Lower Columbia College's Pulp and Paper Skills Panel, a group of employers, educators and workforce development service providers that were convened to support the industry.

The study will help local colleges and workforce service providers respond to your hiring and training needs. That's why we want to talk with you directly. Company Site Coordinator should have forwarded you a summary of the project and topics we'll cover. Did you receive it?

If No: *That's OK, we can walk you through the survey and call back for any missing pieces.*

If Yes: *Great.*

This phone survey may take 30-45 minutes, depending on what parts you're able to cover. Your participation is completely voluntary, and all responses will be treated confidentially. You are free to not answer any questions you may find objectionable, and you can decline to participate at any time. This research has been reviewed and approved by the Institutional Review Board at WSU (IRB). If you have any questions about your rights as participants, you can contact the WSU IRB at (509) 335-9661.

Are you ready to begin?

Survey Topics and Interview Questions

Current & historical employment:

We're focusing the study on Pulp and Paper mills only. We are interested specifically in employment at the site where you work, not satellite operations, or other secondary operations that are not physically located at your site.

Q1. What is the Total Employment at your company site? _____

Q2. Do you employ any part-time workers? If so, what is the number of Full-Time-Equivalents (FTE) employed at your site? _____

We are especially interested in certain hourly employee occupational groups at your plant:

- a. Production occupations: Machine setters, operators, tenders, and similar occupations that are **directly** tied to regular production work.
- b. Mechanical Maintenance occupations: including millwrights, machinists and related maintenance/repair occupations that **support** production work.
- c. Electrical & Instrumentation Maintenance occupations: including electricians, electronic system and instrumentation technicians, and related occupations that **support** production work.

Q3. How many Full-Time-Equivalents (FTE) do you currently employ in each of those hourly occupational groups?

(Enter in Table below)

Occupational Group	Current employment in FTEs
Production	
Mechanical Maintenance	
Electrical and Instrumentation Maintenance	

Q4. Has the number of FTEs in each occupational group increased, declined, or stayed about the same over each of the past 3 years (2002-04)? If employment increased/declined, by how many FTEs?

(Enter in Table below)

Occupational Group	2002 Employment in FTE (+, 0, -)	2003 Employment in FTE (+, 0, -)	2004 Employment In FTE (+, 0, -)
Production			
Mechanical Maintenance			
Electrical and Instrumentation Maintenance			

Wages:

Q5. For each occupational group, what is the annual average hourly wage you currently offer, for entry-level (0-1 yr) and for experienced employees (10-year)?

(Enter in Table below)

Occupational Group	Entry-level hourly wage (0-1 yrs)	Experienced hourly wage (10 years)
Production		
Mechanical Maintenance		
Electrical and Instrumentation Maintenance		

Turnover:

Q6. For each occupational group, what was the annual turnover for each of the last three years (2002-04)? (number FTE). This is turnover due to employees voluntarily quitting, but not layoffs/terminations or retirements.

(Enter in Table below)

Occupational Group	2002 Turnover FTE	2003 Turnover FTE	2004 Turnover FTE
Production			
Mechanical Maintenance			
Electrical and Instrumentation Maintenance			

Retirements:

Q7a. How many of your current employees in these occupational groups do you anticipate losing to employee retirements over the next 5 years? (number FTE)

Q7b. How many of those anticipated retirement FTE positions do you plan to replace?

(Enter in Table below)

Occupational Group	Retirements, next 5 years (2005-09) in FTE	Retirement <u>Replacements</u> (2005-09) in FTE
Production		
Mechanical Maintenance		
Electrical and Instrumentation Maintenance		

Current vacancies & recent hires:

Q8. For each occupational group, how many vacant FTEs are you currently trying to fill?

(Enter in Table below)

Occupational Group	Current Vacancies, FTE
Production	
Mechanical Maintenance	
Electrical and Instrumentation Maintenance	

Future employment projections:

Q9. Do you expect the number of FTEs employed by your organization in each of the occupational groups to increase, decrease, or remain the same in the next 2 and 5-year periods? If there will be changes, how many FTEs do you expect to add or remove?

(Confirm that 5-year forecast includes 2-year estimate. Also that the estimates should NOT include retirement replacements—see Q7ab. Here we’re after non-retirement New hiring or reductions)

(Enter in Table below)

Occupational Group	Employment next 2 years (2005-06), in FTE (+, 0, -)	Employment next 5 years (2005-09), in FTE (+, 0, -)
Production		
Mechanical Maintenance		
Electrical and Instrumentation Maintenance		

Future industry changes and effects

Q10. Are there changes anticipated for this industry—either happening now or likely to occur over the next 5 years—that will alter the core work that employees in these occupational groups will do?

If yes, what will change, and how will it affect their work?

