

CAE Application and Certification for Industrial and Educational Customers

The Case of University-Industry Cooperation between EPLAN and RFH

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Abstract—The paper presents examples of the application of the currently most used CAE software for electrical engineering and project planning EPLAN Electric P8 as well as novel international certification model, of the so called Eplan Certified Engineer (ECE) and EPLAN Certified Student, based on cooperation between Rheinische Fachhochschule Köln gGmbH – University of Applied Sciences in cooperation with EPLAN Software and Service company, a market leader in development and training in electro CAE. It argues that the successful interface management, communication plan and the costumer oriented technical-didactical model of the concept has been essential for the viability and success of the courses. It concludes that cooperation between the industry and university enhances the university's and firm's reputation with consumers and environmental competitors and has had positive financial effects for the both parties. It concludes that on the whole, these joint certification programs have a convenient side effect, like to be the successful way for the development of high-quality training opportunities for the students.

Index Terms—Standardization, CAE, CAD, EPLAN Certified Engineer (ECE), Third-party CAE/CAD Certification, Reverse Engineering, Inplace Editing.

I. INTRODUCTION

EPLAN Electric P8 is CAE database driven software for designing of electrical engineering systems. It uses freely selectable graphical/object orientation & variant technology and offers diverse functions like interfacing article reports, revision management etc. It is most used CAE application in the industry and applied by most import and industrial companies like companies out of automotive segment (Volkswagen, BMW, Mercedes and Ford etc.) or other known international industrial companies. It becomes as a quasi-standard in the CAE application. Institutions of higher education, industry, non-governmental and governmental organizations each achieve economic, scientific, and strategic advantages from collaboration [1]. Their incentives for

collaboration are epistemic, didactical and also political, with the reflection of the marketing needs [2]. Obstacles to cooperation and collaboration contain industry limits, appropriation of study, communication difficulties, and also national [3] and organizational cultural differences. Sometimes also industry and institutions of higher education often have dissimilar time horizons [4]. There are different possibilities to strength collaborations as for instance to use a legal framework and intermediaries. With this in mind, Rheinische Fachhochschule Köln gGmbH (RFH) – University of Applied Sciences has started the first conversations with the representatives of the EPLAN Software and Services (EPLAN) company in July 2006. The RFH is the biggest and oldest German private university. EPLAN is a worldwide leading CAE software developer in the area of electrical engineering, mechatronics and process and investment planning. The company has a contract with more than 60000 licensees worldwide. Gradually the high-level talks have been initiated and the cooperation intention has been developed and underlined with signification of the letter of intent. The letter of intent has defined the first time horizons, the main subjects of the collaboration as well as the framework and the content of the collaboration. After several reciprocal visits of the RFH and EPLAN by the representatives of the company and university cooperation has been established in October 2008. The cooperation concerns the realization of the so-called ECE (Eplan Certified Engineer) assessments, whereby the RFH take on the role of the Third Party Certifier.

II. BACKGROUND AND MOTIVES OF COOPERATION

The ECE assessment as a quality standard assessment, servers to evaluate the quality of the theoretical and practical knowledge of the examinees who are using the EPLAN product Electric P8, which is in the meantime the standard-software used in the German and European industry, particularly in the German automotive industry and companies like Volkswagen, Mercedes or BMW [5]. As is known, automotive industry in Germany is one of the major employers in the country, with a well-built workforce of over

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866,000 working in the manufacturing and trade. Additionally, Germany has the largest share of passenger automobile production in Europe with more than 29% market share [6]. Consequently the multi-purpose impact of automotive industry is huge. The idea for the establishment of the CAE quality standard assessment has been initiated by the German automotive industry in 2005, for the most part by the Volkswagen, which has in this regard addressed EPLAN Company. The reason of the establishment of the quality standards in CAE application has originated, because many supplier's companies which are working for automotive industry, have not made available high-grade qualitative electric engineering wiring diagrams and electro project engineering plans made with the software Electric P8. These led to higher costs because of the time-consuming reviewing of faulty plans. For the long-term directives and norms used for the establishment of the sustainable quality standards an independent quality assurance institution (RFH) has been integrated in the concept. As an independent institution, RFH has undertaken the task of the development of the regulation and contents leading to sustainable quality CAE standards as well as the development of the assessment procedure. It includes also the allocation of the all resources needed for the realization of the effective assessment. It must be independent from the exam location, because the assessment is to be offered to the customers in Germany and worldwide.

