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# Co-Operation between Technical Education of University and Electro-Technical Standardization Association

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## Introduction

Standardization is an important part of product development and product manufacturing. It is important also in electotechnical industry.

There are three standardization organizations (table 1) on international level: IEC, ITU (International Telecommunication Union) and ISO (International Organization of Standardization). There are corresponding standardization bodies on European level: CENELEC, CEN and ETSI and finally also on national level in Finland SESKO (Electrotechnical Standards in Finland), FICORA (Telecommunication Standards in Finland) and SFS (Finnish Standardization Association) [1].

**Table 1.** Standardization organizations

| | ELECTRO-TECHNOLOGY | TELECOMMUNICATIONS TECHNOLOGY | OTHER TECHNOLOGY |
|---|---|---|---|
| INTERNATIONAL LEVEL | IEC<br>IEC standards | ITU<br>ITU guideline | ISO<br>ISO standards |
| EUROPEAN LEVEL | CENELEC<br>EN standards | ETSI<br>EN standards | CEN<br>EN standards |
| NATIONAL LEVEL (FINLAND) | SESKO<br>Finnish Electrotechnical Standards Association<br>SFS standards | FICORA<br>Finnish Communications Regulatory Authority<br>SFS standards | SFS<br>Finnish Standards Association<br>SFS standards |

IEC (International Electrotechnical Commission) is the leading global organization that prepares and publishes international standards for all electrical, electronic and related technologies. IEC has 107 member countries. IEC's highest administrative body is the Council, which convenes once a year. Last year 441 new electrotechnical standards were published bringing the total amount of international IEC standards to 6 146 [2].

The preparation of a new IEC standard takes place in certain consecutive stages. Participants at the national level feed their ideas and proposals for new standards to their National Committees, who then bring these forward as new work projects. If approved by the IEC membership, these are taken forward to the appropriate IEC technical committees who transform the ideas and proposals into International Standards and other types of publications. Producing a standard from a new work item to a published standard requires intensive work of expert groups followed by public enquiries and voting procedures within IEC community. Average development time of IEC publications is 2.5 years and in most cases the project will be finalized in 5 years. The majority of IEC Publications are also adopted as EN-standards either with or without European modifications. These EN-standards are adopted as National SFS-standards and some of them (about 10 %) will be also translated in Finnish. Preparation of the Finnish translation together with national implementation measures will take some 6 months before the translation is available as an official Finnish standard (Fig. 1).

The Finnish standardization bodies consider cooperation with students, teachers and universities as important, especially SESKO, which has had very many projects with different universities and polytechnics. Cooperation with the world of universities and high schools is very important also for international and European standardization bodies (IEC and CENELEC).

SFS and SESKO prepared for the technical students and teachers a project, whose purpose is to:

- *Improve* knowledge of technical students about their line-specific standards and standardization of their own general area.
- *Support* the teachers through familiarization of standards and by using standards as instruments of teaching.

The objectives of this project were:

1) To enable *the familiarization of standards* to enter into one part of systematic technical teaching (study programme).
2) To enable the students' use of *standards at reasonable prices* (the special collection of standards for the students).

3) To produce updated and easily accessible *material, which supports teaching and familiarization* of standards and standardization.
4) To get standards and standardization *well-known among students.*

