

# a chain that pulls and pushes can do the lifting as well

Linear motion technology is a challenge but at the same time it opens up a huge potential for technological innovation and economic improvement: In the manufacturing industry, wherever the logistics of workflow has to be more efficient. In any activity that has to do with the storing and the distribution of goods. Or, for example, in stage and show technology, where there are platforms to be lifted and scenery to be moved – with more aesthetic ambitions, but not with minor technical challenges.

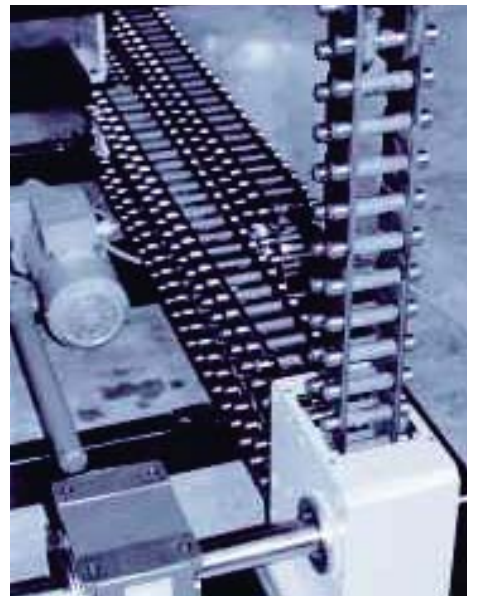
In all these fields, demands on motion technology have been increasing constantly over the past few years. With proceeding automation and higher security standards, they will continue to increase in the future.

SERAPID provides solutions through ongoing product innovation, application-specific engineering and customer-oriented services.

SERAPID has been specializing in linear motion technology for more than 30 years. It all started with a great idea that has never failed to produce new solutions: **the SERAPID rigid pushing chain.**

## a chain that is also a jack

A load can be pulled or pushed. So one uses either a chain or a jack. But chains can only pull and jacks often take up too much space. There are many other drawbacks going along with these conventional methods of transfer. But a combination of the jack and the chain, if only it could eliminate the drawbacks, would double the benefit. It would yield a means of transfer that is flexible and powerful in any application environment. In the domain of chains, in the domain of jacks, and in many further application areas as well.



## the rigid pushing chain

The SERAPID solution is as simple as it is effective. Basically, it is a chain with special links. This link features a hook-like extension which we call the shoulder. The shoulder serves as a joint between neighbouring links. When force is applied, the shoulders interlock and make the chain as rigid as a jack. At their cross-axes, the links are connected flexibly, just as in an ordinary chain. Thus, the rigid chain will still bend and can be coiled up and stored efficiently.

## when push comes to lift

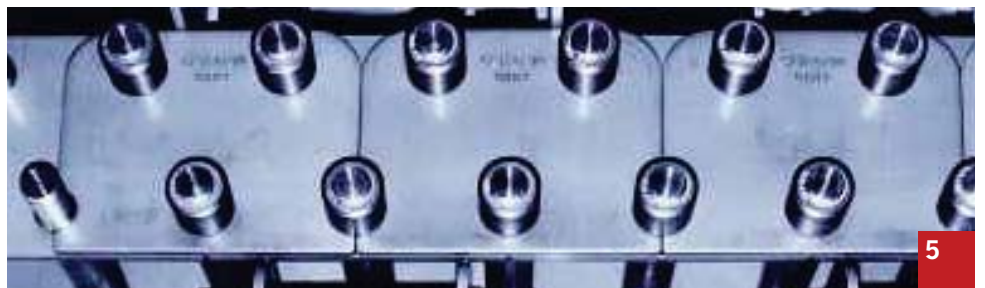
The SERAPID chain can push and pull, and has proven to be the superior solution in a wide variety of horizontal motion tasks. Parallel with the development of chains for horizontal transfer, we have been expanding our range of products for vertical movement. As regards the mechanical principle of the rigid chain, it makes no difference whether the load is pushed forward or upward. Of course, in addition to friction and lateral stability, one has to deal with gravity and column strength.

