



Generbine: Critique and Replies

General Aspects

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Generator manufacturers say: One would never build a generator like that.
Turbine manufacturers say: One would never build a turbine like that.

Hydraulic Properties

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Assertion no. 1:

Without guide vanes, the hydraulic performance will be very poor.

Assertion no. 2:

Because of the fixed blades, the generbine can not be adapted to variable conditions of the water current.

Assertion no. 3:

The corrosion resistance of the rotor blades is a problem, because they must consist of a permanent-magnetic material.

Properties of the Generator

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Assertion no. 1:

Caused by the height of the blades, a great part of the magnetic excitation would be lost by the stray field.

Assertion no. 2:

To achieve reasonable flux densities, "rare earth" magnets would have to be used; but they are not suited because of their mechanical properties and due to their susceptibility to moisture.

Assertion no. 3:

It is not clear how the magnetization can be achieved, if the magnets are the blades at the same time.

General Aspects

Generator manufacturers say: One would never build a generator like that.

Turbine manufacturers say: One would never build a turbine like that.

Of course, both are right. But: A generbine is not a generator. A generbine is not a turbine. A generbine is a generbine!

A combination, a compromise – a synthesis.

The generbine has not the electric efficiency of an optimized generator. The generbine has not the hydraulic efficiency of an optimized turbine. But: *Maybe*, the generbine has a better cost-to-benefit-ratio than a system consisting of a separate turbine and a separate generator. *Maybe*, a power plant assembled of generbines has a better cost-to-benefit-ratio than a power plant assembled of separate turbines and generators.

Maybe? At the moment, the term "maybe" is correct. Theory can guarantee that the generbine will in principle work properly. But its performance can only be known when at least one prototype will have been built and tested. For that, I need the interest of a potential manufacturer and investor.

Hydraulic Properties

Assertion no. 1:

Without guide vanes, the hydraulic performance will be very poor.

It was always part of the concept to put an inlet nozzle in front of the generbine that could be equipped with fixed guide vanes. In the mean time, the prototype concept already includes guide vanes.

Assertion no. 2:

Because of the fixed blades, the generbine can not be adapted to variable conditions of the water current.

False! First, a course adaptation to the local conditions (expected maximum of the flow velocity) is achieved by the dimensioning of the inlet nozzle. The adaptation to the variable flow of water is done by variation of the rotational speed, which is performed automatically by the electronic power converters that are connected behind the generbine (in analogy to the maximum-power-point tracking of photo-voltaic plants). – Turbines with variable speed but fixed blades have been tested successfully before. A relevant research institute in the field of fluid mechanics has signaled interest to collaborate on the generbine project.

Assertion no. 3:

The corrosion resistance of the rotor blades is a problem, because they must consist of a permanent-magnetic material.

True! Tests will be necessary about this subject. The proposed blade material for the prototype is an Al-Ni-Co casting alloy, which will probably have to be coated to achieve an appropriate protection against corrosion.

Properties of the Generator

Assertion no. 1:

Caused by the height of the blades, a great part of the magnetic excitation would be lost by the stray field.

I cannot comprehend this statement. Probably, the critic has not interpreted the three-dimensional geometry of the blades and the path of the field lines correctly. Between the rotor (= blades) and the stator, there is an air gap of no more than 5 mm width; the remaining magnetic path of the main flux consists of high permeability material (permanent magnetic rotor blades, soft-magnetic rotor axle, soft-magnetic stator core sheets). All possible stray fluxes have to run through much longer air paths and thus only reach modest values.

Assertion no. 2:

To achieve reasonable flux densities, "rare earth" magnets would have to be used; but they are not suited because of their mechanical properties and due to their susceptibility to moisture.

It is correct that "rare earth" magnets (Sm-Co or Nd-Fe-B) are very susceptible to corrosion. Thus, for the prototype of the generbine the use of the quite more resistant Al-Ni-Co alloys is proposed, which have comparable remanent flux density. It is true that their coercitive field strength is smaller, for which reason special measures have to be taken to avoid demagnetization between magnetization process and final assembly. This is no fundamental problem, however.

Assertion no. 3:

It is not clear how the magnetization can be achieved, if the magnets are the blades at the same time.

In the Technical Documentation, the construction of a special magnetization equipment is shown and calculated.