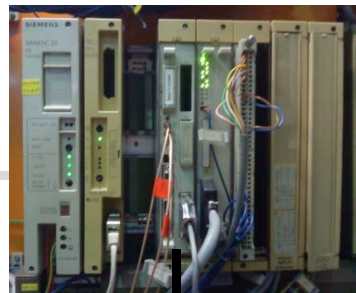# Plant modernisation with

ABC IT Systems

Version 1

Current Condition

- Simatic S5 PLC-System 115U
  - Central rack
    - CPU 944B
    - WF 470 (visualisation)
    - IP 244 (temperature control)
    - Analogue input/output cards (8 channels each)
  - Expansion racks with digital input/output cards
  - STEP5 program

STEP5

Central rack

Expansion racks with
digital input/output cards

VISU

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Current Condition - Assessment

- S5 components to be discontinued
- Procurement of spare parts difficult and expensive
  - WF 470
  - IP 244
- CPU944B at performance limit
- VISU customisations (WF470) very complicated

STEP5

Central rack

Expansion racks with
digital input/output cards

VISU

Modernisation targets

- Replacement of CPU944B with X-CPU (STEP 5 and STEP 7 programmable).
- Conversion of STEP5 program into STEP7.
- Connection of the new VISU to WinCC flexible.
- Removal of WF 470 from central rack.
- Replacement of expansion racks with modern field-bus components (e.g. Profibus, Profinet, Ethercat).
  - Replacement of digital I/O cards with, for example, Siemens ET200S modules.
- Replacement of IP244 temperature-controller component group with field-bus components.
- Replacement of central rack with modern components.
- Creation of performance reserves.

Expansion racks with
digital input/output cards

Central rack

STEP5

VISU

4
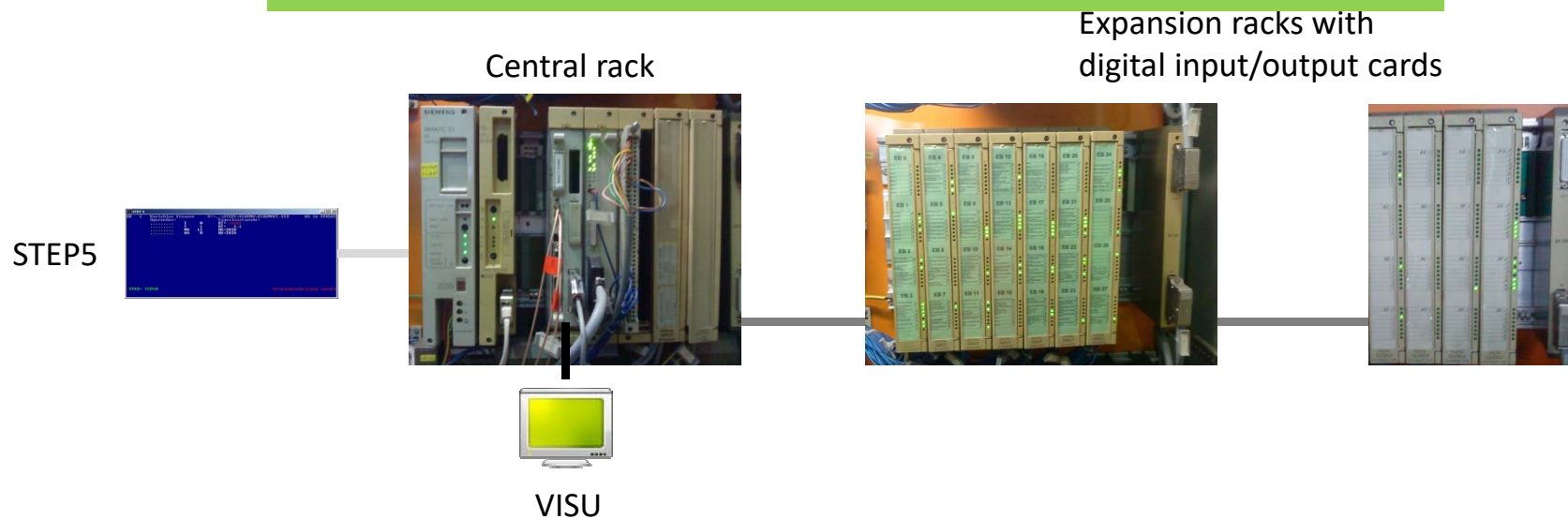
ABC retrofit - concept

✓ The ABC retrofit concept constitutes the basis for the expansion and modernisation of Simatic S5 system controls.

✓ The costs for the individual modernisation and conversion phases may be precisely specified (cost control).

✓ Systems will be modernised according to the state-of-the-art over a planned period of time (planning reliability).

✓ No additional system downtimes during the individual phases of modernisation.

