KHALIFA UNIVERSITY

ENGR110
Introduction to Professional Engineering

Engineering Employment

MAKING THE TRANSITION

Table 4–1 Distribution of Engineers by Type of Employer—1995

Type of Employer	Percent
Private industry	76
Federal government	9
State and local government	6
Education	6
Other	3
	100

Source: National Science Board, *Science and Engineering Indicators—1998*. Arlington, VA: National Science Foundation, 1998 (NSF 98-1).

MAKING THE TRANSITION

- Engineering job is different from being a student
  - in college, many courses taken simultaneously and for short time
  - On job, the focus is usually more on one project at time and this may sometimes take a year or more.
- In many companies, the first thing is assignment to training
  - In some, new engineer may be handed an orientation manual
- Qualities identified by management – above average achievers:
  - better at picking up clues regarding others' reactions
  - listening well and questioning skillfully
  - dealing with objections and encouraging positive responses
  - gathering more information before presenting ideas
  - recognizing when to go through channels and when not to, whom to inform, and whom to check with

STARTING YOUR CAREER

Most frequently encountered problem areas for young professionals:

(in order of the frequency of mentioning)

1. Adjusting to company practices
2. Advancement slow or uncertain
3. Accepting routine jobs
4. Learning what is expected
5. Finding one's own niche
6. Unrealistic ambitions
7. Lack of initiatives
8. Gaining social acceptance
9. Lack of specialized courses
10. Lack of recognition

- Problems 4, 5, and 8 would diminish with time.
- Problem 1 can be helped by company training programs.
- Remaining items are probably the most important and are also the most difficult to deal with constructively.

CONSTRUCTIVE ACTIONS BY EMPLOYERS

- Avenues for improvement open to companies
  - once individual engineer has become equipped with all the right attitudes - *patience*, *enthusiasm*, *diligence*, *alertness*, *thoroughness* - next moves are up to employer
  - good communication must be maintained between engineering and management

- Another problem area - salaries, reviews, promotions
  - salaries should reflect the contributions made by engineers.

- Good facilities emphasized in recommendations
  - include: secretarial /clerical support, provision of technicians, equipment, telephones, computers, common rooms

CONSTRUCTIVE ACTIONS BY EMPLOYERS

- What motivates engineers and what is important?
  - Interesting work more than prestige and recognition (100%)
  - Technical tasks more important than managerial tasks (87%)
  - Diversified work more important than concentrating on single project (80%)
  - Work on one's own ideas more important than knowing what is expected (76%)
  - Sense of individual accomplishment more important than good supervisors and associates (68%)
  - Working in groups more important than working alone (67%)
  - Good salary more important than recognition for work (64%)
  - Opportunity for advancement more important than job security (61%)

PROFESSIONAL EMPLOYMENT GUIDELINES

- Outcome of professional turmoil followed aerospace cutback of late 1960s: development of (by NSPE, not legally binding)

Guidelines to Professional Employment for Engineers and Scientists

- Employee is expected to:
  - be loyal to the employer's objectives
  - safeguard the public welfare
  - avoid conflicts
  - pursue professional development program
- Employer is expected to:
  - keep professional employees informed on objectives and policies
  - establish equitable compensation plans
  - minimize new hiring during layoffs
  - provide for early vesting of pension rights
  - assist in professional development programs
  - provide timely notice in event of termination
  - assist in relocation efforts following termination

TRAINING PROGRAMS

- FORMAL TRAINING
  - may last one, two, or even three years
  - time spent in several different departments, mostly observing
  - written reports and examinations
  - emphasis usually is on preparation for management
- ON-THE-JOB TRAINING
  - Duration program is less than that of formal programs
  - usually focuses more on a particular job, at the expense of a broader orientation
  - involves actual work participation

TRAINING PROGRAMS

- Popular program with students is internship
  - taken between junior and senior years
  - 4weeks to 6 months
  - working closely with “mentor” in host company
- Great value of internship for future engineers
  - get to see first-hand what company does and how it does it
  - experience cultural climate of company and management
  - enjoy unlimited access to long-term employees who can give valuable insight into company practices

THE TECHNOLOGICAL SPECTRUM

Scientist (PhD) → Engineer (MSc or BSc) →Engineering Technologist →Technician →Craftsperson

SCIENTIST

- engage in research
- to be accepted as a full-fledged professional scientist → Ph.D.
- graduates from science programs with B.Sc. and M.Sc. Degrees usually are not accorded full professional status.
- engineering is different because normally engineering graduates with B.Sc. become full-fledged professionals

ENGINEER

- engineer stands next to scientist in technological spectrum because of dependence of engineering upon science and mathematics
- classic role is that of design and development, although engineers frequently move into research

THE TECHNOLOGICAL SPECTRUM

ENGINEERING TECHNOLOGIST

- 4 years B.S.E.T. or B.E.T. does not include as much science and math
- emphasizes learning of current design practice, rather than conceptual skills and theoretical knowledge
- lies between engineer and technician, in product development, manufacturing planning, construction supervision, and technical sales

TECHNICIAN

- two year programs - associate degree
- do not possess knowledge of mathematics and science but highly skilled in certain support functions
- drafting (CAD), field service, inspection, installation, surveying, technical writing, maintenance

CRAFTSPERSON

- make first units that physically embody engineers' designs, commonly called experimental models.
- possess skills of tools and often creative

LEGAL RESPONSIBILITIES

Two words frequently used in contracts – main cause of troubles

SUPERVISION

"engineer shall have general supervision and direction of the work"

- design professionals responsible for defective construction techniques if "supervisor"

INSPECTION

- sometimes interpreted as exhaustive and continuous inspection of all details of construction
    - not the type of function engineers have in mind when agree to perform "inspection of work"
- word *observation* proposed as a substitute that more accurately describes the intended service

BECOMING A CONSULTANT

Minimum requirements to become consultant

- Appropriate education, including humanities
- Engineering registration
- Confidence in one's professional abilities
- Broad prior experience in responsible discharge of engineering work
- Business expertise
- Financial reserves to last one year
- Ability to get along with people, especially clients and employees
- Reputation for keeping your word
- Good health and willingness to work hard

RESUMES

Engineer's resume:

- Education – degree earned, when, where, GPA
- Computer Skills – languages, experiences with applications
- Experience – jobs with relationships to career
- Awards and Honors – honor societies, scholarships
- Professional Membership – engineering societies
- Other Relevant Skills – anything that enhances career preparation