---

1. The necessity for chain tensioners and chain dampers

1.1. The technical contradiction between the polygon of the sprocket, the chain pitch and center distance

The necessity for tensing drive chains results from their constructional design and from the kinematics of the chain drives.

The operation of a chain drive without a chain tensioner as an exception or as a compromise demands as a prerequisite the use of a chain drive with an ideal or all but ideal center distance.

The variation at an ideal center distance - seen from a linear perspective - can only be implemented phased and in dependence on the chain pitch. Cranked chain links and the resultant uneven numbered chains are used for step sizes with a pitch dimension of (1*p). The cranked chain links are the weak points of the chain.
Only in the case of step sizes of 2 pitch dimensions (2*p) is an even numbered chain obtained.
Further complicated variations are possible when taking account of the polygonal curve of the chain and the pitches of contact around the sprockets.

We estimate that some 40% of chain drives fulfill these positive conditions (original equipment manufacturer constructions)
in particular when they are carefully CAD calculated and run initially without a chain tensioner.
The other 60% of chain drives do not sufficiently fulfill these conditions, with the result that an unwanted excessively dimensioned sag of the load-free length exists right from the operational start.
A chain tensioner must compensate this load-free length sag.

Those chain drives that may in principle be considered as ideal, have a run-in extension within their first operating hours. Subsequent to this they are subject to wear and tear in dependence on time and load.

It is generally in the discretion of the operator to what extent he can tolerate this wear and tear in the interests of the demands made on the precision of the chain drives. Wear and tear is at all events slower by a multiple when the ideally dimensioned chain drive is tensioned and damped against load-free sag and loaded shocks.

When an operator is of the view that the price of a chain can be set in relation to the price of an ROLL-RING® that can be put in place in only seconds, he is generally not taking the mounting costs linked to the changing of a chain, down-time costs and the projection of these in multiple through continuous production processes into consideration.

One minute of downtime alone in a single chain driven transfer unit for the automatic manufacture of car tires for example, costs over 7 000 **EUR**. Spontaneous torn chains in continuous production must also be taken into account here, with the resultant repair chaos they brings with them.

Even the highest quality chains (Renold, Rexnord, Tsubaki, Diamond Chain, iwis) with their correspondingly high prices, are tensioned in order to achieve complex functional advantages.

back to overview

1.2. Effects of excessively long load-free length sag

Excessive chain sag leads to the following, largely disadvantageous effects:

Before starting a non-tensioned chain drive both the loaded length and also the load-free length sag. During starting up of the drive from a motionless state the link play of the chain joint is first eliminated. This results in starting shocks that increase the wear and tear and to reverse shocks in the chain drive in reverse operation. These jerky loads are a very particular wear factor.

The rising of the loose chain onto the tooth profile of the sprockets occurs in conjunction with significant sprocket wear and tear.

The in-feed of the chain in the sprocket is not precise and it may happen that the chain jumps the sprocket teeth.

Oscillations occur in the load-free length, favoring wear of the chain, the sprockets and of the sprocket shafts.

A build-up of oscillations develops in the sympathetic vibration in the case of chain drives that are arranged serially (the "goods train" effect).
This effect may be observed in particular in roller conveyors.

The noise level is increased to 5 .. 10 DB(A) (on assumption of a chain of ANSI 40).

Problems with inadequately tensed chains occur among the numerous operators and constructors.

back to overview

2. Why use ROLL-RING®?

2.1. The functional advantages

The ROLL-RING® is the only reversible chain tensioner and damper. It damps oscillations in both the loaded and the load-free
length.
No other chain tensioner has this characteristic.

The ROLL-RING® is the only chain tensioner that affects the loaded length and thus assures a correct in-feed of the chain in the
sprocket in loaded state and with an expanding load.

The ROLL-RING® is self-locking in the chain drive.

The ROLL-RING® rolls like an elastic wheel in the chain drive. It dos not cause its own polygon oscillations and thus does not
vibrate in the chain.

The ROLL-RING® requires only small tension forces in comparison with traditional chain tensioners, because it is elastic and is dampened in rolling. It is sufficient when the chain joint is retained free from play. When there is no link play, it is impossible for joint shocks to build up. The chain runs quietly, easily and free of noise.

