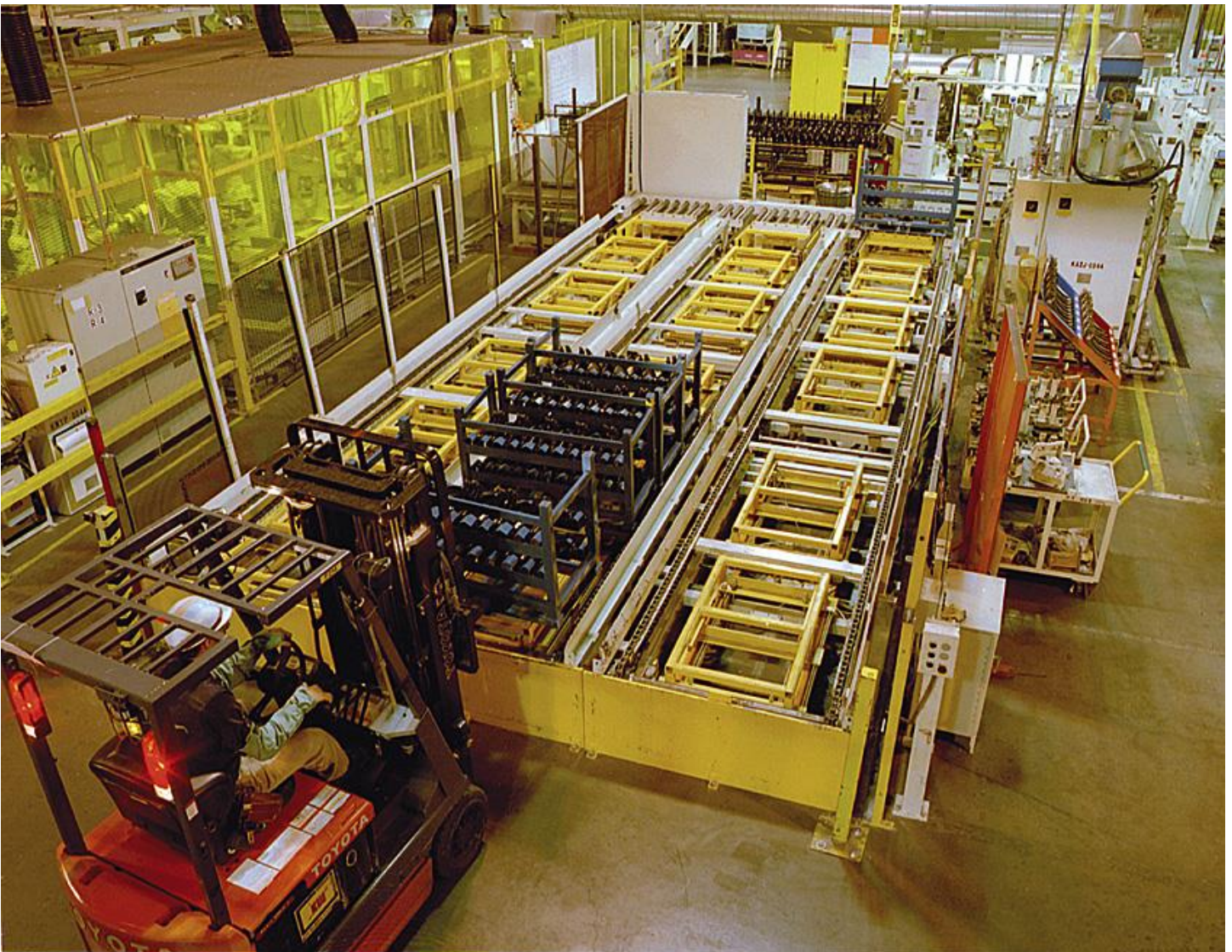


Chain Conveyors In Material Handling



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Chapter 1 – What is Chain Conveyor?

Chain conveyor, sometimes called “multi-strand chain conveyor,” moves product between two points using chain under the product. This is only one type of conveyor. Other types include chain-driven live roller (CDLR), belt, vibrating, and overhead conveyor.

