Lower Operating Costs – Higher Availability.

High-Torque Motors HT-direct

Motors

Answers for industry.

SIEMENS

Significantly lower operating costs and a higher degree of availability with high-power permanent-magnet torque motors.

You are faced with lots of decisions when it comes to selecting the optimum drive solution for your various processes. You require a solution that precisely fulfils your technical specifications, has a high degree of availability – and what is really important – has low life cycle costs. Only then can important competitive advantages be achieved –no matter whether in the paper industry, steel industry or in other sectors.

Drive solutions – a comparison

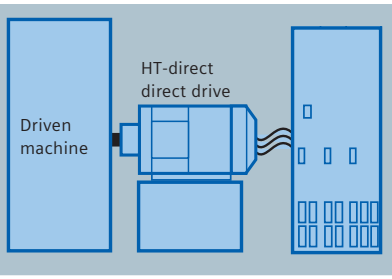
Today, induction motors are mainly used for those applications where a high torque is required at low speeds. Their torque is converted to the required level using a gearbox. In some applications, induction motors with a high number of poles are used as a direct drive. However, both of these drive solutions have a number of system-related disadvantages: Gearboxes increase the operating costs as well as the amount of space required and reduce the plant availability; induction motors with a high number of poles have a low power density and are therefore large and heavy.

The advantages of HT-direct at a glance:

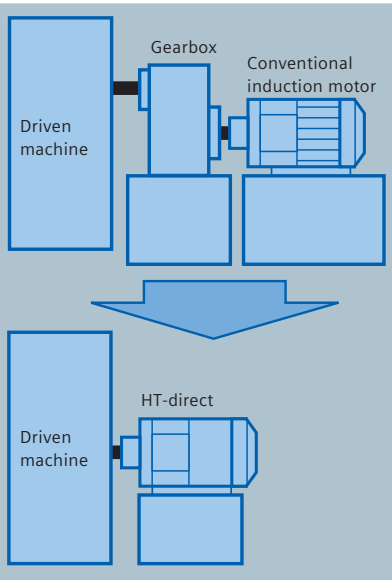
- Gearless, therefore:
  - Higher overall efficiency than drive systems with gearboxes
  - Lower service & maintenance costs
  - No failures due to gearbox damage
  - Space-saving arrangement as a result of the direct drive
  - Lower installation and commissioning costs
  - Low noise
- Low service intervals as a result of long bearing lifetimes
- Our many years of experience with permanent-magnet drive systems
- Seamless integrated range of low-voltage products up into the high power range
- Harmonized system comprising HT-direct motor and SINAMICS drive converter

An optimum fit for many applications

Permanent-magnet synchronous motors eliminate gearboxes and therefore reduce the costs over the complete life cycle of the plant or system when compared to conventional concepts: From the planning through the mounting and installation, commissioning and operation up to service & maintenance. A harmonized low-voltage system comprising SINAMICS drive converters and HT-direct motors can offer many advantages in each and every phase. Our torque motors have already proven themselves in drives for water pumps, main ships' drives and paper machines.

