



# FloDesign Wind Turbine



Dr. Walter Presz, Jr.  
Stanley Kowalski III  
10/20/2010

# WNEC & FloDesign Partnership

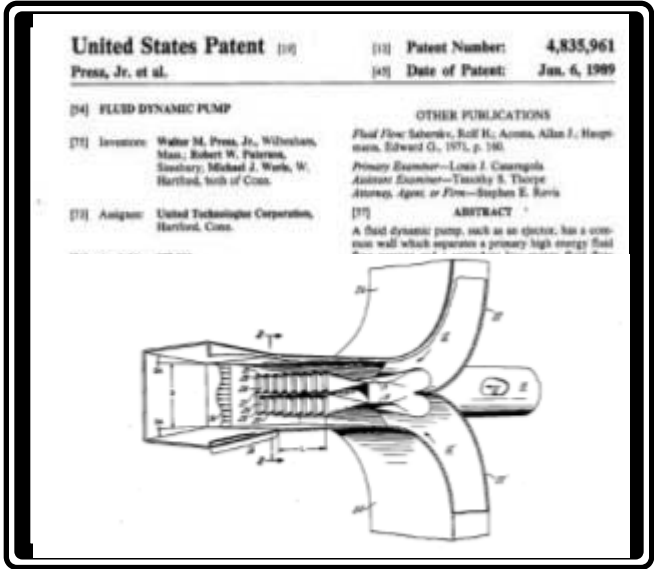
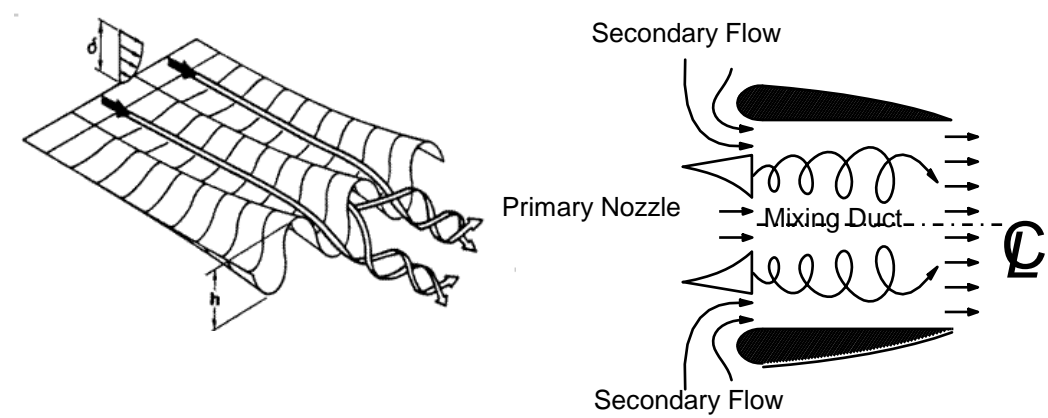
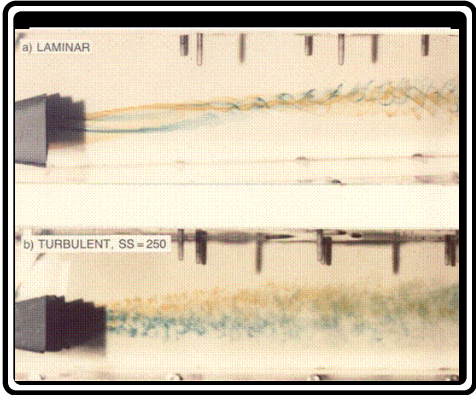
- Founded By Dr. Presz in 1990
- Bridge Academe to Industry
- Faculty & Student Research
  - Commercial Contracts/Hands On Projects
  - DOE, DOD & NASA Grants
  - SBIR
  - FloDesign IR&D
- Multiple Benefits
  - SOA Courses & Labs
  - More Experienced Faculty
  - National Recognition
  - Better Trained Engineers
  - More Reasonable Research Costs
  - Outside The Box Ideas



