

# Engineering Doctorate (EngD) Programme at Universiti Teknologi Malaysia

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**Abstract** - Engineering Doctorate (Eng.D) is a radical alternative to the traditional PhD, being better suited to the needs of industry, and providing a more vocationally oriented doctorate in engineering. The core of the degree is the solution of one or more significant and challenging engineering problem with an industrial context. It provides ambitious and able researchers with the technical, business and personal development competencies needed. In the current context there is a need to produce professional researchers that can enhance Malaysian competitiveness in the construction sector. The focus of this paper is to share our experience in developing Eng.D programme. It discussed a step-by-step process of developing Eng.D programme until obtaining the approval from the Ministry of Education. Through this process we have successfully developed the Eng.D programme and currently there are three EngD candidates following the programme. This Eng.D programme is the first to be approved and conducted in Malaysia. We are confident of producing engineers who are capable of demonstrating innovation in the application of knowledge to the construction sector.

## 1. Introduction

A similar Engineering Doctorate (EngD) programme was launched by the Engineering and Physical Sciences Research Council (EPSRC), United Kingdom (UK) in 1992. The EngD programme currently runs at 15 centres across the UK, each focusing on a specific area of engineering technology. The EngD may have been created in response to the needs of industry. The Eng.D is aimed at developing individuals who not only innovate but who can implement that innovation. The EngD providing a more vocationally oriented doctorate in engineering. It is highly flexible and able to accommodate participants at all levels up to board

level. Evidence shows that EngD graduates achieve better job offers and career progression than those carrying out a traditional PhD or MSc training. The programme is open to graduates in engineering and construction provided that they are articulate, well qualified and highly motivated. The core of the degree is the solution of one or more significant and challenging engineering problems with industrial context. Thus, the solution of the problem will have to take factors such as financial constraints, timescales and personnel management into account. The project must include a thorough analysis of options, based on best practices elsewhere, and must demonstrate key competencies such as project planning and control. To ensure this, projects are designed jointly by the academic and the co-operating company (with, when recruited, the candidate), with agreed objectives, deliverables and timescales and regular monitoring against these targets. To these ends researchers spend around three-quarters of their time working directly with their sponsor. During this time they undertake a projects that present genuine research challenges while solving problems relevant to the participating company. The rest of the time researchers attend courses at university where they study special technical subject. At the end of the four years of study, they not only leave with a PhD-level qualification but have also gained priceless experience along with all skills they needed to be successful in an industrial environment.

## 2. Programme Development

The process of developing Eng.D programme include several stages such as preparation of working paper, presenting the proposal at the Senate Working Committee, then the endorsement from the Board of Directors and lastly is the Ministry of Education. The most important stage is to prepare the working paper.

The process of establishment EngD programme is as shown in Figure 1.

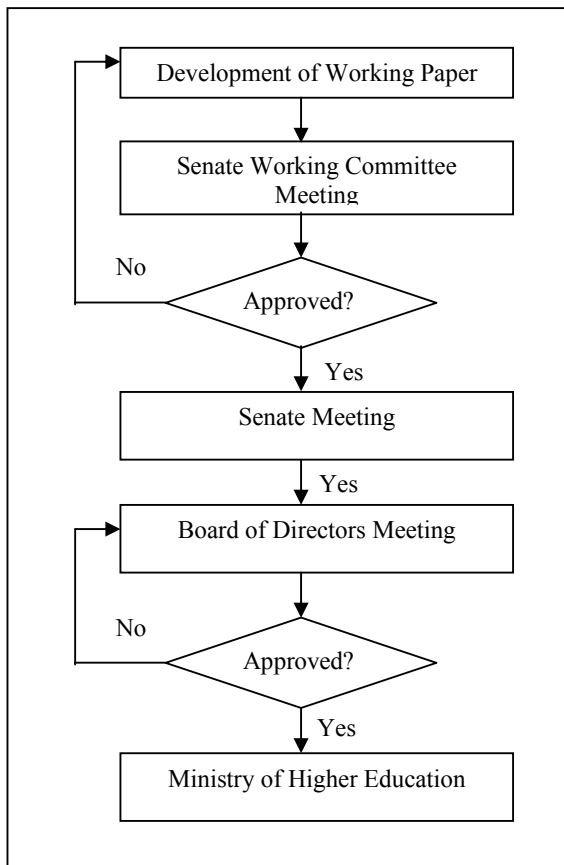


Figure 1: The Process of Establishing EngD Programme

The development of EngD programme started with the preparation of working paper. A few discussions were made before preparing the working paper. The contents of the working paper includes the purpose of working paper, the name of programme applied, level of programme, year of programme start, total duration to complete the programme and methods of programme, background, program objectives and a list of staff involved.

The purpose of the working paper is to get approval from the University's Senate to run EngD programme at the Construction Technology & Management Centre (CTMC), Faculty of Civil Engineering, Universiti Teknologi Malaysia.

