I. PREAMBLe

The School of Mechanical Engineering traces its roots directly to the Morrill Act of 1862 which specified that Purdue, as Indiana’s land-grant university, offer an education in the “mechanic arts.” Mechanical Engineering, the branch of engineering that serves society through the analysis, design and manufacture of systems at all size-scales that combine energy, materials, and information to produce useful mechanical work, is as vital in the 21st century as it was in 1862 because energy and mobility are the lifeblood of our society and economy.

Since it’s founding in 1882, the School has continually been at the forefront of providing the most respected engineering education in the world and research results of profound impact. We take great pride in our mastery of the delicate balance between the practical and the theoretical, between educating a large number of students of very diverse backgrounds/talents and the personalized attention required of different learning styles, between ever-changing technology and workplace needs and the immutable core topics of the discipline, between fostering student creativity and the discipline required of the engineering profession, and between dedication to students and learning and our responsibility for knowledge creation and research. Our graduates are known worldwide for their work ethic and their creativity in problem solving; demand for the program continues to far exceed our capacity. Our more than 17,000 living mechanical engineering alumni number among the largest, if not the largest, groups of alumni in the world.

But more significant than the very large number of students who have received this great opportunity is the impact of those alumni on society. Purdue ME alums include presidents of major universities, corporations, and organizations. They include inventors, entrepreneurs, and members of the National Academy of Engineering. They have served in our military, in the Mercury 7, and walked in space. They have made decisive contributions in a wide range of areas including aerospace, automotive, construction, information security, semiconductors, software, and venture capital. Our vision, and the purpose of this strategic plan, is to sustain that tradition by educating students who will likewise be the "franchise" contributors of the next generation of industry, government, and academe.

One factor in the success of the Purdue ME education has been our ability to stay ahead of the world in delivering an advanced educational experience consistent with the ever-changing needs of the ME profession, be it in industry, government, or graduate school. A key ingredient has been our legacy of a very rich laboratory (experiential learning) environment. ME must continue to lead in providing facilities, mentors, and the environment where hands-on experiences are integrated into the learning process. We are convinced that the virtual university will never provide the rich environment of curricular and co-curricular educational experiences required for the type of leaders we plan to educate. And, because of our location, the future success of ME and Purdue will depend on a continued compelling case for the residential university experience. Our facilities must be a magnet for students, offering the best environment and infrastructure for learning and discovery in the multidisciplinary, collaborative workplace of tomorrow. The
importance of the research component of our mission will become even more crucial as industries outsource discovery activity and as expectations for positive impact on economic development in the state increase. But a rich environment of inquiry and discovery is fostered by the faculty and furthered by the students, and the top talent comes to (or remains at) Purdue because of the excitement associated with high-impact, cutting edge research programs. Finally, the School and the education it provides is only as good as the people involved. We need to recruit and continue to retain the best and brightest faculty, staff, and students to grow our leadership position.

II. VALUES AND CULTURE:

The Purdue School of Mechanical Engineering is a community of faculty, staff, students, alumni, and partners/sponsors working together to create a stimulating, diverse and positive environment of learning and discovery. We strive to provide the highest quality of education to our students, so they can become true leaders and outstanding citizens. We constantly endeavor for research activities that will contribute to the well-being of people, the economy and the environment in the state, the nation and throughout the world. As a community of individuals who value true excellence and preeminence, we seek to challenge and empower one another to reach our full potential while caring for others and our environment. We believe it vital to:

• show respect and concern for others in all interactions;
• be honest and impartial in all educational and research activities; and
• promote ethical behavior in all aspects of academic and professional conduct.

III. MISSION:

The School will serve its students, industry and society by fulfilling the missions of discovery, learning, and engagement through the creation, dissemination, and application of engineering methods, knowledge, and professional standards relevant to the practice of mechanical engineering in the many aspects of modern life where it plays a crucial role.

IV. VISION:

We will build on our long tradition of excellence to be the leading mechanical engineering program in partnership with our students, alumni, industry and government. We will provide our students with educational experiences that will enable them to become leaders in their profession and society. We will maintain and develop world-class research programs that complement our educational mission, address the evolving needs of industry and society, and contribute to economic and social development in the State of Indiana, across the nation, and around the world.

V. GOALS:

1. Offer the leading undergraduate and graduate ME learning environments for the residential university of the 21st century
2. Develop the world’s leading research programs in target areas producing high-impact, high-profile results of significance for industry, government and society

3. Recruit, develop and retain the best faculty, staff, and students appropriate to the School’s Mission

4. Build the infrastructure and environment necessary to support the School’s leadership roles

VI. STRATEGIES, MILESTONES, AND METRICS

Priority Focus Strategies for 2004-05

A. Develop mechanisms to encourage and facilitate successful multi-disciplinary research initiatives and teams.

   Milestones
   o Finalized recommendations from Retreat Working Group/Research Committee on information transfer/publicity, team and PI rewards, and cost-sharing/space
   o Faculty micro-retreat on facilitating large-scale initiatives

   Metrics
   o Number of specific improvements implemented in support structure/environment for large-scale proposal development
   o Number and ME share of large multidisciplinary projects
   o Fraction of Purdue signature initiatives w/ substantial ME contribution

B. Reassess and update the Graduate curriculum for the 21st century ME

   Milestones
   o Development of Graduate Program Objectives
   o Assessment of course offerings (benchmarking, frequency, support of Ph.D. specialization areas, and support of long-term research plan)
   o Development of recommended core offerings and course sequences
   o Development of mechanisms for fostering grad student interaction across ME (e.g., School-wide seminar series)