The differences between horizontal and vertical applications lie in the range of functions that the chain has to accomplish. Horizontal transfers involve only pushing and

pulling operations. Vertical applications, too, require pushing, but braking rather than pulling. This puts special stress on each component part and demands a special design for the entire lifting device.

In stage applications, lifts are used most of the time for holding a load rather than for bringing it up. This sets the further requirement of static capacity. And in the same domain, after all, the pulling function may come in handy again – when there are external pulling forces, for example through seismic shock or on a rolling base, such as a ship on sea. Thanks to the fact that they are basically chains, SERAPID lifts can absorb pulling forces and will remain stable even in unstable environments.

# SERAPID



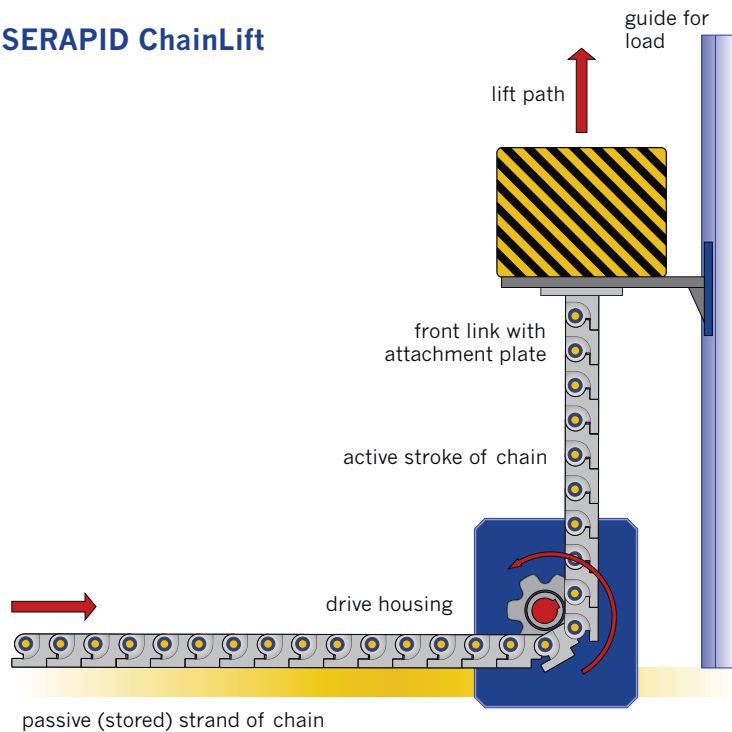
# how the chain lifts a load

The SERAPID lifts are driven by means of pinions on a shaft. These are integrated in the lift drive housing. As the shaft rotates the pinions, their teeth engage with rollers on the links' cross-axes, moving the links upward or downward one by one. As each link enters its upright position on the sprocket wheel, it is locked with its preceding link and aligned on the vertical axis.

As the lift column moves out of the drive housing, it pushes the load upward along the lift path. In the other direction, when lowering the load, the pinions slow down or hold up the load against the force of gravity.

Unlike a normal chain, the lift chain does not cycle and does not need to be twice as long as the stroke. Thus, the **length required for the lift** is always the length of the stroke plus only the few addi-

## SERAPID ChainLift

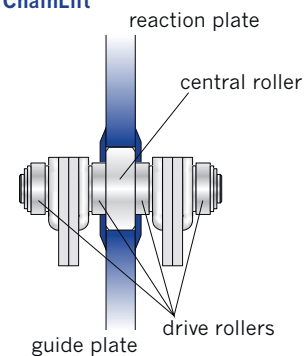


tional links that have to remain in the drive housing.

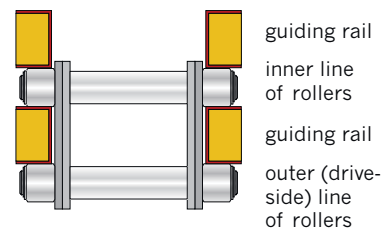
## inside the lift drive

The links' course through the drive housing is defined by **guide and reaction elements**. These counter the thrust resistance and keep the lift strand on its track.

