Trends in the Forest Products Industry

Prepared by John Pletcher
PENNTAP

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Executive Summary

Many external forces such as timber resource characteristics, labor, environment, and consumer preference are driving trends in the wood products industry. This report will analyze what process trends are occurring in the primary and secondary industry and discuss where technology is playing a role in improving the efficiency of the wood products industry.

Index

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I was asked by the Hardwood Development Council to compile a report to review trends that are occurring within the wood products industry. After being directly employed in the kitchen cabinet industry for 8 years, and most recently, providing technical assistance to the wood products industry for 6 years, the Hardwood Development Council felt I could provide a unique perspective on the wood products industry in Pennsylvania. This report will be divided into two main sections; the first will deal with forces affecting the industry such as changes in our timber resource, workforce issues, and market place issues. The second section will discuss how the industry is responding to these influential forces.

Influential Forces affecting our Wood Products Industry

Resource Characteristics

The timber resource in Pennsylvania has always played an important role in the state's economy. As our economy grew so did the demand for this resource and as a direct result the characteristics of our timber resource have constantly changed. During the colonial days and up to and including the industrial revolution, conifers (white pine, yellow pine, and hemlock) dominated our timberlands and provided raw materials for shelter, transportation, and fuel to drive the growing population and economy. As a result, vast areas were harvested to feed an unquenchable demand for wood and wood related products. The depletion of the conifer dominated stands gave way to the hardwood stands we know today and was also a significant force in establishing forest management practices that would help sustain the resource for future generations. The characteristics of wood are still in a state of flux as a result of timber management practices and increasing demand for the timber resource. Our industry has gone global which presents itself as a two-sided issue. On one hand, exports to other countries has opened entirely new markets and spurred economic growth, while on the other hand buyers from foreign countries are competing for the same resource quite successfully. For example, according to the US Department of Commerce, hardwood exports experienced double-digit growth from 1996 to 1997. Log and flooring exports were up by 23% while lumber exports increased by 17%.

Due to the increasing demand for timber from domestic and foreign markets, trees are being harvested at earlier ages than in the past resulting in smaller diameter logs entering the mills. These logs entering the mills are obtained from trees that grew in managed forests where a major objective is to grow trees as quickly as possible to meet future demand. This is great from a fiber standpoint for paper, fiberboard, and particleboard production, but it has created some interesting challenges for the solid wood products portion of the industry.

USDA volume tables indicate the amount of growing stock is increasing, therefore timber regeneration is out pacing harvest rates, but the quantity of trees that yield quality grade 1 logs are becoming more difficult of obtain. On average logs entering sawmills today contain more juvenile and reaction wood resulting in a decrease in lumber recovery rates for the sawmill, increased degradation during drying, and an increase in machining, gluing, and finished related defects in the secondary industries.

Labor Issues

In my travels around the state, one of the most common statements made by primary and secondary wood products companies is pertaining to the challenge they face retaining well trained workers and successfully finding enough workers trained for careers in the wood industry. Historically our industry has always paid lower wages then other groups such as the steel and plastic industries. Now the growing powder metals industry is siphoning away additional workers as well. Factor in the detail that foreign competition pays only a fraction of what US companies pay and that puts the wood products industry between the preverbal rock and a hard place. Not only are foreign companies competing for the same raw materials, they are producing products and selling them back cheaper than we can produce here.

For example, consider the following example:

United States and Offshore Forest Products Labor Costs

Location	Labor Cost/Hr	Annual Productivity	Labor as % of Sales
United States Producer	$12.50	$93,000	26.9%
Offshore Producer	$ 1.25	$40,000	7.5%

To further illustrate my point, consider the following example, which compares furniture import figures and the labor index rate for the top ten source countries.

	Millions of Dollars			US = 100
Source Country	1997	1998	%Growth	Labor Index *
China	$1,297.8	**$1,839.4**	42%	1
Canada	$1,527.7	**$1,765.1**	16%	93
Italy	$728.9	**$847.9**	16%	96
Taiwan	$802.7	**$793.0**	-1%	34
Mexico	$633.3	**$741.9**	17%	9
Malaysia	$404.3	**$398.2**	-1%	9
Indonesia	$275.0	**$340.4**	24%	2
Philippines	$192.3	**$221.2**	15%	4
Thailand	$157.4	**$191.7**	22%	3
United Kingdom	$106.5	**$139.2**	31%	80
Total Top 10	$6,125.9	**$7,278.0**	19%	--
World Total	$7,079.5	**$8,331.5**	18%	--

* *Including vacation pay, bonuses, and fringe benefits*

Without question, offshore producers have a significant labor advantage over US producers especially in ornate and labor-intensive furniture styles. It is only a matter of time before the

Chinese and other offshore producers develop direct relationships with US retailers instead of being resold through US furniture producers to their retail channels.

Environmental Pressure

There has been increasing activity from grass root environmental groups to permanently lock away timberlands in federal and state forests. It is expected their campaign will not stop there; they will be pressuring private landowners not to harvest their lands but to leave them in their natural state. Ironically, many of these groups are not local, but thousands of miles away and so not directly effected by their actions. These groups often thrive on disinformation to sway public sentiment in their favor. The following is an example of the power of these groups through the news media.

Jim Bowyer, a professor at the University of Minnesota conducted a quiz as a part of a survey to find out the publics perception as to the state of our forestlands. The survey queried nearly 2,000 college students and over 1,100 employees of forest products companies.

Survey Results	Students	Workers
1. Believed that forest harvest is exceeding growth in the US	65%	21%
2. Underestimated the area covered by forests in the US	76%	42%
3. Underestimated the use of recycled paper in the US	94%	88%
4. Selected material other than wood as most environmentally friendly	64%	31%

Also key to the environmental issue is the alarming rate of the introduction of foreign pests into this country. This is one of the negative side effects of the global market place. For example, the Asian long horned beetle, a pest whose larvae kill hardwoods such as poplar and maple, arrived in the US via untreated wood packaging materials like crates and pallets shipped from China. The USDA has issued emergency rules requiring all solid wood packing materials to be fumigated, kiln dried, or treated with preservatives. Only two infestations, both in New York, have been found. However, the beetle has been detected at warehouse sites in 14 states. The Chinese government has denied responsibility and complains that the cost of compliance will hinder China-US trade. Is our timber resource in jeopardy?

Independent third party verification of sustainable forest management now encompasses millions of acres around the world and many of the large retailers are looking to adopt procurement policies aimed at protecting the worlds threatened forests. These programs were initially aimed at third world developing nations where deforestation is occurring at alarming rates. Now there is a tremendous push here in the US to adopt similar resource programs through independent third party verification and retailers such as Home Depot and Lowes have announced intentions

of selling only "green" certified lumber and wood products as early as 2002. Personally I see this as redundant and unnecessary in this country; our wood products industry learned the importance of proper timber management in the last century. Sustaining the resource meant sustaining the industry for future generations. Concerns raised by many smaller mills indicate that "green" certification inevitably adds to the cost of the raw material while no evidence as yet exists that the end consumer is willing to pay more for "green" certified products.

Consumer Preference

The trend at the large furniture shows last year indicated consumers in the market for cabinetry and furniture are looking for real wood. Cherry continued as the most popular species at the High Point Furniture Expo last April. Over 20% of bedroom and dining room offerings were cherry followed by oak at 19%. Pine and hard maple followed with 11% and 9% respectively.