III. COOPERATION BENEFITS, ELEMENTS OF COURSE DESIGN AND KEY SUCCESS FACTORS

In times of increasing competition the success of an enterprise depends decisively on productiveness and qualification. Not only the choice of the suitable, achievement-raising software is important for the success, but also the professional handling of the system documents the company's competence face to face with customers. Thus it surprises nobody that the subject "Certification" has won in importance. Enterprises profit more and more from the use of the uniform defined high-class standards, to set themselves apart from the competition and to guarantee the investment security for their products and services. As an EPLAN certificated supplier, the firm stands professionally in their market segment and documents with it the uniform high-class standard, extensive specialist knowledge and competence. Companies indicate to their customers that high-class aspects stand in the center of their enterprise activity. Thus the companies do achieve a clear competitive advantage compared with the not-certificated suppliers [7]. Due to the fact, that a „certificate" is individual-related matter, the idea has originated that the company receives the status as "EPLAN certificated supplier" then, if at least one company's employee has successfully passed the ECE-assessment. Thus the company keeps this status, as long as these employees (owners of the ECE certificate) remain to stay employed in the company. On account of this idea the different benefit aspects came well along, which arise from the user's view, company's

point of view, from the point of view of the EPLAN company and the RFH University. These will be subsequently explained in greater detail below. Customer value of ECE certification

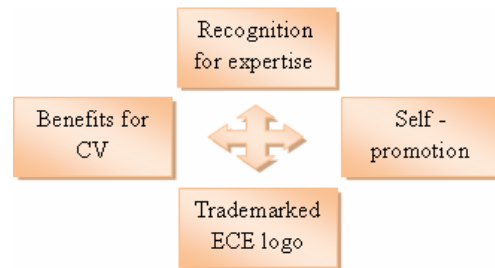


Fig. 1. Customer's benefits of ECE certification.

can be specified as in the Fig. 1.

The owners of the certificate receive recognition for their expertise from their employer. The curriculum vitae of the certificate-owner shows a point, the recruiter considers beneficial. Owners of the certificate receive an ECE logo which they can freely use even for the business purposes, as an advertising for the own business. The ECE logo is legally protected by the EPLAN company and may not be misused.



Fig. 2. Eplan Certified Engineer logo ©.

The ECE logo is presented in Fig. 2.

The profile of owner of the certificate can also be published on the web page of the EPLAN company. For that case RFH University forwards the data of the candidates they passed the ECE exam to the EPLAN company, assumed the customer agrees in co-ordinance with the data security regulations, that his/she's data may be forwarded and published. On this way, everybody can publicly see who the owners of the ECE certificate are [8]. The ECE certificate is issued by RFH University. Furthermore but, behind the certificate issued by the RFH University, owners of the ECE certificate upon request can receive a further high-quality certificate document from EPLAN company. Moreover there are benefits for the EPLAN company and the RFH University which arise from the ECE certification. Firm's value of ECE certification can

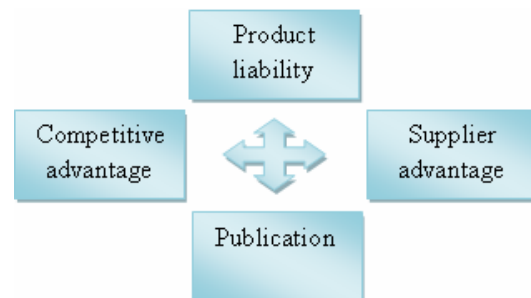


Fig. 3. Company's benefits of ECE certification.

be specified as in the following:

With the certification the firms have a juridical security in the product liability, because of the comprehensible proof of the service quality, offered with the Electric P8 product. On the one side the firms have advantages in the market segment compared with not-certificated competitor and on the other side certification represents a demonstrable high-class standard in the supplier's circle.

