



WoodLINKS

Wood Products Manufacturing

Learning Outcomes Scope & Depth

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INTRODUCTION TO WOOD PRODUCTS MANUFACTURING

Learning Outcomes Scope and Depth

Fundamentals

It is expected that students will be able to:

- investigate and analyze the wood products industry
 - primary
 - secondary
 - tertiary
 - history of
 - locally
 - impact on the community
- explore career paths within the wood products industry
 - technical
 - skilled trades
 - professional
 - ID all positions in a local business
 - salaried
 - hourly
- apply appropriate computer software and skills to prepare reports and demonstrations
 - word processing
 - spreadsheets
 - graphs
 - presentation
- identify the high technology aspects and trends in the wood products industry
 - CNC
 - lasers
 - optimizing
 - scanning
 - emphasis on range and variety
- survey law and environmental issues and their impact on the wood products industry
 - regional regulations
 - the resource
 - impact on jobs
 - air
 - impact on raw materials
 - water
- communicate effectively in the workplace
 - team work
 - oral / written
 - listening, speaking
 - factual, relevant, clear
 - body language
- apply wood products vocabulary and terminology
 - rationale
 - definitions, glossary
 - written
 - oral

- apply wood products mathematics
 - rationale
 - accuracy
 - imperial
 - metric
 - board measure: linear, area, volume
- investigate and apply industry safety strategies and techniques
 - OSHA program and regulations
 - personal protective equipment (PPE)
 - lock out / tag out procedures
 - workplace hazards / identification
- interpret and produce common industry reports: blueprints, flowcharts, technical drawings and reports, spreadsheets, etc.
 - mechanical drawing
 - computer assisted
 - software
 - application

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INTRODUCTION TO WOOD PRODUCTS MANUFACTURING

Learning Outcomes Scope and Depth

Manufacturing

It is expected that students will be able to:

- examine and analyze manufacturing processes
 - define manufacturing
 - shop layout
 - stock supply
 - product flow
 - materials handling
- describe key historical developments in the wood products manufacturing field
 - bush mills
 - urbanization
 - technology
 - large mills
 - transportation
- summarize the future trends that are most likely to change manufacturing processes
 - computers
 - lasers
 - work cells
 - CNC
 - robotics
 - lights out plants
- compare different forms of company structure
 - proprietorship
 - corporation
 - subsidiary
 - limited company
 - cooperative
- explain long term planning issues for wood products manufacturing companies
 - supply of raw materials
 - market identification, local and offshore
 - product life
 - government policies and regulations
- develop and illustrate a theoretical manufacturing process for different wood products
 - design
 - tooling
 - cutting list
 - prototype
 - production flow
 - materials handling

- identify safe and proper set-up and use of cutting tools, hand and machine, in manufacturing processes
 - sharpening
 - chip technology
 - lock out / tag out
 - honing
 - personal protective equipment
 - machine maintenance
- evaluate various types of wood, wood composites, and industry related materials
 - solid wood
 - molded wood
 - MDF
 - plywood, veneers
 - OSB
 - plastic laminates, films
- identify the fundamentals of wood defects and the principles of basic wood grading
 - tree growth
 - bark
 - wane
 - split
 - wood cell structure: hardwood, softwood
 - knots: loose, tight
 - check
 - moisture content
- explain wood seasoning, wood conditioning and wood drying processes
 - rationale
 - dry pile
 - charge
 - benefits of
 - kiln drying
 - stickering

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Products

It is expected that students will be able to:

- describe the wide range of wood products
 - commodities
 - components
 - fixtures
 - furniture
 - art
- explore raw material sources for wood products
 - primary industry
 - inter-business cooperation
 - waste wood
 - salvage
- apply product design factors to wood products
 - aesthetics
 - strength
 - durability
 - fit, finish, function
- define product development steps
 - need
 - niche
 - design
 - prototype
 - critique
 - re-work
 - manufacture
- create a business plan for a product
 - rationale for a business plan
 - components of a business plan
 - business plan template
- manufacture a product
 - interpret the plan
 - organize the site
 - machine and jig set-up
 - product flow
 - materials handling
 - finishing
 - storage
 - inventory
 - quality control

