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NEBRASKA
Good Life. Great Journey.
DEPARTMENT OF TRANSPORTATION

2024 Nebraska Asphalt Paving Workshop

Best Practices of Inspection and Construction for Asphalt Paving, Compaction, and Plant Operations

Learning Objectives

- Discuss types of plants
  - Advantages
  - Disadvantages
- Operation
- Environmental Controls

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Early Asphalt Plant

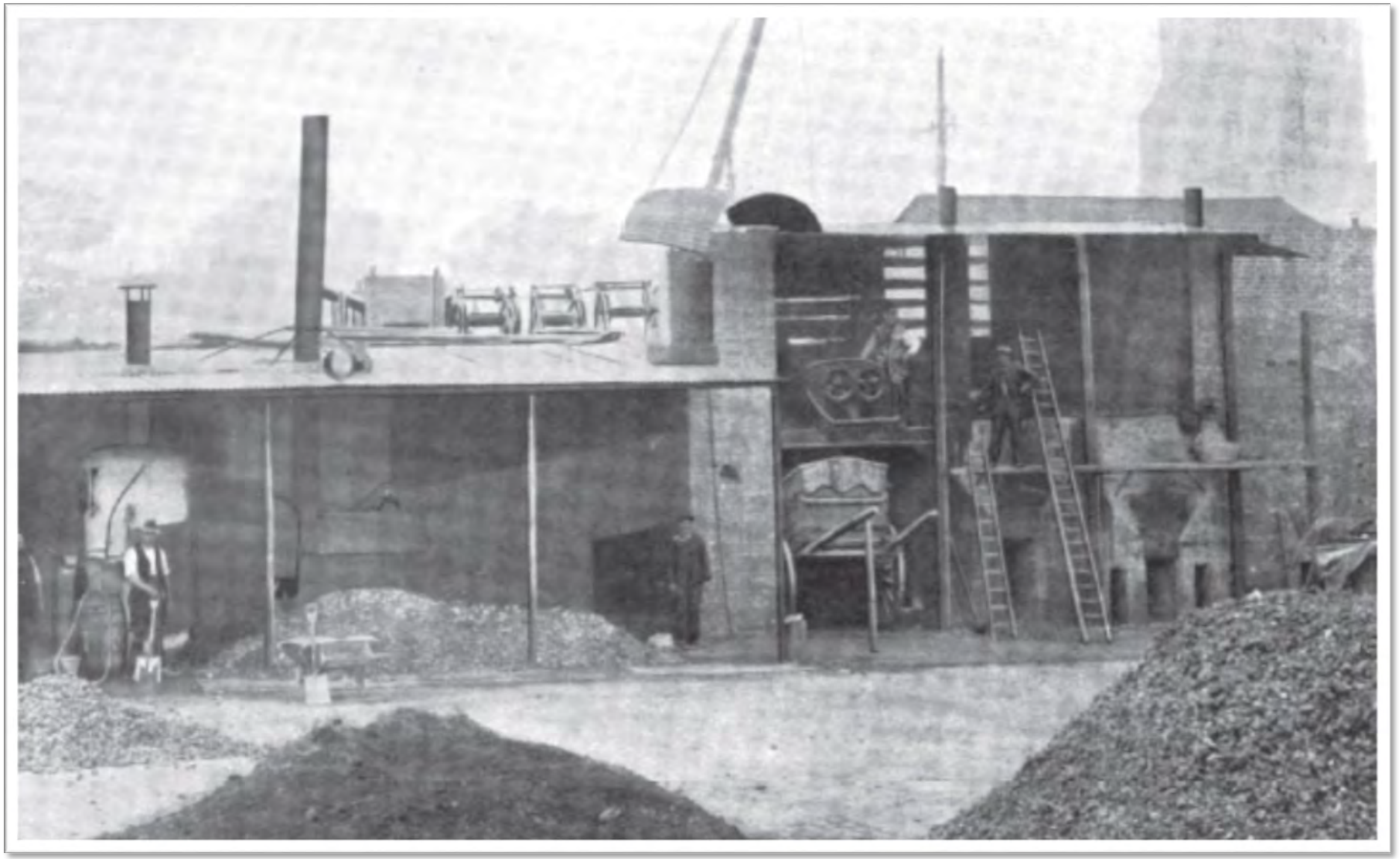

Image Source: Gerry Huber

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Modern Asphalt Plant

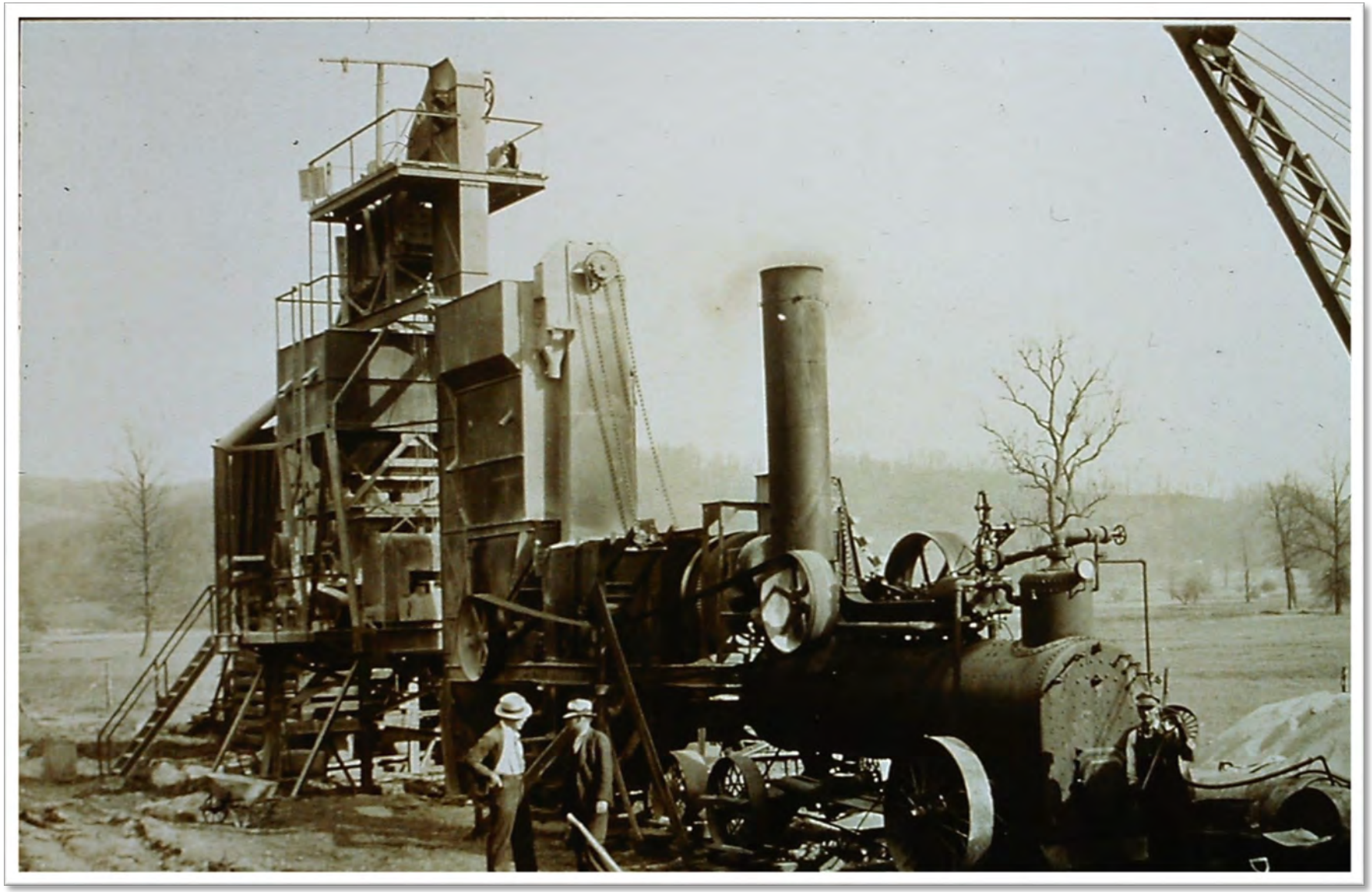

Image Source: John Bukowski

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Types of Production Facilities

Batch Plant

Continuous Flow or Drum Mix Plant

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Mobile Continuous Drum Plant

Major Plant Components

1. Cold feed system including the aggregate stockpiles
2. Asphalt binder storage and supply system
3. Dryers to dry the aggregate
4. Mixing chambers
5. Emission control system
6. Surge storage system or silos

Aggregate Storage

- Multiple stockpiles
- Adequate separation between stockpiles to prevent cross contamination

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Aggregate Storage

- Controlling moisture content of aggregate stockpiles
  - Cost of drying and heating; 1% moisture ≈ 12% fuel savings
  - Covered stockpiles
  - Paving under stockpiles; positive drainage

Asphalt Delivery and Storage

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Cold Feed Bins

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KOMATSU
WA500

Batch Plant Facility

Batch Plant

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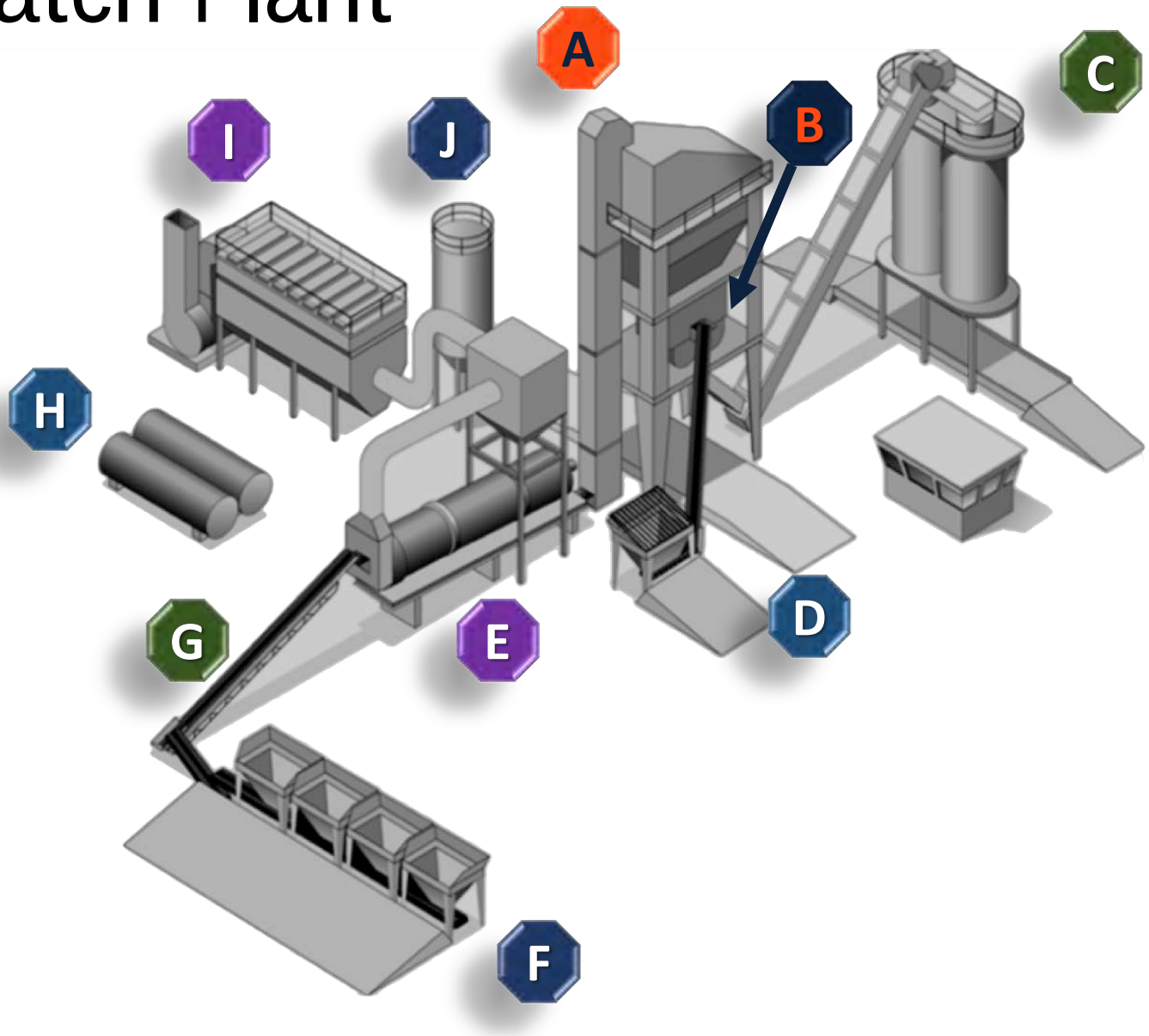
Batch Plant



