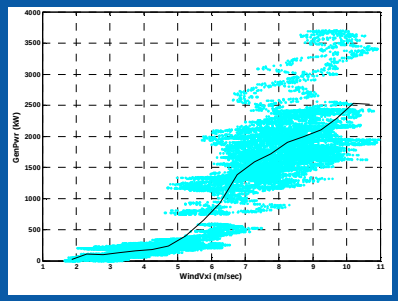
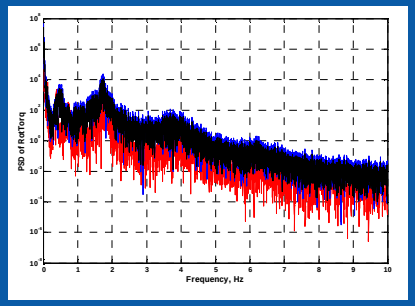
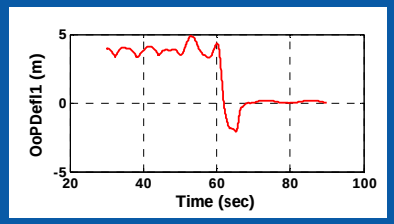
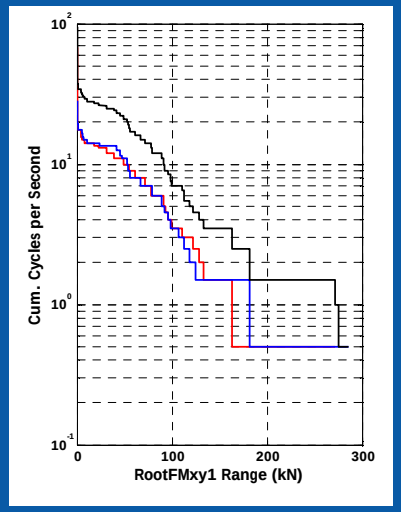
National Renewable Energy Laboratory
Innovation for Our Energy Future

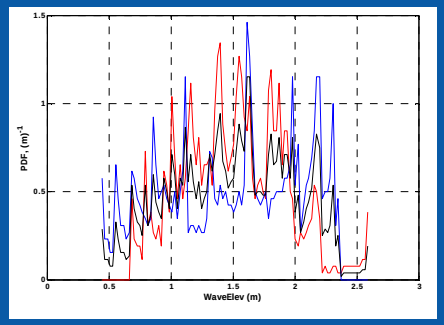
MCrunch – A MatLab-Based Postprocessor











Design Codes Workshop

September 25, 2008

Marshall Buhl

Why MCrunch?

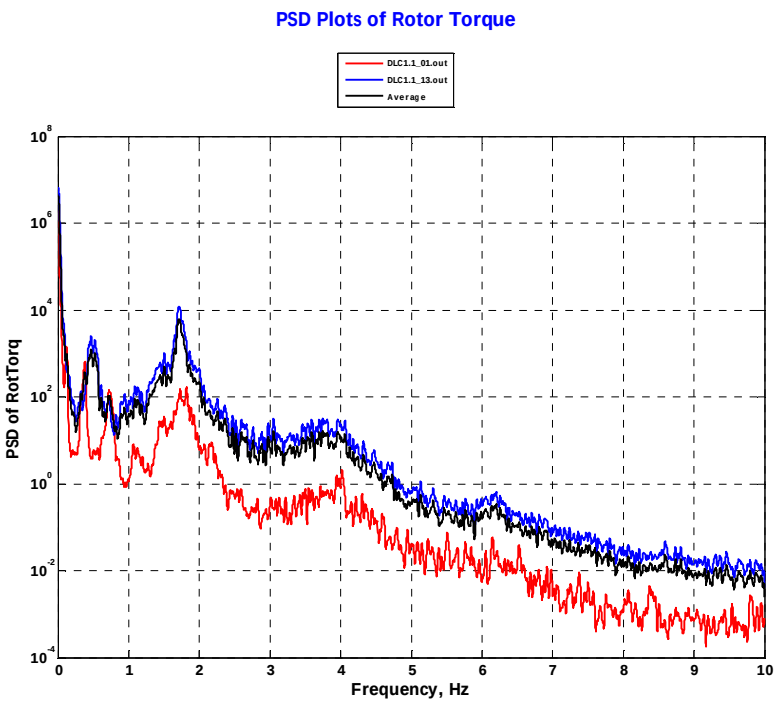
- We had several postprocessors with a variety of features (Crunch, GPP, GenStats, Fatigue)
- We wanted one code that does everything
- We wanted to add new analyses
- Previous codes written in Fortran
- Students learn MatLab instead of Fortran
- MatLab has built-in functions that do many of the things we want
- Good, built-in plotting capabilities
- Polls of the industry said we should use MatLab
- Users can write own scripts to call selected functions

Why Not MCrunch?

