

FPGA technology selection and design for high-integrity applications

- 'Antifuse' FPGAs are the best choice for safety-related applications:
 - They are non-rewritable
 - They are most resistant to Single Event Upset (SEU) soft faults (caused by stray neutrons)
 - They are widely used in aerospace and military applications
- Other types of FPGA are *flash EPROM* and *SRAM*
- Standards for high-integrity FPGAs are in development (IEC 61566 in draft 2011)
- FPGA development has strong similarities with software development
 - Highly complex functions can be implemented, or else FPGAs can just be simple logic solvers
 - Use of high-level Hardware Description Languages (HDL) software tools – design and coding rules necessary – tools are upgraded frequently and may not always be backwards-compatible
 - Use of complex software tools are needed to translate the HDL description, testing and simulation
- FPGA descriptions are sets of interconnected logic functions, which may exhibit hardware malfunctions if not properly implemented
- Monitoring FPGA logic is like monitoring hard-wired logic
- Small feature size in some FPGAs may limit useful life due to electro-migration (50nm feature size may limit life to less than 10 years)