



Application of the EQF Predict optimum models in education practice
**The EQF Predict pilot at VW Service Deutschland:
background, experiences and outcomes**



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Preliminary remarks

The EQF Predict pilot activities have been implemented in order to test the EQF-adaptation optimum models developed and reviewed in the other project workpackages framework and as they are presented on the EQF Adaptation Support Portal (www.eqf-support.eu). They have been implemented into a practical context involving education practitioners who would also work on such issues outside of project settings on the examples of

- an in-company human resource development programme with VW Service Deutschland on a car mechatronics training programme related to the German IVET scheme for car mechatronics
- a public distance learning course implemented by Fastrak (UK) on web content management

It has been the major aim of the two EQF Predict pilots to test how the EQF requirements on education practice as they are described within the EQF predict optimum models of EQF-adaptation can be applied within education practice and by education practitioners.

This paper describes the EQF Predict pilot implemented in the framework of the car mechatronics training at VW Service Deutschland with its focus on adapting this VW specific qualification programme for trainees to the EQF learning outcome approach based on the descriptors “knowledge”, “skills” and “competences”.

(1) The VW Service Deutschland pilots’ background and preliminary considerations

The Volkswagen specific qualification programme for trainees “Volkswagen technology for trainees – powered by Volkswagen” (VTA) is an additional qualification programme at Volkswagen car dealers. It is an improvement of the apprenticeship with Volkswagen specific topics and covers the whole period of the dual system traineeship (3 years). The VTA is a self-contained training, composed of several trainings with an assessment after each year. The VTA takes up the content of the existing national wide framework curricula and deepens it with Volkswagen specific topics. The VTA content for car mechatronics has been chosen as an example within this pilot.

Volkswagen Service Germany has 14 qualification centres spread all of Germany. The training of the trainees attending the “Volkswagen Technology for trainees” takes place in all of these qualification centres and is implemented by a pool of trainers. Training guidelines are developed for each of the courses offered within these centres. These guidelines include aims, content and training steps. They are also the basis for assessment.

Vocational education and training in Germany is based upon the dual system. This system combines two places of learning: vocational schools and companies. A framework curriculum exists for each of the more than 350 vocational education and training profiles. The content of the framework curricula for car mechatronics is divided into three parts.

- Section I: Basic vocational education and training
- Section II: Specialist vocational education and training
- Section III: Specialist vocational education and training according to specialist area

The table below lists an abstract of the framework curriculums content in the field of basic vehicle electrics and in comparison to the training guidelines.

Framework curricula (car mechatronics – abstract from basic vehicle electrics)	Training guidelines VTA (car mechatronics – basic vehicle electrics)
<p>Maintaining, testing and adjusting vehicles, systems and operational equipment (Section I, § 4 No. 11)</p> <p>Measuring and testing systems (Section I, § 4 No. 7)</p> <ul style="list-style-type: none"> • Measure, test and evaluate electric and electronic values and signals in subassemblies and systems, document test results • Test the function of electrical components, wires and fuses 	<p>The participants know the basic electric principals.</p> <p>Content:</p> <ul style="list-style-type: none"> • Basic electrical principals <p>The participants know the construction of the electric equipment in Volkswagen vehicles.</p> <p>The participants know the construction of the circuit diagrams at Volkswagen.</p> <p>The participants are able to deal with the necessary control- and measurement equipment.</p>
<p>Company and technical communication (Section I, § 4 No. 8)</p> <ul style="list-style-type: none"> • Read and use circuit diagrams, flow diagrams, connection plans, layouts and functional plans <p>Quality management (Section II, § 4 No. 6)</p> <ul style="list-style-type: none"> • Seek, evaluate, eliminate and document causes of errors or defects within the work process in a systematic way, assess consequences of errors and defects <p>Diagnosing errors, malfunctions and their causes</p>	<p>The participants are able to develop a strategy for error diagnostics by means of circuit diagrams and implement the strategy with the diagnostic and measurement technology.</p> <p>Content:</p> <ul style="list-style-type: none"> • The on-board network at Volkswagen and circuit diagrams • Systematic error diagnostics in the electric equipment

and evaluating the results (Section II, § 4 No. 15)	
Diagnosing, maintaining, fitting, refitting and retrofitting (Section III, § 4 No. 19)	

The compliance of the training guidelines with the content of the car mechatronics framework curriculum is self-evident. The approach is in its core learning outcome oriented. Thus, to transfer it into an EQF-adapted description should be possible.