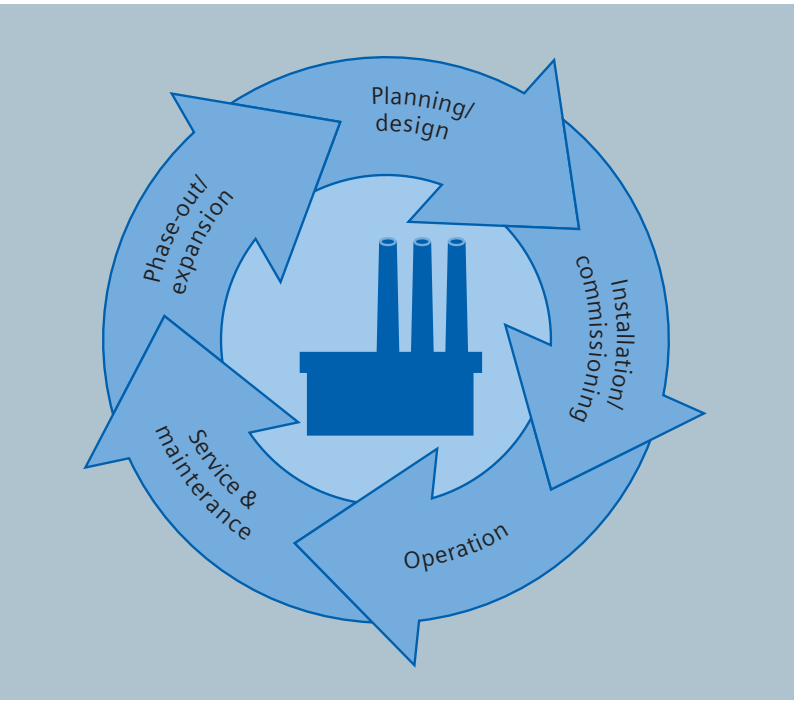


Motor and drive converter form a harmonized system.



When using high-power permanent-magnet torque motor, the gearbox is eliminated. This reduces the life cycle costs and increases the availability.

HT-direct – convincing in every phase.



The life cycle of a plant is subdivided into 5 phases.

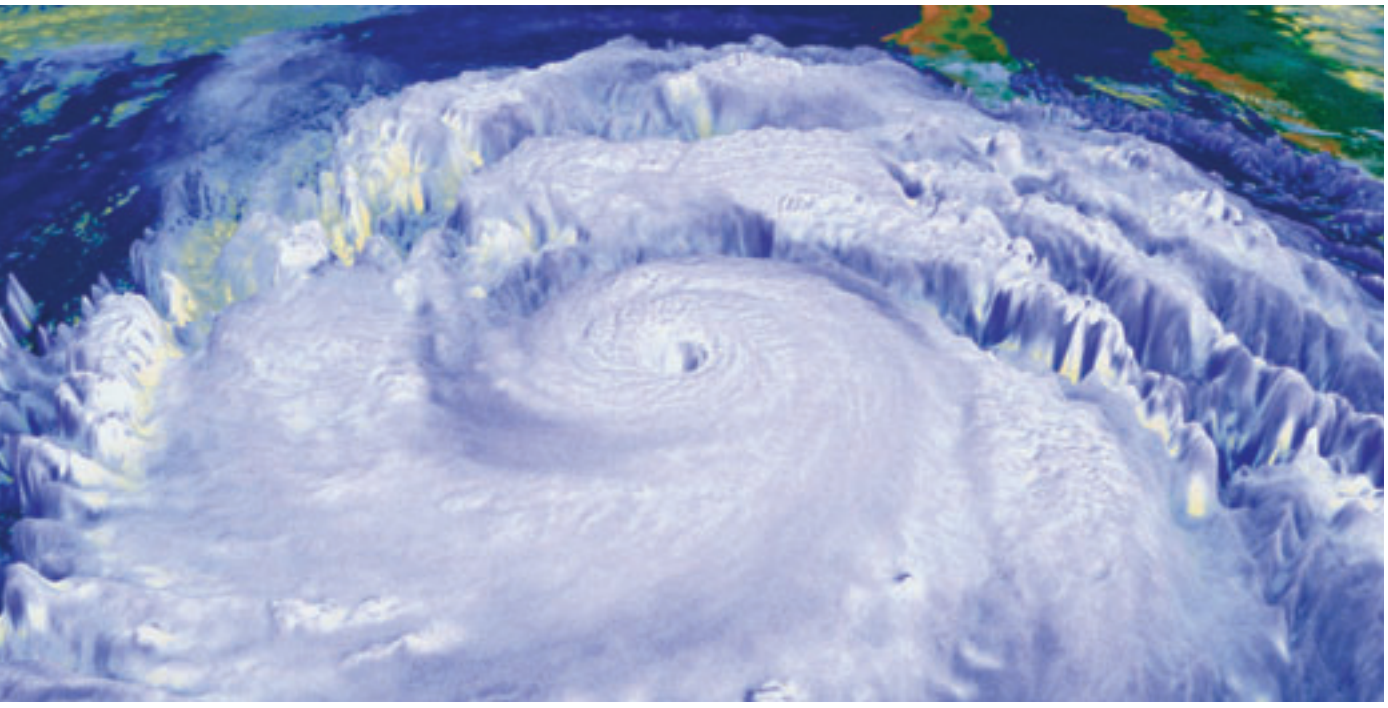
When you select a gearless high-power torque motor then you are selecting a drive with a high degree of cost-effectiveness – and that across the complete life cycle.

