igus® design guide

www.igus.com/cable-carriers

10 Tips for maintenance-friendly and easy-to-assemble energy chains

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Introduction

Install and Forget: Yes, it works with igus® energy chains. Numerous systems with 200-meter travel distances have been in operation for over eight years with minimal maintenance. Systems with travel distances up to 60 meters have been running worldwide for 15 years practically without maintenance. However, completely maintenance-free operation is not possible in the long run, and since these are moving components, every energy chain will eventually need to be replaced – even if it's after 20 years. Therefore, the system builder and/or operator should be prepared and select the e-chain® accordingly.

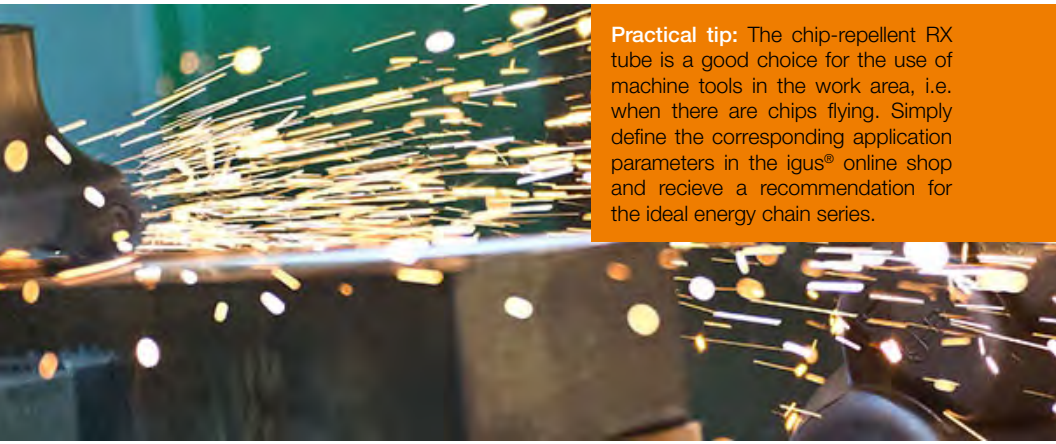
There is another reason to consider maintenance and ease of assembly when selecting energy chains. Whatever is in the moving energy supply – signal or power cables, pneumatic and hydraulic hoses, bus cables, fiber optic cables, flexible cables – can suddenly fail and need to be replaced. The chain determines whether such a replacement takes minutes or hours. Therefore, the question "What should be considered when selecting e-chains® from a maintenance perspective?" is very relevant for several reasons. This small guide provides some practical tips on what this means in concrete terms and what the designer should consider.

Often Underestimated: The Costs of Production Downtime

Small Cause, Big Effect: This motto sums up the impact of machine failures and production downtime. Often, it's just a broken cable or a bearing failure that causes the downtime. The company Senseye annually determines the total downtime costs of the "Fortune Global 500" in the industry. The current "The True Cost of Downtime 2022" report concludes: They amount to $1.5 trillion per year – just for 500 (albeit very large) companies! Downtime costs range from $39,000 to $2.9 million per hour. Although the number of failures has decreased (by 23%), total costs have increased because individual failures have caused higher costs. This is due to both inflation and the longer repair times. Therefore, companies must budget 11% of their annual revenue for (actually unnecessary) downtime costs, up from 8% two years ago. What do these figures show? It pays to focus on durable and "maintenance-friendly" components and to implement modern maintenance concepts such as condition monitoring and predictive maintenance.

Tip 1: Application-Specific Design/Selection

What environmental conditions need to be considered? How high are the loads? Are there application-specific special factors that accelerate the wear of the energy chain (abrasive dust, metal chips, heat …)? There are special chain series for almost all cases.



