

# SYNOPSYS®

Predictable Success

*“We were intrigued to give Synplify DSP a try because it provides the RTL modification capability we needed, and also because it's from Synplicity, a firm we'd come to respect highly after several years of success with their Synplify Pro® product. If it came from a lesser company we might not have considered it.”*

— Michael Adamson,  
Principal Design Engineer,  
Pentland Systems



Synplicity®

Simply Better Results

## Success with the Synopsys® Synplicity® Business Group and Pentland Systems

### Synplify® DSP Success Story

#### Summary

Pentland Systems took advantage of the Synplify DSP software in two ways to capitalize on a substantial business opportunity. The Synopsys' Synplicity Business Group solution first demonstrated that an FPGA was capable of meeting the customer's DSP requirements, and then filled a vital role in the flow that synthesized the actual design. Synplify DSP software introduced an all-important 25% area reduction as well as a 75% performance improvement. Just one month after their initial discussions, Pentland and its customer held a working product in their hands.

Because of Synplify DSP's many benefits for FPGA-for-DSP designs, it has become a vital tool in Pentland's design arsenal. And because it can quickly determine whether specific applications are feasible, it has become just as valuable as a sales and marketing tool.

#### Taking Advantage of a Business Opportunity with Synplify DSP

Pentland Systems is a world leader in the acquisition and synthesis of analog signals. The Livingston, Scotland based firm designs and manufactures a range of signal acquisition and reconstruction electronic products, primarily for military and aerospace applications.

In early summer of 2005 Pentland commenced the design of a multi-channel analog signal acquisition product that offered exceptionally high channel density for the cost, and therefore held great promise for the business. A large customer expressed keen interest in the product and examined it closely. However, they discovered that in its preliminary form it did not yet meet their requirements. Pentland and its customer determined that DSP filtering would solve the problem and that a Xilinx Spartan FPGA had the potential to perform the needed filtering, but they were concerned that the device might not have room for the 16 low-pass filters that were necessary.

Before investing in the incorporation of an FPGA into the product, Pentland needed to find out whether the filters would fit a task that required a DSP synthesis product. “We'd had experience with DSP synthesis in the past, but the tool we used did not offer enough flexibility,” said Michael Adamson, Principal Design Engineer. “One problem was that we could not make modifications to the VHDL code it generated, which is important for introducing the optimizations required for close cases like this. We knew about Synplify DSP and were intrigued to give it a try because it provides the RTL modification capability we needed, and also because it's from Synplicity a firm we'd come to respect highly after several years of success with their Synplify Pro® product. If it were from a lesser company we might not have considered it.”

# Synplify DSP Success Story

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## Synplify DSP Helps in Two Ways: Proving Viability and Generating Results

Pentland has used MATLAB and Simulink® from The MathWorks for many years, which made it very easy to learn Synplify DSP. It took Adamson and his team just two hours to design and synthesize the filters and generate a utilization report, which affirmed that the 16 filters would indeed fit in the FPGA. Now confident that the approach would work, Pentland and their customer moved quickly to generate the solution. The customer created production specifications for the filters and Pentland built them within Simulink using the Synplify DSP Blockset. They then synthesized them into VHDL using Synplify DSP, optimized them further using Synplify Pro, and routed and embedded them in the FPGA using Xilinx ISE software. Just a month after their initial discussions, the team had a working product.

“We applied stimulus signals to the actual board and found that the output was virtually identical to Synplify DSP’s predictions,” reported Adamson. “Our customer was extremely pleased and proceeded to place a volume order for the product.”

## 25% Improvement on Area, 75% on Performance

“The crucial issue was whether the design would fit, and performance was another important factor,” Adamson continued. “Synplify DSP helped us enormously on both fronts. When we first evaluated it against our previous DSP implementation tool, we found that Synplify DSP saved 25% on area, which made all the difference in fitting onto the FPGA. The performance delta was even more dramatic, a 75%

increase. A big reason for these improvements is that Synplify DSP gives us the opportunity to optimize the RTL at the compile stage and perform retiming, which is not possible with the other product.”

Pentland uses a wide range of FPGA vendors and appreciates the fact that Synplify DSP is vendor independent, unlike other DSP tools. With Synplify DSP, they can evaluate how the different FPGA vendors’ products will perform a given task and make an educated decision about which to use.

Adamson was quick to commend Synplicity support as well, both in the UK and the U. S. “In both quality and responsiveness, the support we received was excellent,” he said.

With the success of the analog signal acquisition project in hand, Pentland is now finding that Synplify DSP has yet another benefit as a sales and marketing tool. “Customers often ask us whether we can fit their DSP algorithms onto FPGAs, which was often difficult to say in the past,” explains Adamson. “Now all it can take is as little as fifteen minutes to try their algorithms using Synplify DSP and we have an answer we can count on. Synplify DSP tells us what we need to know to avoid jobs we cannot do, and to confidently accept jobs we can do. That benefit just accelerates the return on investment that we’re already experiencing from our analog signal acquisition win and all the related business we’re seeing. Synplify DSP has quickly become an integral part of our FPGA design suite, and we highly recommend it to any other company with needs like ours.”

To learn more about the Synplify DSP product, visit <http://www.synplicity.com/dsp>.

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