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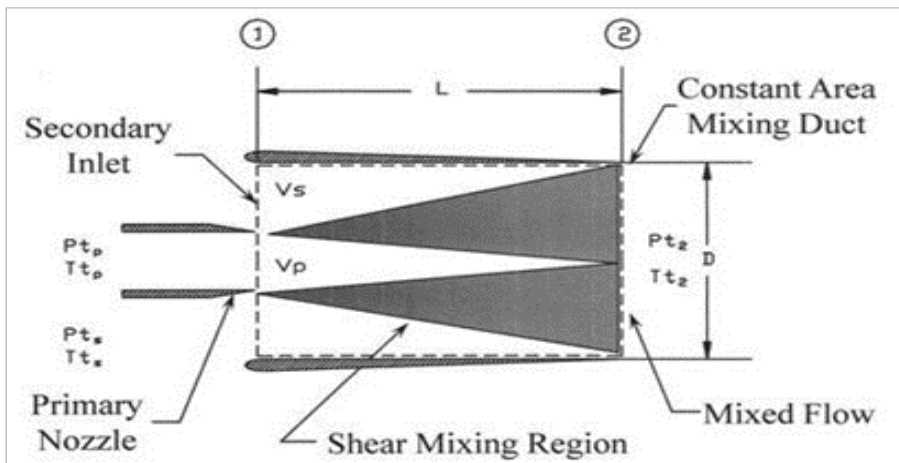
# WNEC Laboratory Experiments & Discoveries Helps Lead To New Invention ➡ Mixer-Ejector Pump



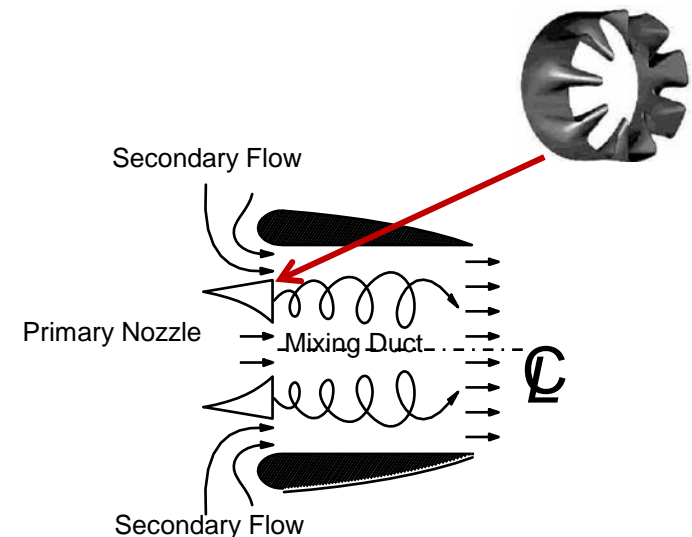
# MIXER/EJECTOR TECHNOLOGY KEY

## *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**

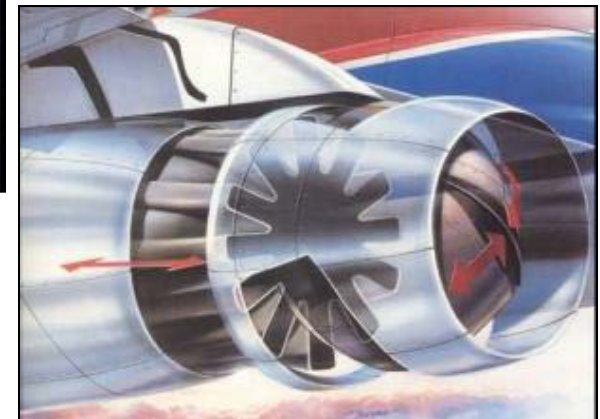
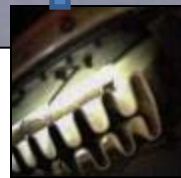


