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MULTILEVEL CERTIFICATION SYSTEM FOR ENGINEERS

Abstract. Multilevel certification system was proposed, which is based on existing procedures in the world and in Europe. The system covers all the period of possessor's carrier: from the school till own engineering projects and honorable titles. New levels are included to the system, e.g. for school and university students. Engineering certificates and personal data of applicants should be saved in e-register. This register is built similar to so called labor book for Soviet Union employees.

Keywords: engineers, certification, system, register.

INTRODUCTION

Ukraine, Portugal, Australia, Chili...The distances between these countries are few thousand kilometers, they have different landscape, climate, their inhabitants speak different languages and have different mentalities. But... One can fly by same type of aircraft to reach any of them and use the same type of cell phone or rent the same type of car without inconveniency in any of these countries. The large group of people, which has general name "engineer", is responsible for work same devices and machines worldwide. Or, in other words: engineer is the specialty "without borders". Unfortunately, general understanding of this statement doesn't follow by well established international procedure for engineering qualification comparison. Everybody knows about TUV label for product certification [1]. Networks for accreditation of engineering programs, e.g. IEA [2] and/or ENAEE [3], cover almost all the world. But certification procedures for individuals are using (much) less often.

The objective of this article is to describe the multi-level cross-cutting certification system for engineers, which Union of scientific and engineering associations of Ukraine (USEAU, [4]) started to implement in Ukraine. We do believe that format of certification procedure for individual should include many levels/steps and follow the specific person during all his life. We are considering this proposal as our contribution into the discussion in European/world engineering community concerning the subject and hope that our ideas/experience would be helpful not only for our organization.

Proposed multilevel system for certification of engineers. During long period of cooperation with international technical federations USEAU learned existing procedures of independent certification of engineers and further implemented many of them. Detailed description of these procedures and the report about our activities are in [5, 6]. As shortly, we already implemented all FEANI [7] tools in Ukraine: INDEX register; Engineering Cards; EUR

ING title. We also supported the process of obtaining the first ENAEE EUR ACE label in our country and initiated Ukraine membership in ENAEE. We also hope to extend European licenses for civil engineers for Ukraine and establish formal cooperation with ECEC [8] and ECCE [9].

Ukrainian business is opening European market now with the number of request of listed above European engineering certificates. The same time our practice showed that existing opportunities doesn't cover all the cases. That is why; we are starting to create the **certification system**. For the key element of this system we used former Soviet Union practice, namely, so called Labor book, which follows worker during all his employment period and reflects all his professional positions with the list of awards, trainings, etc. Such Labor book was independent cross-cutting confirmation of step-by-step professional growth of its owner. But our modern time requires modern tools. So, instead of paper document we are launching now **cross-cutting e-register for all certification levels**. It means that each possessor can obtain its own "certification cell", which gathers all his achievements and follows him during his entire carrier from school till retirement. Proposed e-register is the core of proposed system. Similar to skewer for cooking meal, e-register joins set of independent certification procedures into the system.

It is very easy to explain our idea after above introduction (**Tables 1 and 2**).

As the next step we distributed existing certification procedures into appropriate bands (**Table 1**). We guess that is natural to put FEANI Engineering Card and ECCE membership Card into Band II. We put ECEC licenses and petroleum engineering certification [8] into Band III. One can consider present FEANI EUR ING as both: certification and/or honorable title. Because of such "dualism" (more details are below) we divided EUR ING and put it in **Table 1** twice (in Bands III and IV). But, as one can see, **Table 1** looks "very poor"

Table 1

Existing certification levels for engineers distributed in the bands

# of band	Name of band	Certification level
IV	Highest skill levels	FEANI EUR ING (as Honorable Title)
III	Certificates for high-qualified engineers	FEANI EUR ING (as Certification)
		ECEC Licenses for civil engineers
		SPE Petroleum engineering certification
II	Confirmation of primary qualification	Engineering Card — FEANI
		ECCE membership Card
I	Demand to be engineer for youth	

and has a lot of empty space, even with artificial trick with EUR ING.

Proposed novelties. Based on our local experience and demand of our possessors we added to the bands new certification levels:

1. First of all, we placed two new certification levels with the name “Future engineer” into Band I. We insist that better engineer is formed from those pupils/students, who “waste their time” for designing and producing technical innovations additionally to their regular study in the schools and universities. Thus, we do believe that obtaining official cards in similar format as FEANI Engineering Card will increase motivation to be engineer for creative young people;

2. New certification level with name: Engineering Card (EU) appeared inside Band II. We plan to convince FEANI and our colleagues from, first of all, Poland and Czech Republic to issue EU Cards for Ukrainian applicants. We consider that precondition for the new card should be obtaining local (Ukrainian) Engineering Card. Local Card is used as authorized confirmation of education level and professional employment. We guess that appli-

cant should overcome additional “barrier” to get EU Card, probably as “light variant” of exam for license for civil engineer. For today we see it as short interview in the following format: a) as tele-conference; b) with local expert as examiner and c) by use language of country of issue. The exam should investigate applicant’s knowledge of EU standards and EU engineering ethic;

