MATERIAL HANDLING- ERECTING LIGHT WEIGHT COMPONENTS ON TALL STRUCTURES AND SUPPORT STRUCTURE FOR HEAVY EQUIPMENT AND CONVEYORS

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AGENDA

- MATERIAL HANDLING
- ERECTING LIGHT WEIGHT COMPONENTS ON TALL STRUCTURES
- SAFETY RULES

MATERIAL HANDLING

- Material handling is the movement, storage, control & protection of materials, goods & products throughout the process of manufacturing, distribution consumption and disposal.
- The focus is on the methods, mechanical equipment systems and related controls used to achieve these functions
- Material handling management consists use of a proper technique for moving, transporting, storing or distributing materials with or without the help of mechanical appliances.
- Because of various complexities in the construction process, management must be fully acquainted with various material handling devices so that unit cost of construction can be down

- All material handling activities must be simplified and must be preventing any accidents
- Also material movement planning must be economical is terms and labour

Material handling objective:

- The right amount
- The right material
- At the right time
- In the right position
- In the right sequence
- For the right cost

- The handling of material depends on three items. They identified as follows

- Identification of source of building material
- Identification of quantity and quality of material
- Identification of cost of building material

Principles

- Orientation principle
- Planning principle
- System principle
- Unit load principle
- Space utilization principle

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ERECTING LIGHT WEIGHT COMPONENTS ON TALL STRUCTURE

- Tall buildings are generally multi storey structures where greater part of construction of beams and stanchreons

Erection Procedure for Multi Storey Building

- The order of erection follows pattern of columns, girder and beams or columns, trusses and purlins. Buildings are generally erected by cranes and beyond the reach are erected guy derricks

The step wise operation is as follows

- Guy derrick mast is assembled on ground with its base in approximate required location. The mast is tipped up vertically and guys are anchored to column bases. The boom is inserted and topping lift and load lines are served. The derrick is ready to operate. The first – tier steel is erected

- The bottom is removed from boom seat by picking with topping lift falls, revolved 18degree and placed in a temporary jumping shoe. The top of boom is guyed off with temporary guys
- The load falls are attached to mast above its center of gravity, the mast guys are moved to top of next tier and mast is raised to its new position. The mast guys are adjusted and load falls unhooked
- The temporary guys of boom are removed and the topping lift falls are used to raise the boom and place it in the boom seat. The derrick is now ready to operate and the next tier of steel is erected
- This operation is repeated until all tiers are erected

Safety Rules

- See that the equipment is not over loaded. Be certain of load to be lifted
- All bolts and splice material on lattice derricks and crane sections have been inserted
- Do not open the legs of brother chains to too large an angle
- The rings of chain slings is trig enough for crane hook
- Avoid sudden shocks when lifting

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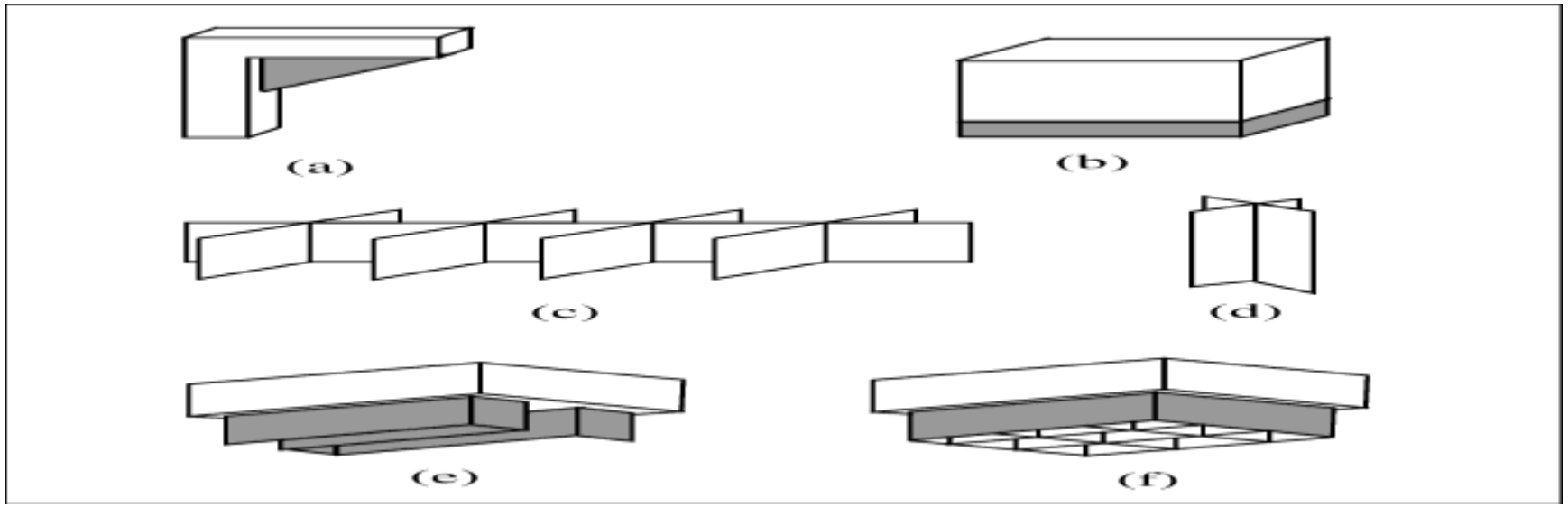
AGENDA

