



# Innovations in Continuous Lecithin Drying

# HISTORY

## Capacity

- Up to 1980, most evaporators sold were for Soybean plants processing 500-1200 short tons/day.
- This = 225-500 kg/hr dry Gums.
- This = 2-6M2 Evaporators

# History

## Capacity

- Non-GMO applications use up to 10 M2 Evaporators
- Latin American applications use up to 26 M2 Evaporators

# History

## Moisture Contents

- Wet Gums are normally 30-50% Water.
- Dry Gums requirements were <1% prior to 2000.
- Current requirements are <0.5% and often <0.2%.

# History

## GMO

- GMO applications were normal until 2000.
- Non-GMO are normally smaller capacities.
- Non-GMO applications are often from non-soy oilseeds, such as sunflower.
- Special evaporator specifications are required for Sunflower.

# History

## Evaporator Orientation

- Most are vertical, but some are horizontal.
- Vertical-Lowest Heat History
- Horizontal-Potentially lower moisture in single stage
- Future R&D-Side by side testing.

**Feed** →

**Vapor (counter-current)**

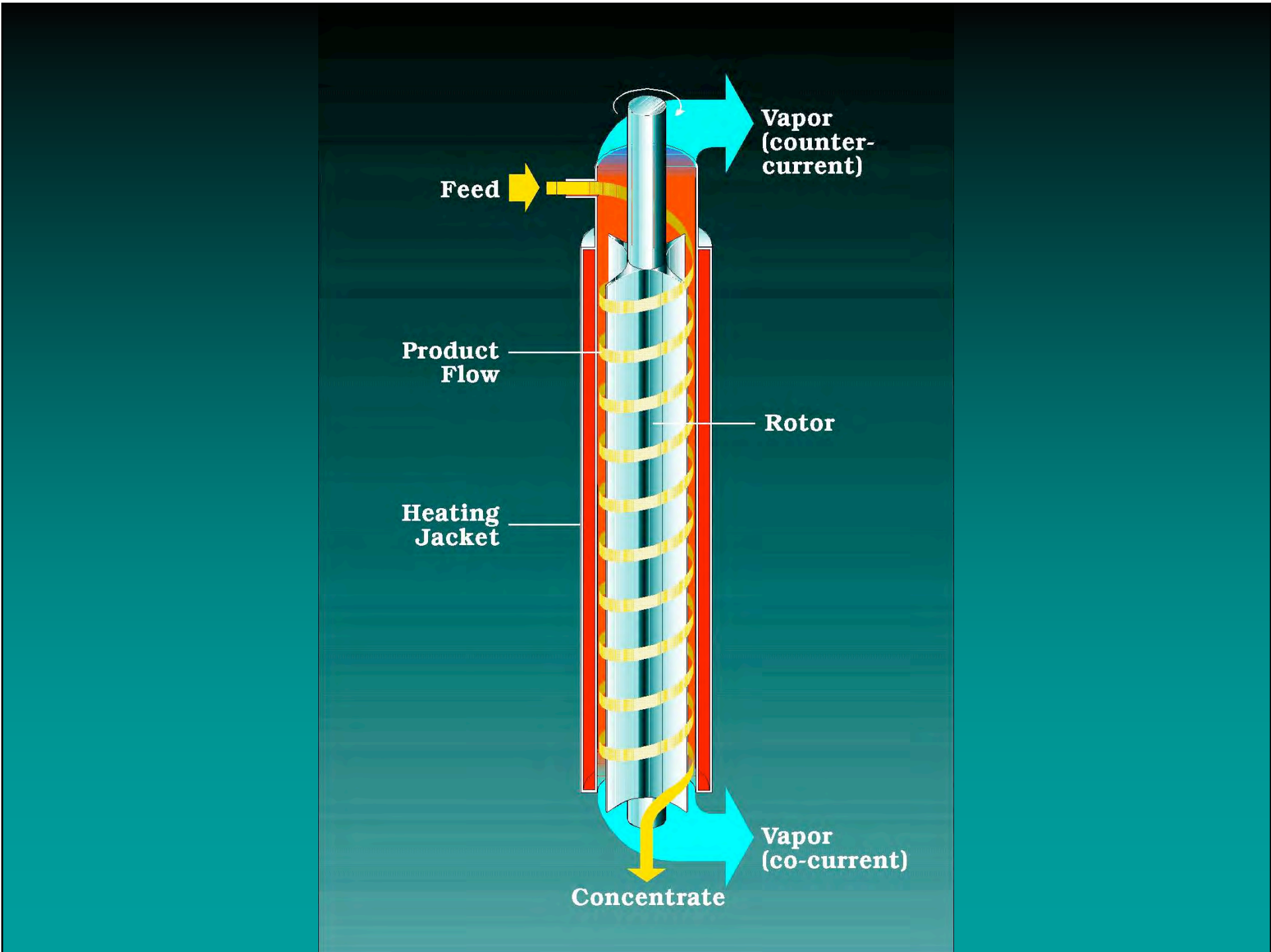
**Product Flow**

**Rotor**

**Heating Jacket**

**Vapor (co-current)**

**Concentrate** ↓







# What is Thin Film Evaporation?

- Thin-Film Evaporation separates water from Dry Gums/Oil using:
- Indirect heat transfer
- Mechanical agitation of a thin product film
- Vacuum

# What is Thin Film Evaporation?

- Short residence time
- Open low pressure-drop configuration
- Allows continuous, reliable processing of
- viscous materials
- heat sensitive products without degradation.

