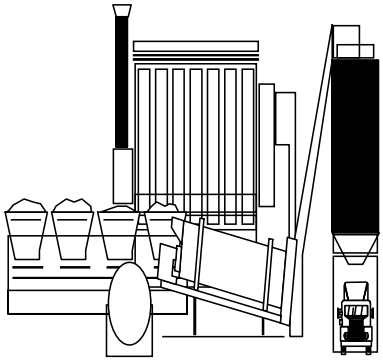
# HMA PLANT OPERATION



The block of instruction will cover the production of hot mix asphalt. At the end of this block the student will:

Understand the function of an asphalt plant.

Know the two basic types of plants and the major components of each

# Types Of Plants

**BATCH** **DRUM MIXER**

# Basic Purpose Of HMA Plants

**To produce a quality hot asphalt mixture that contains the desired proportions of asphalt and aggregate and meets all specifications.**

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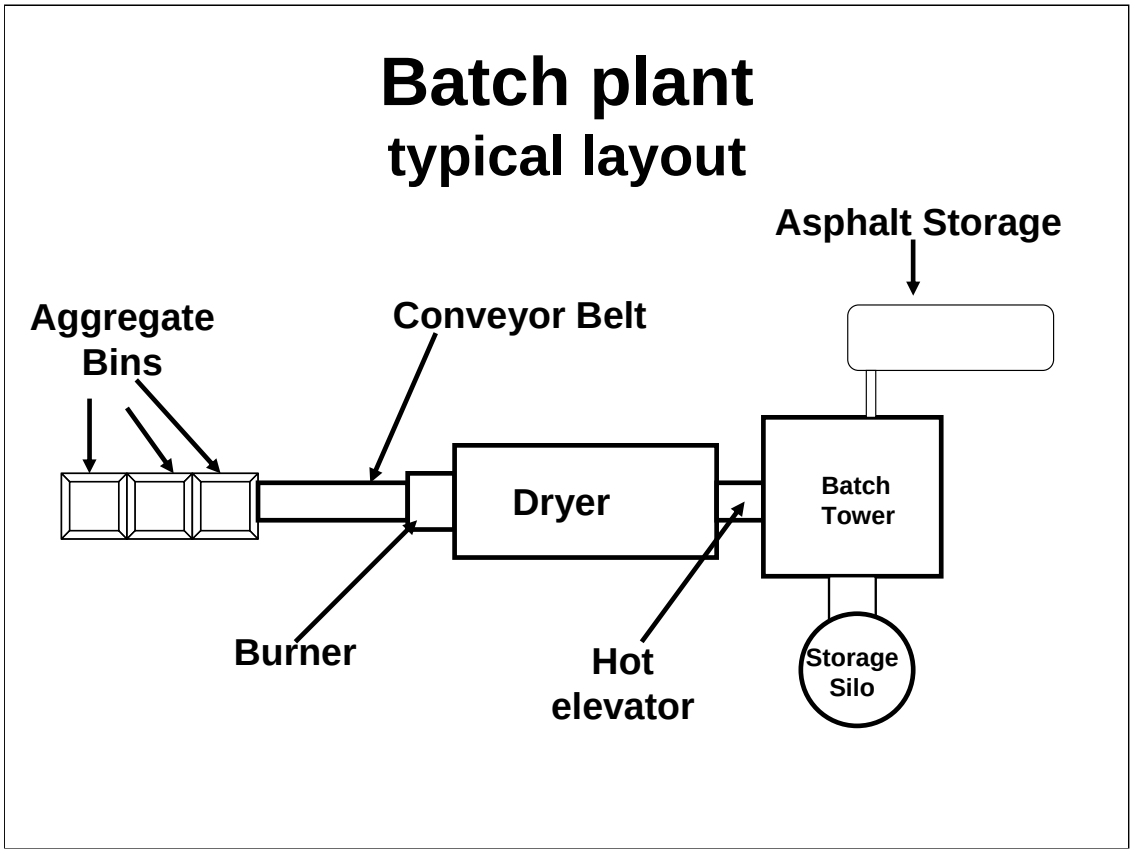
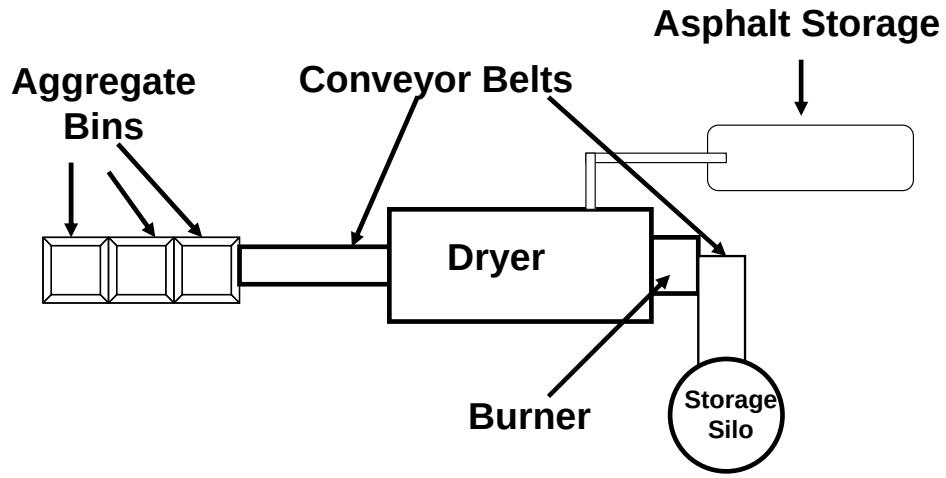
Regardless of the type of plant - the basic purpose is the same. It is as shown on this slide.




This is the typical layout for the batch plant.

# Drum Mixer Plant
## typical layout




This is a typical layout for a Drum mixer plant.

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# Common Plant Operations

- **Cold aggregate storage and feeding**
- **Dust control and collection**
- **Mix storage**
- **Weighing and handling**

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Certain plant operations are common to both the batch plants and drum mix plants. They are noted here. The next few slides will take the student through each of these areas.

