Clipper Liberty Series

David Still
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Agenda

- Introduction to Clipper Windpower
- Liberty Design
- Advanced Technology
- Testing and Certification

The Company

Clipper was formed in 2001 with two subsidiaries:

- Clipper Windpower Development: responsible for project development
  - 44 MW Flying Cloud Project in 2003
  - 160 MW Intrepid in 2004
  - 6000 MW Project Pipeline
- Clipper Windpower Technology: responsible for technology development
- Clipper added four new subsidiaries in 2004/5:
  - Clipper Windpower Europe and Clipper Windpower Marine
  - Clipper Turbine Works: responsible for turbine production and manufacturing
  - Clipper Fleet Services: responsible for maintenance and service

Experienced Leadership

Name	Position	Years in Wind
Jim Dehlsen	Chairman and CEO	25 +
Brent Dehlsen	Chief Operating Officer	15 +
Amir Mikhail	President Engineering	25 +
Kevin Cousineau	Director of Electrical Engineering	25 +
Bob Gates	SVP Commercial Operations	25 +
Jeff Maurer	VP Construction and Fleet Services	15 +
Peter Stricker	VP Development	10 +
Jody Shadden	Director of Manufacturing	15 +
Mike Messier	Director of Fleet Services	15 +

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Awards and Recognition

- The LWST program was awarded in 2003
- The C-93 became operational in 2005
- Awarded $13M in grants by DOE and CEC
- Developed the Liberty™ 2.5 MW series under the $8.9M DOE Low Wind Speed Turbine program in partnership with DOE/NREL
- First prototype developed in 2001-2003 under a grant from the CEC and thoroughly tested at the NREL Dynamometer Test Facility in 2004

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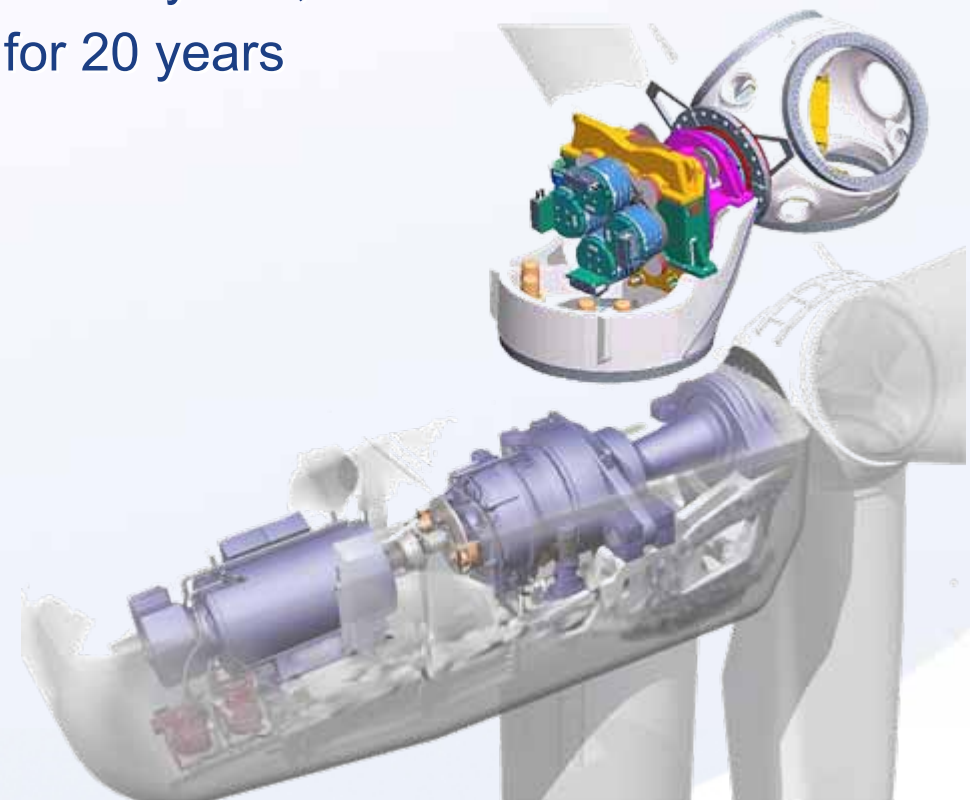
Clipper Technology:
Evolution of Industry Standard

Lower Cost of Energy by design

- Weight reduction, comparison of 2.5 MW class turbines
- The Liberty™ turbine can be installed with cranes sized for commercial 1.5 MW turbines
- Higher powertrain efficiency resulting in lower COE
- Extended fatigue life of 30 years,
- Most turbines rated for 20 years