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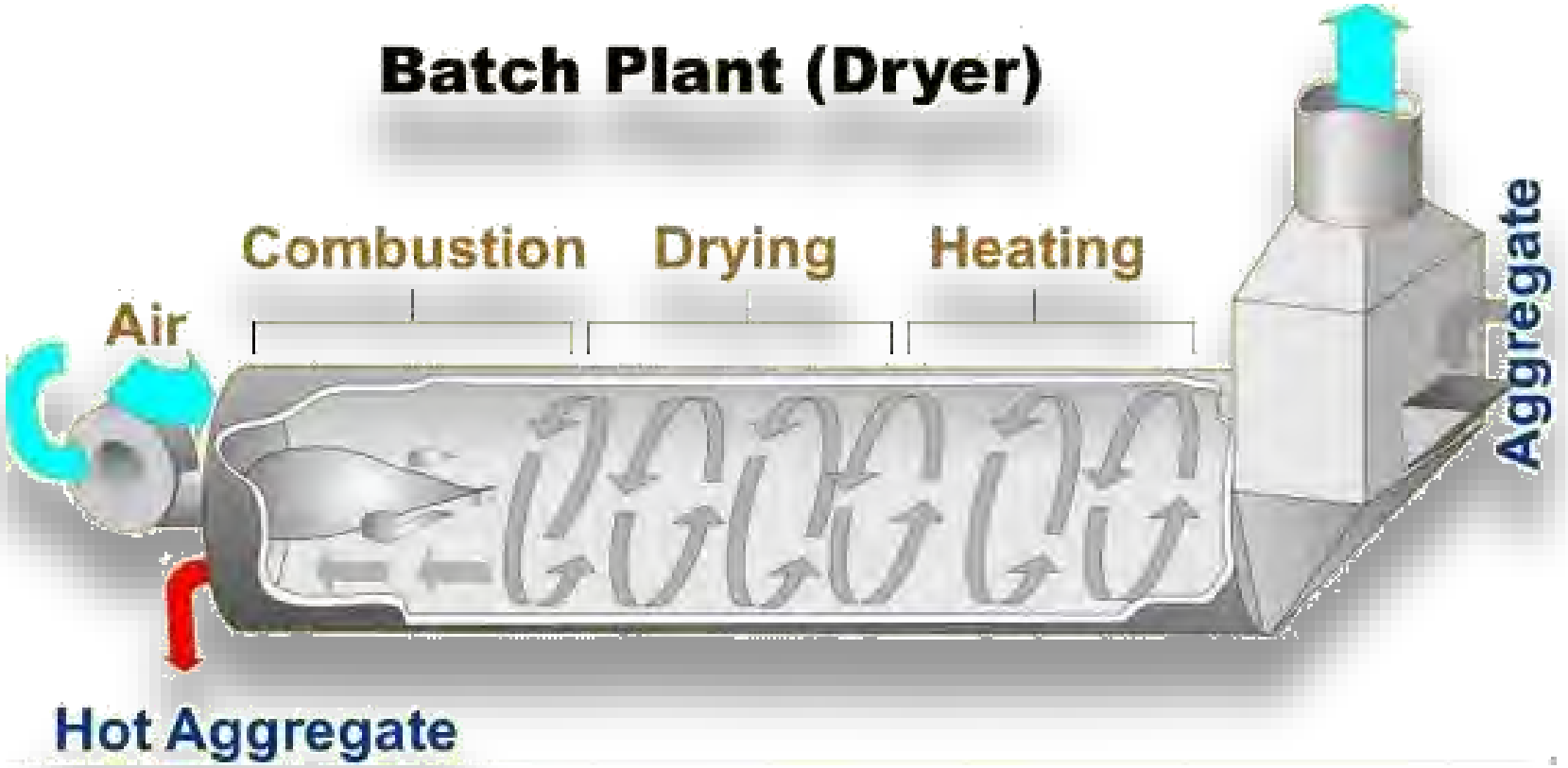
1. Cold Feeds
2. RAP Feed
3. Belt Feeds
4. Dryer Drum
5. Baghouse
6. Hot Bins
7. Pugmill
8. Liquid Binder
9. Mineral Filler
10. Storage Silo

Batch Plant Dryer



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Effective Flight Arrangement

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Ineffective Flight Arrangement

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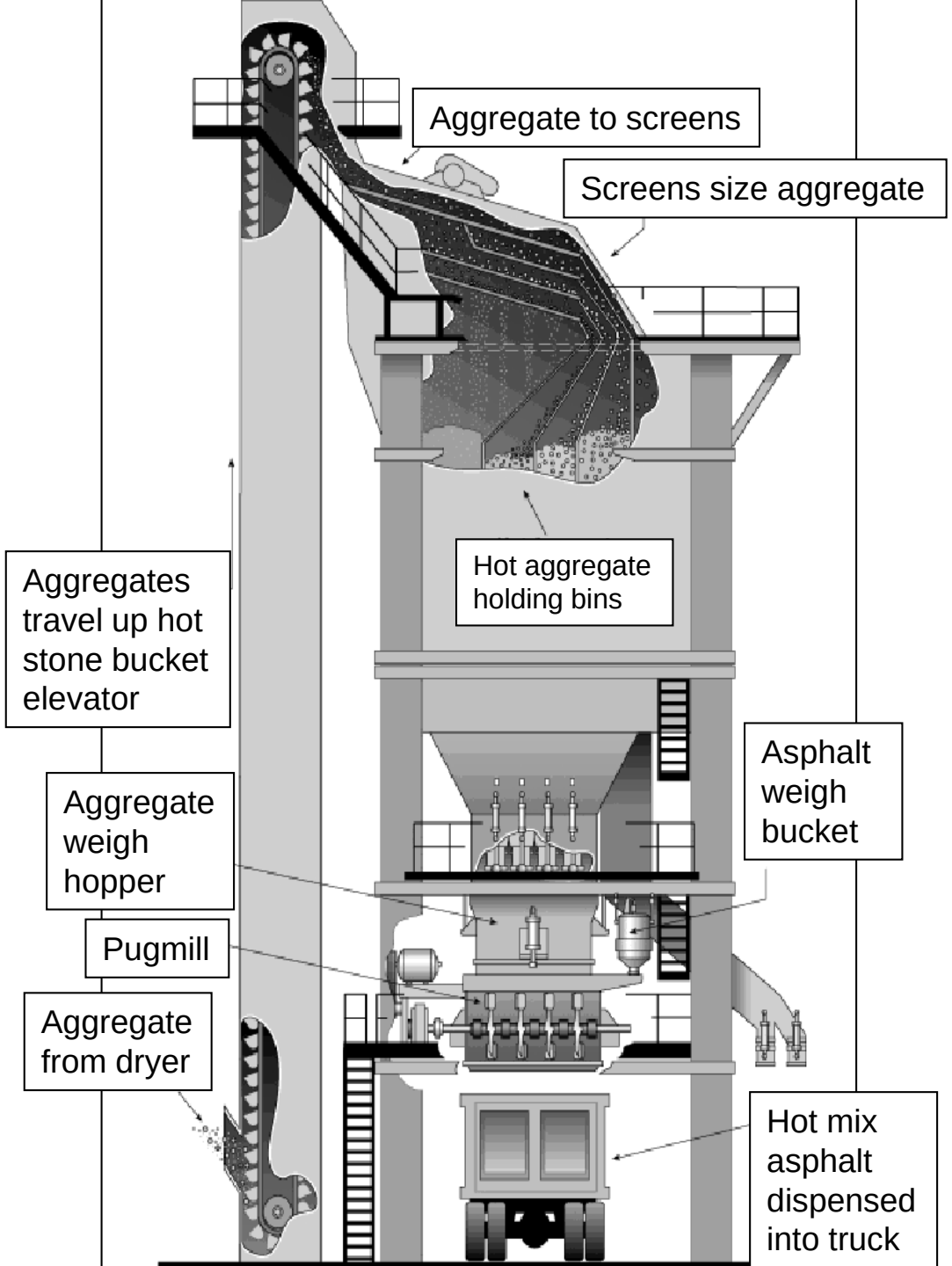
Batch or Mixing Tower

Gradation control at the hot bins



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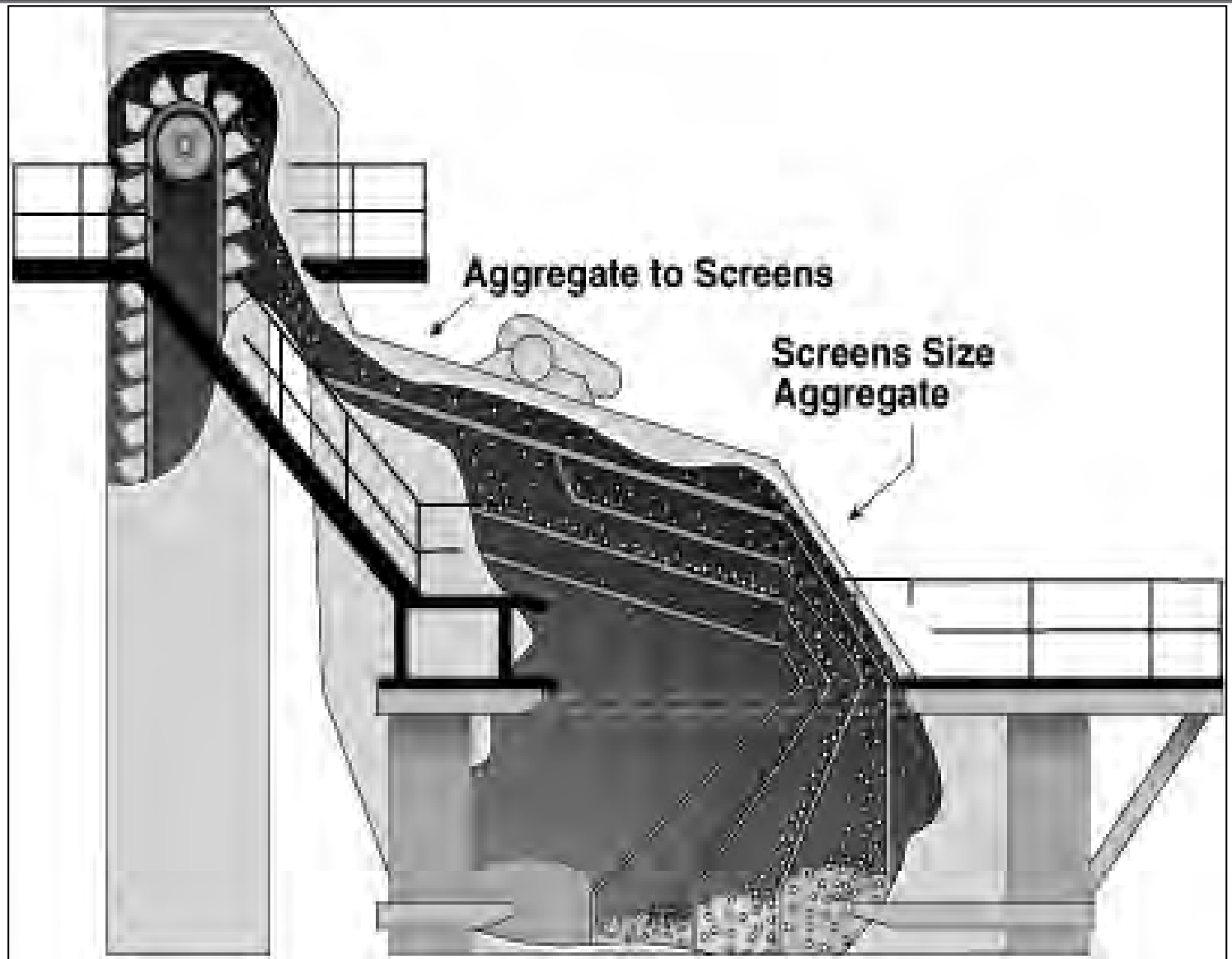
Screen Deck