Also the enterprise profile is published on the web page EPLAN analogical to the publication of the user's data. Certification benefits for RFH University can be specified as in the Fig. 4. For the RFH University there are many benefits arising through the Third Party Certification. According to agreement the RFH receives a free advertisement done by the EPLAN company. During the every product training offered in by the EPLAN company, trainers are instructed to inform the customers about the ECE certification at RFH. Having in mind that EPLAN has 59 subsidiaries worldwide and there from 16 in Germany, the advertising effect is very high. Furthermore EPLAN is regularly advertising also in the professional journals and trade magazines, in internet and other advertising channels. ECE certification is also offered to the students and employees of the RFH university to the reduced price of currently 150 € excl. VAT. It is a benefit for all RFH students and employees, not only because of the reduced price but also because this certification is unique at German universities. The good reputation of the university becomes therefore achieved. At least university gains a substantial financial benefits because the regular customers have to pay 300 € excl. VAT for the 90-120 min on-line assessment. The overhead costs are less, because assessments is carried out with the open source software and needs to be updated every 2 years, with the issuing of the new EPLAN Electric P8 product. The re-certification of the certificate owners is therefore necessary every 2 years. This leads to increasing of the customer pool and consequently to the sustainability of the financial benefit for the university, because for every new certification procedure the costs become due. The ECE certification becomes since 2009 international. The benefits of the internationalization are huge. RFH has a free and improved market access in the EU and worldwide due to possible cooperation with the potential supports of the ECE assessment, which can be licensed. Also the financial advantages increase, without additional resource input. The assessment is offered for the international



Fig. 4. University's benefits of ECE certification.

customers in German and English language and in these languages exams are available. EPLAN's value of ECE

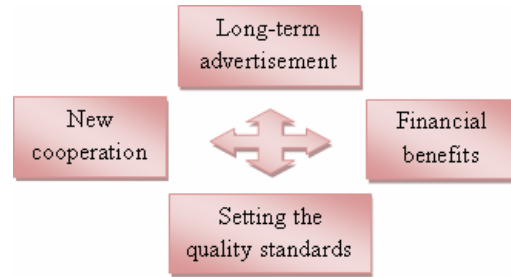


Fig. 5. EPLAN's benefits of ECE certification.

certification can be specified as in the following:

The EPLAN company issues unique standards in creation of the quality standards in the domain of electric engineering and project engineering. The ECE certification can be treated as a stamp of quality for the professional application in electrical CAD. Also the company is achieving the financial benefits because it offers special tailored preparatory courses for the ECE exam. Furthermore, it develops good relationships to the university and can expect the new beneficial cooperation in other areas. EPLAN Electric P8 software is according to agreement between RFH and EPLAN company, also installed and used at RFH University. Thus company gains advantages in long-term from the advertising done at university, because the students learn the advantages of the product, learn to apply it in working environment and can convince the future chiefs of the product advantages. To ensure the successful cooperation, the procedures about the sharing of information have been defined between RFH and EPLAN. It includes the regularly update of the assessment according to the new releases of the Electric P8 software to ensure the actuality and therefore high quality of the assessment. The technical interfaces have been defined, which are including the planning of the examination dates and exam locations for the practical part of the ECE certification. According to the basics of the project management and therein defined communication matrix, key accounts have been defined on both sides, so that the communication flows smoothly. One example for it is that the RFH and the EPLAN are simultaneously informed about the filling the online-application for the assessment with all relevant data, about the assessment date, location etc. Regularly meetings are organized, as well as the evaluations of the feed-backs given by the customers. Mutual respect is of course one of the main keys to success of every collaboration.

IV. CERTIFICATION AND ONLINE-ASSESSMENT PROCEDURE BY USING THE OPEN SOURCE LMS ILIAS

The word "certificating" originates from the Latin "certum facere" and means „to make something certain” or to "guarantee". To certificate somebody signifies that an independent, neutral third party assesses whether with a product, a service or by a person, the given criteria are

fulfilled. If that is the case, neutral third party confirms publicly the certification with a certificate. The application procedure is presented in the Fig. 6.

Generally everyone who is interesting be assessed may take part if he/she can furnish a proof in dealing with the product EPLAN Electric P8. The proof can be furnished e.g. with the visiting of the EPLAN courses, or with application and use the product in the company. Alternatively examinees have the possibility to visit the preparation courses at the EPLAN company [9]. Application to assessment is carried out online and is accessible via URL: www.eplan.rfh-koeln.de. All necessary information about the exam dates, location etc. are