### ChainLift



### LinkLift



With the SERAPID ChainLift, a central roller on each link's cross-axis is guided between two plates. The LinkLift has two lines of rollers on each side; these are guided by rails inside the housing.



## ChainLift and LinkLift

SERAPID offers two types of vertical chains and thus two types of lift systems. One, the **ChainLift**, uses a chain that is basically the same as the chain used in horizontal applications. For vertical use, the chain has been modified mostly in the guide and reaction mechanics, with bigger and broader central rollers and thicker guide and reaction plates.

The second type of SERAPID lift system, the **LinkLift**, uses a newly developed concept of the rigid chain. It features links that are shaped like building blocks and stack up to a tower at the output side of the drive.

The new links consist of two facing steel plates and are interconnected by **two rows of cross-axes**. These axes have rollers on their outer ends which are used for moving, driving and guiding the lift strand.

The axes in one of the rows connect the links permanently, but flexibly, so they still rotate. The axes in the other row only help to prop up the links against each other; they engage with notches in the side plates of neighbouring links. These

connections are opened when the strand is redirected or coiled. Under the load, however, they are fixed and so lock the entire active lifting column. In addition, the cassette-like shape and the boxing of inner and outer links contribute to the column's stability. All factors together make for a **closed formation** with high rigidity and strength.

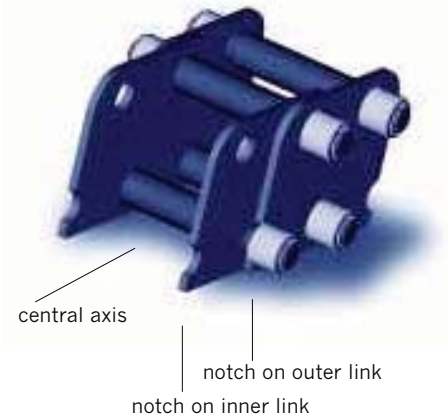
### elementary conditions

To ensure proper operation of the entire lift system, certain conditions have to be met.

**Guiding the load** over the entire lifting distance secures the locking of links.

**The load platform** has to be positioned at a right angle and fixed to the lift without any play. This is ensured with the lift's special front link and attachment plate.

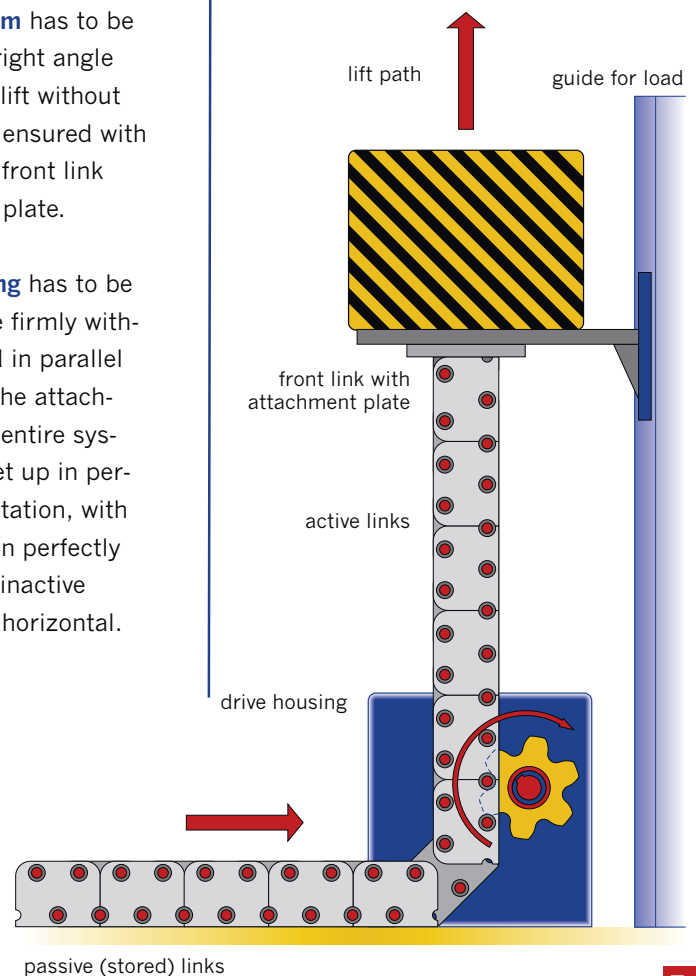
**The drive housing** has to be fixed to the base firmly without any play and in parallel alignment with the attachment plate. The entire system has to be set up in perpendicular orientation, with the lifting column perfectly vertical and the inactive strand perfectly horizontal.