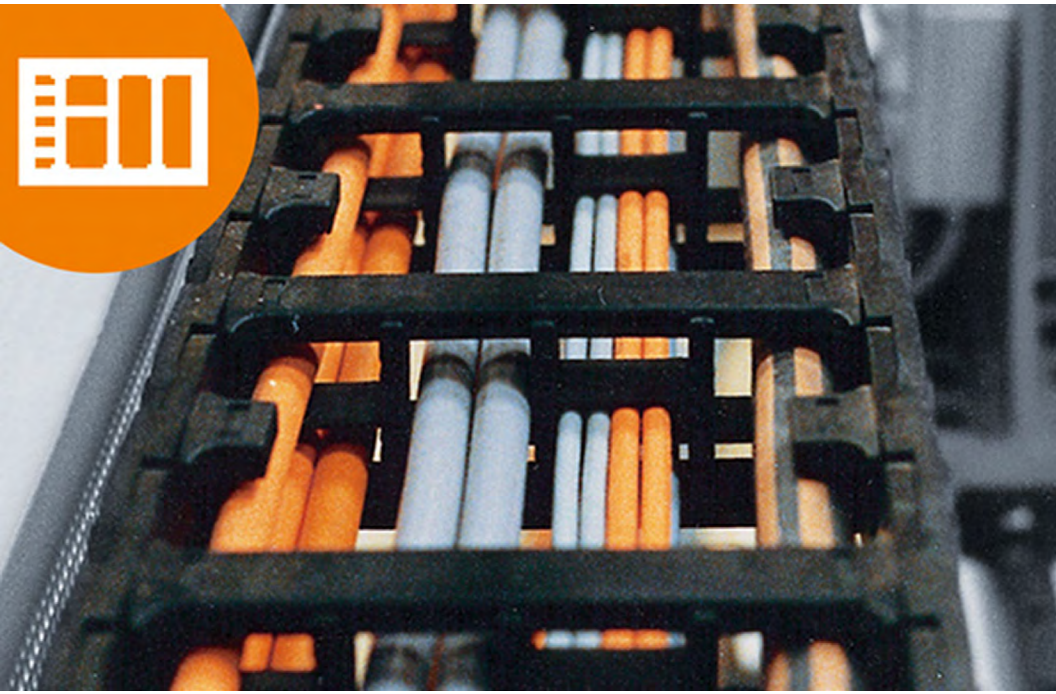
Practical tip: The chip-repellent RX tube is a good choice for the use of machine tools in the work area, i.e. when there are chips flying. Simply define the corresponding application parameters in the igus® online shop and recieve a recommendation for the ideal energy chain series.

Tip 2: Predicting Service Life

With the igus® service life calculator, the user can determine an estimate of the expected service life of the energy chain in just a few clicks. The result is calculated and displayed in double strokes – a valuable aid in design.

Tip 3: Optimal Filling and Integration

Is the chain filling even? Are the bending radii sufficient, and have the mechanical and electrical connection components (connectors, strain relief …) been selected appropriately for the application? Does the guide trough fit the chain, and is the chain correctly mounted at the fixed points? All this should be considered if the energy supply is to have a long service life and be easy to replace or open if necessary.



Practical tip: Separators divide the energy chain into individual sections and ensure orderly movements without friction on the cable sheaths. Use the free interior layout configurator for professional interior layout.

Tip 4: Quick Opening – Intuitive and Without Risk of Breakage

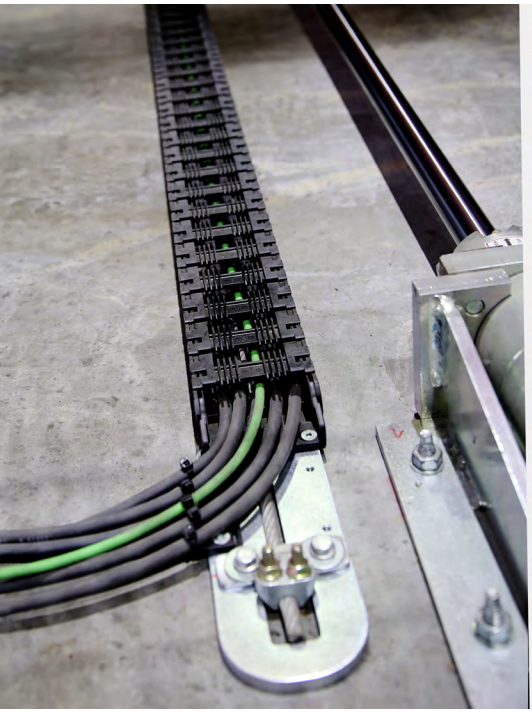
Open and close in no time: This principle is behind the igus® E4Q (e-chain®) series. They allow completely tool-free opening and closing, resulting in significantly reduced filling time. 40% less assembly time compared to the E4.1 series is the norm, which is practical not only during assembly but also when individual cables need to be replaced. And if a different e-chain® is required: igus® offers tools that significantly speed up assembly.

