

# **Improvement assessment - Francis, runner blades**

Six Francis turbines in a plant operating at a 120 m head were updated 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

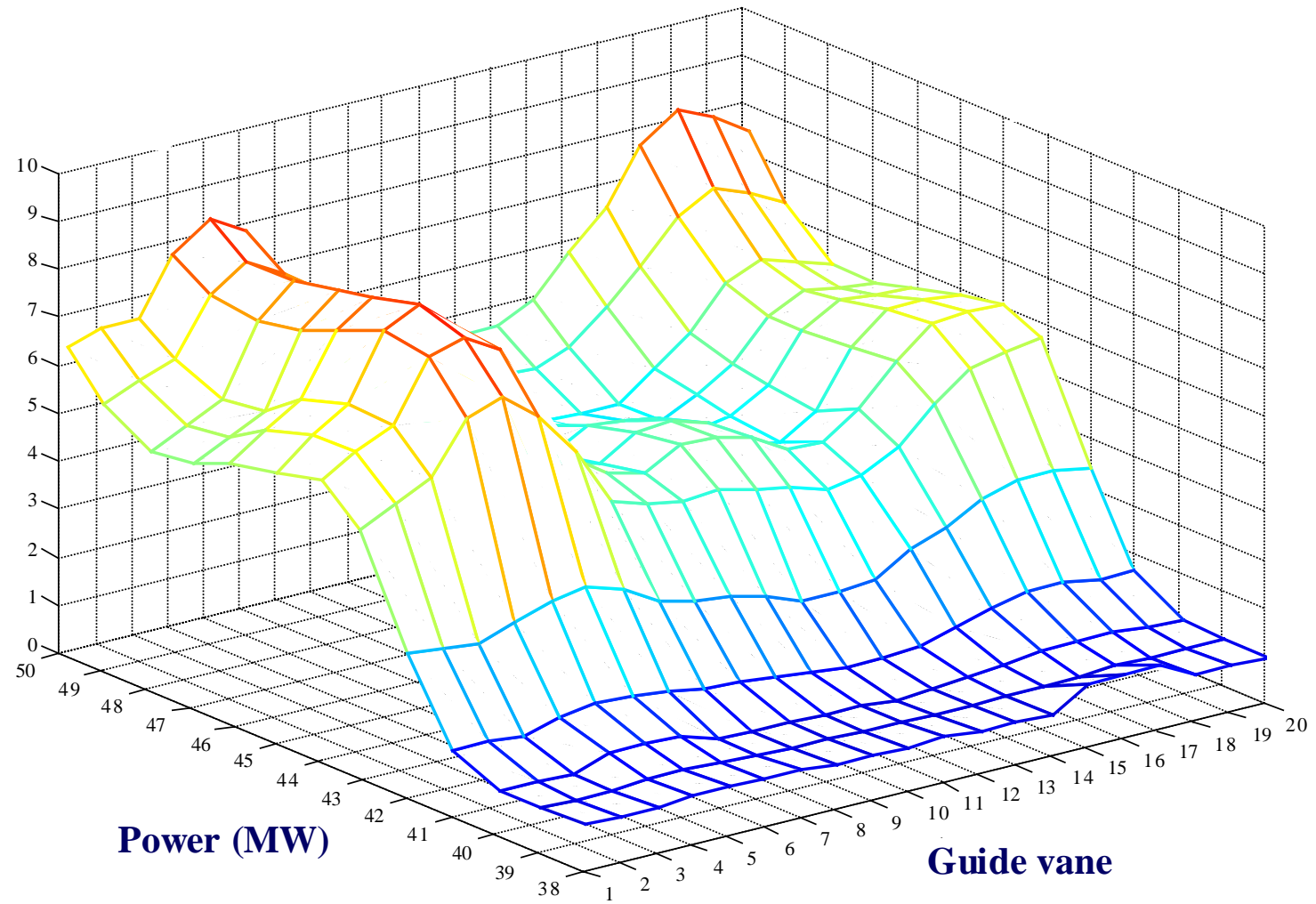
In order to eliminate or suppress cavitation erosion, one runner was modified.

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.

