



UNITED
CONVEYOR
CORPORATION





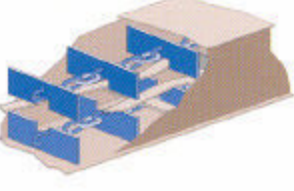


MAX[®] Type DFC
Dry Flight Conveyor

MAX® TYPE DFC

UCC's MAX® Type DFC Dry Flight Conveyor is a chain and flight conveyor that transports dry or moist abrasive material through an enclosed conveyor trough. The motor driven chain moves continuously through the length of the trough, moving the conveyed materials. Several configurations of the Dry Flight Conveyor are available to meet various material handling needs.

SYSTEM APPLICATION

MAX Type DFC Dry Flight Conveyor				
Chain & Flight Type	Conveyor Size (width)	Maximum Particle Size Diameter	Volumetric Capacity (Cu Ft/Hr)*	Nominal Tons/Hr @ 80#/Cu Ft
 <p>Single strand chain with low flights for horizontal conveying</p>	11 inches	2 inches	500	20
	15 inches	3-1/2 inches	700	28
 <p>Double strand chain with low flights for horizontal conveying</p>	22-1/2 inches	12 inches	1300	32
 <p>Double strand chain with high flights for horizontal to inclined conveying</p>	31-1/2 inches	6 inches	1350	54
	35 inches	6 inches	1500	60**
 <p>Single strand chain with U-shape flights for horizontal to vertical conveying</p>	11 inches	2-1/2 inches	300	12
	15 inches	3-1/2 inches	520	21
	19 inches	4-1/2 inches	900	36
 <p>Round link chain with high flights for horizontal or horizontal to inclined conveying</p>	11 inches	1-3/4 inches	500	20
	15 inches	3 inches	700	28

*Capacities based on maximum chain velocity of 20 feet per minute; inclined and vertical conveyors assume 75% lifting efficiency.

**Higher capacity systems can be designed as required.

On the cover:

Two MAX Type DFC units remove bed material from a Fluidized Bed Combustor at a power plant in eastern USA. One horizontal unit moves the material out of the building to the horizontal-to-vertical unit shown, which carries the material up to the storage silo.

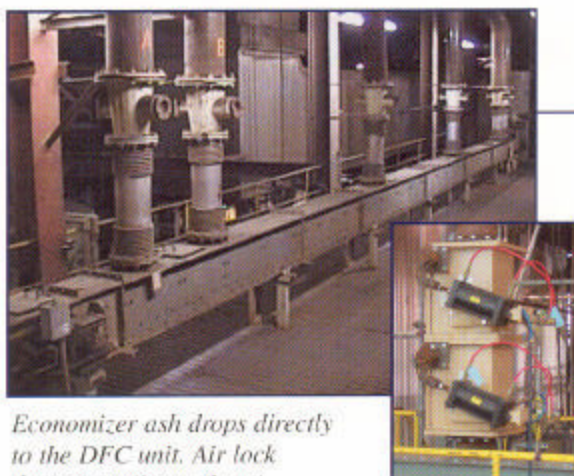
SYSTEM INSTALLATIONS

Atmospheric Fluidized Bed Combustor (AFBC) Units

Spent bed material from an AFBC unit is discharged at a high temperature, typically 500° to 750° F. The MAX Type DFC can withstand these temperatures and accommodate a variety of ash types and particle sizes, including lumps that may be present in this type of ash. This system requires significantly less horsepower than a pneumatic system - it is the preferred conveying method for bed ash when conveying distances are 200 ft. or less.



Cooling screw conveyor from an AFBC unit feeds to parallel MAX Type DFC systems.



Economizer ash drops directly to the DFC unit. Air lock dump gate (inset photo).

Economizer Systems

Because of its high temperature tolerance and continuous removal capability, the MAX Type DFC is an excellent choice for removing ash from economizer hoppers where bridging may occur. This is the recommended conveyor when the calcium oxide content of the ash is 15% or higher, and the ash must be kept dry to prevent it from setting up. The DFC can maintain economizer vacuum with the use of airlock dump gates on the discharge.

