

## Cavitation in Turbines

As the operating pressure in a pump is decreased, cavitation first occurs at inlet since that is where the pressure is lowest. In contrast, in an operating turbine the low pressures occur at discharge and therefore cavitation first occurs at discharge or in the draft tube. It can take the same range of cavitation types discussed in the context of pump cavitation. For example, bubble cavitation occurring close to the turbine blades can cause substantial erosion when they collapse close to trailing edges of the blades. Figure 1 is a dramatic example in which the blades are almost severed from the casing.

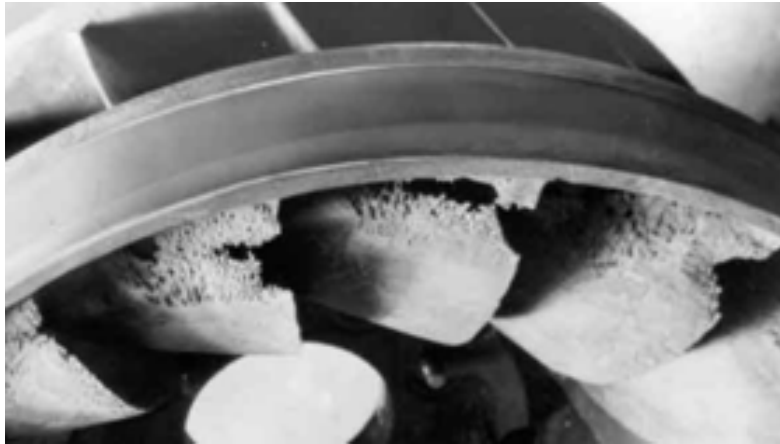


Figure 1: Extensive cavitation damage in a Francis turbine.

the draft tube occurs in the center of the draft tube vortex and often takes the form of complex, interwoven vortices with vapor/gas cores as illustrated in Figure 2. Sometimes these cavitation patterns can oscillate

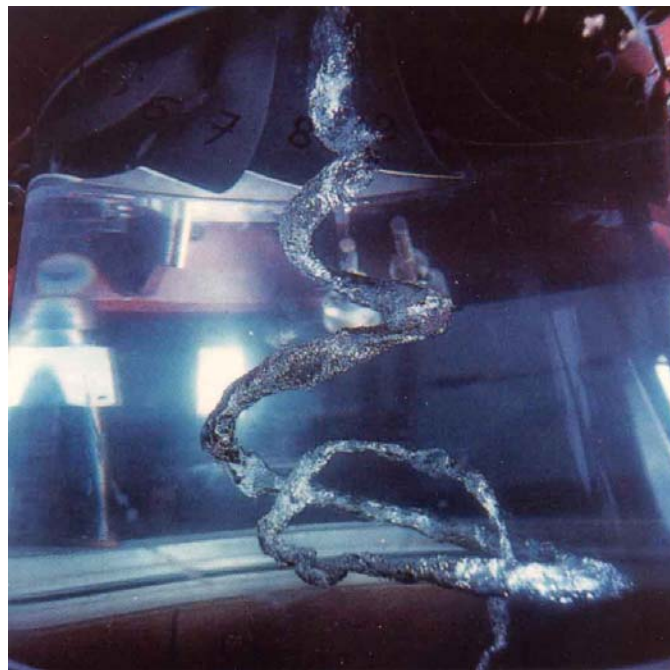


Figure 2: Cavitating vortex in a draft tube.

violently and thus pose an additional danger to the turbine structure.

Most turbine testing is conducted in large facilities that can accommodate the full scale machinery despite the fact that this often inhibits detailed investigation of the basic mechanisms of cavitation in these machines. An example of such a facility is the turbine test facility pictured in Figure 3; cavitation can be observed through the transparent housing surrounding the draft tube.



Figure 3: Turbine test facility at the Central Water and Power Research Station (CWPRS) near Pune, India, with a Francis turbine installed.