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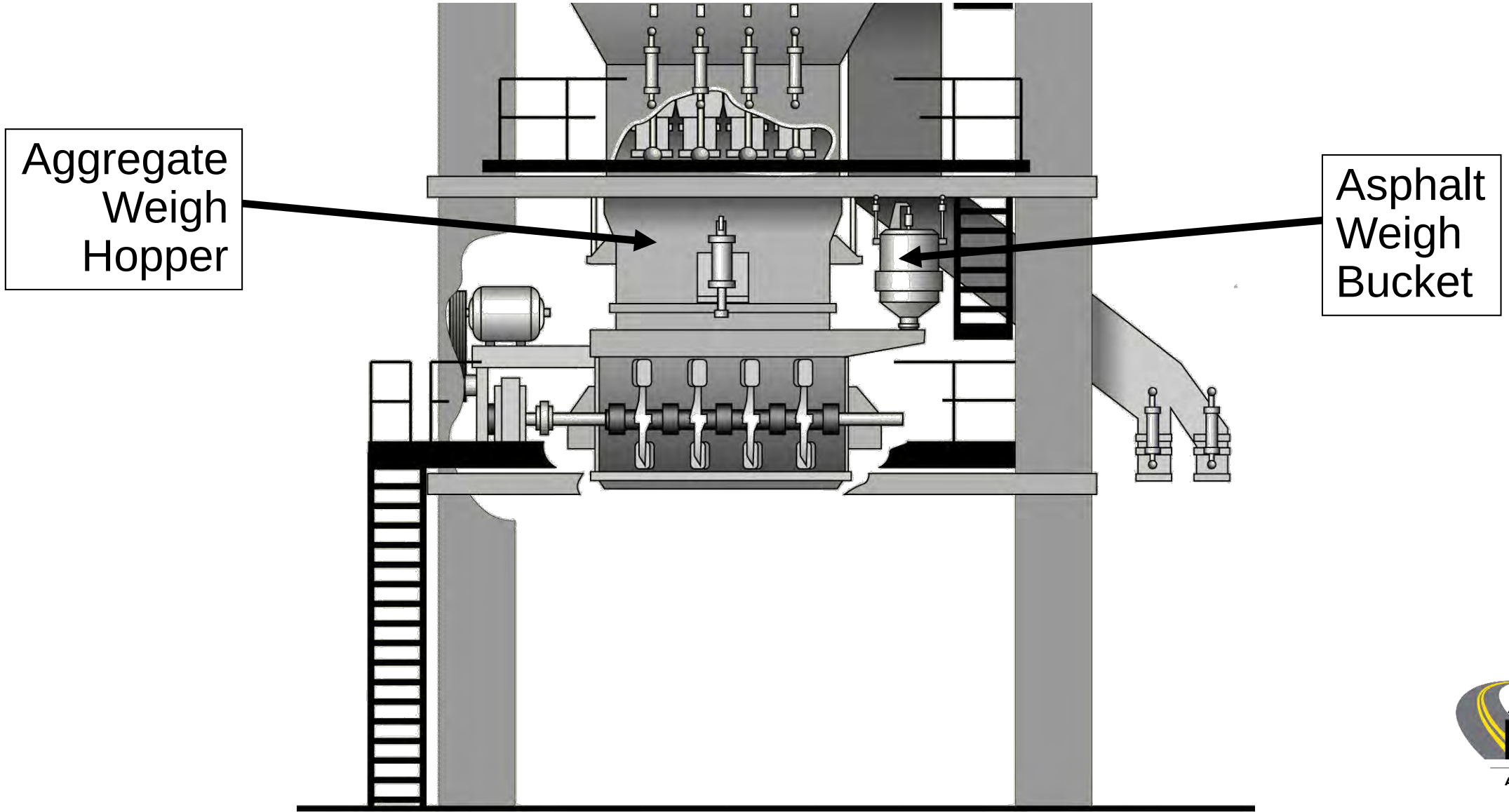
Aggregate Weigh Hopper and Asphalt Weigh Bucket



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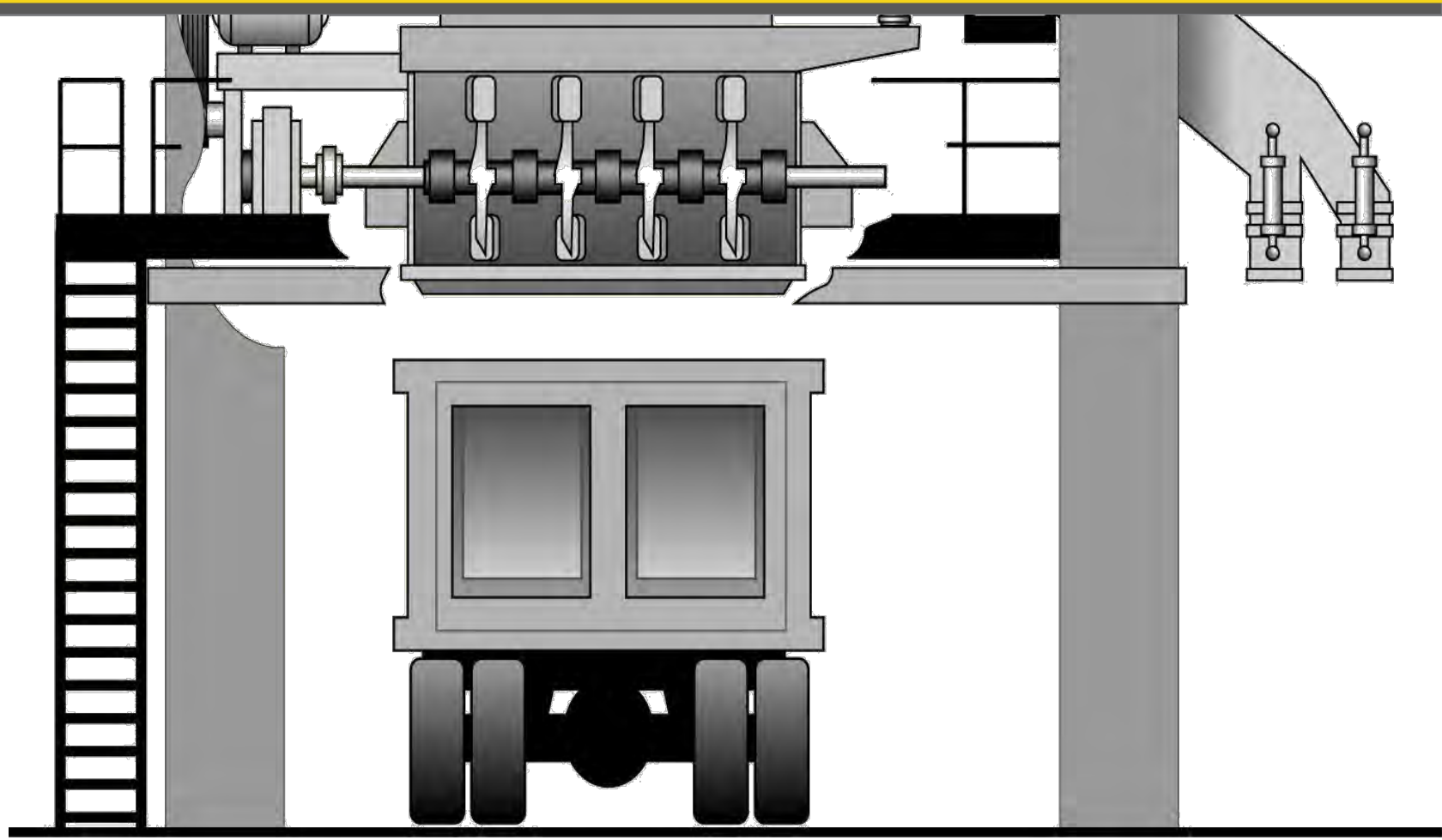
Pugmill

- Dry mix cycle
- Wet mix cycle



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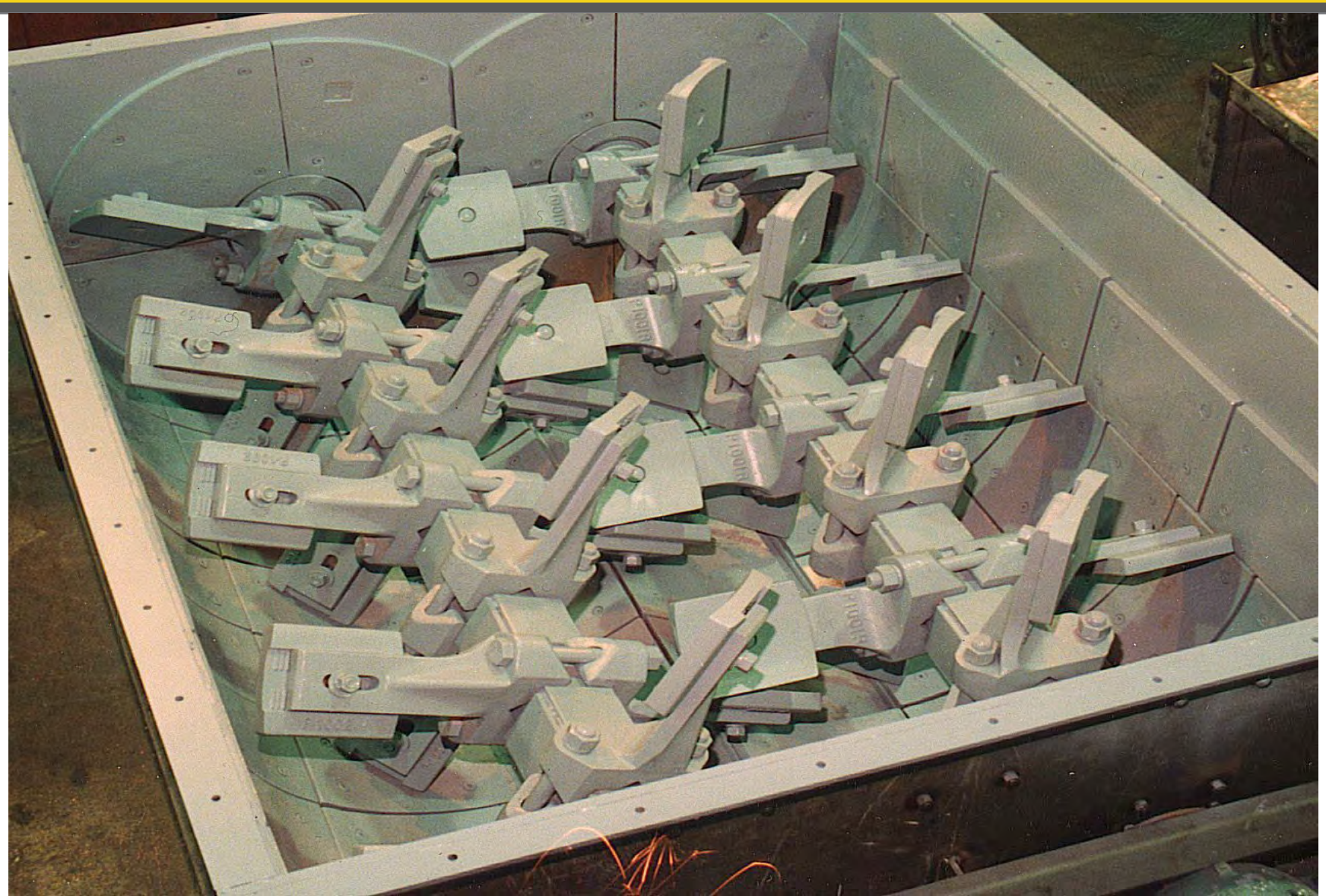
Inside of Pugmill