The proposed name of programme is Engineering Doctorate in 'Construction Technology and Management' areas.

The level of programmed is doctoral level which is equivalent to Doctor of Philosophy (PhD). Year started is the year for the center to start running the programme. CTMC started the programme as soon as the approval is obtained from the Ministry of Higher Education, which is in May 2004. The year of programme means the years taken to complete the course. The normal and maximum study durations for EngD between three and seven years maximum. Candidates should complete their studies within the maximum study period. The program consists of a taught and a research component.

The background should contain the needs of the programme. It should explain the reason why the industry needs the programme. The objectives are formulated so that the aims of the programme is realised. The primary objective of the EngD is to provide outstanding engineers with an intensive, broadly based training in collaboration with major companies, so that they can hold senior positions in industry at an early stage of their careers. Finally, the working paper should consists all relevant information to support and ensuring the success of the proposed programme. This information includes the university's name that apply the programme, the name of programme, the faculty that apply the programme, level of programme applied, year of the programmed will start, total duration of the programme, programme's objectives, application's justification, marketing survey, curriculums structure, expected total number of students, entry requirements, financial/physical/staff implication, the current programme running by the faculty, redundancy of the programme, comparison with other programme (oversea's programme), comments from the Academic's Programme Committee and finally the date that the programme was approved by Academic's Programme Committee and Senate Working Committee.

The completed working paper was then brought to the Senate Working Committee Meeting for discussion and approval. There were some modification that has to be done before bringing the working paper to the Senate Committee. After the approval from Senate Committee is obtained, the working paper was then brought to the Board of Directors Meeting.

Finally, the working paper was submitted to the Ministry of Higher Education Malaysia for approval after incorporating the comments from the Ministry's Committee. It takes several months to obtain the letter of approval. After

obtaining the approval, advertisement was done to market the programme.

### 3. Information Gathering

The information and data gathered in producing the working paper include the Prime Minister's proposition, Malaysian Economics Research, National Science and Technology Policy II, Engineering and Physical Sciences Research Council (EPSRC) of United Kingdom, Centre for Innovative Construction Engineering (CICE), Loughborough University and other public agencies.

Prime Minister's proposition said "*the government wishes to see more research undertaking work in industrial and commercial settings, with exposure to the environment in which research and development operates. The training should prepare the candidates for the budgetary, time-limited, interdisciplinary and team-based manner in which research and development is conducted and constrained within firms*". From his proposition the center commence to propose EngD in Construction Technology & Management as one of the programme that be able to fulfill the industry's needs.

ESPRC paper contains guidelines of the EngD programme operate at their university. The guidelines includes what is EngD; what are the aims of the EngD?; how are the requirements of the EngD met?; What sort of research projects?; Who can participate? What level of commitment is required?; What does the Research Engineer achieved?; What is the role of the industrial sponsor?; How is the EngD Assessed?; How are Research Engineers funded?; and How does the EngD center operate?. This paper provides the basis in preparing the working paper. Based on the contents, the working paper was prepared to suit the Malaysian scenario. A booklet (prospectus) has also been produced by CTMC to highlight the answers to the above questions.

Public agencies commented "*the industry is in dine of scheme where it can provide engineers to enhance their skill and knowledge that are relevant to the industry. Such scheme is an engineering doctorate would be distinct from, and complementary to, the traditional existing PhD, which has been criticised for its lack of industrial relevance*". From this statement, the establishment of the EngD programme is in a way to fulfill the industry's requirements.

### 4. Highlighted Problem

To get the approval from the Ministry of Education, several problems faced by CTMC. Some of the problems faced were:

- The rules and regulations of the programme has to be modified several times to meet the university's requirements. EngD is a new programme in Malaysia, so this proposal will become a model and standard for other higher institutions to apply through the Ministry.
- Several modifications has to be made to incorporate comments from the Senate Working Committee, these takes quite some times.

### 5. Summary

The EngD programme offers the opportunity for outstanding engineers to enhance their qualifications through a mix of broadly based technical and professional training while completing an industry based research project. Successful researchers after completing the programme not only graduate with a title Doctor of Engineering (EngD), but also with the important mix professional skills, technical knowledge, and research experience that will enable them to progress to senior positions within industry at an accelerated rate.

Ministry of higher Education Malaysia had finally approved this programme. We are confident of producing research engineers who are capable of demonstrating innovation in the application of knowledge to the construction sector.

### References

- [1] "ESPRC news line WINTER," 2002/3.
- [2] Dr. John Mitchell "The Engineering Doctorate, A new approach to doctoral level training in engineering"
- [3] Mrs J C Brewin, Mrs C Bujdoso, Engineering Doctorate (EngD) Programme, Engineering and Physical Sciences Research Council.
- [4] Prof. Chimay J Anumba, "Centre for Innovative Construction Engineering (CICE)"
- [5] National Science and Technology Policy II and Plan of Action. "Competitiveness through Science, Technology and Innovation".