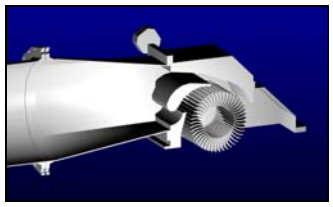
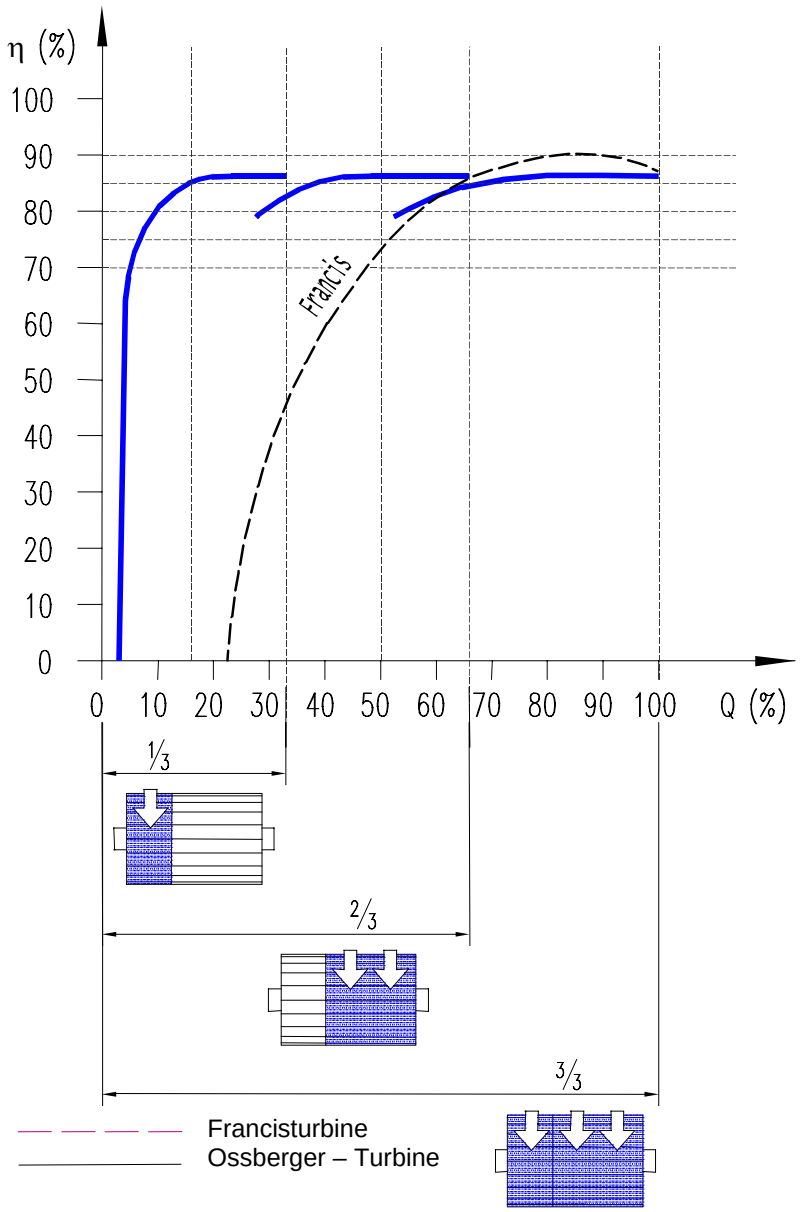
Good reasons for the Ossberger®-Turbine

- **Turbine:**



We shall gladly be prepared to show you our test stand on the occasion of a visit to our works. You will then get an own idea of our permanent research and development on the original OSSBERGER Turbine. As soon as the results obtained will be concrete and well tested, they will be referred to for our manufacture.



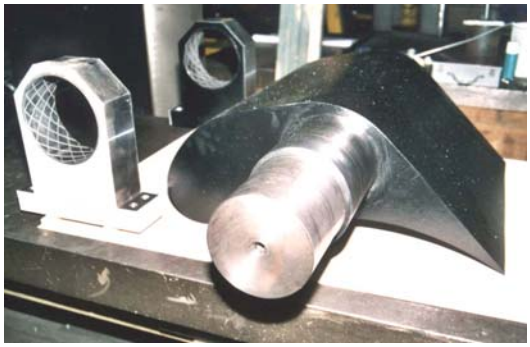
Efficiency characteristic of an OSSBERGER-Turbine compared with the Francis-Turbine at different admission

Your advantage:

⇒ The machine is particularly outstanding compared with imitated cross-flow turbines concerning operating and regulating behaviour as well as efficiency curve and level.

● Guide Vanes:

The subdivided guide vanes provide a flat efficiency curve, they need to direct the water for a jerk-free entry into the runner. As the manufacture of cast guide vanes would demand too large tolerances calibrated profiled guide vanes are referred to. Both guide vanes can be set up independently, they can easily be dismounted towards the radial direction without special tools, the corresponding forces are absorbed by maintenance-free friction bearings brand Permaglide with shaft protecting sleeves.



Your advantages:

⇒ No lubricants are admitted to the water
⇒ Seizing, e.g. due to negligent lubrication (e.g. in case of special steel shafts), is excluded
⇒ Only calibrated guide vanes allow for a hydraulically perfect forming; you may gladly look forward to an operation without cavitation with high efficiencies.