# Batch vs. Continuous

## Batch-Advantages

- Not sensitive to incoming moisture.
- Good Color
- Low Dry Gum Moistures Possible

# Batch vs. Continuous

## Batch-Disadvantages

- Long Batch Processing Times
- Limited Capacities
- High Operator Supervision
- Process upsets damage entire batch.

# Batch vs. Continuous

## Continuous-Advantages

- High Capacities
- Good Color
- Low Dry Gum Moistures Possible
- Low Operator Supervision
- Minimal Off-spec Product w/ Upsets
- Lower Peak Utility Usage

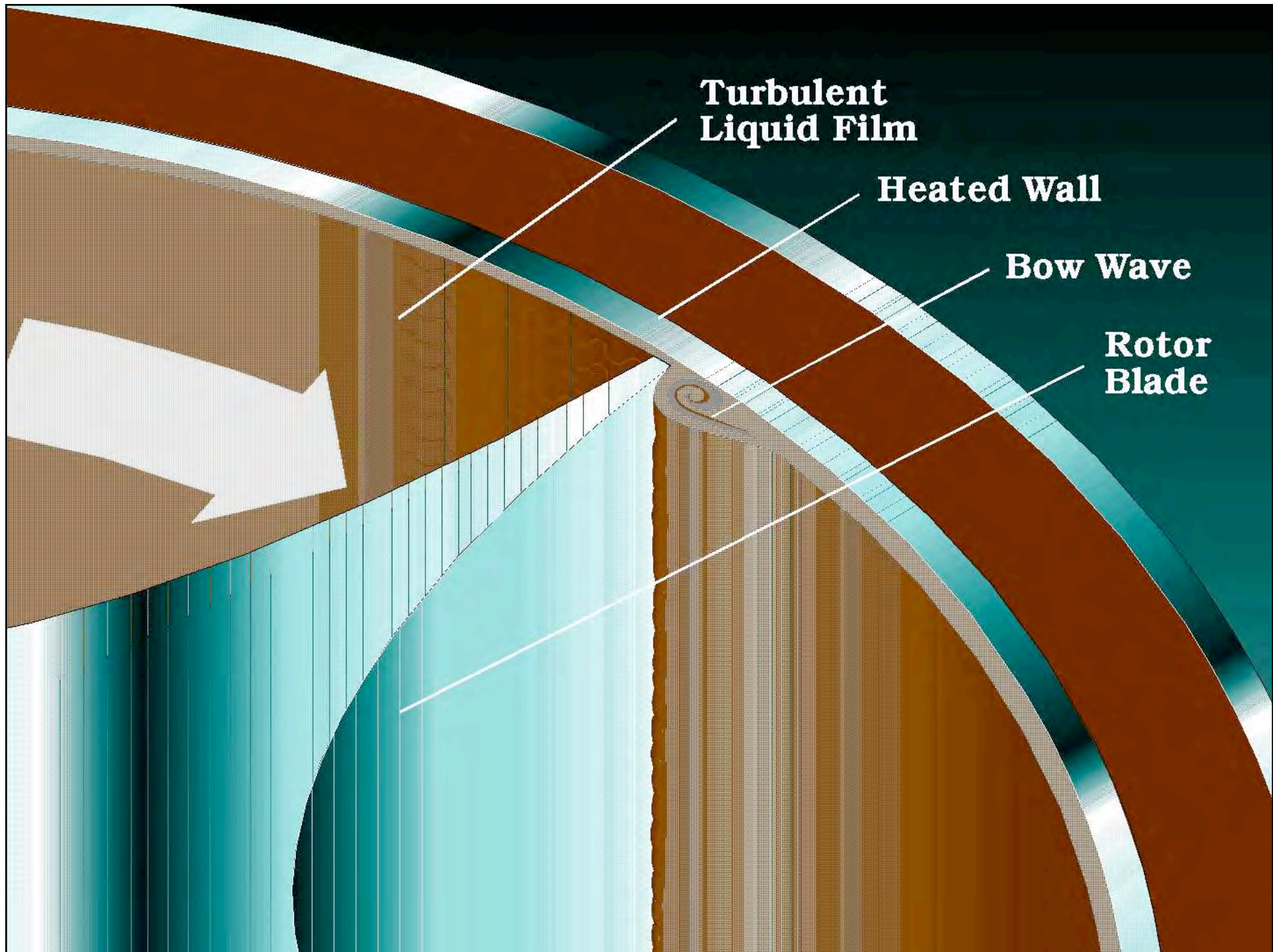
# Batch vs. Continuous

## Continuous-Disadvantages

- Installed Cost-For low capacities
- Sensitive to feed fluctuations (one stage operation)

# Today's Requirements

- Dry Gums Moisture-as low as 0.2%
- Non-GMO Capable
- Acetone Insoluble and Acid # On-line Adjustments.
- Environmentally Compliant.
- High Capacities



**Turbulent  
Liquid Film**

**Heated Wall**

**Bow Wave**

**Rotor  
Blade**



# Design Basis

## 69 mt/day dry basis

	Feed	Oil added to feed	Evaporator Bottoms
Rate	4423 kg/hr	19 kg/hr	2923 kg/hr
Moisture	35%		<1%
Temperature	80°C		110°C
AI	68		66.9
AV	20		19.7

# Operating Conditions

- Feed rate – 4423 kg/hr
- Heating Temperature - 162°C
- Product Temperature – 110°C
- Steam Pressure – 5.5 bar
- Vacuum - 50 mmHg absolute
- Rotor Speed – 12 m/sec

# Water Cleanup



# Product Coolers