- MCrunch requires expensive software including Statistics and Signal Processing toolboxes.
- Programmer (me) has been programming Fortran since 1971 and MatLab since 2007. Can you guess what he is better at?
- Although some of the functions save development time, Fortran is a more-mature language. Some things much easier in Fortran.
- Fortran is probably faster, but no benchmarks have been made.

MCrunch Status

- Started in FY07
- Basic architecture set, but should be reviewed
- Some core functionality
- Buggy alpha version available to test
- User's guide published
- No work currently in progress
- More planned for FY09

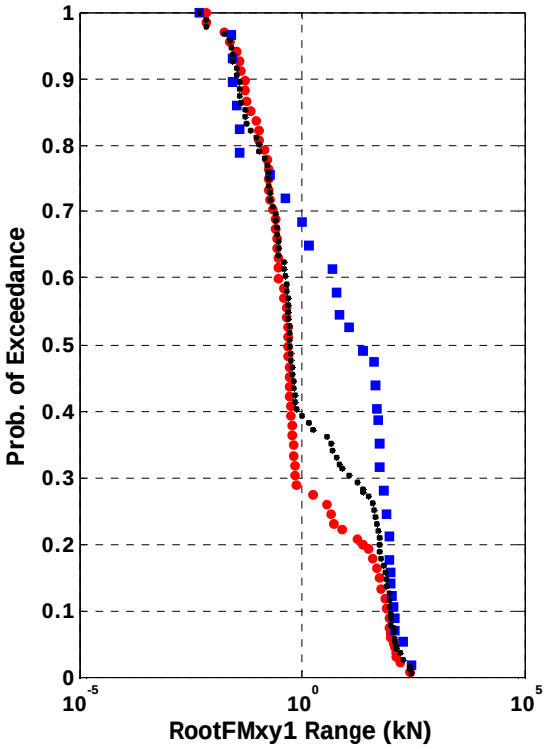


Current MCrunch Features

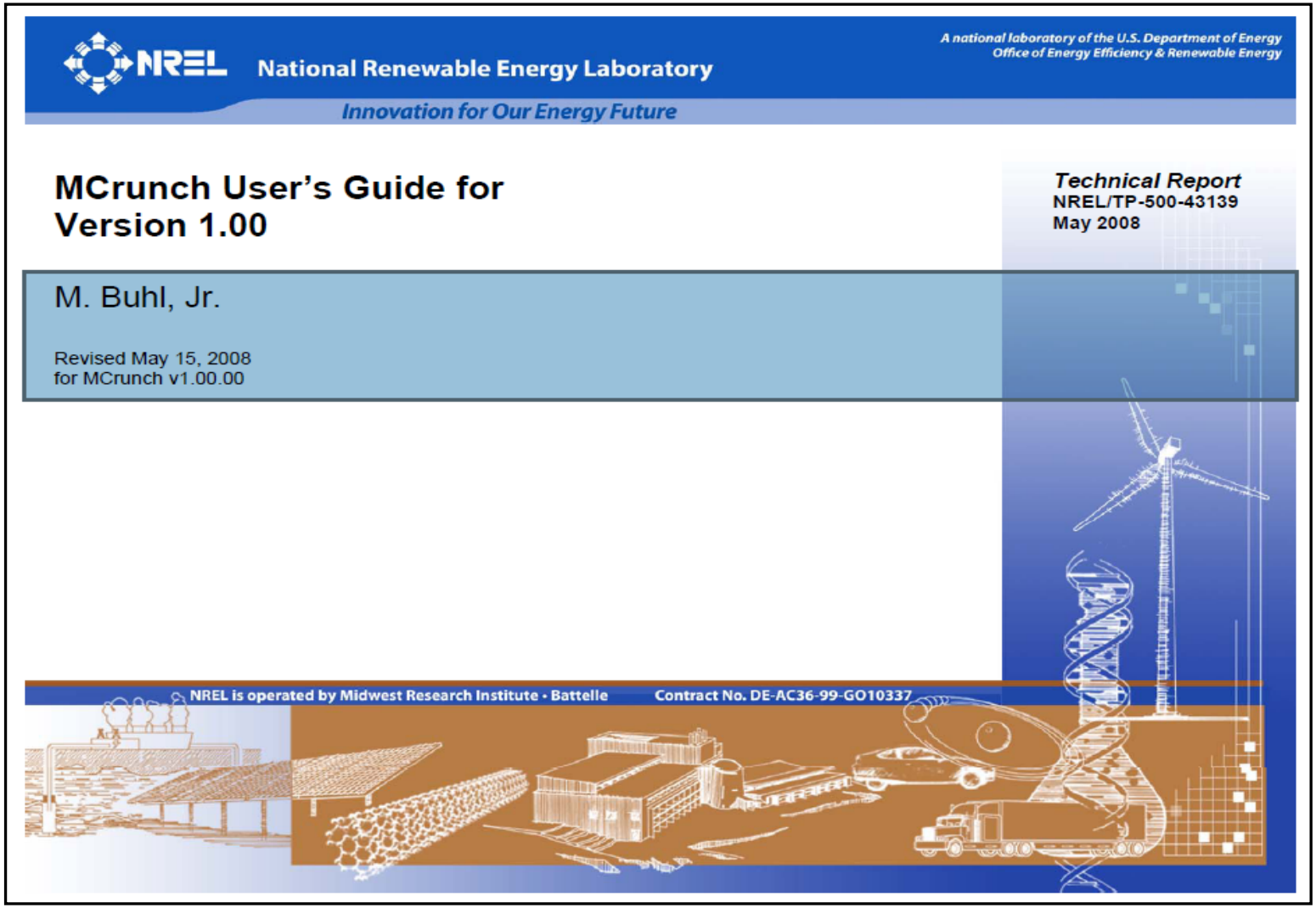
- Scales and offsets
- Calculated channels
- Statistics
- 1D & 2D binning (e.g., Power vs Wind Speed)
- Extreme-event tables
- Probably density (Histograms)
- Power spectral density
- Fatigue
  - Rainflow cycles
  - Single-condition DELs
- Plots of time series and many output types
- Input files may have different lengths
- Users can create custom scripts to call MCrunch functions