Solid wood and wood veneer made substantial gains over wood grain prints. In the wall unit, entertainment center, and home office furniture category, imitation printed wood grains fell by nearly 80% and printed bedroom and dining offerings fell by 25% in just a years time. Consumers want the real thing!

Trends and Opportunities in the Wood Products Industry

After reviewing the major forces affecting our industry one wonders how our industry can compete let alone survive. It's simple, we are adapting by working smarter, changing processes for the better, applying technological advances where necessary, and not taking our lumber resources for granted, but turning it into a competitive weapon. In terms of labor and timber resources, our industry is learning how to obtain more from less.

Typically, finished wooden parts and components account for only 20 to 25% of the original log volume. What happens to the other 75 to 80%? It winds up as low value by-product and waste and in many circumstances is considered a nuisance and an unavoidable factor of transforming timber into value-added wood products. Typically sawmills lose about 45 to 50% of a log converting it into lumber. Then the lumber user loses 45% in the rough mill and as much as 15% in further processing.

Sawmills

Sawmills are beginning to employ thin kerf headrigs and particular thin kerf band resaws to reduce kerf loss and gain lumber recovery. For example, reducing kerf loss by 0.1" per cut can save 0.039" on a 4/4 board or about 3.5%.

Data collected on the Pennsylvania sawmill industry by the U.S. Census Bureau Economic Census clearly shows mills are investing money on process improvements that result in higher efficiencies.

Industry Data for the Pennsylvania Sawmill Industry

	1997	1992	1987
# of Sawmills	342	412	396
# of mills with > 20 emp	64	63	59
Value added	$294,984,000	$257,900,000	$164,300,000
# of employees	4,965	4,600	4,700
Capital Expenditures	$24,938,000	$15,900,000	$1,400,000

Based on survey in Weekly hardwood review, 60% of sawmills that responded indicated they utilized band resaws to improve lumber recovery.

Hardwood mills in the US have many scanning/optimizing and automation technologies to choose from since sawmill equipment manufacturers that were formerly focused on the softwood lumber manufacturing industry have adapted their equipment and marketing plans to address hardwood mills. A 1999 study indicates that the level of adoption of these technologies is still not very high amongst both National Hardwood Lumber Association member and non-member companies (Bowe et al. 2000). Based on 424 sawmill responses obtained in a nationwide study, only 27% of hardwood sawmills employ a headrig optimizer, the most widely adopted of all hardwood sawmill optimization/automation technologies. The frequency for implementation of edger optimizers, automated sorters, trimming optimizers, grade-mark readers, and bucking optimizers was 10%, 7%, 5%, 4%, and less than 1% respectively (Bowe et al. 2000).

Just In Time (JIT) manufacturing will be discussed in greater detail later, but I mention it now because it has created a trend in the supply chain that has tremendous implications for redirecting potential waste and by-product into high value wood parts for later assembly into high value components for resale. If one were to trace the flow of material from the sawmill through dimension and rough mills into the finish mill you would see the following. Cylindrical logs are converted into rough rectangular portions. These rough rectangular portions are then edged and trimmed into cleaner dimensions to conform to lumber grade specifications, which are then sold for further processing. Each step of the process generates waste in order to obtain the required parts.

One of the characteristics of JIT is for the finish mills (furniture and cabinetry) to focus on the assembly of pre-machined parts that have been purchased from outsourced venders. This creates a tremendous opportunity for the processors in the beginning of the supply chain, the saw mill and dimension portion of our industry. A joint study done by Virginia Tech and the USDA Forest Service indicates that up to 25% more cuttings can be obtained from unedged and untrimmed lumber.

There is some consensus within the industry regarding the need to modify the NHLA lumber grades to allow more unedged and untrimmed lumber in the grade classification spectrum.

Think about it, sawing for the highest NHLA grade sends a lot of clear material to the chipper that could be otherwise put into high value parts. Whether the grades get modified has yet to be seen; however, there are mills that are capitalizing on this trend. Some of the integrated sawmills are getting orders from cabinet and furniture companies for face framing, edge glued drawer parts, and rail stock. The material for these parts is coming from by-product that has been rerouted to ripping and cutting departments instead of the chipper. The name of the game is to push part generation as close to the beginning of the process as possible and thereby eliminate unnecessary waste generated from the production of intermediate products.

Opportunities with Residue

No matter how efficient our industry becomes in the future, waste and by-product will still be apart of the manufacturing process. How we deal with waste and by-products has proven to be quite a challenge. One of the biggest changes is how the industry now perceives waste. In many cases, it is now viewed as feedstock for other operations rather than a liability.

An excellent example of this new thinking is wood fuel pellets made from hardwood residue. During the past decade, Pennsylvania saw four pellet fuel plants start operation. In most cases these facilities are add-on businesses within existing wood products industries in both the primary and secondary sector. Combined these four facilities have the ability to transform between 150 to 200 tons of residue into fuel pellets per eight-hour shift. Demand for this residential fuel will continue to grow, especially after the experience of this winter with cold temperatures and spiraling fossil fuel costs. Between 1993 and 1998, the northeastern region of the country saw pellet sales increase from 62,000 tons to 135,000 tons.

Another exciting use of residue is the growing number of sewer processing facilities in the state that are now composting green and dry wood residue with bio-solids to form mulch. Large processors such as the Philadelphia Joint Authority and small processors like Athens sewer authority are jumping on the compost bandwagon. Over the past several years, DEP has been trying to marry the wood products industry and sewer processors as a way to take two waste stream materials, divert them from landfills and produce a much needed value added product. Currently all sewer processors involved in composting report all compost is spoken for and goes for landscaping projects, land reclamation, golf courses, nurseries, and residential gardens.

During the last decade we also saw a few facilities setup shop to transform low value timber into engineered wood products such as particleboard and medium density fiberboard (MDF). In fact the MDF facility in Clarion county is designed to utilize green residue from sawmills and there is another facility slated to break ground in Fayette county that will also utilize sawmill residue as feedstock for MDF and molded fiber products for raised panel interior doors. In 1999, roughly 10% of MDF produced in the country was utilized in molding and other related millwork products. Another engineered wood product to keep an eye on is Oriented Strand Board (OSB). Hardwood consumption by the oriented strand board (OSB) industry has increased by 84 percent between 1990 and 1999 while hardwood consumption by the pulp industry and the hardwood sawmill industry have increased by only 1 percent and 13 percent, respectively, during that same time span. (Schuler 1999). To date, the Pennsylvania hardwood resource has not been strongly impacted by the growth in fiber demand associated with OSB hardwood round wood

requirements. However, the potential use of soft maple in OSB production may lead to OSB opportunities in Pennsylvania over the next decade.

Pushing the Resource Envelope

Another trend currently in its infancy is the attempt to saw hardwood lumber from small diameter logs. This is something that would not have even been considered as recently as a couple of years ago. I have had a few inquiries from local mills about the possibility of converting small diameter logs and in some cases pole wood into lumber. This has been done for decades in the softwood dimension industry, but it has not been practiced in hardwoods industry due to economics and markets. Although not very efficient, it is possible to saw small diameter hardwood logs into lumber, the problem that arises occurs during drying. The logs are going to contain a considerable amount of juvenile wood that will contribute to significant degrade during drying. Very little information exists on the subject lumber recovery from small diameter hardwood. What little information that does exist is research for sawmills only, and does not follow through the dry kiln.

