For further information please contact
david.top@conductix.com

Power and Data Management for Cranes: Energy Guiding Chains Versus Festoons

There is much discussion in the market about power and data management options for mobile equipment. With the growing demand for faster cranes, smart functions and the growing spread of fiber optic communication, festoon systems and energy guiding chains are often competing in an environment characterized by biased marketing claims. Most of the time, suppliers of festoons and/or chains only focus on the advantages of their products and ignore drawbacks. At Conductix-Wampfler, we have offered both solutions for decades. We are uniquely qualified to objectively assess the pros and cons of both systems.

Cable Package

Both energy guiding chains and festoons are designed to safely move a specific cable package along a predefined path. Both can use a very wide selection of cables and hoses and allow the end user to obtain a tailor-made solution.

When a center-feed solution is possible, energy guiding chains to use roughly 50% shorter flexible cables than a comparable festoon system. In that case, less costly cables for fixed installations can be used to reach the center-feed point.

Festoon systems need longer cables, but these cables tend to be less costly than chain cables. Chain cables are constantly bent all along their lengthes during operation and therefore need specific, more complex designs.

Installation

The installation of an energy guiding chain is not complex, but it does require skilled personnel.
In order to simplify the installation process, the chain can be delivered pre-assembled with all its cables and unrolled into a chain channel installed on the crane. It will be fixed on both ends, at its feeding point and at the crane towing arm. Finally, the cables with be secured in the chain and connected. The chain channel needs to be perfectly straight and level to protect the chain from critical stress and friction wear and to avoid unwanted wear and damage on the links' sides.

Finally, the height of the chain driving arm needs to be very accurate. A slight deviation (higher or lower connection height) will greatly increase the stress on

the chain links and may cause an early failure of the chain.

The installation of a festoon system is fairly quick and simple. It also can be delivered pre-assembled on a beam with its complete cable package. In that case, the trolleys are simply rolled from the transportation beam to the crane I-beam. You then fasten the end clamp and connect the towing trolley to the crane towing arm and connect the cables at both ends.

Festoon systems can cope with high mechanical stress and the installation does not require specific skills. They accommodate and tolerate imperfect conditions.

Cable Protection

Energy guiding chains protect the cables fairly well. The cables are housed in the chain that will guide them along a straight path during their travel. The predefined bending radius protects the cables from excessive bending.

Energy guiding chains can also be fully enclosed, thus protecting the cables from dirt and small particles. The cables are fixed at both ends of the chain with proper tension in order to offer optimal protection. The energy guiding chains can also cope with high wind with little problem as they are protected by their channel and the crane structure.

A standard festoon system is always designed to accommodate the most fragile cables in the package and will usually guarantee a cable lifetime of more than 10 years.

The trolley saddle limits the bending radius of the cables and some safety steel wire prevents any excess tension on the cable package. The trolley buffers and shock cords dissipate unwanted energy on even the most dynamic systems. The festoon cables are exposed to the wind and both the festoon system and the crane need to be properly designed in order to cope with the effect of strong winds.

In that case, the festoon system is equipped with a specific wind-dampening system and the crane maker can ensure that its structure is free from entangling risks to the cables. Most of the time, a couple of steel tubes in strategic locations are enough to eliminate this risk.

Maintenance

Both energy guiding chains and festoons require proper supervision and maintenance.
Festoon systems have wear parts such as rollers and buffers that need to be replaced at regular intervals. Energy guiding chains, with thousands of moving parts and friction points, also wear day after day. But the wear is usually hidden and will only be noticed when a mechanical failure occurs.

End users need to perform accurate and regular fine-tuning of the chain, in order to avoid mechanical damages that could lead to system failures. For example, a small deviation of the chain alignment in its channel can result in premature wear of the links. When this happens, the complete chain may need to be replaced. Also, in polluted environments, particles can accumulate in the channel or on the chain and interfere with its operation.

As the energy guiding chain wears after each cycle, it is quite common to need to replace the chain after seven or eight years.