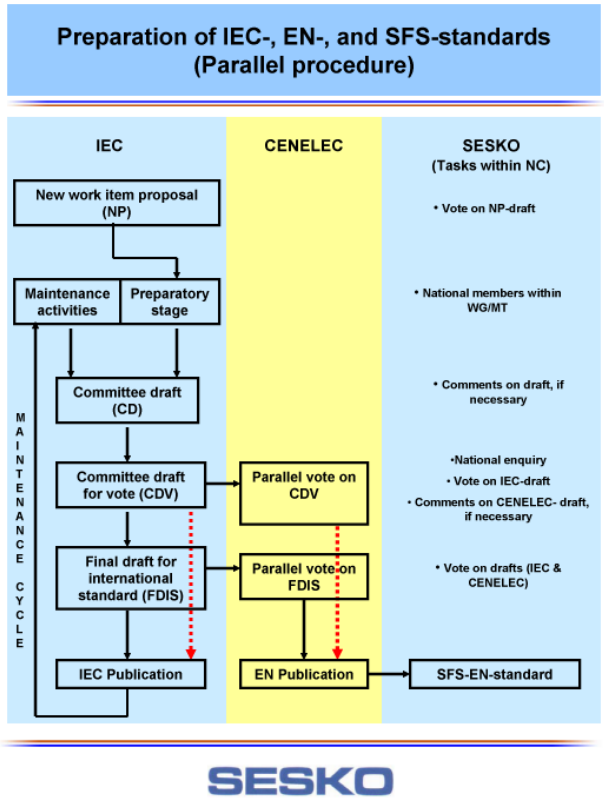


**Fig. 1.** Preparation of IEC-, EN- and SFS-standards [1]

For this purpose SESKO and SFS have:
1) prepared teaching material which teachers can benefit from as a tool in their lessons. They also produced exercise material for self-access to support studies and to test knowledge of standards,
2) published standard collections in the form of handbooks at low prices for students (published over 30 handbooks of standards for students = green versions),
3) published a students' and teachers' website www.SFSedu.fi,
4) arranged many events (about 15 seminars, lectures etc.) for technical students and teachers during four years from 2006 to 2009.

The aim of this paper is to describe the example cases of how the university and the electro-technical standardization association have cooperated in the teaching.

## Measuring Technology Course (Case I)

In the course of measuring technology (at University of Vaasa) the specialist from the electrotechnical standardization body lectured (2 hours). The topic of the lecture was "Standardization of measuring methodologies and measuring devices within electrotechnical sector". There was one question of standardization in the examination: "What sort of electrotechnical standardization is present in measuring technology and how is it realized in practice? In the examination the average of the points (0 – 6) was 3.2 (n = 17). Three students gave up on all examination. Six students got 6 points and all other got from 1 to 4 points.

## Standardization website to education institution (Case II)

*Developing of the website for educational sector.* Three Finnish Standardization Organizations SFS, SESKO and MetSta (Mechanical Engineering and Metals Industry Standardization in Finland) planned, realized and introduced websites for the students and teachers at the universities and high schools in 2009. The project was launched in February and the websites went out in October 2009. The main objective was to improve readiness and knowledge of standards and standardization among college graduated young people and their teachers. A familiarity of standards especially in the technical field is a big part of basic professional skills.

The new website www.sfsedu.fi offers the educational sector:
1) teaching material which teachers can benefit as a tool in their lessons,
2) material for students which they can benefit in their studies and as an information source about standardization,
3) exercise material for self-access to support studies and test knowledge of standards,
4) an easy way to get information of standards and standardization in their own professional area.

*Description of the website www.sfsedu.fi.* The purpose of website is to give information about all kinds of standards and standardization primarily for students and teachers in one place (Fig. 2-7).


**Fig. 2**. Home page of the portal

Students and teachers are able to approach standardization from their own educational area. Included on the front page are 18 different sectors such as: Automation; Food industry; Energy; Management and quality; Information and media technology; Chemistry;

Machinery, industrial engineering and material technology; Traffic and logistics; Business economics; Forest, wood and paper industry; Services; Construction and architecture; Electricity and electronics; Textile; Health care and technology; Information and communication technology; Environment; Common sectors.

You can find information about:

- What standards and standardization are?
- How standards are prepared?
- How standards are used?
- Who is responsible for the preparation of the standards?
- What international standardization means?