Green Lumber Recovery Data from the USDA Forest Service

Log Diameter (Small End)	%1Common & +	Process Time per 1000 Bdft
12”	45%	30 minutes
11”	37%	
10”	28%	36 minutes
9”	18%	
8”	7%	48 minutes

Lumber recovery studies from log through the kiln are slated to take place this year depending on funding status from USDA. More data needs to be obtained in order to determine the economics of the process. My gut reaction is that we will not see grade lumber from small diameter; however, a process called green dimensioning may be able to produce parts. Further studies are a must before proceeding and still extreme caution must be used. Depending on the application, some stand-alone products may be made from small diameter logs successfully, but I would expect the significant longitudinal shrinkage characteristics of the juvenile wood to eliminate this material from the vast majority of solid wood products made today.

Secondary Industry

Until now much of the discussion has revolved around the primary sector, what are the secondary processors doing? The biggest change in the secondary sector is how business is being conducted. In order to compete and survive companies are required to deliver product to customers almost immediately with 100% quality and as cheap as possible. If you are not able to perform under those guidelines, your competition surely will and your company will not be around much longer.

In the past, traditional high value-added operations such as furniture and cabinet producers required seven broad skills: Purchasing Lumber, Drying Lumber, Milling Lumber, Edge Gluing Wood Panel Parts, Machining Wood Panel Parts, Assembling End Products, and Finishing End

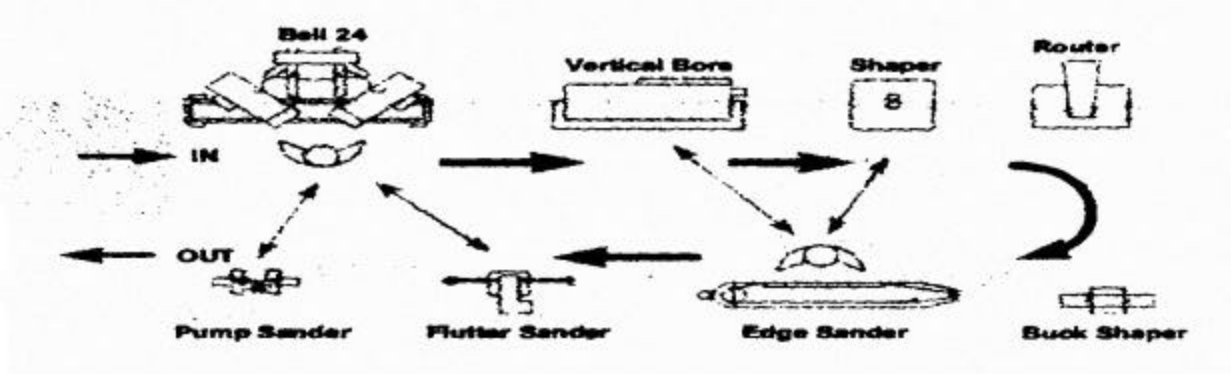
Products. This is an enormous task for a company to assemble and keep the talent required to manage all these components effectively, not to mention the huge capital investment required to build and maintain such a long process. The traditional factory that does everything is becoming obsolete, not because of age, but because of inflexibility, complexity, and is difficult to staff.

Where is the furniture industry headed? It is following the same path that the automobile industry did in the 1980s, Just In Time (JIT) manufacturing. The furniture industry will focus more on assembling and distributing product while maintaining a limited milling and machining capability to remain flexible. Lumber drying will be left to the sawmills and much of the rough milling and machining to the component producers. Over the last decade and a half, kitchen cabinet manufacturers learned the economic benefits of outsourcing to reduce the scope of their process. Many cabinet companies now buy their doors instead of operating kilns, rough mills, and machinery required to make these parts. Overall this has improved their response to changes in the marketplace and has generated higher profits and higher ROI than their integrated competitors.

When JIT first became a buzzword on the American Manufacturing Landscape, most people felt JIT was synonymous with computerized high-tech equipment. Actually, JIT revolves around simplicity. The general consensus among those already involved in this style of manufacturing is to utilize and get the most from conventional low-tech machines before purchasing complex and expensive pieces of equipment. However, there are instances where computerized equipment is desirable, especially in operations where numerous time consuming setups would be required between very short production runs.

The heart of JIT production is a concept called cellular production. Just like the factory itself is product focused, so too is the equipment; many of the machines are arranged in work groups by part and or product family. Each work group and its operators are responsible for a small line of parts. This responsibility means on-time completion of acceptable parts in the required quantity. A cell exists where machines are set up and operated in a tight linkage often approaching one piece flow. Ideally one employee operates more than one machine, and work in process between machines is nonexistent. The goal is to maximize quality, reduce set-up times, reduce work in process, and optimize throughput time. Diagram below illustrates the basic concept of a work cell.

Work Cell Example



The reduction of inventories necessitates clear and accurate communication between suppliers, manufacturers, and customers. In the last few years, technical advances with computers and the Internet has facilitated the growth of e-business. This allows manufacturers to communicate their part needs directly into their vendor's computer improving the accuracy and reliability of order entry. However, the bulk of the wood products industry is riding the heels of the computer wave and is not ready for such systems. I do believe within the next 5 years or so, we will see more of the end value-added companies requiring their suppliers to implement e-business capabilities. Currently some wood products companies are utilizing the Internet to expand their market presence between other wood products companies. However, marketing to the public has been another story entirely. Online furniture markets were expected to revolutionize the industry, but most of the biggest sites have gone bust by the end of last year. UrbanDesign.com, Furniture.com, Living.com, and Homeportfolio.com have all gone out of business due to their inability to deliver products, offer a tactile environment, raise money and offer products at a rate less than consumers could find in a retail store.

The integrated furniture industry is being transformed into a highly efficient industry that incorporates the following characteristics: short product lines, reduced scope of process, workcells that mix conventional and high-tech machines matched to volume demands, product-focused plant layouts, simple yet effective information systems, and most of all well trained motivated workers.

There are still many challenges for the furniture industry. The chart below highlights the characteristics between the average US furniture manufacturer and furniture manufacturers that are achieving "World Class" status.

Performance Measure	**Typical US Plant**	**World Class Plant**
Output per square foot	$75	$125
Travel Distance	5,200 ft	500 ft
Inventory Turnover	6 turns	12 turns
% Time Adding Value	3%	30%
Setup Time	180 min	10 min
Output per Worker	$80,000	$150,000
Cycle Time	5 weeks	5 days
On Time Delivery	80%	95% +

Applying stains and coatings to finish wood products has become increasingly difficult over the last decade with many of the time honored tried and true materials such as nitrocellulose being phased out due to compliance with VOC (volatile organic compound) reduction. These older coatings contained very high concentrations of organic solvents and very little actual coating; however, they were very user friendly from an application standpoint.

There are several approaches to VOC reduction, specifically coating reformulation, improve the transfer efficiency of coating application equipment, add-on technology to deal with VOCs in the exhaust stream, and combinations thereof. Coating reformulation includes water borne finishes which replace VOC solvents with water, high solids low solvent formulations some of which are UV curable, and catalyzed coatings that cure very quickly significantly reducing solvent flash-off. Improvements in transfer efficiency get more of the applied coating to adhere to the surface of the product being coated. This has been accomplished through HVLP (high volume low pressure) spray systems that reduce the velocity of the atomized coating, electrostatic attraction, roll coating and curtain coating. Add-on technology involves incinerating VOCs in the exhaust stream or absorbing VOC via activated carbon filters.