1.1. Replacement of CPU944B with X-CPU

- Free review of the S5 software.
- Software customisations for mixed operations with S5 and S7 (optional).
- Program pulled from existing CPU944B.
- The power to the existing control will be switched off, the CPU944B will be replaced with ABC X-CPU.
- Ethernet connection to ABC X-CPU.
- Loading of the S5 program with STEP5.
- Test run / production with ABC X-CPU.
- Phasing out easily possible.
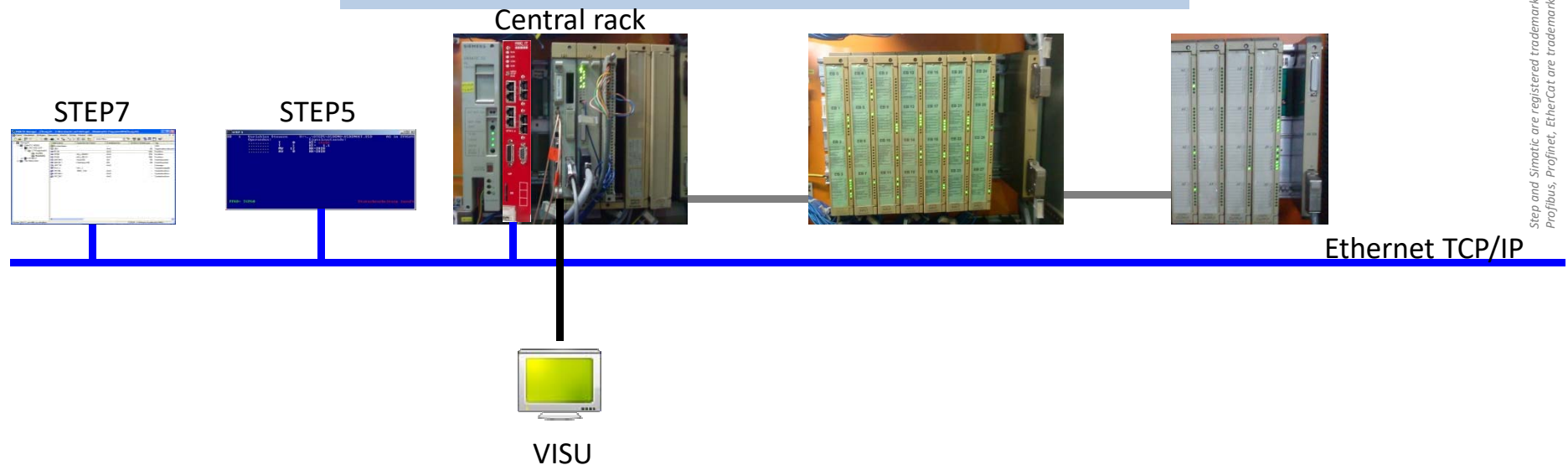
Central rack