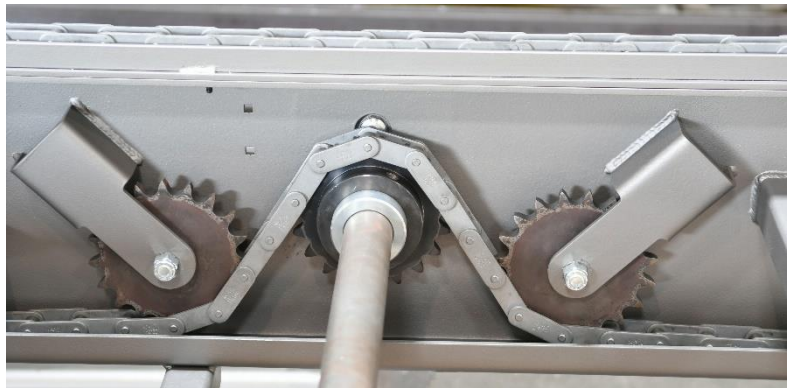
All types are specific to products and environments. The use of different sizes and weights of pallets, boxes, bins, dumpsters, etc. can also be a factor. The single important factor for utilizing chain conveyor is that the product has a sturdy surface that will interface properly with the chain. The surface of the product, however, doesn't necessarily need to be level or smooth.

Chain conveyor is driven by a mechanical gearbox. The gearbox can be powered by an electric, hydraulic or air motor. The drive is placed at one end of each conveyor section. In the case of a reversing chain conveyor, the drive is typically placed equidistant between the end sprockets of the reversing section(s).

The practical length of each conveyor section is based on the weight of the load. Multiple sections may be necessary to transport the load from where it is loaded onto the conveyor and where it is removed.

One major factor to consider in whether a conveyor can or should be split into multiple sections is the bottom surface of the product to be conveyed. With multiple chain conveyor sections configured in a straight line, the load must be able to make transitions from the head sprocket of one conveyor to the tail sprocket of the adjoining section. For loads with a flat and smooth bottom surface, the transition is not an issue. However, loads with cross members on the bottom that are perpendicular to the direction of travel will tend to dip down between the head and tail sprockets. Transition rollers or wheels can improve the situation, but careful consideration needs to be taken in the design of the conveyor.

The drive pulls the chain toward it with the product on the chain. At the end of each section of chain, the product is either passed to the next section of conveyor, deposited on a transfer station to redirect the product, or presented at a workstation for processing.



Once the chain passes around the drive sprocket, it is passed back to the infeed end of the conveyor section to where it wraps around a take-up sprocket and receives additional product. The chain under the product is taut because of the

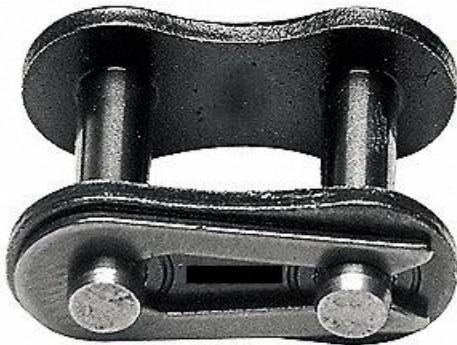
weight of the product. Between the drive and take-up sprockets on the return, the chain will “belly” and may require supports to insure it doesn’t dip so low as to catch on the frame or to be a hazard.

Depending on the configuration, width and weight of the product, two, three, four or more strands of chain can be used in parallel to properly support the product.

The chain on the top of the conveyor that conveys the product is connected between the drive and the take-up sprockets. A side-frame supports the load. The side plates of the chain itself are typically supported by steel or UHMW Polyethylene (a plastic-based material). The proper material is determined during the design stage.

There are (3) basic types of chain conveyor.

- Rollerless chain. Rollerless chain is simple in construction and can be a less expensive option. It is typically most effective in harsh, dirty environments where lubrication is not feasible. Because of this, it requires higher horsepower drives to move the chains. It may also be used with lighter loads.



- Drag Link chain is similar to rollerless chain. Both slide on the supports of the conveyor side frames. Also referred to as “scraper belt” conveyor, a scraper mounted between two rows of chain conveys the material. It can be used in scrap conveyors for metal chips or particles of glass.



