

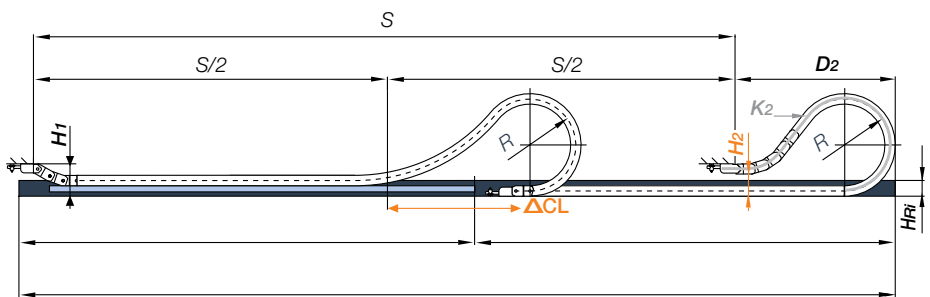
Designing gliding cable carrier systems for large machinery



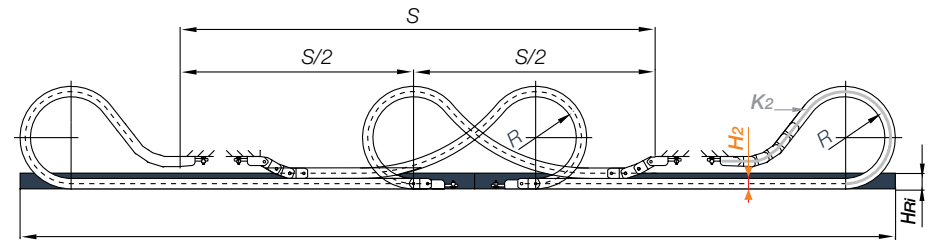
Designing gliding, long-travel cable carriers for large machinery

Compared to cable reels, bus bars or festoon systems, plastic cable carrier systems are an extremely low maintenance, resilient solution which can reduce required installation space and reduce the length of cable required by up to 50%. Over the past several years, cable carrier manufacturers have been increasingly pushing the envelope to develop solutions for higher speeds, harsh environmental conditions, larger loads, and longer travels to develop solutions for large machinery, including cranes, bridges, and more.

For long cable carrier, or e-chain®, travels, the upper part of carrier rests on the lower run, gliding partially on the lower run, and partially on a low-friction plastic glide bar installed at the same height. Some carriers, like the P4 series of e-chains® offer integrated rollers which can greatly reduce the drive power requirements of a gliding application.



To calculate the required length of a cable carrier for a gliding application, assuming the fixed end is in the center of travel, use the formula $Lk = s/2 + K2$. In this case, **S** = the carrier's travel, and **K2** = the length of the curve of the carrier. As a note, the variable **ΔCL** is shown in the diagram shown, which is the mounting location of the fixed end bracket.



Guide Troughs

Almost all gliding applications utilize a guide trough to increase stability and keep the entire system in place. To select the ideal guide trough, be sure that the height of the trough is at least twice that of the chain link height, with chamfered opening to allow the system to glide smoothly. The inner width of the trough should equal to the outer chain width + 4-5 mm, depending on the type of trough selected.



In applications where the fixed point is at the center of the travel distance, low-friction glide bars are installed on the inner walls of the guide trough to allow the carrier to glide at the same height as the chain link.

When installing the trough, there are a few key points to pay attention that:

- All parts of the trough must be properly aligned
- All screw heads must be flush with the trough
- The transition between the end of the chain and the glide bars should be as smooth as possible
- A solid connection with the glide surface is established

Travel speeds and accelerations

Travel speeds of up to 32.8 ft./s (10 m/s) and accelerations of 164 ft./s² (50 m/s²) are possible in continuous operation with energy chains[®] in gliding applications. Higher speeds and accelerations are possible in particular applications, such as in crash test facilities, for example, where speeds can reach over 72 ft./s (22 m/s) with accelerations of more than 2,572 ft./s² (784 m/s²); however, these applications only require a few thousand cycles per year. The acceleration of a gliding application will have a major impact on the possible speeds, cycles, and overall service life of an application.

Service Life

The service life of gliding applications is highly dependent on the quality of the installation of the systems as a whole. Some cable carrier manufacturers, including igus[®], offer service life calculations based on decades of extensive real-world testing. Between these tests and applications running in the field, igus[®] energy chains[®] in gliding applications have seen a service life of more than 12 years with nearly zero maintenance. Individual service life calculations are available from igus based on application-specific criteria.



For maximizing possible service life and simultaneously protecting against downtime, igus offers external condition monitoring systems, which monitor the displacement forces of an energy chain. This “isense EC.P/EC.B system is easy to install, and offers double security, with push-pull force detection (EC.P), and break detection (EC.B). As of early 2017, beta-testing for the new smart isense EC. W modules (intelligent sensor modules), which constantly send information about their status to an igus[®] communication module. Before wear to the cable carrier system becomes critical, custom notifications are sent to allow for planned maintenance instead of unexpected downtime.

To learn more about igus[®] energy chain systems[®] or cable carrier solutions for large machinery, visit www.igus.com/energychains.