Improvement assessment - Francis, runner blades

Six Francis turbines in a plant operating at a 120 m head were uprated from 36 to 48 MW. New runners were designed and installed. In the subsequent overhauls strong erosion damage was found on all the blades of all the runners.
Improvement assessment - Francis, runner blades

In order to eliminate or suppress cavitation erosion, one runner was modified.

In a multidimensional diagnostic test of cavitation, the modified runner and one original runner were compared in order to check the success of the modification.
Component of the cavitation intensity influenced by a guide vane (% of the total)

Wicket-gate cavitation characteristic:
Original runner

Improvement?
Component of the cavitation intensity influenced by a guide vane (% of the total)

Wicket-gate cavitation characteristic:
Modified runner

Improvement?
Total cavitation intensity on the runner (%)
Cavitation not eliminated
Critical power 1 MW higher
Intensity 25 % lower

Original runner
Modified runner

Total cavitation intensity on the runner (%)

Improvement?