Engineering Education Accreditation in China
ENGINEERING EDUCATION ACCREDITATION IN CHINA

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CAST, CEEAA,

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Outline

- Status and Development of Engineering Education in China
- Engineering Education Accreditation in China
Engineering Education System in China

- 12
- 11 PhD in Eng
- 10 Doctor D. Eng
- 10 Doctor Level
- 9 Master in Eng M. Eng
- 8 Master Level
- 7 Bachelor in Eng
- 6 Bachelor Level
- 5 Vocational Education
- 4 Technical College
- 3 Bachelor Level
- 2 Bachelor Level
- 1 Bachelor Level
In 2011, the number of engineering students in universities reached 4.276M, which accounted for 31.7% of all the undergraduate students in China, and made China the largest engineering education country in the world.

30% of the educational programs in universities were engineering programs.

Percentage of Eng degrees in all degrees awarded by Chinese universities in 2010.

Scope of Engineering Education in China (2010)

Universities which have Eng Programs
1003 out of 1090

Colleges which have Eng Programs
1207 out of 1215

It is estimated that 40000 high-level innovative engineering and technology talents will be needed in 2020 in China. Key industry fields in the country will be short of 5 million people with expertise. These proposed new requirements for engineering education in China.

China has initiated “Excellent Engineers Education Program” to facilitate the engineering education reform and improve the quality of engineering education in the country.
Outline

- Status and Development of Engineering Education in China

- Engineering Education Accreditation in China
Purpose of Accreditation

- We hope engineering educational program accreditation will:
  - Plays a key role in the quality insurance system of engineering education.
  - **Links** engineering education with industry and being a driving force to promote the reform of engineering education.
  - Promotes Chinese engineering and technology talents joining in the international competition and mobility.
Development of Engineering Educational Accreditation in China

- The theoretical research and practice of program evaluation in China could be traced back to the late 20th century.

- The program evaluation of architecture, urban planning, civil engineering, construction environment and equipment engineering, water supply and drainage works, engineering management began in 1993.

- China launched the engineering educational program accreditation in 2006 and began to establish the accreditation system.
Till 2011, there are:

- **219 programs in the 6 fields of Architecture and civil engineering** having been accredited.

- **132 programs** in mechanical, chemical, electrical, computer, hydraulic, transportation, environmental, light industry, food, safety, and mineral engineering having been accredited.
<table>
<thead>
<tr>
<th>Discipline Fields</th>
<th>No. of Programs been accredited each year</th>
<th>No. of Programs in the country</th>
<th>Percentage of programs been accredited</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2006</td>
<td>2007</td>
<td>2008</td>
</tr>
<tr>
<td>Mechanical</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Chemical</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>EE</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Computer</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Hydraulic</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Transportation</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Environmental</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Light industry and food</td>
<td>2</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Safety</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Mineral</td>
<td>1</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Subtotal</td>
<td>8</td>
<td>18</td>
<td>19</td>
</tr>
<tr>
<td>Architecture + Civil</td>
<td>1992-2011, 219 programs been accredited</td>
<td>1296</td>
<td>16.90%</td>
</tr>
<tr>
<td>Engineering</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>351</td>
<td>11602</td>
<td>3.03%</td>
</tr>
</tbody>
</table>
Future plan

According to the overall planning, program accreditation work will cover most engineering disciplines in China (around 30 categories) within the next few years. Programs in materials, mapping, instrumentation engineering added in the accreditation calendar of 2012. 39 programs accredited in 2012, the total accredited programs number ---390.

We will gradually increase the number of engineering programs to be accredited and enlarge the scope of accreditation work, on the premise of the quality and international comparability of accreditation results.
Structure of Engineering Educational Program Accreditation

- Chinese Engineering Education Accreditation Association (CEEAA) is a non-profit organization affiliated with China Association for Science and Technology (CAST).

- It is authorized by the Ministry of Education to conduct engineering educational program accreditation in the territory of mainland China.

