

Certified PROFIBUS Training

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Abstract—Modern automation technology is not usable without industrial networks or field buses. PROFIBUS International established a program of certification training to ensure the quality of multi-vendor installations all over the world. The quality of the certification training is ensured by the PROFIBUS Competence Centers.

International Aspects of Engineering Education, Postgraduate Training

1. INTRODUCTION

During the last 15 years the structure of automation systems has changed considerably and the centralized control structures have been replaced by decentralized structures. The introduction of low price microprocessors in the field device and the introduction of industrial networks, the fieldbus for the digital communication, made this possible. The skills to be fulfilled by the technical personnel involved in the planning, installation, engineering and maintenance of such automation systems have also changed.

The most used fieldbus in the world is PROFIBUS according to IEC 61158 [1] and IEC 61784 [2]. To promote this technology a user organization consisting of more than 1200 manufacturers and sales organizations was founded in 1995: PROFIBUS International. This organization is the umbrella organization for the 24 regional PROFIBUS associations (RPA) worldwide. These RPAs are involved mainly in marketing, to promote the PROFIBUS technology.

One of the problems of an open system is that products from different vendors are combined to form one system. When problems arise, it is not clear who is responsible for the correct function of the whole system. There is a need for manufacturer independent, and neutral knowledge, of the glue technology PROFIBUS [3]. For this purpose, and also to distribute this technology all over the world, special education labs have been approved by PROFIBUS International as PROFIBUS Competence Centers (PCC). At present there are 29 such competence centers in 17 different countries that are approved and listed on the PROFIBUS web site [4].

2. CERTIFICATION PROGRAMS

2.1. Certified PROFIBUS Network Engineer

To unify the technical education and improve the acceptance of this education, an engineer certification program was founded. The PROFIBUS Trade Organisation USA (PTO), together with the PROFIBUS Integration Centre (PIC) in Johnson City, defined a four day training program to become a Certified PROFIBUS Network Engineer. This program was taken over also by the Berne University of Applied

Science, the Manchester Metropolitan University, and the PROFIBUS Center Netherlands. This is an international engineer education program taught in different languages, on different continents, but with an identical final examination.

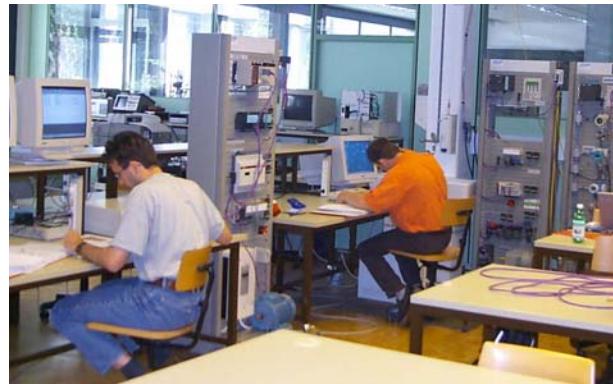


Figure 1. Practical exercises in the laboratory on PROFIBUS installations

During their training, the participants acquire detailed knowledge about the cabling and installation of PROFIBUS cables, learn the correct planning and commissioning of PROFIBUS installations and, last but not least, learn to debug an installation with different analyzing tools. The goal is to enable the participants to construct working PROFIBUS installations with products of different manufacturers and to identify the source of problems when they arise. The requirements for such an training is also described in [3].

In a written examination with multiple choice questions and a practical test on localization of errors in an installation the participants have to prove their skills. All participants who successfully pass the final examination are listed on the website [5].

2.2. Certified PROFIBUS Network Installer

Practical experience shows that about 95% of failures of a PROFIBUS network are due to bad or wrong cable installations. But it makes no sense to pass all personnel involved in the installation of the cables through the complete PROFIBUS engineer certification program. Very often the persons involved in the installation of the cables are not the same persons responsible for the engineering of the PROFIBUS network.

Consequently, the Manchester Metropolitan University defined a second certification program for Certified PROFIBUS Network Installers. This program is completed in a single day and enables the installation personnel to correctly install and verify the installation of a PROFIBUS cable and also concludes with a written and practical examination.



Figure 2. Practical examination on installation technology

This training program was not only successful in Great Britain, but also in South Africa and the Netherlands. PROFIBUS Switzerland obtained the license to also offer this training in Switzerland, and the Berne University of Applied Science translated the documents into German.

2.3. Quality Assurance

All the PCCs meet once a year to coordinate their activities and exchange ideas. At these meetings the technical information and knowledge of the different PCCs are exchanged and information about the latest PROFIBUS developments is distributed.



Figure 3. 5th PCC Meeting in Reinach (June 2002)

To ensure the quality of the exams, and to ensure that all PCCs performing the certification training use the same level of quality, a task force representing the involved PCCs was established to coordinate the content of the training and the final examinations. The main focus is to ensure that the examination is undertaken at the same level in all countries.

3. FUTURE EXTENSION

3.1. PROFIBUS Network Commissioning

At present there are discussions about introducing other training programs and titles at the international level. There are preparations for a certification program for commissioning and maintenance personal. It seems that the requirements to install, to plan and integrate a PROFIBUS installation are different from the requirements for the commissioning and maintenance of a PROFIBUS network. The focus lays more in the extended diagnostics possibilities of the PROFIBUS automation technology.

3.2. PROFIBUS for Process Automation

There also exists different domains of applications for the PROFIBUS networks. The requirements of an application situated in manufacturing automation are different from the requirements of an application situated in process automation. Different rules for correct cabling are used in process automation and manufacturing automation. The installations can also be situated in an explosive environment and special installation requirements are to be fulfilled with intrinsic safety. The field devices, the transmitters and actuators are commissioned with a special function block technology, which is defined in separated profiles. To deal with these requirements an extension of the Certified PROFIBUS Network Engineering program was defined. This extension covers these specialities and takes an extra day of training. In the Netherlands this training is offered as an additional course whereas Endress + Hauser Process Solutions offers this training as a complete 5 day course in Singapore.

3.3. PROFINET

At the same time there is a move in the technology: The fieldbus PROFIBUS will be replaced in the upcoming years by PROFINET, an industrial network based on Ethernet technology [6], [7]. The first products with PROFINET are now on the market and initial experiences with real installations are gathered. The Ethernet and TCP/IP technology is not new, but it is new for the personnel involved in the automation systems to use Ethernet for real time applications in the field. The installation technology and commissioning for industrial Ethernet is different to Ethernet in the office environment. To fulfil the real time requirements of the automation technology the Ethernet protocol must be adapted: PROFINET uses special switching components.

It is the intention of PROFIBUS International to introduce a program for certified network engineers for PROFINET. The PROFINET Competence Centres (PNCCs) are working on a proposition for a training program for this purpose. We expect that the first training sessions may be held in the next year.

4. CONCLUSIONS

Open systems present a new challenge for the system builder: is it really possible to combine products from different vendors in one system? The experience shows that this is in fact possible, but to commission it without problems there is a need for special training and education in the connecting technology.

ACKNOWLEDGMENT

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