STEP7

STEP5

Ethernet TCP/IP
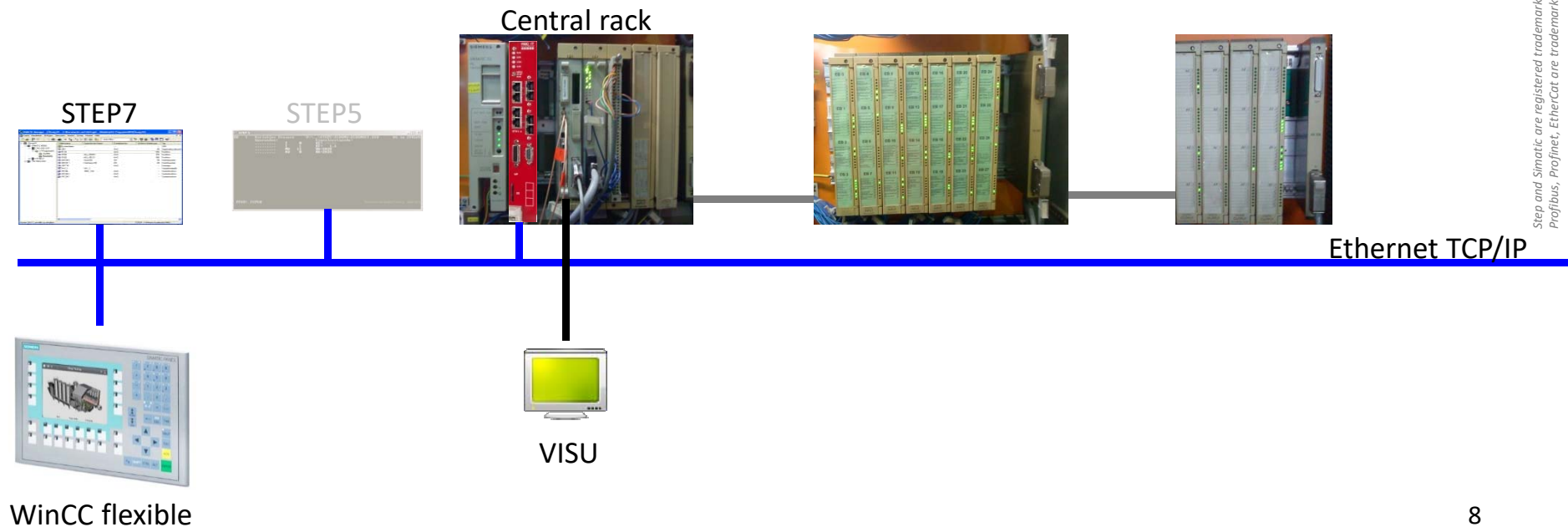
VISU

1.2. S5 conversion into S7 program

- S5 program will be converted into an S7 program.
- Software customisations for special component groups in STEP7.
- System will be stopped.
- The S7 program will be loaded into ABC X-CPU with STEP7.
- Test run / production with STEP7 program.
- Phasing out easily possible.
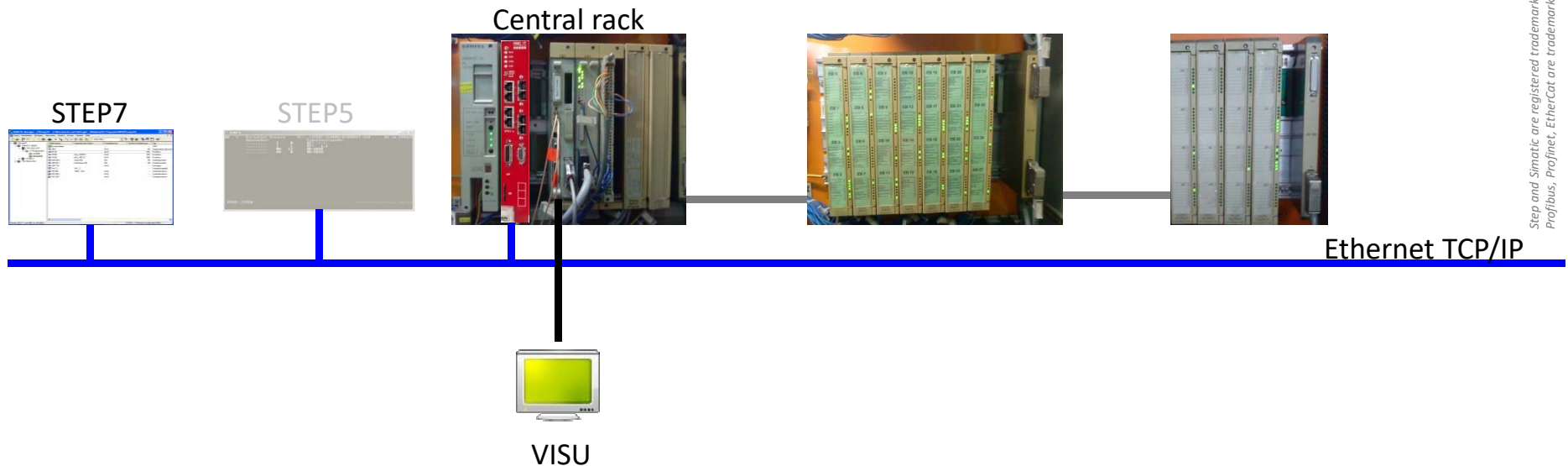
Central rack

