Siemens Mechatronic Systems Certification Program

Level 1 SMSCP

Pre-requisite: Knowledge of basic arithmetic is highly recommended.

1. **SMS 101 – Electrical Components (~40 hours)**
   This course covers the basics of electrical components in a complex mechatronic system. Based upon a physical system, students will learn the basic functions and physical properties of electrical components, and the roles they play within the system. Technical documentation such as data sheets, schematics, timing diagrams and system specifications will also be covered. By understanding the complete system, the flow of energy through it and measurements on the components, students will learn and apply troubleshooting strategies to identify, localise and (where possible) correct malfunctions. Preventive maintenance and safety issues for electrical components within the system will be discussed.

2. **SMS 102 – Mechanical Components and Electrical Drives (~40 hours)**
   This course covers the basics of mechanical components and electrical drives in a complex mechatronic system. Based upon a physical system, students will learn the basic functions and physical properties of mechanical components as well as electrical drives (AC and DC), and the roles they play within the system. They will also learn about mechanical components which lead and support the energy through a mechanical system to increase efficiency and to reduce wear and tear. Materials, lubrication requirements and surface properties will be examined. Technical documentation such as data sheets and specifications of mechanical elements and electrical drives will also be covered. By understanding the interworking of the complete system, students will learn and apply troubleshooting strategies to identify, localise and (where possible) correct malfunctions. Preventive maintenance of mechanical elements and electrical drives, as well as safety issues within the system, will be discussed.

3. **SMS 103 – (Electro) Pneumatic and Hydraulic Control Circuits (~40 hours)**
   This course covers the basics of pneumatic, electro-pneumatic and hydraulic control circuits in a complex mechatronic system. Students will learn the functions and properties of control elements based on physical principles, and the roles they play within the system. Technical documentation such as data sheets, circuit diagrams, displacement step diagrams and function charts will also be covered. By understanding and performing measurements on the pneumatic and hydraulic control circuits, students will learn and

apply troubleshooting strategies to identify, localise and (where possible) correct malfunctions. Preventive maintenance of (electro) pneumatic and hydraulic components, as well as safety issues within the system, will be discussed.

4. **SMS 104 – Digital Fundamentals and PLCs (~40 hours)**
   This course covers the fundamentals of digital logic and an introduction to programmable logic controllers (PLCs) in a complex mechatronic system with a focus on the automation system SIMATIC S7-300 and the appropriate programming software STEP7. Using computer simulation, students will learn the role PLCs play within a mechatronic system or subsystem. They will also learn basic elements of PLC functions by writing small programs and testing these programs on an actual system. Students will learn to identify malfunctioning PLCs, as well as to apply troubleshooting strategies to identify and localize problems caused by PLC hardware.