Pacific Northwest
NATIONAL LABORATORY

PNNL-35673

Percheron Power Archimedes Screw Turbine Analysis (Abstract)

CRADA #364 (PNNL #68798)

February 2024

David R Geist

Percheron Power, LLC

U.S. DEPARTMENT OF ENERGY

Prepared for the U.S. Department of Energy
under Contract DE-AC05-76RL01830

DISCLAIMER

PACIFIC NORTHWEST NATIONAL LABORATORY
operated by
BATTELLE
for the
UNITED STATES DEPARTMENT OF ENERGY
under Contract DE-AC05-76RL01830

Printed in the United States of America

Available to DOE and DOE contractors from the Office of Scientific and Technical Information,
P.O. Box 62, Oak Ridge, TN 37831-0062
www.osti.gov
ph: (865) 576-8401
fox: (865) 576-5728
email: reports@osti.gov

Available to the public from the National Technical Information Service
5301 Shawnee Rd., Alexandria, VA 22312 ph: (800) 553-NTIS (6847)
or (703) 605-6000
email: info@ntis.gov
Online ordering: http://www.ntis.gov

PNNL-35673

Percheron Power Archimedes Screw Turbine Analysis (Abstract)

CRADA #364 (PNNL #68798)

Abstract

February 2024

David R Geist

Prepared for
the U.S. Department of Energy
under Contract DE-AC05-76RL01830

Pacific Northwest National Laboratory
Richland, Washington 99354

Abstract

PROBLEM: Recent research has shown that the conventional helicoid shape used for steel blades in Archimedes screw hydroelectric turbines are not optimum for hydraulic performance.

PROPOSED SOLUTION: Percheron will work with PNNL to analyze optimized turbine blade designs using advanced CFD (computational fluid dynamics) and FEA (finite element analysis) models to compare the performance of different turbine designs and predict the materials requirements for the future turbines.

GOALS: Percheron will develop and select up to six theoretically improved turbine designs that PNNL will simulate to generate CFD pressure loads and FEA stress analysis, and provide the analysis in a detailed technical report. Percheron will use the results to build prototype composite turbines and test them in a lab and in the field.

Pacific Northwest National Laboratory

902 Battelle Boulevard
P.O. Box 999
Richland, WA 99354
1-888-375-PNNL (7665)

www.pnnl.gov