



E-Learning for Automotive Software Quality Engineer

July 2024

The combination of courses is perfect for a Software Quality Engineer within the automotive domain.





Courses within the e-learning package

The "Automotive Software Quality Manager" e-learning package is a comprehensive program that equips learners with essential knowledge and skills in the field of automotive system and software development of electrical control units within the vehicle.


This package covers a wide range of topics to provide a well-rounded understanding of automotive software quality management.

This first part is providing you with the most important know-how on embedded software development focusing on areas where quality issues are often coming from.






Operating
System OS



Real-Time
Operating System
RTOS



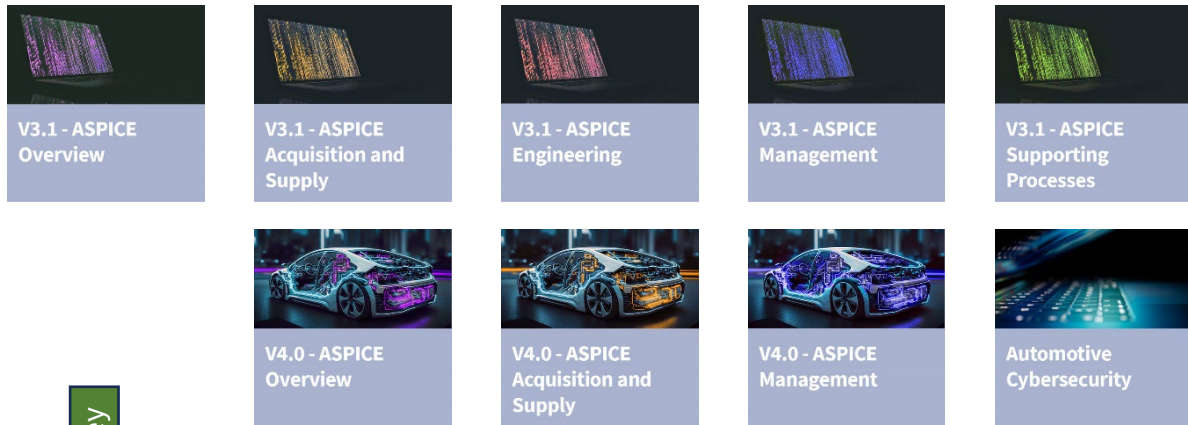
AUTOSAR

Operating systems, are explored in-depth, focusing on kernel operations, multitasking, safety considerations, and common challenges in embedded OS development.

The operating system in an embedded application has real-time requirements and thus a **Real-Time Operating System** is needed. We cover different real-time requirements, time and event-based tasks and more.

AUTOSAR provides you with a general understanding of this Automotive standard which will help you to navigate through the extensive set of specifications.

In this second part the focus lies on automotive specific processes ASPICE and cybersecurity.



Automotive SPICE is structured into several courses for the version 3.1 and version 4.0 of the standard. We recommend to start with

- ASPICE Overview, then to take the
- ASPICE engineering processes, keep going with
- ASPICE Supporting Processes before
- ASPICE Management and finally to learn all about
- ASPICE Acquisition and Supply course.

The next e-learning is going into the details and specific requirements and process required by automotive cybersecurity.