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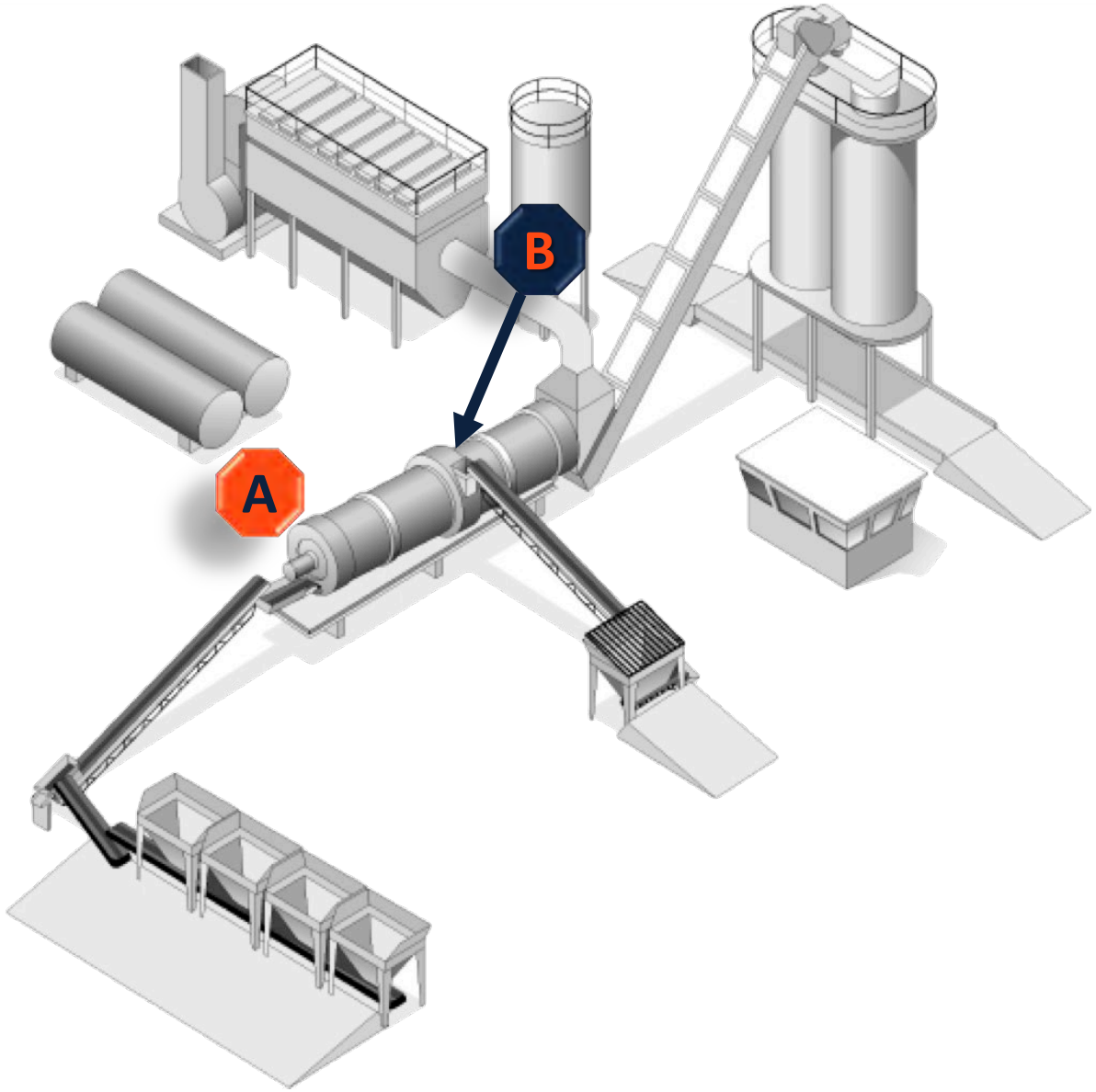
Continuous Mix Plant


TILCON
TILCON
ASTEC
ASTEC
ASTEC
SAFETY
QUALITY
INTEGRITY
DOUBLE BARREL
SCALE HOUS
AND PLANT

Continuous-Mix Production

- Hot mix production is characterized by:
  - Gradation control at cold feeds
  - Measure aggregate flow with belt scale
  - Meter asphalt proportional to aggregate flow

Continuous Mix Plant



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1. Cold Feeds
2. RAP Feed
3. Belt Feeds
4. Drum Mixer
5. Baghouse
6. Liquid Binder
7. Admixture
8. Storage Silo

Cold Feed Proportioning

- Composite gradation is controlled at cold feed by proportioning material from individual bins
- Gradation and quality of the individual materials is controlled at the quarry

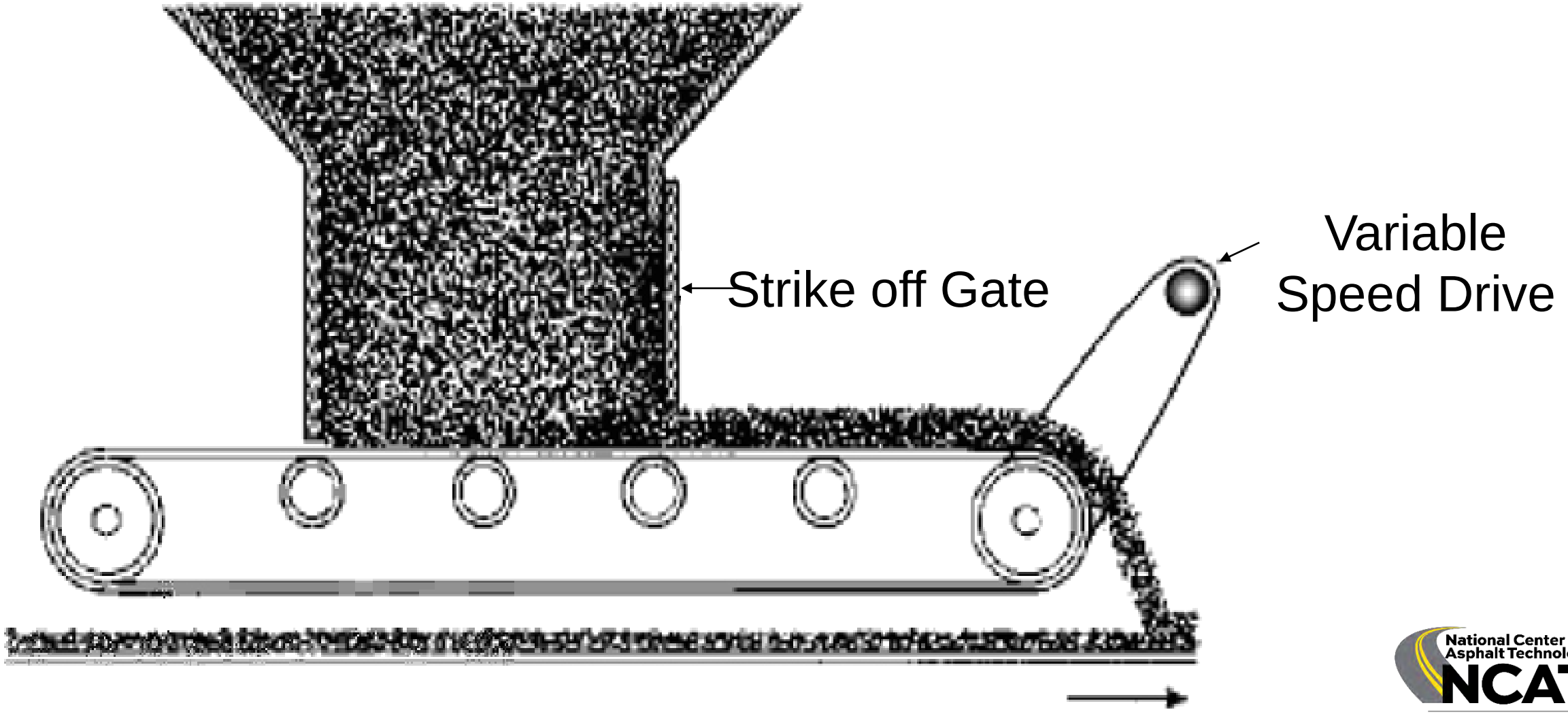

PUNTO DE
BLOQUEO
BLOCKING
POINT

Cold Feed Proportioning

- Variation in material flow from individual bins:
  - Based on variable speed motor on the belt