- CEEAA consists of over 30 national professional associations, institutes and federations, which cover most of the engineering and technology fields in the country. With the development of accreditation work, members of CEEAA will increase gradually.
Accreditation Criteria
Accreditation Process

1. The institution submits application
2. Application accepted
3. The institution conducts self-evaluation and submits self-evaluation report
4. The Sub-Committee reviews and discusses the self-evaluation report
   - Pass
5. The Accreditation Visiting team visits the campus
6. Submits On-site Visit Report to the sub-committee
7. The Accreditation Sub-committee reviews relevant documents and submit accreditation report to the Council
8. Council holds Plenary Meeting and votes
9. The Maintenance of the Accreditation Status
Accreditation Documents

- Policy and Procedure of Engineering Educational Programs Accreditation
- The Engineering Educational Programs Accreditation Criteria
- The Evaluators Selection and Training Methods for Engineering Educational Programs Accreditation
- The Working Guidance for the Program Evaluators
- The Preparation Working Guidance for Programs to be Accredited
General Principal for Accreditation

The establishment of engineering educational program accreditation system follows these general principals:

- **Substantial Equivalence** with international accreditation systems
- **Third party** accreditation body
- **Outcome based**
- **Rigorous and normative**
Exchanges with WA signatories

- We have actively communicated with WA accreditation bodies and invited experts from UK, Australia, USA, Chinese Hongkong and Chinese Taipei to observe our accreditation work. They gave active assessments to our accreditation system.
- Engineers Australia and ECUK has accepted CAST’s invitation to be the nominators for CAST application to be provisional membership of Washington Accord in 2013.
- In September 2012, Engineers Australia and ECUK joint observed accreditation process of Technical University of Taiyuan (Computer Engineering program) and Northeastern University in Shenyang (program 1: Material Forming and Control Engineering and program 2: Automation)
Exchanges with WA signatories

Feedback from Engineers Australia
The assessment of the Engineering Accreditation System, as administered by CAST, is based on the documents provided to the Observers, the observations made during the visits, the translations provided and the response to questions asked. Based on these qualifications, the following observations were made:

1. High level administrative support was evident as demonstrated by CAST Senior Management.
2. Well documented procedures were set out in the CAST Manuals provided to the Observers.
3. There appeared to be effective recruitment and training of Assessors. This was based on the documentation provided and comments from the meetings attended.
4. The Accreditation Panels observed were drawn from senior experienced engineers from academia and industry.
5. From the observations made, the Accreditation processes were perceived to be thorough but fair.
6. Appropriate governance structures were seen to be in place which could deliver consistence and fair outcomes within discipline areas and then the final determination being made by Council covering all disciplines.

The Chinese Engineering Accreditation System, as administered by CAST and observed during a visit to China 18 – 27 September 2012, was assessed to be ‘substantially equivalent’ to other Washington Accord Systems.
Feedback from ECUK

During the visits to Taiyuan University of Technology and Northeastern University in Shenyang, Professor Hicks reached the following conclusions:

- The CAST documentation is comprehensive in its scope and clearly sets out the criteria on which accreditation decisions are based;
- The accreditation visits were conducted in accordance with the CAST documentation;
- The expert team involved in the on-site visits adopted a robust and probing approach to the evaluation of the provision and the decisions reached were in line with the published accreditation criteria;
- The accreditation process developed and practiced by CAST is substantially equivalent to that used in other jurisdictions that are signatories to the Washington Accord.
A sample of the accreditation

- Engineering Education Accreditation on Mechanical Engineering and Automation Program in Tsinghua University

- Some data for TH ME Program;
The Accreditation Process

- Application Review:-------- Mar. 22nd.
  ---Result---accept the application;
- Self-evaluation Report:--Report to Accreditation and Mechanical Sub-committee ------------------------- on Aug. 7th.
- Self-evaluation Report Review:--(Oct.18th~21st)
- Teleconference:---------------- Oct. 15th and formed Evaluation Focuses
- On-site Visit:-------on Oct. 18th~21st.

