



Has the fee helped?

- It has been a big asset
- There have no student complaints or even inquiries
- Did have a few questions from parents

Can we strongly connect the Ph.D. program to ABE? Is this the way to build it? Is there a willingness in both departments?

- It is certainly an avenue

Are you fully staffed?

- No
- Thinking about adding a sophomore advisor to take some of the load off the faculty
- M.E. recruits students who sometimes peel off and move into other SDSU programs
- People like the hands-on but don't like the amount of Math necessary for a M.E. degree
- Would also like a technician that could be dedicated to the materials lab
  - This would help research efforts
  - Rather call them a "technologist" instead of "technician"

How many students are in the SDS of M Ph.D. program?

Hard to track at this point

# Mechanical Engineering

## Status, Strengths and Future Directions



Strategic Planning  
Committee Visit  
March 23, 2012

## Status - Faculty

### ➤ Faculty

- 10 University-allocated faculty positions
  - 8 tenured/tenure-track (including department head)
    - 3 Professors
    - 2 Associate Professors
    - 3 Assistant Professors
  - 2 instructors
- 2 instructors on soft funds
- 2 half-time GTA's assist with lab instruction
- 5 GTA's on minimum stipends

# Strengths - Faculty

- Faculty with diverse backgrounds and degrees from a mix of respected engineering institutions:
  - University of Illinois – Urbana/Champaign
  - Iowa State University
  - Missouri University of Science and Technology
  - North Dakota State University
  - University of North Dakota
  - Pennsylvania State University
  - Rensselaer Polytechnic Institute
  - South Dakota State University
  - Tsinghua University

# Challenges - Faculty

- Workload associated with undergrad program

ASME Biennial Mechanical Engineering Department Benchmarking Study- 2010  
U.S. Departments  
Carnegie Classification RU/H (Public)

University-Funded Staffing Numbers per Department

	Mean	10 Percentile	Median	90 Percentile	SDSU ME
Faculty	18.8	10.4	16.0	28.8	10.0
Staff	5.0	1.4	4.0	10.6	2.0

Degrees Awarded per T/TT Faculty

	Mean	10 Percentile	Median	90 Percentile	SDSU ME
BSME	3.7	2.6	3.4	5.4	5.6
MS	0.5	0.4	0.4	0.5	-
MSME	1.0	0.4	0.8	1.1	1.0
PHD	0.3	0.2	0.3	0.5	-

Student-to-Faculty Ratio

SDSU M.E.	SDSU Overall*	SDSM&T Overall*
32.4	17.7	14.4

\*Regents Fact Book Fiscal Year 2011, SDBOR

# Challenges - Faculty

## ➤ Salary compression

	Full Prof.	Assoc. Prof.	Asst. Prof.	Instructor	Lecturer	Half-Time GTA
ASME	\$188,061	\$87,085	\$76,797	\$60,157	\$47,609	\$10,627
SDSU ME	\$87,154	\$77,676	\$71,944	\$55,012	\$45,000	\$12,532
OK Survey	\$127,447	\$92,425	\$80,333	\$57,153		

## Status - Staff

- Staff – University-Allocated
  - 1 Secretary
  - 1 Fabrication Technician
- Staff – Externally Funded
  - Business & Marketing Manager for Materials Evaluation & Testing Lab (METLAB)
  - Post-Doc Research Associate with Bio-Fuels Lab
  - Quarter-time Bookkeeping Assistant

# Challenges -Staff

- Research activity has increased accounting load
- Tasks formerly completed by others have been pushed downward through implementation of software/online systems
- New sophisticated research & lab equipment requires dedicated expertise to operate and maintain

