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Siemens Mechatronic Systems Certification Program (SMSCP)

# Hardware Requirements

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SMSCP Partner Schools must have a mechatronic system, which includes the following components:

# Level 1 system component requirements:

## Basic Electrical and Mechanical Components:

### Electrical components
- Conductors, wires and terminal blocks
- Electrical power supplies (including transformer, rectifier, filter, voltage regulator)
- Basic electrical components (e.g. resistors, potentiometers, capacitors, inductors, diodes and transistors)
- Relays, contactors and solenoids
- Over current protection devices (fuses and circuit breakers)
- Sensors
  - Inductive- and capacitive sensors
  - Photoelectric sensors
  - Proximity and limit switches (mechanical, reed)
- Measuring devices (multimeters, oscilloscopes)
- DC motors and Control circuits
  - Direction control
  - Speed control

### Mechanical components
- Chain, belt and gear drives
- Bushings, bearings and gearboxes
- Clutches and brakes
- Conveyor belts, lifts, shuts and component storage
- Grippers, jaws and pivot devices
- Fasteners, supports and springs

## Pneumatic/Hydraulic Components:

### General pneumatic (hydraulic) components
- Pressure source (compressor/pump)
- Pressure regulation valve with filter and gauge
- Shut-off valve
### Pneumatic (Hydraulic) actuators/cylinders
### Pneumatic (Hydraulic) gating, valves and flow control
- Different DCV designs (e.g. 2/2-, 3/2-, 4/2-, 5/2-, 5/3-way)
- Flow control valves

## PLC Components

NOTE: PLC components must be Siemens Series S7-300 or S7-1500
- Personal Computer with PLC Editing software (e.g. SIMATIC S7, STEP7 Professional)
- PC to PLC adapter
- PLC Components:
  - Power supply
  - CPU
  - Memory cards
  - Digital in- and output modules
  - Control Desk with (illuminated) pushbuttons, switches (n.o./n.c.) and indicators

## Level 2 – Additional requirements

- Electrical Components
    - Analog sensors such as ultrasonic- or hall-effect sensors
- Electrical Machines
    - Step motors
    - Single phase and Three phase AC motors
        - Direction control
        - Speed control – variable frequency drives
- Guards and mechanical safety devices
- PLC related
    - Simulation software (e.g. SIMIT)
    - Analog In- and Output modules
    - PROFIBUS/PROFINET System with field devices
- SIMATIC HMI TP700 COMFORT with HMI Editing software SIMATIC WinCC Advanced

## Systems meeting the SMSCP Hardware Requirements

1. Amatrol Mechatronic System
   For additional information, please visit their website here.

2. Encon-Koester Mechatronic System
   For additional information, please visit their website here.

3. Festo Modular Production System (MPS) I4.0
   For additional information, please visit their website here.