

# From the Forest to the Floor

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# Continuing Education Credits



- NWFA is a Registered Provider with AIA/CES, and IDCEC.
- AIA = 1 LU
- IDCEC = 1 CEU
  - ASID
  - IIDA
  - IDC
- AIA/IDCEC does not endorse content
- Questions answered at end of presentation.





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# Course Description



This course explores the process of how trees become wood flooring. Architect and design professionals will become more familiar with wood and its use as a flooring material in an effort to properly specify the product for their client projects.

# Learning Objectives



- Understand how US forests are managed and harvested to promote sustainable growth
- Explain the manufacturing process for both lumber and wood flooring production
- Discuss what happens to wood flooring after it is manufactured
- Describe the different ways that wood flooring can be installed





# Sustainable Forestry



# Sustainability



- USDA Forest Service
  - 1.6 trees planted per tree harvested
  - Standing volume more than double since 1950s
  - Responsible forest management
- 40-60 years to mature
- National Association of Home Builders
  - Wood floors last 100+ years
- Inventory not needed for 40-60 years
- Rapidly renewable for life cycle



# Sustainability of Wood



- Forest Stewardship Council (FSC)
- Sustainable Forestry Initiative (SFI)
- American Tree Farm System (ATFS)





# Environmental Impacts



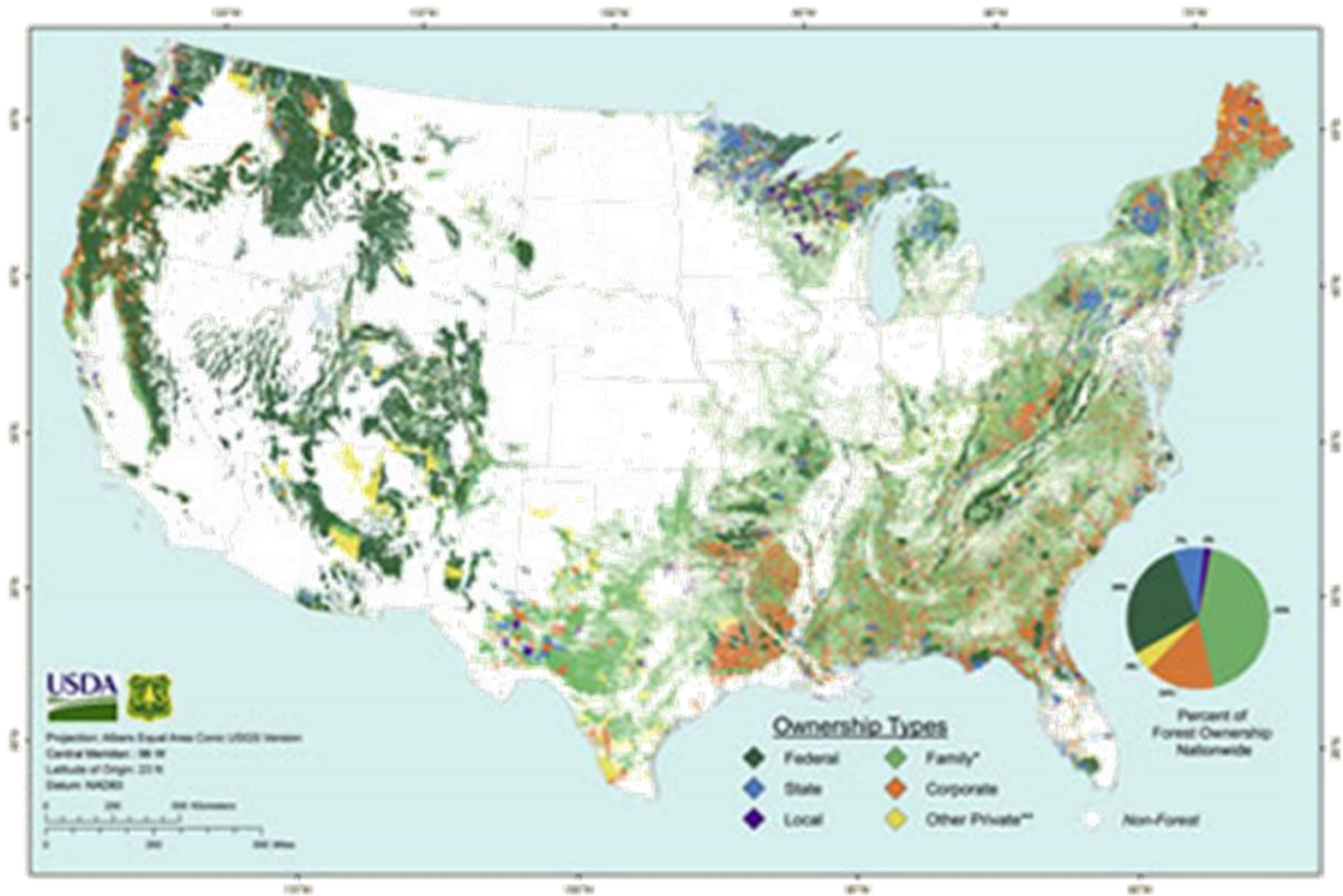
- Renewable flooring material
- Sustainably managed forests in North America
- Low environmental impact
  - Factory: forest naturally regenerates raw material
  - Sun: renewable energy source
- Carbon neutral
  - Produce oxygen during growth
  - Store carbon during service life
- Less water, energy used manufacturing
- End of service = fuel, recycled
- Last 100+ years
  - Less replacement, raw material