(2) The pilots' implementation

In order to implement the pilot course different trainers and human resource development staff have been involved into the piloting activities in order to adapt parts of this in-company qualification scheme to EQF requirements. Among others the responsible for the elaboration of the VTA trainings has been strongly involved in the realisation of the pilot, but also VTA trainers have been involved in order to provide feedback and for the review of intermediate results. In order to limit and focus the pilots' area of work it has been agreed to focus pilot activities on one training element only: "Basic vehicle electrics".

An evaluation of the original VTA training guidelines showed that descriptions of the related learning outcome and curricular/ didactical aspects were strongly mixed within these guidelines and have not been presented separate from each other. It was therefore necessary to change the approach of structuring, but also developing these guidelines, especially in terms of separating expected learning outcomes and curricular/ didactical aspects in order to apply the EQF learning outcomes approach:

As a first attempt it has been tried to extract the different already available learning outcomes descriptions from the original guidelines and to assign them to the EQF categories knowledge, skills and competences. But this turned out to be a dead end street very quickly, because the already existing learning outcome descriptions did not follow the EQF logic and were therefore not directly usable for the definition of EQF learning outcomes. It was especially not possible to thoroughly cover the descriptor "competence" in this way.

Alternatively and following the logic proposed in the EQF Predict models it has been tried to follow the work processes that are behind the selected training content and to use these work processes as the actual starting point to define knowledge, skills and competences. Based on the work processes related general competences for car mechatronics have been identified and phrased, such as "*To be able to repair the vehicle in a professional and customer-oriented way*". Such descriptions of general competences to be achieved with the training "Basic vehicle electrics" have been the basis for all following steps. Only after this step it was possible to assign the already available learning outcomes to the descriptors knowledge and skills and to further elaborate the knowledge and skills necessary to perform the defined general competence.

The same approach has been used in order to analyzing another training of the VTA within another field of work. The result was the same. By analyzing the trainings in this way it was possible to elaborate a basic grid which is suitable for the description of competences, skills and knowledge of all fields of work covered by the VTA trainings. The descriptions differed only in some specifications based to the

different fields of work the trainings are related to such as electrics and motor engineering. This finding has been the basis for developing a matrix for the whole VW Service Deutschland qualification programme. As in the first trainings, the starting point was always the competence – in this case the general competence for car mechatronics. To achieve this general competence it is necessary to attain knowledge, skills and competences in the various fields of the qualification program: electrics, motor engineering, airbag, refrigerant circuit, communication and intranet based information systems.

Particularly the integration of legal requirements was discussed during this process. These legal requirements are included in the trainings “airbag” and “refrigerant circuit”. In Germany it is not permitted to repair airbags or the refrigerant circuit without meeting these requirements and holding a special permission. It was discussed, if this is a matter of competence or of skills. Because of the legal necessity it was allocated to the competence. Also the general competence for car mechatronics was affected by this decision: the passage “respecting legal rules” has been added to the overall competence (“*To be able to repair the vehicle in a professional and customer-oriented way respecting legal rules*”).

Another interesting finding was that the capability of communication and acting in a customer and business oriented way being one of the core targets of the Volkswagen sales and retail organisation was not expressed explicitly in the original training guidelines. The application of this systematic approach revealed this deficit because it requires such abilities in order to reach a high work quality. For this reason these topics were integrated into the EQF-adapted descriptions of the learning outcomes.

(3) Description of the training learning outcomes in EQF terms

As described above a *structure* has been developed which permits to describe the trainings in a systematic way following the EQF logic and applying the EQFs learning outcomes approach. This structure can be summarised in the following major elements:

Definition of the overall competence:

“The ability to capture customer complaints and to fix the errors at Volkswagen vehicles in a customer and business oriented way” is the overall competence to be achieved by the participants in the different trainings. The specifications in the different thematic fields refer to the different errors of each field.

Elaboration of related skills:

After having passed through the training the participants are able to analyse an error with the specification what has to be done in order to analyse the error. When the participants are able to analyse the error, they understand the matter of the problem and this implicates that they are able to explain the defect. It is the minimum requirement that the participants are able to repair the error (based on the customer demands) with the ability to specify what has to be done for repairing the vehicle.