The majority of the larger cabinet and furniture producers have opted for catalyzed finishes applied with HVLP systems. Clear coatings being applied to large flat surfaces such as cabinet sides and tabletops are being done with curtain coating equipment applying UV curable finishes which are cured in seconds in UV ovens. Water borne finishes have not really caught on in high production shops due to problems with grain raise and its reliance on low humidity environments. I am aware of smaller shops that are utilizing water borne coatings where volume is not an issue. Preheating parts to enhance drying of the coating can control grain raise to some extent.

Dimension Industry

Considering the mills at the end of the value-added chain will be focusing on assembly, there will be an increasing demand for manufacturers to supply machined parts to these entities. Companies who can transform rough lumber into parts that meet customer specifications with on-time delivery efficiently will be able to grow.

This in itself is quite challenging when you consider customer specification seems to be leaning more towards the “clear plastic” appearance while lumber entering the process appears to be going the opposite direction. Luckily this issue is being addressed from both ends of the industry. On the tail end, furniture companies are promoting the natural characteristics of the resource. So called green advertisements are calling for more furniture to incorporate wood that has color variation, gum pockets, small knots, and other characteristics once considered unacceptable to enhance the uniqueness to the final product. In fact many companies have successfully designed entire furniture lines around this concept.

On the front lines of the industry in the rough mills, processing technology is being utilized to help increase throughput despite increasing variability of incoming lumber. Technology such as automated gang ripsaws and optimizing cutup saws have become a very important component of the rough mill industry for several reasons.

First the labor issue. Transforming rough lumber into rough intermediate parts for further processing usually entails heavy manual labor, is repetitive and not at all glamorous. Many companies consider this an entry-level position and is typically low on the wage scale. As a result, employee turnover is usually quite high. Ironically, this is probably the single most influential department in determining the profitability of the company. The position requires a keen understanding of lumber grades and how to best break the board down into parts.

Second is throughput. Many processing decisions need to be made very quickly for each board that passes. Over the years as incoming lumber has migrated down in grade due to price and availability, the task of transforming rough lumber into intermediate parts has become more challenging.

Many of the larger mills are investing heavily in the front end of their process by installing automated equipment that will handle the incoming material variation, increase capacity, and improve yield. Computerized rip and cutup systems are tackling the challenge quite efficiently.

The majority of the optimizing cutup saws require human input in the form of florescent crayon marks that distinguish the boundaries between clear material and unusable portions. The computer then determines how best to obtain the required parts from the marked clear areas of the lumber passing through the system. A good rule of thumb is two people marking lumber and feeding one optimizing saw can do the work of 15 manual chop saws.

Multi-blade saws known as gang ripsaws have the advantage of tremendous throughput over single blade straightline saws. Automated gang ripsaws can take it a step further by offering the ability to increase yield with improved throughput. Automated gang rip systems come in a variety of configurations starting with fixed arbors that incorporate laser lights to highlight optimum combinations to fixed arbors with automated in-feed fences to direct lumber to the optimum combination to all blade movable setups just to name a few. These also require human input in the form of moving laser lights to determine the width of the board. The computer then analyzes incoming board width and cutting bill requirements to establish the optimum break down.

Currently, many of the machinery manufacturers that supply equipment to the hardwood industry are in the process of incorporating scanning technology to the front end of cutup and rip systems. The sensing technology is comprised of an array of equipment such as cameras, magnetic resonance imaging or other types of sensors that work with visual, infrared, ultraviolet, laser, or X-ray input. Scanning technology initially got its start in the softwood industry where knots, splits, cracks, and other undesirable characteristics are easily distinguished from clear wood. Hardwood lumber however has much more variability in the form of different grain and color patterns, thus it is more of a challenge to adapt artificial intelligence to distinguish usable material from unusable material. At present, I am aware of a couple pilot projects taking place in mills where vision-scanning systems are running in parallel with their other equipment. These companies have reported yield improvements of 2 to 3% above the crayon mark optimizer systems; however, consistency has been a problem.

Although automated equipment in the rough mill has enhanced throughput and yield, it can just as easily cause disaster. The equipment needs to be correctly programmed to achieve desirable results. Optimizing cut and rip systems need instructed how to correctly prioritize parts for a given cutting bill and incoming lumber characteristics. Incorrect programming will result in a lot of unwanted parts and waste. Employees responsible for operating this equipment need to fully understand how the equipment works and should have a good understanding of lumber grades as well.

There still appears to be a dilemma regarding rip first or cut first capability. The general rule of thumb has always been if longer parts were needed then rip first was the logical choice or if short parts were the majority of your business then cut first was utilized. However, in today's business environment, it is best to maintain the ability to be able to rip or cut first.

The JIT concepts adapted from the automobile industry works quite efficiently at the end of the value-added chain (i.e.: furniture & cabinetry); however, these same concepts do not incorporate very well in the primary sector. Anywhere rough random length and width lumber is being transformed into specified dimensioned parts, more is usually better. The more cutting options you have, the better the yields are. Just in Time also does not work with drying lumber when then main goal is to dry with minimal degrade. I have seen numerous new kiln equipment manufacturers trying to capitalize on JIT stating their equipment can dry lumber in a fraction of the time as conventional kilns. While this is true, what they neglect to tell the industry is degrade rates often run as high as 50% compared to degrade of 2% when lumber is dried correctly according to established schedules.

Another area that is aiding mills with transforming rough lumber into specified dimensioned parts is simulation-based software. Over the past several years the USDA Forest Service and a host of Universities have developed software to help the wood industry make educated processing decisions that improve yields and processing efficiency. Programs such as ROMI-RIP allow mills to analyze how grade mix, machine setup, part prioritization, and salvage impact yield and processing time. I spent a lot of time last year getting programs such as this into the hands of industry; as a result, companies reported over 2 million dollars economic impact due to their use!

Veneer

Veneer mills, a portion of our industry that has already pushed the resource recovery factor into the stratosphere is pushing the benchmark even higher. Veneer slicing technology from Europe has the ability to produce veneer 0.004" – 0.006" with a surface finish comparable to a 220 grit sanded surface. This has the capability to stretch the yield of a high quality veneer log by a factor of 4 to 5. The by-product from veneer operations whether spent cants from log slicing operations or backer-board from lumber slicing operations is now finding its way into markets such as thick veneer for doors, parquet floor parts, and even in wainscot applications sold at some of the home improvement chains.

Conclusion

So how is the industry doing? Manufacturing productivity in the United States increased by 4.3% in 1998, the 3rd consecutive annual increase over 4%. Last year the durable goods segment, which contains furniture and cabinetry, gained 6.8%.

Industry data for Pennsylvania shows both the primary and secondary industries grew in the number of companies and employees. The appendix contains data from the Pennsylvania Department of Labor, which shows the number of companies and the number of employees in SIC 2400 (lumber/Wood Products) and SIC 2500 (Furniture/Fixtures) from 1995 through 1999 by county.

As long as we continue to work smart, the forest products industry in Pennsylvania should continue to prosper and grow.

Additional Resource-related trends of interest noted in recent USDA studies:

- Current research in both the primary and secondary hardwood processing is largely focused in the areas of scanning and material optimization. Nondestructive evaluation technology sorting logs by magnetic resonance imaging, assisting lumber edging decisions with camera and laser scanning, controlling product flow and lumber sorting with cameras that read inspector's grade marks, and using ultrasound and X-rays to detect internal defects have been well tested in the lab but need further on the job training so that they readily fit into existing material handling systems and sawmill environments.