- Roller chain. As the name implies the side plates of the chain are connected by a roller-type bearing. The value to this type of chain lies in the reduced drag. Reduced drag results in smoother operation and less surging. Drive units aren’t required to be as large because of lower friction. Roller chain can also reduce operating costs. Lower friction allows longer distances between drive and take-up sprockets. The downside is that this chain doesn’t work as well in dirty environments where the rollers would be contaminated.



- Another variation of chain conveyor is a slat conveyor. The slats are connected at properly designed intervals to roller chain. Slat conveyors are typically used to convey heavy loads, oily or high temperature parts through a drying system and in assembly lines. Other appropriate uses are to convey materials that are irregular. Imagine an elevator in an airport. That's a good example of an everyday form of slat conveyor.

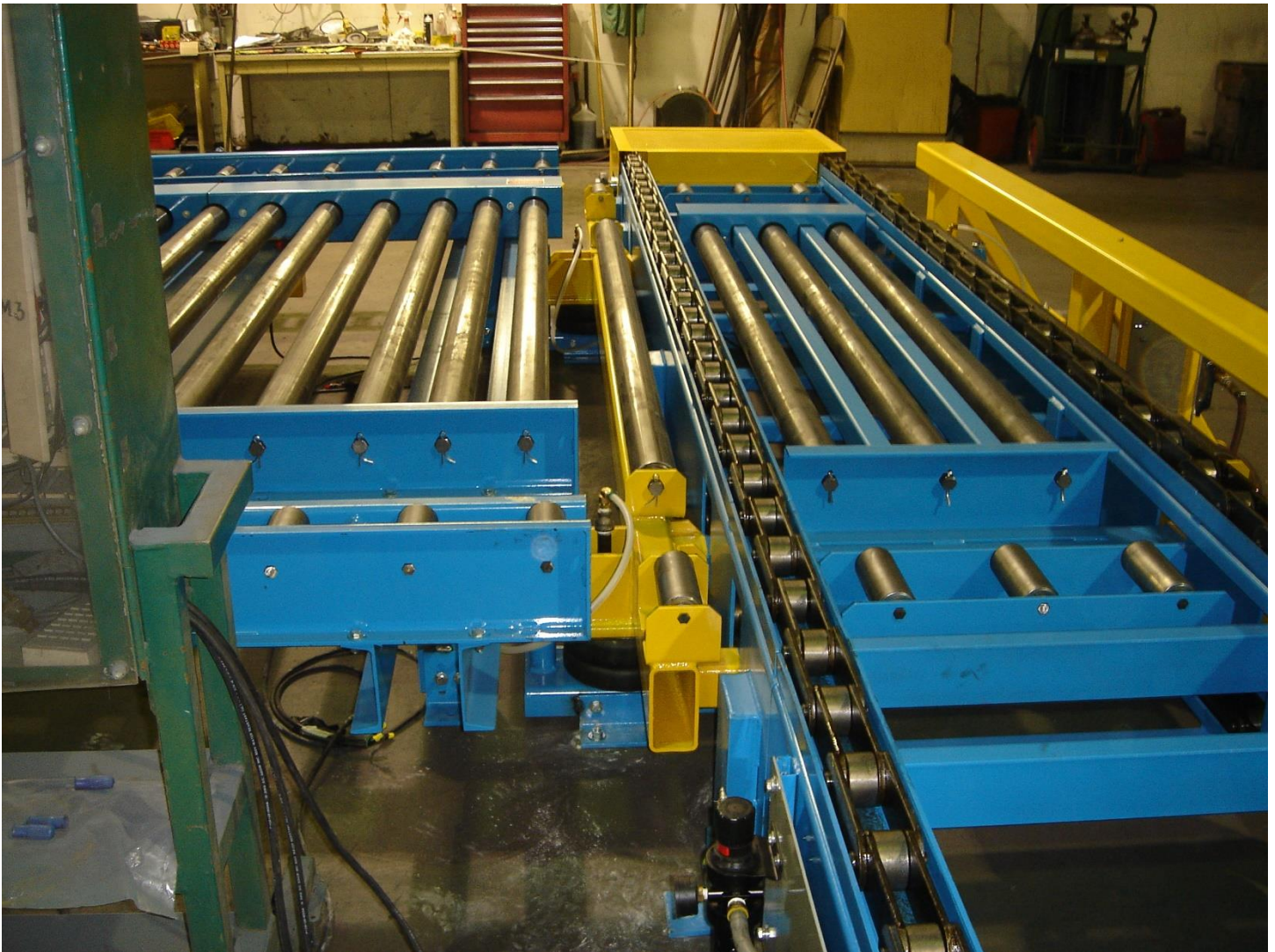


Chain Conveyor arrangements, depending on the type of chain used, are versatile. The conveyor can be horizontal, inclined or even vertical. The engineering team will be able to specify the proper arrangement for a particular use.

Chapter 2 – Which is the Correct Type of Chain Conveyor to Use?

Chain conveyor is typically used to convey heavy unit loads on wooden, steel, corrugated paper or plastic pallets, in boxes or wrapped in an industrial container.

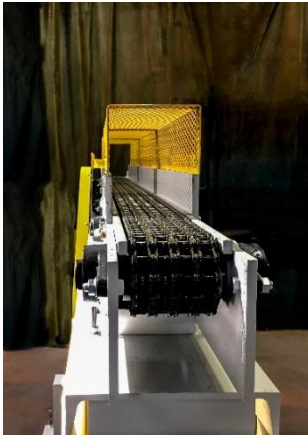
Some applications require the use of a combination of chain conveyor and powered roller conveyor. An example would be a system handling common wooden GMA pallets. These pallets usually have bottom boards that flow well on rollers in one direction and chains in the other. Therefore, chain conveyors and pop-up chain transfers are used in combination with roller conveyor to move the pallets through a facility (i.e. rollers used to convey loads in North / South direction and chains to convey in East / West direction).