STEP7

STEP5

Ethernet TCP/IP
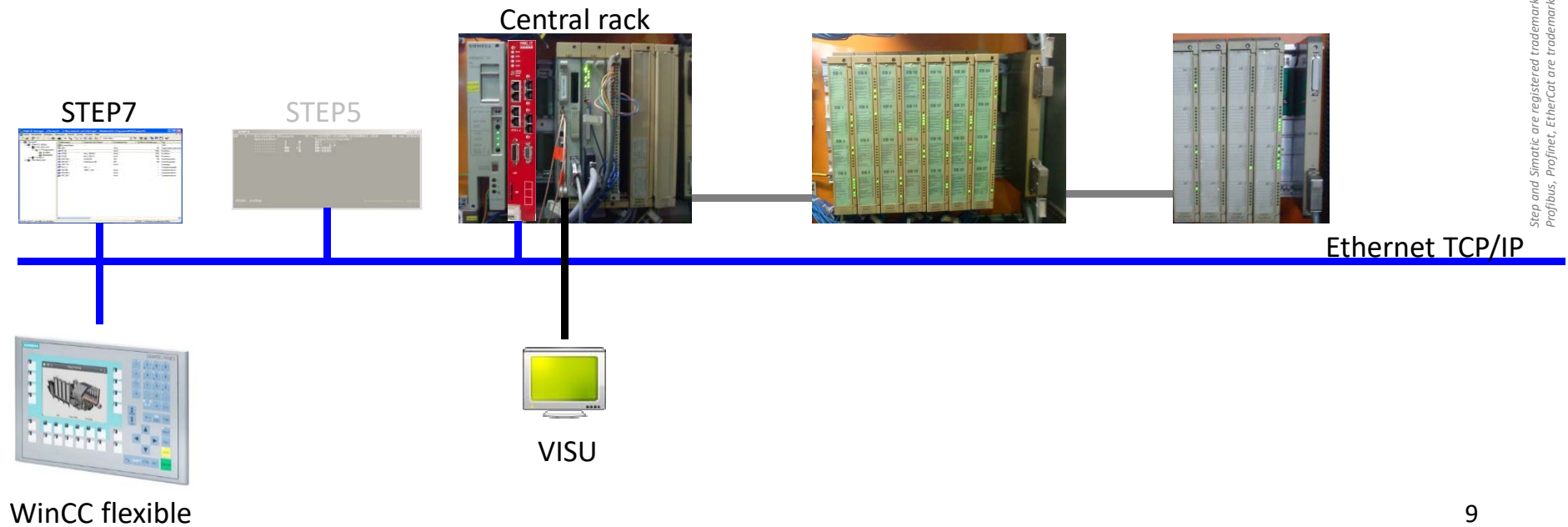
VISU

2. Connection of the new VISU

- WinCC flexible (e.g. OP277) will be set up in parallel to the existing VISU (from WF 470).
- WinCC flexible is able to access ABC X-CPU directly via Ethernet.
- No production downtimes, implementation may be realised while operations are on-going.
- The old VISU may be deactivated when all functions have been integrated into the new VISU.
- New VISU may be customised by the person responsible for maintenance.
- Implementation may be realised by the customer.

Central rack

STEP7

STEP5

Ethernet TCP/IP

VISU

WinCC flexible

2.1. Creation of a new VISU

- Integration of data points into the new WinCC flexible VISU.
- Creation of masks.
- Integration of malfunction alert function into WinCC flexible.
- Function tests.
- New VISU may be tested in parallel to the old VISU.

Central rack

STEP7

STEP5

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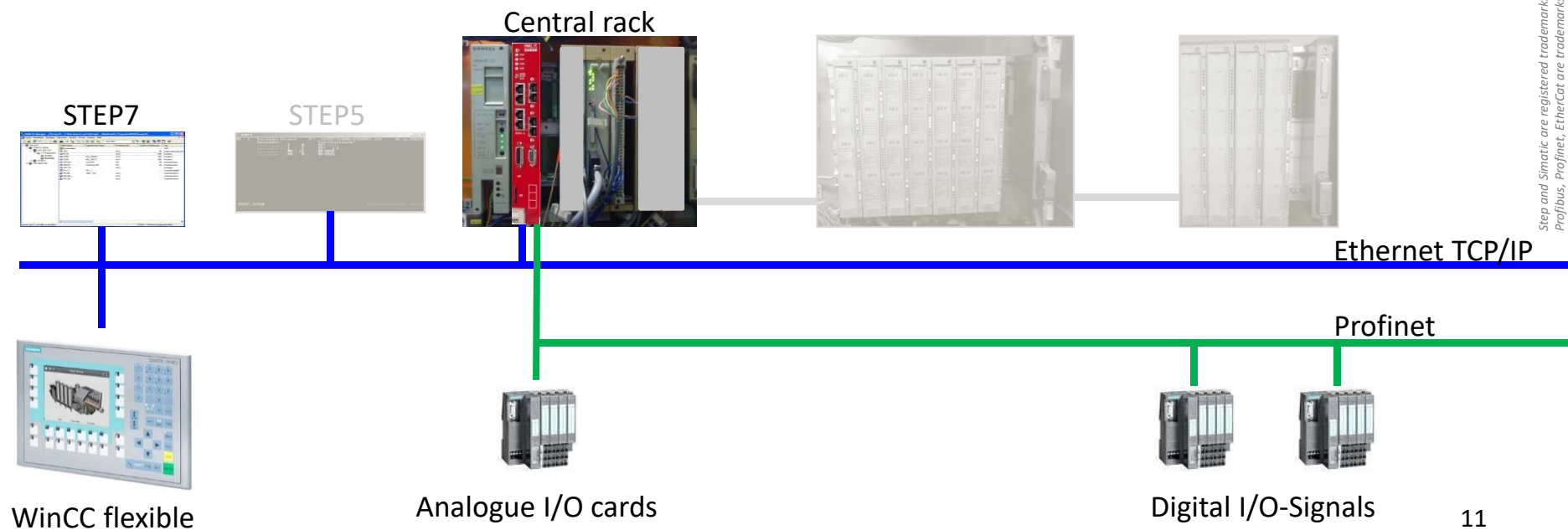
Ethernet TCP/IP

VISU

WinCC flexible

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2.2. Removal of the old VISU

