WNEC & FloDesign Partnership

• Founded By Dr. Presz in 1990
• Bridge Academe to Industry
• Faculty & Student Research
  – Commercial Contracts/Hands On Projects
  – DOE, DOD & NASA Grants
  – SBIR
  – FloDesign IR&D
• Multiple Benefits
  – SOA Courses & Labs
  – More Experienced Faculty
  – National Recognition
  – Better Trained Engineers
  – More Reasonable Research Costs
  – Outside The Box Ideas
WNEC Laboratory Experiments & Discoveries Helps Lead To New Invention  
Mixer-Ejector Pump

[Images of laboratory experiments and diagrams]

FloDesign Wind Turbine

[Logo: FloDesign Wind Turbine]
MIXER/EJECTOR TECHNOLOGY KEY

FloDesign’s Numerous Patents & Unique Expertise

- Rapid, efficient energy transfer
- The lobed mixer design critical:
  - Large scale, low loss mixing vortices
  - Rapid mixing
  - Short, compact pump
  - No moving parts

Ejector Pump – Long Mixing Duct Required

Mixer/Ejector – Short & Compact
FloDesign’s Mixer/Ejector Applications
All Started With WNEC Senior Projects!!!!

- Stage III Technologies
  - Gulfstream GIII
  - Noise Suppression
  - Thrust Augmentation
  - Patents: 06233920; 05761900

- Boeing 737
  - Noise Suppression

- Sikorsky
  - IR Suppression

- Propulsion Is Where It All Started!!!
Disruptive Technology Lessons

Migrating a mature technology to a new market that delivers a disruptive combination of performance and price” Clayton Christianson

- Shrouded mixer-ejector design
  - Changes wind turbine cycle
  - Pumps more flow through turbine

- 3x - 4x traditional turbine efficiency
  - Smaller diameter per kW

- Higher energy density per acre
  - Turbine wake quickly dissipates

- Lower maintenance
  - Shorter blades, no gearbox

- Environmentally sensitive
  - Minimizes impact to height, bird, bats, radar

Goal: Substantially lower cost per kilowatt-hour
From MIT Wright Brothers Wind Tunnel Facility
To On A Tower (Over 20 Student Projects)
From Lab to Product, Lessons Learned

• University Programs Can Help Business Succeed
  – Technology Drives Most Small Business
  – Students Can Be Very Productive Through Hands On Projects

• Laboratory Efforts & Hands On Testing Encourage Novel Technology & Products
  – Computer Modeling Has Severe Limitations

• Disruptive Technology Lessons
  – Think Outside The Box
  – Patent New Ideas
  – Provisional Patents Are Easy & Inexpensive To File
  – Patents Are Extremely Valuable To New Companies
  – Migrate Mature Or Known Technology To New Product Applications

• Today Anyone Can Start A New Business!
FloDesign specializes in the development of innovative technologies through:

- Joint Research Agreements
- Independent Research & Licensing Agreements
- Contract Engineering Efforts
- WNEC Faculty & Student Efforts
- The Formation of Spinout Companies
- Small Business Innovative Research (SBIRs)
Wind is the **Lowest** Cost Renewable

FDWT Funding to date

- Ignite Clean Energy, CEEP
  - Won competitions, $300K in prizes
- $6M Series A, KPCB
  - Doerr and Joy
- $8.3 million ARPA-E grant, NREL collaboration
  - 2 year R&D, advanced materials & aero
- $36M Series B
  - Kleiner Perkins, VantagePoint, Technology Partners, Goldman Sachs, SVB
- $3 Mass Clean Energy Center financing package
- $1.7 million Congressional R&D appropriation
- $750K SBIR
FloDesign Wind Snapshot

• Founded in 2007
• Headquartered in Waltham, Massachusetts
• 57 + employees
• Core expertise in jet engine and wind technologies
• 200 + patent applications (6 + awarded)
• Awards:
  • 2008 – MIT CEEP & ICE Winner
  • 2009 – arpa-e Award (3rd largest – technology called “transformative” by Steven Chu)
  • 2010 – Mass CEC Financing Package
• Investor syndicate:
  • Kleiner Perkins Caufield & Byers
  • Vantage Point Venture Partners
  • Goldman Sachs
  • Technology Ventures
New CEO: Lars Andersen, Joined 1/2010

Former President of Vestas China 2005-2009

• Lars was responsible for leading and growing Vestas China into the largest multi-national-owned wind turbine supplier in China
• Vestas is world’s largest wind turbine manufacturer, with China as one of the largest single markets
• Vestas established 10 factories in 3 provinces, designed and manufactured turbines in China specifically for China

Prior Experience

• Vice President, Project, Vestas Asia Pacific (Denmark) 2003-2005
• Manager, Project Engineering, NEG Micon (Denmark) 2001-2003
• Manager, Hydro Power Projects, Black & Veatch (USA) 1993-2001
• Design and Commissioning Engineer, ABB Power (Switzerland) 1990-1992

Education

• Vestas Executive Education, IMD Business School (Switzerland) 2008
• Advanced Management Program, INSEAD Business School (France) 2007
• Power Systems: Engineering College of Aarhus (Denmark) 1990
Venture Capital Funding?

• Founder Sells a portion, funds used for development
  – Loose Control, “Founderitus”
• There are people who have jobs to deploy $$$
  – Board Members are experienced

• Small piece of BIG pie
• 75% Fortune 100, VC backed
• Google, 55,000:1
Disruptive Technology=Good Idea

“Migrating a mature technology to a new market that delivers a disruptive combination of performance and price” Clayton Christianson

• Only occurs after you have Capital & People
  – Facility helps!

• Don’t fall in love with the technology!!

• Migrate mature technology to growth markets

• Market pulled by customers

• Credibility, Patents, Publications
Raising Capital Lessons

• Full Time job, 6 months
• Cash is king, never stop raising money
• Herd mentality, Do diligence on VC
• VC’s fund the team, not the business plan
• Hype, Web-site, blogs, newspaper, trade shows etc...
• Rejection is the norm, Don’t quit
• 3rd Party Validation,
  – Awards, IP, Hires, Investors, Customers
Team Building Lessons

• Identify the best!!
  – Don’t be greedy
  – Secure Contingent Agreements

• Hire the “head of the snake”
  – Good people follow the best

• Hire people smarter than you
  - Recruit attitude, follow your gut

• Rejection is the norm, Don’t quit
Conclusions

• Some Ideas are best for a start-up
• Match Funding to Idea
• Team Building!
• Protect the Idea, IP
• Optimism Important
• It can be done!