Selective Catalytic Reduction (SCR) Units

SCR systems are usually installed between the economizer and air heater sections of the boiler. Ash that drops out of the SCR system will be similar to that from the air heater, and tends to be more granular than fly ash. It is often desirable to keep SCR hoppers empty to avoid arching associated with ammonia slip - excess NH₃ in the flue gas can cause the ash to become sticky. The DFC is more tolerant of ammonia slip than pneumatic systems and offers continuous removal capabilities, making the DFC a good choice for this application.



Double chain MAX Type DFC unit. Note the wide spacing between flights to accommodate large clinkers.

Other Granular Material

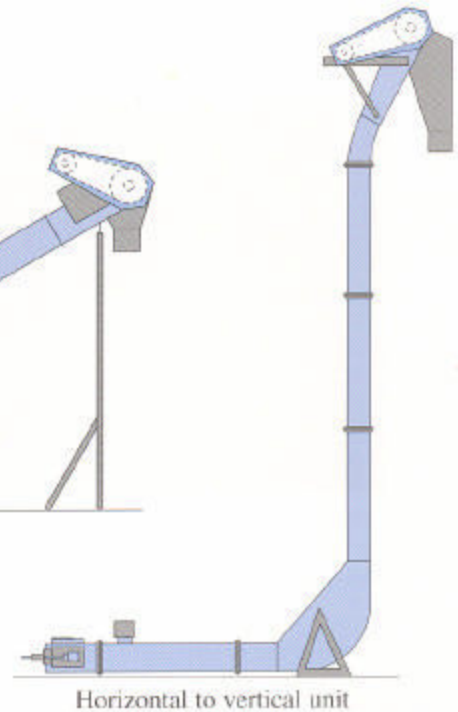
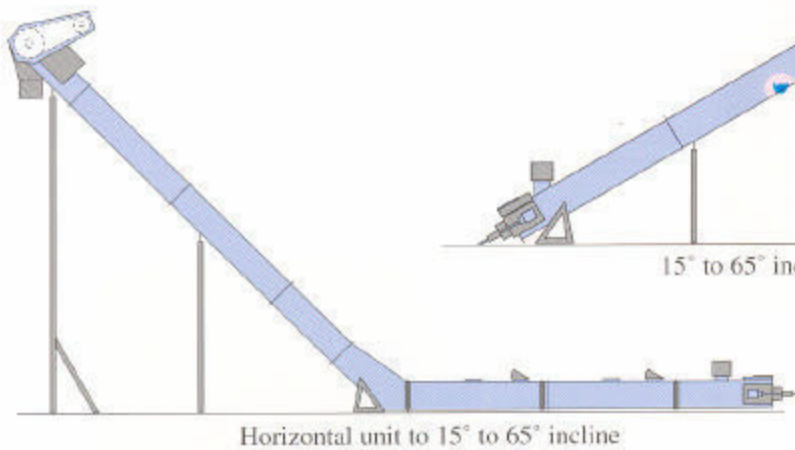
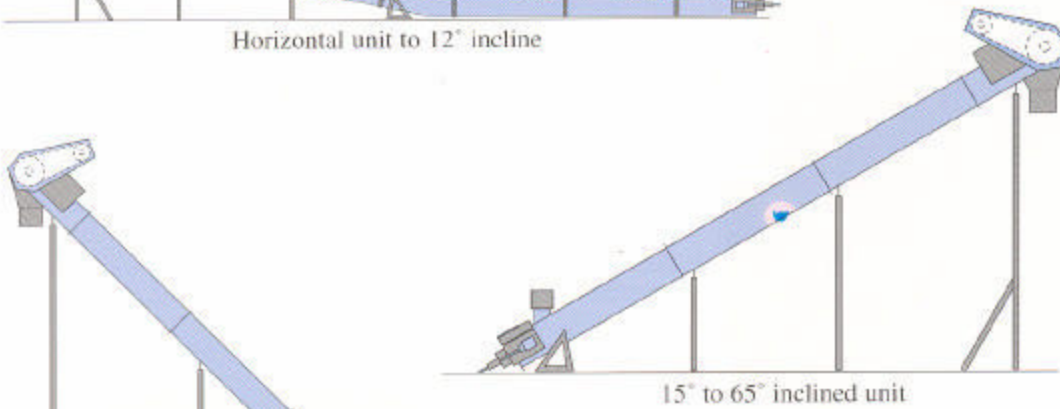
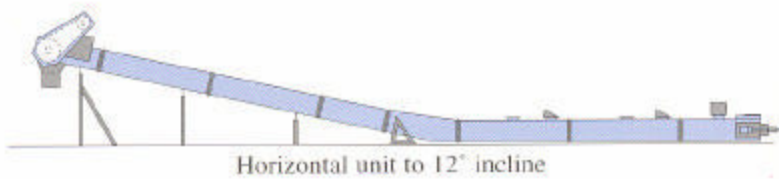
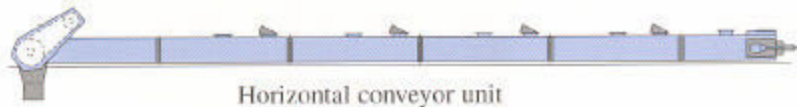
Cement that is collected from the clinker cooler at the discharge end of the kiln can be conveyed in a MAX Type DFC unit. This material is usually discharged at about 450° F and is moderately abrasive.

