

## *SMALL HYDRO POWER STATION AT WEHRATAL BARRAGE*

Good water potentials are found all over Germany where small hydro power stations can be implemented. Consequently small water power stations play an important role in the field of energy production. Ossberger of Weissenburg in Bavaria is one of the leading companies working in this field. As an example the “Wehratal” project is described below which was realised recently.

Wehra basin is the lower basin of Wehr pump storage plant owned by Schluchseewerk AG. At each level in the basin the inflow needs to be redirected to the original river bed. Discharge is made through a tunnel with outlet structure. Within the barrage plant part of the discharge is intended for renewable energy production. As independently from one another inflows and heads are fluctuating strongly, the installation of a double-cell cross-flow turbine is justifiable from the economic point of view. The installed power is 1.135 kW, the average annual performance amounts to appr. 3.8 million kWh.

The optimal utilisation of the existing flow distribution demanded a turbine with an efficiency curve that should be as flat as possible throughout the whole flow range, and with acceptable efficiencies even at extreme variations of the head. So a two-cell Ossberger® Turbine was selected, equipped with a draft tube. A Cross-Flow Turbine of Ossberger GmbH + Co of Weissenburg/Bavaria was installed, of 1,000 mm runner diameter.

Fig. 1 shows the efficiency curve of an OSSBERGER Turbine in comparison with a Francis Turbine at different operating modes.

The casing (Fig. 2) takes up the precision bearing inserts to support the guide vanes. The regulating shafts with shrunk, hardened and grinded special steel bushings run in maintenance-free DEVA friction bearings (fig. 3). This will permit an easier guide vane mounting and dismounting towards radial direction (fig. 4).

Upon erection the runner is inserted into the turbine casing (fig. 5).

Wehra dam barrage station means a unique possibility of implementing hydro power economically without any further prejudice to the environment. During construction, and with regard to future service, all demands of economy and environmental harmony could be brought into line without conflicts. No customary trouble as e.g. ecological passage, utilisation of residual water, discharge section and prejudice to the downstream owners were faced with this implementation.