- Adjustable manual gates help control minimum and maximum flow

Cold Feed



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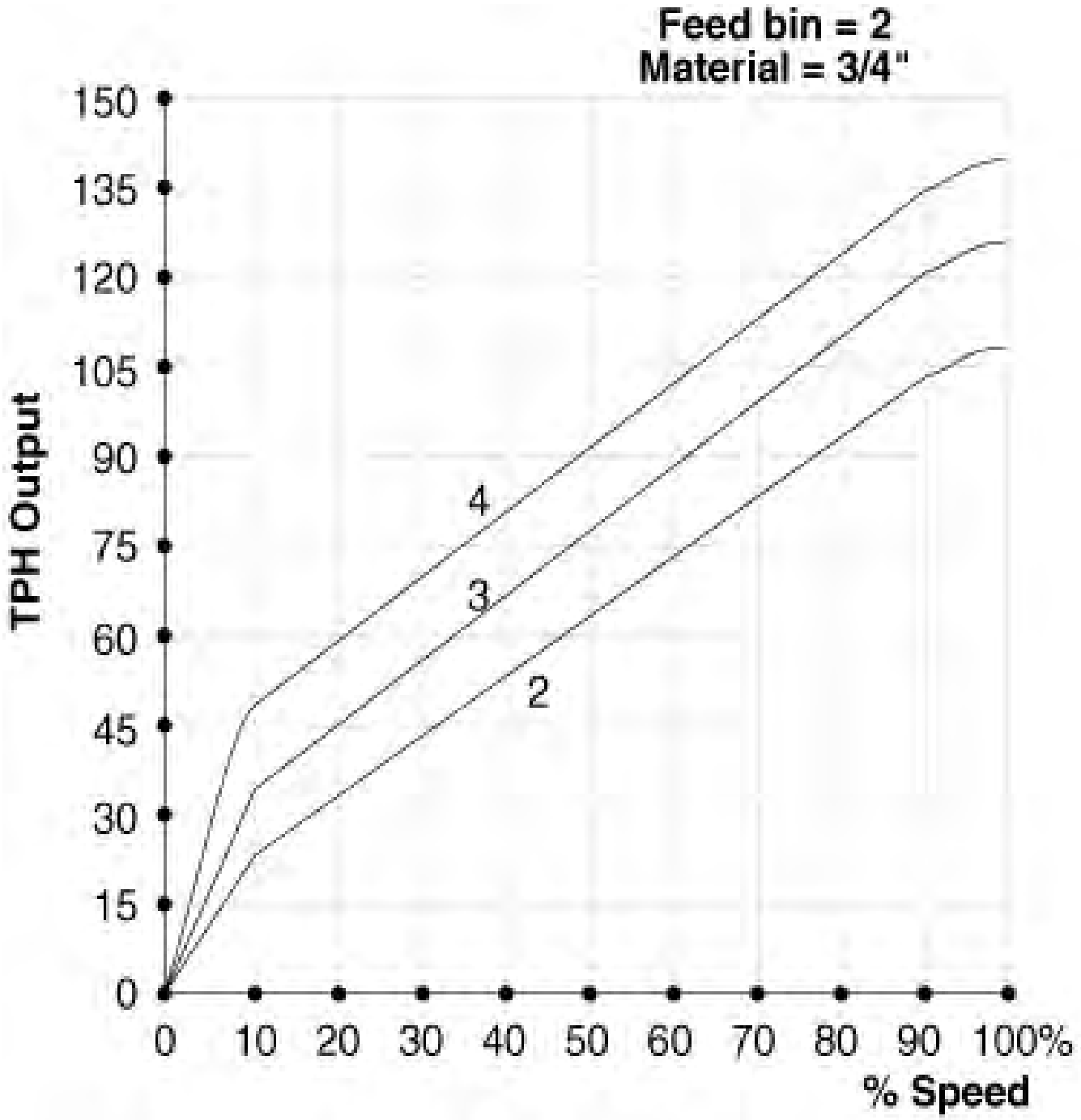

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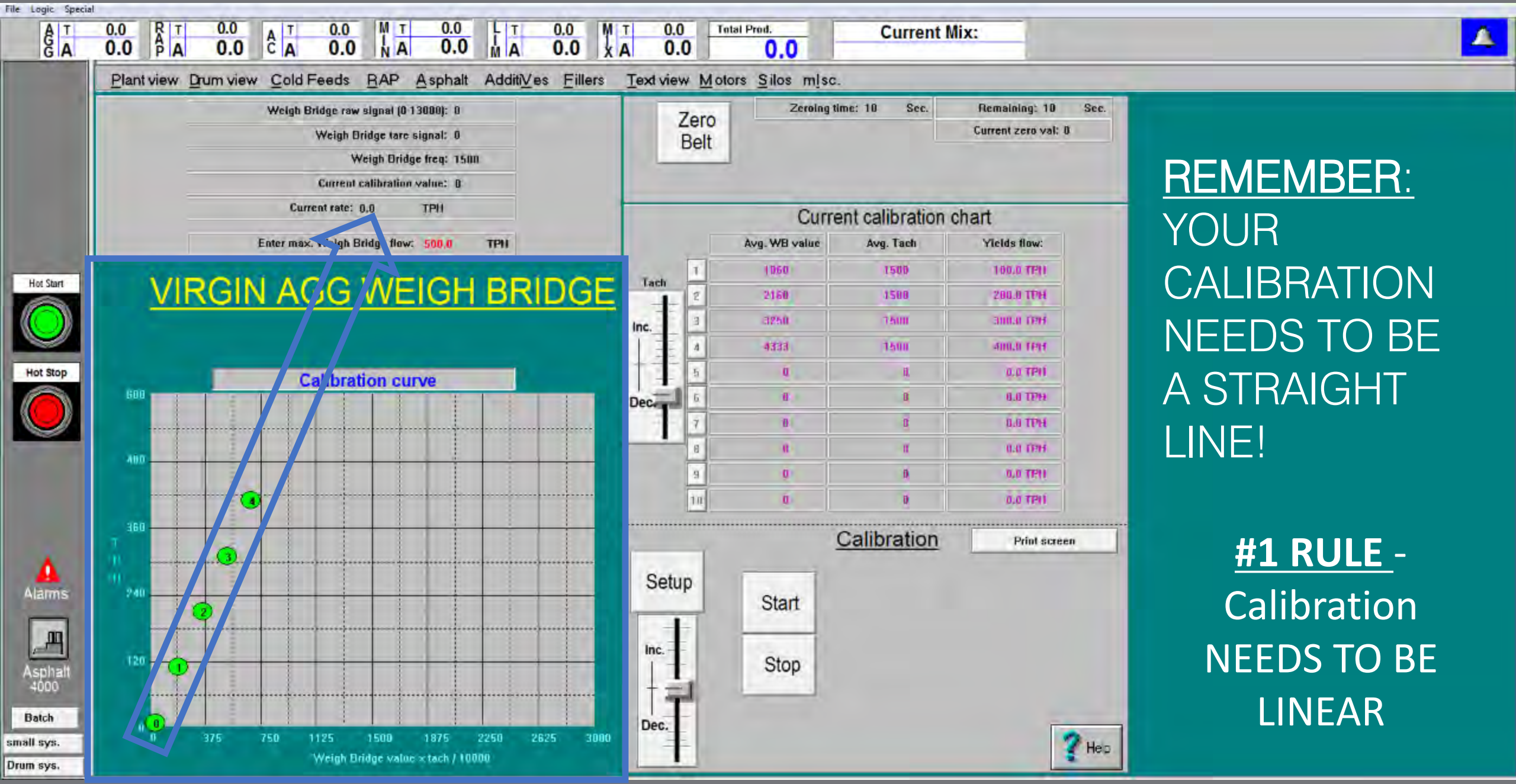
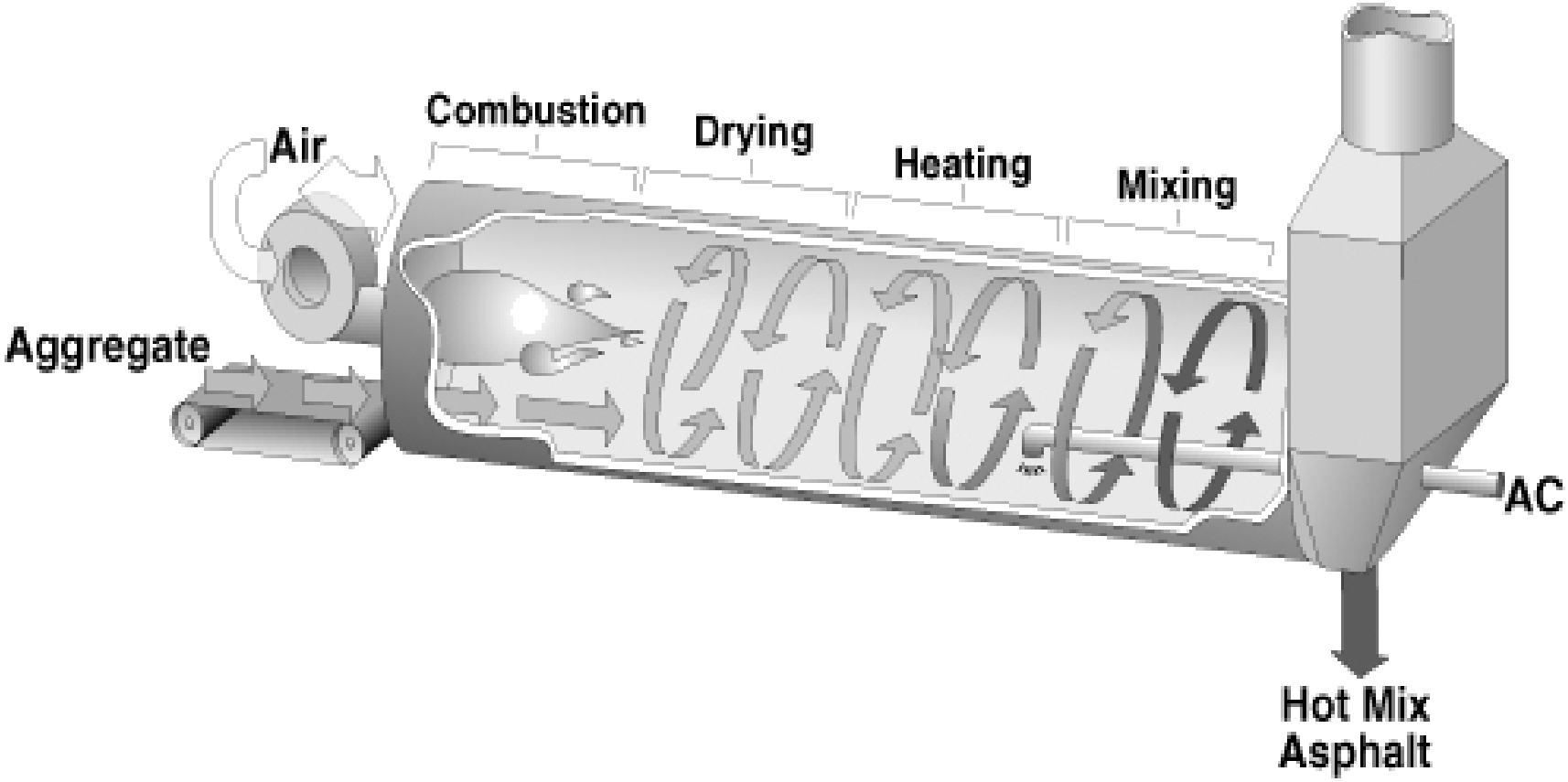


REMEMBER:
YOUR CALIBRATION NEEDS TO BE A STRAIGHT LINE!