- SUPPORT STRUCTURES
- TYPES OF SUPPORT STRUCTURES
- SUPPORT STRUCTURE FOR HEAVY EQUIPMENTS
- SUPPORT STRUCTURE FOR CONVEYING SYSTEMS

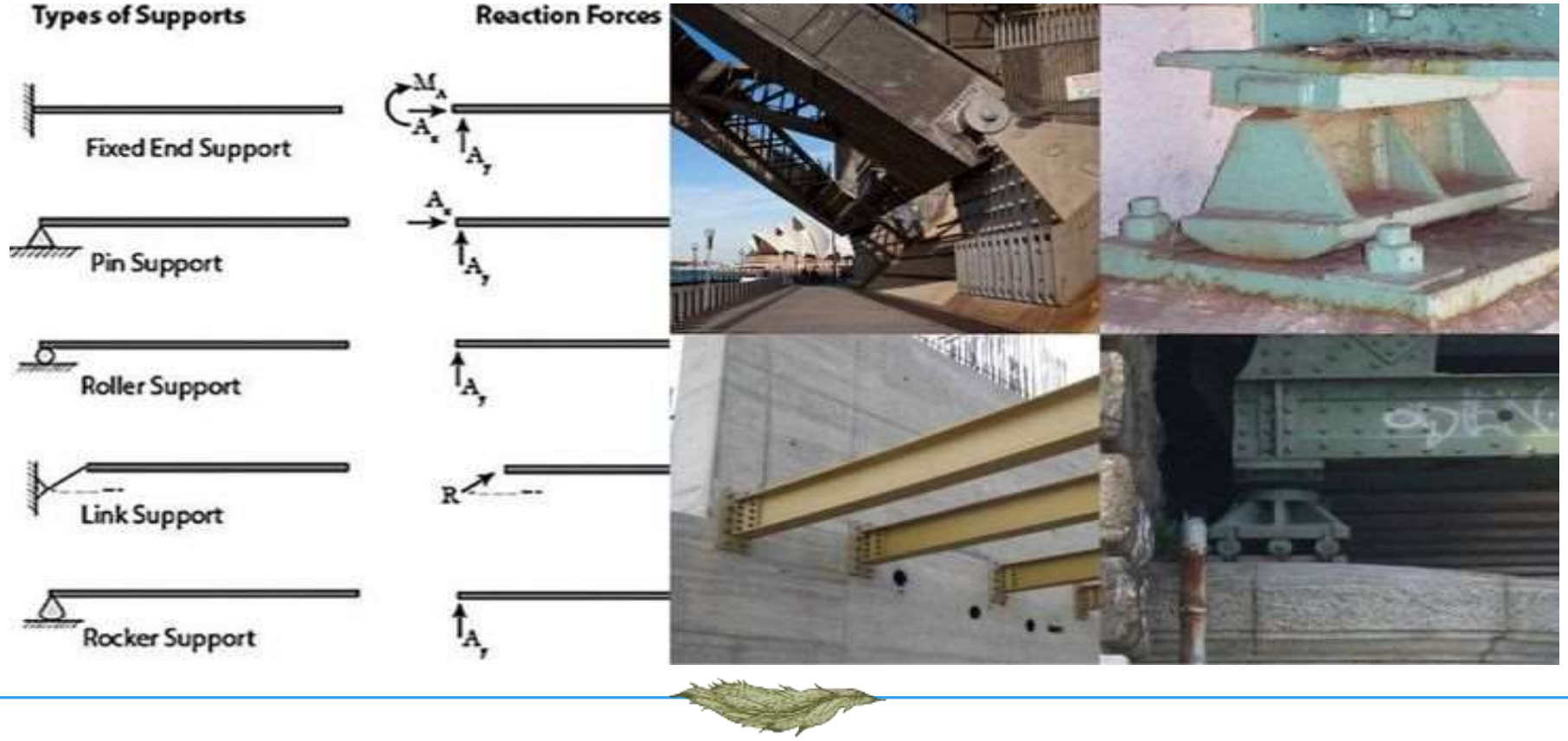
SUPPORT STRUCTURES

A STRUCTURAL SUPPORT IS A PART OF A BUILDING OR STRUCTURE THAT PROVIDES THE NECESSARY STIFFNESS AND STRENGTH IN ORDER TO RESIST THE INTERNAL FORCES AND GUIDE THEM SAFELY TO THE GROUND.

(A) GUSSET SUPPORT, (B) BASE SUPPORT, (C) WEB SUPPORT, (D) COLUMN SUPPORT, (E) ZIGZAG SUPPORT, (F) PERIMETER AND HATCH SUPPORT.



TYPES OF SUPPORT STRUCTURES


Types of Supports
Reaction Forces
Fixed End Support
Pin Support
Roller Support
Link Support
Rocker Support
M_A
A_x
A_y
R

FIXED SUPPORT

RIGID OR FIXED SUPPORTS MAINTAIN THE ANGULAR RELATIONSHIP BETWEEN THE JOINED ELEMENTS AND PROVIDE BOTH FORCE AND MOMENT RESISTANCE. IT EXERTS FORCES ACTING IN ANY DIRECTION AND PREVENTS ALL TRANSLATIONAL MOVEMENTS (HORIZONTAL AND VERTICAL) AS WELL AS ALL ROTATIONAL MOVEMENTS OF A MEMBER.

