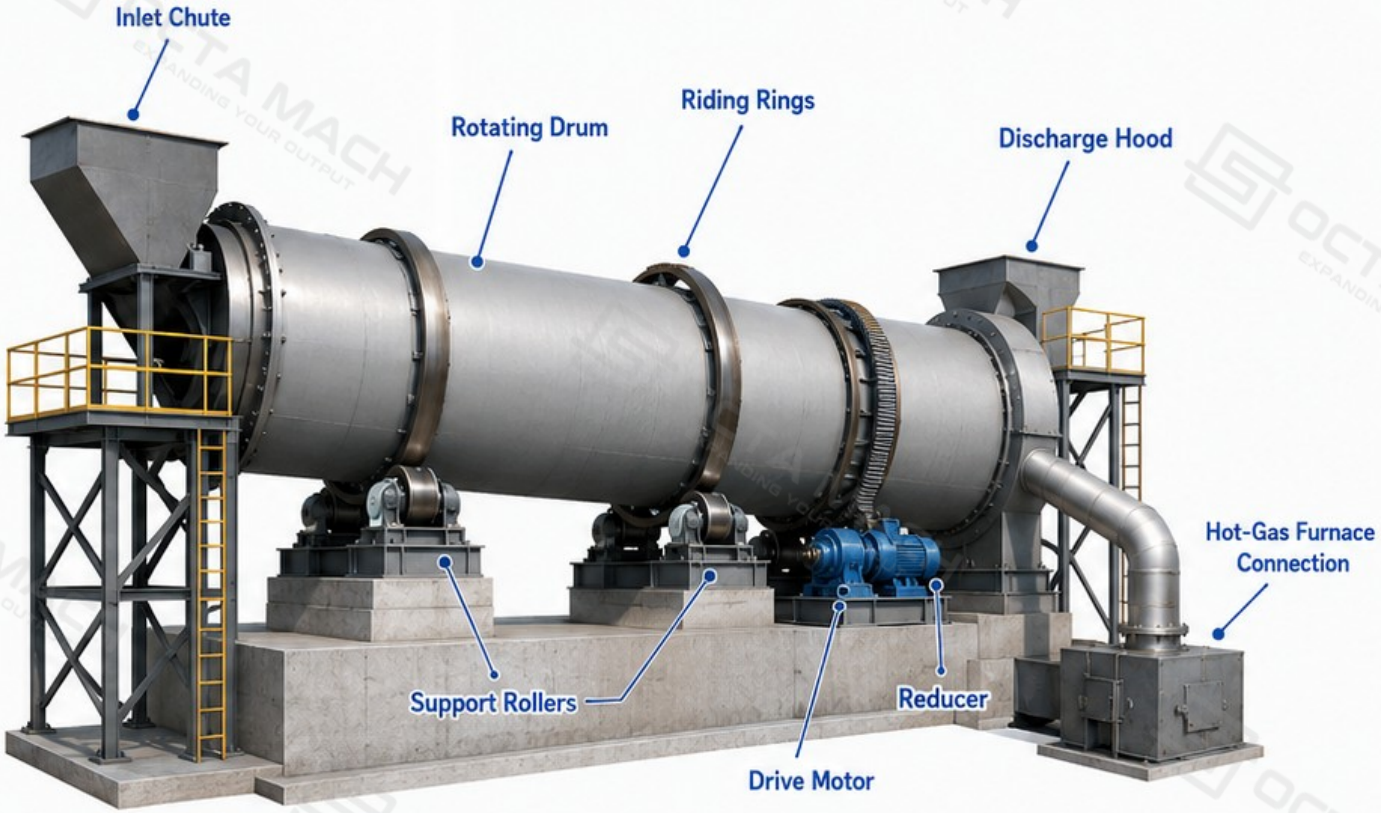
# Rotary Dryer Technical Parameters and Drying Duty Selection Guide