### The LinkLift's patented locking mechanism:

Links are boxed into one another. The central axis connecting the side plates of one link engages with notches on the plates of the adjoining links.

## SERAPID LinkLift



# system configuration

Several lift columns can be combined into one array, and be driven synchronously with only one motor. Several such arrays may in turn be combined for practically any platform or load size and shape. In general, the system layout is flexible and easily adaptable to the individual application environment.

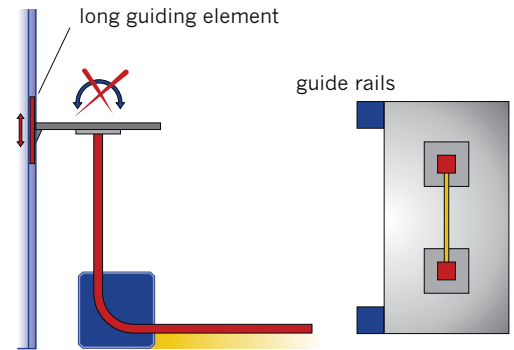
## basic configurations

Lift columns that are connected to the same drive are usually arranged in one or two lines, as required by the dimensions of the load. Except for lifting tables that have their own structure to secure the lift's proper course, all configurations require the load platform to be guided externally along the entire lifting distance. At least two guides are required to balance the lift. Large loads or specially shaped platforms may require additional guides.

The total force that has to be applied to the load is distributed on the columns of the lift array.

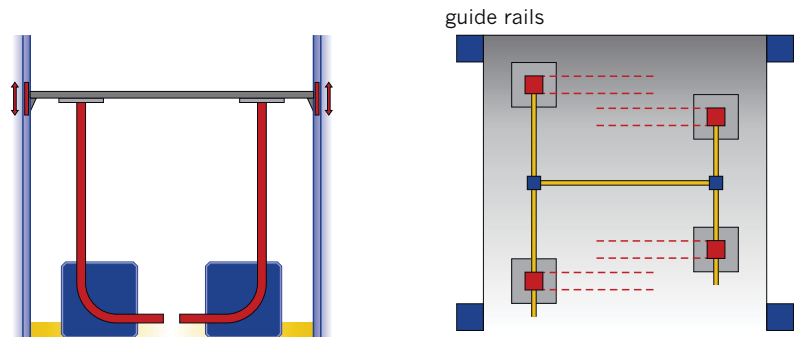
**To plan your system,** use the drawings provided in this brochure. Download drawings in DXF format from [www.serapid.com](http://www.serapid.com)

**Columns in one line:** The array may consist of only one column, or of two in line. If guide rails cannot be put on all four corners, the guiding element must be long enough to prevent tilting of the load.



**Columns in two lines:** At least three columns are required. The line positions can be offset against each other

to utilize the space under the platform for economical storage of the lift return.



**Lifting table with collapsible structure:** The load may be supported by a mechanically expanding structure that defines the vertical movement. For example, with a table on

scissors-legs, the lift-side ends of the scissors are fixed while their opposites move along a clearly defined path. – This type of lift usually has one or two columns.