Designed for Ease of Maintenance and Serviceability

C-93 designed for ease of assembly, installation and maintenance

- Hub access through nacelle ports
- Service Lift for up-tower access
- Full head-room and walk-around
- 2 ton jib crane services
  - Brakes
  - Generators
  - Pinion cartridges
  - Yaw motors
  - Hydraulics and cooling systems

Liberty: Designed for enhanced availability and easy maintenance

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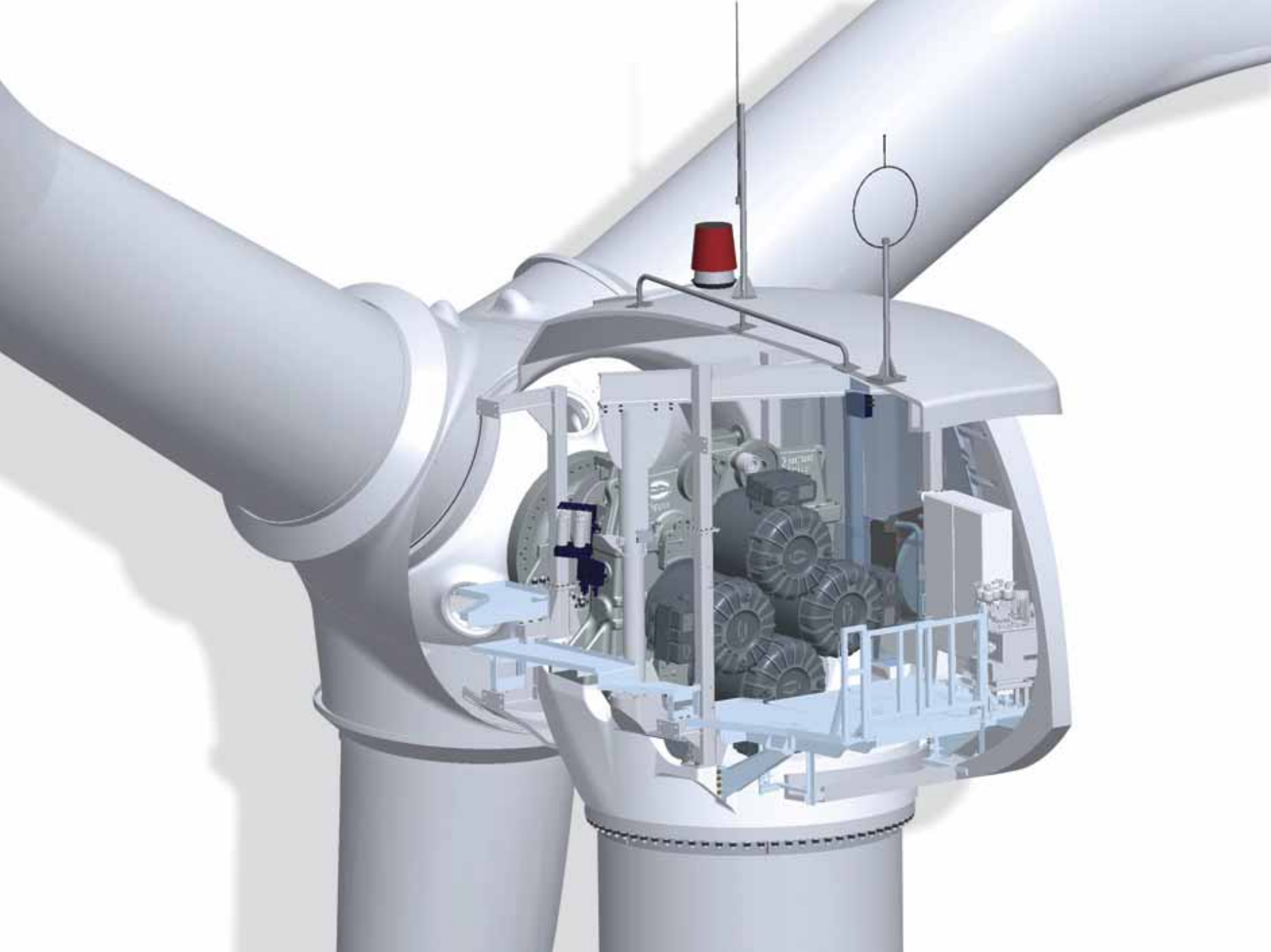
Turbine Production in Cedar Rapids

- April 21, 2005: Clipper announces 2.5 MW wind turbine production
- September 23, 2005 Grand Opening of Plant
- 140 jobs will be created at the Clipper Turbine Works Plant
- Lease option for 210,000 square feet of factory and office space



Advanced Technology

The Quantum Distributed Generation Drivetrain (DGEN-Q) (3 Patents: 2 Issued, 1 Allowed)