# Common Plant Operations

- **Cold aggregate storage and feeding**
- **Dust control and collection**
- **Mix storage**
- **Weighing and handling**

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The first step in the manufacture of a HMA mix is to obtain aggregates and properly store them to insure that they are not contaminated with dirt or co-rmingled with other materials. The aggregate storage and feeding systems move the cold (unheated) aggregate from the aggregate processing areas to the plant.

# Aggregate Stockpile

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The stockpiles must be managed to prevent contamination.

# Stockpiling Operations

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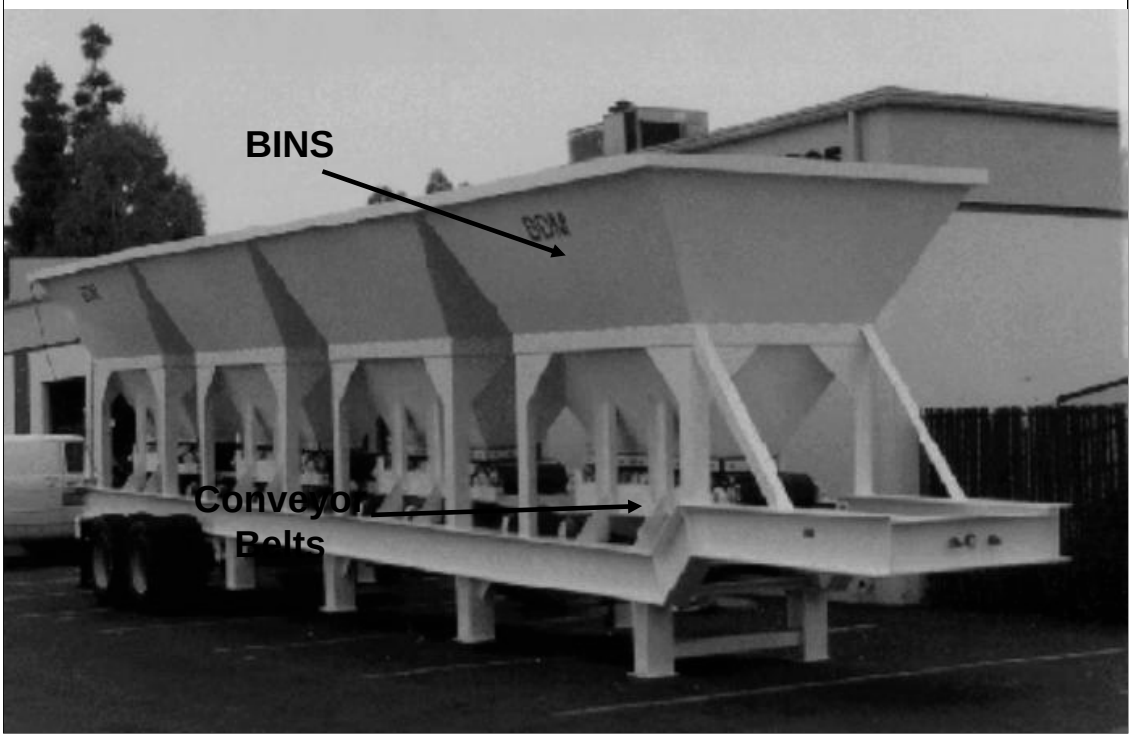
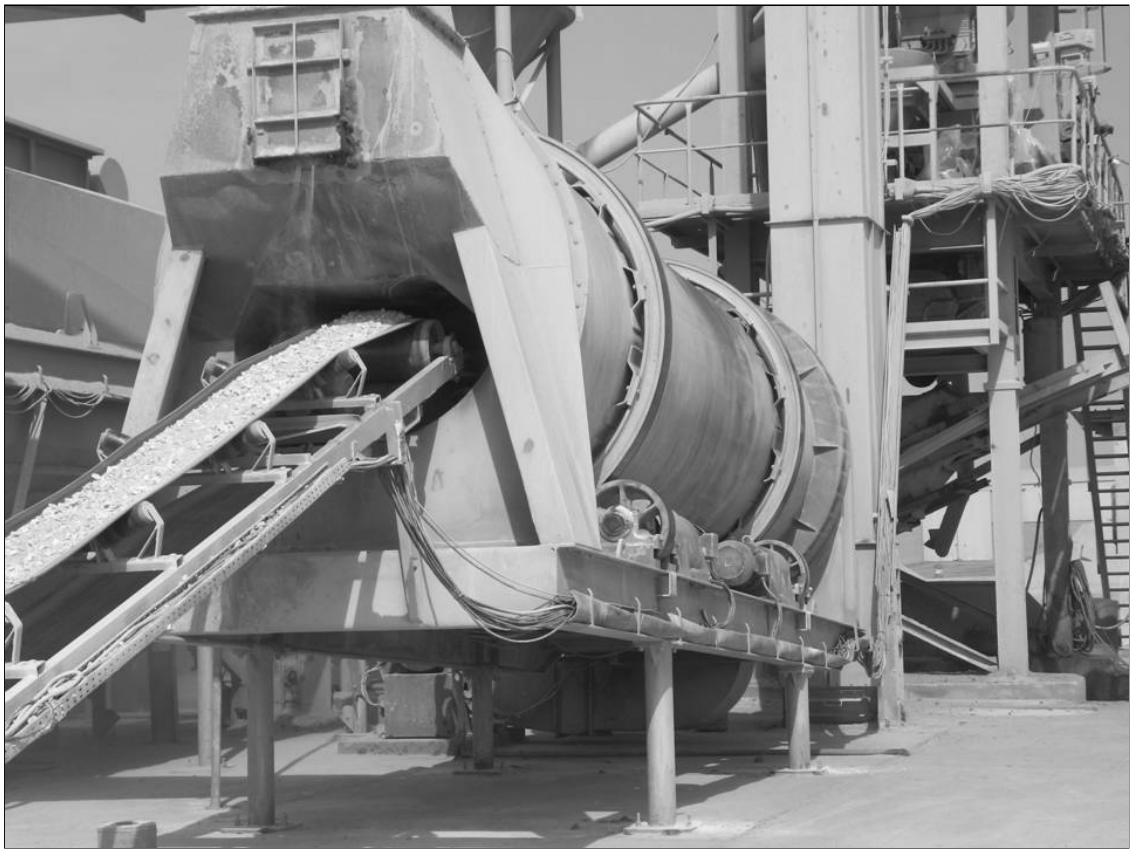
It is easy when the piles are of different colors - but, many times that is not the case.