- The old VISU (WF 470) may be removed from the PLC program once all the new functions have been integrated into the new VISU.
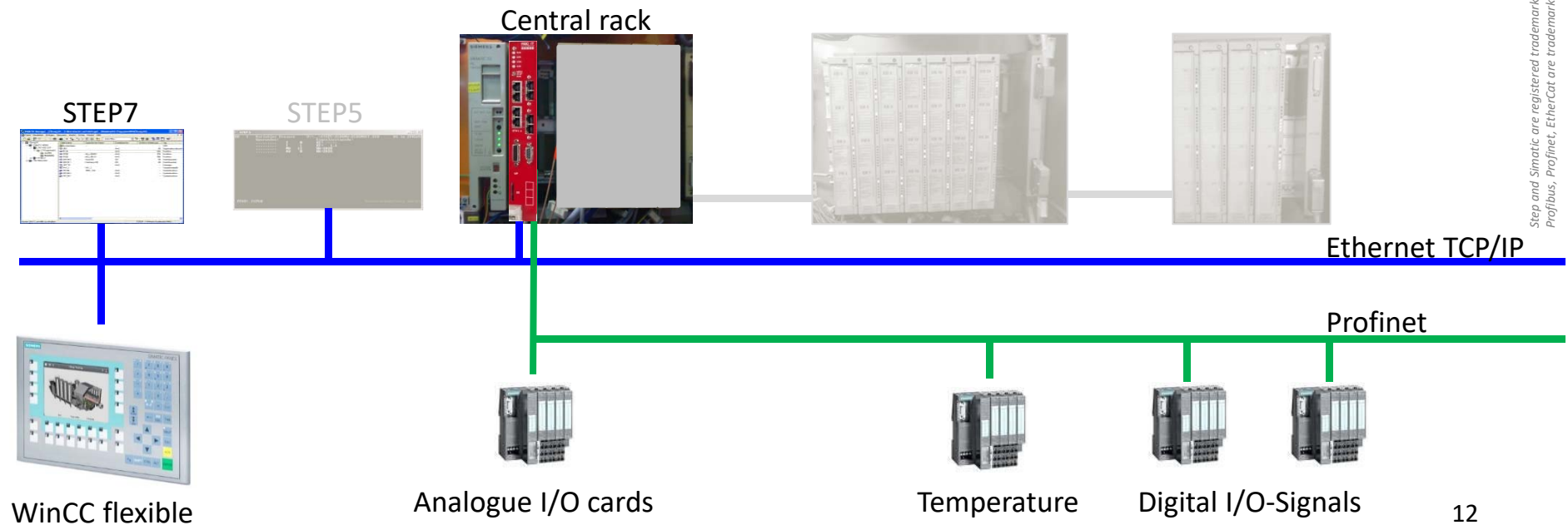- Removal of the WF 470 hardware.

Central rack

STEP7 STEP5

Ethernet TCP/IP

VISU

WinCC flexible
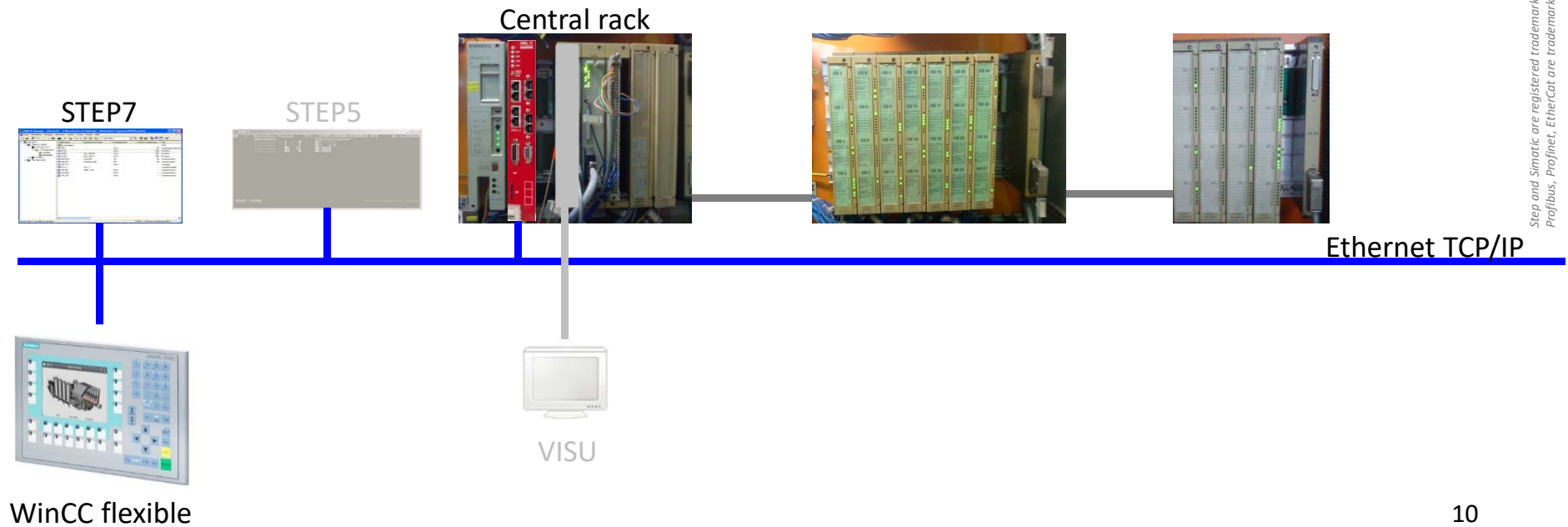
3.1. Replacement of expansion racks, digital and analogue component groups with Profibus/Profinet/Ethercat components

