Initial Response of the Mechanical Engineering Department to the

10-Year ME Review Report (Dated 20 April 2007)

Date of this response: 18 June 2007

It is our understanding that an in-person review of the Committee Report will be held by the Graduate School Council during Autumn Quarter 2007. The Mechanical Engineering Department looks forward to this review, and hopes to respond to specific comments/questions from the Council during the Autumn Qtr review.

In the meantime we are forwarding responses and/or clarifying comments associated with Sections 2 and 4 (only) of the review report.

2. GENERAL OBSERVATIONS

● The current department administration (Chair Mark Tuttle and Associate Chairs John Kramlich and Brian Fabien) is very pleased that the Review Committee noted that considerable progress that has been made by the department in recent years. For the record, many of these positive changes were initiated by Prof. Bill Wilson, who served as department chair from 1999 to 2003. It was during this time period that we reduced our teaching load by simultaneously streamlining our curriculum and beginning a gradual reduction in the number of students admitted, and recruited tenure track and research faculty according to a well-defined strategic plan. This has subsequently given all faculty members within the department more time to develop research initiatives and expand the collaborative research activities noted by the Committee. In a very real sense the current departmental administrative leaders are the beneficiaries of initiatives begun and nurtured by Profs. Bill Wilson and Bruce Adee (Prof. Adee served as Acting Chair from 2003-2004).

● The Review Committee noted that our external research expenditures of ~$200k/TTF is below that of ME Departments at peer institutions. As explained in our self-study, ME research expenditures have increased from $2.85M in FY2001 to $6.30M in FY2005. This corresponds to an increase of ~120% over a 5-year period, which in our view is a *spectacular* percentage increase (rather than a "pronounced" increase, as described in the review report; the college as a whole has experienced a pronounced increase of 40% over this same period). We have established a goal of increasing our expenditures to ~$300k/TTF by FY2011. We will almost certainly achieve this goal, as our research expenditures for 2007 FY will be between $225k- $250k/TTF. Given these successes some ME faculty argue that we should increase our goal to $350k/TTF by FY2011.

● The Committee notes that our Ph.D production per faculty member ratio is about 0.4. Within the UW-CoE this production is:

- below that of the BioE, EE, and ChE departments,
- about the same as the IE, MSE, and CSE departments, and
- about twice as high as the CEE and A&A departments.

The Committee asks whether the market would be able to absorb additional ME Ph.D's, if we are able to increase our rate of production. Our answer is an emphatic "YES". A

market for ME Ph.D's exists within academia, government research labs, and high-tech industrial labs, both within the USA and abroad. As explained in our self-study, a part of our strategic plan is to increase our rate of Ph.D production by 50% in the near-term (to ~0.6 Ph.D/TTF), and to double our rate to ~0.8 Ph.D/TTF in the long-term.

Simultaneously, we wish to emphasize that within the mechanical engineering discipline the Master's degree is a valuable terminal degree. We currently produced about 1.4 MS/TTF, as explained in our self-study report. We intend to maintain this level of productivity in future years.

● The Committee report indicates that some junior research faculty felt less than fully integrated with the rest of the department. Chair Tuttle was unaware of this perception and will take steps to address this issue in the coming months.

4. RESEARCH

● The Committee report states: "During the past five to six years the department's research thrusts have ventured into non-traditional areas that have not normally been associated with the field of mechanical engineering. These new areas include biomechanics, advanced materials and nanotechnology, and quantum systems."

This statement is incorrect. The UW ME Department has a long tradition in both biomechanics and advanced materials. For example, Prof. Lee Huntsman (regarded as a pioneer in bioengineering), held a Research Professorship in the UW ME Department from 1968-81 (he subsequently became chair of the Bioengineering Department and UW Provost and President). Mr. Wayne Quinton, often considered the "father of biomechanics," began his bio-related studies as a part of his BSME degree from the UW. Emeritus Professors Albert Kobayashi and Colin Daly both maintained robust biomechanics research portfolios during the 1960-70's. It is true that several current ME faculty (Gao, Reinhall, Ching, Seibel, Nuckley, Ao, etc) have reinvigorated ME's involvement in bio-related research, but we have a long tradition in this area. Similarly, ME faculty have had research programs involving advanced materials and structures (including steel-aluminum-titanium alloys, ceramics, composites, etc) as these materials were being developed and over the entire 100-year history of the department. Current ME faculty involved in advanced materials (Taya, Tuttle, Ramulu, W. Li, Fabien, J. Li, Ganter, etc) carry on this tradition.

The more recent departmental activities related to nanotechnologies and quantum systems engineering simply reflect the fact that the underlying sciences associated with these fields have been developed to a point that they may soon be of significance to the engineering community. Hence, the ME Department is evolving to accommodate these new technologies in our research portfolio and curriculum.

● The Department does indeed pride itself on our many cross-departmental collaborations, since these collaborations are crucial to the current and future success of the entire College of Engineering. We were astonished that the review committee decided to include several inappropriate and highly partisan comments regarding these collaborations in their review report. These comments seem to arise from bean-counting at its worst. We are disappointed that these comments were included in the review report, but since they were included we are compelled to make following rebuttal statements:

Regarding the AMTAS Center:

- The report states that UW has two partner institutions (Washington State University and Oregon State University) in the AMTAS Center. In reality AMTAS involves a fourth academic institution, Edmonds Community College, as well as 12 industrial partners.

