

Vital Systems Board Development

The main objective of the **Vital Systems Board Development** project was to design, develop and test the programmable hardware for the Precision Station Stop (PSS) Transmitter function using VHDL (hardware description language). The board itself was a new product intended to provide one hardware design that could be adapted to three different functions including Precision Station Stop. PSA was responsible for hardware verification based on board design requirements, VHDL development of PSS Transmitter function, and testbenches implementation for engineering tests.

PSS Transmitter is a part of PSS system, which represents one of the three function modes of a multifunctional board. The main purpose of PSS mode is to provide the high precision positioning of a train at a station. This functionality includes a method to transmit a wide-band signal that causes resonance with a tuned wayside circuit at a specific frequency, which can then be detected as a marker for position.

The PSS Transmitter (PSST) generates 10 simultaneous carrier frequencies with independently configurable frequency and amplitude level. They are generated within the FPGA through programmable hardware and the sum of carriers is then sent to a DAC via a DAC Interface Controller module as a continuous digital flow. Each frequency and combined flow is controlled by a high-level module configuration register interface.

Scope

- Programmable hardware design
- Programmable hardware implementation and testing
- Hardware Verification
- Testbenches implementation
- Technical documentation support
- 3 engineers for 10 months duration



Tools and Technologies

- VHDL (Altera Quartus II, FFT MegaCore Function module, Xilinx ISE)
- LabVIEW
- MATLAB
- ModelSim
- Embedded C

Project Management

- Weekly updated project plan and budget
- Weekly status report and documentation update
- Weekly status calls