# Cold Feed




After the aggregate is processed it is feed into cold feed bins where the exact proportions of the material are controlled.


AGG
1 1/2"
AGG
966E
1026



# Common Plant Operations

- **Cold aggregate storage and feeding**
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Another component of the plant is a dust control system. All HMA plant s have an integrated dust control system.

# HMA Mixing Plants Create Dust

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Dust is a constant problem around HMA plants - it must be controlled.

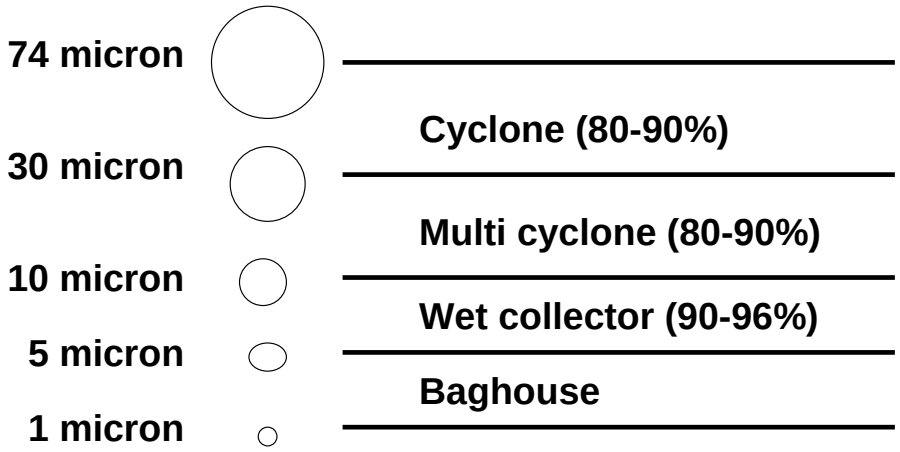
# Centrifugal Dust Collector


In a centrifugal collector the dirty gas from the top of the dryer sucks the smoke and fine particles into the cyclone where it is spiraled around. The large particles hit the outside wall and drop to the bottom of the cyclone. The dust and smoke are discharged through the top of the collector. The fines collected at the bottom of the cyclone are picked up by a dust-return auger and may be returned to the plant or wasted. Many times the cyclone is the first step in the removal process. The gas will go from the cyclone to a baghouse.

# Baghouse Dust Collector

A baghouse is a large metal housing containing hundreds of synthetic, heat-resistant fabric bags, usually silicone treated to increase their ability to collect very fine particles of dust. A baghouse functions in the same manner as a vacuum cleaner. A large vacuum fan creates a suction within the housing, which draws in dirty air and filters it through the fabric of the bags. The air carrying the dust particles passes through the fabric of the filter bags depositing the dust on the surface of the bag. The clean air then continues out of the chamber. Eventually, the dust accumulates into a "dust cake" which must be removed before it stops the flow of air through the bag. The bags are flexed and the dust drops to an auger at the bottom of the baghouse and is generally returned to the plant or wasted.

# Collector Efficiency

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The different efficiencies of the various collector types.

# Common Plant Operations

- **Cold aggregate storage and feeding**
- **Dust control and collection**
- **Mix storage**
- **Weighing and handling**

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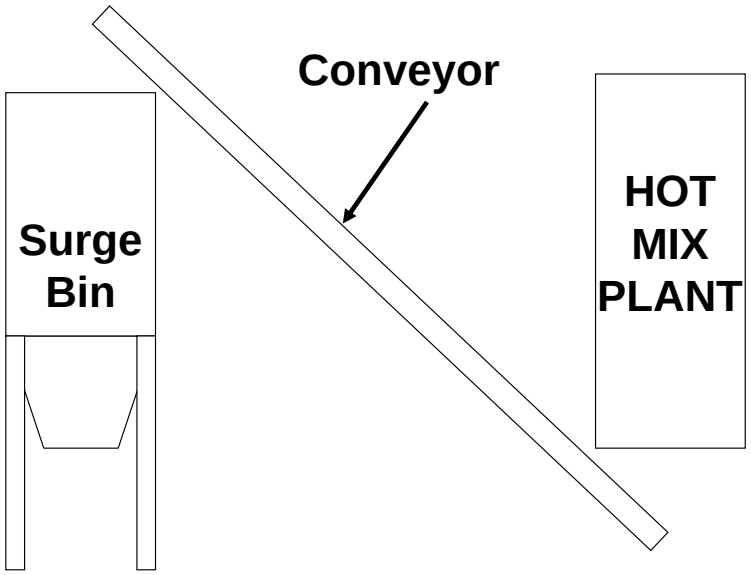
To prevent plant shutdowns due to temporary interruptions of paving operations or shortages of trucks to haul material from the plant to paving site, most HMA plants are equipped with storage silos (surge bins) for temporary storage of HMA.