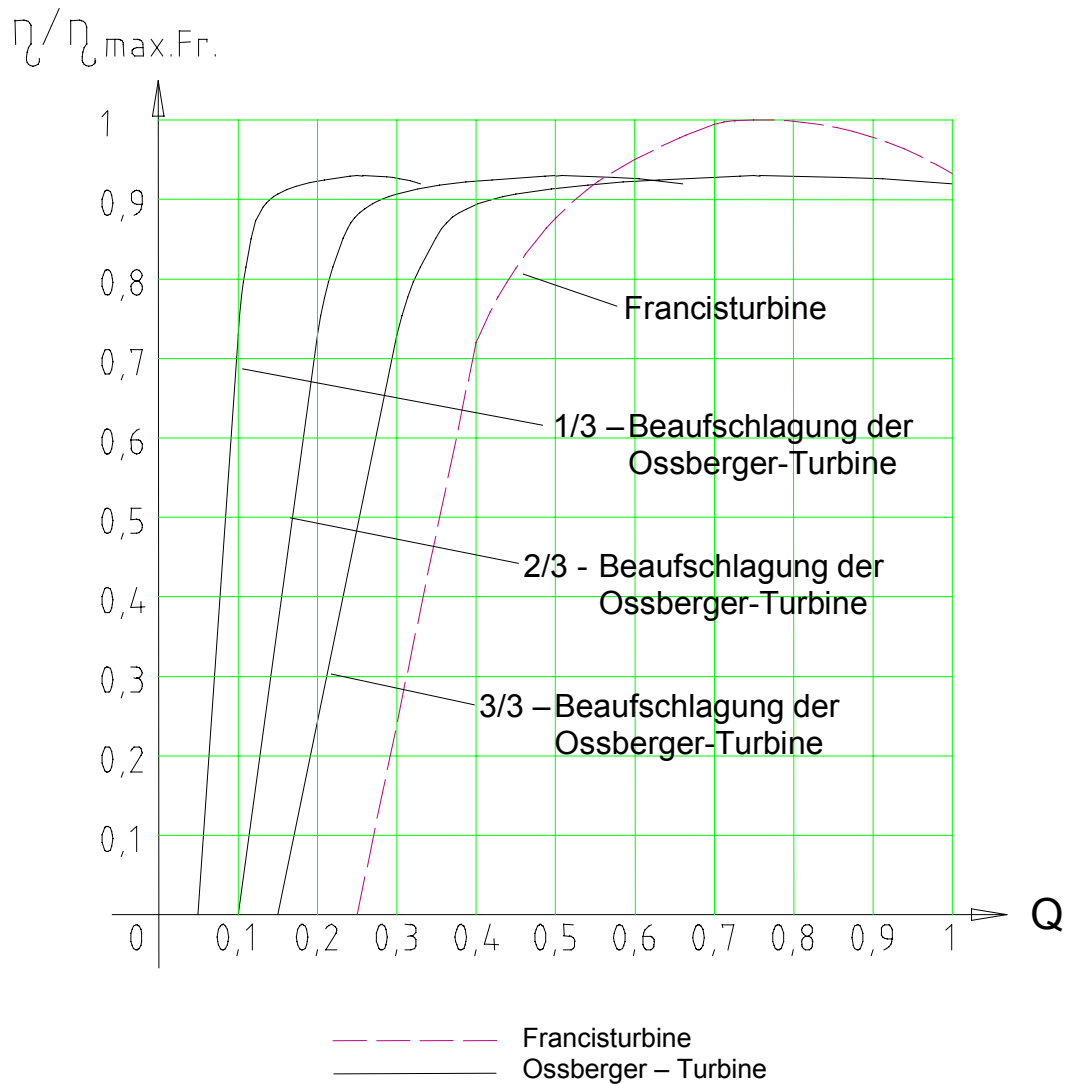
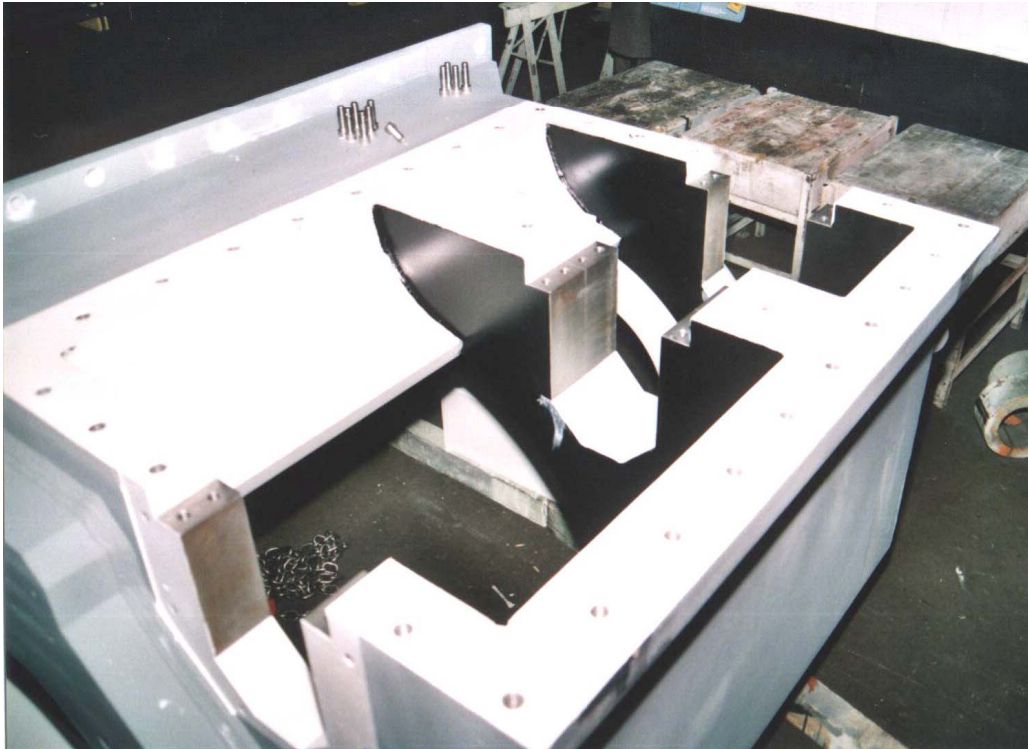
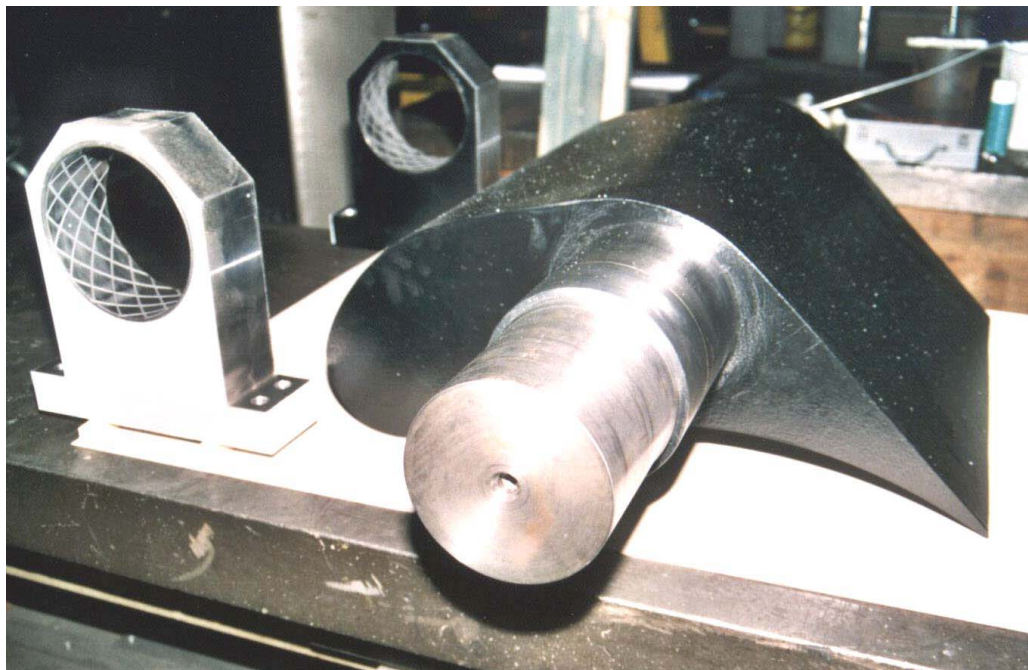


