Despite the completely different MCUs, DSPs and fieldbus technologies, the FGC3 is running the software developed for the FGC2. By maintaining the core architecture combined with the flexibility given by the programmable logic and the separation of functionality into different modules, both generations of FGC appear almost identical at the conceptual level. By inheriting technology from the FGC2, the project saved an estimated 30 FTE years compared to starting from scratch.

This chassis allows the simulation of the power converter signals, the connection of debugger interfaces for the 3 processors, the use of test points and measurement of analog signals.

The required 50Hz synchronisation signal, when using the Ethernet daughter board, is injected in a spare pair of the Ethernet UTP cable by the Pulse Injector Box.

The porting and debugging of the low-level functions to the new FGC3 took about 1 year, while for the higher level functions it took another 6 months. By comparison the development of the current operational FGC2 software took twelve years.

As hardware design tools (PCB and FPGA) become more powerful, it has become clear that it is the software which becomes the hardest and most time consuming part of an embedded converter controller development project.

The Ethernet Pulse Injector

WorldFIP Network Interface
- WorldFIP as synchronous fieldbus
- 1.5Mbps multidrop bus
- 122 bytes packets
- No synchronisation pulse needed

WorldFIP Network Interface
- WorldFIP as synchronous fieldbus
- 1.5Mbps multidrop bus
- 122 bytes packets
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Ethernet Pulse Injector
- 4 high ADC channels, 50kHz bandwidth
- 2 16bits DAC channels
- Internal +10v, -10v reference for automatic calibration
- Internal bus matrix for channel path selection

Analogue Interface
- 4 high ADC channels, 50kHz bandwidth
- 2 16bits DAC channels
- Internal +10v, -10v reference for automatic calibration
- Internal bus matrix for channel path selection

Ethernet Switch and Sync Pulse Injector
- WorldFIP as synchronous fieldbus
- 1.5Mbps multidrop bus
- 122 bytes packets
- No synchronisation pulse needed

Ethernet Network Interface
- Ethernet as synchronous fieldbus
- Standard 100Mbps LAN
- 1500 bytes packets
- External 50Hz synchronisation pulse needed

Logically, this is the hardest and most time consuming part of an embedded converter controller development project.