Many industries use chain conveyor on production or processing lines. This includes the automotive, waste processing (such as for radioactive and medical hazardous wastes) and specialty products (chemical and other bulk products) industries.



Chain conveyor can be made up of two or more strands of chain, depending on the weight of the unit load, the width and the ability of the pallet, box, etc. to properly support the load.



Chain conveyors can also be provided with cross-slats to support the product. Slat conveyors can be used to convey a variety of products that cannot be supported properly on rollers or chains. Product can be conveyed directly on the slats or fixtures attached to the slats. Fixtures allow for more a precise placing of product. Conveyors that move products into an automated machining cell would be an example where fixtures could be applied. This would allow for precise positioning of products to be picked up by a robot and loaded into the machining center.

If the standard pallet or box cannot properly support the weight of the load between the chain centers, chain conveyor may not be the best selection. Products such as sand or rock are better conveyed with a belt conveyor. Paint and empty box systems often use overhead, enclosed-track conveyors.

Examples of industries that use chain conveyor:

- Manufacturing
- Warehouse & Distribution
- Automotive
- Order fulfillment
- Food & Beverage
- Furniture/Cabinetry

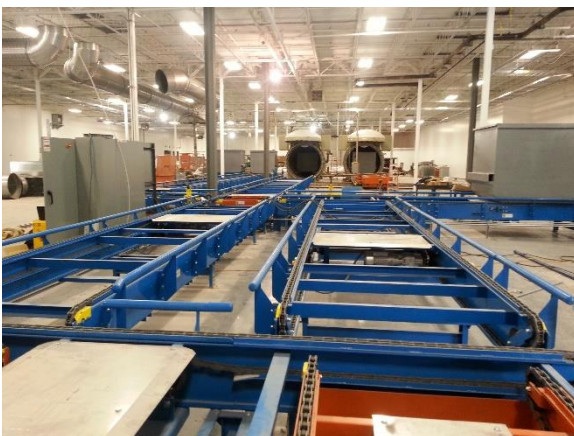
Chapter 3 – Case Studies of Successful Chain Conveyor Installations

Typically, chain conveyor is used to convey heavy or bulky unit loads. Examples are:

- Food processing, especially in very cold or hot environments. This includes meat, ice cream and other frozen products. High temperature materials, such as in forges and foundries, can also take advantage of chain conveyor designs.