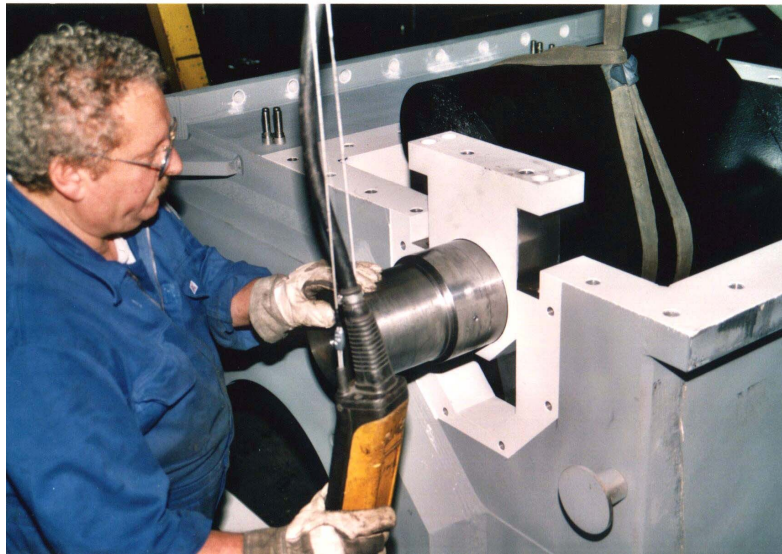
Fig. 1 : Efficiency characteristic of an OSSBERGER-Turbine compared with the Francis-Turbine at different operational modes



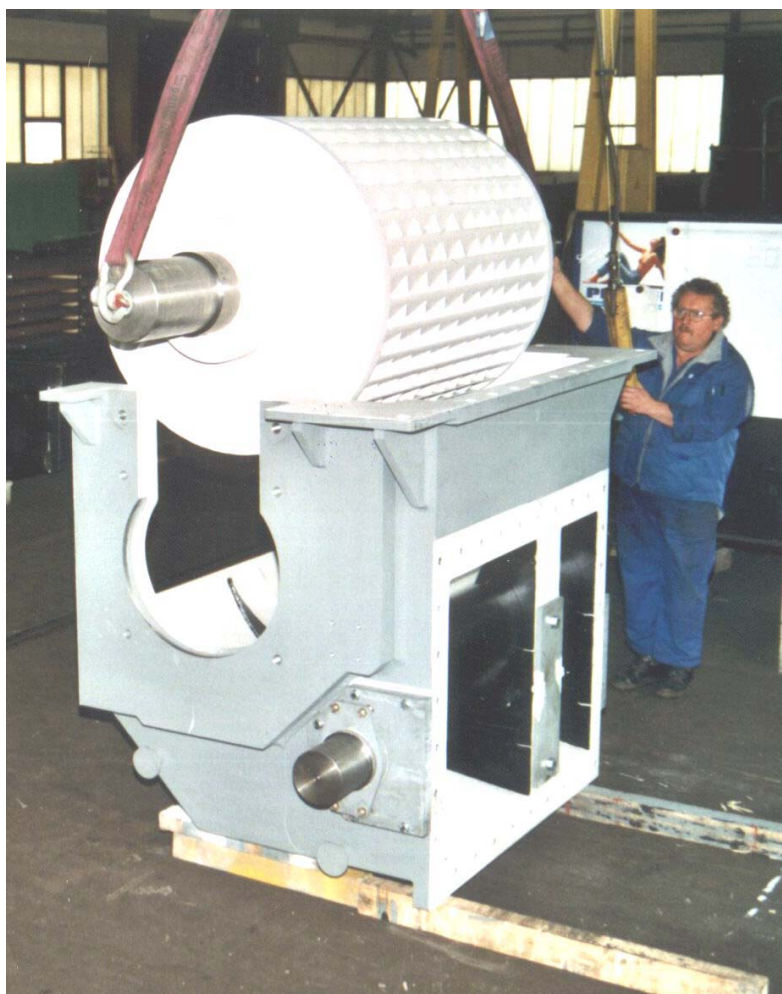
*Fig. 2: Casing of a two-cell Ossberger®-Turbine with milled vane recesses*



*Fig. 3: Guide vane with corresponding bearing inserts (maintenance free)*



*Fig. 4: Mounting of guide vanes with bearing insert into the turbine casing*



*Fig. 5: Mounting of runner radially to the turbine axis*





*Fig. 6: Power train in the power house*