Practical tip: With the chain openers for the E2/000, E/2000, and E2.1 series, the user can open one meter of chain in just two seconds. Without this tool, it takes more than 30

Tip 5: Alternatives to the “Normal” e-chain®

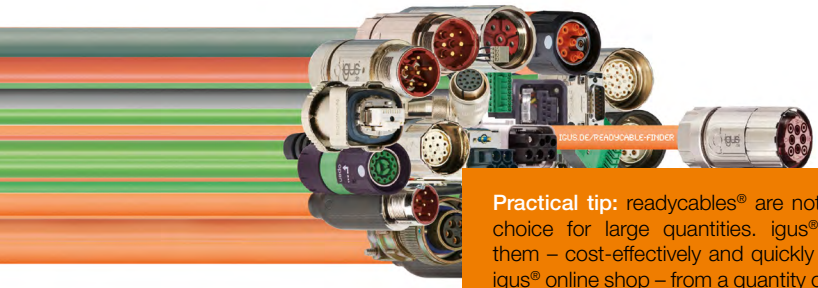
It doesn’t always have to be the “normal” energy chain with guide trough. More and more companies are using the autoglide 5 as an alternative. In this case, a tensioned rope guides the chain on the support structure. The result: Compared to a conventional trough solution, assembly time is reduced by up to 88%. In other words, the user can install about 80 meters of travel distance in one hour.

Practical example from the Crane industry: One manufacturer of special indoor cranes uses the autoglide on which Crane bridge mounted, for the Energy and signal supply the crane cat.



Tip 6: Ordering Pre-assembled Cable Sets

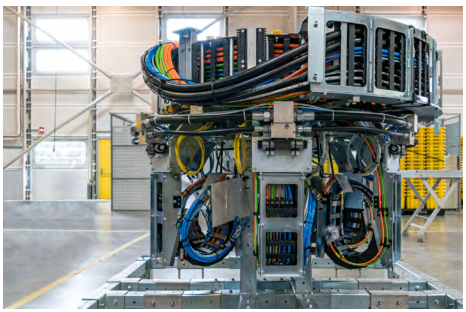
No company today needs to deal with the elaborate assembly and installation of cables on-site. igus® delivers readycable® cables cut to length and pre-assembled, ready for “plug and play” just before the system is commissioned.



Practical tip: readycables® are not only the best choice for large quantities. igus® also delivers them – cost-effectively and quickly ordered in the igus® online shop – from a quantity of 1. Both small cable sets for repairs and very large and complex ready-to-install cable systems, e.g., for cranes and conveyor systems.

Tip 7: Using Ready-to-Install Systems

The next step in simplifying assembly effort is the readychain®: a fixed and (connection) ready “package” consisting of pre-assembled cables and the matching chain. Numerous igus® customers from various user industries use this offer. igus® delivers large readychains® in transport and assembly frames. This allows even several tons of heavy cable and guide systems to be installed very quickly on-site.



Practical tip: Ordering readychains® offers the additional advantage that the chain is perfectly filled. This further increases its service life. Convince yourself with a free sample box.

Tip 8: Reducing Effort at Interfaces

Module Connect is the next development step in simplifying the assembly of e-chains®: The modular interface concept allows the connection of a large number of cables with just one separation/plug-in point to the machine and can be adapted to the geometry and filling of the e-chain®. The adapter also makes the energy supply and Module Connect a cohesive system. This makes it even easier and faster to connect the energy supply to the application. In practice, this means: Assembly time can be reduced by about 80%.

Practical Example: A manufacturer of storage systems in shuttle technology uses Module Connect to replace individual components of the “storage machine” within minutes in case of repair.

