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Mechanical Engineering in the FY 2002 Budget

Michael Reischman,
American Society of Mechanical Engineers International[1]

INTRODUCTION

The information in this chapter relates specifically to agency programs with significant mechanical engineering components. Table 1 summarizes the FY 2002 funding requests for mechanical engineering-related research and development (R&D) in seven federal agencies. The Department of Defense (DOD) component has not been included due to the late submission of the agency's budget request. A more detailed breakdown of individual agencies' R&D budgets and analyses follows.

Table 1: Summary of Mechanical Engineering-Related Programs in the Federal Budget (in millions of dollars)

	FY 2000 Budget	FY 2001 Estimate	FY 2002 Request
Department of Energy	2,144.0	2,670.0	2,170.5
Department of Transportation	607.2	746.9	797.6
Environmental Protection Agency	212.0	218.4	211.8
National Aeronautics and Space Administration	705.1	702.8	714.1
National Institutes of Health	771.2	814.9	*
National Institute of Standards and Technology	536.8	570.4	474.8
National Science Foundation	238.2	262.9	260.8

* Figures not available

[1] The author is Chair of the ASME Inter-Council Committee on Federal R&D (ICCFR&D).

Table 2: Detail of Selected Mechanical Engineering-Related Programs in the FY 2002 Budget (in millions of dollars)

	FY 2000 Budget	FY 2001 Estimate	FY 2002 Request
Department of Energy (DOE)			
Basic Energy Sciences	752.0	991.7	1,004.7
Advanced Scientific Computing Research	122.3	165.8	165.8
Nuclear Energy S&T	225.6	243.9	223.1
Energy Supply	235.0	277.3	174.2
Fossil Energy R&D	294.2	435.4	211.3
Energy Conservation	514.9	555.4	391.4
Total DOE	2,144.0	2,670.0	2,120.5
Department of Transportation (DOT; please see Table II-15)			
Environmental Protection Agency (EPA)			
Superfund Basic Research	37.5	35.4	36.9
Climate Change Research	20.6	22.5	22.0
Particulate Matter Research	62.3	68.8	65.7
Tropospheric Ozone Research	6.3	6.5	6.8
Air Toxics Research	18.1	22.2	18.9
Pollution Prevention	27.4	24.4	21.9
Environmental Tech. Verification	6.4	6.3	3.6
Environmental Monitoring & Assessment	30.5	29.5	33.0
Science Advisory Board	2.9	2.8	3.0
Total EPA	212.0	218.4	211.8
National Aeronautics and Space Administration (NASA; please see Table II-12)			
National Institutes of Health (NIH)			
Bioengineering Research	771.2	812.9	*
Nat'l Inst. Biomedical Imaging and Bioengineering	0.0	2.0	40.2
Total NIH	771.2	814.9	*
National Institute of Standards and Technology (NIST)			
Scientific and Technical Research and Services (STRS)			
NIST Laboratories	277.2	301.8	336.9
Baldrige National Quality Program (BNQP)	4.9	5.2	5.4
Critical Infrastructure Protection Grants	0.0	5.0	5.0
Industrial Technology Services (ITS)			
Advanced Technology Program (ATP)	142.6	145.4	13.0

Manufacturing Extension Partnership (MEP)	104.2	104.9	106.3
US/Office of Technology Policy (OTP)	7.9	8.1	8.2
Total NIST	536.8	570.4	474.8
National Science Foundation (NSF)			
Chemical and Transport Systems	44.2	50.7	50.2
Design, Manufacture and Industrial Innovation (excluding SBIR)	47.3	51.4	50.9
Engineering Education and Centers (includes ERC and I/UCRC)	98.4	107.5	107.5
Civil and Mechanical Systems	48.3	53.3	52.2
Total NSF	238.2	262.9	260.8

*Figures not available

DEPARTMENT OF ENERGY (DOE)

Funding opportunities for mechanical engineering research are present in a broad spectrum of DOE programs. Proposed allocations in selected research areas where mechanical engineers can play a role are in Table 2. The FY 2002 budget request for the selected programs is lower than the comparable FY 2001 appropriated level by 20 percent.

The Basic Energy Sciences (BES) program is one of the nation's largest sponsors of fundamental research. In FY 2002, BES program funding would increase by 1.3 percent. Programs in nanoscale materials modeling, robotics and intelligent machines, life sciences research, and bioengineering would be continued. The proposed increase would be less than estimates for maintaining user access to national laboratory research facilities and completing work on major new laboratories such as the Spallation Neutron Source. Advanced scientific computing program goals include providing user access to computing facilities and the development of advanced computing models for applications such as combustion and fossil fuel systems modeling, global climate modeling, and fusion energy.

Funding for nuclear energy S&T programs would be reduced 20 percent in the proposed budget. Major program emphasis would be placed on infrastructure development, especially workforce development in areas ranging from technicians and construction workers to advanced nuclear engineering graduates. Work would continue on defining cost effective standard designs for nuclear plants of the future which would have

increased margins of safety and reduced permitting times due to replication of plants with identical configurations.