- The total volume of hardwood sawtimber sold off National Forests in the northern Appalachians (including the Monongahela, Allegheny, Green Mountains, and White Mountains) in 1997 was 35.0 million BF. This is 46.7% lower than the volume of hardwood sawtimber sales off these same four National Forests 12 years earlier, in 1985 (Luppold and Baumgras 2000). However, the price of sawtimber sold off these four National Forests has increased by 411 percent of this same time frame leading to increase in revenue generated from the National Forests sales of hardwood sawtimber of 172 percent (Luppold and Baumgras 2000). While only seven percent of the hardwood sawtimber volume in the northeastern US is contained on the National Forests, they contain higher percentages and better quality of certain very highly demanded species such as black cherry and sugar maple than do private forestlands in the region (Luppold and Baumgras 2000)

- In 1996, less than 2 percent of the hardwood sawtimber removals in the northeast were off the region's National Forests. Eighty percent of the hardwood sawtimber volume harvested in 1996 was off non-industrial private forestlands and 13 percent was removed from forest industry lands (http://www.srsfia.usfs.msstate.edu).

- Red oak continues to be a dominant species with removals of red oak in some regions of the northeast exceeding growth for the first time in decades. Yellow-poplar and maple sawlog harvest rates are increasing but in most regions the proportions of these species

harvested when compared to total hardwood harvests do not exceed their relative distributions in the forests (Luppold and Baumgras 1999)

- Average mill prices of grade 1 red oak logs in northwestern Pennsylvania in 1999 were lower than their level in 1994, $509 vs. $555 (Emmanual and Rhodes 2000). White oak log prices have declined steeply over the same time period. In 1999, they were just 60% their 1994 level. Data compiled by the Weekly Hardwood Review showed the price of 1 common 4/4 kiln-dried Appalachian red oak lumber in 1999 was 2% higher than it was in 1994 (Emmanual and Rhodes 2000).

- In contrast, black cherry and hard maple log prices were higher in 1999 than in 1994 by 30% and 20%, respectively (Emmanual and Rhodes 2000). The prices of 1 common, 4/4 kiln-dried black cherry and hard maple lumber also increased 10% and 21% respectively during the same time period (Emmanual and Rhodes 2000).

Literature Cited:

Bowe, S., R. Smith, P.A. Araman, and D. E. Kline. 2000. Use of advanced hardwood sawmill equipment and desired features for next-generation systems. In: Meyer, D.A., ed., Proceedings of the 28th Annual Hardwood Symposium; 2000 May 11-13; Davis, WV: National Hardwood Lumber Association, Memphis, TN: 131-140.

Emanuel, D. and C. Rhodes. 2000. Bulletin of hardwood market statistics: 1999 Reasearch Note NE-371, USDA Forest Service, Northeastern Research Station, Newtown Square, PA. 22 p.

Hansen, B., P. Araman, C. West, and A. Schuler. 1999. Hardwood timber product markets: a focus on small-diameter. In: Proceedings of the Annual Meeting of the Society of American Foresters; 1999, September 12-15; Portland, OR: Society of American Foresters, Bethesda, MD: 305-311.

Luppold, W. G. and J.E. Baumgras. 2000. Analysis of changes in eastern National Forest timber sales between 1985 and 1997. Forest Products Journal 50 (1):87-93.

Luppold, W. G., J.E. Baumgras, and G. Barrett. 2000. Characteristeics of eastern "grade" hardwood sawmilling industry. Forest Products Journal 50(9):23-27

Schuler, A. 2000. Engineered wood products: a growing factor in hardwood fiber consumption. In: Meyer, D. A. ed., Proceeding of the 28th Annual Hardwood Symposium; 2000, May 11-13; Davis, WV: National Hardwood Lumber Association, Memphis TN: 1-6.

Raymond, A.G., 1999, The Wood World Monitor, Volume 3, Issue 1 – 4.

Raymond, A.G., 2000, The Wood World Monitor, Volume 4, Issue 1 – 4.

U.S. Department of Agriculture. 1996. Timber products output report. Forest Inventory and Analysis timber product output (TPO) database retrieval system.

U.S. Department of Commerce. 1999. Lumber production and mill stocks. MA321T(99). USDC, Washington, D.C.

U.S. Department of Commerce. 1997. Economic Sensus of Manufacturing – Sawmills. EC97M-3211A(97), USDC, Washington, D.C.

Wiedenbeck, J. and J. Dwyer. 2000. Sawmill performance systems for industry: Solve 2000. In: Meyer, D.A., ed., Proceedings of the 28th Annual Hardwood Symposium; 2000, May 11-13; Davis, WV: National Hardwood Lumber Association, Memphis, TN: 131-140.

Forest Products Establishment & Employment Figures
By County

	1995	1996	1997	1998	1999	PERCENCHANGE 95-99	98-99
PENNSYLVANIA							
EST							
24 Lumber/Wood Products	1,645	1,668	1,666	1,732	1,761	7.1	1.7
25 Furniture/Fixtures	459	463	467	486	480	4.6	-1.2
PENNSYLVANIA							
EMP							
24 Lumber/Wood Products	32,349	33,031	34,266	36,279	37,669	16.4	3.8
25 Furniture/Fixtures	16,851	16,359	16,774	17,242	17,338	2.9	0.6
ADAMS							
EST							
24 Lumber/Wood Products	17	17	21	22	20	17.6	-9.1
25 Furniture/Fixtures	8	6	5	4	4	-50.0	0.0
ADAMS							
EMP							
24 Lumber/Wood Products	635	738	815	874	930	46.5	6.4
25 Furniture/Fixtures	305	144	138	150	168	-44.9	12.0
ALLEGHENY							
EST							
24 Lumber/Wood Products	55	54	52	54	55	0.0	1.9
25 Furniture/Fixtures	43	44	46	50	47	9.3	-6.0
ALLEGHENY							
EMP							
24 Lumber/Wood Products	699	627	572	594	572	-18.2	-3.7
25 Furniture/Fixtures	1,035	995	968	1,013	992	-4.2	-2.1
ARMSTRONG							
EST							
24 Lumber/Wood Products	12	14	12	12	13	8.3	8.3
25 Furniture/Fixtures	*.*	*.*	*.*	*.*	*.*	*.*	*.*
ARMSTRONG							
EMP							
24 Lumber/Wood Products	207	255	279	346	350	69.1	1.2
25 Furniture/Fixtures	*.*	*.*	*.*	*.*	*.*	*.*	*.*
BEAVER							
EST							
24 Lumber/Wood Products	12	12	12	10	9	-25.0	-10.0
25 Furniture/Fixtures	*.*	*.*	*.*	*.*	*.*	*.*	*.*
BEAVER							
EMP							
24 Lumber/Wood Products	268	299	362	374	347	29.5	-7.2
25 Furniture/Fixtures	*.*	*.*	*.*	*.*	*.*	*.*	*.*
BEDFORD							
EST							
24 Lumber/Wood Products	30	29	27	24	26	-13.3	8.3
25 Furniture/Fixtures	3	3	3	3	*.*	*.*	*.*

