

Systematising career progression

Advanced and continuing training in the electrical sector

► To tailor the development of skilled workers to the industry's needs, as of August 2009 a process-oriented system of continuing vocational education and training (CVET) has been instituted in the German electrical and electronics sector: having completed initial vocational education and training (IVET) in an electrical and electronics training occupation, skilled workers can pursue further CVET to qualify as Specialists and then gain a second-stage recognised qualification as a Certified Process Manager in Electrics/Electronics (Operative Professional). The realisation of a third-stage advanced training qualification (Strategic Professional) is planned for 2012. This article outlines the innovative structure and the standards governing the content of this new advanced training model. It focuses on the potential of this form of CVET, which is work-process-oriented, undertaken in tandem with work to keep pace with constant advances in technology and organisation.



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Professional process management

The objectives of modern vocational education derive from the structural conditions of the economy. Flexible specialisation – a strategy that relies on the rapid implementation of innovations in the form of high-quality, marketable products – is the unavoidable response of companies wishing to safeguard their international competitiveness and access new markets. This approach goes hand in hand with process-oriented organisational structures: the functional hierarchy is no longer the determining structure; business processes and operations come first. If these are designed effectively and efficiently, the requisite flexibility and customer-orientation, quality improvement and cost reduction can be achieved.

These modern process-based structures impose a changing set of tasks and requirements upon skilled workers: job-elements are integrated and intermeshed; tasks become broader and more demanding; isolated processes are combined and integrated. More responsible decisions are delegated to skilled-worker level. Integrated system development, intelligently organised production and customer-oriented service call for competent members of staff at all levels of employment who share a common, comprehensive understanding of the processes involved.

The development of skilled workers in the course of business processes is a key issue for companies, not just with a view to safeguarding their competitiveness but most of all in the light of demographic change. Amid rising demand for skilled workers and high qualifications, the workforce is ageing and the supply of junior staff is diminishing. What were once abstract demographic scenarios are thus turning into acute business challenges.

At the heart of these changes, the electro-technical and electronics industry has to contend with complex products and systems, branch-specific solutions and diverse product variants, global value chains and worldwide operations and services. New advanced training occupations and the respective CVET provision must do justice to these changes: at the earliest opportunity in the modernisation of the training regulations for the industrial electrical occupations, the social partners agreed upon a connecting thread linking

them to CVET (cf. ZVEI/IG Metall 2000). In this conception, business processes were used in the development of the new advanced training regulation as the common basis for the prospective qualifications and the examination requirements. This has ensured that skilled workers at every level attain competence in sub-processes along with an understanding of the overall process.

Training and career progression in electro-technical (ET) occupations

Employees express very high interest in an external upgrading training programme but are reluctant to participate in full-time courses (cf. BORCH 2007). The time-consuming nature of advanced training for Master Craftsman or Technical Engineer qualifications is mentioned as one of the inhibiting factors. Criticism is also levelled at the high proportion of training content that is not required in business practice, and the fact that advanced training courses only superficially help candidates with professional process management or even aim to do so.

Conversations with human resources managers, apprentice instructors, CVET coordinators and skilled workers during site visits to ten companies with up to 500 members of staff revealed that typical company-based career patterns in the electrical and electronics industry consist of “growing into” higher-grade activities. The skilled workers concerned, mainly vocationally qualified Electronics Technicians, work alongside engineers on projects, develop specialisations within their subject field and undertake their own continuing education within the company. Specialists like these are highly regarded as company employees because they work at the interface between the development of systems, production, installation and customer service, and have a crucial influence on the quality and functionality of products and services.

The conversations also showed that there is a growing demand for skilled workers who can work independently and make decisions in technically demanding and complex task areas. Against this background, a training programme that does not require a career break is welcomed. A job-compatible, work-process-oriented advanced training course is seen as an appropriate solution.

Some companies are already working within structures that support incremental company-based CVET programmes. These training models allow staff to remain in the workplace. The company provides the enabling conditions for the training process and ensures that staff can perform well while gaining certification.

This work-process-oriented CVET is seen as an efficient form of professional training and a superb instrument for the targeted development of skilled workers. It takes place within real projects and thus imparts a high degree of occupational competence (cf. BORCH/GERDES 2009).

Skills for transformation processes

As the business environment changes and industries constantly reinvent themselves, IVET and CVET – and human resources development in companies – need new strategies to ensure that they remain competitive in future.