Fossil energy funding would be reduced by 52 percent for R&D programs. The advanced turbine program and liquid fuels research would be eliminated, while funding for carbon sequestration would increase 10 percent. Oil and natural gas programs would be reduced by 54 percent and 53 percent, respectively. Central power systems research would be reduced by 69 percent. Funding for advanced research would be reduced by 14 percent. $150 million in funding for technology demonstrations is proposed for a Clean Coal Power Initiative, which would maintain an overall funding level for Fossil Energy programs comparable to FY 2001.

Energy supply programs would be reduced by 37 percent. Biomass / biofuels energy systems research would be reduced by 6.7 percent. Geothermal technology development would be reduced by 48 percent, with major reductions coming in the energy systems research and testing programs and the geoscience and supporting technologies programs. Hydrogen research would be reduced by 48 percent; hydropower research, by 50 percent; solar research, by 54 percent; and wind energy research, by 48 percent. Electric energy systems and storage programs would be reduced by 34 percent.

Energy conservation programs would also be reduced by an average of 30 percent. Power technology programs would remain at their FY 2001 level, while buildings technology programs would be reduced by 46 percent, industrial technologies programs by 41 percent, and transportation technologies programs by 22 percent. The industrial technologies budget would be insufficient to meet continuation requirements for FY 2001 awards. The Partnership for a New Generation of Vehicles (PNGV) program would sustain a substantial portion of the transportation technologies budget reduction. Cooperative programs with states and energy efficiency science initiative programs in the buildings, industrial, and transportation sectors would be eliminated.

DEPARTMENT OF TRANSPORTATION (DOT)

The FY 2002 request for DOT would increase R&D funding 6.8 percent, to $798 million (see Table II-15), and overall DOT funding to $61.9 billion,

a 1.5 percent increase. Mechanical engineering R&D would be present in a number of interagency initiatives. Intelligent Transportation Systems (ITS) R&D would receive $74 million, a 45.5 percent increase, in support of technologies to enhance the surface transportation infrastructure, including interactive traffic controls, traveler information systems and advanced toll systems. Next Generation High-Speed Road R&D would remain level-funded at $25 million. The Surface Transportation Research program would be increased by almost 55 percent to $114 million. An increase of $1 million, to $59 million, for R&D at the National Highway Traffic Safety Administration (NHTSA) represents a 1.3 percent increase. The NHTSA funding would support efforts at the National Biomechanics Research Center (NTBRC) on the effects on the human body of highway crashes. The NTBRC would also support R&D in crash avoidance, including the effectiveness of anti-lock braking systems, vehicle roll-over, and heavy vehicle visibility. R&D in the Federal Aviation Administration (FAA) would receive $276 million, an 8.3 percent decrease from the FY 2001 estimated level. FAA efforts would include research in aircraft structures and materials, explosive detection technologies and other security measures.

ENVIRONMENTAL PROTECTION AGENCY (EPA)

The FY 2002 request for mechanical engineering-related R&D at the EPA is $211.8 million, a decline of 3.0 percent from the FY 2001 level. Much of the R&D support comes from the Office of Research and Development (ORD), which has a total budget request of $535.1 million, 6.8 percent lower than the $574.1 million budget enacted in FY 2001. Significant additional support would come from funding to address climate change, for which the requested budget is $122.7 million.

Environmental monitoring and assessment research would represent the largest gain, 11.2 percent. One of the primary activities would be the Western Environmental Monitoring and Assessment Program. Superfund basic research, tropospheric ozone research, and the Science Advisory Board would receive increases between 4.2 and 9.1 percent. Most other programs would see slight declines in funding, ranging from 2.2 to 10.3 percent. Particulate matter research to provide data on exposure, toxicity, and health effects as the reassessment of the national ambient air quality standards would continue to remain a priority, at nearly 30 percent of the

research budget, after a decline of 4.6 percent. Funding for the Environmental Technology Verification Program would drop 42.4 percent due to a changing strategy for certifying environmental technologies.

NATIONAL AERONAUTICS AND SPACE ADMINISTRATION (NASA)

NASA would see its total budget increase by 1.8 percent to $14.5 billion in FY 2002. NASA's R&D (two-thirds of the agency's budget) would increase 0.4 percent to $10.0 billion (see Table II-12). Aero-Space Technology would increase 7.3 percent to $2.4 billion because of a more than $200 million increase, to $475 million, for the Space Launch Initiative to explore technologies for reusable launch vehicles.

Mechanical engineering-related R&D is conducted primarily in the Research and Technology Base portion of NASA's Science, Aeronautics and Technology account, and includes vehicle systems technology, propulsion and power, flight research, rotorcraft, space transfer and launch technology, and information technology. The Research and Technology Base element would increase 1.6 percent to $714.1 million. The Intelligent Synthesis Environment (ISE), High Performance Computing and Communication (HPCC), Rotorcraft and other aircraft activities focused on near-term military applications would be terminated.