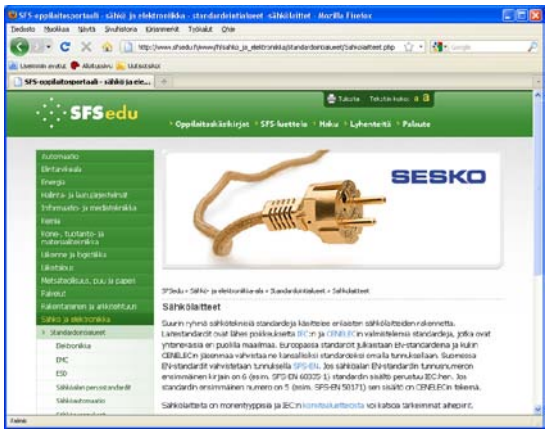


**Fig. 3.** Page of topic “electrical equipments”

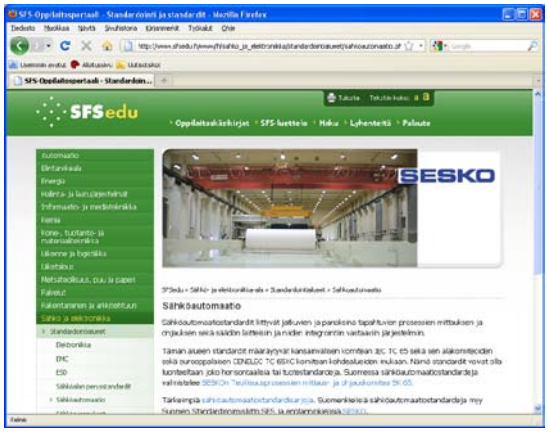


**Fig. 4.** Page of the topic “automation”

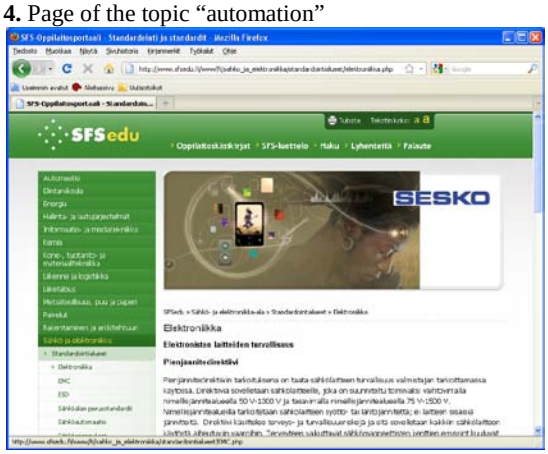


**Fig. 5.** Page of topic “electronics”

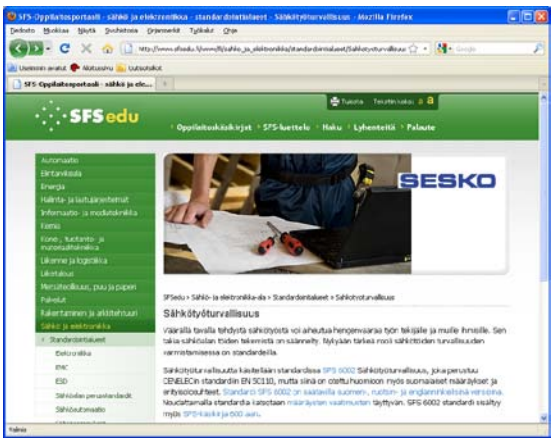


**Fig. 6.** Page of topic “electrical safety”

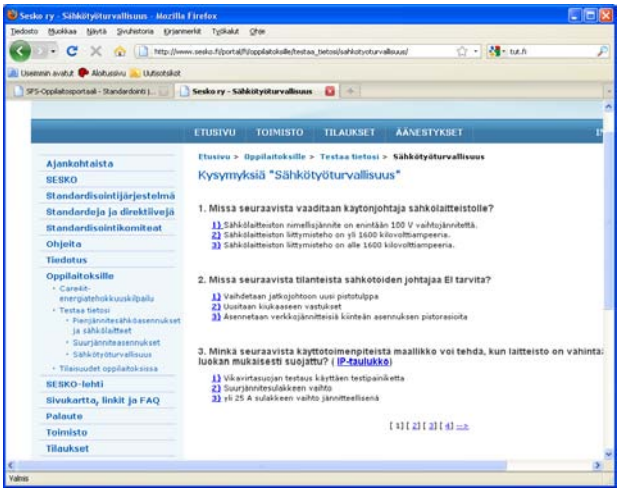


**Fig. 7.** Questions of the topic “electrical safety”

## Course of $SF_6$ questions (Case III)

In November 2009 Tampere University of Technology arranged a course for those who work with fluoridised greenhouse gas. Those people need certificate of qualification from now on because of EU directives [3,4]. The name of the course is STL-1200 Use of $SF_6$ gas in high voltage (over 1000 V) electric power equipments and environmental issues.

This kind of course has never been needed before in Finland. That is why the universities and high schools do not have constructions and devices for this. Some companies let the use of their constructions and devices and gave their experts for teaching. The timetable was also very challenging since the course should have been integrated into the education of Tampere University of Technology. The study programme involves participation with and the use of two standards, which concern charasters of $SF_6$ gas, as part of education and proficiency test. SESKO took care of very quick translation of those two standards for educational use. Thus the students got brand-new standards directly applicable in use. Total amount of participants were 33 and 21 came particularly to pass the exam of qualification. This education at Tampere University of Technology was a very good example of work made on a practical level between university, standardization body and companies.

## Discussion

*Case I; Course of measuring technology.* Students managed very well in examination. The situation was very challenging because of the huge amount of standards relating to common measuring technology. That is why it was necessary to limit standards only to electrotechnical measuring technology.

*Case II; Standardization website to education institution.* At the moment we don't have so much experience of using the website but at least those who have prepared thesis required for a diploma have exploited the website's information in their research. The contents of websites will be developed continuously.

