

Home Grown Energy
February 28, 2006
University of Minnesota, Morris

Renewable Energy Technologies for Farms,
Businesses, Homes and Public Buildings



Reliable With Every Turn™

Topics

- EMS Background
- System Overview
- Installation
- Maintenance
- Reliability
- Production
- Economics



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EMS Background

- Privately held corporation with corporate offices located in Gary, South Dakota
- Remanufacturing and component repair facility in Howard, South Dakota
- O&M base in Tehachapi, California
- 75+ full time employees
- Driven by Safety – Mod Rate of .73



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Revenue Sources

- Services
 - Operations, scheduled and unscheduled maintenance, asset management
- Construction
 - Primarily offload through commissioning
- Technical Support
 - UL Certified Customer Control Systems
- **Remanufacturing**
 - **Customer owned components, complete turbine systems**



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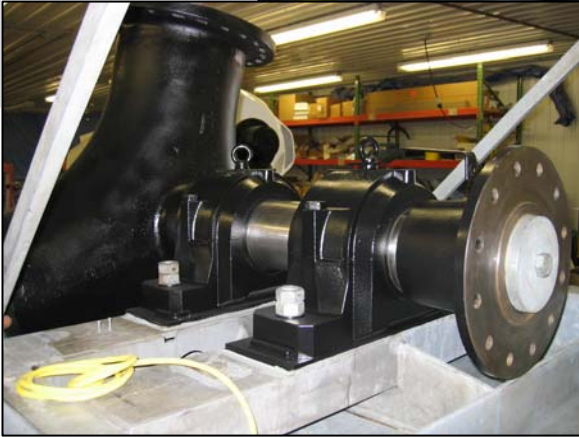
Remanufacturing



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Nordtank Hub & Main Shaft Rebuild



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Remanufacturing – Quantitative QC Standards



Blade Number	Leading edge deflection	Trailing edge deflection	Chord Length
EMS-009	0.09 mm	0.08 mm	40 inches
EMS-010	0.02 mm	0.07 mm	40.5 inches
EMS-011	0.08 mm	0.07 mm	40 inches



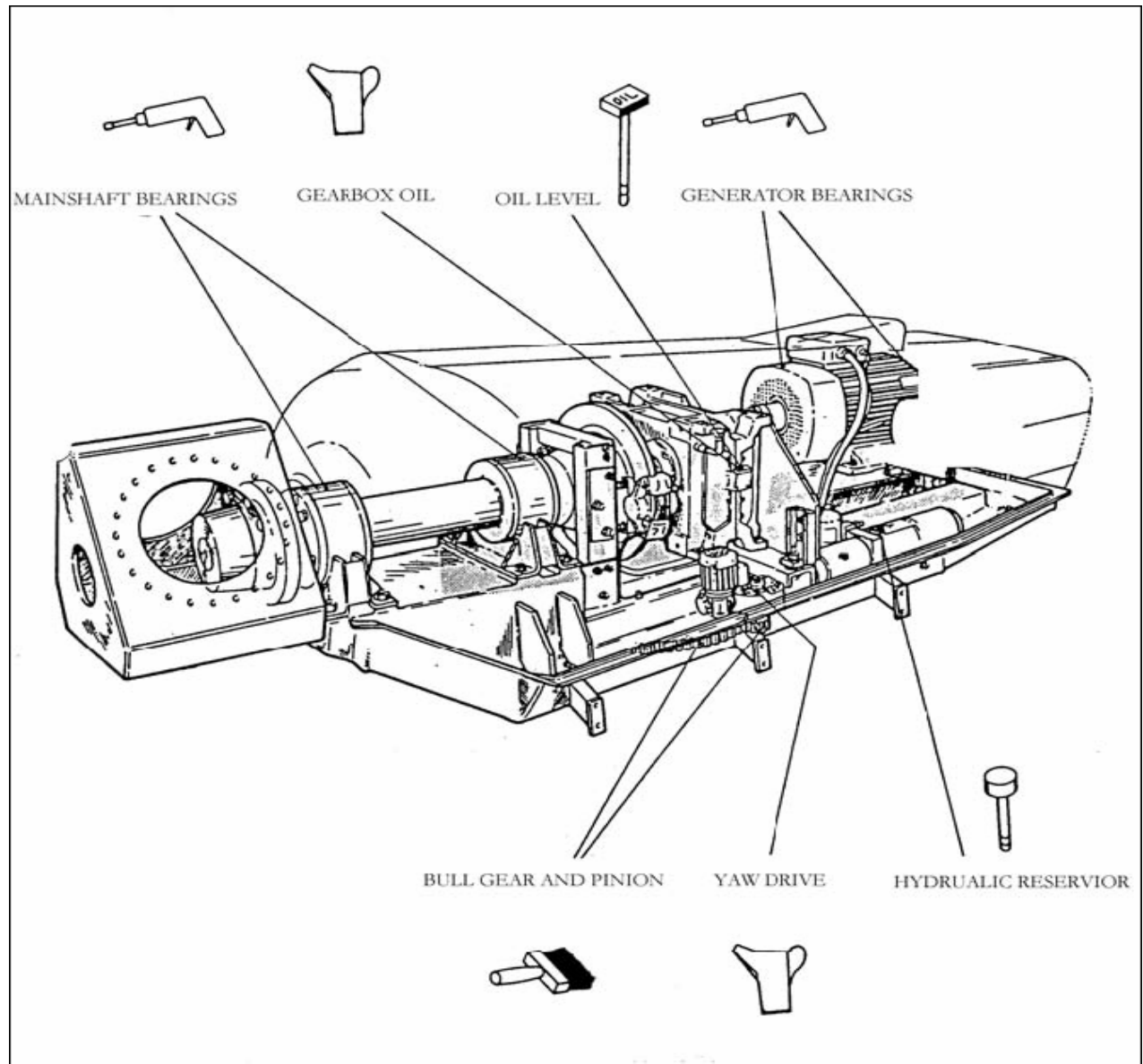
Blade Number	EMS-009	Set # 3
<i>Weight in Pounds</i>	Root	Tip
Weight Before	425	292
Weight Added	10	-5
Weight After	435	287