Dry flight conveyor units are also commonly considered for applications where a pneumatic system is undesirable due to combustibles present in the material to be conveyed.

DESIGN FLEXIBILITY

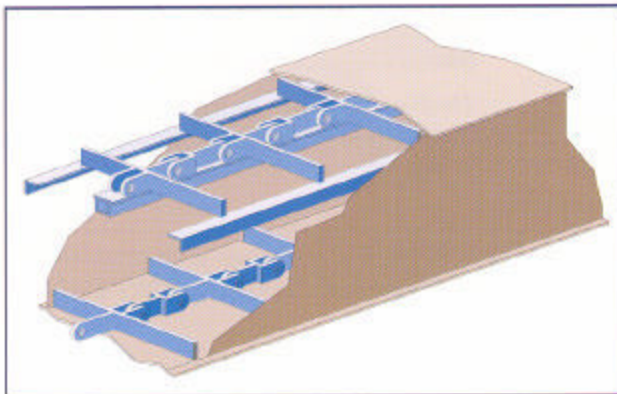
Modular construction of the main body sections of the MAX Type DFC permits considerable flexibility when matching the conveyor to the equipment it will serve. The conveyor's low profile design allows it to be adapted to installations where headroom is limited.

The dry flight conveyor can be configured in several ways to meet the needs of the individual installation. Some of the typical configurations are shown below; other configurations are possible as well. This flexibility allows the conveyor to be installed with limited space, or to lift the material to the height required for storage or transfer to another conveyor.



CHAIN & FLIGHT BAR ARRANGEMENT

Five different designs for flight bars, and three different types of chain are used within the various MAX Type DFC units. The flights vary in height depending upon the configuration of the conveyor and the material to be conveyed. The five designs are illustrated here.



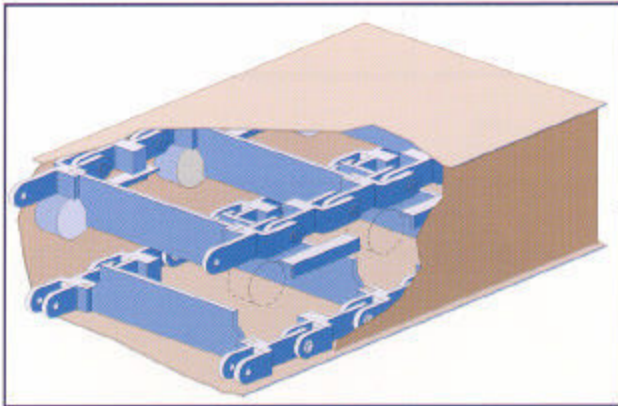
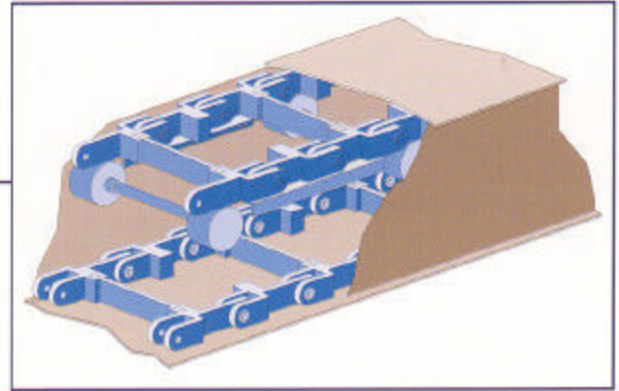
Low Flight Bar with Single Strand Chain

For economical, horizontal en masse conveying.