   Metrics
   o Satisfaction of program objectives
   o Course offerings, including new courses in cutting edge areas
   o Course enrollments and student evaluations

C. Improve the effectiveness of our faculty

   Milestones
   o Development and application of an accurate and time-efficient methodology to record faculty tasks and time spent on them
   o Analysis of data and identification of faculty activities that could be eliminated or delegated to support staff.
Development, implementation, and assessment of specific recommendations for changes in staff activities and training
Identification of peer institution(s) to do similar studies for comparison
Make recommendations for a department ad-hoc committee to study expectations and career paths for faculty in ME

**Metrics**
- Increased scholarly output (research papers, textbooks and other archival teaching support material, education/teaching papers, graduate student theses)
- Increased job satisfaction for faculty and staff
- Increased proposals and awards for external support for research and education

**D. More aggressively pursue faculty and student diversity**

**Milestones**
- Operation of Special Opportunity Faculty Search Committee
- Identification and plan for improving ME attributes that encourage minorities and women to join the School

**Metrics**
- Degree to which faculty, staff, and students reflect the diversity of the nation
- Fraction of faculty/staff participating in Diversity Workshops or similar educational activities
- Degree of satisfaction with our environment (survey of underrepresented groups)

**E. Develop and implement a vigorous program of internal and external communications designed to market the School and its graduates**

**Milestones**
- Assign 50-100% FTE person to ME publicity/communication requirements
- Website renovation, including on-line research report

**Metrics**
- Frequency of appearance of faculty and School accomplishments and expertise in national and international media
- Fundraising success

**F. Develop research clusters and a long term research plan**

**Milestones**
- Definition of attributes of successful research clusters
- Development of long term plan for building, supporting, and sunsetting ME clusters
- Development of strategic plans for each cluster

**Metrics**
- Number of successful research clusters
- Number of new clusters identified and developed
G. Build and maintain a support group of A/P, clerical and service staff capable of supporting the teaching, research and service missions of the School

**Milestones**
- Evaluation of the current situation using faculty survey of clerical and technical needs.
- Hold two *clerical* supervisor meetings per year, discussing pay levels, work expectations, and pressing issues.
- Hold two *technical* supervisor meetings per year discussing pay levels, work expectations, and pressing issues.
- Development and implementation of a new instrument for staff evaluation that better reflects merit-based raises.
- Development and implementation of methods for work-load balancing.

**Metrics**
- Uniformity of workload across School staff
- Perception of faculty and students on supportiveness of staff
- Perception of staff of work environment for to supporting School mission
- Increased productivity of School

Focus Strategies for 2004-09 (not ordered)

H. Provide modern, state-of-the-art equipment in classrooms that are maintained by the University.

I. Provide state-of-the-art multiscale (nano/micro- through macro-) machining/manufacturing experience for all UG students, and access for all graduate students and faculty

J. Work to identify and understand the diverse career paths of our faculty upon which we will build preeminence and foster an understanding of those roles to develop a spirit of respect, collegiality, and trust

K. Improve intra-school communication

L. Raise funds and report progress for new ME facilities

M. Endow faculty fellowships, research innovation and grad teaching awards.

N. Increase international-global perspectives of graduates

O. Increase project-based and co-curricular learning experiences

P. Reassess and update the UG curriculum for the 21\textsuperscript{st} century ME

Q. Develop innovative course delivery methods (including web-assisted and web-based instruction)
R. Increase our global research reputation

S. Increase the number of ME undergraduates pursuing advanced degrees

T. Establish mechanisms for research recognition and promotion of faculty and students

U. Develop mechanisms to increase the size and quality of the doctoral program.

V. Keep our faculty and staff trained and informed on current teaching and classroom technologies and machines.

VII. PEER INSTITUTIONS:

**US Peers**

- California - Berkeley
- Georgia Tech
- Illinois
- Michigan
- MIT
- Penn State University
- Stanford
- Texas – Austin

**Global Peers**

- ECOLE Polytechnique – Paris
- Imperial College - London
- Indian. Inst. Tech. - Bangalore
- Tokyo Inst. Technology - Japan
- U. Karlsruhe, Germany
- Univ. New South Wales - Sydney

VIII. BENCHMARK MEASURES

Input Measures

- Number of National Merit Scholars
- Student-to-faculty ratio
- Undergraduate class size
- Faculty salaries by rank
- Graduate assistant stipend
- State appropriation per FTE student
- Sponsored funding (total and NSF data for sciences and engineering) per FTE faculty
- Private giving and endowment value
Output Measures

- National ranking of program
- National Academy/other prestigious memberships
- Demography of underrepresented populations (faculty, staff, students)
- Undergraduate and graduate degrees awarded
- Student retention and graduation rates (years to degree for graduate students)
- Graduates' career placement and advanced study enrollment
- E&G expenditures per FTE student
- Research and development (R&D) expenditures
- Sponsored project funding from industrial sources/with industrial partners
- Technology transfer activities, including short courses, workshops, start-ups

IX. FUNDING THE PLAN

State Appropriations:
Increases to support larger faculty (est. 65) to bring us in line with faculty-to-student ratios at aspiring peer schools

Sponsored Funding:
Increases to fund additional graduate students, faculty and staff time, equipment and facilities, and educational initiatives commensurate with growing sponsored funding initiatives.

Private Giving:
Increased funds will be generated from private gifts and endowment income to support strategic School initiatives

X. KEY INVESTMENT AREAS

- Faculty Hiring to reach 65, including start-up funds
- Facilities, new and renovated
- Research clusters
- Fellowships, Professorships, Faculty Fellowships, and Scholarships