# Improvement ?

Wicket-gate cavitation characteristic:  
**Original runner**

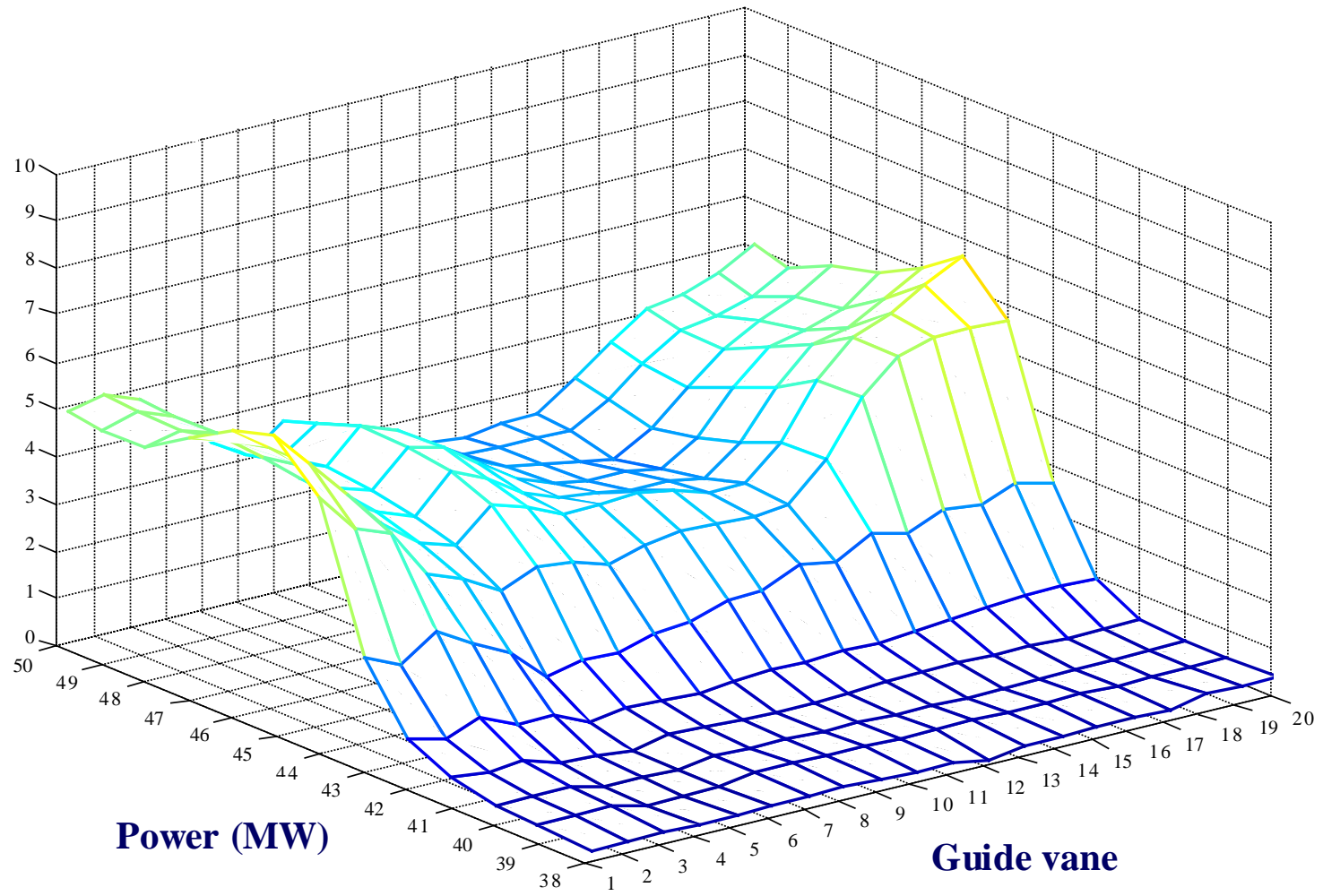
Component of the cavitation intensity influenced by a guide vane (% of the total)



