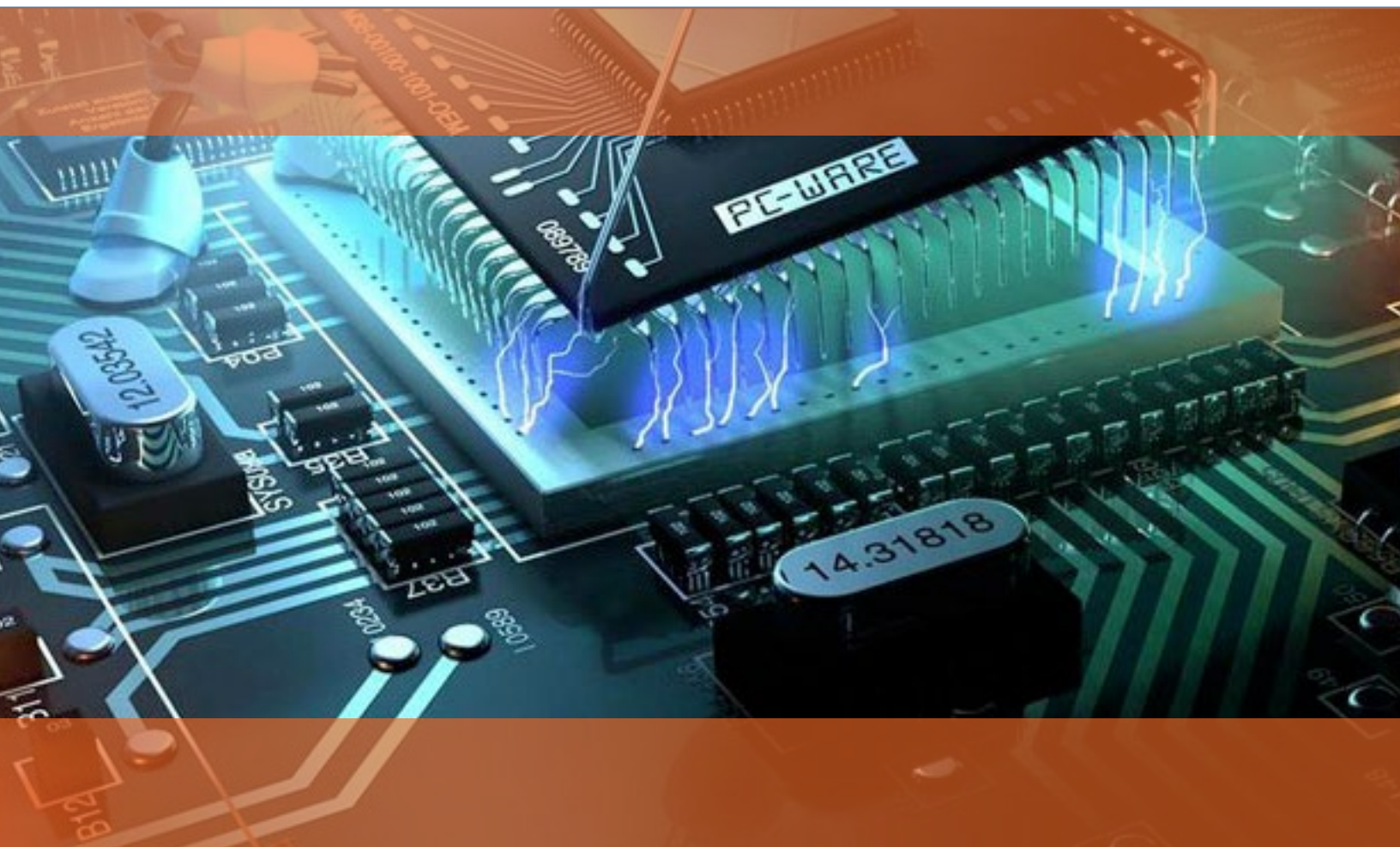




CERN Selects Agnisys IDesignSpec for The TOTEM Experiment Project at the Large Hadron Collider



About CERN:

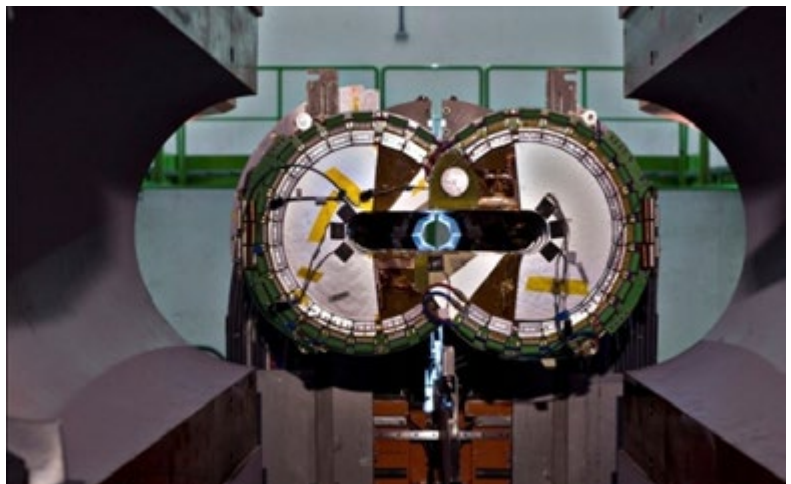
The Large Hadron Collider (LHC) at CERN is the worlds largest and most powerful particle accelerator. Inside the accelerator, two high-energy particle beams travel at close to the speed of light before they are made to collide. This research facility enables some of the most advanced scientific experiments.



Image of the Large Hadron Collider

About TOTEM:

Most of the LHC experiments are on a grand scale, however, TOTEM's (TOTal cross section, Elastic scattering and diffraction dissociation Measurement at the LHC)'s characteristic is its extension over 440 meters. TOTEM's physics program is dedicated to the precise measurement of the proton-proton interaction cross section, as well as to the in-depth study of the proton structure which is still poorly understood. The study of the physics processes in the region very close to the particles beam (forward region) is complementary to the programs of the LHC general-purpose experiments and requires appropriate detectors. That's why, the TOTEM collaboration had to invest heavily in the design of sophisticated detectors characterized by a high acceptance for particles produced in that very busy region. All the detectors of the experimental apparatus detect charged particles emitted by the proton-proton collisions in the IP5 interaction point and have trigger capabilities that will allow an online selection of specific events.



One arm of a TOTEM T2 detector during its installation at interaction point 5.

How CERN used IDesignSpec:

Because of the advanced complexity of the TOTEM project, the team needed the ability to document the design registers and ensure the hardware code and the c-header register files matched and stayed synchronized as design changes occurred during the project.

"IDesignSpec enabled TOTEM to improve efficiency of work time of three separate processes (to date): register specification, documentation and implementation are condensed to a single interaction with the tool saving time and eliminating errors."

Adrian Fiergolski - CERN



The project team documented their registers with the Microsoft Word version of IDesignSpec to capture the register definitions. They took advantage of blocks and the ability to link register definition documents together aligning with the natural segmentation of the design blocks, logic, data, reset blocks, etc. By segmenting the document this way when a specific block changed management and update of the specification was quite easy and even design team members who were not as familiar with the design were able to update the specification. The specifications and the generated code were managed by their subversion source code control system.



Custom Readout OptoRX mezzanine equipped with Altera FPGA

The Benefits Realized by CERN From Using IDesignSpec:

In previous projects, when register changes would occur, it was very difficult to communicate the change accurately to the many team members. As a result, as the hardware and software was integrated in the lab, the team would run into bugs that would take a long while to identify and then resolve. Even though one would think register definition is a simple item, errors in implementing them caused significant project delays. Once the team implemented IDesignSpec and used the HDL register code and C-Header file automatic code generation capability, the errors in implementing registers in the hardware and software were eliminated.

What's more, because the team was targeting both Altera and Xilinx devices in their design, they were able to leverage the variant capability to retain one specification but still generate accurate HDL code for the registers in either the Altera or Xilinx design. The variant feature enables IDesignSpec to capture slightly different variations of the specification in a Master and then generate code for the different variations from the same master.

To learn more about Agnisis IDesignSpec please request a demonstration or an evaluation of the latest capabilities of this advanced tool.

"With IDesignSpec the product was very easy to use and development follows naturally after requirements and documentation; consistency between firmware and software code is guaranteed!"

Michele Quinto of CERN



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