# Storage Structure
# Typical Layout

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**TRUCK BEING LOADED FROM A DIRECTLY FROM A BATCH PLANT**

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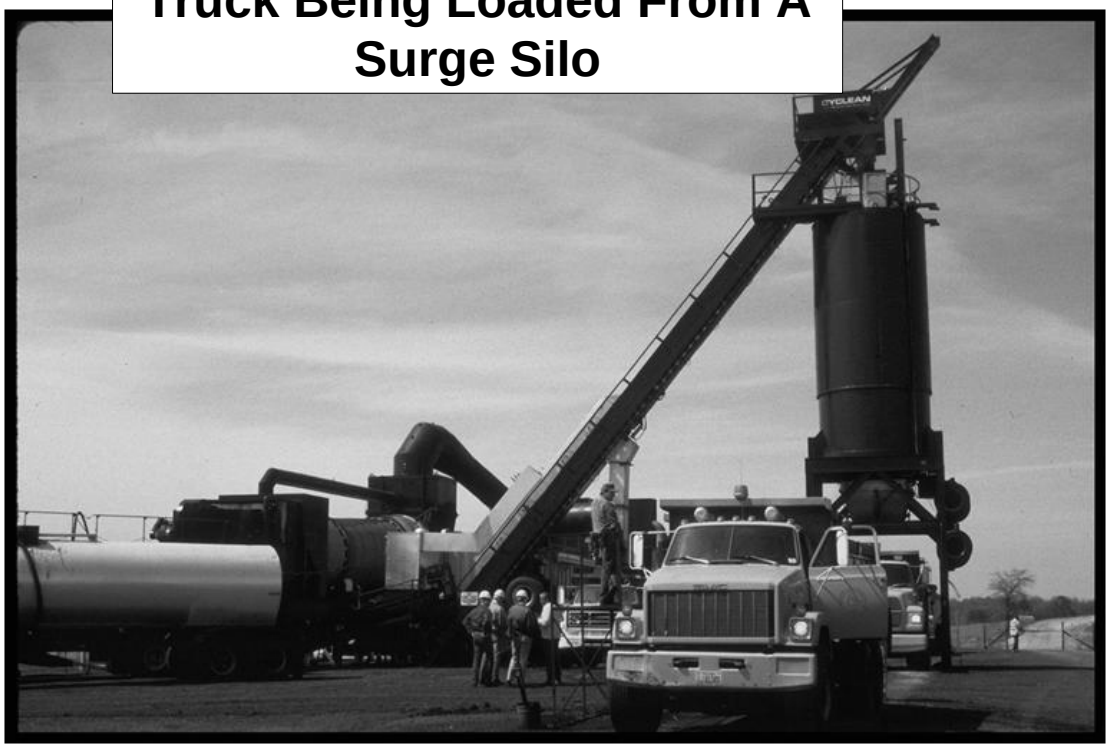
Typical surge silo.

## Truck Being Loaded From A Surge Silo



There are two types of plants - the batch plant and the drum mixer plant. Both batch plants and drum mix plants are designed to accomplish this purpose. The difference between the two plants is that the batch plants dry and heat the aggregate and then in a separate mixer blend the aggregate and asphalt one batch at a time; drum mix plants dry the aggregate and blend it with asphalt in a continuous process and in the same piece of equipment.

# Truck Loading from a Surge Bin

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# Common Plant Operations

- **Cold aggregate storage and feeding**
- **Dust control and collection**
- **Mix storage**
- **Weighing and handling**

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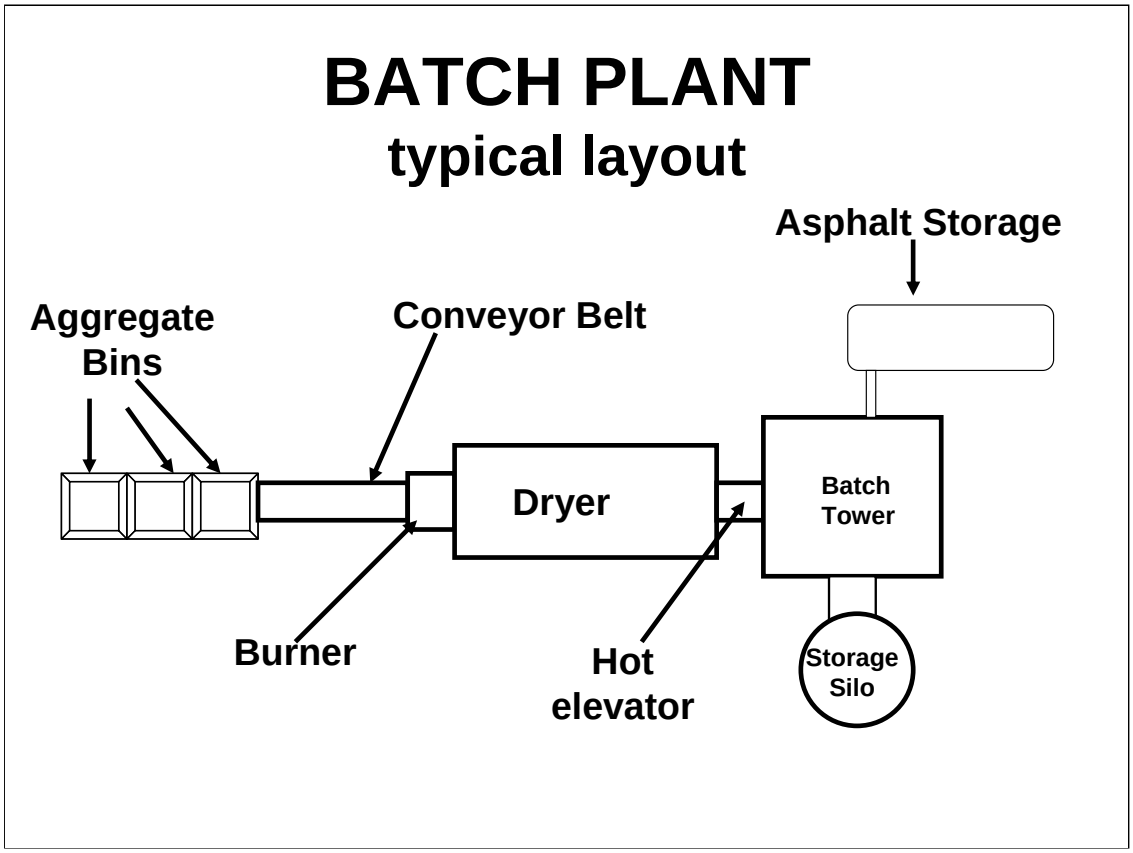
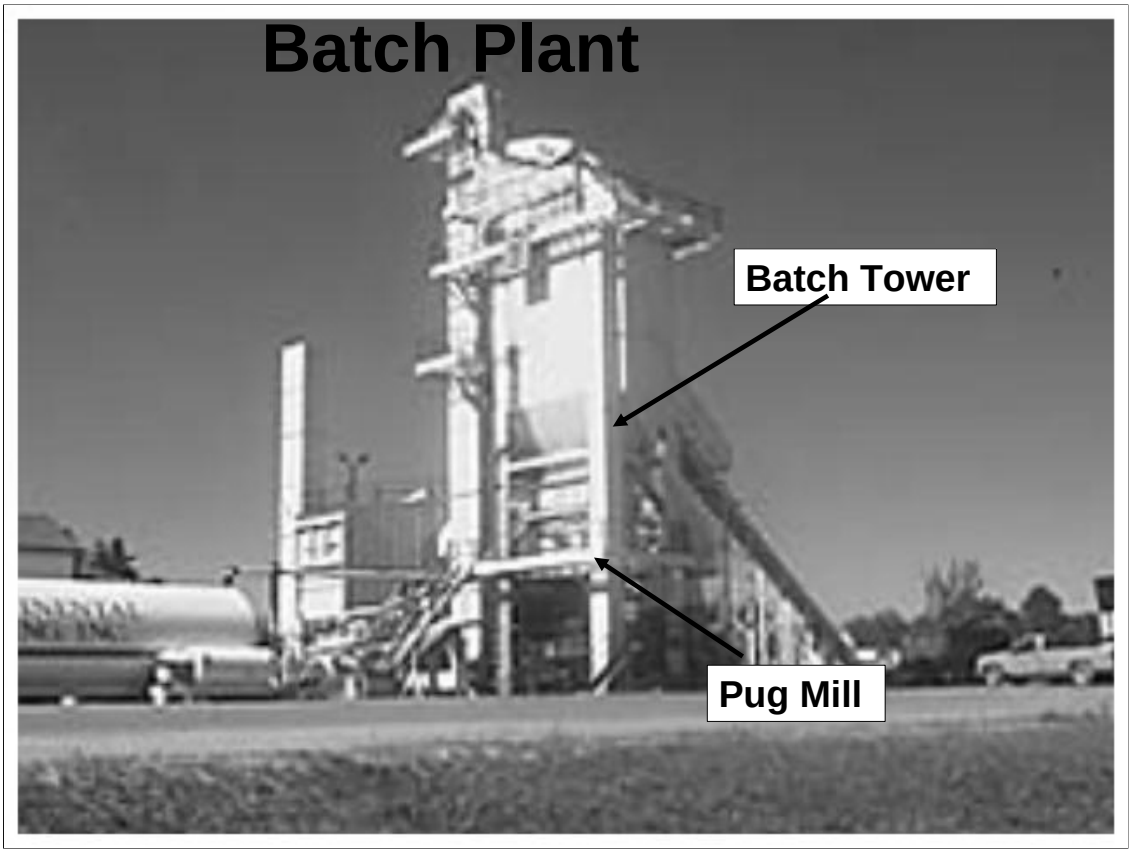
HMA is hauled to the paving site in trucks. The type of equipment will vary from one contractor to another. The quantity of HMA delivered to the paving site can be determined by either of two methods (1) weighing the trucks on scales or (2) using an HMA plant's automatic recording system.