(Enter in Table below)

Occupational Group	Changes, next 5 years	Effects on employee work
Production		
Mechanical Maintenance		
Electrical and Instrumentation Maintenance		

Assessing new applicant qualifications

Q11. For new applicants, how do you assess their qualifications? What process and tools do you use?
 (Enter in Table below)

Q12. Does the process or tools used differ among the occupational groups? How?
 (Enter in Table below)

Occupational Group	New applicant assessment process, tools
Production	
Mechanical Maintenance	
Electrical and Instrumentation Maintenance	

Q13. What are your most significant challenges in hiring qualified workers in any of the three occupational groups?
 (Enter in Table below)

Occupational Group	Significant hiring challenges
Production	
Mechanical Maintenance	
Electrical and Instrumentation Maintenance	

Q14. For production occupations, what are the current minimum education and skill requirements for hiring at the entry level?
 (Enter in Table below)

Occupational Group	Minimum Education hiring requirements	Minimum Skill hiring requirements
Production		

Current training and investments

Q15. For New workers in each occupational group, what kinds of training is currently offered (types—technical, non-technical)

(Enter in Table below)

Occupational Group	Technical Training offered to new workers	Non-Technical Training offered to new workers
Production		
Mechanical Maintenance		
Electrical and Instrumentation Maintenance		

Q16. For New workers in each occupational group, who are your primary training providers, and what delivery methods do they use? (on-site or off-site classes, online instruction, etc.).

(Enter in Table below)

Occupational Group	Primary Training Providers	Delivery Methods
Production		
Mechanical Maintenance		
Electrical and Instrumentation Maintenance		

Q17. For Incumbent workers in each occupational group, what kinds of training is currently offered (types—technical, non-technical)

(Enter in Table below)

Occupational Group	Technical Training offered to existing workers	Non-Technical Training offered to existing workers
Production		
Mechanical Maintenance		
Electrical and Instrumentation Maintenance		

Q18. For Incumbent (existing) workers in each occupational group, who are your primary training providers, and what delivery methods do they use? (on-site or off-site classes, online instruction, etc.).

(Enter in Table below)

Occupational Group	Primary Training Providers	Delivery Methods
Production		
Mechanical Maintenance		
Electrical and Instrumentation Maintenance		

Q19. Are there any other college partners you work with? If so, what kinds of training do they provide for the different occupational groups?

(Enter in Table below)

Occupational Group	College Partners	Type of Training
Production		
Mechanical Maintenance		
Electrical and Instrumentation Maintenance		

Q20. For each occupational group, what are the biggest Skill Gaps for which additional technical or non-technical training is needed?

(Enter in Table below)

Occupational Group	Skill Gaps, Technical Training needs	Skill Gaps, Non-Technical Training needs
Production		
Mechanical Maintenance		
Electrical and Instrumentation Maintenance		

Q21. For each occupational group, what training delivery methods are most effective?

(Enter in Table below)

Occupational Group	Most Effective Delivery Methods
Production	
Mechanical Maintenance	
Electrical and Instrumentation Maintenance	

Q22. What is your annual budget for all employee training at your site? _____

Q23. What is the annual cost of training employees in each occupational group?

- New hires
- Incumbent workers

(Enter in Table below)

Occupational Group	New Hires	Incumbent Workers
Production		
Mechanical Maintenance		
Electrical and Instrumentation Maintenance		

Q24. What categories are included in your estimate of training costs? Do they differ by occupational group?

(Probe: Tuition, books, equipment, travel, wages, lost production, training department personnel or facilities, other)

(Enter/check off in Table below)

	Tuition	Books	Equipt.	Travel	Wages	Lost Prod.	Trng. Staffs	Facilities	Other* (List)
Production									
Mechanical Maintenance									
Elect./Instr. Maintenance									

*Other: _____

Future training needs

Q25. For each occupational group, what new training will be needed in the future (2-5 yrs)?

- Technical areas
- Non-technical areas
- Future delivery methods

(Enter in Table below)

Occupational Group	Technical Training, Next 2-5 years	Non-Technical Training, Next 2-5 Years	Delivery Methods
Production			
Mechanical Maintenance			
Electrical and Instrumentation Maintenance			

Q26. What strategies or suggestions do you have for potential new workers interested in this industry? How should they prepare?

- High school students
- Adult job-seekers
- Laid-off workers

(Enter in Table below)

Strategies, High school students	Strategies, Adult job-seekers	Strategies, Laid-off workers

Q27. That's the last of our questions. Do you have any additional comments, or questions about the study?

EXIT: Ok, thanks for your participation. The results of this survey should be available in July. Someone from Lower Columbia College or the Skills Panel will let you know how to access the report when it's available.