**Leader of the Team** was Prof. Peigen Li who was president of Huazhong University of Science and Technology and director member of the Mechanical Sub-committee.

**Team members** included:
- Prof. Ji Zhao, vice-president of Jilin University;
- Senior Engineer Lu Gao of Chinese Mechanical Engineering Society.
- Prof. Guanlong Chen of Shanghai Jiaotong University,
- Prof. Changlin Wu of Huazhong University of Science and Technology
The Mechanical Engineering and Automation Program of Tsinghua University derived from the Department of Mechanical Engineering established in 1932 and is now co-hosted by Department of Mechanical Engineering and Department of Precision Instruments and Mechanology, who both belonged to School of Mechanical Engineering.
The program has 642 undergraduate students and 253 faculties,
among which are 77 professors/researchers,
88 associate professors and 56 assistant professors.
40 faculties have practical experience of industry or
social engineering, accounting for 20% of the total
number of faculties.
182 faculties have been involved in research
activities with engineering background, accounting
for 90% of the total number of faculties.
75% of the faculties have more than five years
 teaching experience.
The program follows the teaching thoughts of “solid foundation, wide adaptability, practice focused and high quality”, and guiding ideology as to “optimize the knowledge structure, enhance capacity-building and improve the overall quality” and commits to provide high-quality education and transport high-quality talents.
Characteristics of the Program

(1) The program insists on education as the fundamental task. to cultivate the students' abilities on research, innovation and teamwork,

(2) The program emphasized faculty development, young faculty training and teaching team building.
Review opinions of the Self-evaluation Report

- The Team considered that the program’s teaching plan and curriculum setting was reasonable. Its knowledge system covered enough teaching compositions.

- Items need to be reviewed and verified and the evaluation methods (see *Appendix 3*)
The On-site Visit

- met with people in charge of the program and some faculties. Prof. Zheng You,

- visited the teaching facilities
- The Team had 47 interviews with management personnel of the department and institution, students, teaching faculties, experiment staffs, graduates and employers;

- reviewed the syllabus, teaching plan, teaching materials, textbooks, assignments, test papers, course design and experiment report
The On-site Visit--continue

- reviewed 167 graduate designs; heard 6 students reporting the Production Intern; and evaluated the students’ abilities.

- The Team met with people in charge of the program and communicated the on-site visit on Oct. 21st.
Accreditation Decision

- Accreditation Decision Suggestions: accreditation passed with validity period of 3 years.
- The National Experts Committee on Engineering Educational Programs Accreditation held a plenary meeting on Dec. 4th, 2009.
- Accreditation Decision: accreditation passed with validity period of 3 years.
Current Evaluation Results

- Program Objective
- Curriculum
- Faculty
- Supporting condition
- Student’s development
- Management system
- Quality Evaluation
Content of Appendixes

- Appendix 1. Evaluator’s Personal Analysis on Self-evaluation
- Appendix 2. The Conference Minutes of On-site Visit Team Teleconference
- Appendix 3. Evaluation Focuses for On-site Visit Team
- Appendix 4. Schedule of On-site Visit
- Appendix 5. On-site Visit Report of Engineering Education Accreditation
- Appendix 7. 2009 Accreditation Decisions of the National Experts Committee on Engineering Educational Programs Accreditation
According to the Criteria for Engineering Educational Programs Accreditation --(2009). The Team proposed the following questions and suggestions:
Curriculum:

1. The **program objectives were not fully reflected by the curriculum**. The syllabus should further clarify the requirements on knowledge transfer and capacity-building; the program **should strengthen the research and implementation of the relationship between program objectives, graduates outcomes and curriculum**.

2. The program should further **improve the curriculum**, which is suitable for educate generalist in mechanical engineering field, and strengthen **the integration of the program and cours ed in Department of Mechanical Engineering and Department of Precision Instrument**.

3. The program should further strengthen the students' engineering training and the cultivation of practice ability.
Supporting Resources:

- The Team suggested the program have closer links with industry, to promote enterprise and industry experts involved in the program planning, curriculum settings and teaching activities.
Thank you!