## Product Overview and Confirmed Model Range




**1 Model Range**
Φ600 × 6000 to Φ3000 × 25000 mm

**2 Published Capacity**
0.5–55 t/h

**3 Drum Inclination**
3–5%

**4 Rotation Speed**
1.5–8 r/min

**5 Motor Power**
3–75 kW

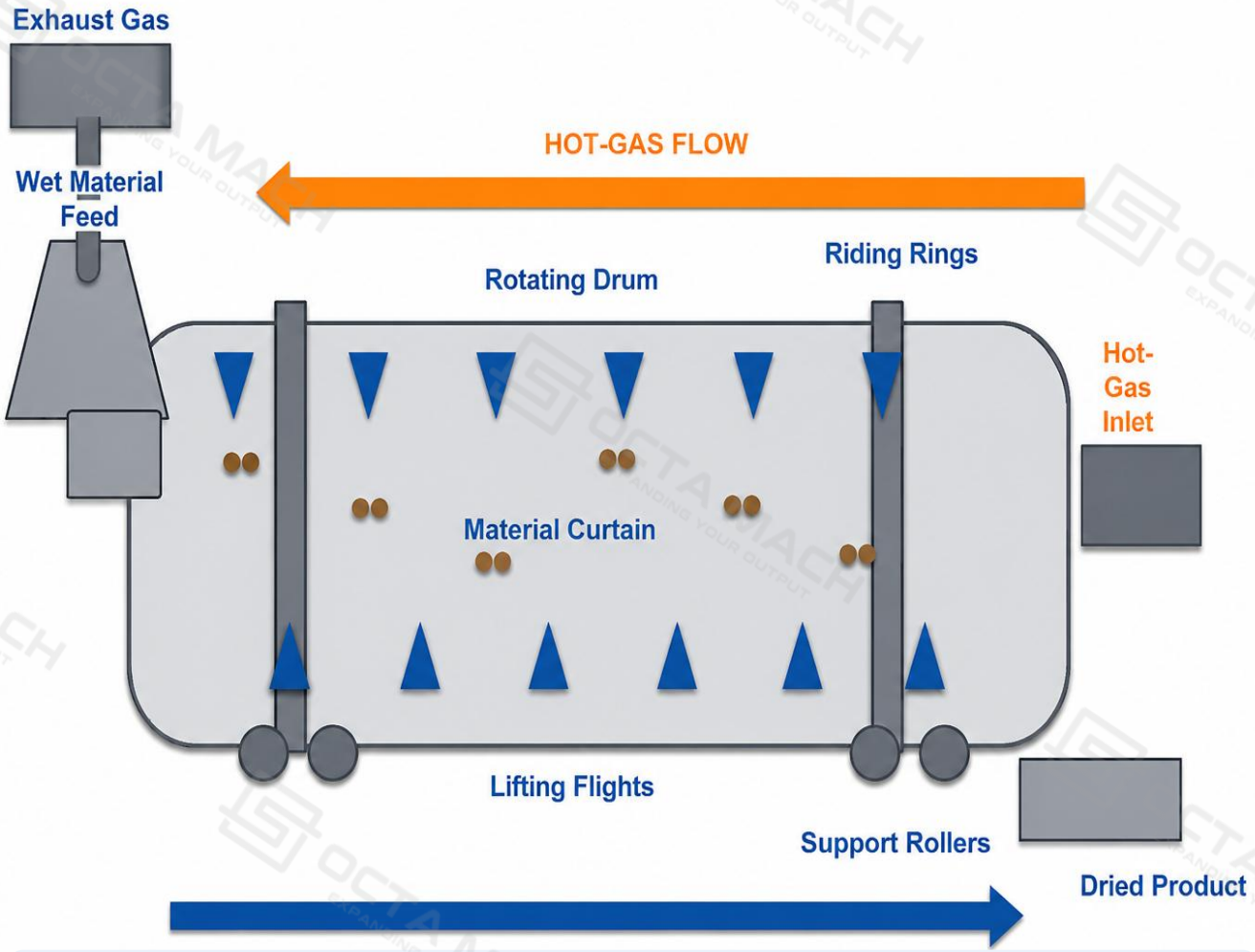
**6 Max Inlet Gas Temperature**
≤700 to ≤800 °C

**7 Typical Materials**
Mineral, sand, slag, limestone, clay, coal

***Published capacity is intended for preliminary model selection.*** Final dryer sizing depends on wet feed rate, inlet moisture, target outlet moisture, particle size, bulk density, allowable product temperature, and available heat source.