# Sustainability of Wood



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# Harvesting



# Harvesting Techniques



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## Clearcutting



## Selective Cutting





# Harvesting Techniques



- Hardwood trees selectively harvested
- Experienced loggers select trees based on species, diameter, height
- Removing larger trees allows younger, smaller trees to reach forest canopy
- Increased exposure to sunlight promotes growth

# Harvesting Techniques



- Experienced loggers cut trees to avoid damaging other trees
- Cuts made for trees to fall between others
- Selective logging highly skilled



# Harvesting Techniques



- Logger removes limbs, other protrusions
- Maximizes usable wood from each log
- Provides rough cut for log before shipping to lumber mill



# Harvesting Techniques



- Log removed from forest
- Machine called a grapple skidder
- Cable skidders utilized in steeper terrains
- Very maneuverable
- Minimizes disruption to forest





# Harvesting Techniques



- Individual logs removed from forest
- Individual trees piled into group
- Multiple trees moved to landing for loading on logging truck

# Harvesting Techniques



- Trees cut into logs
- Loaded onto logging truck
- Transported to lumber mill
- Must be full load for transport due to cost, labor involved



# Harvesting Techniques



- Fully loaded logging truck
- Logs milled into raw lumber
- Raw lumber milled into wood flooring



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# Milling





# Milling



- Logs removed from transport truck
- Stored according to species
- Generally run one species at a time
- Can be dictated by season
- Some species continuously sprayed with water to minimize staining
- Caused by fungus



# Milling



- Logs being kept under water spray
- Dark logs = wet
- Lighter logs = dry



# Milling



- Logs delivered to the debarking machine
- Logs loaded on deck
- Machine removes bark





# Milling



- Machine removes bark
- Removal is rough, most is eliminated
- Bark is collected
- Used to fuel facility, make wood pellets



# Milling



- Logs with bark removed
- Very rough lumber
- Ready for sawing



# Milling



- Rough sawing
- Removes as little wood as possible
- Maximizes useable lumber
- Computers, lasers guide saw blades

# Milling



- Rough cut on 3 sides
- Rough, splintery 4<sup>th</sup> side, called the wane
- Wane removed to square board
- Maximizes yield from each log
- All waste saved, reused



# Milling



- Rough boards enter straight line rip saw
- Removes wane
- Squares edges
- Ends trimmed
- Result = square board





# Milling



- Boards delivered to inspection line
- Sorted by grade
- Skilled grading inspectors
- Looking at quality of wood, knot holes, mineral streaks, color, etc.
- Different grades for construction, cabinets, furniture, flooring, pallets



# Milling



- Inspected boards sorted by grade
- Ready for drying
- Drying removes moisture from wood to prepare for final use
- Construction, cabinets, mouldings, furniture, flooring, etc.

# Milling



- Sorted by grade, boards stacked again
- Continues drying process
- Small, thin, long sticks placed between board layers
  - Called stickers
- Increases air flow



# Milling



- Stacked by grade to continue drying
- Stickers used again to help with air flow
- Air-drying can take 6 months
- Air-drying yards can hold <2 million board feet

# Milling



- Kiln drying controls temperature, humidity
- Temperatures reach 150-175°F
- Takes 5-7 days
- Typical kiln holds 100,000 board feet



# Milling



- Kilns finish drying process
- Saves time, energy, turns inventory faster
- Comes at steep price
- Final results yield stable material
- Sterilizes wood from insects, larvae





# Milling



- Dried lumber delivered to flooring line



# Milling

- Raw lumber runs through planer
- Handles boards of varying length
- Produces boards of consistent thickness



# Milling



- Boards inspected
- Knot holes, other flaws affecting appearance, performance cut out
- Knots, mineral streaks, other natural characteristics of wood now preferred by consumers
- Many manufacturers grades allow for these characteristics



