

I TOP ROLLER

HORN
GLASS INDUSTRIES

innovation
ENGINEERED IN GERMANY

HORN® TOP ROLLER

Top rollers are among the most important machines of a tin bath. Top rollers are used in pairs to form the glass ribbon with precise control of its width and thickness. Each pair works synchronously and thereby creates optimal conditions for a smooth production process.

Top rollers are used for producing a glass ribbon that is thinner or thicker than the equilibrium thickness of around 7 mm.

In general, one can distinguish between two production processes using top rollers:

- The "assisted direct stretch" (ADS), where the top roller is swivelled towards the tin bath exit
- The "reverse assisted direct stretch" (RADS), where the top roller is swivelled towards the tin bath entrance. The number of machine pairs required depends on the glass thickness and the glass pull rate.

In the ADS process the natural expansion of the glass ribbon is reinforced, allowing for production of glass thicknesses below 7 mm. In the RADS process the natural expansion of the glass ribbon is restricted, allowing for production of glass thicknesses of up to 15 mm and above.

HORN® offers two different types of top roller machines:

- The floor-based top roller, type HRTM-F, which is installed on the hall floor
- The suspended top roller, type HRTM-S, which is suspended from the tin bath steel structure

The most important component of each top roller is the knurl. The knurl is a type of gearwheel with a tooth profile, which is screwed onto a hollow shaft and specially adapted to the application process. A servomotor allows for infinitely adjustable rotation speed of the knurl. A rotary transmission at the end of the hollow shaft ensures optimal cooling water supply for the shaft and the knurl. Installed in a water-cooled casing pipe, the knurl with its drive shaft is optimally equipped to operate inside the hot tin bath. All machine movements, such as extension and retraction, angle adjustment and positioning relative to the glass ribbon, as well as the so-called nip, are effected by electric motors. Manual operation of all machine movements is also possible, e.g. to remove the machines from the tin bath in order to avoid serious damage to the machines or plant in the unlikely event of power failure.

The emergency nip-off, which is triggered when there is a failure of the rotary knurl movement, is executed by a pneumatic lifting cylinder. All movements of the top rollers can be controlled both from the control room and at the operating panel on the machine on-site. When operating from the control room, these actions can be supervised by means of a periscope. The periscope shows the

operator in the control room what the top roller is doing inside the tin bath following the operator's orders. The periscope can be used in a standalone version with independent support and drive, or it can optionally be installed on the top roller frame. With the combined solution where the periscope is installed on the top roller support frame, the periscope makes exactly the same moves as the top roller, except for the nip. The periscope can be pulled out separately for cleaning the lenses or for other purposes.

When operation is effected locally on-site, the operator can observe the machine's actions inside the tin bath through a window side sealing. In order to facilitate the setup operation and the local control on-site, each top roller is equipped with an interface for a mobile plug-in touch panel. The customer can choose any number of panels to be supplied. These panels greatly facilitate the local operation of the machine on-site. This additional feature of the HORN® top rollers allows the machine setup and the local operation on-site to be executed by one person.

Each movement of the machine is preceded by a flashing light and an acoustic signal, so that any person present in the vicinity could safely leave the operating range of the machine in time. The control system provided for the control room, comprising a control panel and a separate PC with the appropriate control software and visualisation, completes the overall package for the HORN® top rollers. No matter which type of top roller the customer chooses, the HORN® top roller will be a reliable and robust companion for manufacturing high-quality products.

BENEFITS OF HORN® TOP ROLLERS

- **Easy and quick installation, operation and maintenance**
- **Optimised set-up operation and on-site control by means of a mobile touch panel**
- **Compact design with integrated switch cabinet: the complete wiring and internal pipework up to the interfaces are pre-installed by the manufacturer**
- **Supplied fully mechanically and electrically tested**
- **Possibility of installing the periscope on the top roller support frame**
- **Complete media supply from below at the pivot point of the machine - no bothersome hoses, etc. in the work area**
- **High safety standard for handling and operation**