- describe product marketing steps and strategies
 - niche identification
 - direct marketing
 - packaging
 - promotional tools
 - broker
 - distribution / transportation
- define product life cycles
 - local vs. large markets
 - change of style or taste
 - market saturation
 - supply and demand
- describe inventory systems and controls
 - pre / post-production inventory
 - stock control
 - space
 - electronic system
 - on-site and off-site
 - cost
 - manual system
- describe wood commodity product pricing
 - stumpage
 - transportation
 - raw materials purchase cost
 - units (linear, square, FBM, per thousand)

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INTRODUCTION TO WOOD PRODUCTS MANUFACTURING

Learning Outcomes Scope and Depth

Industry Issues

It is expected that students will be able to:

- define the role of organized and unorganized labour in the wood products industry
 - definitions
 - wages, benefit packages
 - advantages
 - constraints
 - worker
 - employer
- present both management and labour perspectives on key issues in the wood products industry
 - labour laws
 - regulations
 - government policies
 - local
 - regional
- explain rotation and non-rotation types of work schedules for various manufacturing enterprises
 - definitions
 - shift work
 - worker health
 - ergonomics / monotony / specialization
 - task rotation
 - multi-skilling / work cells
- describe the education and training required for entry level, technical, professional, and management positions
 - industry requirements
 - degree programs
 - technical programs
 - apprenticeships
 - self-improvement
 - just-in-time training
- describe the effect of supply and demand of raw materials on the wood products industry
 - free enterprise
 - flexibility
 - investment issues
 - secure supply
 - effect on jobs
 - effect on the community
- analyze forest harvesting methods in relation to product manufacturing
 - raw material contamination
 - raw material damage / quality / value
 - cost of raw material

- explain the impact of regional regulatory issues relative to the wood products industry
 - air quality
 - water quality
 - resource sustainability

- outline the effects of politics, economics, and environmental concerns on the supply of raw materials for the wood products industry
 - laws
 - policies
 - the environment
 - free enterprise
 - reduced AAC
 - company size

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ADVANCED WOOD PRODUCTS MANUFACTURING

Learning Outcomes Scope and Depth

Fundamentals

It is expected that students will be able to:

- describe quality control processes in the wood products industry
 - repeatability/duplication
 - specifications
 - tolerance
 - quality as it relates to profit
- evaluate recent high technology manufacturing plant upgrades in the local community
 - optimizing systems
 - thin kerf technology
 - CNC technology
 - finishing systems
 - product handling
- communicate effectively in the workplace
 - verbal vs. non-verbal
 - body language
 - team skills
 - 1st impression
 - ESL workers
 - listening vs. hearing
 - conflict resolution skills
 - positive, negative communication
 - constructive criticism
- apply appropriate safety regulations and standards
 - OSHA standards
 - hazard identification
 - personal protective equip.
 - worker rights and responsibilities
- assess a manufacturing operation to determine if the safety of any of the operations can be improved
 - observe
 - report
 - suggest
 - review
 - improve
- apply appropriate equipment safety in the production shop
 - guards
 - tools
 - application
 - set-up
 - obligation to the team
 - worker responsibility
 - employer responsibility

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ADVANCED WOOD PRODUCTS MANUFACTURING

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Manufacturing

It is expected that students will be able to:

- describe major shifts in the manufacturing of products since the industrial revolution
 - handwork to CNC
 - machines in change
 - components
 - one-of to mass production
- define productivity
 - on task
 - quality control
 - volume vs. quality vs. profit
- explain the free enterprise system in relation to the global wood products industry
 - definition
 - supply and demand
 - commodities
- describe the characteristics of an entrepreneur
 - independent
 - imaginative/creative
 - knowledgeable
 - a risk taker
 - optimistic
 - persistent
 - competitive
 - thrives on challenge
- present the steps for starting a business and participate in a business enterprise
 - concept
 - prototype
 - material supply
 - business plan
 - marketing plan
 - facilities/equipment
- select appropriate wood seasoning, wood conditioning and wood drying processes for products
 - dry piling
 - air drying
 - kiln types and sizes
 - stickering, charging
 - airflow
 - moisture content
 - schedules: temperature / duration
 - mathematics: percent, rate, volume, weight
 - impact on processes (machining, assembly, finishing, shipping)
 - cost vs. profit

- identify different materials for a variety of wood products
 - materials groups (solid wood, panel, structural, engineered, composite etc.)
 - strength, durability -longevity
 - finish -cost
 - environmental impact