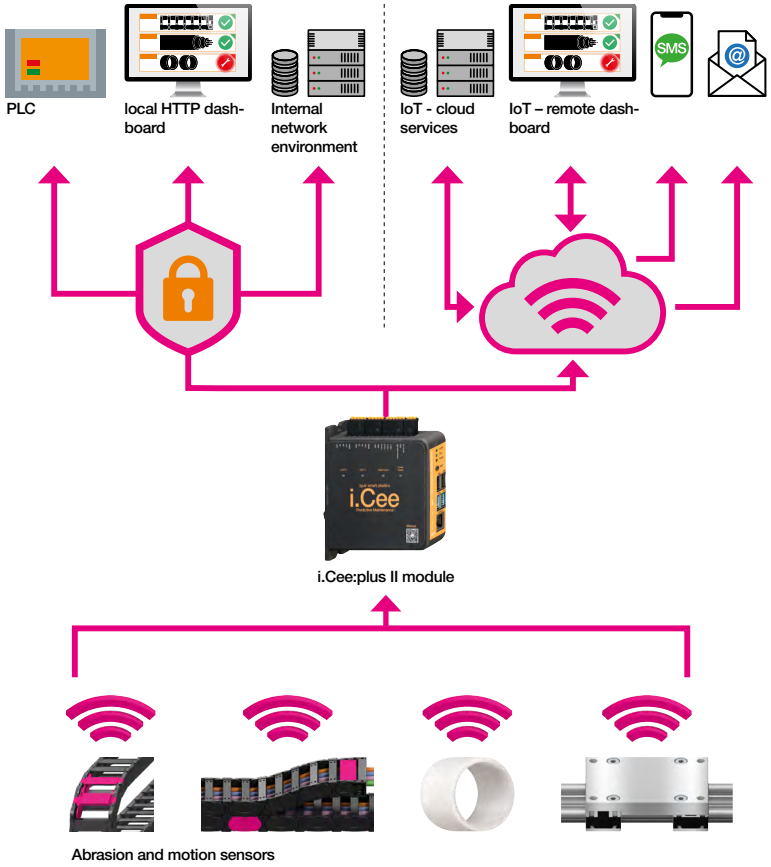
Tip 9: Condition Monitoring (i.Sense)

The concept of condition monitoring with i.Sense goes even further. Significant values for the wear or functionality of the e-chain® (especially tensile and compressive forces) are recorded by sensors integrated into the chain. The signals are transmitted via cable or wirelessly. In case of irregularities and malfunctions, the system can give an alarm or shut down immediately. This prevents costly consequential damage. This is how digitized maintenance works at the pulse of the machine.

Practical tip: Start in small steps, but faster without much effort, with the i.Sense EC.W sensor. This enables a dynamic statement about the remaining service life of the energy chain in real time for just a few hundred euros.

Tip 10: Predicting Service Life

Better safe than sorry: Those who proactively maintain machines and systems before downtimes or quality losses occur are safe from surprises and failures. With smart plastics, igus® is ushering in this era. Sensors in the e-chain® measure its load (cycle numbers, travel distance) and report early when the optimal maintenance time has come and when the end of the calculated service life is approaching.



Practical tip: Get your own picture and learn from the numerous success stories of our customers with smart plastics.

Conclusion: Check All Options

Which of the options presented here is useful in the specific application case is decided by the designer or user – preferably in cooperation with an igus® sales consultant. In any case, there is always potential for optimization to reduce the assembly time of e-chains® (by up to 88%!), increase their service life, and improve reliability (through smart plastics with integrated sensors and intelligent evaluation).

In the long run, the best solution – with a short “ROI”

For these reasons, it is worth dealing with the topic of “maintenance-friendly energy chain” and deciding to implement some of the tips mentioned here. This is made easier by the low investment and short payback period. An example: A ready-to-install i.Sense condition monitoring system for an energy chain up to 30 meters long costs less than $2200 in the igus® online shop. The installation can be easily done by yourself, and there are no ongoing costs. Once the system is installed, regular inspections are no longer necessary. This saves time and costs. And: Since an unplanned production downtime on a machine almost always causes more than $2200 in additional costs, the system has already paid for itself if it prevents just one failure.