ROLLER SUPPORT

A ROLLER SUPPORT ALLOWS THERMAL EXPANSION AND CONTRACTION OF THE SPAN AND PREVENTS DAMAGE ON OTHER STRUCTURAL MEMBERS SUCH AS A PINNED SUPPORT. THE TYPICAL APPLICATION OF ROLLER SUPPORTS IS IN LARGE BRIDGES. IN CIVIL ENGINEERING, ROLLER SUPPORTS CAN BE SEEN AT ONE END OF A BRIDGE.

PINNED SUPPORT

A PINNED SUPPORT ATTACHES THE ONLY WEB OF A BEAM TO A GIRDER CALLED A SHEAR CONNECTION. THE SUPPORT CAN EXERT A FORCE ON A MEMBER ACTING IN ANY DIRECTION AND PREVENT TRANSLATIONAL MOVEMENTS, OR RELATIVE DISPLACEMENT OF THE MEMBER-ENDS IN ALL DIRECTIONS BUT CANNOT PREVENT ANY ROTATIONAL MOVEMENTS.

SIMPLE SUPPORT

A SIMPLE SUPPORT IS BASICALLY WHERE THE STRUCTURAL MEMBER RESTS ON AN EXTERNAL STRUCTURE AS IN TWO CONCRETE BLOCKS HOLDING A RESTING PLANK OF WOOD ON THEIR TOPS. THIS SUPPORT IS SIMILAR TO ROLLER SUPPORT IN A SENSE THAT RESTRAINS VERTICAL FORCES BUT NOT HORIZONTAL FORCES.