- conduct destructive and non-destructive materials testing
 - modulus of strength -elasticity
 - tensile strength -shear
 - compression

- analyze wood by-products and their potential uses
 - bark -residues
 - fall-down -chips
 - sawdust -OSB
 - MDF -particle board
 - panels -pellets
 - finger-jointed products

- differentiate between types of wood joints
 - mitre, mortise & tenon, dovetail, lap
 - shoulders, fit, surface area, appearance
 - strength, cost

- classify assembly methods, components, and adhesives
 - stool -box
 - frame and panel -leg and rail
 - solid gable carcass -drawers
 - pressure and non-pressure assembly procedures
 - clamping, pressing, vacuum
 - adhesives (water soluble, water resistant, water proof)
 - cements (contact)

- describe and apply finishing processes
 - preparation for finishing (sanding, scraping, filling, steaming for dents)
 - stains (water base, alcohol base, oil base)
 - coating finishes (varnish, polyurethane, lacquer, french polish, poly resin)
 - solvents

- use appropriate furniture fixtures, fasteners, and display products
 - hinges, knobs, handles, pulls, tracks, locks
 - 32 mm technology
 - RTA fasteners
 - screws, nails, staples, brads, wafers, dowels

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Products

It is expected that students will be able to:

- use components of various furniture products
 - common components applied to the design of new products
 - mass production to application
- describe major product lines: industrial, remanufactured, and engineered wood products
 - define
 - compare
 - I-beam
 - parallam
 - microlam
- conduct market research for a product
 - business plan
 - concept sketches
 - CAD
 - 3D
 - prototype
 - photos
 - survey
- design a product
 - design theory
 - concept sketches
 - pictorial drawings
 - working drawings
 - flowcharts
 - bottlenecks
- create and implement a business plan for a product
 - the business plan: executive summary, objectives, strategies, enterprise description and outlook, management and ownership, product or service
 - the marketing plan: goals and objectives, strategies, time line, evaluation
- manufacture a wood product
 - design
 - prototype
 - test
 - adjust
 - build
 - cost / price point
 - market & sell
 - profit
 - proportional share
 - equal share

- use CAD/CAM equipment to manufacture a product or component
 - CNC application and use -accuracy, speed, efficiency
 - cost / time saving -profit picture
- select testing systems for wood products
 - prototype stage -fit, finish, function
 - destructive / non-destructive
- create a marketing plan for a wood product
 - define marketing plan -research
 - promotion -venue
 - price point -target market
- design advertising for a wood product
 - tags -brochures
 - pamphlets -advertising
 - trade show displays -samples
- select packaging for a wood product
 - single piece -bulk
 - assembled -knocked down
 - shrink-wrap -carton
 - pallet -protection from damage
- examine and develop inventory systems for wood products
 - maintain production in reduced space
 - limited production vs. inventory
 - inventory vs. “just in time” supply
 - system based on forecast sales
 - system based on bulk purchase of materials, components, fasteners etc.
 - identification of storage systems: racks, bins, boxes, rail car, warehouse, environment
 - inventory system compliments production

- explain wood commodity and product pricing
 - supply and demand
 - bartering / negotiation
 - cost (overhead, wages, utilities, failures)
 - profit
 - what the market will bear
 - cost + mark-up = price

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Industry Issues

It is expected that students will be able to:

- analyze management and labour perspectives associated with various situations and issues
 - conflict resolution
 - team skills
 - environmental pressure
 - wages
 - absenteeism
 - production
 - safety
 - organized workforce
- investigate and evaluate rotation and non-rotation work schedules for various manufacturing enterprises
 - shift work (days, afternoons, nights)
 - swing / split shifts
 - impact on production levels
 - job rotation/task variety
 - work cells
 - ergonomics
 - employee satisfaction
 - reduce downtime
 - maintain quality
 - increased up-time with new technology
- describe how laws, regulations and environmental issues impact the wood products industry
 - waste products
 - by-products
 - effluent
 - chemicals
 - VOC (volatile organic compounds)
 - air, water, aesthetics
 - urban interface
 - compliance vs. cost vs. profit
- explain supply and demand of raw materials in relation to wood products manufacturing
 - supply and demand of commodities
 - cutting permits
 - AAC (annual allowable cut)
 - quantity and quality