#1 RULE - Calibration NEEDS TO BE LINEAR

Parallel Flow Drier - Drum Mixer



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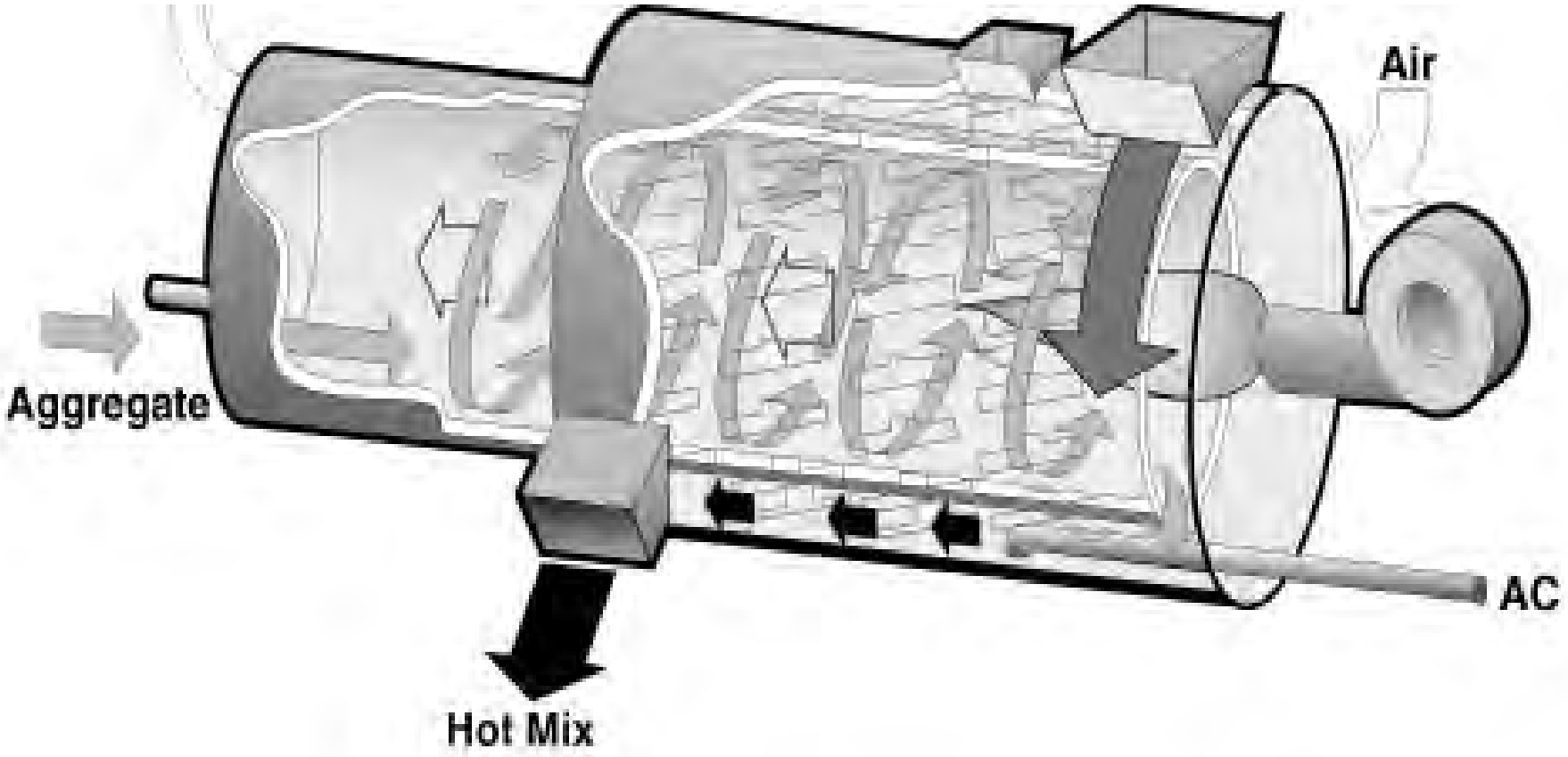
Double Barrel Counter-Flow Drier - Drum Mixer



Asphalt Proportioning

- The asphalt content is controlled by pumping the asphalt rate proportional to aggregate flow rate
- The first step in asphalt proportioning is measuring aggregate flow
- Belt scale (i.e. weigh bridge) is used

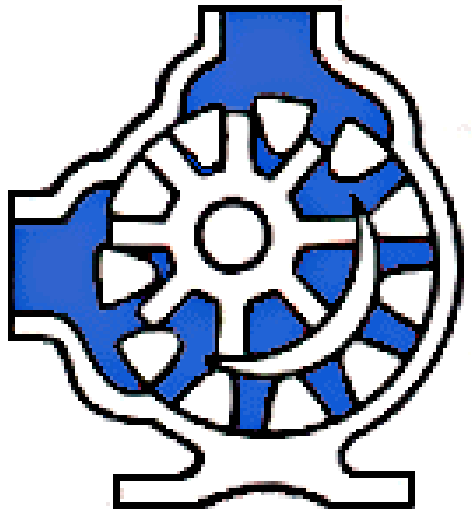

GENCOR

How a Belt Scale Works

- Weigh bridge measures weight of aggregate on moving belt
- Speed sensor measures speed of belt
- Plant's control continuously calculates aggregate flow in tons per hour

Asphalt Proportioning

- Asphalt must be proportioned to the aggregate flow
- Second step is regulating asphalt flow
- Asphalt pumping / metering unit is used



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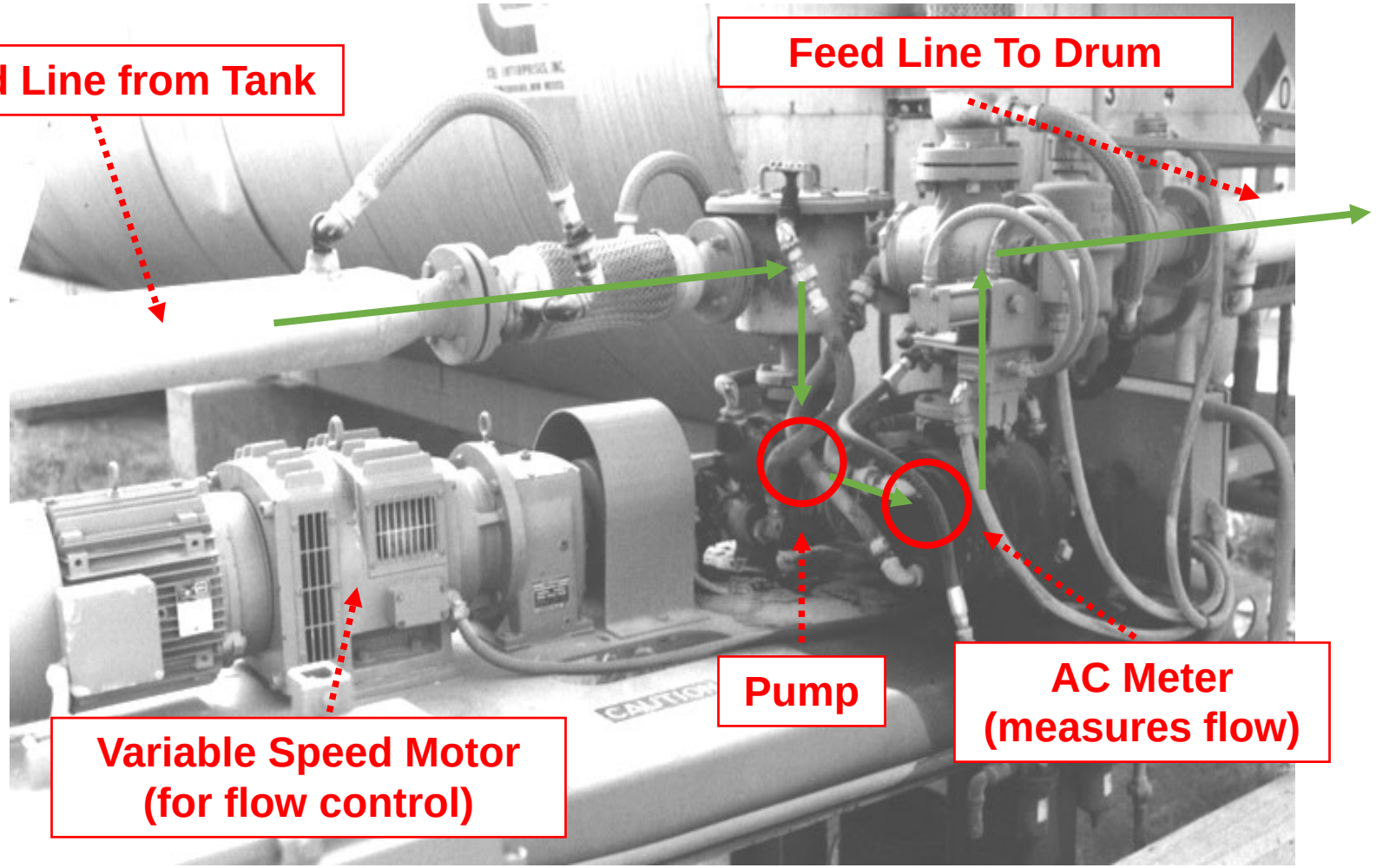
Asphalt Binder Pump & Meter



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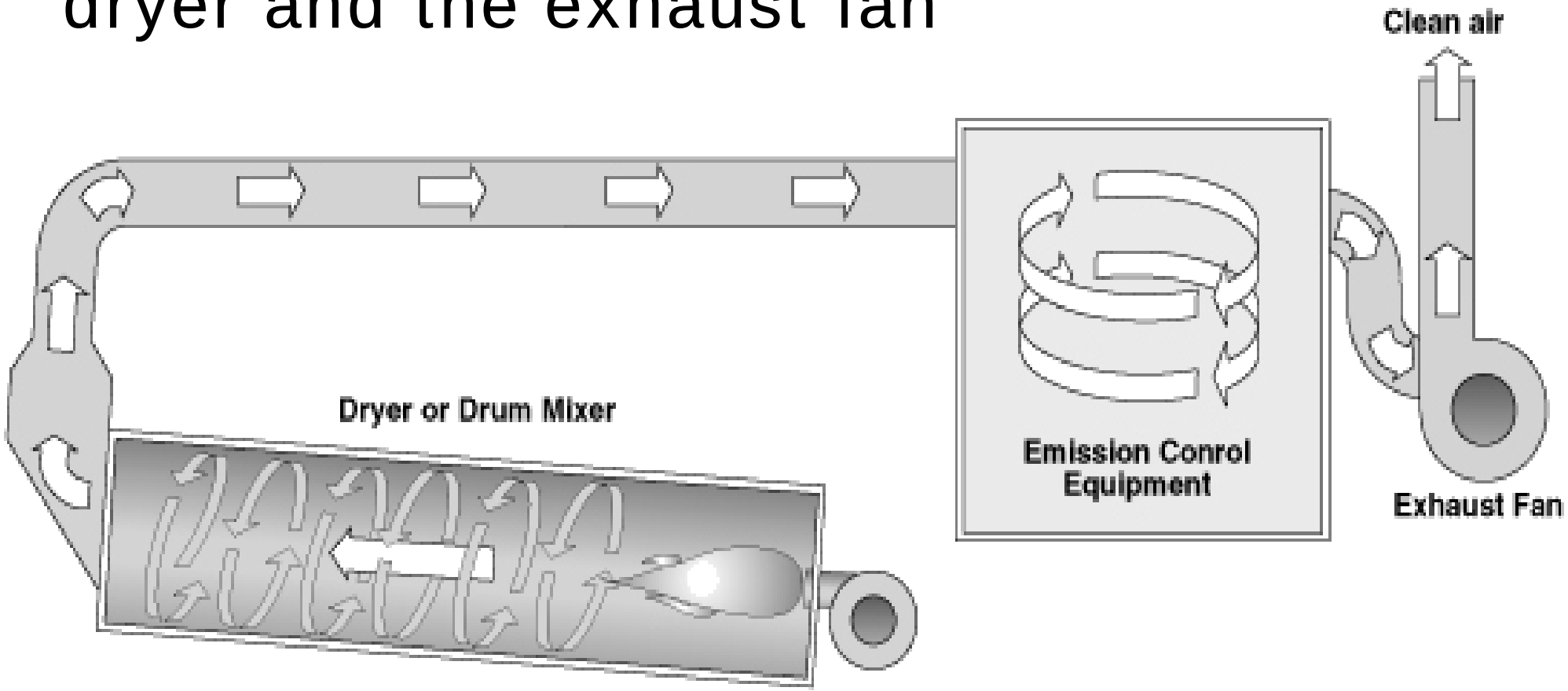
Dust Control