CHAIN & FLIGHT BAR ARRANGEMENT (CONTINUED)

Low Flight Bar with Double Strand Chain

For horizontal, en masse conveying with large particles.

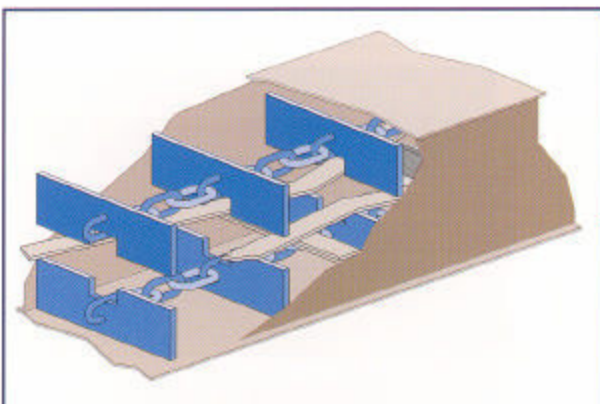
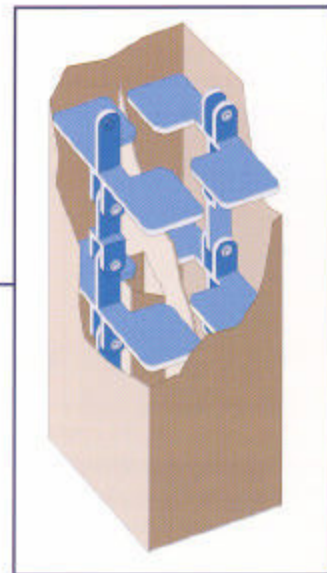


High Flight Bar with Double Strand Chain

For applications which require inclined conveying and/or higher volumes.

U-Shape Flight Bar with Single Strand Chain

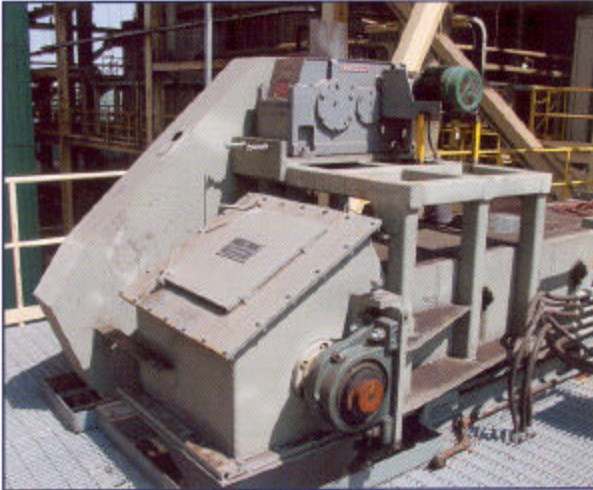
For vertical or steeply inclined conveying.



High Flight Bar with Round Chain

For horizontal or inclined conveying without chain coming into contact with wear surfaces.

SYSTEM COMPONENTS



Drive section for a 31-1/2" dry flight conveyor

Drive Section (Head Section)

The drive assembly includes a motor, which can vary from 2 to 40 HP, a high-speed coupling, and a speed reducer. The flexible coupling reduces stress on the motor and speed reducer at start-up. Roller chain connects the speed reducer output sprocket with the sprocket of the drive shaft. The drive unit mounts on a slide base so that the tension of the roller chain can be adjusted. The shaft runs in self-aligning double-row roller bearings designed for long life.

