

PERFORMANCE ESTIMATION AND DESIGN OPTIMIZATION OF COOLING TOWER FAN

VERTICAL:
**POWER & NUCLEAR
ENERGY**

SERVICE:
**CUSTOMIZED CAE
SOFTWARE**

TECHNOLOGY:
CFD

Our customer is a large enterprise that erects & commissions cooling towers for thermal power plants. One of their projects required them to design & install a 34ft diameter fan, a size that is normally a standard for cooling tower fans. However, due to the stringent power consumption criteria on fan, customer decided to rework the design. Uncertainty over existing thumb rules & major time, cost associated with prototyping & evaluation, led them to adopt a design-by-analysis approach.

Zeus Numerix used its proprietary fan design software, FanZ™ that uses Blade Element Method to estimate performance. It requires lift and drag coefficients for the airfoil section of fan, which were obtained using CFD analysis on proprietary software, CFDExpert™. Finding that efficiency of first-cut fan design was not upto the required value, optimization module of FanZ™ was used to get the optimum twist & chord length of airfoil along the span of fan blade.

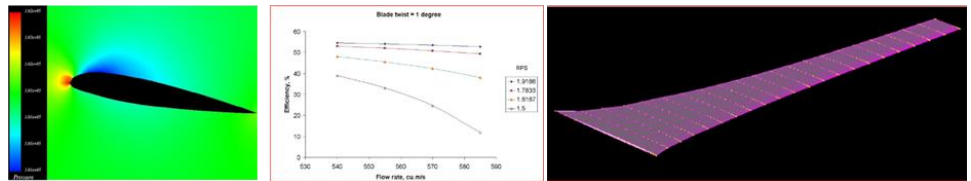


Figure 46: (a) CFD result of airfoil section; (b) performance prediction of fan; (c) Optimized fan blade design

The optimum fan blade design was delivered to the customer in AutoCAD® format. The customer went ahead with the fabrication of the recommended fan design. On commissioning the desired energy efficiency was successfully obtained.