

DIGITAL AUDIO HI-FI SYSTEM

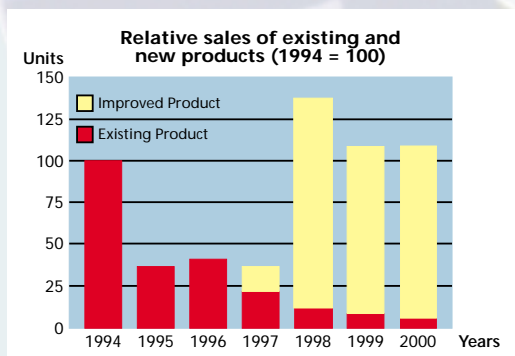
FPGA technology improves performance at lower cost

DPA Digital Ltd has used FPGA technology to produce studio quality Hi-Fi performance from its new Digital to Analogue converter (DAC). Interfacing to a CD player, the new DAC offers true 24-bit performance across the audio range, and provides an improved performance / cost ratio of approximately 200%. Sales of the new DAC are showing impressive growth, and the FPGA technology has opened up new market opportunities for DPA Digital around the world.

DPA Digital is a small company specialising in the design, manufacture and marketing of high performance audio products to Hi-Fi enthusiasts around the world. Skilled in both analogue and digital design, DPA has a reputation for quality and high performance in this extremely competitive industry.

DPA DIGITAL LTD	
Employees	5
Turnover	250 K€/year
Industrial Sector	Audio and video equipment - NACE code: 32
Technical expertise before the project	Analogue and digital design
Technical expertise at end of project	FPGA design

SIGNIFICANT ECONOMIC BENEFITS



DPA Digital is a specialist supplier to a niche market within the audio industry. The company is highly innovative, constantly striving to improve its products to retain market position in this rapidly advancing industry. The adoption of FPGA technology has led to the following major commercial benefits:

- A 50% reduction in component and assembly costs as a result of higher levels of integration.
- Improved market reputation as a technical leader and innovator.
- Return on investment during year 1 of operation of 76%.
- Payback period on the initial investment of 28k€ is estimated at 13 months.

PRODUCT IMPROVEMENTS

The improved DAC contains a total of 9 FPGA devices with approximately 50,000 gates. The solution adopted has led to the following benefits:

- True 24-bit operation across the operational frequency range.
- Higher perceived sound quality / reproduction as experienced by the listener.
- Reduced levels of inter-modulation distortion caused by out of band noise.
- A 50% reduction in component count and manufacturing costs.



How to go about it

CHOOSING THE RIGHT TECHNOLOGY

FPGA technology was chosen to implement the improvements in the DAC for the following reasons:

- Low cost pc-based design tools.
- Low risk solution with easy routes for future upgrades.
- High gate count; large number of inputs and outputs.
- High speed & high performance at modest cost.
- Suitable technology step for the company.

PROJECT OVERVIEW	
Main Activity	FPGA design and implementation
Duration	9 months
Effort	180 Person days
Overall prototype development costs	28 K€

A PARTNERSHIP FOR SUCCESS

The project was conducted by the company as a FUSE application experiment with the support of an expert subcontractor at all stages. The subcontractor provided support in:

- Preparing a feasibility study which analysed the technical and commercial aspects of the proposed solution.
- Training for the company in FPGA design methodology, using a distance learning training tool.
- Writing functional and technical specifications.
- Design and simulation of the FPGA blocks, together with the external circuitry.

The project's effort and cost are listed in the adjacent table

EFFORT & COST		
Task	Company's effort (days)	Subcontractors' costs (K€)
Management	20	
Training	20	1.0
Functional and Technical Specification	25	1.3
FPGA Design and simulation	75	1.3
PCB Design	10	1.0
Prototype testing	30	
Total	180	4.6

YOU CAN ALSO BENEFIT FROM MICROELECTRONICS

FPGA technology provided DPA Digital with the means of improving its products and enhancing its market position. You can also achieve significant benefits by acquiring the right microelectronics technology and utilising it in your product or manufacturing process. You can get help from FUSE to realise this.

FUSE is a technology transfer programme, funded by the European Commission to stimulate the wider use of microelectronics technologies by European enterprises to increase their competitiveness and enhance their economic growth. The demonstrator described here is one of many examples in the public FUSE portfolio covering the whole spectrum of microelectronics technologies and spanning a wide range of applications and industry sectors.

FUSE provides you with:

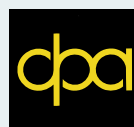
- **Best practice in acquiring specific microelectronics technologies and conducting full development projects through the FUSE portfolio of real life demonstrator documents.**
- **Local training and expert support to plan your innovation realistically and help you conduct your project successfully.**

Further information and support relating to this and other demonstrators can be obtained from the addresses below.

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