# Challenges -Staff

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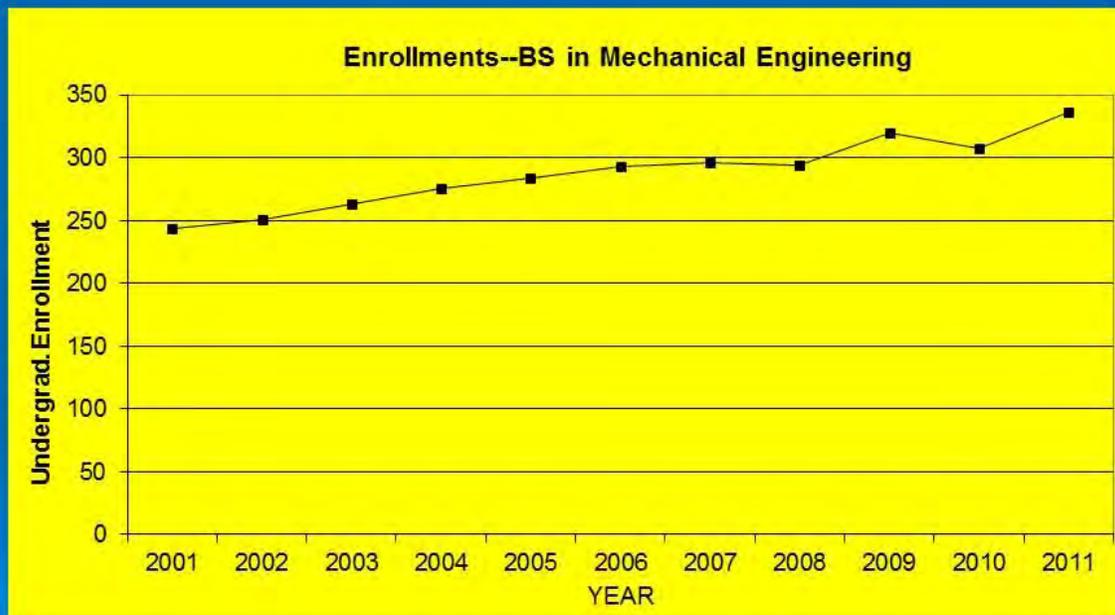
## Status - Students

Five-Year Enrollment Data		
Year	Undergraduate	Graduate
2007	296	17
2008	294	28
2009	320	28
2010	308	19
2011	337	21

8.5% are women  
More than 40% are not from SD

## Comfort Enrollment 250 Undergrads

## Status – Undergrad Program Enrollment Trend



# Strengths - Students

## ➤ Scholars

- Undergrad Research Participants
- Goldwater Scholar
- DOD SMART Scholar
- Briggs Scholars
- Honors College Students
- Successful in Graduate Schools

## ➤ Leaders

## ➤ Sought by Employers

# Strengths - Students

## ➤ Innovators

- Capstone Design Projects – Approximately 12 projects in progress with various external and internal sponsors

## ➤ Internships/Coops

- 60% of M.E. grads completed internships in 2011 (up from 37% four years ago)
- 19 different employers (60% in South Dakota)

## Internship/Coop Locations

3M, Brookings, SD  
Aero Race Wheels, Estherville, IA  
AGCO, Jackson, MN (2)  
Basin Electric (Deer Creek Station), White SD  
Bobcat/Doosan, Gwinner, ND (3)  
City of Sioux Falls - Landfill Gas Recovery, Sioux Falls, SD  
Daktronics, Brookings, SD (5)  
General Motors, Pontiac, MI  
Goodrich, Jamestown, ND  
Horton, Inc., Britton, SD  
Manitou Group (Gehl), Madison, SD  
Missouri River Energy Services, Sioux Falls, SD  
Omaha Public Power District, Omaha, NE  
Raven Industries, Sioux Falls, SD  
Sioux Corporation, Beresford, SD  
Terex Utilities, Watertown, SD  
Trail King, Mitchell, SD  
West Plains Engineering, Sioux Falls, SD  
Xcel Energy- Monticello Nuclear Plant, Monticello, MN

## Students –Professional Organizations

- ASME
- SAE
- ASHRAE
- Pi Tau Sigma



## Status/Strengths - Program

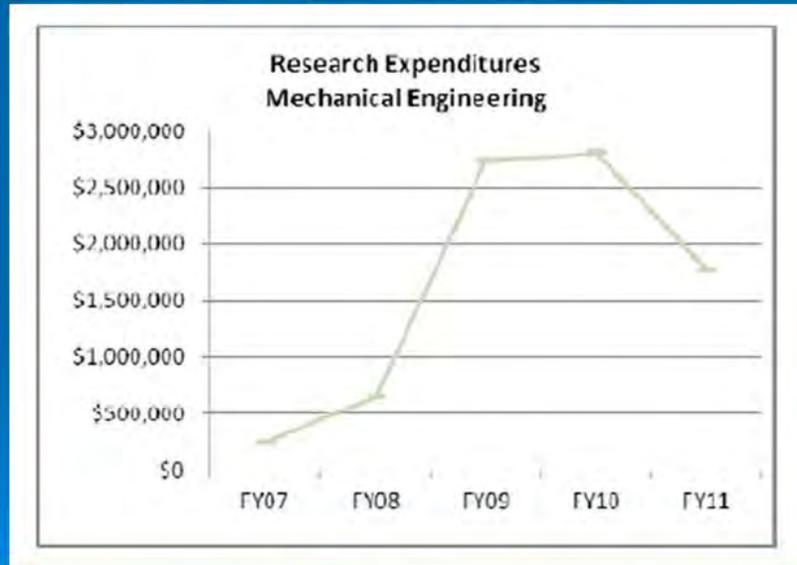
- Freshman Advising Program
  - This new program has freed up valuable faculty time and has also provided improved advising services to the freshmen
- Program Fee
  - It is hard to overstate how important the Program Fee funds are to our academic program
  - We can now afford equipment, software, and services that are needed for a competitive program

