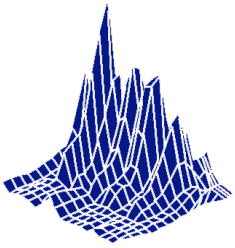

Korto Cavitation Services

Multidimensional Diagnostics & Monitoring of Cavitation

www.korto.com

Subject: Cavitation

Dear Operation & Maintenance Manager,

If you have problems with cavitation in the turbines of your plants, you might wish to consider the following facts:

1) The checking of cavitation erosion on turbine parts, as it is performed during an overhaul, shows a **total accumulated effect** from various turbine operating points. The most important causes of erosion are at only some of the operating points – and these are not necessarily those points with the highest load.
2) Very often, the cavitation characteristics of different turbines in one plant **differ substantially** from one another. This holds true even for turbines of the same design, operating in identical conditions.
3) The true behaviour of a prototype turbine can substantially differ from the prediction based on **model tests**.
4) Repeated runner repairs can result in a worsening of their cavitation behaviour. This, as well as incidents such as the passage of a solid body through the turbine tract, can result in **changes** in turbine characteristics **during the exploitation**.

A visual check of cavitation erosion does not yield data on the **dependence of cavitation intensity on turbine operating points** and model tests cannot reveal differences between nominally identical turbines. In order to obtain such data, vibro-acoustic tests on turbines in exploitation must be made, and in order to follow changes in turbine cavitation behaviour in time, repeated vibro-acoustic tests or a permanent monitoring are necessary. The results of the well-performed **diagnostic tests and/or monitoring** can be used to:

A) Optimise **plant operation** for a minimum total erosion.
(In the periods when not all units of a plant are being driven at the highest load, required total power can be obtained by having a lower load on the turbines with stronger cavitation and a higher load on those which are less prone to cavitation.)

B) Identify **causes of cavitation** and eliminate them.

C) Detect **deterioration effects** in time to stop their development.

D) Optimise the **overhaul schedule** – do repairs based on an accumulated-erosion criterium and not according to a fixed time plan.

It has been determined that simple approaches to the vibro-acoustic testing and monitoring do not deliver reliable cavitation assessments and do not yield the details needed for a diagnosis of its causes. Our company has developed a more sophisticated, **multidimensional method** for cavitation diagnostics and monitoring. It yields:

a) reliable cavitation-intensity assessments and

b) detailed cavitation descriptions
(distinguishes between cavitation mechanisms, delivers data on spatial distribution of cavitation in a turbine, determines the role of turbine parts in the cavitation processes)

c) and it makes highly sensitive monitoring possible to detect deterioration effects in their incipient phases.

The multidimensional method has been used on many Francis, Kaplan and bulb turbines, including some of the largest in the world. The first step in the work on a turbine is a diagnostic test. It is performed within a few hours. On this website, a review of the examples of use and a description of the method can be found.

If you wish to discuss the possibilities of using the multidimensional method on your turbines, write us, without obligation, about your problems and your machinery. Maybe we can be of help.

Sincerely,

Branko Bajić

Dr. Branko Bajic
Managing director