Plants are computer controlled.




Today's batch plant has changed little since 1940.


Batch Plant
Batch Tower
Pug Mill

# Burner - Batch Plant

The batch plant is a parallel flow plant.  The aggregate enters at the burner end of the dryer.

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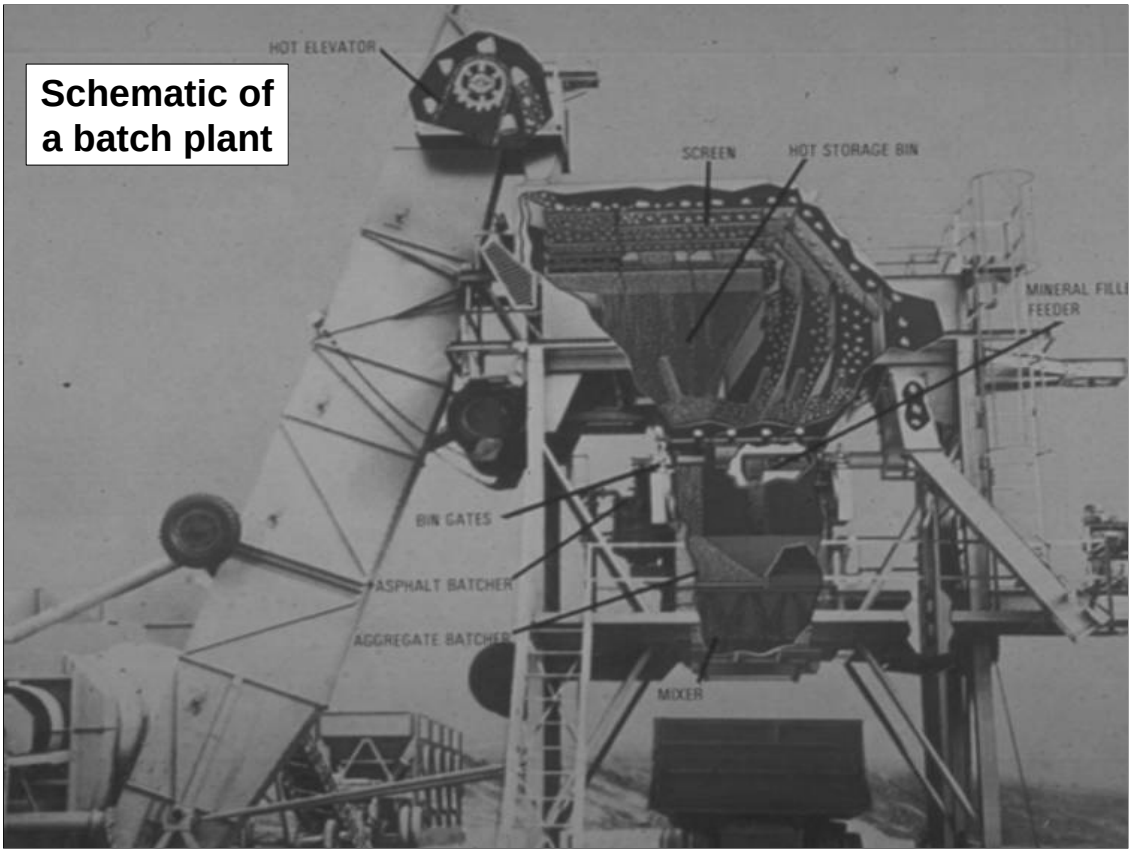
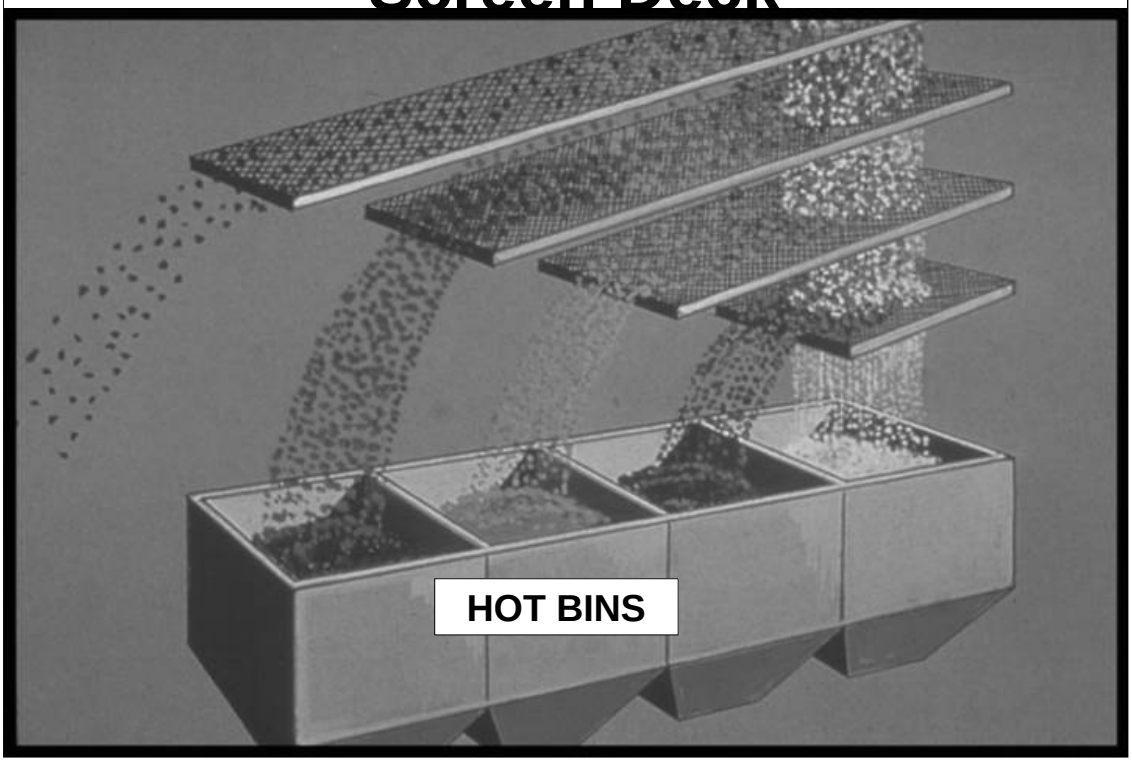



