

## GUNT-FEMLINE TURBINE TRAINING

Turbines are driving machines. They convert the internal energy of a fluid into mechanical energy. Depending on where the energy conversion takes place, we distinguish between action turbines and reaction turbines.

Turbines are used in power plants to generate electrical power through connected generators, and in power units to generate thrust.

The complete trainer consists of three components:

- 1 HM 365 Universal Drive and Brake Unit
- 2 HM 365.31 Pelton and Francis Turbine
- 3 HM 365.32 Turbine Supply Unit



HM365 is in generator mode and slows down the turbine with a V-belt. The generator converts the resulting power into electrical power.

On the work surface of the Turbine Supply Unit HM 365.32, one of the turbines HM 365.31 is placed and connected via hoses. The closed water circuit means that the trainer is mobile and can be used independently from the water system. The flow rate and/or the pressure can be adjusted by means of a flow control valve.

For more information on this training course please refer to the data sheets for the corresponding devices in chapter 2.

The GUNT-FEMLine turbine training introduces participants to an action turbine and a reaction turbine. The action turbine is a Pelton turbine, and the reaction turbine is a Francis turbine. The course explores and compares the different principles of operation of these turbines.



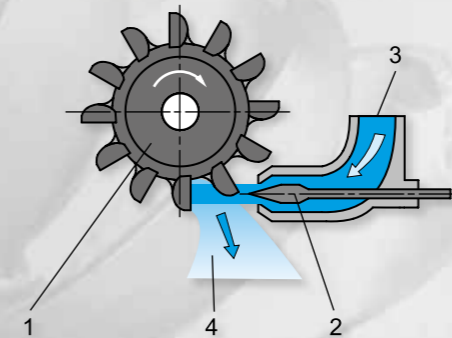
Assembly of a Pelton turbine at the Walchensee power plant in Germany (Voith Siemens Hydro Power)



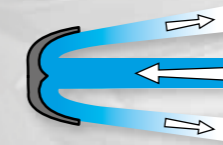
Francis turbine, deinstalled

### TURBINE TRAINING: COMPARISON OF THE PRINCIPLES OF OPERATION

#### Action turbine (Pelton turbine)



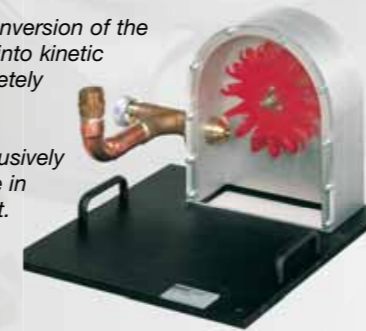
- 1 rotor,
- 2 distributor,
- 3 water inlet,
- 4 water outlet



The water jet changes direction in the blade without changing velocity

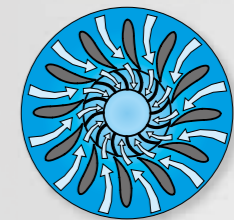
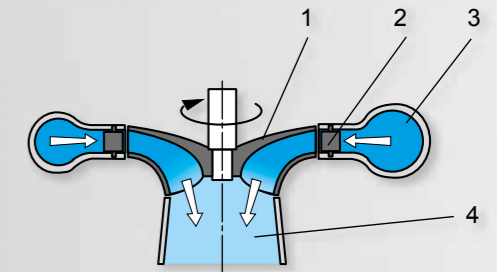


In a Pelton turbine, the conversion of the pressure energy of water into kinetic energy takes place completely at the distributor. Since the entire pressure difference is reduced exclusively in the nozzle, the pressure in the rotor remains constant. The turbine power is controlled by adjusting the nozzle cross-section.



HM 365.31 Pelton and Francis Turbine

#### Reaction turbine (Francis turbine)



The flow cross sections change. Acceleration of the water jet in the guide vane and the blade



In a Francis turbine, the conversion of the pressure energy into kinetic energy takes place inside the distributor and the rotor. The pressure at the rotor inlet is higher than the pressure at the rotor outlet. The turbine power is controlled by adjusting the guide vanes.