# Rotary Dryer Working Principle

## Counter-current material and hot-gas flow




**Flight profile and spacing must match particle size, bulk density, abrasiveness and stickiness.**

**1 — Controlled Feed**

Wet material enters at a stable rate through the elevated feed end.

**2 — Lift and Cascade**

Internal flights repeatedly raise and release solids through the gas stream.

**3 — Heat Transfer**

The material curtain increases exposed surface area and gas-solid contact.

**4 — Moisture Removal**

Evaporated water leaves with the moisture-laden exhaust gas.

**5 — Product Movement**

Inclination, rotation and gravity move material toward the discharge end.

**6 — Dust Separation**

Cyclone or bag-filter equipment controls entrained fines before discharge.

# Moisture Load and Water Evaporation

## Drying duty is defined by water removal, not wet-feed tonnage alone

**Wet Feed Rate**
10 t/h

**Inlet Moisture**
20% wet basis

**Target Outlet Moisture**
5% wet basis

**1 Dry Solids Rate**

Wet Feed Rate × (1 - Inlet Moisture)

10 × (1 - 0.20) = 8.00 t/h

**2 Final Product Rate**

Dry Solids Rate ÷ (1 - Outlet Moisture)

8.00 ÷ (1 - 0.05) = 8.42 t/h

**3 Water Evaporation Rate**

Wet Feed Rate - Final Product Rate

10.00 - 8.42 = 1.58 t/h

### Worked Example Result

| | |
|---|---|
| Dry Solids | 8.00 t/h |
| Final Product | 8.42 t/h |
| Water Removed | 1.58 t/h |

**Published t/h ≠ water evaporation capacity**

**Final sizing must also include material heating, exhaust losses, shell heat loss, dust entrainment, combustion efficiency and operating variation.**