- Plugging of the ABC Profinet extension board on to ABC X-CPU.
- Replacement of expansion racks with Profinet components, e.g. ET200S.
  - Digital I/Os
- Replacement of analogue component groups with Profinet components.
- Configuration of the Profinet controller.
- No customisation of STEP7 programming necessary.
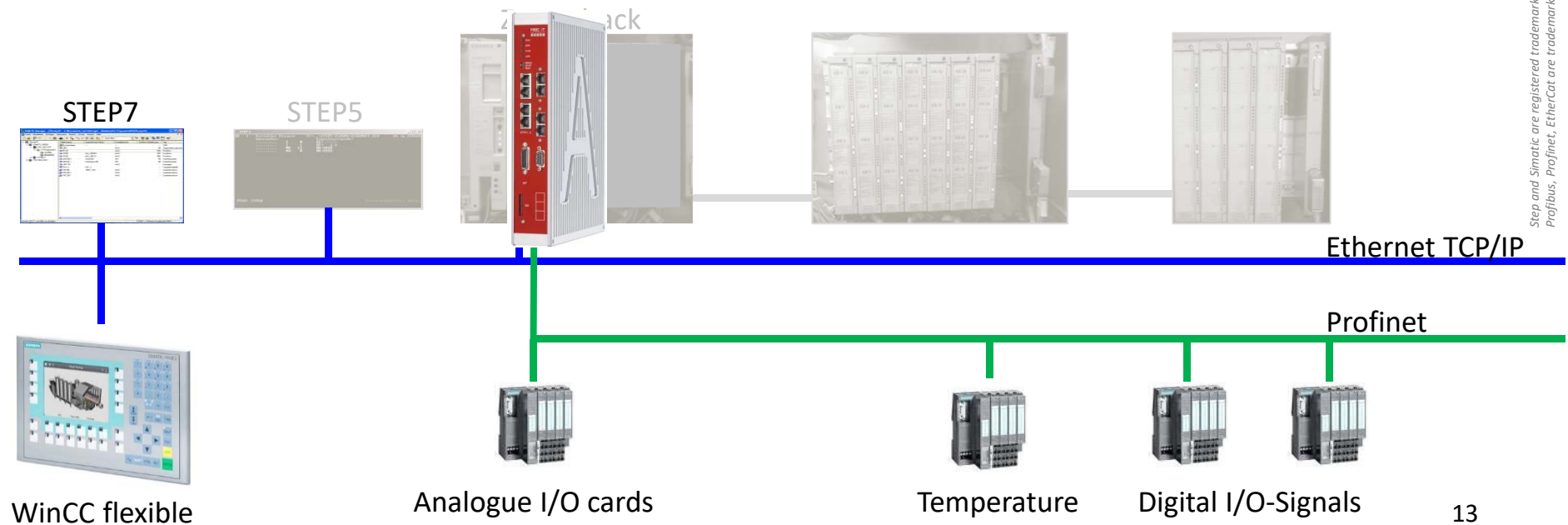
Central rack

STEP7

STEP5

Ethernet TCP/IP

Profinet

WinCC flexible

Analogue I/O cards

Digital I/O-Signals

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- Installation of the ET200S module with „2AI TC ST" temperature-measuring modules.
- Connection of the existing NiCr-Ni (K) temperature sensors to the temperature-measuring module.
- Parameterisation of the Profinet and temperature-measuring modules.
- Software customisation in the PLC program (Integration of the standard temperature-control components).
- Removal of the IP244 component group.
- Only the S5-IP244 component group needs to be refitted if taking into operation is interrrupted; the system will then be ready for production.