Elaboration of related knowledge:

We pointed out three different levels:

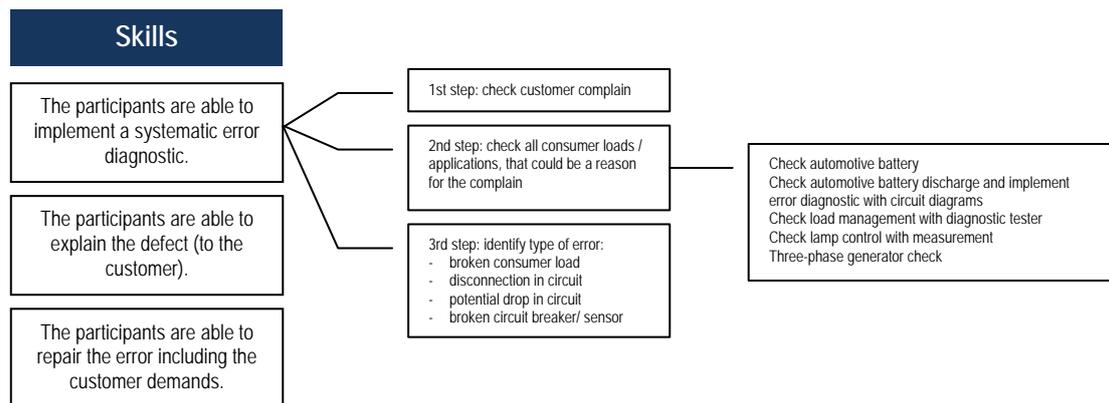
1. The participants know the basics
2. The participants know the specifics
3. The participants know the Volkswagen specifics.

Following this structure the EQF learning outcome description of the VTA training “basic vehicle electrics” has been specified in the following way:

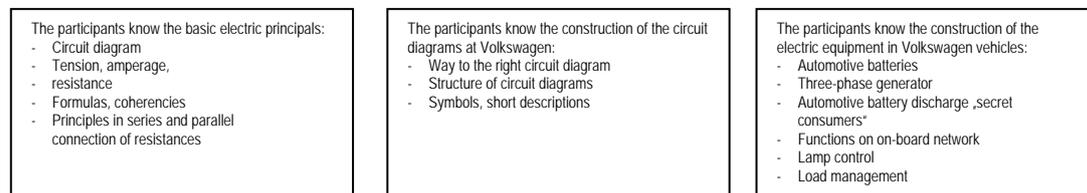
Competence

“The participants are able to capture customer complaints and to fix the errors of the electric equipment at Volkswagen vehicles in a customer and business oriented way on the basis of an error diagnostics system.”

Skills



Knowledge



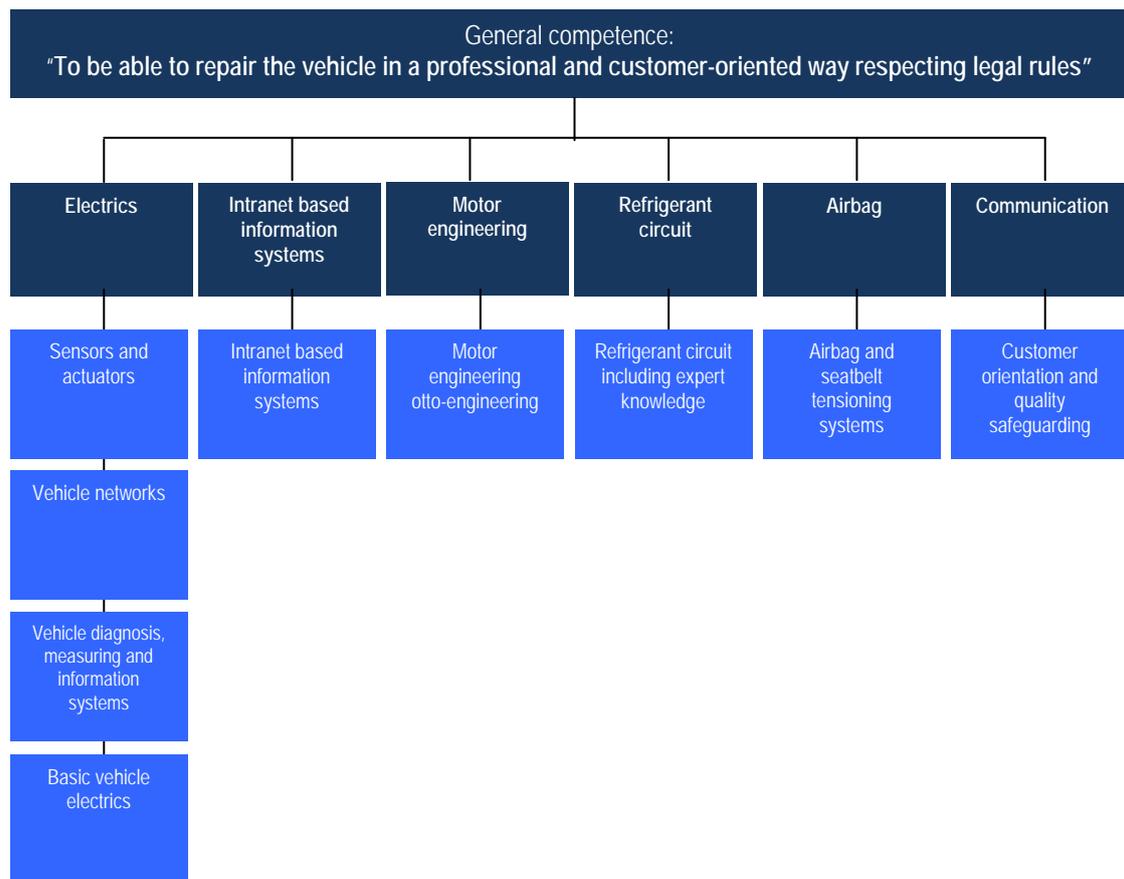
As pointed out above already all trainings of the Volkswagen technology for trainees have been listed in a *matrix as well*, which includes the whole qualification programme for trainees for car mechatronics. The overall competence of the qualification program is:

General competence: “To be able to repair the vehicle in a professional and customer-oriented way respecting legal rules”

For being able to do so, competences, skills and knowledge have to be gained in the fields of

- Electrics
- Intranet based information systems
- Motor engineering
- Refrigerant circuit
- Airbag
- Communication

In the field of Electrics, competences, skills and knowledge have to be achieved in various sections.



Please see the annex for the defined learning outcomes within the remaining fields of work as they are defined in this matrix.

(4) Conclusion

The official description of occupational standards in Germany is highly standardised. As in our case – for the apprenticeship scheme car mechatronics – there is a framework curriculum in force Germany wide. The qualification programme examined in this project - the “Volkswagen technology for trainees” - is directly related to this framework curriculum and deepens the general content with Volkswagen specific topics. Like the existing national wide framework curriculum for car mechatronics the qualification program is also not explicitly learning outcome oriented. But: both are *in their core* already learning outcome oriented. This fact was the key for developing the EQF-compatible descriptions of this in-company training programme.

The most important step was the change of the approach as it has been applied so far into an approach that clearly defines general competences to be achieved through the training. These general competences needed to be strongly based on the tasks performed by a worker in this profession and they needed to reflect the companies’, but also others requirements on a competent performance of these tasks expected from professionals or in this specific case from the companies employees. These general competences gave the overall direction for all further steps to define learning outcomes in the

different training areas. The work process/ task orientation as described in the optimum model of EQF-adaptation (see EQF adaptation support portal) has therefore been not only a recommended approach, but even an urgently necessary one because without it would not have been possible to define the learning outcomes although a general learning outcome orientation was already integrated into the training guidelines before. However, the already previously defined and available learning outcomes simplified the overall process of defining and assigning skills and knowledge to the competences and the description of the VTA trainings into EQF-compatible descriptions was possible without huge adjustments.

But assigning the EQF learning outcomes approach has proven to be not only a formal process without added value for the company. It turned out that the overall adaptation process even helped to detect gaps within the training programmes. The EQF adaptation process revealed that customer orientation being one of the core targets of the Volkswagen sales and retail organisation, was so far not explicitly expressed within the training guidelines and therefore customer orientation was integrated into each of the defined general competences explicitly.

A training description with EQF compatible learning outcomes is a conclusive approach which gives an easy overview about the expected learning outcomes of a training programme. Especially due to this advantage an easier adaptation of the training seems to be possible if there are any training amendments or new technologies that need to be integrated. And even more: this new approach of defining learning outcomes starting from the tasks performed by professionals also supports uncovering gaps within the training programmes that need to be closed in order to develop the defined general competence.