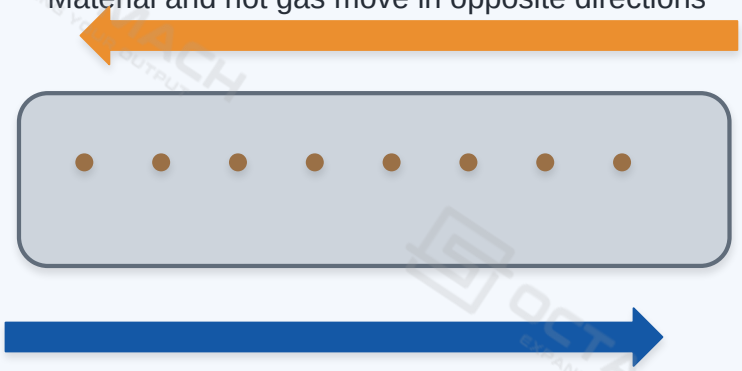
# Airflow and Heat-Source Configuration

## Counter-current and co-current arrangements

### Counter-Current Flow

HOT GAS

Material and hot gas move in opposite directions



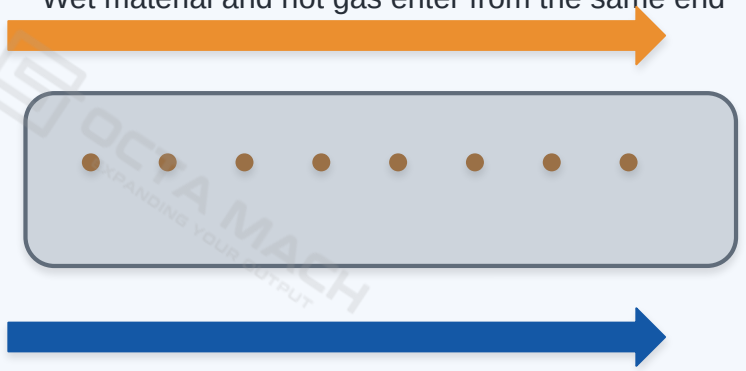
MATERIAL

**Strong final drying force; confirm allowable discharge-end product temperature.**

### Co-Current Flow

HOT GAS

Wet material and hot gas enter from the same end



MATERIAL

**Hottest gas contacts wettest feed; useful when lower discharge temperature is required.**

**Evaporation Duty**

Water removal and heat demand

**Heat Source**

Fuel availability or waste heat

**Material Limit**

Maximum allowable product temperature

**Gas & Dust**

Exhaust volume and dust loading

**Sealing**

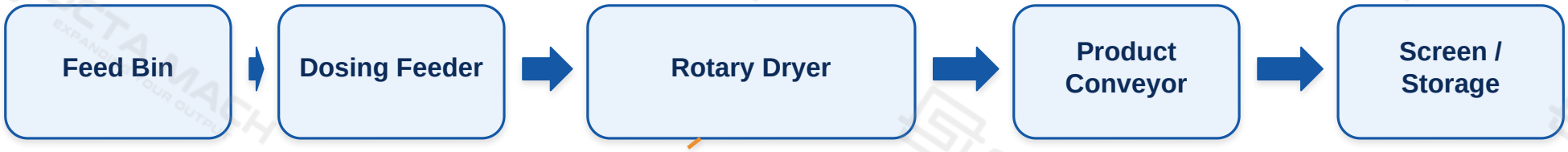
Control cold-air leakage

**Cold-air leakage lowers gas temperature, increases exhaust volume and may overload the induced-draft fan.**

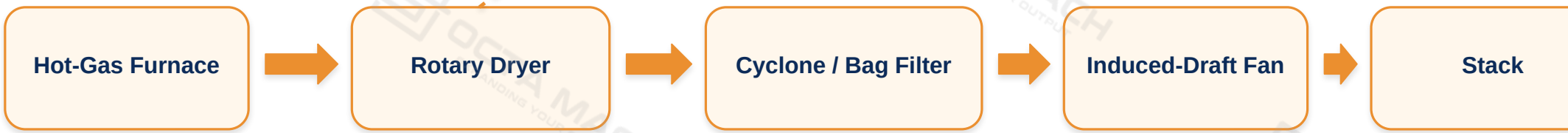
# Rotary Dryer System Configuration

## Material path, hot-gas path and main equipment interfaces

### MATERIAL FLOW




### HOT-GAS AND EXHAUST FLOW




### MAIN COMPONENTS

| | | | | |
|---|---|---|---|---|
| **Rotating Drum**<br>Drying chamber | **Lifting Flights**<br>Material curtain | **Drive System**<br>Drum rotation | **Riding Rings**<br>Load transfer | **Support Rollers**<br>Drum support |
| **Thrust Rollers**<br>Axial control | **Inlet / Outlet Seals**<br>Limit false air | **Hot-Gas Furnace**<br>Thermal energy | **Dust Collector**<br>Fine-particle control | **Electrical Controls**<br>Interlocks and operation |

**System scope should define the dryer body, feeding, heating, exhaust, dust collection, controls and downstream interfaces.**

# Model Selection Inputs and Final Checklist

## Confirm the drying duty before selecting drum size

### Required Process Inputs

| | | | |
|---|---|---|---|
| **Material** | Mineral, sand, slag, clay, limestone or coal | **Material Behavior** | Abrasive, sticky, fragile or heat-sensitive |
| **Wet Feed Rate** | Normal and peak t/h | **Heat Source** | Fuel type, calorific value or waste heat |
| **Inlet Moisture** | State wet basis or dry basis | **Site Conditions** | Altitude, ambient temperature and layout |
| **Target Outlet Moisture** | Required value and tolerance | **Electrical Supply** | Voltage and frequency |
| **Particle Size** | Maximum size and fines content | **Dust Requirement** | Particle recovery and emission limit |
| **Bulk Density** | Loose and operating density | **Plant Interfaces** | Upstream feed and downstream handling |

**Final model selection must be based on evaporation duty, not catalog throughput alone.**

### Final Selection Logic

1. **Calculate Water Evaporation**
2. **Set Product Temperature Limit**
3. **Choose Airflow and Heat Source**
4. **Match Drum, Flights and Gas Volume**
5. **Confirm Dust and Plant Interfaces**

### Operating Checks

- Stable feed rate
- Flight and seal condition
- Roller alignment
- Bearing temperature
- Dust-collector pressure drop