ROLLON®
BY TIMKEN

White Paper

INDUSTRIAL AUTOMATION: WHICH TELESCOPIC RAIL IS BEST?

Seven characteristics to consider when choosing the right telescopic rail for industrial automation applications

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Introduction:

In the most advanced automation systems, such as industrial machines or automated warehouses, telescopic rails are used for cantilever extractions of mobile parts, and frequently operate under critical conditions such as heavy loads, stressful cycles or dirty environments. If engineers want to obtain the best results possible, they need to choose the right rail. In addition to the technical features, they will also want to consider some **variables connected to the use and motion profile**, for example: rail orientation, type of stroke, accelerations and maintenance options.

Having the right telescopic rail in industrial automation applications makes it possible to always obtain the best performance while guaranteeing that production systems function correctly. Derived advantages are evident in terms of **reduced maintenance costs and increased productivity**.

Some types of applications can require variable strokes or vertical movements. In other cases, if rails are not prepared with special treatments, they might not be hard enough to manage heavy loads, or they might have a low resistance to corrosion. Therefore, **not all telescopic rails are suitable for use in industrial automation systems**, and choosing an unsuitable product can cause the entire system to lose efficiency and slow down production.

To pick the best rail for industrial automation applications, and thus obtain the best performance and optimize costs, engineers must carefully verify the following characteristics.

TYPE OF MOVEMENT:

The movement that the rail would be making is **horizontal or vertical**, with a **constant or variable stroke**. Telescopic rails with caged balls, for example, show their limits with variable strokes or vertical uses, due to the cage displacement. Telescopic rails with rollers can guarantee in both cases good sliding movement and long working life.

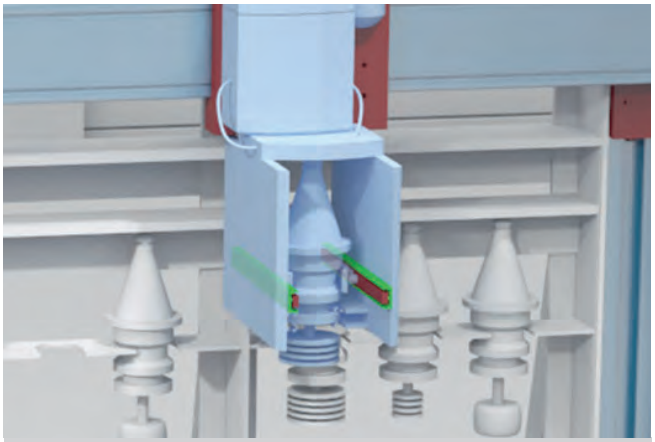

Fig. 1 - Tool changer: a bilateral stroke enables the telescopic rail to extract the tool and position it in CNC machine.

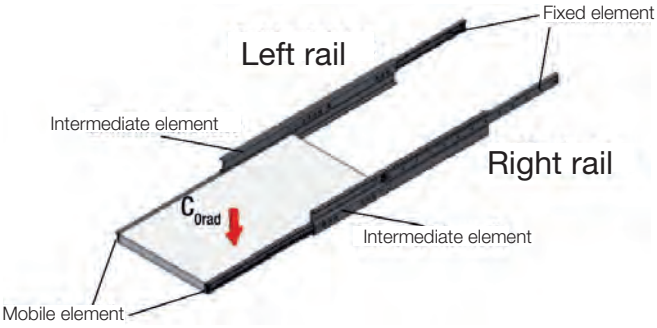

Fig. 2 - Diagram for correctly mounting of a pair of telescopic rails. The horizontal configuration is often recommended.

SPEED AND ACCELERATION:

A telescopic rail system is typically made up of a fixed part, a mobile part and an intermediate element. For **high dynamics applications**, the latter element often does not slide with optimal performance due to high stress. Accessories like **synchronization systems and bumpers** help increase efficiency in applications like these.

RELIABILITY IN DIFFICULT ENVIRONMENTS:

Telescopic rails in industrial environments are almost always in contact with **contaminants** such as production residue, debris or dust. When the system operates in risky environments, it is a good idea to use telescopic rails with rollers. The **large rolling elements**, in addition to being more resistant than smaller ones, allow the rail to slide with optimal performance even in the presence of impurities.