- Hazardous waste. The reliability of chain conveyor makes it an attractive choice in processing environments that are difficult for people to access. This includes the processing of medical and radioactive waste, garbage, and recyclables.



- Unusually large, heavy or bulky products. Masts for wind-power farms, automotive parts, appliances and bulky wooden, plastic, carbon fiber, etc. structures all can use chain conveyor. Products with unit weights of over 80,000 pounds can be conveyed.

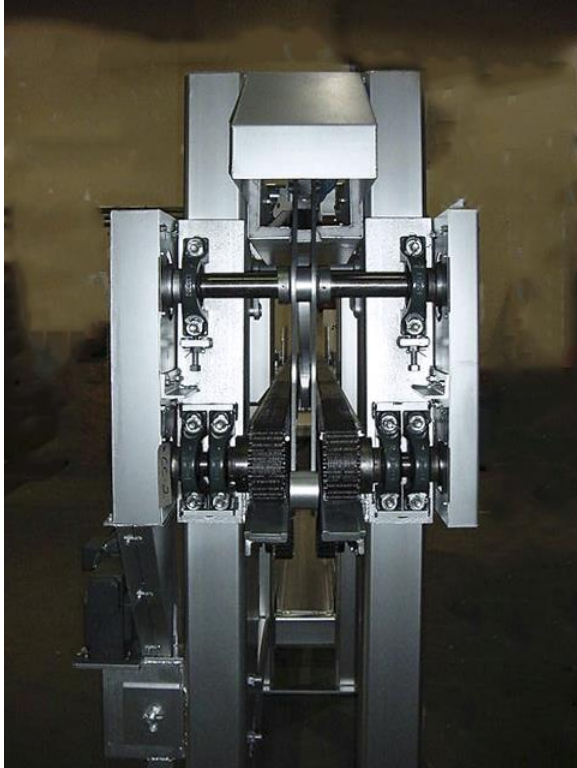


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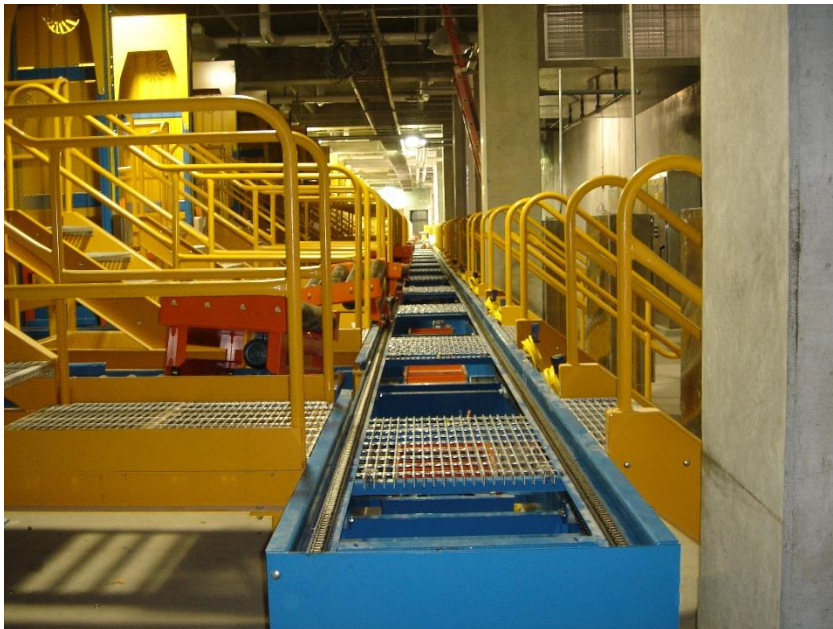


Chapter 4 – Unusual Chain Conveyor Installations

- Forged automotive axles at 2500 degrees F.



- Freezer & Blast freezer (-40 degrees F.) for food processing.



- Grocery industry – incoming loads with squaring devices.