The feedback of the trainers involved in the VTA training regarding the learning outcome oriented description of the "Volkswagen Technology for trainees" has been quite positive and they confirmed the advantages mentioned above. But further steps will be necessary and are already planned in order to implement and test this approach on a broader basis and within actual training settings. At this point in time also possible influences on the actual teaching/training practice such as requirements on trainers and training/teaching methods and on assessment procedures will be looked at. These aspects have not been integrated into this piloting activity in order to allow the involved practitioners to focus on the learning outcome description instead, since this turned out to be the first challenging step for EQF adaptation in the context of this in-company training programme.

List of references:

EQF Predict optimum models of EQF adaptation available at www.project-predict.eu (Downloads) and in the EQF adaptation support section (principles and optimum models of EQF-adaptation) of the EQF Adaptation Support Portal (www.eqf-support.eu)

Annexes:

Learning outcomes descriptions for remaining thematic fields

For further information on the project please consult:

www.project-predict.eu or
www.eqf-support.eu

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EQF Predict:

*The EQF Predict pilot at VW Service
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experiences and outcomes*

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**Annex: Learning outcome descriptions remaining thematic fields of the qualification program
“Volkswagen Technology for trainees”**

Based on the described approach all trainings of the qualification programme were described in terms of EQF-compatible learning outcomes.

Thematic field: Electrics

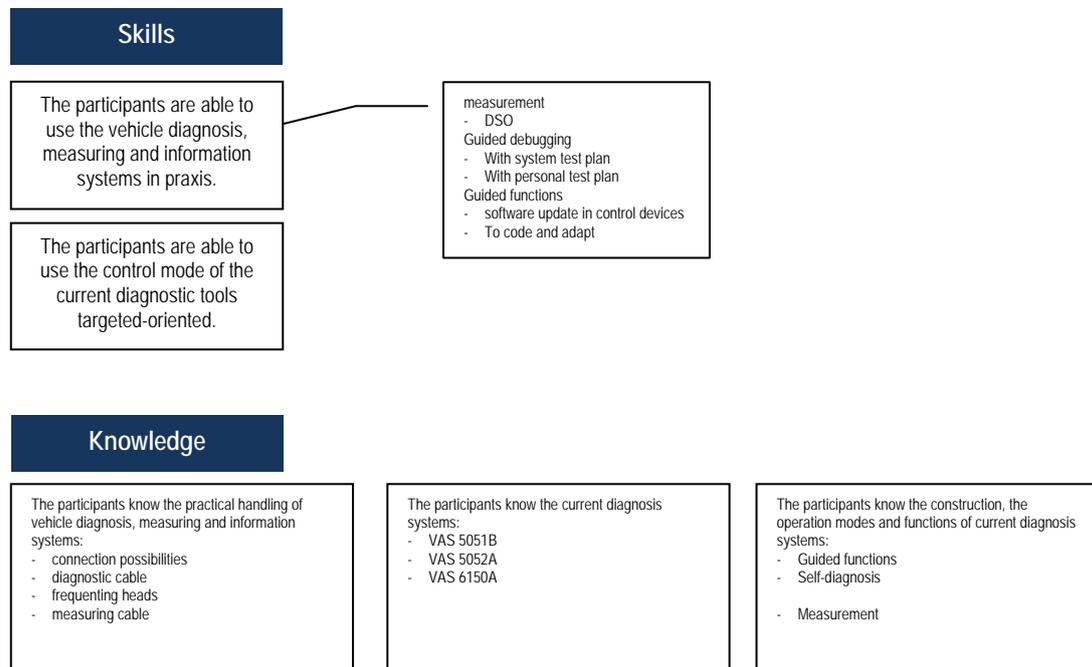
The thematic field “Electrics” is subdivided into trainings on “Basic vehicle electrics”, “Vehicle diagnosis, measuring and information systems”, “Vehicle networks” and “Sensors and actuators” as outlined in the matrix in chapter 3.2.

Training on “Basic vehicle electrics”:

See chapter 3.

Training on “Vehicle diagnosis, measuring and information systems”:

In this training we elaborated the particularity that competences cannot be defined. At the end of the training the trainees achieved some skills which are important for the competences in the field of vehicle networks and the overall competence to be able to repair the vehicle in a professional and customer oriented way, but it was not possible to identify a competence specific for this training area.