- Four high speed output shafts
- Lighter and more efficient than other commercial GBs
- Split load by a factor of 16, 400% more than the commercially available GBs
- Two stages, vs. the three used in commercially available gearboxes
- Ability to replace all high-speed stage components using on-board gantry crane

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MegaFlux™ Permanent Magnet Generator

(Patents Pending)

- Very compact 3.5' x 3.0'
- Does not require coupling between the GB and the generators because of low short-circuit current
- Efficiencies 3 to 4% more over conventional doubly fed or wound field synchronous
- Totally enclosed TEWAC, free from contamination
- An IP54 air-cooled option is available for less demanding application
- Form wound class H stator insulation rated for medium voltage
- Low weight < 4000 Lbs. per generator. Can be handled by on-board gantry crane
- Can operate with 3 or 2 generators

Variable Speed System

(Patent Issued, Others Pending)

- Fewer parts and higher reliability
- Generators completely isolated from grid, which allows for easier voltage ride through capability and complete isolation from grid disturbance
- Control system anticipates resonance conditions within DGEN-Q structure and generators, and patented software precludes development of harmful vibrations
- Unity power factor operation, down to 5% of rated power

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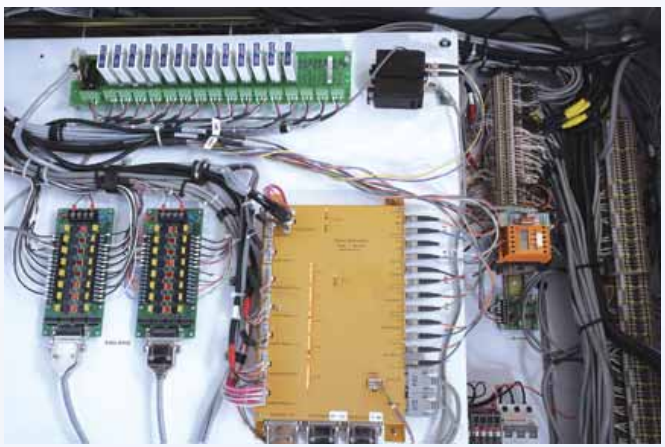
Turbine Control System (TCU) and Clipper VAR Control (CVAR) (Patent Issued)

- Purpose designed, embedded processor
- Tower and Gearbox damping through pitch and torque control
- Clipper distributed Static VAR Correction System (CVAR) provides VAR compensation and voltage regulation if needed
- Meets current new requirement for ride-through with 90% reduction in rated voltage for 3 seconds.