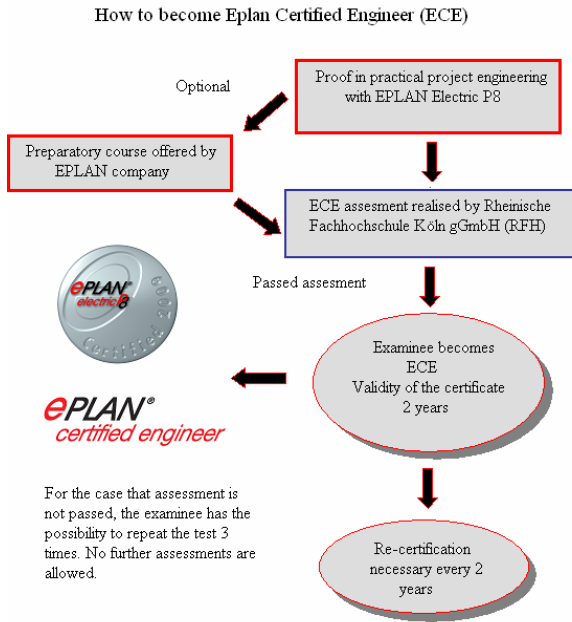


Fig. 6. Modalities of ECE certification.

Account holder:	Rheinisch
Account number:	27832039
Bank code:	37050198
Financial institution:	Stadtspark
Amount:	300,-€ + \
Reason for payment:	ECE-Fore
IBAN - Number	DE11370
BIC	COLSDE3

Fig. 7. ECE assessment registration.

to be found at this website. The assessment consists of the practical and the theoretical part. Practical part occurs on location selected during the application. For the practical part, RFH nominates licensed examiner who has the tasks to observe the task. All results are to be forwarded to the RFH which has the final authority to decide whether the assessment is passed or not.

ILIAS is worldwide used application, with the large spectrum of the features. The ECE assessment website is accessible via URL: www.ece.rfh-koeln.de. Fig. 8 shows the log-in mask.

The log-in data are automatically generated and delivered to the customer over email for the case that the assessment fees are paid. The application website is a SSL secured site in accordance with the data privacy regulations and terms, which are valid for the Federal Republic of Germany.

V. APPLICATION EXAMPLES

So called direct editing function lets the user edit texts (e.g. device tags, function text or part numbers) with an effortless click of the mouse in the circuit diagram. Without having to edit the device dialog box, all information can be

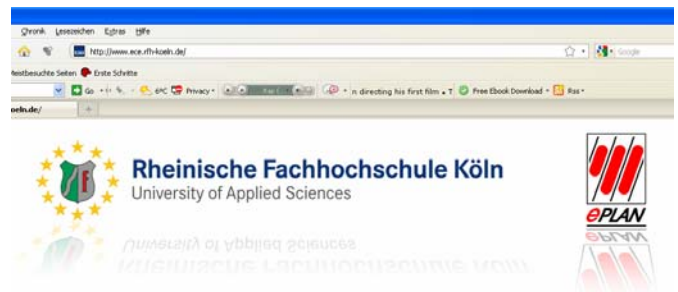


Fig. 8. ECE assessment log-in.

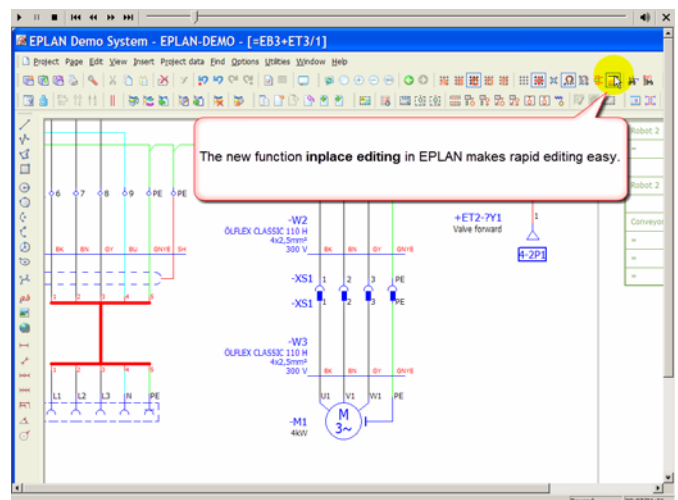


Fig. 9. Inplace editing function.