*Case III; Course of $SF_6$ questions.* The students welcomed translated standards very positively. From this topic very much positive feedback was given in different contexts. It is also an excellent possibility to maintain the Finnish terminology of electrotechnology through such kind of activities.

## Conclusion

The conclusion of cooperation between standardization bodies and the educational world is that it has been very fruitful for both sides and it is easy to recommend this kind of cooperation to other standardization bodies and universities in Europe.

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This paper discusses the three educational cooperation projects between Tampere University of Technology, Vaasa University and standardization bodies – especially Electrotechnical Standardization Organization SESKO in Finland. The projects are Measuring Technology Course, standardization website to educational institution and the course of SF6 gas questions. The aim of cooperation is to improve readiness of students for work life. The two purposes are 1) to improve knowledge of technical students about their line-specific standards and standardization of their own general area. 2) to support the teachers through familiarization of standards and by using standards as instruments of teaching. Feedback from the students and teachers was quite positive. Ill. 7, bibl. 6, tabl. 1 (in English; abstracts in English and Lithuanian).

**S. Hieta-Wilkman, J. Vesa, L. Korpinen. Elektrotechninės standartizavimo organizacijos ir techniškąjį išsilavinimą teikiančių universitetų bendradarbiavimas // Elektronika ir elektrotechnika. – Kaunas: Technologija, 2010. – Nr. 10(106). – P. 165–168.**

Aprašomas Suomijos Tamperės technologijos universiteto, Vaasa universiteto ir Elektrotechnikos standartizacijos organizacijos (SESKO) bendradarbiavimas organizuojant studijas. Bendradarbiavimo pagrindas – matavimo technologijų kursas, mokymo įstaigoms skirta interneto svetainė ir SF6 klausimų kursas. Pagrindinis tikslas – pagerinti studentų pasirengimą darbo rinkai. Gauta dėstytojų ir studentų teigiamų atsiliepimų. Il. 7, bibl. 6, lent. 1 (anglų kalba; santraukos anglų ir lietuvių k.).