While Space Science would increase by 6.2 percent to $2.8 billion, there would be cuts totaling $200 million in the Earth Science enterprise, down 11.7 percent to $1.5 billion. Biological and Physical Research would decline 4.7 percent to $361 million. Mechanical engineering activities constitute a minor portion of research in these three areas.

NATIONAL INSTITUTES OF HEALTH (NIH)

The total FY 2002 NIH budget request is $23.1 billion, which represents a $2.8 billion, or 13.5 percent increase over FY 2001 (see Table II-9).

In FY 2001, Bioengineering Research Support is estimated at $812.9 million, or 7.3 percent of total NIH Research Project Grants (RPG). Until last year, the focus of bioengineering at NIH was the Bioengineering Consortium (BECON), which consists of representatives from each of the NIH institutes, centers, and divisions and representatives of other

federal agencies. In FY 2001, the National Institute of Biomedical Imaging and Bioengineering (NIBIB) was established. The focus of the new institute will be to develop new knowledge, create new technologies, and train researchers capable of integrating the quantitative sciences with biomedical research. The FY 2002 budget requests $40.2 million for the NIBIB. A trans-NIH review committee is conducting an analysis of bioengineering and biomedical imaging research portfolios and potentially moving some current projects to NIBIB. Tissue engineering continues to be an area of special interest to the NIH. Orofacial tissue restoration has been identified as a focus for new initiatives for creating biomaterials and composites for the restoration of oral, dental and craniofacial structures. Nanoparticles and nanospheres to serve as drug and gene delivery systems for different diseases is an additional emphasis area.

NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY (NIST)

The FY 2002 request for mechanical engineering-related R&D in NIST is $474.8 million, down 17 percent from FY 2001. The portion of the NIST budget related to mechanical engineering consists of two major components: Scientific and Technical Research Services (STRS; $347.3 million) and Industrial Technology Services (ITS; $119.3 million).

The STRS portion contains a requested increase of 11.3 percent to further the development of critical measurement technologies, methods, and services needed by the U.S. to promote technological progress, and enhance international competitiveness through the promotion of standards. This request would support the NIST Laboratories ($336.9 million), the Baldridge National Quality Program ($5.4 million), and the Critical Infrastructure Protection Grants Program ($5.0 million).

Most of the budget cuts for FY 2002 would be in the ITS component, which has two major elements: the Advanced Technology Program (ATP) and the Manufacturing Extension Partnership (MEP). ATP shares the cost with industry of developing cutting-edge technologies for a broad range of applications. ATP's budget would fall by $132.4 million or 91.1 percent from the FY 2001 level. The request, when combined with anticipated carryover and prior year recoveries, would provide an operating budget of $79.9 million to cover continuation funding requirements in FY 2002. The budget request assumes no new awards in

FY 2002 while ATP is being reviewed. The MEP request for $106.3 million (up 1.3 percent) would permit NIST to continue providing the federal share of funding needed to support the network of centers serving smaller manufacturers in all 50 states, the District of Columbia, and Puerto Rico. The number of centers would remain essentially the same.

NATIONAL SCIENCE FOUNDATION (NSF)

The total FY 2002 NSF request is $4.5 billion, a $56 million or 1.3 percent increase over FY 2001. The budget request for Computer Information Science and Engineering (CISE) reflects a 16 percent decrease from $478 million to $470 million in FY 2002. While NSF would continue its leadership role of the nation's Information Technology Research (ITR) initiative, the CISE funding request for ITR in FY 2002 would be identical to current year estimates of $155 million. Agency-wide funding requests for all four of NSF's major initiatives would increase. ITR would increase by $13 milion to $273 million. Nanoscale Science and Engineering would go up by $24 million to $174 million (see Chapter 23). There would be increases of $3 million for Biocomplexity in the Environment (to $58 million), and $4 million for Learning for the 21st Century (to $125 million).

The FY 2002 budget request for the Engineering Directorate (ENG) is $431 million, virtually unchanged from the current year. ENG remains the sixth-largest directorate at NSF behind Education and Human Resources ($1.0 billion), Mathematical and Physical Sciences ($864 million), Geosciences ($559 million), Biological Sciences ($483 million) and CISE ($470 million). In FY 2002, CISE would slip below BIO to become the fifth-largest NSF directorate.

Funding for mechanical engineering-related research within ENG would decrease 0.8 percent to $261 million. It should be noted that, given the multidisciplinary nature of modern engineering research, funding for mechanical engineering-related research may be obtained from programs outside of the selected group and outside of ENG overall. Detailed examination of individual programs, however, is beyond the scope of this analysis. (For more information on NSF, please see Chapter 7.)