**Mixer/Ejector – Short & Compact**

# 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!**

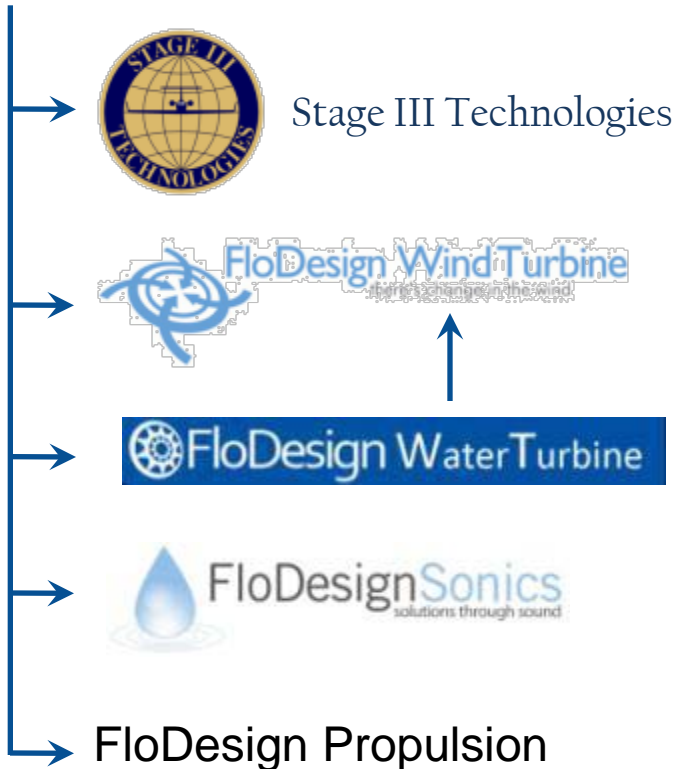


# FloDesign Hub & Spoke History

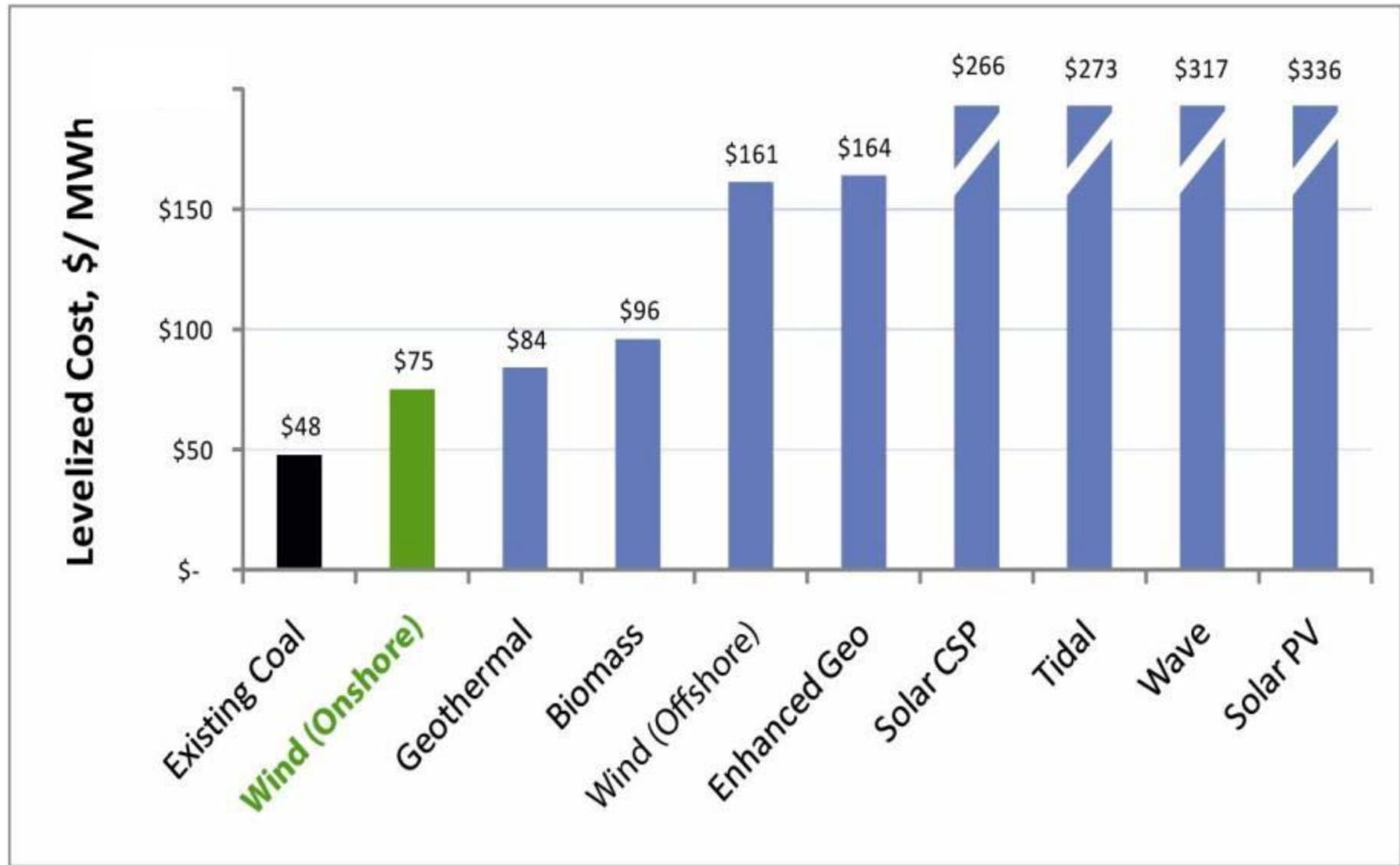


***FloDesign specializes in the development of innovative technologies through :***

- *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



Source: Emerging Energy Research

# 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



- 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 –  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



**VANTAGE POINT**  
VENTURE PARTNERS



# 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
  - Loses Control, “Founderitis”
- 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



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# 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
- 3<sup>rd</sup> Party Validation,
  - Awards, IP, Hires, Investors, Customer



# 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!**