Central rack

STEP7

STEP5

Ethernet TCP/IP

Profinet

WinCC flexible

Analogue I/O cards

Temperature

Digital I/O-Signals

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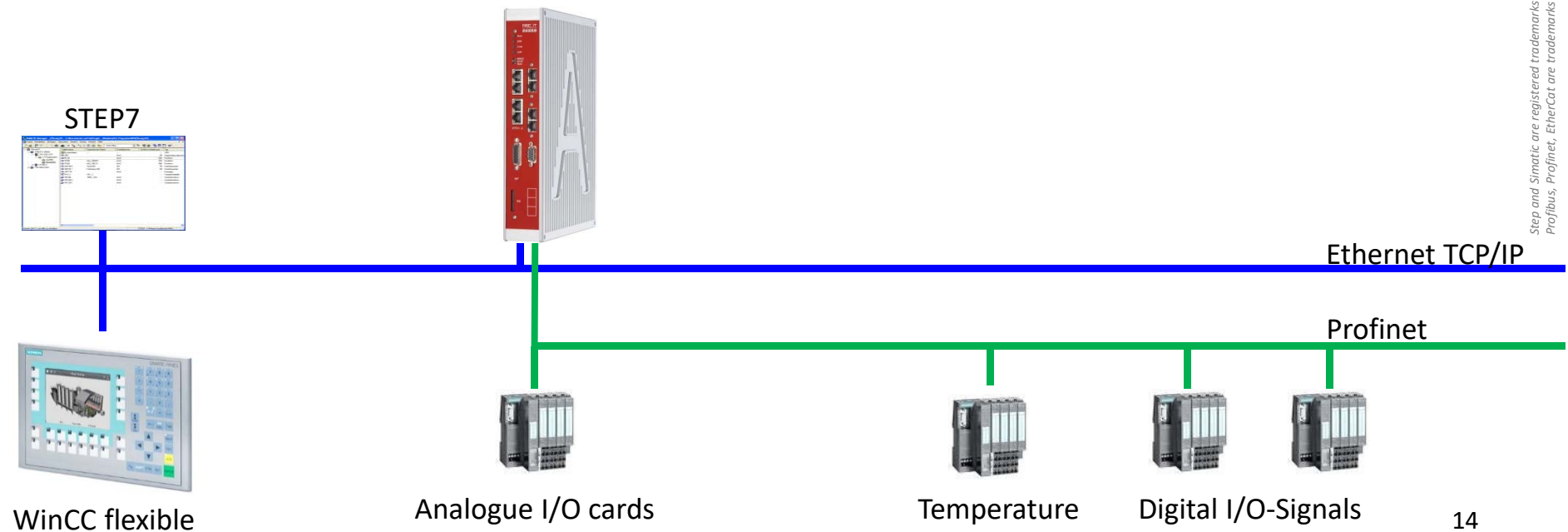*Profibus, Profinet, EtherCat are trademarks of the respective holder*

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4. Removal of the central rack

- All Simatic S5 rack components are realised decentrally via Profinet.
- Only ABC-X-CPU still remains in the Simatic S5 rack (prerequisite for substitution).
- The ABC-X-CPU with Profinet extension is integrated into a compact housing.

STEP7

STEP5

Ethernet TCP/IP

Profinet

WinCC flexible

Analogue I/O cards

Temperature

Digital I/O-Signals

5. System future-proof

STEP7

Ethernet TCP/IP

Profinet

WinCC flexible

Analogue I/O cards

Temperature

Digital I/O-Signals

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Retrofit with ABC X-CPU

Benefits:

- Short changeover times.

- Existing and production-reliable S5 program may be kept and even extended.

- Shorter cycle times.

- 4x Ethernet CPs on board.

- Replacements and customisations may be implemented in STEP7.

- New visualisation system, e.g. WinCC flexible, may be connected in parallel to the existing VISU.
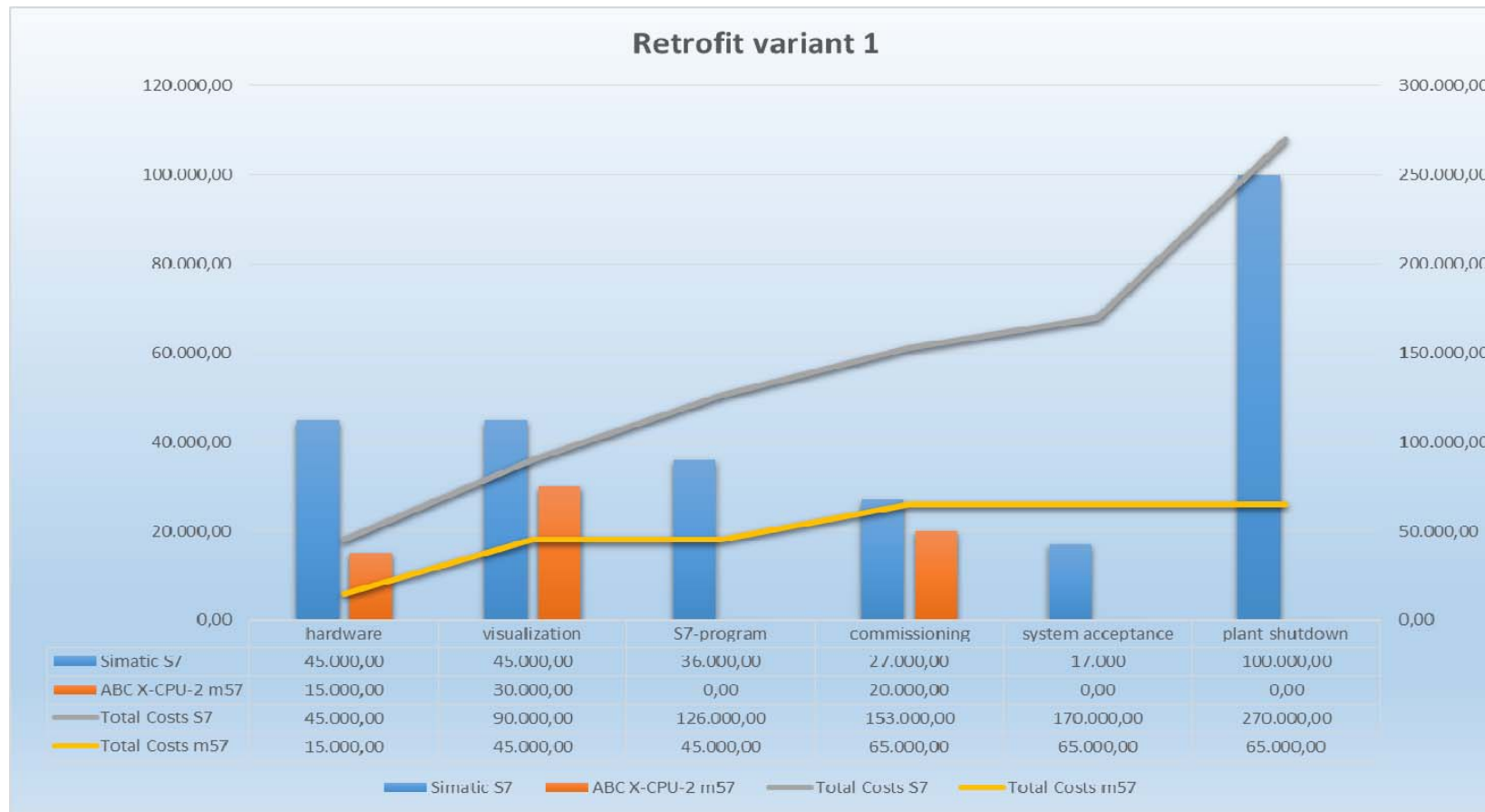
Services