From the dryer the material moves up the hot elevator to the hot bins and then to weight box and then to the pug mill where the asphalt cement and the aggregates are mixed.

# Screen Deck

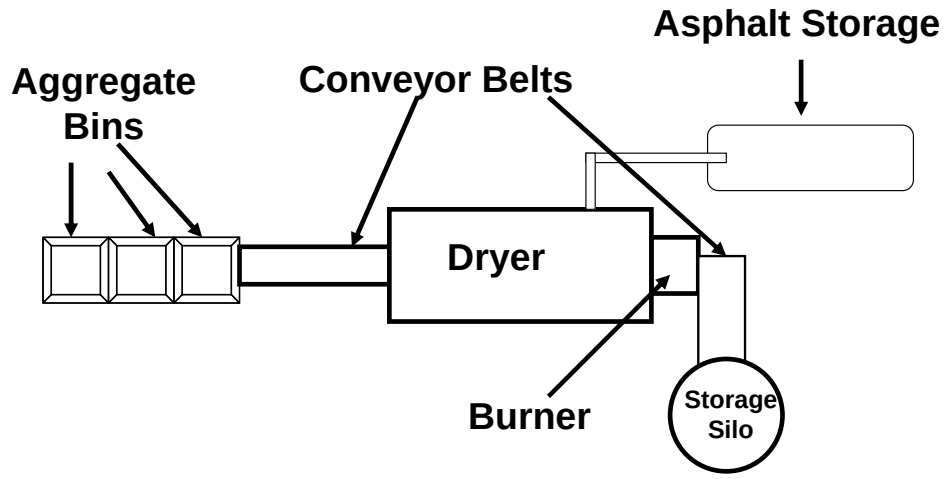



After the material is brought up the hot elevators it is re-screened and the separate sizes are placed in hot bins.

# Pug Mill

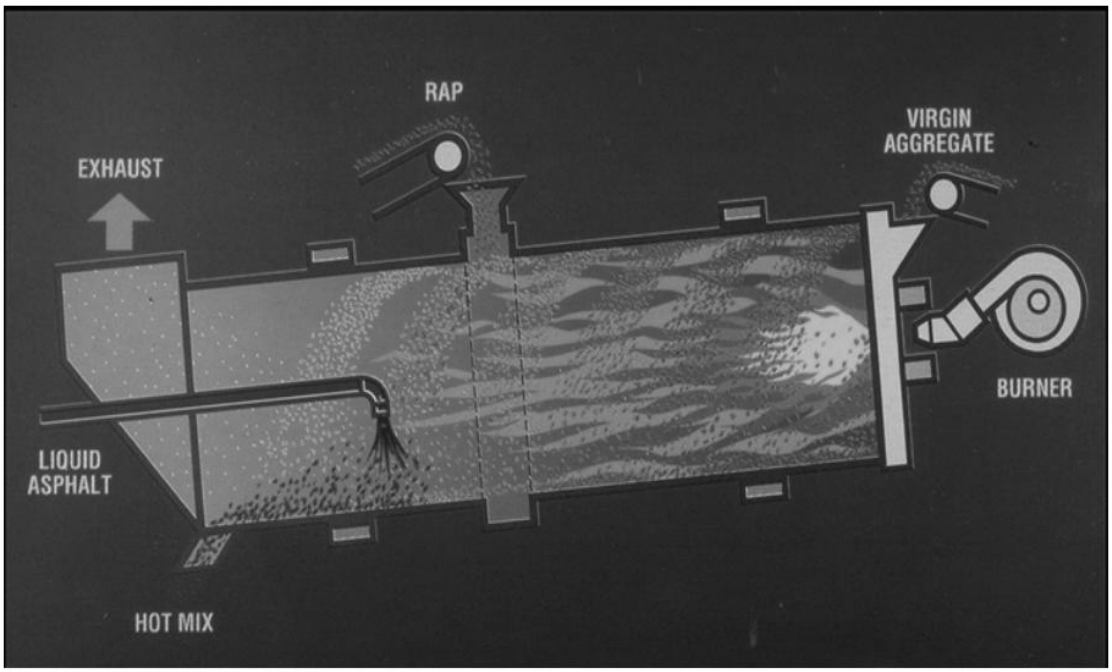
The mixing unit for the batch plant. The asphalt and aggregate will be mixed in the here. The mixing time must be long enough to produce a homogeneous mixture of evenly distributed and uniformly coated aggregate particles. If the mixing time is too long you can adversely affect the properties of the asphalt binder.