3. We also have revolutionary (?) proposal for FEANI EUR ING Title. Initially EUR ING was the first Pan-European engineering certificate. Later (after launching Engineering Card) it “drifts” to honorable title. We guess that minority changes in FEANI manuals could divide original EUR ING into three different levels:

- Certification for qualified engineers (level with the name EUR ING (C) inside Band III, similar to license for civil engineers) with probably exam for applicants;
- We insist to create new level for **project leaders** (level with the name EUR ING (PL) inside Band IV). We consider it as also certification level, but for those applicants, who reached outstanding professional results, or more specific: who al-

Table 2

Existing certification levels for engineers and proposed new ones distributed in the bands

# of band	Name of band	Certification level	Existing or new level
IV	Highest skill levels	FEANI EUR ING T (Honorable Title)	+ / New
		National honorable titles	+
		FEANI EUR ING C+ (Certification for leader of own completed project)	+ / New
III	Certificates for high-qualified engineers	FEANI EUR ING C (Certification)	+ / New
		ECEC License for civil engineers	+
		SPE Petroleum engineering certification	+
II	Confirmation of primary qualification	FEANI Engineering Card (EU)	New
		FEANI Engineering Card	+
		ECCE membership Card	+
I	Demand to be engineer for youth	Card of Future engineer (university students)	New
		Card of Future engineer (school students)	New

ready managed his own engineering project(s). Just as example: one of the largest bridges in Kiev, capital of Ukraine. It was one of successful project of prominent Ukrainian engineer Prof. Evgenii Paton. Today this construction has name Paton Bridge;

- We also guess that EUR ING should be saved as the highest European honorable engineering title (level with the name EUR ING (T) inside Band IV).

4. We also added National Honorable Titles to the Band IV.

And we obtained more attractive **Table 2** after adding proposed novelties to the **Table 1**. **Table 2** has one extra column. "Old procedures" are marked by "+" in it. Proposed extensions are marked as "New" in this column. One also can find symbol "+/New" in the last column. This mark is for "divided into three" FEANI EUR ING.

It should be stressed, that we put levels inside any selected band (**Table 2**) as equal ones. Proposed scheme is the first draft, so we don't consider ranking and priorities inside each band. It should be the subject for discussion in the future.

How to launch the system? Any manual says that invention should have combination of majority of well-known technical elements, which is balanced by certain number of innovations. For small number of novelties one obtains only certain improvement of known technical solution. In case of big number of innovative elements, proposed machine may not work. We tried to follow above rules while "inventing" our system:

- I - As one can see, the majority of certification procedures in the Table 2 are existing ones;
- II - We plan that guidance for the new procedures (like Future Engineer Cards in Band I or Engineering Card (EU) in Band II) will be based on existing FEANI/ECEC/ECCE regulations and, it seems, doesn't need many changes during implementation;
- III - We propose the procedure for investigation of the applications on the national level similar to FEANI practice. It should be small secretariat in USEAU HQ for formal final inspection (before submission to European/world level). This secretariat is also responsible for all financial matters;
- IV - We assume to use ENAEE format with number of authorized agencies for the initial inspection of specific engineering professions in our country. In other words, we plan that Aerospace Society of Ukraine will inspect applications of aerospace engineers; Ukrainian Nuclear Society does similar job for nuclear engineers and etc.;

- V - For present we have almost forty local technical associations, which support above ideas. All interested parties are joining today into National Network "European Engineer".

CONCLUSIONS/PLANS FOR THE FUTURE

1. The system for certification of engineers during long-life is proposed. One should consider this system as the first draft, which will be corrected and filled by new elements during implementation;

2. Implementation of proposed system is impossible without joint efforts of a number of interested parties: technical associations; universities; business; etc. It is planned to joint of all of them into National Network "European Engineer";

3. We are considering proposed system as pilot initiative and do believe that (in case of success) our experience will be useful for European and world engineering community.

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БАГАТОРІВНЕВА СИСТЕМА СЕРТИФІКАЦІЇ ІНЖЕНЕРІВ

Резюме. На основі аналізу існуючих процедур атестації інженерів у Європі та світі й власного досвіду запропонована багаторівнева система сертифікації, яка охоплює весь період професійної кар'єри майбутнього апліката: від шкільних технічних гуртків до створення власних інженерних проектів та одержання почесних титулів. До системи включено нові рівні сертифікації, зокрема для школярів і студентів. Інформація щодо персональних досягнень має зберігатися в електронному реєстрі, який вибудований подібно до відповідних розділів трудової книжки.

Ключові слова: інженери, сертифікація, система, реєстр.

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МНОГОУРОВНЕВА СИСТЕМА СЕРТИФИКАЦИИ ИНЖЕНЕРОВ

Резюме. На основе анализа существующих процедур аттестации инженеров в Европе и мире была предложена многоуровневая система сертификации, охватывающая весь период профессиональной карьеры будущего соискателя: от школьных технических кружков до реализации собственных инженерных проектов и награждения почетными титулами. В систему включены новые уровни сертификации, в частности, для школьников и студентов. Информация о персональных достижениях должна сохраняться в электронном реестре, который создан по принципам, подобным соответствующим разделам в трудовой книжке.

Ключевые слова: инженеры, сертификация, система, реестр.

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