- Creation of modernisation concepts for old system controls.

- Support with the implementation of retrofits.

- Consulting and implementation in the fields of software development, network engineering and databases.

- We are able to offer industrial seminars, e.g. component group training for X-CPU.
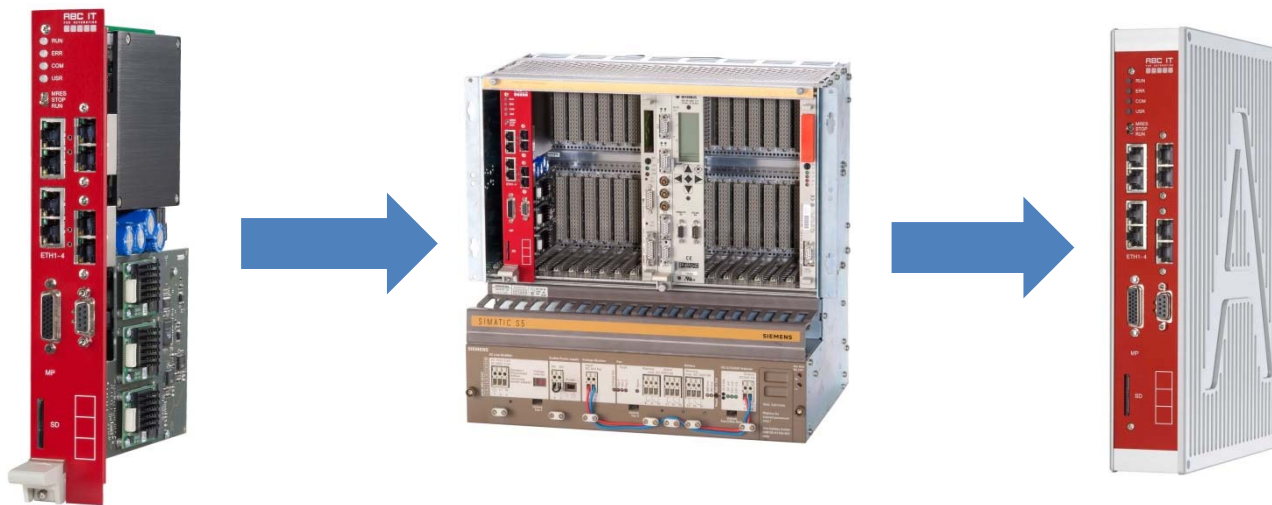
Cost example

Retrofit variant 1

	hardware	visualization	S7-program	commissioning	system acceptance	plant shutdown
Simatic S7	45.000,00	45.000,00	36.000,00	27.000,00	17.000	100.000,00
ABC X-CPU-2 m57	15.000,00	30.000,00	0,00	20.000,00	0,00	0,00
Total Costs S7	45.000,00	90.000,00	126.000,00	153.000,00	170.000,00	270.000,00
Total Costs m57	15.000,00	45.000,00	45.000,00	65.000,00	65.000,00	65.000,00

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ABC components

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