# Improvement ?

Wicket-gate cavitation characteristic:  
**Modified runner**

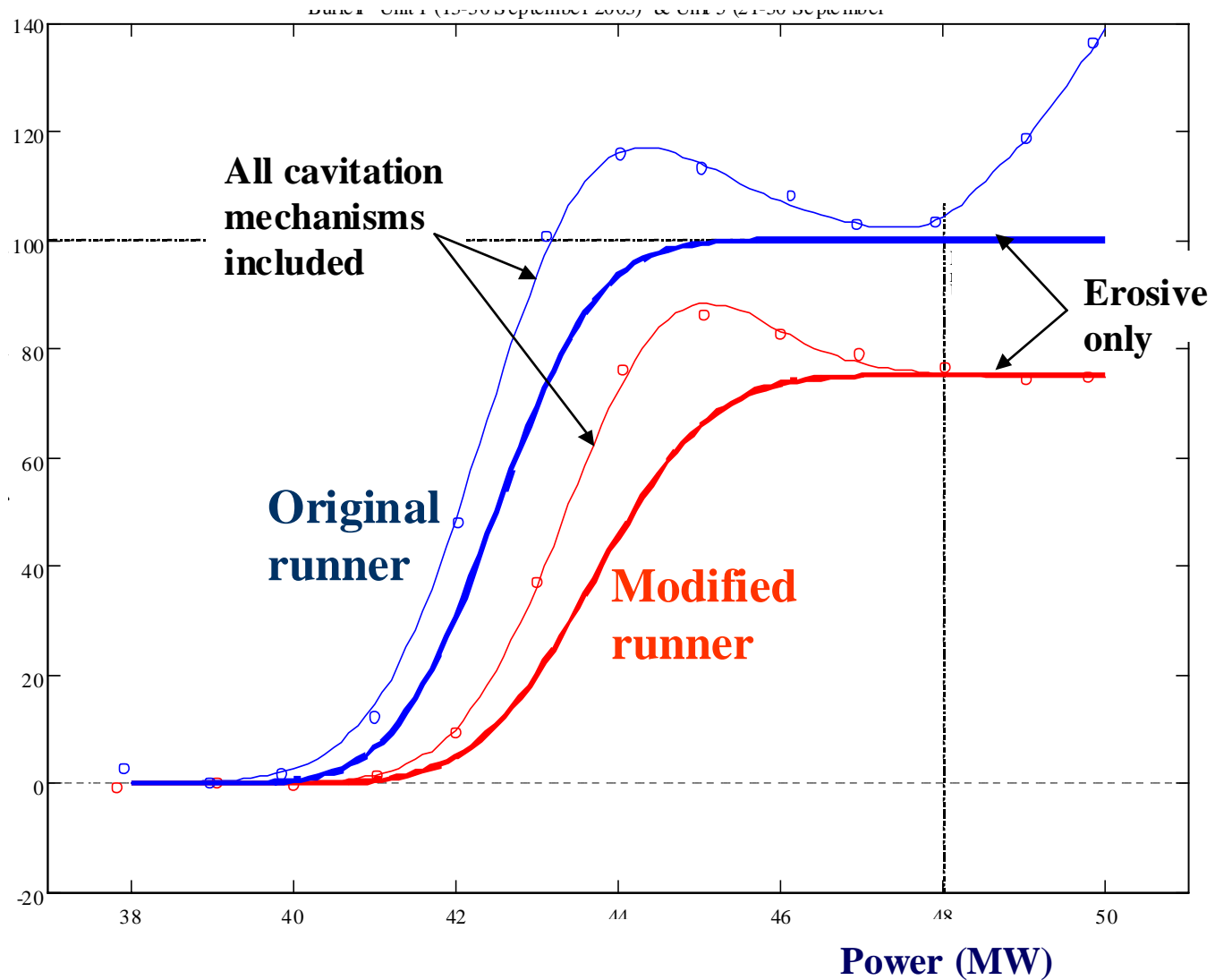
Component of the cavitation intensity influenced by a guide vane (% of the total)



# Improvement ?

Global cavitation characteristic

Total cavitation intensity on the runner (%)



# Improvement ?

Cavitation not eliminated  
Critical power 1 MW higher  
Intensity 25 % lower

Total cavitation intensity on the runner (%)