The small tensing force of the ROLL-RING® has the effect of resulting in the advantage of a lower level of joint friction and thus less wear and tear and lower frictional losses of the chain joint. The chain is heated less and its changes in length due to thermal expansion are less.

The ROLL-RING® can be used for chain speeds such as those for chain tensioner with steel sprockets on ball bearings. The area of application from the perspective of chain speed thus applies to all no-maintenance, service-lifelong lubricated, manually lubricated and drip lubricated chain drives in use in mechanical engineering.

The user may be sure that an advantageous effect is achieved in comparison with the traditional chain tensioners, which vibrate over the chain with their slide elements or tensing wheels, as a result of the non-polygonal, but rotational-elastic and dampened tensing force transmission of the ROLL-RING® to the chain.
This in turn results in the advantage of a higher load capacity, of lower wear and tear, increased reliability and also generally constructive reserves for the dimensioning of lighter and more cost effective chain drives.

back to overview

2.2. The time advantage

The ROLL-RING® is installed in seconds without the need for tools (snap-in mounting). A traditional mounting basis on the
machine casing is not required. It is thus suitable for use both in the first fitting out of machines as also for replacing and retrofitting or the reconstruction of chain drives within extremely low downtime periods.

The ROLL-RING® is maintenance-free.

The ROLL-RING® is a mechanical element with a minimal level of wear and tear. Even after over 40,000 hours of continuous operation in a baggage transportation system (Germany's busiest Frankfurt Airport) with the extreme demands on technical reliability that are made here, no wear and tear worth mentioning is recognizable. This means long service life.

In the construction of chain drives with ROLL-RING®, the constructor has direct access to the CAD files. There is a CAD file
for each ROLL-RING® in the format *.dxf/ *.dwg.
The ROLL-RING® can be fed directly into the CAD construction (http://www.roll-ring.com) by this means.

back to overview

2.3. Quality, guarantee

We have developed the user advantages of our new mechanical elements as part of an extensive development and quality program, forming a part of our DIN EN ISO 9001 certified quality management system .

The ROLL-RING® is a quality product with guarantee terms extending far beyond the average, a real level of innovation that can be measured against the international patents that have been issued and offering a broad range of user advantages.
We give a 2-year guarantee from the delivery date on the ROLL-RING® chain tensioner, when this has been installed in accordance with our free of charge faxed installation suggestion.

A parameter comparison of chain tensioners for the most important technical structures will make plain the ROLL-RING®
advantages. This means:

- (1) chain tensioner with elastic bearing swing arm and tensing wheel

- (2) chain tensioner with elastic bearing telescope and curve-formed slide

- (3) chain tensioner, rotational elasto-kinetic (ROLL-RING®)

Please take a moment of time to consider the totality of the advantages. Assess them for yourself. If any point is not entirely clear simply ask us to explain, or let us know if you are of another opinion.
We are at your service.

Definition of the parameters
Parameter area 0 to 100 (minimum to maximum value)

Automation
The chain tensioner automation describes the characteristic of adjusting automatically to chain extensions. This readjustment is done by turning in the joint axle of the swing arm (1), through a linear motion of the telescope (2) or by the return deformation of the ROLL-RING® chain tensioners from the ellipse-like and slightly curved form (3).

Reversibility
The reversibility describes the characteristic of functioning independent of the transportation direction, in the change of turning direction of the chain drive and the change between loaded length and load-free length associated with this.
The chain tensioner (1) and (2) engages only in the load-free length; in the change in the direction of turning this original load-free length becomes the new loaded length, pushing back the load-free length sag against the chain tensioner. By contrast the new load-free length is not tensed or it requires an additional chain tensioner.
The ROLL-RING® chain tensioner always engages in the load and load-free length and is thereby reversible as a matter of principle.

Installation
This is the fixing and adjusting of the chain tensioner to the chain drive. The installation is better the less the effort required for marking, drilling, screw thread cutting, jointing, ..., and adjustment of the tensing force as also for the alignment on the chain drive. Downtimes and plant costs during the mounting period are not taken into account here.
ROLL-RING® chain tensioners snap into place in the chain drive in seconds and are instantly operational.

