

**Scaling up of cross flow turbine t15-300 for capacity improvement by using  
Computational Fluid Dynamics (CFD).**

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A study on scaling up of the cross-flow turbine model T15 300 using Computational Fluid Dynamics (CFD) has been conducted. The aim of this study was an attempt to increase the capacity of the crossflow turbine from the existing maximum power of 150 kW. The geometrical parameter was first determined. The effects of runner diameter linked with other geometrical parts were investigated at different heads and flow-rates. The runner diameter, head and flow-rate were varied and power output was determined respectively. Moreover, flow characteristics were studied while effect of number of blades on turbine performance was determined numerically. The results from this study revealed that, increasing the runner diameter from 300 mm to 1200 mm with flowrate  $2.64 \text{ m}^3/\text{s}$  and net head 50 m, increased power output from 150 kW to 1.0 MW. It was also found that, scaling-up has insignificant effect on the flow pattern in the crossflow turbine. Similarly, it was found that the number of blades has effect on the performance of the turbine for the given range. Moreover, the turbine specific speed for the scaled-up turbine was determined to be 61 that is in good agreement with recommended standard range of 40 – 200. In general, findings from this study suggest that, crossflow turbine can be scaled-up to improve power generation capacity. However, it is recommended that further studies be carried out on the effect of number of blades on flow characteristics for performance optimization of the turbine.