

PowerWorkshop

Professional FPGA Design Techniques

For the successful implementation of the digital circuits in the FPGA, the strong knowledge of the digital circuit's basics is mandatory. The HDL based developing method simplifies the developing cycle but for that developer must have the good knowledge of digital circuit design. Although most of developer basically knows the digital components like combinational and sequential and there usage but some of their knowledge got lost due to time or some developer have not learned e.g. that's the fact when software programmer has to develop FPGA'S without special previous knowledge.

The 5-days workshop "Professional FPGA Schaltungstechnik" is an advanced training to the workshop "Compact FPGA Schaltungstechnik" which thoroughly educate the FPGA designer to implement the complex digital circuits within the FPGA.

After the review of combinational and sequential circuits as well as the implementation of arithmetic operations the design of combinational circuits will be discuss briefly in

the chapter "Design of digital combinatorial systems". In the next chapter "Design of digital sequential circuits" basic principal of sequential systems and the design of typical sequential circuits will be presented.

The final chapter "XILINX FPGAs as platform for the implementation of digital systems" will focus on the implementation of digital circuits on XILINX FPGA's. In this chapter we will also see how to avoid the mistakes which can be introduced during digital circuits implementation.

Applicable technologies

All kind of FPGA technologies

Requirements

Basic knowledge of digital technology (e.g. Compact FPGA Schaltungstechnik)

Duration and Cost

Duration: 5 days

Cost: € 2.800, – net per person, including detailed training material, drinks in the breaks and lunch.

Agenda

Review

- Number representation and basic arithmetic
- Basic arithmetic circuits
- Clocked circuits
- Memory

Design of digital combinatorial systems

- Circuit configuration table
- Practical realization of combinational circuits

Design of digital sequential circuits

- Design of sequential circuits
- Asynchronous circuits versus synchronous circuits
- Rules for synchronous circuits
- Implementation of state machines
- Clock generation

Auxiliary circuits for digital systems

- Synchronization of asynchronous signals
Avoidance of Meta stability communication
sequentially synchronous and asynchronous systems
- Chopper

Timing budget of sequential circuits

- Basic model
- Cause of timing failure
- Analysis of timing failure
- Correction of timing failure
- Input / Output Timing
- Pipelining and Multicycle-circuits

Timing analyses

XILINX FPGAs as platform for the implementation of digital systems

- Architecture
- Design of digital sequential circuits
- Memory

Examples and exercises at the PC