# Milling



- Inspected boards fed into side matcher
- Board lengths vary
- Board thickness consistent
- Produces tongue, groove in sides of boards

# Milling



- Side matched board



# Milling



- Side matched boards feed into end matcher
- Process same as side matcher
- Produces tongue, groove in ends of boards

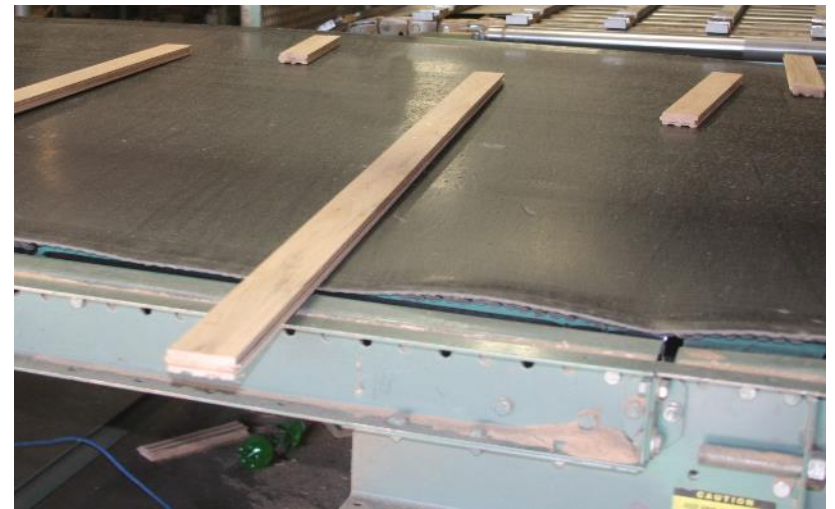




# Milling



- End matched board



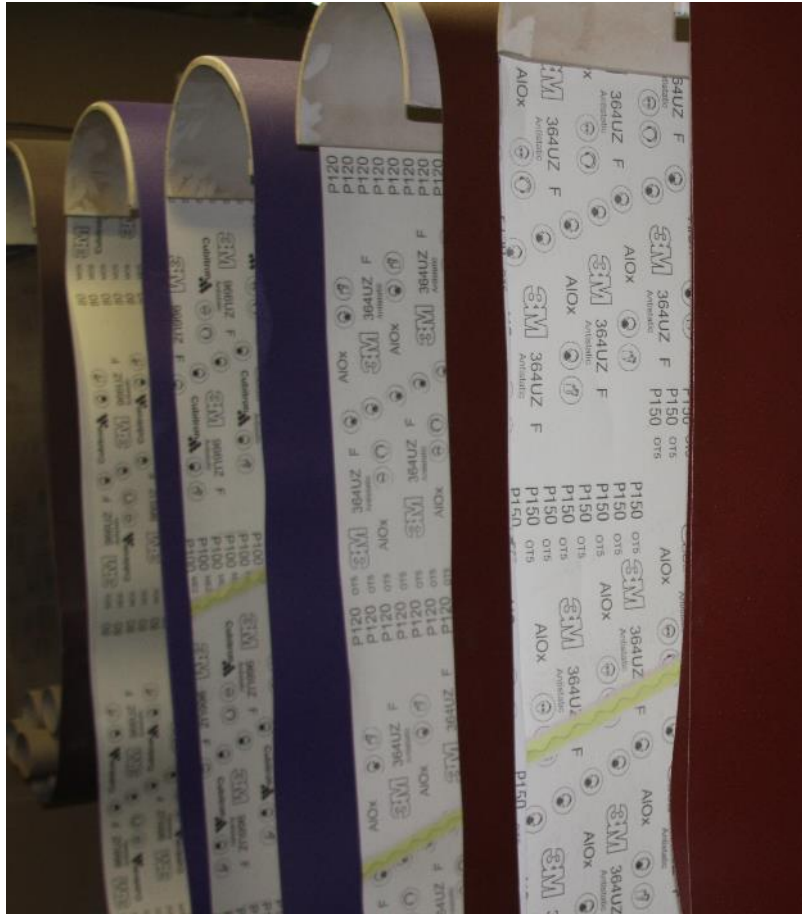
# Milling



- End result is tongue, groove on sides, ends of board
- Unfinished solid wood flooring example
- Prefinished flooring adds sanding, finish application to process
- Different manufacturing process for engineered wood flooring
- Different LU/CEU available for engineered manufacturing process