# Drum Mixer Plant
## typical layout



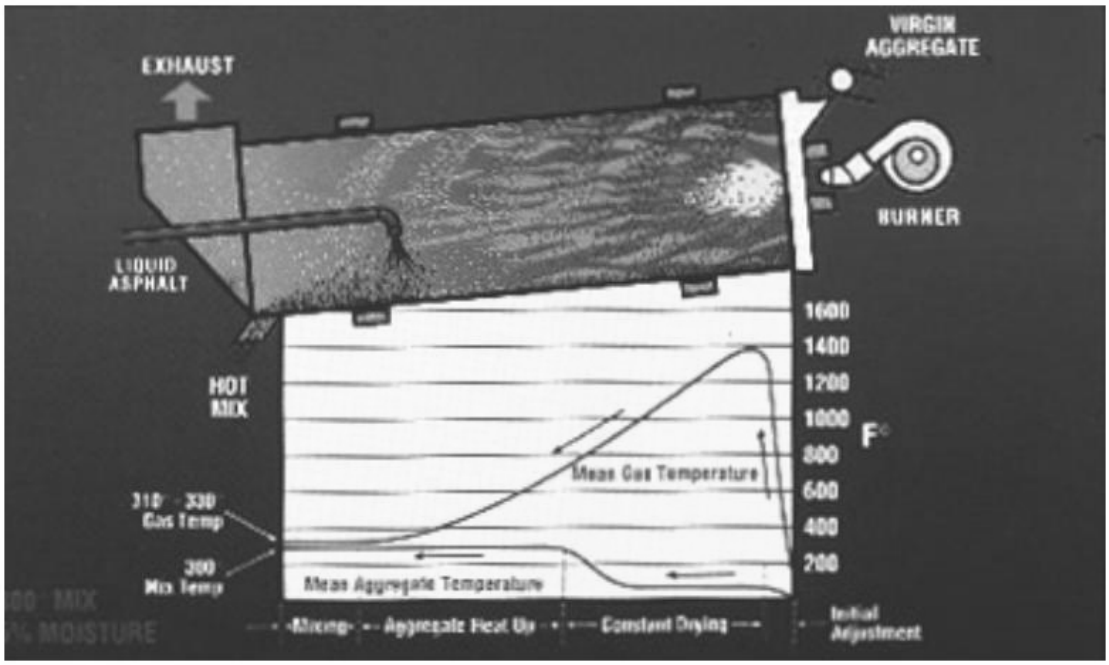

Drum mix plants were first introduced about 1910. More than 100 small drum mix plants were operated until the mid-1930s. They were replaced by batch plants. They were resurrected in a revised form in the late 1960s. Introduced on a large scale in the 1970s about 70% of the plants now sold in the US are drum mix plants. They represent about 50% of the plants in the US.

# Drum Dryer Mixer



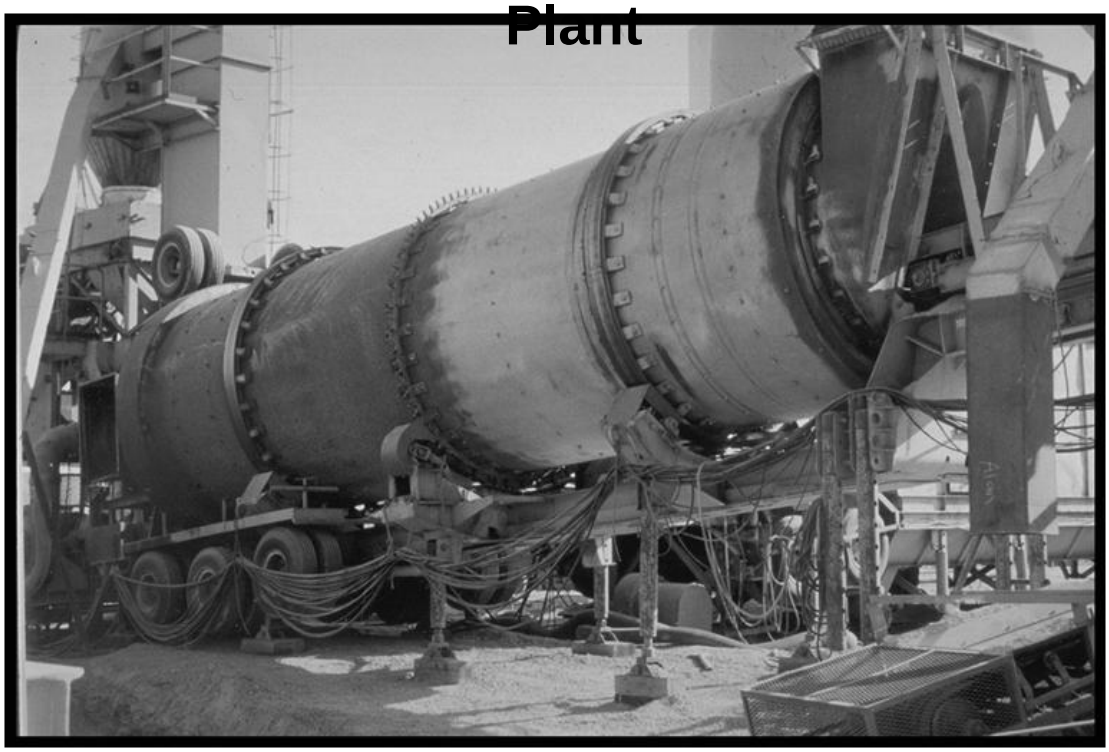

This is a schematic of the drum mix plant.