Conveyor Chain Sprockets

Conveyor chain sprockets are mounted on the drive shaft - in the center for single strand chain, and on either side for double strand chain. Individual segments of the sprocket are replaceable without removing the sprocket hub from the shaft. Contact surfaces on the teeth are induction hardened to 560 BHN (55 Rc).



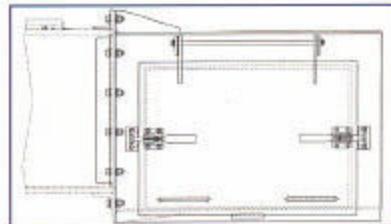
Drive sprocket for double strand chain

Take Up Section (Tail Section)

The take-up section, located at the opposite end from the conveyor's head section, houses the chain tensioner and limit switches. The standard design includes a spring-loaded screw take-up at the tail end shaft to maintain tension on the conveyor chain. This arrangement compensates for temperature expansion and chain wear, and cushions the chain from load shocks. An optional hydraulic cylinder-operated tensioner is also available. An optional collection box can also be added to the take up section to hold large particles that don't fall through the return section and ride the chain back to the tail. Shaft seals and bearings are designed to the same high standard as those on the drive shaft. Limit switches in this section transmit alarms when the chain is worn excessively or stop the unit automatically in case of a chain break.



Standard take up section



Optional collection box



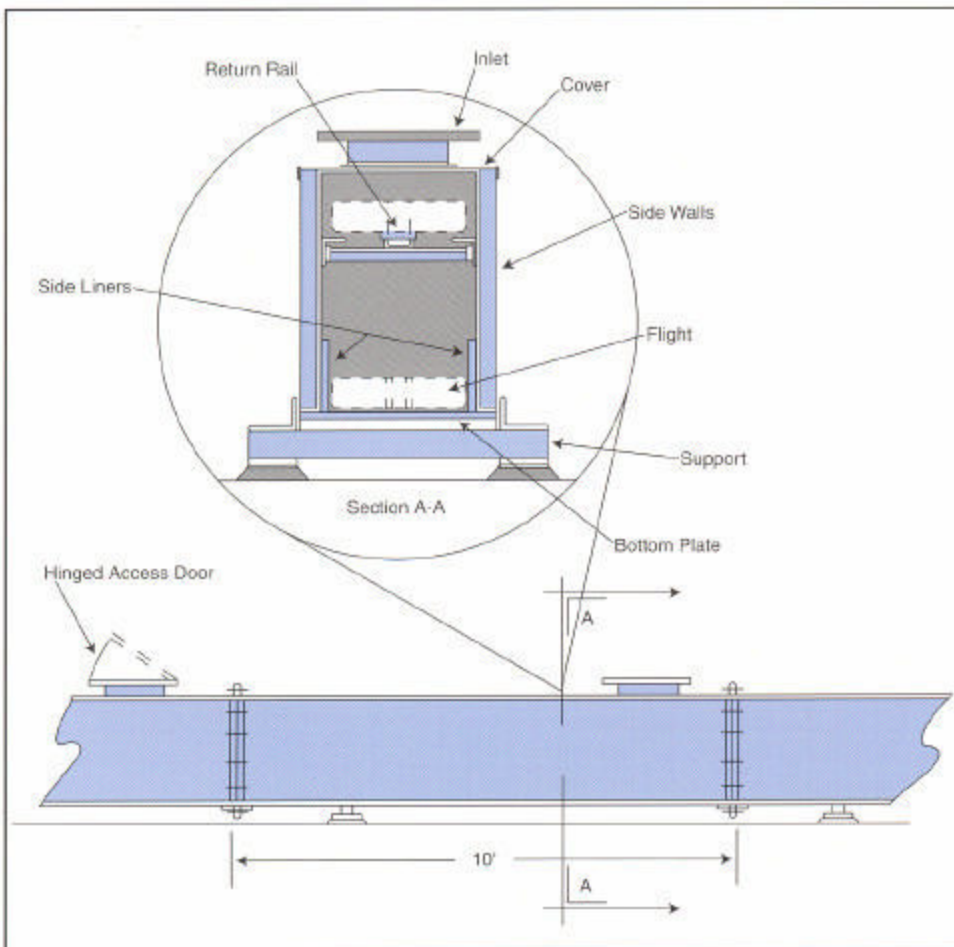
Take up section with hydraulic tensioner