Proposed MCrunch Features

- Ability to read CART files
- Add cross spectra to the spectral analysis
- Polynomial fitting (for BModes output)
- Time-weighted DELs including shutdowns
- Filtering
- Moving averages
- Azimuth averages
- Crosstalk removal
- Peak and valley listing
- Statistical extrapolation
- Decimation
- Interpolation
- Consider changing it so only one file is in memory at a time.



MCrunch User's Guide



NREL National Renewable Energy Laboratory

A national laboratory of the U.S. Department of Energy
Office of Energy Efficiency & Renewable Energy

Innovation for Our Energy Future

MCrunch User's Guide for Version 1.00

Technical Report
NREL/TP-500-43139
May 2008

M. Buhl, Jr.

Revised May 15, 2008
for MCrunch v1.00.00

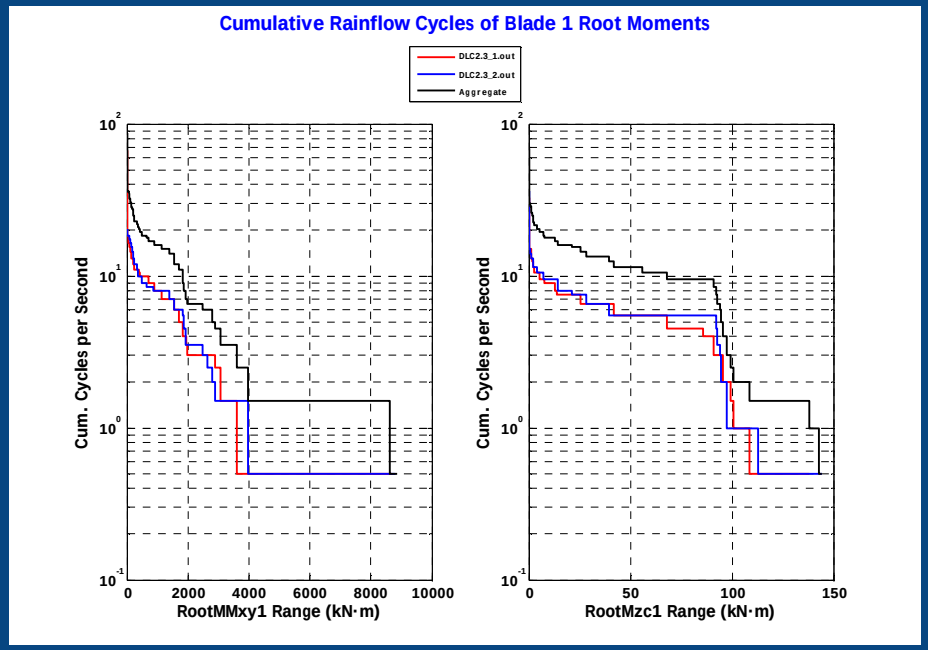
NREL is operated by Midwest Research Institute • Battelle Contract No. DE-AC36-99-GO10337

MCrunch Demo

http://wind.nrel.gov/designcodes/postprocessors/mcrunch/alpha

National Renewable Energy Laboratory
Innovation for Our Energy Future

Questions?



Marshall Buhl

+1 (303) 384–6914

marshall_buhl@nrel.gov