## Status – Research & Outreach

- Materials Evaluation & Testing Lab (METLAB)
- Bio-Fuels Lab –Thermochemical Energy Conversion
- SD Wind Application Center
  - Wind For Schools Program
- Energy Analysis Lab
- Photo-Active Nanoscale Systems
- Multi-Body Dynamic Systems
- Heat Transfer/Computational Fluid Dynamics

# Status - Research

- Research expenditures of \$1.77 million in FY11
- Level of activity will not be sustainable with current resources and program configuration



# Status - Research

- Research expenditures of \$1.77 million in FY11
  - How do we compare?

ASME Biennial Mechanical Engineering Department Benchmarking Study- 2010  
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Total External Sponsored Research Expenditures per T/TT Faculty

Mean	10 Percentile	Median	90 Percentile	SDSU ME
\$151,178	\$67,534	\$135,000	\$228,337	\$221,605

## Benefits - Research

- More than \$2 million worth of state-of-the-art testing and analysis equipment acquired in last 3 years
- Equipment is available for and used by other departments on campus
- Annual output of conference and journal papers has more than doubled
- Increased opportunities for undergrads and M.S. students to participate in funded projects

## Challenges - Research

- Insufficient T/TT FTE's to form a critical mass for sustained success
- M.S. program is an inefficient model for sustained success in externally funded competitive research
  - Start/Stop – Faculty perform the bulk of the work
  - Must use post-docs instead of Ph.D. students to support complex projects – cost twice as much and leave without SDSU's "stamp"
  - Funding agencies are less confident in the ability of a program to deliver results without a Ph.D.-level graduate students

# Challenges - Research

- New faculty startup resources have improved but are still not at a level that will support consistent success

Total Startup Package for New Faculty Hires

Mean	10 Percentile	Median	90 Percentile	SDSU ME
\$204,140	\$56,000	\$237,000	\$275,000	\$40,000

- Insufficient lab and office space has been a big problem
- Our program is unlike our counterparts at the University's selected peers in one major way – we do not have access to a Ph.D. program

# Status - Outreach

- Energy Analysis Lab & SD Wind Application Center
  - State Agencies
  - Regional Industries
  - General Public
  - K-12 Schools
- METLAB
  - Government Agencies
  - Regional Industries
- Alumni/Employers
  - Good working relationship

## Status - Facilities

- Current Space Allocation: 12,380 ft<sup>2</sup> in CEH
- Proposed Space Allocation: 16,745 ft<sup>2</sup> in CEH after relocations
- Proposed Capstone Design Lab Space in new AME Building: 5000 ft<sup>2</sup> dedicated space plus additional shared space

## Challenges – Facilities

- Office Space
- Research Lab Space

## Future Directions

- Academics/Scholarship
  - Strive for Alignment of Resources and Program Configuration that Supports Expectations for Faculty Performance
    - New T/TT FTE's
  - Accreditation
  - Expand Scholarships
  - Explore new course/program delivery concepts

## Future Directions

- Academics/Scholarship
  - Students choose our university and our program because of what we are now
  - We need to be sure that we don't eliminate the attributes that make us attractive and set us apart from other programs as we shape ourselves for the future

## Future Directions

- Research/Outreach
  - Leverage our current successes
  - Expand existing engagement with regional industries/agencies
  - Strengthen graduate program
  - Ph.D. Program
- Facilities/Resources
  - Acquire critical space and new facilities
  - Seek a higher level of private support

# Conclusion

- Thank you for your time & attention
- Questions?