Delivery Content

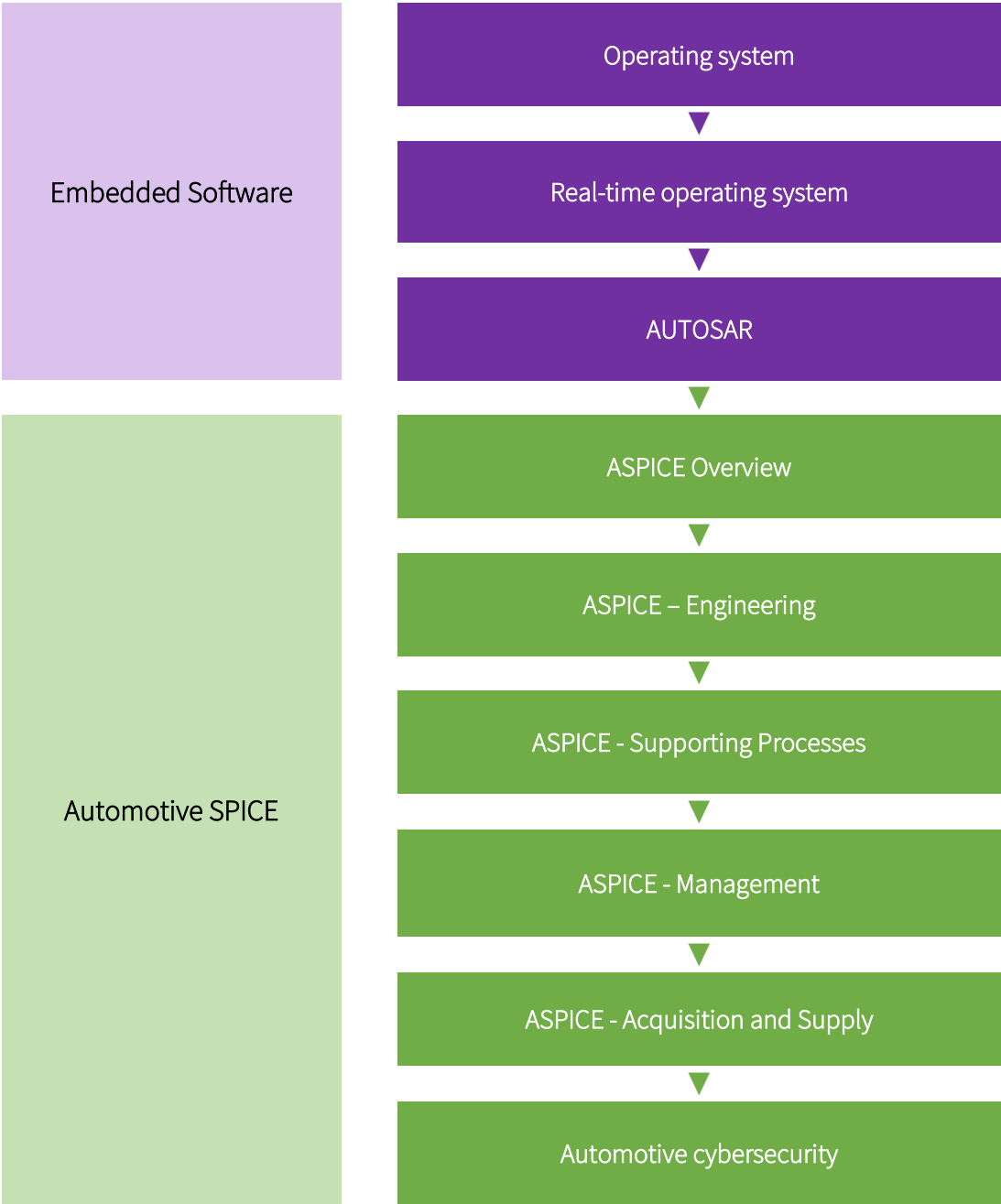
Access

- for one user
- to all e-learning courses
- for the purchased time period

of the Embedded Academy.

Recommended Learning Journey

The Automotive Application Software Developer e-learning package is composed of several e-learning courses. We recommend the following order for learning.



E-Learning Content

1) Operating System

- Language: English
- Course objective: The aim of this course is to provide a basic knowledge of operating systems and the various components and functions they contain.
- Course content: In this course, you learn what an **operating system** is. Therefore, you are familiarized with the kernel, which holds the core functionality of the operating system and you get to know the scheduler, which controls the execution of multiple tasks and allocates resources to them. This is covered in greater detail in the chapter “Multitasking”. To complete this course, safety and other advanced aspects are covered as well as the characteristics of embedded operating systems.
- Duration: 55 minutes
- Study time: 4 hours, 40 minutes
- Further insights: <https://embedded-academy.com/en/courses/operating-system/>

2) Real-Time Operating System

- Language: English
- Course objective: The aim of this course is to provide a basic knowledge of real-time operating systems. The learner will understand what a real-time operating system is and how it works.
- Course content: You will learn when **real-time operating systems** are needed and which requirements they have. In particular, we cover the difference between soft real-time requirements and hard real-time requirements. You will also encounter the term “timing analysis” and learn about the difference between time-based tasks and event-based tasks. At the end you will be familiarized with three scheduling algorithms, before we cover three typical problems: task starvation, deadlock and race conditions.
- Duration: 1 hour, 5 minutes
- Study time: 5 hours, 25 minutes
- Further insights:
<https://embedded-academy.com/en/courses/real-time-operating-system-en/>

3) AUTOSAR

- Language: English
- Course objective: The aim of this course is to understand what AUTOSAR™ is so that you are able to develop software related to AUTOSAR™.