- Dust control equipment is positioned between the dryer and the exhaust fan



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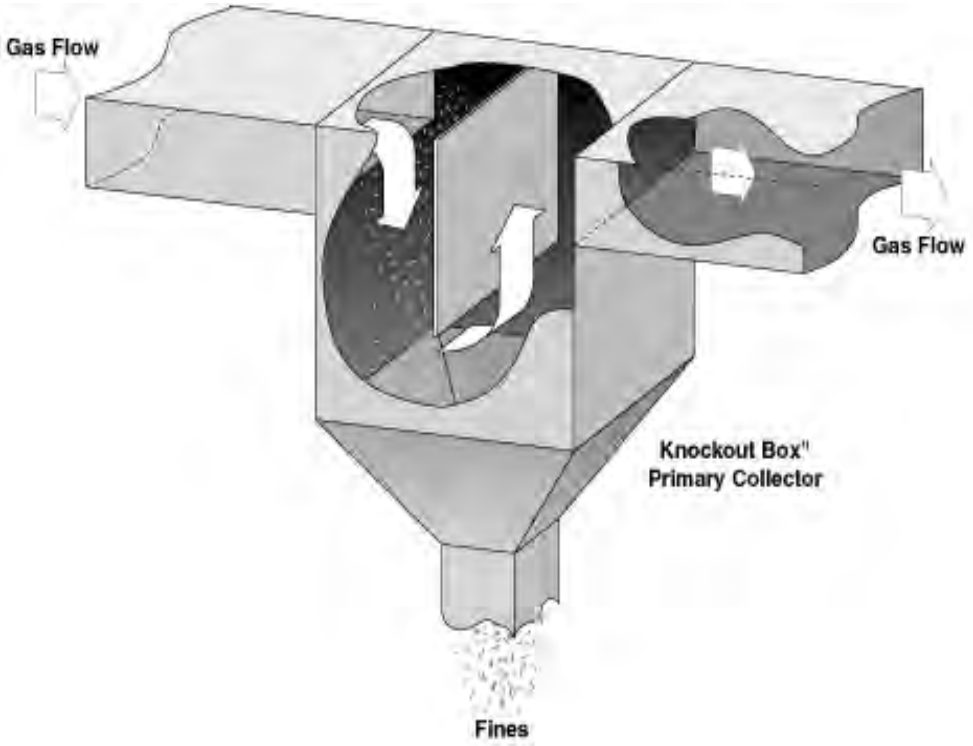
Primary Collectors

- Several Styles:
  - Knockout Boxes (least efficient)
  - Single Cyclones
  - Multiple Cyclones (most efficient)

- Primary Collectors collect the largest size dust particles (+100 mesh material).

Primary Collector

- Knock-Out Box Type



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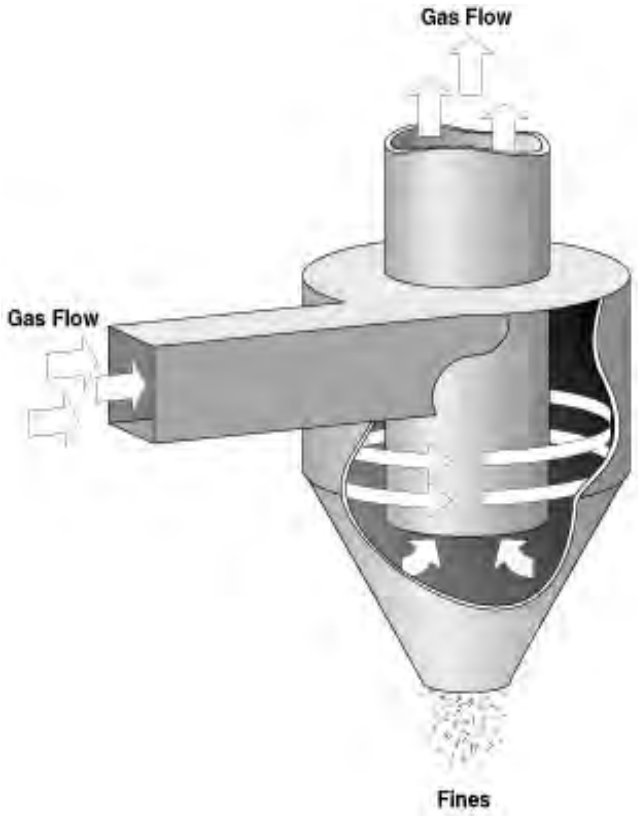
Primary Collectors

- Cyclone Type Collector



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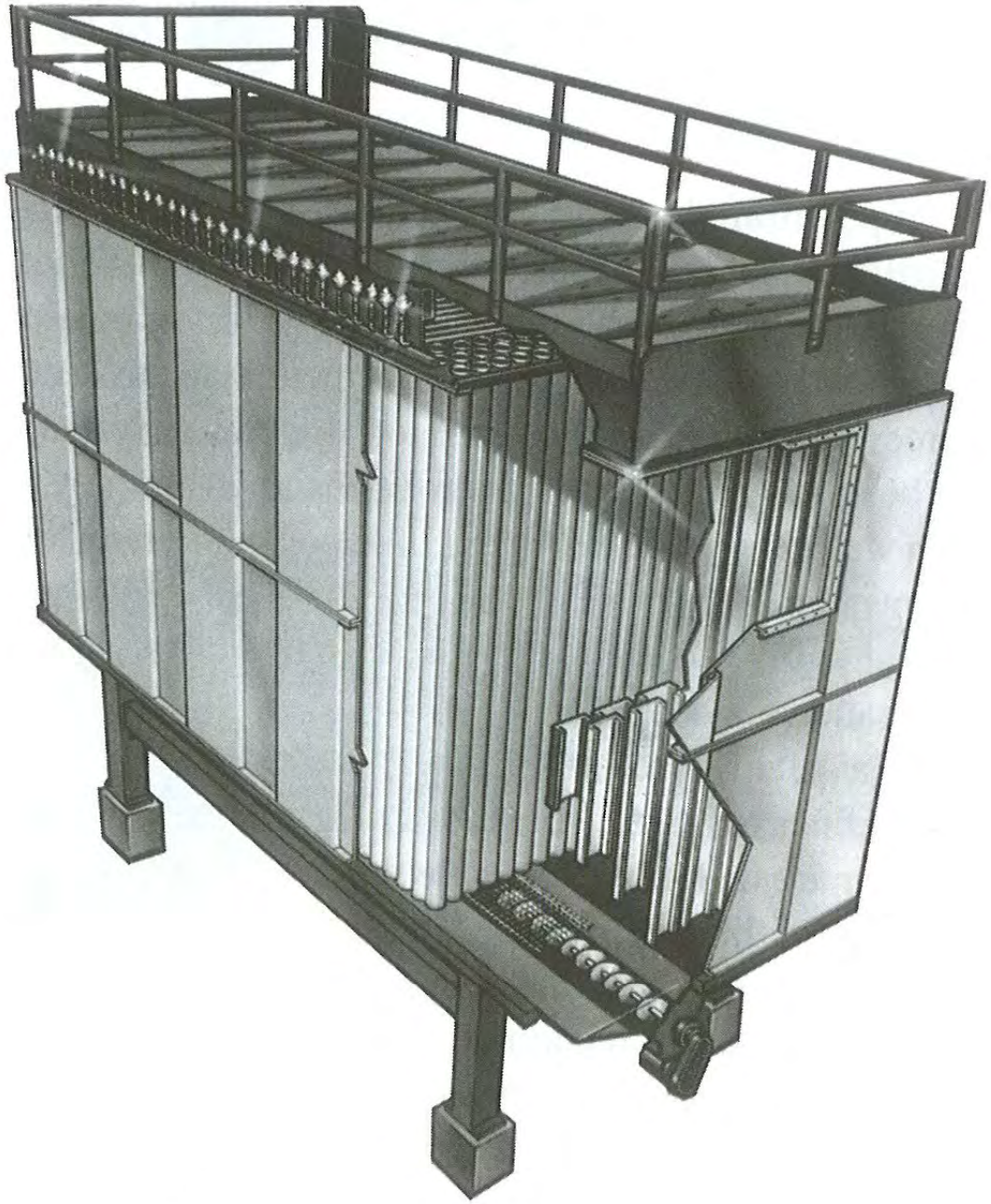
Baghouse (Secondary Collector)

- Most common now, usually tied with knockout box
- Up to 99.9% efficient, impacted by gas temperature and particle load
- Includes: synthetic fiber filter cloth around cylindrical metal cages in a two-chamber “house”
- Particle build-up on the fabric is cleaned by reverse air or pulse jet
- Collected dust can be returned to the plant or wasted

Baghouse



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Adding RAP

- Getting the RAP ready for use:
  - Millings
    - No additional processing required
  - Multi-source RAP
    - Requires processing:
      - Blending
      - Screening
      - Crushing

Stockpiling RAP

- Minimize Moisture
  - Covered Stockpiles
  - Sloped Pavement Underneath

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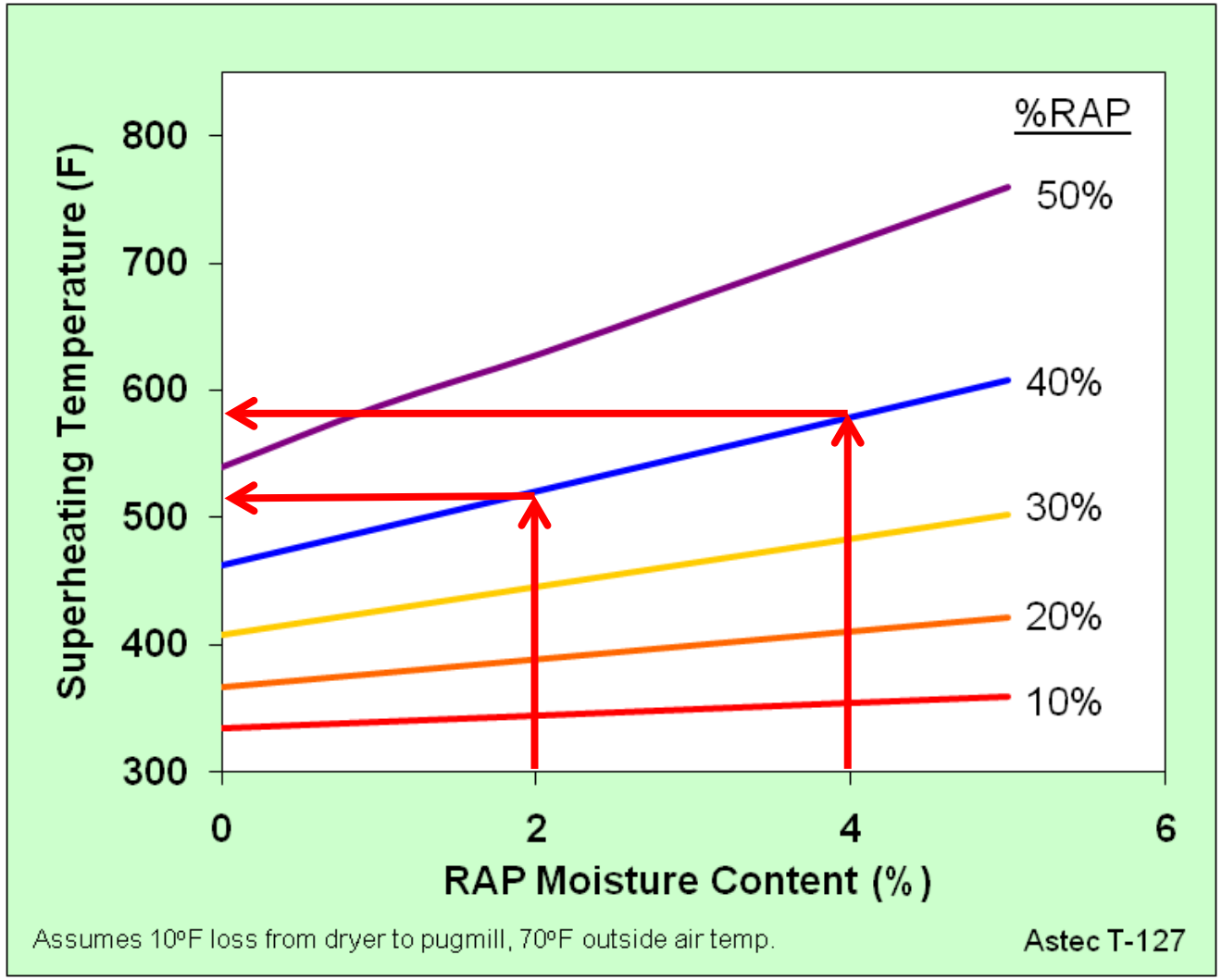
Effect of RAP Moisture on Superheating Temperature