Advantages even in the planning phase

The elimination of the gearbox reduces the costs over the complete life cycle of the plant. This already starts in the planning phase. This is made easier as less space is required and a separate gearbox foundation is not required. The result – lower planning costs, a higher degree of flexibility and more space for new solutions.

Lower installation and commissioning costs

Mounting and installation is a lot easier thanks to the gearless concept as there are fewer components and a foundation is not required for the gearbox. The drive components are optimally harmonized with one another, which means that commissioning is faster and also more straightforward.



Energy saving thanks to direct drives

Further, energy is saved thanks to an average of 3% higher overall efficiency – depending on the plant configuration. This higher overall efficiency comes from the fact that there are no longer any gearbox losses. This cuts the operating costs. And, not only this, the procurement costs are almost identical for both systems as well as the higher motor efficiencies in the partial load range and speed setting range.

Low-maintenance and environmentally friendly with a high degree of availability

Eliminating a gearbox also eliminates time-consuming service and the use of oil. This not only means lower service & maintenance costs, but also significantly service intervals. But this isn't everything – direct drives not only reduce the costs, but also relieve the environment as there is no oil. Gearbox damage can also result in unplanned plant downtimes. With HT-direct the subsequent loss of production and the associated costs are a thing of the past.
This means that the higher availability increases the productivity and cost-effectiveness of the plant.

Harmonized system solutions – HT-direct and SINAMICS.

HT-direct motors were developed for operation with SINAMICS drive converters. Motors and converters are subject to exhaustive testing in our Nuremberg system test facility – the most modern test facility worldwide. This guarantees that they work together in an optimum fashion. Sensorless operation of HT-direct motors is possible when they are fed from SINAMICS drive converters. For applications with high requirements on the dynamic performance with closed-loop torque control at low speeds, an optional closed-loop control with encoder can be used.

SINAMICS – the new family of drives

SINAMICS is the new family of drives from Siemens for innovative drive solutions that are truly fit for the future. This drive family covers the complete range regarding power rating, performance and voltage in different versions. SINAMICS distinguishes itself thanks to standard, unified engineering over all of the drive versions. Only two engineering tools are required for the complete SINAMICS family – SIZER to design and engineer the drives and STARTER to commission them.

HT-direct – technical data:	
Rated torques:	Up to 42 kNm
Rated speeds:	0–800 RPM
Rated voltages:	400 V to 690 V
Cooling:	Rib-cooled, water jacket-cooled with forced ventilation
Shaft heights:	400, 450, 500 mm with solid shafts
Degree of protection:	IP55
Frame:	Steel or grey cast iron

Permanent-magnet drive systems – the technology for gearless drives

A highly utilized, permanent-magnet synchronous motor is the core of this gearless system. This slow-running synchronous motor has a rotor with a high number of poles. Contrary to slow-running induction motors – where the magnetization requirement and the apparent power drawn increases – these motors can be easily implemented with a high number of poles. Using these motors, gearless drive concepts can be implemented even for low speeds but at the same time providing high torques. The version with the high number of poles results in short winding overhangs, thin stator yokes and therefore supports a space-saving and compact design. NdFeB magnets are used to excite the rotor. These magnets are manufactured out of a low-corrosion alloy and have additional coating to protect them against corrosion.

Examples for applications using HT-direct motors:

- Paper machines, e.g. presses, wire, roll drives and drying cylinder
- Steel, e.g. shears, edgers, treatment lines and blowers
- Shipbuilding, e.g. bow thrusters, winches, main drives
- Oil & gas, e.g. pump drives, cranes, winches
- Mining, e.g. crusher drives
- Water and wastewater, e.g. screw pumps, centrifugal pumps