

CASE STUDY

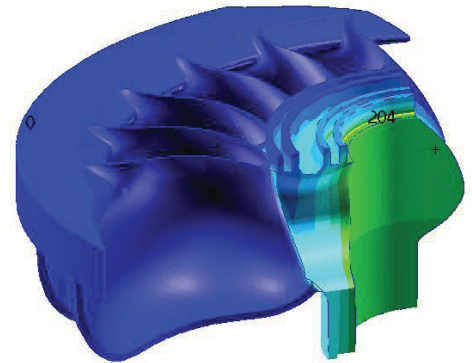
BRANDYWINE, ROR Power, Gilkes Turgo Turbine Upgrade

THE TURGO TURBINE BACKGROUND

In 1919 Gilkes invented the Turgo Impulse turbine. This turbine design has since been continually developed and refined into what has now become the most versatile turbine on the market for small hydro. The Turgo's favourable efficiency performance at low flows ensures that more often than not on a run of river scheme, improved annual energy results will be achieved compared to other turbine types. Combined with this, the turbines superior ability to cope with abrasive water has ensured that the Turgo turbine has proved a great success worldwide. However, this success has led to its design being imitated, but not necessarily duplicated...

CASE STUDY BACKGROUND

In 2011 Gilkes were asked to visit a site in Canada which housed two Turgo machines which had been manufactured and installed by another manufacturer in 2005. Upon the site visit it soon became apparent that these machines had been modelled on an old 1980's Gilkes Turgo design. Not only was this an old design, the critical runner and spear tip/seat dimensions had not been achieved. In turn and as expected, these poorly modelled turbines were not achieving their desired output.



FE analysis to optimise design

Gilkes therefore proposed implementing the critical dimensions of their modern Turgo design. This mechanical upgrade involved retrofitting new Gilkes designed runners and spear tips, as well as modifying the existing seat to achieve the optimum spear tip/seat relationship. The objective of this upgrade was to improve the power output of the turbines, but more specifically, to improve the annual energy production of the plant.



New runner bore machining



New CNC machined runner installed

"After years of underperformance from the two Turgo machines installed at one of our premium sites we approached Gilkes to see if they, being the original inventors of the Turgo Turbine could assist us with our power and annual energy deficiency. Upon completion of the upgrade to retrofit the existing turbines with their latest design of the nozzle, spear tip and runner arrangement, we achieved an immediate increase in power!!

We were extremely pleased with Gilkes' performance on the project and are currently assessing the performance gains which we will share with you as soon as we have completed our analysis. We also eagerly await to see how this will increase our overall annual energy production once we have operated the units for a full year through both the high and low flow periods."

Rick Hopp, ROR Power.

CONTACT

Email: hydro@gilkes.com Tel: 01539 720028 Fax: 01539 732110

www.gilkes.com

Gilbert Gilkes & Gordon Ltd, Canal Head North, Kendal, Cumbria LA9 7BZ. Registration No.173768 London

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