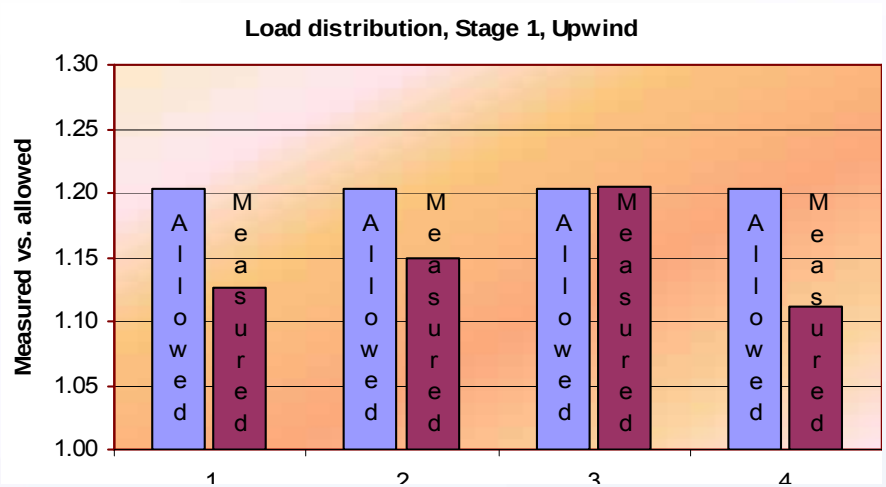


Testing and Certification

Subsystem Testing

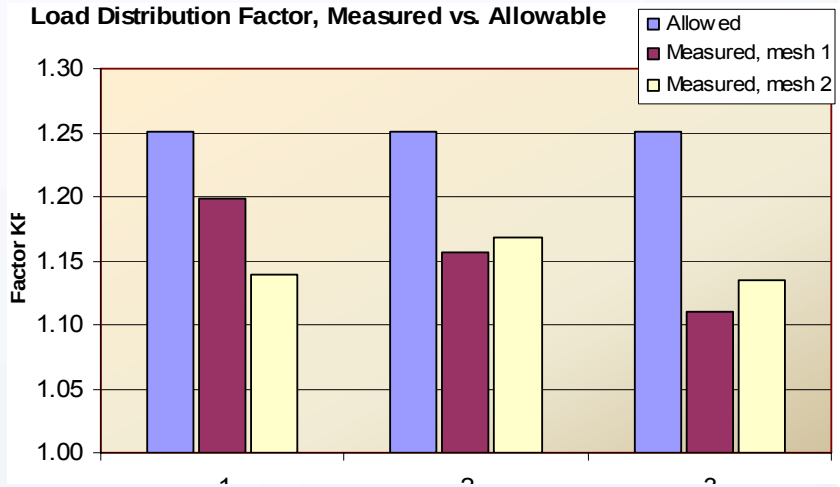
The DGEN-Q Test at NREL Dynamometer Test Facility

Stage 1 signal example



Comparative results, KF , stage 1 upwind

Stage 2 example of data extraction forthe 4 HS pinions



Comparative results, KF , stage 2 mesh 1and 2

Subsystem Testing

- MegaFlux™ Converter Technology
  - Verified efficiencies, temperature increase and dynamics of the Clipper MegaFlux™ generators

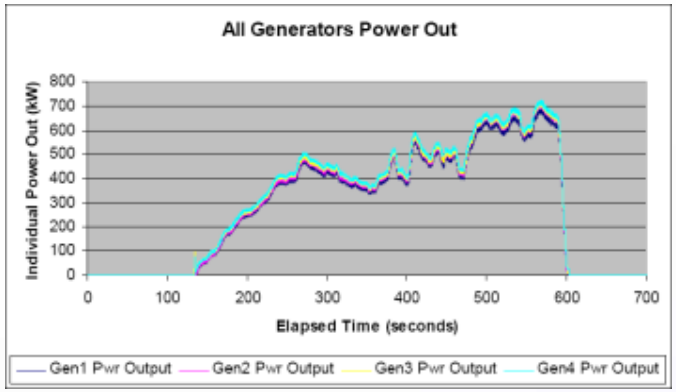
Extreme and Fatigue Load Testing - Blades

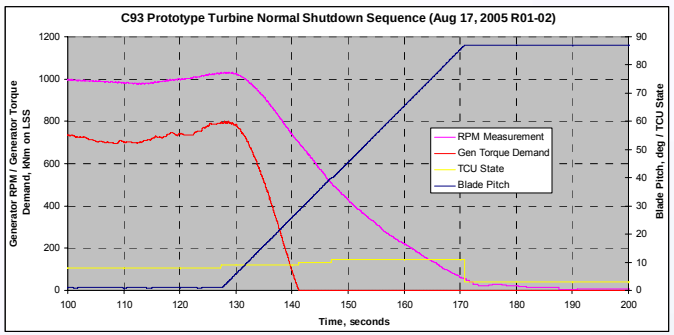
The C-93 at Medicine Bow, Wyoming

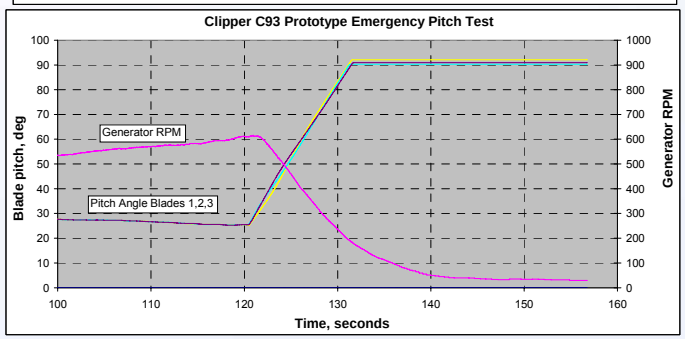
Testing the C-93 at Medicine Bow, Wyoming

- Pitch system functional testing (servo and Emergency Feather function (EFF))
- Controls tuning (PI on pitch, torque control and drive train damping)
- Determination of preliminary power curve
- Design of full inboard-chord airfoil
- Power curve measurement and improvement
- Development of generator rectifier snubber circuit dev
- Totally enclosed water-to-air cooled (TEWAC) cooling kit performance assessed and selected for delivery to corrosive (near-shore/offshore) project locations
- Air-cooled generator configuration selected for non-corrosive, inland project locations

Testing the C-93 at Medicine Bow, Wyoming







- Turbine Control Unit (TCU) functional testing
- Safety system functional testing
- Conducted tests and implemented protocols for continued monitoring of subsystem reliability (gearbox, bearings, electrical systems)
- Yaw brake system hydraulic controls and algorithms developed
- Baseline acoustic measurements performed
- Baseline system thermal performance established

Thank You…Questions?

David Still
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