- Pallet Dispensers – zones queue pallets between stacker and destacker



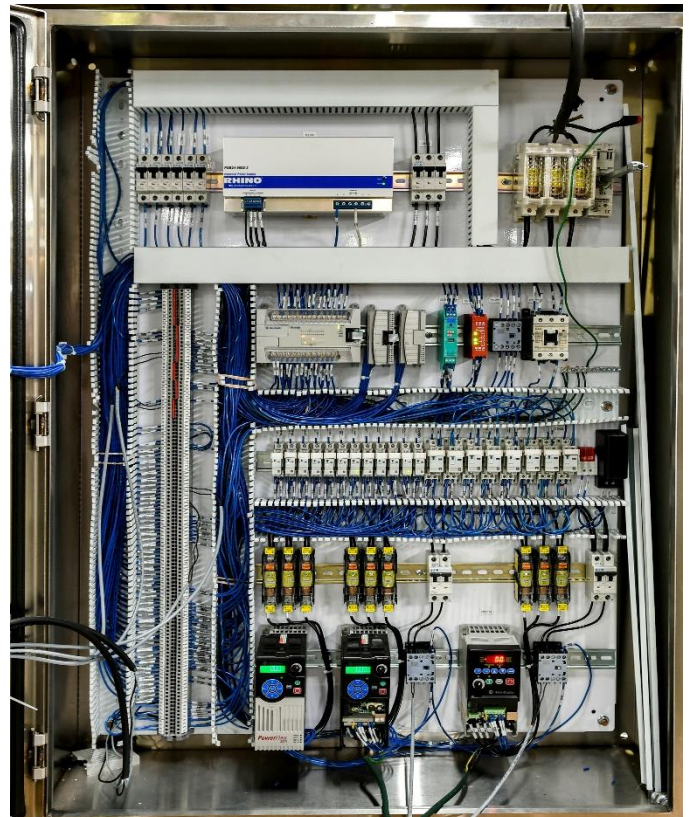
- Medical waste



- Metal or Glass Chip Conveyors



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Chapter 5 – If Not Chain Conveyor, Then What?

When designing a material handling system based on conveyors, take into account that many products may be better moved through the manufacturing or distribution process on different types of conveyors.

Circumstances where chain conveyor might not be best solution. Where you need:

- Accumulation of products
- Products with soft bottom surfaces
- Products that are too flexible to be properly supported between chain centers

Alternative conveyor possibilities include:

- Chain driven live roller (CDLR)
- Belt
- Over-head enclosed track
- Screw
- Flow rail
- Gravity rail
- Pneumatic
- Power and free
- Slat

Hybrid systems, that use CDLR for the mainline conveyor and chain conveyor for the transfer stations, are also warranted in many circumstances.

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Chapter 6 – Finding the Right Conveying System for Your Situation

Ultimately, the right conveying system is determined by a capable, experienced manufacturer of material handling systems based on what your company needs to convey, the distances involved, the means of support for the loads, the environment, the rate of movement, etc. Always choose a company that has the experience from past projects to advise you on the best solutions to your material handling needs.

This requires that you, first, have confidence in the experience of the material handling company and, second, provide them with all the details they need to understand your company's specific situation, its goals and its abilities. The right conveying system supplier will have the application experience to assist you properly. They will work closely with you on the assessment, planning, and development phases all the way through to the installation, implementation and support phases.

Your ultimate decision on the right supplier should not be simply based on the lowest cost for the equipment alone. It must factor in examples of the conveyor manufacturer's experience in dealing with situations such as yours, the flexibility of the system to work with changes in your production needs and the cost, over time, to maintain the conveyor system.

In evaluating a conveying system supplier, look for those who offer advantages such as:

- A custom engineering capability
- A proven track record
- A culture of innovation
- Experience that allows them to bring new ideas to the design process
- The ability to adapt to the end user's needs
- The ability to provide custom equipment at a reasonable cost
- Excellent project communication and collaboration
- A diverse product offering
- The ability to tackle turn-key systems
- The ability to provide control systems
- The ability to install the system
- The ability to handle a shop-runoff if required

Partnering with the right conveyor system specialist will continue to bear dividends for you long after the project is complete, signed off and moving your product through the facility.





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