# Temperature Profile in Drum Mixer




This is the temperature profile of the inside of the drum mixer plant.

# Dryer For Drum Dryer Mix Plant

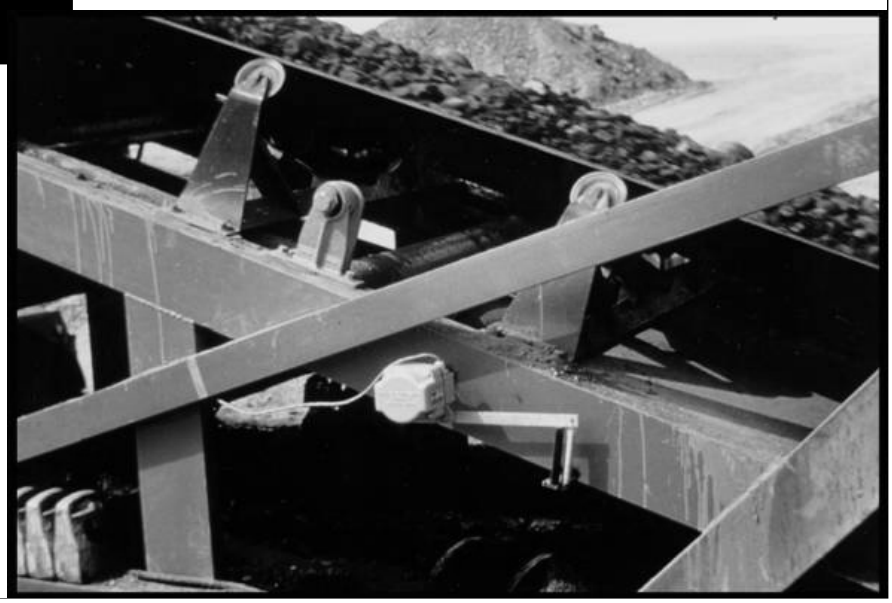


This is the working part of the plant - the drum mixer. Note that it slopes down away from the burner. The rate of the material flow through the mixer can be controlled somewhat by the slope of the drum.

# Dryer For A Drum Mixer Plant

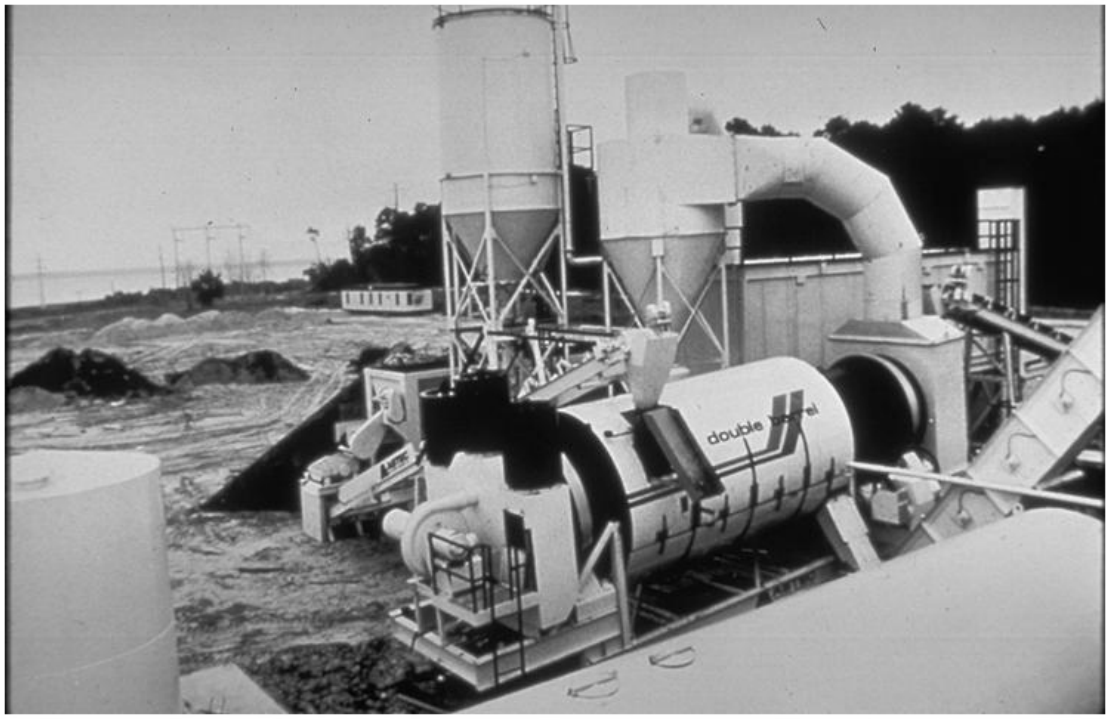
In a drum mix plant the aggregate enters at the burner end of the plant.

# Controls



Drum mix plants are computer controlled. The controls are linked to a weigh belt. As the material moves across this weigh bridge the weight of the material on the belt is determined and knowing the speed of the belt - the amount of material per unit of time can be determined. This is then used to control through the computer the amount of asphalt cement to be feed into the mix.

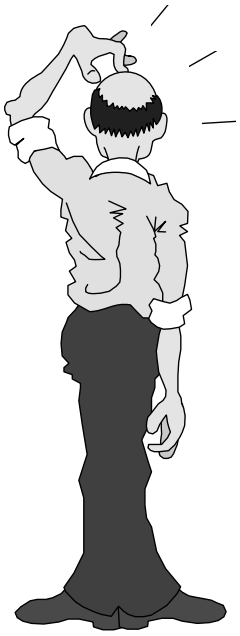
## Small Drum Mixer Plant



The advantage of the drum-mix plant is that a high production (200 tons per hour) plant can be moved and set up quickly. This is a “six-pack”. It can be moved in six units.

# Sometimes Things Go Wrong

# Questions - ?



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Thank
You