SUPPORT STRUCTURE FOR HEAVY EQUIPMENTS

Column Base

- Foundation is necessary for a column to distribute the column load on sufficient area of the soil so that the bearing capacity of the soil is not exceeded, it is also equally important that the column load be applied on sufficient area of the concrete foundation so that bearing strength of the concrete is not exceeded
- A steel base plate is therefore used to spread the column loaf on sufficient area of the concrete foundation
- Base plate used may be of following types
  - Slab bases
  - Gusseted bases

- Slab bases : In this case the column stands directly on the base plate the bearing end of the column is machined so that the column load is transferred to the slab base by bearing
- Gusseted base: Gusseted base plates are used in columns carrying heavy loads.
- In this case fastenings are used to connect the base plate and the column in the form of gusset plate, angles etc.,
- In case the end of the column is sufficiently machined so as to provide full bearing on the base plate, it is usual to assume that half the column load is liable to be transferred to the base plate through the fastenings and the balance load is transferred to the base plate by direct bearing.
- Suppose the ends of the column and gusset plates are not exactly faced for full or complete bearing. Then it is usual to design the fastenings to transmit all the forces to which the base is subjected.

- Grillage foundation: It is provided for a column carrying heavy load when it has to transfer its load to a soil of low bearing strength
- This foundation consists of two or more layers or tiers of steel beams, the layers being provide one above the other at right angles at each other .
- The beams are completely encased in well compared concrete.
- Generally only two tiers of beams are used
- The column rests on a base plate through which the load is transmitted to the upper tiers beams
- These beams in turn transfer the loads to the lower tier beams. From the lower tier beams the load will be transmitted to the soil.

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CONVEYING EQUIPMENT

CONVEYING BELT SUPPORT WITH IDLERS

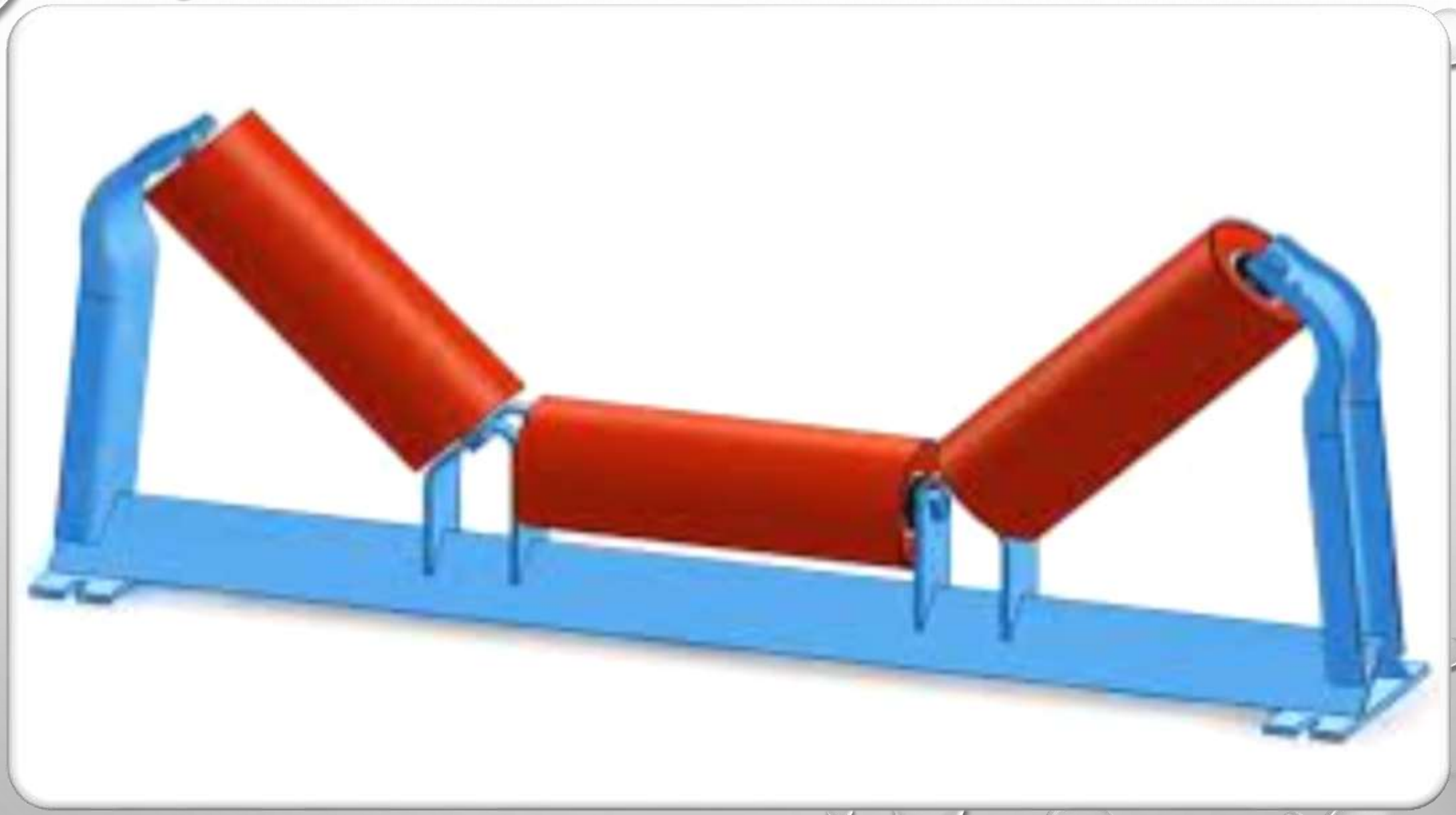
- THE BASIC MEANS OF SUPPORT FOR A CONVEYOR BELT IS IDLERS. AN IDLER CONSISTS OF ONE OR MORE ROLLERS – WITH EACH ROLLER CONTAINING ONE OR MORE BEARINGS TO ENSURE IT IS FREE ROLLING. THE ROLLERS ARE SUPPORTED BY, OR SUSPENDED FROM, A FRAMEWORK INSTALLED ACROSS THE CONVEYOR STRINGERS. IDLERS ARE THE MOST NUMEROUS OF CONVEYOR COMPONENTS, IN TERMS OF BOTH THE NUMBER USED ON A PARTICULAR CONVEYOR AND THE NUMBER OF STYLES AND CHOICES AVAILABLE.