Axial stability
Axial stability represents the systematic running capability of the chain tensioners at the chain drive rotational level.
The swing arm (1) lying outside the kinetically effective joint axial line is subject to creeping deformation only over a longer period of time; the telescope guide (2) is subject to a wear and tear of the guides. The sub-quadratic form of the ROLL-RING® chain tensioner ring part ensures the deformation at the level of the chain drive in principle.

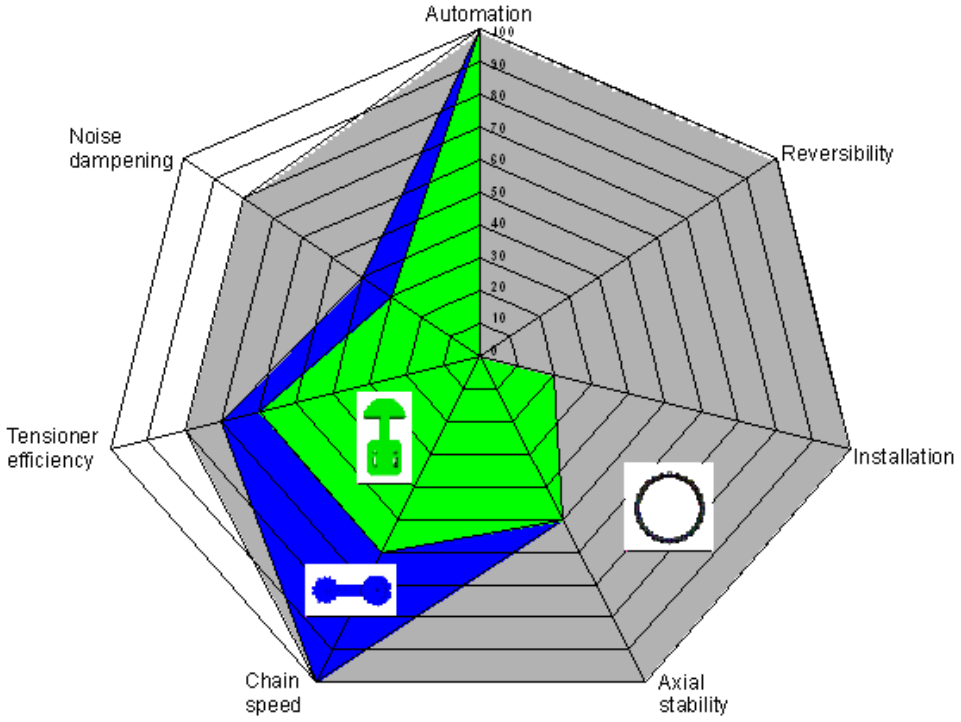
Chain speed
The chain speed refers to the maximum rotational speed of the chain. The most frequent areas of discontinued manual lubrication and of drip lubrication in practical terms are taken into account for the observation of the maximum chain speed.

Tensioner efficiency
The tensioner efficiency describes the complex characteristic of the chain tensioner to produce a good and reproducible circular dynamism for the chain.
Seen in the context of a real chain drive this signifies achievement of optimum pitches for circular contact (not the maximum wrap-around, but a maximum engagement of the chain links, in particular with the sprocket play following the chain links of the loaded length) with the best possible level of tension force distribution, lowest roller impact speed in the sprocket roller beds, minimum chain link play, necessary slackening of the load-free length and damping down of oscillations and driving shocks as also the pre-positioning of the chain links link play for an optimum chain run in the sprocket teeth.
Chain tensioners with a tensing force that is relayed via tensing wheels or slides, vibrate in the pitch rhythm of

the running chain and are in a resonance frequency with the oscillations from the polygon effect.
A good tensioning efficiency is an important prerequisite (in addition to the dimensioning and servicing) for a long service life of the chain drive.

Silencing

Silencing describes the characteristic of audibly and measurably reducing the specific chain drive noise, which results principally from the impact of the chain roller or the bush on the tooth flank during the in-feed of the chain onto the teeth.
The silencing achieved is an indirect effect. Inadequately or too tightly tensioned chain drives and oscillating chain drives result in increased chain noise levels.



back to overview