System Competence for Belt Conveyor Drives
Increasing delivery rates, longer conveyor routes, higher outputs and more stringent requirements regarding reliability lead to evergrowing demands on the drives used in modern belt conveyors.

The belt is often the most expensive component and thus determines the size of the investment and the economics of the entire system. Fluid couplings from Voith (turbo couplings) protect the belt and other conveyor components and help reduce investments costs while providing maximum power transmission at the same time.

When it comes to suitable solutions in this special field of drive technology, Voith Turbo is your competent partner with extensive drive system expertise. We have been manufacturing hydrodynamic couplings for belt conveyors for over 50 years.

More than 100,000 Voith Turbo fluid couplings are in use on belt conveyors worldwide. They have proven their value under the harshest operating conditions: under extremely challenging topography, in the cold and in the heat as well as under continually changing conditions.

An ongoing dialog with research institutes, conveyor manufacturers, belt manufacturers and belt operators ensures state-of-the-art technology for Voith products and systems competence for optimum interaction among all components of the belt conveyor system.
When it comes to designing modern belt conveyor systems, Voith Turbo stands ready as an experienced partner.

For us, system competence means:

- Comprehensive consultation regarding all areas of the conveyor system that are affected by the drive
- Supplying drive components that are perfectly suited to the operating conditions
- Commissioning
- A worldwide service network that assures you maximum system availability and profitability

We will be happy to advise you regarding these points when laying out and designing the drive concept that is best-suited for your application.

Our declared goal is to always achieve the optimum cost/benefit ratio for our customers. With their worldwide presence, our subsidiaries and representatives assist in this regard by providing direct contact with you as well as fast, widely available service.
Your demanding specifications contain challenging requirements – Voith fluid couplings meet them!

To achieve longer belt conveyors with increased performance, modern drives must provide higher power output. At the same time, drive units should protect the equipment and machine components, be reliable and cost-effective. A drive can meet these requirements only if it satisfies the following.

- Load-free motor run-up
- Use of low-cost squirrel cage motors requiring little maintenance
- Gradual build-up of start-up torque until the break-away torque of the drive is reached
- Limitation of the maximum torque during start-up
- Adapting the start-up torque to the particular load conditions
- Reducing longitudinal tension waves in the belt
- Load sharing in multi-motor drives
- Staggered start-up of motors in multi-motor drives in order to avoid a cumulative inrush current
- Simple handling and compact construction
- Operation characterized by minimal wear and maintenance
- Possible use of water as the operating fluid, especially in underground mining applications

Your specifications will contain additional detailed requirements. A discussion with a Voith technical representative will show you that we can provide engineered reliability in your drive solution. Give us the opportunity!
It all depends on the following...

**Main drive**

When selecting the correct drive concept, more and more decisions are being made in favor of multi-motor drives with lower output instead of a single higher output drive. The reasons for this include the resultant lower inrush currents as well as the ability to transmit power to several drive pulleys. Voith fluid couplings permit staggered start-up of motors in order to prevent simultaneous inrush currents. The individual motors are subjected only to the start-up torque of the Voith fluid coupling.

**Tensioning mechanism**

A natural load sharing during the start-up operation ensures that overloading of individual motors is avoided. Depending on the type and design, Voith fluid couplings offer the ability to limit the start-up torque to values between 1.1 to 1.6 of the nominal torque.

To prevent belt slippage at the pulley, the takeup device must provide adequate pre-tension on the belt under all operating conditions. The more uniform and gradual the acceleration, the smaller is the pre-tensioning force required.
Belt

The belt is often the most expensive component of the conveyor system. Its purchase price is greater when it must transmit higher drive traction during the start-up operation. Voith fluid couplings limit the torque applied and thus minimize the tension on the belt. The benefits: The belt is subject to less stretch, leading to increased service life for the belt and belt splices. In addition to use of lower-cost belts, minimizing the acceleration torque means easier curve transitions for the belt.

Intermediate drives

Intermediate drives, such as "tripper booster" drives — distribute application of drive torque over the entire conveyor. By splitting up the drive points along the conveyor, the tension levels are significantly reduced, thus permitting use of lower-cost belts. Use of intermediate drives generally requires a suitable control mechanism, since each drive must be adjusted individually to the belt segment associated with it.

Tail drives

Drive stations at the tail are often a practical location for a brake, since the braking force acts directly on the load carrying side of the belt. The tail drive also reduces the tension on the belt in multi-drive systems. It should be possible to adjust this drive variably to the load distribution. Often, the tail drives only power the return side of the belt, in which case only the necessary power requirement is used for sizing purposes.
The right solution for each drive

Voith Turbo satisfies the variety of requirements for drives in belt conveyor systems with a comprehensive line of couplings. Depending on the system-specific demands of the customer, the appropriate coupling is supplied for each drive and an optimum cost/benefit ratio is achieved.

Constant-filled fluid coupling with delay chamber

Constant-filled fluid coupling with enlarged delay chamber

The **Type TV** fluid coupling with delay chamber is usually used when lower power outputs are required. During start-up, a large portion of the operating filling is retained in the attached delay chamber. As a consequence, less torque is transmitted during the start-up operation and the driven machine starts up under lower load. The resulting gradual, uniform acceleration of the belt during the course of start-up extends the service life of the belt.

For situations where start-up with a lower torque is necessary, use of the fluid coupling **Type TVV** with enlarged delay chamber can further reduce the start-up torque of the coupling and thus achieve an even more gradual acceleration of the conveyor.

Even more demanding requirements on the drive are satisfied by using the **Type TVVS** fluid coupling with the additional annular chamber. It produces an especially low start-up torque and provides an extended torque build-up which results in an automatic adjustment to the particular load condition.
The primary design factors for a coupling are the power requirement, mass moment of inertia of the belt, and the speed of the drive motor. The coupling’s size is determined from the nominal demand power and the motor speed. Depending on how the design criteria for the belt conveyor are weighted (page 4), a variety of start-up characteristics can be achieved by selecting the appropriate coupling.
With fill-controlled couplings, the degree of filling can be varied during operation. Motor run-up occurs at almost no load with a drained coupling. Fill control couplings also allow the conveyor to be accelerated precisely to follow a programmed "S-shaped" speed-time ramp. These units limit the maximum acceleration forces and provide active load sharing, tension control for booster drives, and controlled deceleration.

The Type DTPK is a coupling that is externally supported by motor and gearbox shaft. It is very compact in size, needs no connecting couplings and operates with almost no wear.

The Type TPKL is a self-supported coupling. The concept permits simple handling and for this reason is recommended specifically for use in underground mining applications.

The Type TPKL-T is alignment-free, as both motor and gearbox are connected to the coupling by intermediate tunnel housings. The entire drive can be attached to and detached from the drive pulley on-site without difficulty.