Linear chain dries cable harnesses in the assembly line production of cars

The following problems occurred in the assembly line production at a car manufacturer: the cable harnesses are delivered by the manufacturer in plastic bags. That is not a problem in summer, but in winter when temperatures are cold the following happens: when the cable harnesses are unpacked and installed, some of the components can break. The cable harnesses are then useless. This leads to production bottlenecks and increased costs.

Therefore a solution was sought with which the cable harnesses could be warmed up in their packaging immediately before installation so that the plastic parts are more pliable.

The design engineers chose the linear chain as the ideal drive element.

Important requirement from the production:

1. The production cycle per installation is 1 minute. The warming-up process takes 20 minutes. Therefore 20 cable harnesses are warmed up simultaneously.

2. The container with the cable harnesses must be driven vertically into the furnace. Due to the cramped spatial conditions the linear chain was chosen. “The linear chain is ideal for this application because it requires very little installation space. Not only that it is electrically driven and requires no pneumatics, which is a great advantage for use”, says the design engineer responsible for this fixture.
3. The lifting stroke is 1 m per cycle and is to be traversed in 4 seconds. That is easy for the linear chain, with which speeds of up to 250 mm/s and more are possible. Each cable harness weighs 25 kg. Therefore the linear chain must lift a total load of 500 kg. The temperature inside the furnace is 60 °C, which raises the temperature in the containers by about 11°C. The linear chain is designed for continuous temperatures of 250 °C and can thus be used for this application without any problems.

The Production Dept. is delighted

Only words of praise are to be heard from the Production Dept.: "The cable harnesses are now much easier to install", says the responsible production manager, "and cable lead-throughs that had previously been difficult to mount can now be mounted very easily. The decisive advantage, however, is that parts no longer break off during installation."

How does the linear chain drive function in detail?

The linear chain is driven by a drive motor. The linear chain acts like a bar when the frame with the cable harnesses is pushed upwards into the furnace. The part of the linear chain that is not under load is rolled up like a rope in the furnace, thus saving a great deal of installation space.

Theoretically, therefore, it is possible to realise "endlessly" long strokes. In this case the linear chain has a total length of 9 m. Design engineers value the linear chain because it can be precisely positioned, has a constant stroke speed and allows jerk-free movement. Further advantages are the long service life and minimal service requirement.

Typical applications for the linear chain are:
Transport systems for opening and closing hall roofs | raising and lowering of floors and podiums in stage set construction | extension and retraction of galleries | vehicle lifts | load platforms | container transfer | moving materials into tempering furnaces | lifting platforms in workshops | conveying systems | driverless transport systems | in warehouse logistics | in modern building technical services |
Background knowledge: the ingenious method of operation of the linear chain – the space-saving marvel

The linear chain is a special product in linear drive technology, which shows its real strength when space is tight. The linear chain consists of specially formed, high-precision mechanical chain links. It can work in both directions: pulling and "pushing".

In the drive housing of the linear chain is a gear wheel that engages in the intermediate chain links and moves it link by link – both forwards and backwards. The chain has two loose ends. The load which is to be moved is attached to one end. The other end is guided freely and is usually rolled up in a storage device.

When the linear chain works in one direction it pulls like a normal chain. When the linear chain pushes, i.e. when it works in the opposite direction, the chain links interlock with one another to make the chain rigid – it acts like a bar.

"The part of the linear chain that is not under load can be rolled up like a rope. That saves an enormous amount of installation space. That is the main advantage of the linear chain", says managing director Eugen Reimche. "In addition, customers value the possibility of being able to implement practically "endless" strokes with the linear chain. This allows us to realise solutions where conventional linear drives are impossible due to the cramped spatial conditions, or where hydraulic or pneumatic systems are not desired."

The standard version of the linear chain is designed for temperatures of up to 250°C. Continuous temperatures of up to 560 °C are possible with a special version. Higher short-term temperatures are also possible.

The maximum stroke speed is 250 mm/sec and in special cases up to 1,000 mm/sec are even possible.

The currently largest linear chain is the SM35 with a maximum static load of 35 kN.

Further applications with linear drives can be found here:

https://www.grob-antriebstechnik.de/de/news/uebersicht.html

Do you have a similar application? Then please call us. Phone +49 7621/92630