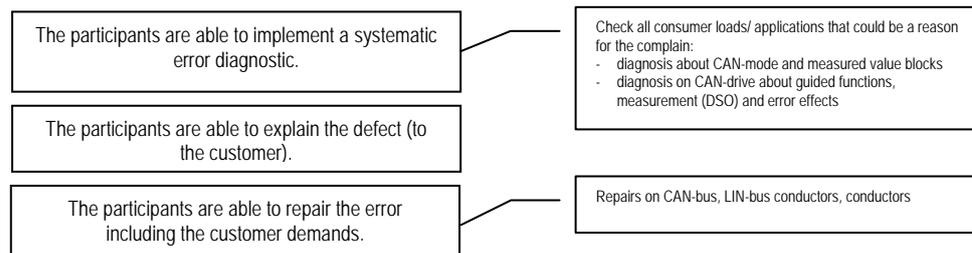
Training on "Vehicle networks":

This is a training course without any specific characteristics.

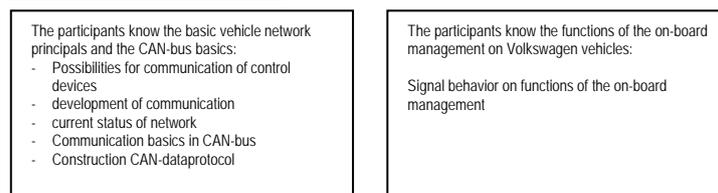
Competence

The participants are able to capture customer complaints and to fix the errors of the network functions at Volkswagen vehicles customer and business oriented on the basis of an error diagnostics system.

Skills



Knowledge

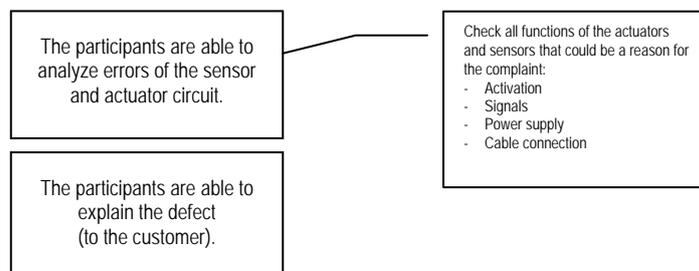


Training on "Sensors and actuators":

Competence

The participants are able to capture customer complaints and to identify target-oriented the errors of the sensor and actuator circuit at Volkswagen vehicles.

Skills



Knowledge

The participants know the basic module of electronic engineering:

- construction of circuits
- measuring of circuits
- principles of electrical engineering

The participants know the construction and function of different sensors and actuators:

- types of sensors and actuators
- actuator circuits
- sensor circuits
- rotation sensor

The participants know the cooperation with electronic control units of different systems in the electrical system management of Volkswagen vehicles:

- Input and output variable of electronic control units

Thematic field: Intranet based information systems

As in the case of the training "Vehicle diagnosis, measuring and information systems" no competences were specified. Also here the targeted skills are important for the overall competence to be able to repair the vehicle in a professional and customer oriented way.

Training on "intranet based information systems":

Skills

The participants are able to use the electronic service information system (ELSA) in practice.

The participants are able to use the intranet based information systems

Dealer portal

- PartnerNet
- ServiceNet
- Online Product training

Knowledge

The participants know the practical handling with electronic service information system:

- Repair guideline
- Maintenance
- Circuit diagrams
- Maintenance chart
- Vehicle specific hints

The participants know the intranet based information systems of Volkswagen:

- Log-in
- Applications
- Content PartnerNet
- Content ServiceNet

Thematic field: Motor engineering

This is a training course without any specific characteristics.

Training on "Motor engineering otto-engineering":

Competence

The participants are able to capture customer complaints and to fix the errors of the engine control and motor engineering at Volkswagen vehicles customer and business oriented.

Skills

The participants are able to decompose and reassemble an otto-engineering and to set the engine control.

The participants are able to analyze errors of the fuel system, the induction and exhaust system.

The participants are able to explain the defect (to the customer).