BEDFORD

EMP

24 Lumber/Wood Products	397	363	363	381	396	-0.3	3.9
25 Furniture/Fixtures	18	15	11	12	*.*	*.*	*.*

BERKS

EST

24 Lumber/Wood Products	39	39	40	39	43	10.3	10.3
25 Furniture/Fixtures	19	21	19	20	18	-5.3	-10.0

BERKS

EMP

24 Lumber/Wood Products	784	656	588	624	647	-17.5	3.7
25 Furniture/Fixtures	507	436	412	437	436	-14.0	-0.2

BLAIR

EST

24 Lumber/Wood Products	23	24	24	24	24	4.3	0.0
25 Furniture/Fixtures	5	5	5	4	6	20.0	50.0

BLAIR

EMP

24 Lumber/Wood Products	392	349	385	401	549	40.1	36.9
25 Furniture/Fixtures	59	71	88	99	84	42.4	-15.2

BRADFORD

EST

24 Lumber/Wood Products	32	35	37	35	36	12.5	2.9
25 Furniture/Fixtures	*.*	*.*	*.*	*.*	*.*	*.*	*.*

BRADFORD

EMP

24 Lumber/Wood Products	946	1,058	1,077	934	1,013	7.1	8.5
25 Furniture/Fixtures	*.*	*.*	*.*	*.*	*.*	*.*	*.*

BUCKS

EST

24 Lumber/Wood Products	59	58	63	64	64 8.	5	0.0
25 Furniture/Fixtures	25	24	28	31	34	36.0	9.7

BUCKS

EMP

24 Lumber/Wood Products	804	803	772	907	853	6.1	-6.0
25 Furniture/Fixtures	805	770	793	554	569	-29.3	2.7

BUTLER

EST

24 Lumber/Wood Products	16	14	20	22	20	25.0	-9.1
25 Furniture/Fixtures	*.*	*.*	*.*	3	4	0.0	33.3

BUTLER

EMP

24 Lumber/Wood Products	110	105	112	135	137	24.	5 1.5
25 Furniture/Fixtures	*.*	*.*	*.*	28	37	0.0	32.1

CAMBRIA

EST

24 Lumber/Wood Products	32	34	30	28	29	-9.4	3.6
25 Furniture/Fixtures	3	3	4	4	4	33.3	0.0

CAMBRIA

EMP							
24 Lumber/Wood Products	457	466	434	461	517	13.1	12.1
25 Furniture/Fixtures	170	171	188	201	187	10.0	-7.0

CAMERON

EST							
24 Lumber/Wood Products	9	11	10	10	11	22.2	10.0

CAMERON

EMP							
24 Lumber/Wood Products	147	136	128	145	150	2.0	3.4

CARBON

EST							
24 Lumber/Wood Products	5	6	4	5	4	-20.0	-20.0
25 Furniture/Fixtures	*.*	*.*	*.*	*.*	*.*	*.*	*.*

CARBON

EMP							
24 Lumber/Wood Products	84	93	82	89	95	13.1	6.7
25 Furniture/Fixtures	*.*	*.*	*.*	*.*	*.*	*.*	*.*

CENTRE

EST							
24 Lumber/Wood Products	19	21	21	19	17	-10.5	-10.5
25 Furniture/Fixtures	5	4	4	4	4	-20.0	0.0

CENTRE

EMP							
24 Lumber/Wood Products	160	171	195	192	195	21.9	1.6
25 Furniture/Fixtures	150	182	178	186	207	38.0	11.3

CHESTER

EST							
24 Lumber/Wood Products	30	30	31	33	30	0.0	-9.1
25 Furniture/Fixtures	21	21	21	19	17	-19.0	-10.5

CHESTER

EMP							
24 Lumber/Wood Products	370	351	376	376	414	11.9	10.1
25 Furniture/Fixtures	884	954	1,031	1,007	325	-63.2	-67.7

CLARION

EST							
24 Lumber/Wood Products	27	27	28	27	27	0.0	0.0
25 Furniture/Fixtures	4	4	3	3	3	-25.0	0.0

CLARION

EMP							
24 Lumber/Wood Products	918	1,049	1,234	1,364	1,350	47.1	-1.0
25 Furniture/Fixtures	277	267	274	325	345	24.5	6.2

CLEARFIELD

EST							
24 Lumber/Wood Products	43	42	45	47	49	14.0	4.3
25 Furniture/Fixtures	3	*.*	3	4	4	33.3	0.0

