

# Workshop Compact 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 two days workshop "Compact FPGA Schaltungs-technik" gives the FPGA developers a solid and detailed knowledge in the area of digital circuit techniques.

Furthermore the arithmetic operations and their implementation will be discussed in detail after this we will discuss examples of combination circuits like encoder, decoder, and multiplexer. Moreover the RTL design tech-

niques will be presented with the RTL components like counters, frequency generators etc. The errors which can be occur during clock generation and clock distribution will be discussed in brief. In the next section we will see the implementation of digital circuits with the memory devices like RAM'S, ROM'S etc. The final section consists of brief introduction to the XILINX FPGA'S as target device for implementation of digital circuits.

## Applicable technologies

All kind of FPGA technologies

## Requirements

None

## Duration and Cost

Duration: 2 days

Cost: € 1.350, – net per person, including detailed training material, drinks in the breaks and lunch.

## Agenda

### Analog and Digital system

- Analog Signal
- Digital Signal
- Realization of digital systems

### Number representation and basic arithmetic

- Number Systems
- BCD
- Basic arithmetic

### Logic gate

- Characteristics of Logic gates

### Code converter and multiplex

- Code converter
- Multiplexer and Demultiplexer

### Basic arithmetic circuits

- Comparators
- Adder/ Subtractor
- ALU
- Parity

### Clocked circuits

- Flip-Flop Levels
- Counting Flip-Flop

### Counters and frequency divider

- Dual Counter
- Decimal Counter

### Memories

- Parallel register
- Shift register
- Fixed memory ROM / RAM

### Sequential ROM-Applications (Switches)

- Rom counter/Rom programmed control unit

### XILINX FPGAs as platform for the implementation of digital systems

- Architecture
- Design of digital combinatorial systems
- Design of digital sequential circuits
- Memory

### Examples and exercises at the PC