Check all functions of the fuel system, the induction and exhaust system that could be a reason for the complaint:

- Check fuel system and petrol pump
- Check fuel pressure
- Check injection valve
- Check intake-manifold switching
- Check activation of the intake-manifold throttle
- Check turbocharger
- Check charge pressure control
- Check exhaust gas recirculation
- Check lambda probe and control

Knowledge

The participants know the construction and the fuel system of an otto-engineering:

- Crank drive
- Valve timing
- Camshaft drive system
- Fuel system
- Induction system
- Exhaust system
- Fuel tank (electric petrol pump, injection valve and fuel line)
- Difference between intake-manifold fuel injection and direct injection

The participants know the induction system of Volkswagen otto-engineering:

- Intake-manifold switching
- Intake-manifold throttle
- Charge-air systems

The participants know the exhaust systems of Volkswagen otto-engineering:

- Catalytic converter
- Exhaust gas recirculation
- Lambda sensor and control

Thematic field: Refrigerant circuit

This thematic area contains the special case that the participants achieve authorization to work on the refrigerant circuit and therefore not only an ability, but also the permission to do something. Car mechatronics are not allowed to work on these aspects without having received a special training because special requirements apply to safe handling of refrigerants and to related safety instructions.

Training on "Refrigerant circuit including expert knowledge":

Competence

The participants are authorized to work on the refrigerant circuit. The participants are able to capture customer complaints and to fix the errors of the refrigerant circuit at Volkswagen vehicles customer and business oriented on the basis of an error diagnostics system.

Skills

The participants are able to analyze errors on the refrigerant circuit.

The participants are able to explain the defect (to the customer).

The participants are able to repair the error.

Check all functions of the refrigerant circuit that could be a reason for the complaint:

- Refrigerant capacity
- Pressures on the refrigerant circuit
- Leak test

- Safe handling with refrigerants, recovery devices (climate service stations) and refrigerants bottle
Empty, evacuate and fill refrigerants environmentally friendly
- define refrigerant and oil amount
- Reparation on refrigerants
- Rinse refrigerants
 - Clean vaporizer

Knowledge

The participants know the legal bases and safety instructions for handling with refrigerants:

- European and national law
- General safety at work

The participants know the basics of refrigerants:

- physical basics
- functionality air condition
- components of the refrigerant circuit

The participants know the interaction of the components of the refrigerant circuit of vehicles:

- Construction and function of the climate processor
- equipment for leak tests

The participants know the technical information of Volkswagen:

- Available information

Thematic field: Airbag

Again we have the specific that the participants achieve the competence to be authorized to work on airbags. It is also not allowed to work on airbags and belt tensioning systems without any training:

Training on "Airbag and seat belt tensioning system":

Competence

The participants are authorized to work on airbags and seat belt tensioning systems. They are able to capture customer complaints and to fix the errors of the airbags and seat belt tensioning systems at Volkswagen vehicles customer and business oriented.

Skills

The participants are able to analyze defects on airbags and belt tensioners.

The participants are able to explain the defect (to the customer).

The participants are able to repair the error.

The participants are able to shut down airbags.

Check all systems at airbags and belt tensioners that could be reason for complain:

- read fault memory
- arrange actuator diagnosis
- code control device

Knowledge

The participants know active and passive safety concepts:

- Definition
- Measures for passive occupant protection
- Specific characteristics of vehicles with pyrotechnics

The participants know the legal bases for handling with pyrotechnic airbags and seat belt tensioning systems:

- working on airbags and belt tensioners
- Handle of airbags and belt tensioners
 - Distribution
 - Storage
 - Disposal

The participants know the construction and the effectiveness of pyrotechnic module on the vehicle:

- Airbag module
- Belt tensioners
- Trigger sensors

The participants know the Volkswagen safety restraints:

- Spherical pretensioner
- Wankel pretensioner
- Tube pretensioner
- Rack and pinion drive pretensioner
- Belt force limiter

Thematic field: Communication

Training on "Customer orientation and quality safeguarding":

Communication skills are part of the framework curricula for car mechatronics and are integrated into the Volkswagen technology for trainees. The participation in this training is open for the trainees of all professions and not limited to car mechatronics.

For this training no competence was defined, but it is very important for achieving the competence to capture customer complaints which is integrated in all competences already described.

Skills

The participants are able to analyze personal behavior and know how to optimize it.

The participants are able to communicate and act in a customer-oriented way.

The participants are able to support the realization of the Service process at Volkswagen car dealers.

Knowledge

The participants know the communication basics and the most important customer expectations

- Instruments
- Customer satisfaction
- Five most important customer expectations

The participants know the structure of the Volkswagen group and the overall concept of the brand

The participants know the structure at car dealers and the impact of teamwork

- Difference between product and service quality

The participants know the Service processes and service effort of Volkswagen