CLEARFIELD

EMP

24 Lumber/Wood Products	746	677	759	835	953	27.7	14.25
Furniture/Fixtures 25	*.*	23	29	24	-4.0	-17.2	

CLINTON

EST

24 Lumber/Wood Products	24	22	21	23	22	-8.3	-4.3
25 Furniture/Fixtures	*.*	*.*	*.*	*.*	*.*	*.*	*.*

CLINTON

EMP

24 Lumber/Wood Products	374	349	439	410	435	16.3	6.1
25 Furniture/Fixtures	*.*	*.*	*.*	*.*	*.*	*.*	*.*

COLUMBIA

EST

24 Lumber/Wood Products	11	9	11	10	12	9.1	20.0
25 Furniture and fixtures	*.*	*.*	*.*	*.*	*.*	*.*	*.*

COLUMBIA

EMP

24 Lumber/Wood Products	616	574	498	579	557	-9.6	-3.8
25 Furniture and fixtures	*.*	*.*	*.*	*.*	*.*	*.*	*.*

CRAWFORD

EST

24 Lumber/Wood Products	43	42	41	39	42	-2.3	7.7
25 Furniture/Fixtures	4	3	3	3	3	-25.0	0.0

CRAWFORD

EMP

24 Lumber/Wood Products	700	681	674	647	672	-4.0	3.9
25 Furniture/Fixtures	190	183	208	202	172	-9.5	-14.9

CUMBERLAND

EST

24 Lumber/Wood Products	9	10	10	11	11	22.2	0.0
25 Furniture/Fixtures	4	4	6	6	4	0.0	-33.3

CUMBERLAND

EMP

24 Lumber/Wood Products	88	78	75	78	183	108.0	134.6
25 Furniture/Fixtures	103	102	105	120	127	23.3	5.8

DAUPHIN

EST

24 Lumber/Wood Products	20	20	17	19	18	-10.0	-5.3
25 Furniture/Fixtures	4	3	3	3	3	-25.0	0.0

DAUPHIN

EMP

24 Lumber/Wood Products	160	180	142	193	197	23.1	2.1
25 Furniture/Fixtures	96	91	98	83	106	10.4	27.7

DELAWARE

EST

24 Lumber/Wood Products	10	10	11	11	13	30.0	18.2
25 Furniture/Fixtures	11	11	11	12	14	27.3	16.7

DELAWARE

EMP

24 Lumber/Wood Products	175	166	165	180	161	-8.0	-10.6
25 Furniture/Fixtures	81	88	95	93	120	48.1	29.0

ELK

EST

24 Lumber/Wood Products	31	35	40	42	38	22.6	-9.5

ELK

EMP

24 Lumber/Wood Products	302	310	328	319	319	5.6	0.0

ERIE

EST

24 Lumber/Wood Products	30	32	29	29	27	-10.0	-6.9
25 Furniture/Fixtures	15	18	18	18	17	13.3	-5.6

ERIE

EMP

24 Lumber/Wood Products	470	518	504	467	532	13.2	13.9
25 Furniture/Fixtures	984	1,074	1,167	1,317	1,552	57.7	17.8

FAYETTE

EST

24 Lumber/Wood Products	44	42	38	41	46	4.5	12.2
25 Furniture and fixtures	*.*	*.*	*.*	*.*	*.*	*.*	*.*

FAYETTE

EMP

24 Lumber/Wood Products	474	453	407	457	427	-9.9	-6.6
25 Furniture and fixtures	*.*	*.*	*.*	*.*	*.*	*.*	*.*

FOREST

EST

24 Lumber/Wood Products	5	6	5	5	5	0.0	0.0

FOREST

EMP

24 Lumber/Wood Products	101	119	115	112	126	24.8	12.5

FRANKLIN

EST

24 Lumber/Wood Products	42	48	47	47	46	9.5	-2.1
25 Furniture/Fixtures	4	6	5	6	7	75.0	16.7

FRANKLIN

EMP

24 Lumber/Wood Products	622	595	740	848	651	4.7	-23.2
25 Furniture/Fixtures	42	100	97	98	103	145.2	5.1

FULTON

EST

24 Lumber/Wood Products	11	9	7	7	7	-36.4	0.0

FULTON

EMP

24 Lumber/Wood Products	74	69	66	66	68	-8.1	3.0

GREENE

EST

24 Lumber/Wood Products	5	5	4	4	4	-20.0	0.0
25 Furniture/Fixtures	*.*	*.*	*.*	*.*	*.*	*.*	*.*

GREENE

EMP

24 Lumber/Wood Products	35	51	51	85	90	157.1	5.9
25 Furniture/Fixtures	*.*	*.*	*.*	*.*	*.*	*.*	*.*

HUNTINGDON

EST

24 Lumber/Wood Products	19	16	18	19	19	0.0	0.0
25 Furniture/Fixtures	*.*	*.*	*.*	*.*	*.*	*.*	*.*

HUNTINGDON

EMP

24 Lumber/Wood Products	95	172	170	191	139	46.3	-27.2
25 Furniture/Fixtures	*.*	*.*	*.*	*.*	*.*	*.*	*.*

INDIANA

EST

24 Lumber/Wood Products	19	17	16	16	20	5.3	25.0
25 Furniture/Fixtures	*.*	*.*	*.*	*.*	*.*	*.*	*.*

INDIANA

EMP

24 Lumber/Wood Products	204	272	275	283	104	-49.0	-63.3
25 Furniture/Fixtures	*.*	*.*	*.*	*.*	*.*	*.*	*.*

JEFFERSON

EST

24 Lumber/Wood Products	42	37	37	46	49	16.7	6.5
25 Furniture/Fixtures	*.*	*.*	*.*	*.*	*.*	*.*	*.*

JEFFERSON

EMP

24 Lumber/Wood Products	575	569	598	687	679	18.1	-1.2
25 Furniture/Fixtures	*.*	*.*	*.*	*.*	*.*	*.*	*.*

JUNIATA

EST

24 Lumber/Wood Products	33	34	36	36	37	12.1	2.8
25 Furniture/Fixtures	*.*	*.*	*.*	*.*	*.*	*.*	*.*

JUNIATA

EMP

24 Lumber/Wood Products	560	675	740	853	866	54.6	1.5
25 Furniture/Fixtures	*.*	*.*	*.*	*.*	*.*	*.*	*.*

LACKAWANNA

EST

24 Lumber/Wood Products	23	23	27	24	25	8.7	4.2
25 Furniture/Fixtures	7	7	6	7	6	-14.3	-14.3

LACKAWANNA

EMP

24 Lumber/Wood Products	575	544	686	723	659	14.6	-8.9
25 Furniture/Fixtures	141	136	104	163	110	-22.0	-32.5

LANCASTER

EST

24 Lumber/Wood Products	110	110	103	113	110	0.0	-2.7
25 Furniture/Fixtures	36	36	43	49	55	52.8	12.2

LANCASTER

EMP

24 Lumber/Wood Products	3,685	3,733	3,924	4,070	4,320	17.2	6.1
25 Furniture/Fixtures	987	997	1,131	1,070	1,141	15.6	6.6

LAWRENCE

EST

24 Lumber/Wood Products	8	10	10	9	9	12.5	0.0
25 Furniture/Fixtures	*.*	*.*	*.*	*.*	*.*	*.*	*.*

LAWRENCE

EMP

24 Lumber/Wood Products	56	55	68	130	144	157.1	10.8
25 Furniture/Fixtures	*.*	*.*	*.*	*.*	*.*	*.*	*.*

LEBANON

EST

24 Lumber/Wood Products	17	19	21	20	20	17.6	0.0
25 Furniture/Fixtures	10	10	10	10	11	10.0	10.0

LEBANON

EMP

24 Lumber/Wood Products	1,015	1,026	1,077	1,144	1,138	12.1	-0.5
25 Furniture/Fixtures	87	76	84	99	98	12.6	-1.0

LEHIGH

EST

24 Lumber/Wood Products	14	16	14	14	14	0.0	0.0
25 Furniture/Fixtures	9	12	12	10	10	11.1	0.0

LEHIGH

EMP

24 Lumber/Wood Products	188	251	214	203	182	-3.2	-10.3
25 Furniture/Fixtures	575	574	627	588	497	-13.6	-15.5

LUZERNE

EST

24 Lumber/Wood Products	26	22	23	21	21	-19.2	0.0
25 Furniture/Fixtures	14	15	12	12	10	-28.6	-16.7

LUZERNE

EMP

24 Lumber/Wood Products	286	188	160	191	184	-35.7	-3.7
25 Furniture/Fixtures	616	645	635	624	595	-3.4	-4.6

LYCOMING

EST

24 Lumber/Wood Products	33	31	31	34	35	6.1	2.9
25 Furniture/Fixtures	13	14	13	12	12	-7.7	0.0

LYCOMING

EMP

24 Lumber/Wood Products	702	836	926	1,036	1,146	63.2	10.6
25 Furniture/Fixtures	1,460	1,333	1,387	1,511	1,581	8.3	4.6

McKEAN

EST

24 Lumber/Wood Products	26	34	36	41	43	65.4	4.9
25 Furniture/Fixtures	*.*	3	4	4	3	0.0	-25.0

McKEAN

EMP

24 Lumber/Wood Products	836	936	974	867	1,040	24.4	20.0
25 Furniture/Fixtures	*.*	234	260	247	284	0.0	15.0