- The statement that "no ME faculty has actually performed research under FAA funding" is incorrect. AMTAS Director Prof. Mark Tuttle is co-PI on the project led by Prof. Eli Livne of the A&A Department and has received funding for his portion of this study. Prof. Tuttle has used these funds in support of the MS study of Ms. Francesca Paltera, a ME grad student. He has also made fundamental research contributions to the project led by Prof. Brian Flinn of the MSE Department; Prof. Flinn and his students have routinely acknowledged Prof. Tuttle's contributions in their presentations and reports. Further, ME grad student Apichaya Meeseplak has participated in, and received funding from, the project led by Prof Lin of the A&A Department.

- The report states that ~70% of FAA funds are directed to the A&A and MSE Departments at the UW, and to faculty at OSU and WSU. Actually, the largest allocation of FAA funding (outside of the UW) has been to Edmonds CC, followed by WSU. OSU has yet to receive any FAA funding via the AMTAS Center (OSU is expected to receive funding during the 2008FY).

- The report states that "the idea for the [AMTAS] Center was originally conceived" by A&A faculty. In reality, it was Prof. Tuttle who conceived of the AMTAS Center. The discussions that ultimately led to formation of AMTAS occurred in late 2002 and early 2003. A&A faculty wished to join an existing FAA Center called AACE, whereas Prof. Tuttle wished to form a new Center led by the UW. After debate Prof. Kuen Lin agreed to assist Prof. Tuttle in forming a new center if Prof. Tuttle would "take the lead". In any case, the AMTAS Center would not have become a reality without the leadership of Prof. Tuttle, working very closely with Prof. Lin. [As an aside, despite their stated desire to join the existing Center AACE, A&A faculty took no action to make this a reality. Prof. Tuttle ***did*** contact the AACE Program Manager (Mr. Jim White), ***did*** apply for admittance to AACE on behalf of the UW CoE, and the UW-CoE ***was*** admitted to AACE in 2004.

The UW remains a member of AACE, although no UW faculty has ever applied for research funding from the AACE program.]

- ME faculty, particularly Prof. Tuttle, feel that the AMTAS Center should be viewed as *a college-wide success* that should be nurtured and expanded by the college in future years. Stating that the ME Department's role is "purely administrative" within the review report is not only incorrect but also insulting and derogatory. Statements of this nature inhibit multi-departmental collaborative efforts.

Regarding the NSF IGERT:

The report states that the "department's involvement is…as a collaborator, not as its leader (the grant is led by a faculty member in Chemical Engineering)." This statement is incorrect, and it is clear that the review committee is unaware of the background of this IGERT Award. As a matter of record, two faculty are responsible for this successful IGERT Award: Profs. Dan Schwartz of Chem Eng and Joyce Cooper of ME. Profs. Schwartz and Cooper created and submitted three IGERT proposals over a three-year period. Their first two proposal submittals were denied, but they were ultimately successful on their third try. In each case Prof. Schwartz was listed as PI and Prof. Cooper as co-PI. ME faculty congratulate both Profs. Schwartz and Cooper on their success – they have provided leadership on this collaborative IGERT in equal measures.

Regarding Multidepartmental Collaboration On Renewable Energy

The report states that the ME Department has not provided leadership in multidepartmental collaborations involving renewable energy conversion. This is completely wrong. Prof. Malte of the ME Department organized the cross-departmental Energy Seminar that began in spring quarter 2007, not the Chemical Engineering Department. For many years Prof. Malte has been actively involved in the university-wide "Program on the Environment", has offered undergrad/grad courses devoted to alternate energy that attract students from around the college, and has worked with grad students on thesis studies involving solar/wind energy and (more recently) biofuels. To our knowledge Prof. Malte is the first and only CoE faculty member to receive funding to study tidal energy within Puget Sound region. Other ME faculty that have participated in studies related to some form of alternate energies include Profs. Kramlich, Reinhall, Fabien, and Cooper.

We emphatically deny that ME has not played a leadership role in energy education/research on the UW campus. At the same time, we do not wish to minimize the active participation of other faculty members from around the college. Successful efforts to develop sustainable energy conversion will require the

expertise of all engineering disciplines, not to mention acumen in the area of governmental regulations and business. Defining which unit within the college plays the "leadership role" in these activities is not helpful towards future collaborative success.

● Section 4 concludes with a paragraph that implies that the department has an excessive focus on increasing research funding levels. It is interesting to note that preceding paragraphs in this same section of the report (those associated with AMTAS funding levels, for example) are focused nearly exclusively on research funding levels rather than other metrics of productivity.

Pressure to increase research funding levels is neither more nor less severe within the ME Department than in any other department in the college. A balanced set of metrics to define productivity are used within ME, and include:

(a) research activities (as measured by funding levels, journal publications, conference publications, citations, proposals generated, etc),

(b) teaching (as measured by student evaluations, collegial teaching evaluations, number/type of courses taught, course development or renewal, undergrad/grad student mentoring, etc), and

(c) service (dept/college/university committees, professional society involvement, community involvement, etc)

It is true that we wish to increase our research funding levels and to increase our rate of Ph.D production, but these increases are not being pursued at the expense of our other measures of productivity, as listed above.