

Infinity Turbine LLC and Global Energy LLC

Container Kiln Builders Guide

By the Infinity Turbine and Global Energy Staff

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1. Introduction
 - Overview of using shipping containers as dry kilns.
 - Benefits of repurposing shipping containers.
 - Objectives of the outline.
2. Understanding Shipping Containers
 - Types and sizes of shipping containers suitable for conversion (insulated, hi-cube, vans, SIPs).
 - Structural properties of shipping containers.
 - Advantages and limitations for kiln purposes.
3. Design Considerations
 - Assessing the capacity needs (size and volume of wood to be dried).
 - Layout design for effective space utilization.
 - Insulation requirements for maintaining temperature.
 - Ventilation considerations for moisture control.
4. Retrofitting Process
 - Steps for converting a shipping container into a dry kiln.
 - Installation of heating units: types and specifications.
 - Installation of fans for air circulation: positioning and power requirements.
 - Sealing and insulation for heat retention and efficiency.
 - Vent systems and installation
5. Control Systems
 - Implementing temperature and humidity control systems.
 - Automation and monitoring options.
 - Safety features and fail-safes.
6. Operational Guidelines
 - Loading and unloading procedures.
 - Maintenance of optimal drying conditions (temperature, humidity, air flow).
 - Monitoring and adjusting settings for different types of wood.
 - Safety protocols during operation.
7. Energy Efficiency and Sustainability
 - Options for energy-efficient heating units.
 - Utilizing renewable energy sources (e.g., solar panels).
 - Environmental benefits of using repurposed containers.
8. Economic Analysis
 - Cost estimation for setup and operation.
 - Comparison with traditional kiln drying methods.
 - Potential return on investment.
9. Case Studies and Examples
 - Real-world implementations and their outcomes.
 - Lessons learned from existing projects.
10. Regulatory and Compliance Issues
 - Building codes and regulations for kiln construction.
 - Compliance with environmental and safety standards.

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- 11. Challenges and Solutions
 - Common challenges in setting up and operating these kilns.
 - Possible solutions and troubleshooting tips.
- 12. Loading Systems and Operation
 - Carts, Rails, IBC Totes, Nets, Moving Floor, Continuous Feed
 - Batch versus continuous process flow.
- 13. Power Options
 - Grid, solar thermal and PV, battery, diesel, natural gas, and wood.
 - Heat pumps and ground source geothermal.
- 14. Heating the Dry Kiln with Wood or Biomass Heat
 - Overview of Biomass Heating
 - Definition and types of biomass suitable for heating (wood chips, pellets, etc.).
 - Advantages of using biomass as a renewable energy source.
 - Designing a Biomass Heating System
 - Criteria for selecting the right type of biomass heater (size, efficiency, etc.).
 - Integration of the biomass heating system with the shipping container kiln.
 - Considerations for storage and handling of biomass fuel.
 - System Components and Installation
 - Key components of a biomass heating system (combustion unit, heat exchanger, etc.).
 - Installation process and safety considerations.
 - Ventilation requirements for combustion and exhaust.
 - Operational Efficiency and Control
 - Optimizing heat distribution within the kiln for uniform drying.
 - Controlling temperature and emissions.
 - Maintenance routines to ensure efficiency and longevity of the system.
 - Environmental and Sustainability Aspects
 - Reduction in carbon footprint compared to fossil fuels.
 - Sourcing sustainable and local biomass resources.
 - Compliance with environmental regulations regarding biomass heating.
 - Economic Considerations
 - Cost analysis of setting up and operating a biomass heating system.
 - Comparing the operational costs of biomass heating with other energy sources.
 - Potential subsidies and incentives for using renewable energy sources.
 - Challenges and Problem Solving
 - Addressing common challenges associated with biomass heating systems (fuel quality, supply, etc.).
 - Strategies for troubleshooting and maintaining system efficiency.
 - Case Studies and Real-world Applications
 - Examples of successful implementations of biomass-heated dry kilns.
 - Lessons learned and best practices from existing setups.

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15. Exploring Various Kiln Types

- Conventional Lumber Dry Kiln
 - Description and function of conventional lumber dry kilns.
 - Design and operational principles.
 - Suitable scenarios and limitations of conventional kilns.
- Firewood Drying Kiln
 - Specifics of kilns designed for drying firewood.
 - How firewood kilns differ from conventional lumber kilns.
 - Efficiency and capacity considerations for firewood drying.
- Dehumidification Kiln
 - The concept and workings of a dehumidification kiln.
 - Advantages of using dehumidification for wood drying.
 - Appropriate use cases and energy requirements.
- Vacuum Kiln
 - Introduction to vacuum kilns and their unique drying method.
 - Benefits and challenges associated with vacuum drying.
 - Types of wood products ideal for vacuum kiln drying.
 - Vacuum Kiln Commercial Scale
 - Vacuum Kiln Commercial Scale (using technology from vacuum bagging fiberglass and carbon fiber yachts)
- Wood Products Dry Kiln
 - Overview of dry kilns designed for various wood products (e.g., furniture, crafts, potpourri, hemp).
 - Customization and adaptability for different wood product requirements.
 - Comparative analysis of performance and quality outcomes.
- Comparative Analysis
 - Comparison of these kiln types in terms of efficiency, cost, and suitability for different wood types.
 - Decision-making criteria for selecting the appropriate kiln type.
 - Potential for integrating multiple kiln types within a single operation.

Expanded Information:

Furnace Type Kiln
Convention Kiln Schedules

Complete plans with parts list:

Global Energy 5,000 BF Container Kiln
Global Energy 15,000 BF Container Kiln

Note: in 1992, the first 15,000 BF Lumber Container Dry Kiln was build in Madison, Wisconsin by Global Energy, using a heat pipe (Furnace Type) heating system and a wood-fired Conifer Biomass Burner custom built.

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