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RAP Feed System

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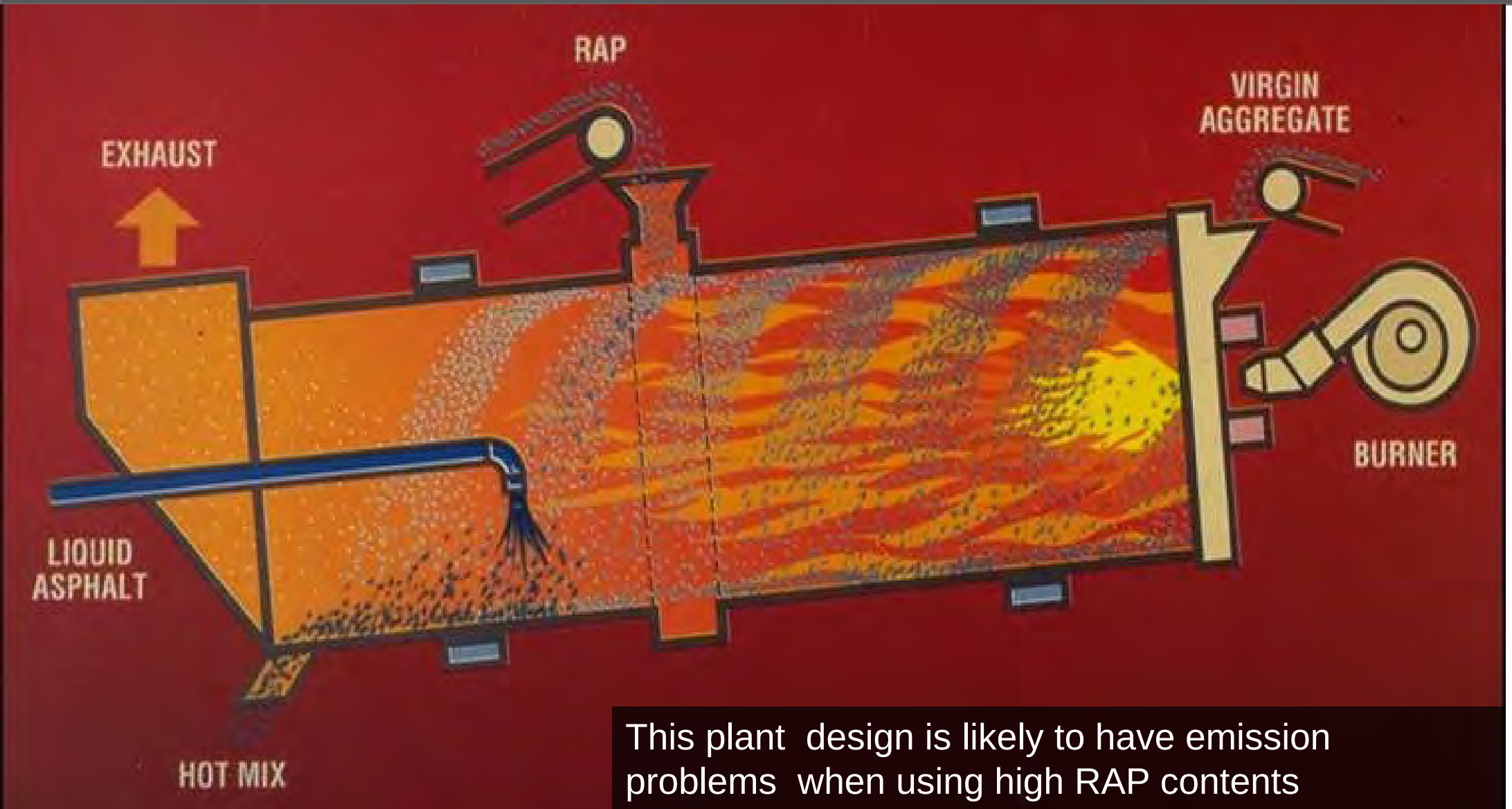
RAP Entry for Drum Mixer

Screening to Remove Oversized RAP Particles

In-Line Crushing of RAP

- Test samples before and after the “crusher” to determine if gradation is changed

Parallel Flow Drum with RAP Center Entry



This plant design is likely to have emission problems when using high RAP contents

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HMA Storage

Section 503.03 – 2.(6)(iii)

- The surge bin shall be completely emptied at the end of each operating day.

Storage Silos are Important for Consistency

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Silos for Storing Asphalt Mix

- Important Points:
  - Temperature
  - Segregation
  - Moisture
  - Time

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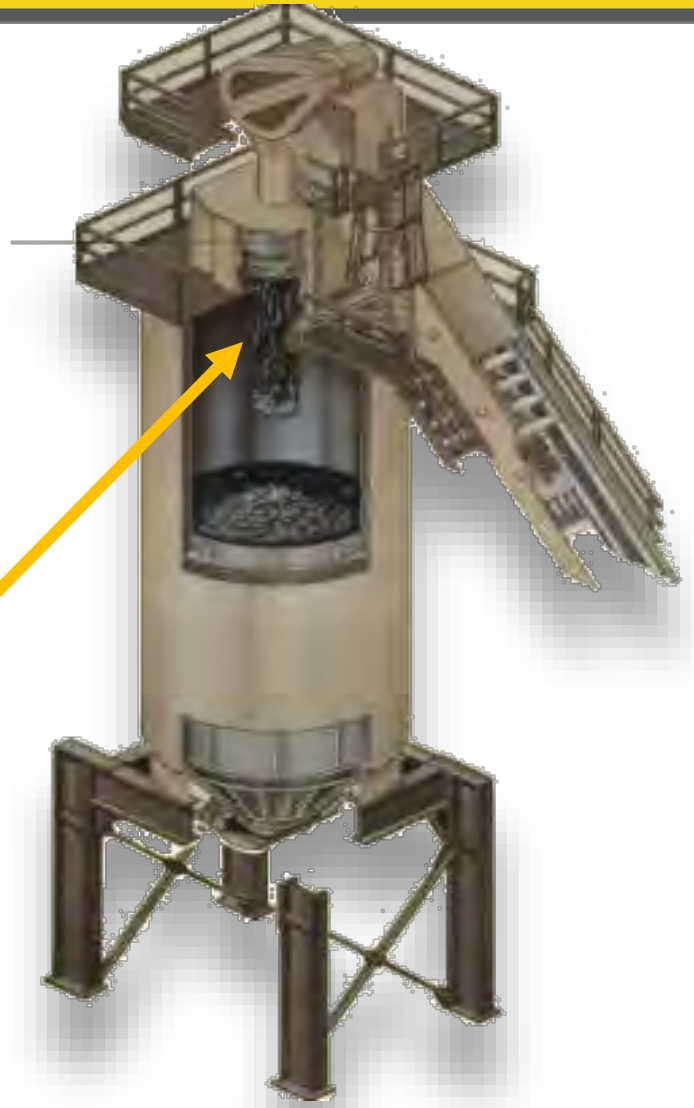
Silos for Storing Asphalt Mix

Batcher or Gob-Hopper In Silo




MICHIGAN
PAVING & MATERIALS CO


MORGAN


1
2
B-70

Do Not Use Diesel as a Release Agent

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Release Agents

- Lubricate dump box when necessary with a thin film of material that does not dissolve the bitumen.
- Do not use petroleum distillates.
- Drain excess coating from dump box before use.

- Diesel fuel is allowed at night after paving operations have finished for the day.

Travis' face ➡

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Diesel Fuel

Cannot be used as a release agent

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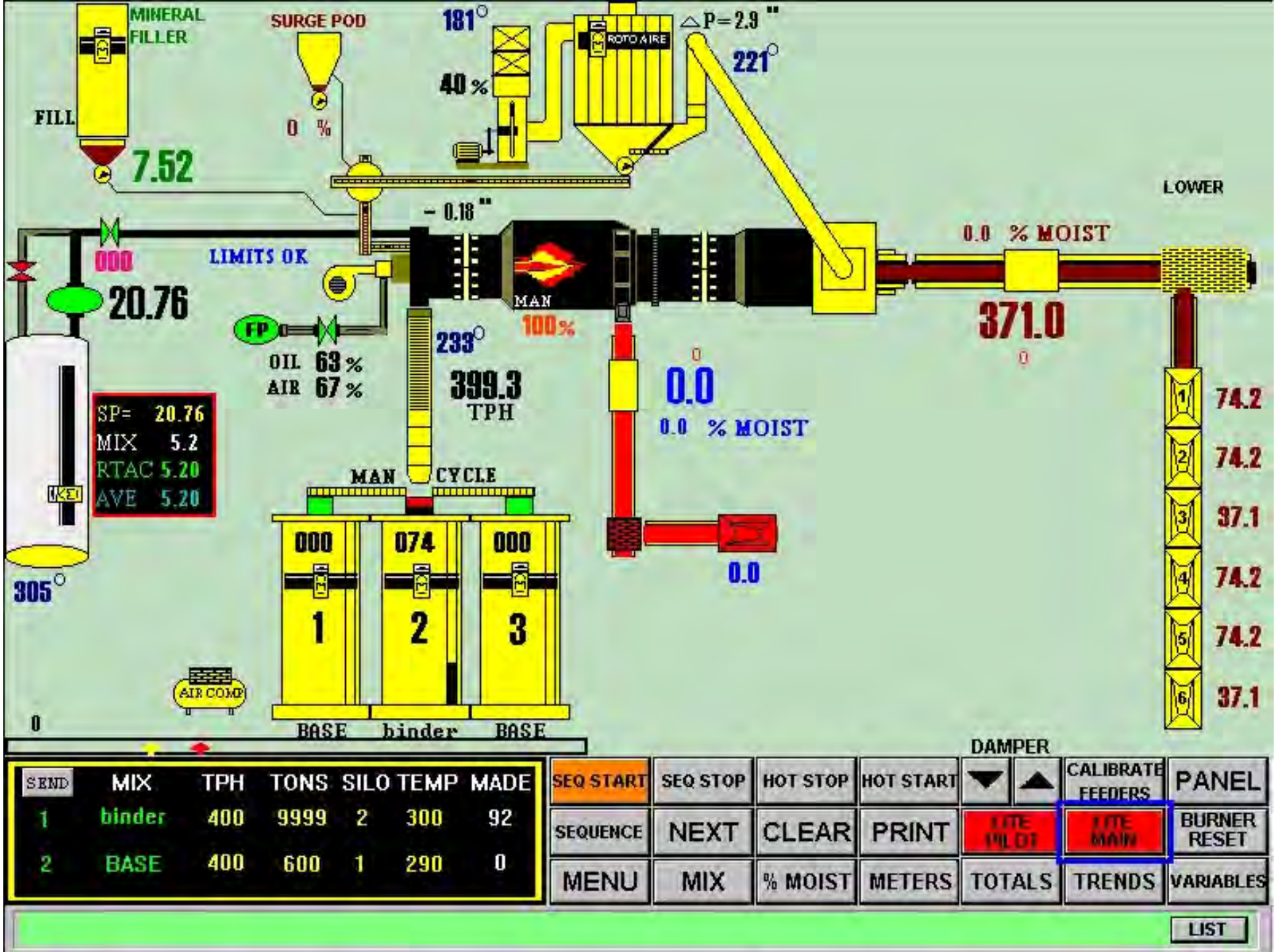
PROHIBIDO
USO DE DIESEL
EN LAS TUMBAS



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WHEN THE PLANT SENDS
THE MIX TOO HOT

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Questions