Festoon systems in medium to heavy duty applications will also need regular inspections and the replacement of wear parts to ensure optimal efficiency. A basic maintenance schedule should include inspecting critical parts such as rollers, buffers, or shock cords. Nevertheless, these parts usually last more than five years and the replacement costs are relatively low. With proper supervision and maintenance, a festoon system will usually last more than 15 years.

Cable Replacement

Whether on a festoon system or on a chain, changing cables requires some work. First, you need access to the system. Larger cranes usually have a maintenance platform covering the full length of the parked festoon system. For energy guiding chains, you will need access to half of the runway length in case of center-feed or the full length in case of an end-feed system. This will allow you to work with the fully extended chain.

To replace cables on a festoon system, you need to park the system on the side of the crane, lock it, and release the cable clamps of usually five to 12 trolleys. Then, you need to remove the old cable and add a new one, laying it on each trolley saddle. During the process, you need to make sure to install the proper loop lengths. Finally, you need to tighten the clamps again.

On an energy guiding chain system with openable links, you will need to open each link. The link quantity depends on the chain length but you will usually have five to eight links per meter. Then you need to remove the old cable and lay in a new one. Once the new cable is installed, you need to close down the links again making sure to maintain proper alignment with the cable separators. Finally, you need to check the tension of the new cable and to make sure that it does not touch the chain's frame stays when bending.

Space

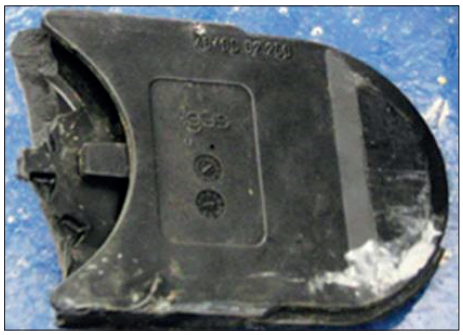
Energy guiding chains occupy less space than a festoon on the crane since they do not need a parking area, which may limit the travel of the hoist or winch. However, if this is taken into account early enough in a project, the end user can optimize floor space accordingly.

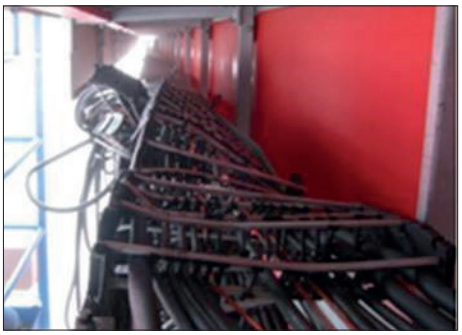
Also, the energy chain can help to save some vertical space since it does not require cable loops. In some cases end users can maximize their working area.

Festoon loops occupy more space than chains when the system is close to its parked position. If the loop length exceeds the height of the crane beam, this will limit the free space under the beam on one side of the crane.

Incidents

In case of an incident, festoon systems can usually still operate, in a degraded mode or at lower speeds until the damage gets fixed.





In case of a problem, a damaged energy guiding chain system will need to be put to a stop within seconds in order to prevent irreparable damage. The damaged parts or the complete chain will need to be replaced before restarting the crane.

Conclusion

Both festoon and chain systems have pros and cons. **Energy guiding chains** are a good technical solution. They can accept a wide choice of cables and offer good protection. In case of center feed they require roughly 50% less flexible cable length and can use less costly fixed installation cables to reach the center-feed point. They do require supervision and maintenance and usually have a shorter lifetime than festoon systems. They can help save space because they do not need a parking area or cable loops. In case of damage, they will immobilize the crane until they are fully repaired.

Festoons also offer several advantages. They also accept a large range of cable types. They require relatively more cable length, but festoon cables tend to be less costly. Festoons work in the most challenging environments and conditions but require specific handling in case of extreme climatic conditions. They require some maintenance and the replacement of wear parts after a number of years, but overall they are a rugged solution and will usually last twice as long as an equivalent energy guiding chain. Finally, even damaged, a festoon system will be able to continue working, albeit at reduced speed, and will not immobilize the machine it powers.