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EMS E15 System Overview



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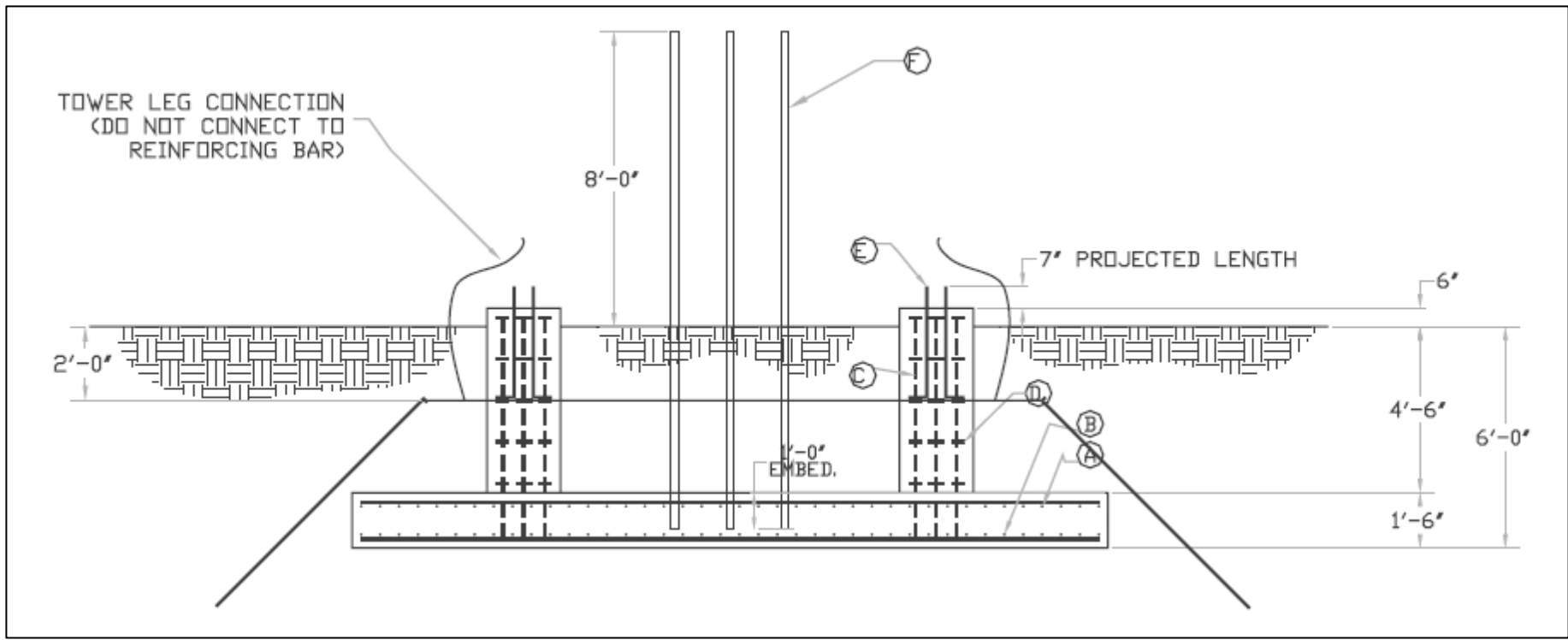
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Installation

- Foundation – 28 day cure
- Electrical – Panel to Interconnect
- Shipping, Offload, Assembly and Erection – 2 to 3 days Wx permitting
- Termination – Local Electrician
- Commissioning



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Scheduled Maintenance

- Every Six Months
- Up-tower Inspection
 - Torque, grease, oil and clean rotor assembly, yaw system, break system, g-box, coupling, generator
- Tower
 - Torque inspection
- Panel
 - Connections and clean



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Capacity and Availability

- Capacity Range on the 35kW unit of 20 to 30% (45,000 to 90,000 kWh annually).
- Availability 90%+



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Basic Economics

- FOB Howard \$53 to \$55K (original 80' tower)
- Turnkey \$70 to \$80K
- COE of .06 to .08 per kWh (est. energy production divided by est. 20 yr capital outlay)
- Depreciation? State/Fed Incentives? Grants?
- Good macro/micro citing, good winds and preventative maintenance are the keys to project success



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