Main Body Section

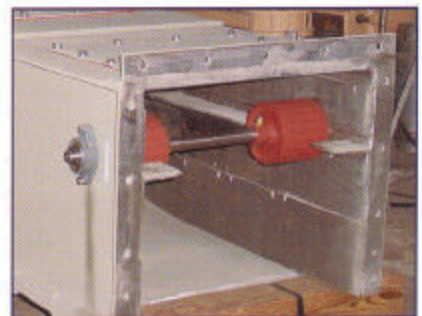
Standard 10-ft. or 20-ft. modules comprise the main body section of the dry flight conveyor; this section represents most of the length of the conveyor. The casing side walls are 1/4" thick steel plate. Flights move over a bottom plate of 1/2" thick abrasion resistant steel. 3/8" thick abrasion resistant side liners prevent wear along the sides of the trough.

Return rails, located in the upper part of the body section, support the return chain traveling toward the take-up section. The rail is 1/2" thick abrasion resistant steel to withstand the wear of the moving chain. To reduce chain wear caused by abrasion between the return rail and chain links, roller supports can be used in lieu of return rails. These rollers span the return section and provide a rolling surface for the chain; roller supports are recommended if the chain speed is high and the material being conveyed is highly abrasive.

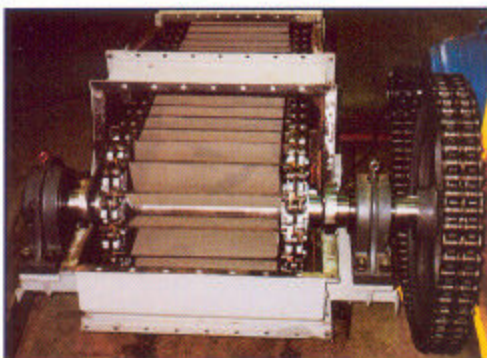
Covers and hinged access doors are constructed of 10-gauge steel. Continuous seals prevent airborne material from entering the atmosphere. Each conveyor is aligned at the factory, and all connection flanges have alignment pins to ensure accuracy during field fit-up of the conveyor.



Strategically located access doors make inspections convenient.



Optional rollers support the chain in the return section (Double strand chain unit shown)



Double strand chain and drive sprocket

Drive Assembly

A high flight, double strand chain unit is shown here with the casing removed. The conveyor chain moves the flights forward, then up and around the drive shaft. Roller-type chain connects the drive shaft sprocket to the speed reducer.

Standard & Heavy Duty Chain

Chain links are available in various strengths and sizes to match the required chain pull. Individual links are drop forged from high chrome/magnesium steel with a core hardness of 300 - 400 BHN. The entire link is then case hardened to 550 - 650 BHN (54 - 58 Rc) for wear resistance. Chain connecting bolts have the same strength and hardness as the links; heavy clamp washers at the ends of the chain bolts allow individual links to be replaced easily.



14x50mm round, single strand	142mm single strand, standard weight	142mm single strand, heavy duty	142mm double strand, standard weight	142mm double strand, heavy duty	175mm double strand, standard weight
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Torque Protection

To prevent damage, each conveyor unit is equipped with either a variable speed drive control or a shear pin on the drive shaft. The variable speed control will stop the unit automatically when it senses excessive torque. Alternately, the shear pin will break in that situation to prevent damage to the conveyor unit.



Variable speed drive control unit

BENEFITS OF THE MAX TYPE DFC DRY FLIGHT CONVEYOR

- Premium construction for highly reliable, 24-hour design
- Modular construction reduces cost and design time, improves fabrication accuracy, and minimizes spare parts requirements
- Handles combustion by-products and other highly abrasive material
- Designed to withstand high temperature material (up to 800° F) without damage to the conveyor.
- Low horsepower requirements per ton per hour
- Low maintenance as a result of low speed operation and wear-resistant components
- Reliably conveys a variety of material, regardless of particle size distribution
- Several standard designs allow for horizontal or inclined motion
- Two chain types; single and double strand chains; three flight styles; and six standard sizes allow units to be adapted for a variety of applications



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