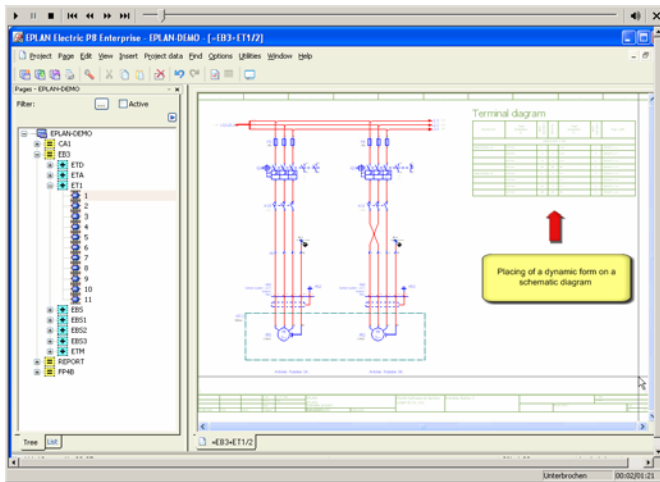


Fig. 10. Dynamic reports functions.

spontaneously edited in the circuit diagram directly where it is displayed. Following figure presents the inplace editing function.

Dynamic reports functions are assigned to schematic views and individual reports are combined on one report page.

PLC multifunctional terminals allow the flexible use of the Input and Output terminals of the PLC enabling the use of the same terminal for different function. In the example in Fig. 11 and 12, for the case of the substitution of the thermo-elements which are connected with PLC system over 2-wire technique, with potentiometers which are connected with PLC system over 4-wire technique it is possible, without to change layout to carry out new numbering of the terminals also by using the numbering scheme of the different manufacturer.

So, in the picture above is presented numbering scheme by PILZ and the picture below by Siemens.

VI. CONCLUSION

This paper has provided the applicational and conceptual insights in the most used CAE software for electrical engineering and project planning in the European industry, motives, conceptualization and design of the successful university-industry cooperation in the area of the Third Party Certification by using the open source LMS application. The evaluation of the key success factors for such cooperation has indicated, that the optimal technical solution adjusted to the customer needs, deliberate interface management between the university and company, as well as the mutual respect are decisive for the long-term success of the cooperation. Note: Further information can any time be requested from the author. Please use authors electronic mail address for the request.

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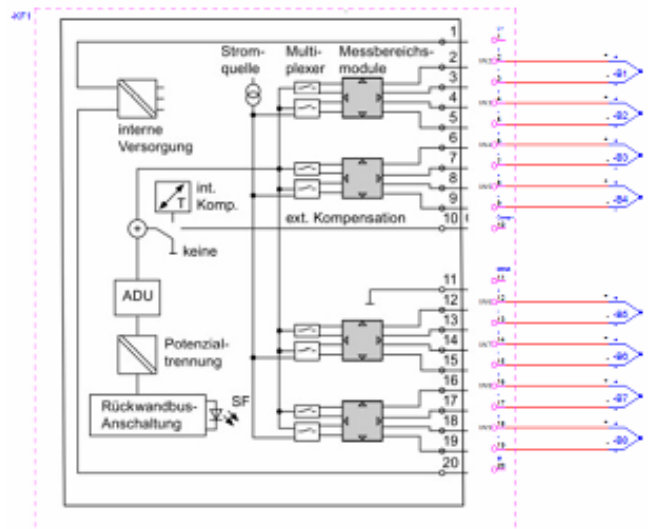


Fig. 11. PLC connected thermo-elements in 2-wire technique.

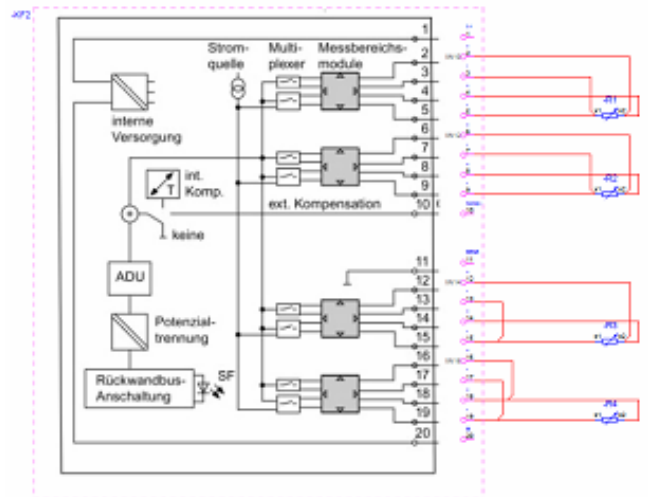


Fig. 12. PLC connected potentiometers in 4-wire technique.

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