MERCER

EST

24 Lumber/Wood Products	20	25	25	29	29	45.0	0.0
25 Furniture/Fixtures	3	4	4	4	3	0.0	-25.0

MERCER

EMP

24 Lumber/Wood Products	245	269	299	350	517	111.0	47.7
25 Furniture/Fixtures	78	56	53	63	63	-19.2	0.0

MIFFLIN

EST

24 Lumber/Wood Products	25	26	25	29	29	16.0	0.0
26 Paper/Allied Products	*.*	*.*	*.*	*.*	*.*	*.*	*.*

MIFFLIN

EMP

24 Lumber/Wood Products	586	609	650	699	723	23.4	3.4

MONROE

EST

24 Lumber/Wood Products	10	9	8	12	16	60.0	33.3
25 Furniture/Fixtures	*.*	*.*	*.*	*.*	*.*	*.*	*.*

MONROE

EMP

24 Lumber/Wood Products	126	113	78	94	99	-21.4	5.3
25 Furniture/Fixtures	*.*	*.*	*.*	*.*	*.*	*.*	*.*

MONTGOMERY

EST

24 Lumber/Wood Products	32	34	33	35	34	6.3	-2.9
25 Furniture/Fixtures	40	38	40	41	40	0.0	-2.4

MONTGOMERY

EMP

24 Lumber/Wood Products	410	480	567	592	524	27.8	-11.5
25 Furniture/Fixtures	1,947	1,895	1,910	2,214	2,281	17.2	3.0

MONTOUR

EST

25 Furniture/Fixtures	*.*	*.*	*.*	*.*	*.*	*.*	*.*

MONTOUR

EMP

25 Furniture/Fixtures	*.*	*.*	*.*	*.*	*.*	*.*	*.*

NORTHAMPTON

EST

24 Lumber/Wood Products	19	16	22	26	27	42.1	3.8
25 Furniture/Fixtures	*.*	*.*	*.*	*.*	*.*	*.*	*.*

NORTHAMPTON

EMP

24 Lumber/Wood Products	393	352	384	448	442	12.5	-1.3
25 Furniture/Fixtures	*.*	*.*	*.*	*.*	*.*	*.*	*.*

NORTHUMBERLAND

EST

24 Lumber/Wood Products	10	11	12	11	12	20.0	9.1
25 Furniture/Fixtures	*.*	3	*.*	3	3	0.0	0.0

NORTHUMBERLAND

EMP

24 Lumber/Wood Products	774	797	845	842	860	11.1	2.1
25 Furniture/Fixtures	*.*	124	*.*	183	192	0.0	4.9

PERRY

EST

24 Lumber/Wood Products	13	14	14	16	16	23.1	0.0
25 Furniture and fixtures	*.*	*.*	*.*	*.*	*.*	*.*	*.*

PERRY

EMP

24 Lumber/Wood Products	361	384	389	453	490	35.7	8.2
25 Furniture and fixtures	*.*	*.*	*.*	*.*	*.*	*.*	*.*

PHILADELPHIA

EST

24 Lumber/Wood Products	35	39	34	39	37	5.7	-5.1
25 Furniture/Fixtures	63	57	52	50	50	-20.6	0.0

PHILADELPHIA

EMP

24 Lumber/Wood Products	371	361	260	279	231	-37.7	-17.2
25 Furniture/Fixtures	1,690	1,536	1,218	1,154	1,172	-30.7	1.6

PIKE

EST

24 Lumber and wood products	*.*	*.*	*.*	*.*	*.*	*.*	*.*
25 Furniture/Fixtures	*.*	*.*	*.*	*.*	*.*	*.*	*.*

PIKE

EMP

24 Lumber and wood Products	*.*	*.*	*.*	*.*	*.*	*.*	*.*
25 Furniture/Fixtures	*.*	*.*	*.*	*.*	*.*	*.*	*.*

POTTER

EST

24 Lumber/Wood Products	31	29	27	29	30	-3.2	3.4
25 Furniture/Fixtures	*.*	*.*	*.*	*.*	*.*	*.*	*.*

POTTER

EMP

24 Lumber/Wood Products	438	460	410	412	380	-13.2	-7.8
25 Furniture/Fixtures	*.*	*.*	*.*	*.*	*.*	*.*	*.*

SCHUYLKILL

EST

24 Lumber/Wood Products	31	31	30	25	24	-22.6	-4.0
25 Furniture/Fixtures	4	*.*	*.*	*.*	3	-25.0	0.0

SCHUYLKILL

EMP

24 Lumber/Wood Products	1,160	1,209	1,066	926	972	-16.2	5.0
25 Furniture/Fixtures	23	*.*	*.*	*.*	67	191.3	0.0

SNYDER

EST

24 Lumber/Wood Products	28	28	26	27	30	7.1	11.1
25 Furniture/Fixtures	4	5	5	5	4	0.0	-20.0

SNYDER

EMP

24 Lumber/Wood Products	2,299	2,164	2,270	2,329	2,547	10.8	9.4
25 Furniture/Fixtures	306	315	312	222	260	-15.0	17.1

SOMERSET

EST

24 Lumber/Wood Products	34	33	33	32	32	-5.9	0.0
25 Furniture/Fixtures	3	3	3	4	3	0.0	-25.0

SOMERSET

EMP

24 Lumber/Wood Products	289	281	328	346	338	17.0	-2.3
25 Furniture/Fixtures	94	116	137	123	124	31.9	0.8

SULLIVAN

EST

24 Lumber/Wood Products	15	13	11	17	18	20.0	5.9

SULLIVAN

EMP

24 Lumber/Wood Products	176	154	134	158	161	-8.5	1.9

SUSQUEHANNA

EST

24 Lumber/Wood Products	18	20	17	17	18	0.0	5.9
25 Furniture/Fixtures	*.*	*.*	*.*	*.*	*.*	*.*	*.*

SUSQUEHANNA

EMP

24 Lumber/Wood Products	229	246	293	266	271	18.3	1.9
25 Furniture/Fixtures	*.*	*.*	*.*	*.*	*.*	*.*	*.*

TIOGA

EST

24 Lumber/Wood Products	23	22	25	27	27	17.4	0.0

TIOGA

EMP

24 Lumber/Wood Products	218	255	296	303	322	47.7	6.3

UNION

EST

24 Lumber/Wood Products	8	8	8	8	8	0.0	0.0
25 Furniture/Fixtures	5	3	5	5	5	0.0	0.0

UNION

EMP

24 Lumber/Wood Products	779	854	867	1,016	1,175	50.8	15.6
25 Furniture/Fixtures	807	599	589	647	719	-10.9	11.1

VENANGO

EST

24 Lumber/Wood Products	30	28	27	28	26	-13.3	-7.1

VENANGO

EMP

24 Lumber/Wood Products	281	290	267	271	266	-5.3	-1.8

WARREN							
EST							
24 Lumber/Wood Products	25	27	25	27	26	4.0	-3.7
25 Furniture/Fixtures	*.*	*.*	*.*	*.*	*.*	*.*	*.*
WARREN							
EMP							
24 Lumber/Wood Products	240	270	274	294	295	22.9	0.3
25 Furniture/Fixtures	*.*	*.*	*.*	*.*	*.*	*.*	*.*
WASHINGTON							
EST							
24 Lumber/Wood Products	10	12	14	13	14	40.0	7.7
25 Furniture/Fixtures	4	3	*.*	3	*.*	*.*	*.*
WASHINGTON							
EMP							
24 Lumber/Wood Products	197	213	215	211	216	9.6	2.4
25 Furniture/Fixtures	37	36	*.*	54	*.*	*.*	*.*
WAYNE							
EST							
24 Lumber/Wood Products	20	22	21	22	24	20.0	9.1
25 Furniture/Fixtures	4	4	4	4	5	25.0	25.0
WAYNE							
EMP							
24 Lumber/Wood Products	119	132	145	153	162	36.1	5.9
25 Furniture/Fixtures	129	124	141	146	160	24.0	9.6
WESTMORELAND							
EST							
24 Lumber/Wood Products	38	37	36	41	47	23.7	14.6
25 Furniture/Fixtures	8	7	8	10	8	0.0	-20.0
WESTMORELAND							
EMP							
24 Lumber/Wood Products	372	355	385	423	626	68.3	48.0
25 Furniture/Fixtures	126	122	155	195	159	26.2	-18.5
WYOMING							
EST							
24 Lumber/Wood Products	9	9	12	12	14	55.6	16.7
WYOMING							
EMP							
24 Lumber/Wood Products	106	101	107	115	269	153.8	133.9
YORK							
EST							
24 Lumber/Wood Products	40	41	42	45	46	15.0	2.2
25 Furniture/Fixtures	21	24	23	24	21	0.0	-12.5
YORK							
EMP							
24 Lumber/Wood Products	1,014	1,014	1,092	1,335	1,167	15.1	-12.6
25 Furniture/Fixtures	941	970	961	926	969	3.0	4.6

* Data, which might be identified with an individual employer, are not published
Source: Pennsylvania Department of Labor, Unemployment Compensation Covered Employment and Wages