

Manpower supply for industry

During the last 25 years it has been a general perception in industry, among politicians and the public that there is a unfilled need for civil and building engineers, and indeed the unemployment rate is very low even in these difficult times (2009). In particular in the field of road and rail construction there is an unfilled gap, which has been identified with deteriorated research and innovation in this field in universities. However some studies (by the contractors' organisation, Dansk Byggeri) suggest that the number of academically educated civil engineers will not be to low in the coming 10 years. Especially the public sector is actively seeking to attract engineers again after a period of more focus on economy and general competences among public managers.

Quality and competences of graduate output for industry

During 2004 the academic level of the university educated engineers was dramatically (and to some extend unjustified) criticised by the Association of Consulting Engineers. Partly as a response to this criticism the Technical University of Denmark established a series of networking events and workshops (aftagerseminarer) where employers were invited to discuss and influence the curriculum and pedagogical element elements of the education. As a result of this activity the educations at DTU has been revised and the Bologna 3+2+3 system introduced. For the bachelor of engineering programme at DTU the CDIO system has been introduced, see: <http://www.cdio.org/> . As a result of these and other initiatives the overall repute of the young newly educated engineers has risen among employers and in the public.

Skills shortages

The following areas have been highlighted as areas within civil and building engineering where there is a strategic skills shortage:

- Civil works and infrastructure planning
- Climate adaptation, planning an management
- Building energy and installations

The industry has responded to the skills shortage by sponsoring courses and professorships in rail construction and (from 2009) hydraulic engineering.

Difficulty of finding and retaining suitably qualified personnel

In the boom up till 2008 industry was headhunting students during their thesis work and even PhD students were head hunted out of their projects. This has slowed down since 2009.

Industry complained that output from universities was too small. However the output is mainly governed by the number of interested students, since admission has in essence been free except at DTU where admission is restricted.

It ma be noted that the number of students applying for entry at DTU has risen from 1600 in 2002 to nearly 3000 in year 2009. The rise in applications has been particularly high for civil and architectural engineering where admission has been restricted by capacity and regulated through admission grades since 2006. In 2009 the number of applications was twice the number of admission places.

An interesting finding has been that some firms, both consulting and contractors, during the last 5 years have begun using industrial PhD grants as a recruitment mechanism. Firstly they attract the best students and produce targeted knowledge for their own company, secondly they raise the esteem of their company among other students and thirdly they participate in raising the esteem of the entire business in society.

Future training needs

The training needs for already educated engineers are generally covered by short courses provided by the employers and private knowledge companies. Formal competence giving education (Master programmes for professionals) is offered by the universities in the following fields:

- Fire (functional based design)
- Construction Planning and Management
- General Business Management

It is envisaged that training in the future will include master programmes in:

- Energy efficient building
- Facilities Management

Perceived/required changes and developments in engineering education

Since 2001 a number of changes have been implemented:

- 2001: The Architectural Engineering programme was opened
- 2002: Arctic Technology programme (starting with 3 semesters in Greenland) was opened
- 2005: The Bologna was adopted (3+2+3)
- 2007: CDIO was adopted for BEng programmes
- 2008: A number of synthesis/design courses were included in the academic CE programme.

National Accreditation of all BEng, BSc, and MSc programmes was initiated in 2007/8. The process is putting a strain on resources at universities. The present author is seriously in doubt if the accreditation process will increase educational quality.

The number of female students is now 50% in Architectural Engineering and above 30% in Civil Engineering at DTU. The present author advocates that we maintain a gender balance in this range, since experience in other education programmes (medical and veterinary science) has shown that male students flee programmes with an overweight of female students.

Impact of the current economic crisis

The current crisis has increased the number of student seeking admission to civil engineering even more.

The industry particularly contractors building homes have laid off engineers, however it seems that the slow down to some extent is balanced by an increase in need for engineers to realise the large infra structure projects currently under way in Denmark: The Fehmarn Belt Link between Denmark (Copenhagen) and Germany (Hamburg), Copenhagen Metro, A number of planned motor ways, A number of new/renovated rail lines, off shore wind parks, large investments in regional hospitals.

References

The above was based on background knowledge compiled by Head of Civil Engineering Department, Technical University of Denmark, PhD Jacob Steen Møller.

The following reports (mostly in Danish) may be consulted for further reading.

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