IMEC implements efficient image compression for ESA

In 1995, IMEC started a collaboration with ESA/ESTEC on the efficient implementation of advanced image compression algorithms for space-borne applications.
This collaboration is now yielding fruitful results.

The performance of space-borne image sensors is rapidly improving. As a consequence, image sensors produce increasingly more information and hence, require the availability of dedicated compression algorithms, reducing the necessary communication bandwidth and storage capacity. Although image compression algorithms exist for a long time (think about the popular JPEG on the Internet), compression in space-borne applications poses additional constraints:

- the compression must be scalable to the nature of the images (visual, infrared…) as well as to the immediately available bandwidth;
- the compression must be applicable to images as produced by sensors aboard satellites that are flying over (namely with high resolution and continuous scan or "push-broom" operation mode);
- the implementation of the compression technique requires minimal electrical power consumption.

IMEC has a worldwide reputation in the area of designing cost-efficient architectures for complex signal processing algorithms and participates actively in the most important inter-national standardization committees for image processing, such as JPEG (Joint Photographic Experts Group), MPEG (Moving Picture Experts Group) en CCSDS (Consultative Committee for Space Data Systems). IMEC, together with ESA, selected a wavelet-based compression scheme. This relatively new technique has a larger implementation complexity, but it fulfils the specific requirements for space-borne applications.

A first important result was achieved in 1998 with the realization of the OZONE chip, the first compression chip for wavelet-transformed images worldwide (photo 1). Later, the FlexWave-II has been developed, which is superior to the OZONE chip in many respects: the implementation targets a much higher processing throughput (>10 Msample/s) and handles multiple wavelet configurations. During spring 2002, the FlexWave-II has been demonstrated for the first time on an FPGA (Field Programmable Gate Array)-based platform (photo 2). Currently, the development of a radiation-hard chip is being prepared.

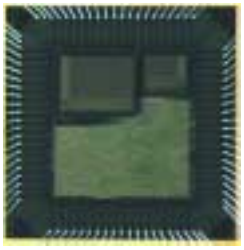

Photo 1: The OZONE chip, worldwide the first compression chip for wavelet-transformed images

Thanks to this collaboration, IMEC plays worldwide a leading role in the area of implementation of advanced wavelet image compression systems. The expertise is available to Flemish companies, enabling them to increase their lead over their competitors.

Photo 2: The FlexWave-II architecture demonstrated on an FPGA-board