- Course content: The course introduces AUTOSAR™ as an organization, explains the standard it defines and addresses the methodology as well as the classic platform from the release R19-11.

Learners can start with the **overview** e-learning, which introduces AUTOSAR™ as an organization and explains the standard it defines. In particular, there will be details about the different standards AUTOSAR™ contains.

Another e-learning addresses the **classic platform** from the release R19-11. There we take a look at the methodology as well as the software architecture. The methodology describes how one proceeds when developing a system with AUTOSAR™ and the software architecture describes the different layers of the layered software architecture.

The e-learnings about the **virtual functional bus** explain the main communication concept of the classic platform.

And we also offer an e-learning about the **operating system** of AUTOSAR Classic Platform.

- Duration: 3 hours, 50 minutes
- Study time: 19 hours, 10 minutes
- Further insights: <https://embedded-academy.com/en/courses/autosar-en/>

4) V3.1 ASPICE - 1 – Overview

- Language: English, German
- Course objective: The aim of this course is to understand ASPICE and to get to know the purpose of this standard.
- Course content: The course “V3.1 ASPICE – Overview” is divided into two e-learning units and provides basic knowledge about Automotive SPICE. The first E-Learning provides reasons that speak for **Automotive SPICE** and introduces further standards that are relevant to the topic of Automotive SPICE. The second E-Learning provides an overview of the contents of the **process model**. The Process Reference Model (PRM) and the Process Assessment Model (PAM) are explained in detail. The concept of the standard is explained using an example process.
- Duration: English: 65 minutes, German: 95 minutes
- Study time: English: 5 hours 25 minutes, German: 7 hours 55 minutes
- Further insights: <https://embedded-academy.com/en/courses/automotive-spice-overview/>

5) V3.1 ASPICE – Acquisition and Supply

- Language: English
- Course objective: The aim of this course is to understand ASPICE and to get detailed information about the supplier monitoring and product release.
- Course content: In this course we focus on the processes which are relevant for the VDA Scope as the VDA Scope is mandatory for more or less every automotive electronics and software projects. In addition, we consider the processes which will also be relevant for



ASPICE 4.0. For the acquisition process group this applies to **Supplier Monitoring** ACQ.4 as it is part of the VDA Scope and to the Product Release SPL.2 as it will also be relevant for ASPICE 4.0. At the beginning of the Supplier Monitoring ACQ.4 e-learning the respective process group ACQ is introduced and you get to know the connections between the different processes. The e-learning highlights the connection between different topics. This is particularly helpful for practical application work when processes and relationships need to be understood.

The e-learning on **Process Release** SPL.2 also starts with the introduction to the Supply Process Group SPL. Within the e-learning you will get to know all the details of the Product Release including process outcomes, work products and more.

- Duration: 1 hour, 15 minutes
- Study time: 6 hours, 15 minutes
- Further insights:
<https://embedded-academy.com/en/courses/automotive-spice-acquisition-and-supply-en/>

6) V3.1 ASPICE – Engineering

- Language: English, German
- Course objective: The aim of this course is to understand ASPICE and to get detailed information about the engineering processes.
- Course content: The course “V3.1 ASPICE – Engineering and Management” is divided into four e-learning units. Each of them explains one or more processes. It covers all processes of the **System Engineering** Process Group SYS and the **Software Engineering** Group SWE.
- Duration: 2 hours, 50 minutes
- Study time: 14 hours, 10 minutes
- Further insights:
<https://embedded-academy.com/en/courses/automotive-spice-engineering-en/>

7) V3.1 ASPICE – Management

- Language: English, German
- Course objective: The aim of this course is to understand ASPICE and to get detailed information about the management processes.
- Course content: The course “V3.1 ASPICE – Management” currently includes two e-learnings covering the Management Process Group.

The first e-learning talks about the **Project Management** Process MAN.3. It was included as it is part of the VDA scope, a required subset of the ASPICE processes which is essential for approval for production at German OEMs. After completing this e-learning, engineers will understand the ASPICE project management requirements.

The second e-learning features the **Risk Management** Process MAN.5.