● Bearings:

The OSSBERGER turbine is equipped with standardised self-aligning roller bearings, designed for an infinite service life. The bearing casings and the bearing inserts can be considered as one unit, they are fixed in the turbine casing by a locating bunch. This will permit to dismount the runner radially without removing the bearing casings from the runner shaft. A simple readjustable gland packing arrangement with hemp tallow cord seals the shaft.

Your advantages:

⇒ No lubricants are admitted to the water
⇒ An exchange against standardised parts is possible without problems
⇒ Maintenance is limited to an annual change of grease
⇒ No monitoring of the bearing condition is required
⇒ The hemp tallow cord does not need to be lubricated.

● Draft Tube:

The draft tube is essential for utilising the level difference between runner and downstream water level. During turbine operation the air in the casing is taken along with the discharged water. Thus a

vacuum is formed; for the exterior atmospheric pressure the suction column rises. A simple venting valve which is free of own friction controls the vacuum in the turbine casing to utilise the energy potential optimally.

Your advantages:

⇒ No maintenance of the vent valve
⇒ Utilisation of the whole head which is available from the upstream to the downstream level.

● Runner:

The cylindrical runner core consists of conservatively designed cam disks and, following its width, several intermediate disks to which the profiled blades are adapted and welded. This will make the runner extremely solid by stiffening it at the same time in such a way that no vibrations are faced. The blades consisting of bright-drawn profiled steel mean an ideal solution regarding solidity and water guidance. By utilising the bright-drawn and exact blade profiles an ideal balance condition is achieved automatically, only slight corrections are required on the balancing machine. The blades bent in a linear way only do not produce any axial thrust, thus there is no need for pressure bearings. Another advantage of the flow guidance is that leaves, grass or snow, pressed between the blades when the water enters the runner, are spilled out again after a half turn by the leaving water, backed-up by the centrifugal force. Thus the self-cleaning runner is never obstructed.

Your advantages:

⇒ The runner can be dismounted without special tools nor additional axial space requirements
⇒ No axial thrust, consequently simple low-maintenance bearings
⇒ Smooth, vibration-free operation without cavitation
⇒ Self-cleaning effect, consequently no service costs due for cleaning personal nor stillstand periods
⇒ A high availability is decisive for the rentability of your investment.

● Base Frame:

A stable base frame is provided between turbine and foundation, permitting a rapid and sure installation.

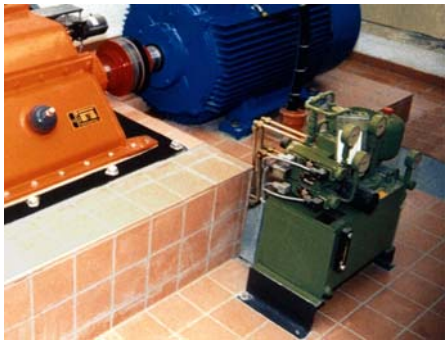
Your advantage:

⇒ Short time of erection
⇒ Maintenance and dismounting without special tools

OSSBERGER GmbH + Co
D-91773 Weissenburg - P. O. Box. 425 - Phone 00 49 91 41 / 9 77 -0 - Facsimile 00 49 91 41 / 9 77 -20
e-mail: ossberger@ossberger.de - www.ossberger.de

Regulator:

For an automatic operation of the machine unit and the turbine regulation in accordance with the water level an electro-hydraulic turbine controller has been foreseen. It is composed of a hydraulic unit and a control switchboard. Emergency stop in case of mains failure or generator switch release are made without any foreign energy through storage weights. The continuous water level registration by a depth gauge and the regulation which is continuous either mean a precondition for an almost constant upstream water level and thus an optimal utilisation of the existing flow. The computer capacity of the specially adapted regulator element has been overdimensioned and allows for an enlarged servicing and observance as well as for the necessary plain text display, and all this operator-controlled, at the device directly. No programming knowledge nor devices are necessary.



Your advantages:

- ⇒ Maximum annual production for a permanent registration and conversion of the level value
- ⇒ Easy mounting of the zinced sensor holder
- ⇒ Adjustments are made at the switchboard directly without auxiliary means
- ⇒ Industrial components of a long service life, no electronic elements of short lifetime
- ⇒ Minimum drive energy for the utilisation of a storage accumulator

Installation and commissioning:

The proposed concept does not comprise any elements that need to be concreted in advance. In case of order you will be provided, apart from the plan of installation, with a plan of foundations which will enable you to prepare the site for a quick and trouble-free erection. The turbine and the base frame are lodged on the carriers laid in the primary concrete which is situated above the draft tube pit. Own bases have been foreseen for gearbox and generator. The fixation is made by means of foundation blocks.

Each plant is completely assembled prior to its dispatch and tested at the manufacturer's works. Thus it is ready for operation at site as soon as the erection work has been finished. The equipment is delivered as premounted units. Thus erection is limited to the exact alignment of the elastic couplings.

Your advantages:

- ⇒ Quick and consequently priceworthy erection
- ⇒ No demanding efforts for civil construction as only plain surfaces need to be
- ⇒ created.