

Sediment Removal by an Axial Hydro Cyclone

Silt problems are well known at hydropower plants in alpine areas and cause high damage to the turbine blades. With the help of this invention the desilting can be done within the pressure pipe by implementing an axial hydro cyclone. This device produces a heavy swirling flow. The particles are carried radially outwards due to the centrifugal force and extracted after a short pathway.

BACKGROUND

Silt problems due to water catchment near glaciers are well known for hydropower plants in alpine areas. Sand and silt in the headrace of a high-pressure water turbine result in considerable wear of the rotating parts and further in a decrease of efficiency and output. To prevent this, extensive desilting chambers have currently to be built. These require a large structural complexity, a lot of space and construction work in the area of the water intake. Since the water catchment of a high pressure system is in the mountains, space is usually limited, construction and maintenance cause significant costs. Other limitations may arise from official approval in nature protection areas.

TECHNOLOGY

The principle idea of this invention is the usage of a cyclone collector in the form of an axial hydro cyclone to separate the unwanted sediment particles from the high-pressure water and collect them. The axial hydro cyclone can be implemented in the pressure pipe of a hydropower plant, preferably positioned directly after the existing desilting chamber. The axial hydro cyclone does not consist of any rotating parts. It filters the sediments only by its special shape and the applied swirl on the water-sand mixture. The conical design elements are the crucial factors to strengthen the swirl followed by a separating tube, where particles are carried radially outwards due to the effect of centrifugal force and are finally extracted.

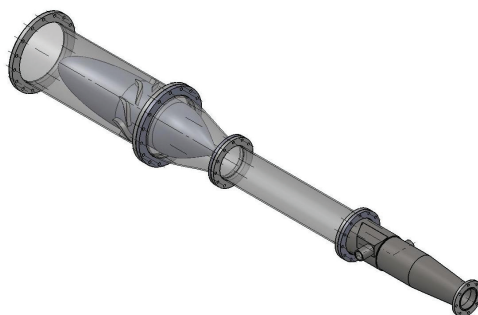


Fig 1: 3D view of the axial hydro cyclone

ADVANTAGES

- Extraction of particles in the range of 60-300 µm and larger
- Reduction of buildings within the alpine area (nature protection area)
- Space saving due to implementation within the pressure pipe
- Service reduced device
- Maintenance costs of the rotating parts of the turbine can be reduced

REFERENCE:
M041-09

APPLICATIONS:
Desilting within the pressure pipe of a hydropower

STATE OF DEVELOPMENT:
Concept and construction verified by laboratory model

KEYWORDS:
desilting, axial cyclone, pressure pipe, hydropower plant

IPR:
Austrian patent (AT) granted, international patent application (PCT) filed

OPTIONS:
■ R&D cooperation
■ License agreement

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