- Duration: 1 hour
- Study time: 5 hours
- Further insights:
<https://embedded-academy.com/en/courses/automotive-spice-v3-1-management-en/>

8) V3.1 ASPICE – Supporting Processes

- Language: English
- Course objective: The aim of this course is to get detailed information about of Supporting Process Group and Supplier Monitoring of V3.1 ASPICE.
- Course content: In this course we focus on the processes which are part of the VDA Scope and thus mandatory for more or less every automotive electronics and software project. For the supporting processes this applies to Quality Assurance **SUP.1**, Configuration Management **SUP.8**, Problem Resolution Management **SUP.9**, and Change Request Management **SUP.10**. The course is divided into several e-learning units. Each of them covers one process and its work products. At the beginning of each e-learning the respective process group is introduced and you get to know the connections between the different processes. The e-learnings highlight connection between different topics. This is particularly helpful for practical application work when processes and relationships need to be understood.
- Duration: 1 hour, 45 minutes
- Study time: 8 hours, 45 minutes
- Further insights:
<https://embedded-academy.com/en/courses/automotive-spice-supporting-processes-en/>

9) V4.0 ASPICE – 1 – Overview

- Language: English
- Course objective: The target of this course is to understand V4.0 ASPICE and to get to know the purpose of this standard.
- Course content: The course “V4.0 ASPICE Overview” is structured into three e-learning units and provides you with a general knowledge about Automotive SPICE.
The first e-learning presents a motivation for using Automotive SPICE and covers the process dimension of the process assessment model. It focuses in particular on the **measurement framework**. The most important aspects of the measurement framework are the capability levels, the process attributes and NPLF rating scale.
The second e-learning provides an overview of the contents of the process dimension of process assessment model. In this e-learning, the **process reference model** is explained in detail.
Finally, the concept of the standard is explained by using the **project management process** as an example. This e-learning provides detailed information about the process purpose, the process outcomes, the base practices and the output information items.



- Duration: 1 hour, 40 minutes
- Study time: 8 hours, 20 minutes
- Further insights: <https://embedded-academy.com/en/courses/v4-0-aspice-1-overview/>

10) V4.0 ASPICE – Acquisition and Supply

- Language: English
- Course objective: The target of this course is to understand V4.0 ASPICE and to get detailed information about the supplier monitoring and the product release.
- Course content: In this course we provide e-learning units to the acquisition process group and the supply process group. The processes are Supplier Monitoring ACQ.4 and Product Release SPL.2.

At the beginning of the **Supplier Monitoring** ACQ.4 e-learning you get to know the connections between the different processes. The e-learning provides you with the details of the process itself, the base practices, and the output information items. It always highlights the connection between different topics. This is particularly helpful for practical application work when processes and relationships need to be understood.

The e-learning on **Product Release** SPL.2 also starts with the introduction to the Supply Process Group SPL. Within the e-learning you will get to know all the details of the Product Release including process outcomes, work products and more. The release note is the most complex output information item and is explained in detail.

- Duration: 1 hour, 25 minutes
- Study time: 7 hours, 05 minutes
- Further insights:
<https://embedded-academy.com/en/courses/v4-0-aspice-acquisition-and-supply/>

11) V4.0 ASPICE – Management

- Language: English
- Course objective: The goal of this course is to understand ASPICE and to get detailed information about the management processes.
- Course content: The course “V4.0 ASPICE – Management” currently covers one e-learning for the first of the three processes within the Management Process Group.

The first e-learning is teaching you about the **Project Management** Process MAN.3. After completing this e-learning, engineers will understand the ASPICE project management requirements.

- Duration: 50 min
- Study time: 4 hours 10 min
- Further insights:
<https://embedded-academy.com/de/courses/v4-0-aspice-management/>

12) Automotive Cybersecurity

- Language: English
- Course objective: The aim of this course is to get an overview of what is relevant in the topic of automotive cybersecurity. The learner will be aware why automotive cybersecurity is important and how it is regulated, implemented, and controlled.
- Course content: In the first e-learning unit of this course, you learn why **automotive cybersecurity** matters. You get introduced to the main reasons for the implementation as well as the top attack points. In the following, you get to know the upcoming regulations and standards as well as the role of cybersecurity in the product life cycle. Then, you get to know the cybersecurity threat analysis and risk assessment, also known as TARA. It is explained through an example so it is easy to understand. At the end of this course, you will learn what the cybersecurity controls and requirements are and you will take a closer look at the cybersecurity verification and validation testing.
- Duration: 60 minutes
- Study time: 5 hours
- Further insights:
<https://embedded-academy.com/en/courses/automotive-cybersecurity-en/>