In a technologically demanding environment, the work process itself becomes the greatest source of learning. In this context, companies can utilise the potential and experience of their skilled workers by deliberately developing their skills within the framework of in-company CVET. Learning within the work process does not happen spontaneously: lessons learned in the work process need to be reflected upon in order to draw the right conclusions.

The permanent impulses for change and improvement that are stimulated not only develop the skills of individual staff members, but have similar benefits for teams and – on the principle of “learning organisations” – the company itself (cf. OLESCH/PAULUS 2000). For not all organisations are alike; some are better equipped than others to accomplish all the requirements of their tasks. In this sense, competence development can ease the path of structural adaptations and develop the ability to shape technical and organisational transformation processes, working closely with the skilled workers concerned.

Systematised advanced and continuing education and training

The new Professional qualifications give those who successfully complete an apprenticeship access to levels of specialisation that have normally been the sole preserve of Technical Engineers (cf. Figure 1). As a consequence of the shortage of Electrical Engineers, companies will have to consider much more precisely in future which engineering tasks they can appropriately assign to skilled workers who have acquired their occupational competence via the IVET and CVET route. In this context, particular importance is restored to the apprenticeship route into a career.

Four Specialist profiles

The Specialist profiles contained in the Ordinance on the Examination for the Recognised Advanced Vocational Qualification (Bundesgesetzblatt 2009, p. 2841) describe an innovative approach of work-process-oriented training. These are located on the first level of CVET, and could be assigned to Level 5 of the German Qualifications Framework (Deutscher Qualifikationsrahmen, DQR). The Annex to the Ordinance sets out the content-related standards of the individual profiles. These standards are also a prerequisite for admission to the qualifying examination as a Certified Process Manager (Electrics/Electronics). Hence

they form the link between IVET in a recognised occupation and the Operative Professional qualification governed by advanced vocational training regulations. The foundation for the Specialist qualification is laid by training in the fields of work and the work processes described for the individual profiles:

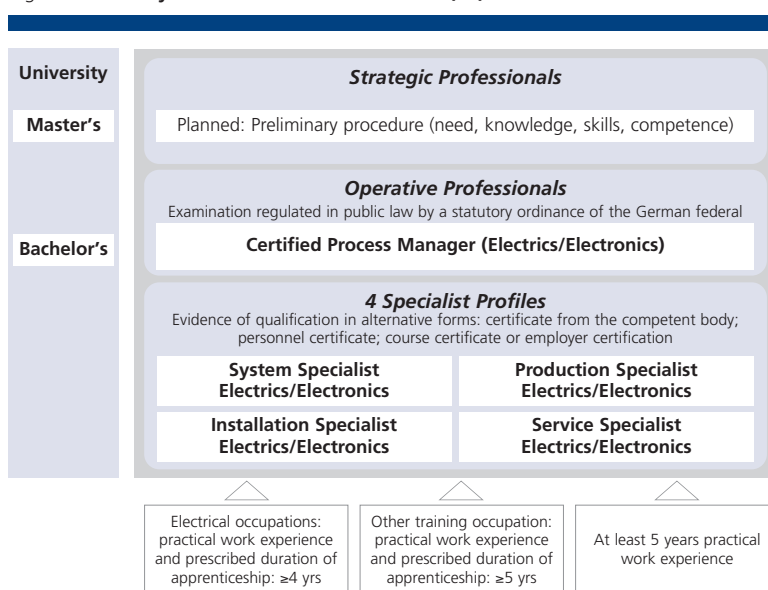
- ET System Specialists plan and design electrical components, devices, plants or systems, and devise technical solutions for products or systems.
- ET Production Specialists devise solutions for technical production and procedural challenges in the manufacturing of electrical and electronic products.
- ET Installation Specialists coordinate and oversee procedures in the construction of installations and systems on the customer's premises.
- ET Service Specialists analyse customer enquiries, devise and implement solutions to problems, and support customers in this process.

All the Specialist profiles were conceived in such a way that training can take place within real, company-based operations and projects. In the course of training, the listed work processes have to be carried out independently in the process of fulfilling company orders and projects. In-process documentation must be completed, and a coherent account of the activities and the competence attained must be delivered in the form of a presentation, on which the candidate must subsequently answer questions in an expert dialogue. Professional mentoring on the learning process is, of course, essential to facilitate and support reflection on learning. This gives companies the opportunity, for the first time, not only to design the training of their Specialists themselves but also to document it independently in the form of an employer's certificate.