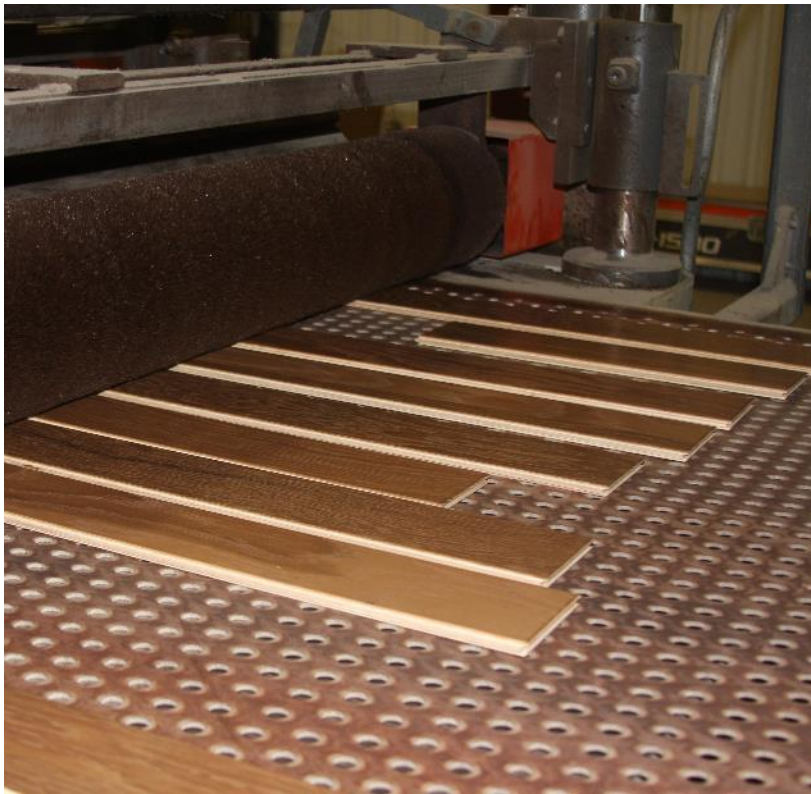
# Milling



- Prefinished floors sanded at manufacturing facility
- Boards sanded multiple times
- Finer grit used each time
- Produces very smooth surface for finish application



# Milling



- Sanded boards run through finishing line
- Unfinished boards run through in small rows
- Each row receives several coats of finish

# Milling



- Side, end matched boards stacked in bundles by grade
- Specific total square footage per bundle
- Bundle square footage varies by manufacturer

# Milling



- Unfinished flooring bundles run through strapping machine
- Minimizes damage to face of boards
- Maintains square footage during shipment





# Milling



- Bundles loaded onto pallets
- Ready for shipping
- Pallets covered to protect wood
- Loaded onto trucks for shipment





Storage &  
Acclimation



# Storage



- Controlled environment
- Heat, humidity controlled
- Building enclosed
- Wood not exposed to outside elements, weather





# Acclimation



- Flooring must acclimate to living conditions
- Moisture testing of flooring, subfloor
- Adjust to normal living conditions
- Windows installed
- HVAC installed, running
- Temperature 60-80°F
- Humidity 30-50%
- Acclimation can take several days, weeks
  - Species
  - Thickness of wood
  - Environmental conditions





# Installation Methods



# Installation



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## Nail-down

## Glue-down

## Float





# Installation



- Wood flooring professional recommended
- Training, skills to ensure successful installation
  - Acclimation, conditioning
  - Moisture testing
  - Flat subfloors
  - Right materials
  - Proper tools
  - Installation experience
  - Resources available if problems encountered
- Ensures long-term performance of floor

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# Summary



# Summary



- US hardwood forests responsibly managed, sustainable
- 2/3 of US forests privately owned
- Lumber harvesting methods include clear cutting, selective cutting
- Hardwood forests harvested using selective cutting
- Trees milled first into lumber, then into flooring
- Lumber milled to maximize log yield
- Wood waste used to fuel facility, manufactured into other after-market products
- Lumber can be air-dried, kiln-dried
- Wood flooring stored in controlled environment, acclimated to the job site
- Professional installation recommended to ensure performance



Thank You

The logo for the Northwest Florida Area (nwfa) is located in the top right corner. It consists of the lowercase letters 'nwfa' in a white, sans-serif font, with a small green leaf icon integrated into the letter 'a'. The background of the top right corner of the slide features a photograph of a young child sitting on a couch and reading a book.

This concludes this course for:

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A photograph of a bedroom interior. The floor is made of dark wood planks arranged in a herringbone pattern. On the left, a bed with a white and grey plaid sheet is visible. In the background, there is a dark nightstand with a lamp and a white curtain. The text "Questions?" is overlaid in white on the floor.

**Questions?**