



Mechanical Engineering Education **– A Perspective from the U.S.A.**

ERC
NSM

A Perspective from the U.S.A.

By

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Research and Teaching in an International Perspective

International Hearing

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- **Diplom Ingenieur (Maschinenbau / Fertigung / Umformtechnik). Technical University Hannover, 1962.**
- **M.S. – Mechanical Engineering – University of California at Berkeley, 1964.**
- **Ph.D. – Mechanical Engineering – University of California at Berkeley, 1966.**
- **1966-68 – Dupont, Research Scientist.**
- **1968-1986 – Battelle Columbus Labs, Research Scientist/Sr. Research Leader.**
- **1986-present – The Ohio State University**

Engineering Faculty / Professors (Assistant / Associate / Full)

- Industry Experience – not very common.
- Promotion / Tenure – requires publications and funded research projects.
- Position / Support – usually no Institute, sometimes endowed chair.

Engineering Students (Undergraduate)

- High School Graduates – only a small group (10-12%) have the background to study engineering.
- Financing Education – tuition and fees (up to \$25k/year) / in graduate school (M.S. and Ph.D.), usually assistantship.
- Practical Training – in undergraduate school, some universities have co-op programs (similar to Praktikum). Most foreign graduate students lack industry experience.
- University employment – usually not related to engineering. No incentive for faculty to hire undergraduates for research.

Engineering Students (International)

- **In undergraduate school, usually 10-15%.**
- **In graduate school, more than 50% / 75% of engineering and science Ph.D.'s are granted to international students.**
- **Over 30% of U.S. professors are first generation immigrants.**
- **Foreign nationals graduating from U.S. universities receive an 18 month training visa that may lead to “green card” or immigration to the U.S.**

Educational Structure

- The University System – BS/MS/PhD degrees / engineering technology programs / community (2 year) colleges.
- Engineering within university – most engineering schools are part of a large university / exceptions are MIT, Caltech, RPI, IIT, etc.
- Ranking of universities – very important in U.S. private universities (MIT, Stanford, Princeton, Yale, etc.) have more resources (endowments) but some public universities are also good (Berkeley, Michigan, etc.)
- Science vs. engineering – in general U.S. engineering schools emphasize science of engineering (faculty interest, limited laboratory equipment).
- Design and manufacturing – in U.S. often with Industrial Engineering, some project related learning, some faculty with industry experience.

Educational Structure / Graduate School

- **Entrance requires examination and good grades (less consideration of other factors, as in undergraduate school).**
- **Foreign students have an advantage since they are better prepared for the entrance examination.**
- **MS takes two years, some programs do not require a thesis but only course work (not desirable).**
- **PhD takes two to four years after the MS, requires courses and dissertation, mostly theoretical topics.**
- **Graduate schools attract the best students from all over the world.**

University Administration

- Public and Private Universities – State funding and tuition / tuition and endowment income.
- Federal and State Support – Both public and private universities try hard to attract federal and state fund via projects.
- Major Funding Agencies – National Science Foundation, Departments of Defense, Transportation, Energy and Education. Popular areas “now” are nanotechnology, biotechnology, information technology, advanced materials and environmental sciences.