Unlike the CVET system in the IT sector, in which the Specialist qualification can only be taken as part of a personnel certification scheme conforming to an international norm, the new CVET system in the ET sector is consciously pluralistic: it formally stipulates that evidence of the qualification is to be provided through a certificate from a competent body, a personnel certificate, a course certificate or certification – in particular one awarded by employers –, which sets out the breadth, depth and method of the Specialist qualification.

The breadth and depth of the qualifications to be certified are described in detail for each of the four Specialist profiles and are understood as a reference standard for the precise company-specific design and personalisation of the training. In contrast to the IT sector, these descriptions of the typical work processes fitting the profile are an integrated component of the advanced training regulation. The method of Specialist training itself is determined by the concrete process in the given case, the organisation of the training process, e. g. in the form of learning-process mentoring and expert counselling, or cooperation with in-com-

Figure 1 CVET system in the electro-technical (ET) sector



pany and/or external training establishments. This means that implementation in the company context can also be tailored, participant-focused and situationally appropriate.

The Operative Professional (Process Manager Electrics/Electronics)

Certified Process Managers (Electrics/Electronics) provide technically innovative and marketable electrical and electronic products, customer-oriented solutions and associated services. In addition, they perform human resources management functions and are deployed in the fields of development, production and customer service. Qualitatively, this qualification could be assigned to the same level as the Bachelor's degree, i. e. DQR Level 6.

The aim of the new Chamber of Industry and Commerce (IHK) CVET examination is to certify that process managers are proficient in the management of processes and projects, either in development, in production or in customer service, taking account of technical, organisational and commercial issues and complying with rules and standards.

For admission to the examination, over and above the usual provisions, the advanced vocational training regulations stipulate that a Specialist qualification must be held in one of the four electro-technical specialisations, or evidence provided of a qualification meeting equivalent standards of subject knowledge (cf. REINECKE 2009).

The examination structure consists of three components (cf. Figure 2, p. 34): In the "Process and Project Management" component of the examination, candidates have to carry out and document a company-based project, and report on this. For this element, they choose one of three possible fields of activity: systems engineering, production engi-

neering or services engineering. In this exam component the candidate must demonstrate proficiency in analysing processes and carrying out projects to modify processes. In the “Comprehensive Specialist Tasks“ component, the candidate must demonstrate proficiency in carrying out engineering tasks with due regard to technical, organisational, economic and human resources aspects. This capability has to be demonstrated in two situational tasks: for the first, they must draw up technical specifications in the form of a requirements specification, while for the second, they have to produce technical solutions in the form of a functional specification.

In the “Personnel Management“ component of the examination, evidence must be shown of the capability to deal with tasks and interventions in the areas of staffing needs, staff deployment and staff leadership. This capability is examined in a further written situational assignment.

Planned qualification: Strategic Professional (ET Technical Engineer)

During the modernisation process, the expert representatives of employers and employees appointed by the federal government reached agreement on a proposal for a new project to draft a third-stage CVET qualification (Strategic Professionals), building on the Operative Professionals level. From the viewpoint of BIBB, initially it proved effective to organise the planned advanced training qualification (prospectively assigned to DQR Level 7) in such a way as to retain the work-process-oriented approach, supplemented with academic study content from the discipline of electrical engineering.

This integration is intended to make it clear that vocational competencies and excellent CVET achievements by skilled occupational practitioners can also include scientific investigation of topics from basic and applied fields of electrical engineering. It is conceivable that content teaching could take place within a short degree-level course in tandem with work or by attending modules of study, and that credit points could be applied to one of the three planned sections of the examination. The selection of study modules is to be limited exclusively to scientific and technical teaching content.

As in the CVET system for IT, the other two examination elements could comprise “Strategic Process and Personnel Management“ and “Project and Business Relationships“ in the ET sector. A preliminary procedure will initially be launched to study the feasibility of adding a third stage to the CVET system for the electrical and electronics sector and to clarify conceptual aspects of the model.

Summary

The new advanced and continuing education structure in the electrical and electronics sector offers opportunities both for employees and for companies:

- The work-process-oriented CVET system enables companies to adopt an efficient form of staff training and is a superb instrument for sustainable human resources development in the context of demographic change.
- It enables skilled workers to systematically develop their own competencies within the work process, and thus opens up a wide range of employment opportunities in electrical engineering and electronics.
- The training leading to both Specialist and Professional qualifications takes place in parallel with work and within real business tasks. It is highly transfer-oriented and promotes comprehensive vocational competence. ■

Figure 2 Examination structure of the CVET system in the ET sector



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