THE IDLER FAMILY

- IDLERS ARE CLASSIFIED ACCORDING TO ROLL DIAMETER, TYPE OF SERVICE, OPERATING CONDITION, BELT LOAD, AND BELT SPEED; THEY ARE RATED ON THEIR LOAD-CARRYING CAPACITY BASED ON CALCULATED BEARING LIFE. CEMA USES A TWO-CHARACTER CODE THAT EXPRESSES THE IDLER CLASSIFICATION AND IMPLIED LOAD RATING, WITH A LETTER-BASED CODE FOLLOWED BY IDLER DIAMETER IN INCHES, RESULTING IN CLASSES FROM B4 TO F8. OTHER REGIONS MAY HAVE DIFFERENT CLASSIFICATION SYSTEMS.

CARRYING IDLERS

- CARRYING IDLERS PROVIDE SUPPORT FOR THE BELT WHILE IT CARRIES THE MATERIAL. THEY ARE AVAILABLE IN FLAT OR TROUGHED DESIGNS. THE FLAT DESIGN USUALLY CONSISTS OF A SINGLE HORIZONTAL ROLL FOR USE ON FLAT BELTS, SUCH AS BELT FEEDERS.
- THE TROUGHED IDLER USUALLY CONSISTS OF THREE ROLLS - ONE HORIZONTAL ROLL IN THE CENTER WITH INCLINED (OR WING) ROLLS ON EITHER SIDE. THE ANGLE OF THE INCLINED ROLLERS FROM HORIZONTAL IS CALLED THE TROUGH ANGLE. TYPICALLY, ALL THREE ROLLS ARE THE SAME LENGTH, ALTHOUGH THERE ARE SETS THAT INCORPORATE A LONGER CENTER ROLL AND SHORTER INCLINED ROLLERS CALLED “PICKING” IDLERS. THIS DESIGN SUPPLIES A LARGER FLAT AREA TO CARRY MATERIAL WHILE ALLOWING INSPECTION OR “PICKING” OF THE CARGO.



RETURN IDLERS

- RETURN IDLERS PROVIDE SUPPORT FOR THE BELT ON ITS WAY BACK TO THE LOADING ZONE AFTER UNLOADING THE CARGO. THESE IDLERS NORMALLY CONSIST OF A SINGLE HORIZONTAL ROLL HUNG FROM THE UNDERSIDE OF THE CONVEYOR STRINGERS. V-RETURN IDLERS, INCORPORATING TWO SMALLER ROLLS, ARE SOMETIMES INSTALLED TO IMPROVE BELT TRACKING.

QUESTIONS

1. WHAT ARE SUPPORT STRUCTURES?
2. NAME ALL THE TYPES OF SUPPORTS.

THANK YOU

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