Fig. 3 - In automated warehouses, telescopic rails extract parts from the shelf and load them onto the carriage, or vice versa.

EXPECTED WORKING LIFE AND LOAD CAPACITY:

In automated applications the rail must often operate for long periods, even for a few million cycles, with long maintenance intervals and under heavy loads. With this in mind, the characteristics of the materials become extremely important: a **process of hardening the raceways**, such as induction hardening or deep nitriding, can confer the hardness necessary to manage these situations in the best possible way.

RESISTANCE TO CORROSION:

During operation, rails often come into contact with water, liquids and acid or base solution. In these cases, the supplier plays a key role in providing a wide range of **low corrosion materials or anti-corrosion treatments**, to allow the rail to be used effectively in different environments.

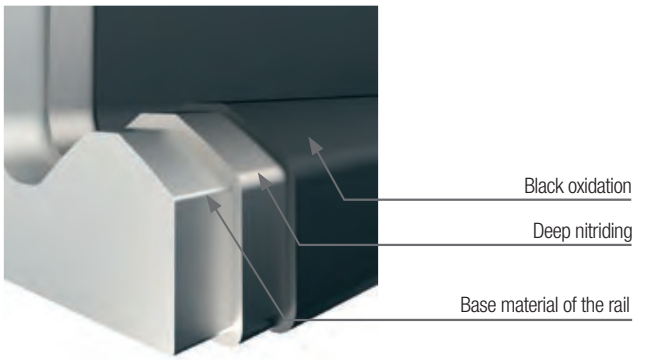

Fig. 4 -Telerace telescopic guides by Rollon are treated with the patented Rollon-Nox hardening process that confers a greater resistance to corrosion.

MAINTENANCE INTERVALS:

Self-lubricated systems, slow release grease tanks and wipers are elements that considerably prolong maintenance intervals on telescopic rails, and sometimes even manage to eliminate them. Needless to say, this quickly translates into an advantage in terms of cost and performance.

MISALIGNMENT:

Alignment between the fixed and mobile parts of an extraction is not always precise. Often, **misalignments of several millimeters** are found and these reduce the life span of the rails considerably. In these cases, it is possible to undertake costly surface machining processes, which double assembly times, or opt for a **rail that can absorb misalignments**.

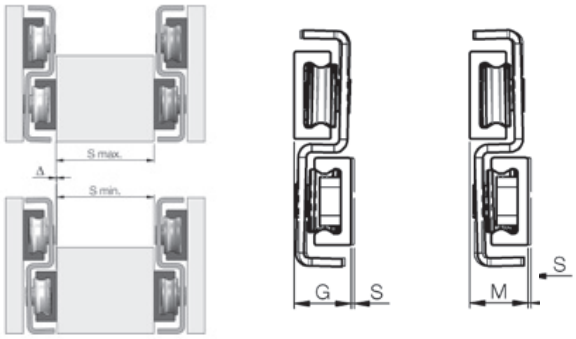

Fig. 5 - Telerace telescopic guides from Rollon can manage misalignment of the assembly surfaces thanks to axial floating rollers.

Telerace telescopic guides: a winning choice

Rollon product range has recently been enhanced by the introduction of the Telerace family: **telescopic rails with double row ball bearings** and raceways treated with the patented **Rollon-Nox thermo-chemical hardening process**. These rails can easily manage variable strokes, high speeds and stressful cycles, also in vertical applications, and in completely extracted positions with the maximum load.

These rails have **large rolling elements**, with a maximum diameter of **up to 31.5mm** and internal sliders equipped with wipers and lubrication systems, for excellent sliding quality. The hardening treatment ensures maximum efficiency **up to 2 million cycles** thanks to a raceway surface hardness of 60-62 HRC. Double row ball bearings allow the system to manage heavy loads, up to around **780 kg per pair** for the best performing rails, the TLR 43 model.

Lastly, Telerace rails are designed with a slight rotation of the rail elements with respect to the intermediate element. This permits them to **manage misalignments up to 2° and flatness up to 3 mm**.

Fig. 6 - The Telerace family from Rollon includes 3 series of telescopic rails: TLR-TLQ high performance steel rails with double row ball bearings; TLN-TQN rails in profiled sheet with ball bearings; TLAX-TQX like previous series but in stainless steel.